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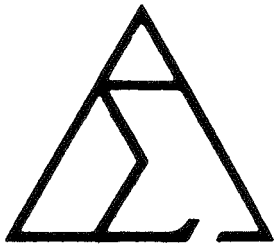

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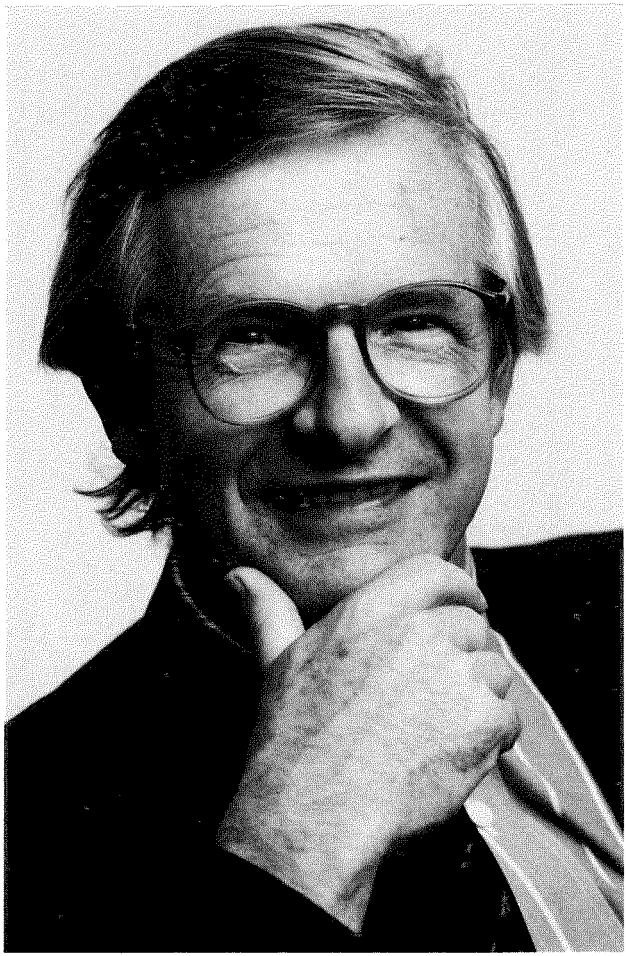

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John F.M. Ross, F.F.A., F.I.A.A.

1. INTRODUCTION

1.1 As we move towards the nineties, this address is primarily forward looking - it points towards objectives for the Institute, proposes methods of reaching some of them and thus provides a vehicle for members of the profession to comment on, and thus to influence, both the objectives and the structures through which they might be attained. Before that, like any self-respecting actuary, I look back to consider briefly our sojourn in the eighties, to see what might be learned from that experience.

1.2 It is not unusual to find that two actuaries disagree on a matter of professional judgement, but it is disquieting to find that our Presidents of 1980 and 1981 could not even agree on the beginning of the decade. Allan Geddes, in 1980, said "...Institute .. enters a decade in which it is destined to make some exciting advances." David Kimber found exhilaration in 1981 at the beginning of a new decade - "I .. subscribe to the view that the present decade began on 1st January, 1981 ..." As I have no wish to arbitrate between two such eminent predecessors, I chose the first six words of paragraph 1.1 above with great care.

1.3 They were, of course, both correct in anticipating that the Institute would make giant strides in the eighties. In that time our examinations have become well-established, actuarial involvement in general insurance has become more and more significant, our new Code of Conduct has been introduced and has been well accepted, Professional Standards have been issued for reports on life offices and on defined benefit superannuation schemes, as well as a note on professional practice in general insurance, submissions have been made to governments and commissions on actuarial matters, a compulsory professionalism course has been introduced and the standards of professional competence and behaviour of the Institute have been well maintained. We can reasonably take pride in the work that the profession has handled in the rapidly changing circumstances of the eighties.

1.4 The pace of change in the nineties will not lessen, though the experience of the eighties may provide a lesson through which we may be able to improve the

results of the changes in the nineties, whatever they may be.

(a) Nationally, we could concentrate on structure, not on detail. Governments in the eighties have tinkered endlessly with a poorly-built retirement incomes structure, but without attention to the foundations of the system their efforts simply add complexity to an unsound base. There is some hope that the life insurance changes proposed in the budget may lead to a better structure there. As for health insurance and workers' compensation, it is difficult to discern any structure at all.

(b) As an Institute, we cannot forecast which areas of our activity will require most attention in the nineties. We can, however, ensure that our structure provides us with the capacity to react quickly and efficiently to the demands placed on it.

Both these subjects are considered later in this address.

1.5 I should acknowledge here that I lay no claim to originality - the thoughts here have arisen from discussion with members of this Institute and of other actuarial bodies. It is one of the joys of membership of our close-knit profession that ideas are freely given and I am grateful to all those who have allowed me to benefit from their thoughts from the days of my initiation into the actuarial mysteries.

2. THE ACTUARY AND THE INSTITUTE

The Actuary

2.1 Current conservation politics provide an analogy which helps to answer that question with which actuaries wrestle from the earliest days of their involvement in the profession - what is an actuary?

2.2 The definition of "conservation" used by the International Union for Conservation of Nature is:-

> "The management of human use of the biosphere (that part of the environment in which living organisms occur) so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations."

2.3 Clearly, the actuary is a financial greenie. The greenie is concerned with the preservation of our natural heritage of forest and mountain; the actuary is concerned with the preservation of our institutional heritage of financial forest and monetary mountains, represented by the insurance companies and superannuation funds which pass into his care from previous generations. We all have a responsibility to enhance the heritage handed on by our fathers; actuaries have a particular obligation to hand on in their turn the financial institutions for which they have been trustee for a time.

2.4 The conservation of our financial institutions, like the conservation of our natural resources, requires the avoidance of the short term exploitation of assets built up over long periods in the past. It is only too easy to use for short term gain accumulated funds, or natural assets, generated over many years. Of course there are times when it is proper to use reserves to meet adverse circumstances, but it is not always easy to recognise as they occur the difference between temporary market pressures and long term changes in the environment. Whether assets are financial or natural, caution is needed in making major changes which affect them. However, conservation is not a passive process; it requires constant attention to the changes which are occurring with a frequency which is increasing as quickly in the financial environment as it is in the physical

environment. It also requires the realisation that some of the changes will demand positive and swift action by those who have undertaken the duty of conservation.

2.5 To enable him to carry out his conservation work, the actuary acquires skill, knowledge and techniques which fit him for a wide range of tasks. Nonetheless, the essence of the actuary's work concerns the security and structure of financial institutions. We should not lose sight of that in reaching decisions about our tuition and examination systems and in our external relations with other professions and government agencies.

2.6 One of the cornerstones of the actuary's conservation activities over the years has been his use of the concept of matching assets to liabilities. While the financial structure was based on future matched transactions, it would clearly be sound in the long term. Inflation has complicated this picture in recent years; inflation is the enemy of matching, because its origin lies in the absence of matching. Other things being equal (an unusual situation), an increase in the quantity of money is likely to lead to an increase in the money price of goods and services - i.e. a mismatch occurs between money and the products which it can buy, leading to a fall in the real value of money. Can we hope that a government which espouses so keenly the cause of environmental conservation may apply the same enthusiasm to currency conservation?

The Institute

2.7 The Institute must know its objective. No plan can be made unless there is a desired outcome. The architect cannot prepare the plans, nor the actuary design his report, without knowledge of the client's intentions; no more can Council make coherent major decisions about the Institute's future unless there is agreement amongst the members about the purpose of the proposed action.

2.8 Despite the existence in our Memorandum of Association of " .. objects for which the Institute is established ..", there is no unanimity on our objects. The prime objective (Clause 3(a)) is -

> "To increase the value to the community of the actuarial profession."

The Planning Committee of 1988 summarised the remaining objectives by adding -

> "To safeguard the interests and welfare of members, to further their advancement and to promote whatever may lead to the improvement of their status."

2.9 Earlier, in his Presidential Address for 1985, Tim Jenkins had proposed a different objective -

> ".. to apply our skill and judgement to bring risk, time, money, the public interest and the position of the individual member of a financial structure into balance."

Tim suggested that this balance was what we meant by "actuarially sound". In the discussion on Ron Hunter's Address last year, he explained the contrast between these objectives by ascribing his own wording to the profession and the Planning Committee wording to the Institute.

2.10 This distinction between the profession, or the actuary, and the Institute is very helpful in clarifying the aims of the Institute. It was not evident in the effort of the 1989 Planning Committee, (of which I was a member), to propose objectives for the Institute:-

" 1. To meet the needs of the community for a body of people who are educated in probabilistic mathematics and its application to financial problems at the highest level and who adhere to the highest standards of professional integrity.

2. To further the advancement of actuaries, to promote whatever may lead to the improvement of their status and to safeguard the interests and welfare of members of the Institute."

2.11 This tries both to define the job of the actuary and to express the aim of the Institute. Better to separate them - I would accept Tim Jenkins's definition quite happily for the actuary, but we need to think again about the Institute. Our present aim, "to increase the value to the community ..", seems to

me too self-centred, concerned as it is with value. It is certain that our Institute will flourish only if it does serve a purpose which is seen as useful by the community in which we live, and that seems to me to be expressed better by the opening words of the above - "To meet the needs of the community ..", emphasizing needs rather than value. The objective must concentrate on the maintenance and improvement of our standards of work and behaviour, as a consequence of which our influence and status will grow, rather than setting out to improve status and safeguard members' interests as a prime objective. We should also aim to protect members acting properly and to make more widely known the abilities of actuaries. In today's world it is not enough to be useful - one must be seen to be useful, and the Institute has an obligation in that respect which cannot be met solely by the efforts of individual actuaries.

2.12 We also have obligations. We have some privileges as members of the actuarial profession. That puts upon us an onus to use our skills for the benefit of our fellow-citizens in those areas where we have special knowledge or experience and where our advice or comments would consequently be expected to have particular value or relevance.

2.13 This leads me to propose that our objective should be:-

(a) To meet any needs which may exist in the community for a body of people capable of providing actuarial services.

(b) To maintain and to enhance the standards of knowledge, ability and professional conduct of members.

(c) To provide an actuarial view on relevant matters of public interest.

(d) To protect the professional interests of members.

In that order.

2.14 Having agreed on our objective, we must have in existence plans towards its attainment and the machinery by which these plans can be carried out. In the rest of this paper, my own objective is to

consider some aspects of (c) above and to put forward changes which Council has now agreed to implement in the machinery by which our current and future plans may be carried out. That is not to deny that (a) and (b) above are more important; it is to recognise that major steps have already been taken in the eighties towards the achievement of those objectives. Since we started to carry out our own examinations, we have introduced our new Code of Conduct and the successful Professionalism courses have been made compulsory. We also have, in addition to the well established Macquarie course, the University of Melbourne and A.N.U. already engaged in actuarial education, other universities eager to be involved, and the prospect of significant strengthening of the Melbourne facilities. I believe we do have to think more about continuing post-qualification education and about the encouragement of research, but a Presidential Address has to stop somewhere and the new examination structure will need some time to bed down.

3. THE INSTITUTE'S COMMITTEE STRUCTURE

3.1 As members have been informed through the Presidents' Newsletters, (another innovation of the eighties), Council has accepted, subject to some modification, a recommendation from the Planning Committee to re-organise our committee system, particularly in relation to communications between Council and Committee, and to the number of committees. In recent years our committees have carried out very significant work for the Institute, and as an Institute we can only be thankful that we have such a large number of members who spend time and thought on matters which may have a fairly remote connection with daily activities, but are essential for the work of the Institute. Without this level of commitment, our Institute could not function at its present level. It is important, therefore, that we as an Institute should continue to deserve that level of support from members.

3.2 Our committees have "just growed" since the significant reorganisation which was carried out by David Kimber as President ten years ago. The 1989 Institute Calendar lists 39 committees. Some of them have in turn a number of sub-committees and task forces devoted to specific aspects of their work, whilst others have "one-off" jobs and meet infrequently. Some carry out functions independently of all other committees, some have work which touches on the work of several others. Some need contact with Council, others can work on their own. Some have need to react quickly to external events, requests or influences, others have much longer term perspectives. Very few include more than one Council member.

3.3 The efficiency of this system was one of the matters on the agenda of the Planning Committee when I, as President Elect, became its convenor. Tim Trahair had referred to our committees amongst other administrative matters in his Presidential Address and had been instrumental in setting up the Planning Committee. The Committee's view broadly was that the Committee system had recently been working reasonably well because of the efforts of those involved and despite the structure, that communication between Council and committees was inadequate, and that the structure may not withstand increasing demands on it. They also felt that there was imminent danger of Presidential overload and that some means should be found to spread the President's workload more broadly.

3.4 When visiting the U.K. this year, I therefore took the opportunity to talk to some of those involved in the organisation of the Faculty, the London Institute, the Society and the Canadian Institute (in order of visits). There were some quite wide differences, but it was evident that Council members played a much greater part in committee work than our Council members do, and that through either Vice Presidents or Honorary Secretaries, some of the work handled by our President is delegated in these organisations. It was also clear that in U.K. more work is handled by full time staff than in Australia, but that is partly a function of size.

3.5 The proposed solution, now accepted by Council, was to reduce to eight the number of committees which report to Council, to ensure strong Council representation on each of these committees, and to have two Vice Presidents to replace the President Elect.

3.6 It is intended that the Council Committees should act through working groups which could be sub-committees or, for short-term activities, task forces of up to four people. These groups would carry out activities on behalf of the Council Committee, which would be responsible for -

(a) setting up appropriate groups for each task and disbanding groups whose task was completed,

(b) ensuring communication amongst the groups,

(c) ensuring that relevant Institute policy was made known to the active groups,

(d) communication with Council.

3.7 The two Vice Presidents would in effect be President Elect (Senior Vice President) and "President Elect Elect" (Junior Vice President). Each Vice President would take an active interest in the affairs of four of the eight Council Committees and would be available to act in relation to the affairs of those four Committees on behalf of the President. The Vice Presidents would also be members of a new Committee to be known as the Issues Committee, which would have the function of identifying issues for consideration by the Institute and putting these issues with suggested priorities before Council.

3.8 The eight major committee groupings would be :-

Administration - all internal matters to do with the Institute.

External Relations - all matters concerning our relations with other bodies.

Education - all aspects of education.

Subject committees - Investment

Superannuation

Life Insurance

All other insurance

Issues - forward planning.

Certain committees would report direct to Council or to the President for particular purposes such as examination results and aspects of professional conduct.

3.9 The intention behind all these changes is to enable Council to give proper consideration to the major decisions which have to be made by the Institute and to improve communication between Council and working groups. There are two potential problems which have been put forward.

(a) Earlier mention was made of the enthusiasm which members of the Institute bring to the work which they do for it. The thought has been expressed that members might feel less enthusiasm for a committee which may be seen to be one step removed from Council.

(b) The introduction of an extra layer of communication between Council and working group could lead to delays in putting recommendations before Council.

The second seems to me to have a little more substance than the first, but we have, in effect, experience of this structure in operation already, in the shape of the larger present Committees (Life Insurance, Superannuation, General Insurance) which presently operate through a number of small sub-committees who carry out specific tasks for the Committee. These seem to work well in practice and indeed their success was one of the factors which influenced the decision. Further, the idea behind the new approach is to enable Council to delegate more decisions to Committees, and though it remains to be seen exactly how this will operate in practice, the result should be to speed decision making.

3.10 All Committees and working groups are Committees of Council and as such all minutes of meetings will be available to Council, as they have been in the past. I believe this structure will make it possible for the Institute to tackle more of its agenda, and to tackle it more efficiently. It is in practice often difficult for the Institute to comment on proposals put before it; time is usually limited, those involved have to act quickly, and on occasions it has simply been impossible for comments or proposals on major matters to be approved by Council before they have to be submitted. There has been de facto delegation to Committees. By ensuring that a significant number of Council members is involved in each Committee, it becomes possible for this delegation to occur while retaining useful Council input and involvement.

4 SUPERANNUATION STRUCTURES

4.1 It will soon be forty years since my first involvement as an actuarial student in working with superannuation schemes. For much of that time the actuarial profession has worried doggedly at a number of bones, and so has the wider community. For example, taxation - the 1947 Act in U.K. was then becoming effective, restricting lump sum benefits in approved schemes to the commutation value of one quarter of the pension. For example, national superannuation - flat rate, earnings related, means tested, integrated - they have all been tried and found wanting. For example, transfer values - just a few weeks ago we considered a thoughtful paper on that subject by David Edwards, though others had been produced in the past. In all of these areas and in other aspects of superannuation there has been little progress, though in many of them there has been no shortage of changes. The main effect, with the perspective of 40 years, has been an intolerable increase in complexity. Little seems to have improved. Why is this so? Why do we have so many changes and so much complexity to little effect? Can we learn anything which will help us in the future, because more changes are certain? What can our profession do?

4.2 There can be no doubt that one cause of our difficulties is the way in which our politicians feel obliged to act under our electoral system - they understandably place a great deal of weight on the result of the next election and they automatically disagree with any proposal of their political opponents. This is in itself enough to cause problems, but they are compounded by the tendency to treat superannuation structures as the putty to be used to repair the broken window of some other building. Two recent examples: one, the three per cent productivity/union schemes, introduced not to solve long term structural problems of aged care and investment, but to provide a quick fix to an industrial relations problem; two, the tax on superannuation fund contributions, introduced not to encourage superannuation - far from it! - but to put a billion dollars or so into current budgets instead of greater amounts into future budgets. The result is an unduly complicated set of rules and structures from which earnest efforts are being made to build a retirement income policy.

4.3 Another possible reason for our lack of progress is our own close involvement in the complex detail of superannuation work and our concentration on working for individual clients. For most of us the main elements of our work relate to the valuation and administration of superannuation funds and we are quite properly attending to the needs of our clients or employers in these areas; thus, in our comments on proposals from arms of government we tend to have regard to the efficient operation of a given structure, not to the structure itself. We are also constrained at times by attempting to put forward proposals which we think likely to be acceptable to the Government of the day, i.e., which are "politically practicable". In matters of basic structure, that is misguided. Governments come and go, and ideas change (who would have thought that the Hawke Government would call on the R.A.A.F. after pilots had withdrawn their labour?) We should determine our attitude to such basic questions as means testing and the payment of superannuation in pension form without being seduced by "political practicalities"; our attitude should be based on a logical approach to the achievement of defined objectives, and we must avoid the temptation to align with current fashions, political parties or business interests.

4.4 The form of the invitation to comment may in itself be another cause of problems. Often - in fact usually - comment is sought at very short notice. A recent example was the Cass Report, published in December 1988 and on which comments were sought by the 6th February 1989 - we had a few weeks during the holiday period to comment on major issues which could affect superannuation policy for many years to come. The Institute took this opportunity, and submitted an excellent response prepared by the Superannuation Committee - but it had to respond on the basis of an agenda set by the Report, not on its own terms. At least in that case the Institute did have an opportunity to comment on policy issues; in others the policy has been presented as a fait accompli and comment has been sought on operational aspects only.

4.5 It is not within our power to change the electoral system. It is however possible for us to emphasize the need for long-term thinking, to put positive proposals for sensible superannuation structures, to persist with pressure for political bi-partisan attitudes to superannuation. As an Institute it is something we can and should do in meeting community needs. We have performed well a useful function in contributing to consideration of tax and I.S.C. thinking on the

regulation and administration of the unsatisfactory structures which have been erected, but we can do a great deal more to meet the needs of the community by patiently putting up practical proposals over months and years for structures which will stand the test of time. In meeting these needs, we can enhance the reputation and standing of the Institute and thus benefit its members as well as the community at large. Maybe one of the today's new students would see results after 40 years.

4.6 To achieve this end we must do more than react to proposals; we must take the initiative in setting out policy positions and help to shape the early part of the national debate and to influence the thinking which takes place when proposals are put forward. That implies the development of a set of basic principles for superannuation which can be used as the foundation on which proposals can be built. That in turn demands time and effort by members in drafting and seeking comments on these principles and on preparing and publicising a policy statement.

4.7 The comments above have related to one part of the financial aspect of care for older people - there are many other aspects, including taxation, health care, housing and ancillary services. The Institute should confine itself to those areas in which actuaries have special competence and make clear that it is doing so, whilst pointing to the need to consider how these other aspects may affect the position.

4.8 The next section points out some of the less logical features of our present retirement incomes structure, with the aid of a well-known mathematician, C.L. Dodgson.

5. ALICE IN SUPERLAND

".. I know who I was when I got up this morning, but I think I must have been changed several times since then."

Alice in Wonderland

Alice was beginning to think the party was really quite dull till the Mad Hatter spoke.

"Why is superannuation?" he asked, "and why should I do it?"

Come, we shall have some fun now! I'm glad they've begun asking riddles, she thought, and I know the answer to that, but I must be careful .. because it is a little difficult to understand, and they are a little mad.

"I believe I can guess that", said Alice, with some severity.

"Do you mean that you think you can find out the answer to the riddle?" said the Mad Hatter.

"Exactly so," said Alice.

"Then you should say what you mean," the Mad Hatter went on.

"I do" Alice hastily replied; "at least, I mean what I say."

"It's because people want to live comfortably for as long as they live, after they stop working."

She felt confident she could deal with this. From the corner of her eye she saw the March Hare busy stuffing the Dormouse into the teapot.

"You mean it goes on and on till they die?" asked the Mad Hatter. "I think I should do it then."

This is a trap, thought Alice - she knew most superannuation came in one lump - so she just said, "Sometimes" - rather haughtily - but the March Hare was taking an interest.

"But if it doesn't go on, how are older people going to live comfortably - specially when they can't look after their own affairs?" he was looking at the Dormouse, dozing happily in the teapot - (and wondering what he would do with a lump sum).

This is getting harder, thought Alice - maybe they're not as mad as I thought.

"Superannuation is good, and the Queen of Hearts wants everyone to have more of it. In fact, if you don't buy any for yourself, she'll give you some."

The Mad Hatter looked at her thoughtfully.

"Why should anyone buy it if Her Majesty will give you some? Tell me that!" There was a look of triumph on his face.

"Silly goose", thought Alice - but aloud she said, "It's obvious - the Red Queen just gives you a little superannuation, not <u>really</u> enough to let you live comfortably, like <u>real</u> superannuation."

She saw the next question coming from the look in the Mad Hatter's eye, and quickly added, "Of <u>course</u> she's rich. She raised money from the other cards - she's already cut off several heads to encourage everyone else to pay. In return she has given them a magic superannuation pudding, which is very curious. The more money she takes from the cards, the greater will be their magic superannuation pudding when they retire."

"How sensible and generous of Her Majesty!" exclaimed the Hatter. "So the rest of the pack can save their own money and make their own real superannuation if they wish - that must be what Her Majesty meant when she said she was encouraging people to have their own superannuation."

This was getting a bit tricky for Alice, because she knew something of The Rules.

"Not exactly," she began hesitantly, "not exactly, because if you save enough to let you live comfortably the Queen doesn't give you any." What a pity she felt obliged to tell the truth, because it <u>did</u> sound a little odd.

"Nonsense!" It was the March Hare butting in. "If the Queen wanted to encourage people to create their own superannuation, she wouldn't take <u>her</u> superannuation away from the ones who did it for themselves."

The March Hare was annoying Alice - it always seemed to seize an opportunity to make her seem silly.

"It's not nonsense", she said crossly. "The people who have real superannuation don't need any from the Queen, because they have enough anyway."

There was a moment's silence, and Alice thought she had won the day; then the Mad Hatter spoke.

"But I can't live comfortably now," said the Hatter, (and Alice thought his clothes certainly looked very worn), "so I couldn't possibly sell enough hats to save enough to be able to live comfortably after retirement. Perhaps I could save enough to add to the Queen's pension".

He looked thoughtfully at Alice. He hadn't asked a question, but Alice knew he was waiting for an answer - and as I've said, Alice knew something of The Rules. There was a pause in the conversation.

"I'm afraid it doesn't work like that", she said reluctantly, "even if you have quite little superannuation, the Queen takes hers away. But if you sell more hats and become more productive you can get Productivity Superannuation. Of course, you will have to join the pack, or at least carry a card."

The Hatter reacted in what Alice thought an overdramatic fashion. Jumping from his chair and yanking on the Dormouse's tail, he shouted, "That settles it - no superannuation for me!"

"Don't go" - Alice had to shout - she knew he should have superannuation, because the Queen's pension would never be enough - "You don't pay so much tax on superannuation." Mad he may be, thought Alice, but he knows what tax is.

She was right. The Hatter pulled up short. The March Hare's ears stood tall. Even the Dormouse opened his eyes and raised his head from the teapot. This will persuade them, thought Alice. She had their full attention.

"Less tax?" they said in chorus.

Alice became a little nervous, thinking about The Rules, and about telling the truth, but she began confidently.

"Yes, you pay less tax on superannuation", she said, and paused. "You see, the Queen wants people to save, because that makes more money available to invest, lowers interest rates, reduces consumption, helps the balance of payments, encourages entrepreneurs ..."

"Stop all that", interrupted the Mad Hatter - just as Alice was warming to her subject. "I don't care about all that - you were saying I could save tax - tell me more about that."

"I didn't say you could actually save tax", said Alice, "I said you paid less tax when you received your superannuation".

At this point she began to turn pink. "But you do have to pay tax on the money you put in, and you do pay tax when it's growing, and you do pay tax when you take it out, and you do have to keep The Rules."

They looked doubtful.

"What is, 'The Rules'?" asked the Hatter. "Is it like keeping wicket, or keeping left?"

Alice couldn't help smiling, but she was still embarrassed.

"No, it's Acts of Parliament, and Regulations, and Guidelines, and Tax Rulings, and rollover and ADF and ISC and 23F - but mostly it's Press Releases which are only pretend Rules, but if you don't obey them the Queen says 'Off with your head!' - and it changes every year when the Queen says "Change!", but she doesn't tell you what the change is till the end of the year - and sometimes she doesn't tell you at all till the change has been made, and sometimes she tells you to pretend the Rule was made three years ago."

"I think I'll forget about superannuation", said the Mad Hatter. " You'd have to be nuts to get mixed up in that lot!"

6. CONCLUSION

6.1 It may seem impossible to reconcile the present superannuation wonderland with any kind of logical structure, but I believe we have a better opportunity now than we have seen in living memory. The reason is the change in thinking discernible from the Minister for Social Security's statement entitled "Better Incomes; Retirement Income Policy into the Next Century" published in August. This statement recognises the benefits of long-term savings for superannuation, links superannuation with investment, and says, "The key to providing better incomes for the growing number of older people is increased saving." The Government recognises the need and the objective; it is open to us to show how that can logically be achieved.

6.2 To do that, we need to do more than produce a piece of paper with some good ideas expressed on it. We have to present our ideas in such a way that they can be fully understood by our audience - we have to understand the objectives and feelings of our audience - we have to "walk in their moccasins" so that we share their experiences and thus can appreciate their view. In short, we need to pay much more attention to the presentation of our proposals than we have done in the past.

6.3 This is not intended to imply that we need glossy booklets and multi-dimensional videos - what we must do is demonstrate to those we seek to influence how our proposals will meet their needs or objectives. This may call for an expansion of the role of the Public Relations Committee, which has recently produced a range of recruiting aids for the profession and has otherwise concentrated on gaining media exposure for the Institute. We have achieved increasing success in both those areas, and that work should be continued,but in addition we should give thought to the methods which might be used to help decision-makers to appreciate our ideas and to adopt them - not for the greater glory of the Institute, but because our training and experience provides us with skills which could and should be used to benefit our fellow-citizens.

6.4 Another way in which members of the Institute may be able to influence debate has been put forward as a result of discussion on the form of our biennial conventions. Amongst several suggestions, one has been that in inter-convention years, we could hold simpler, shorter conventions, devoted to one subject, very much on the lines of the conventions which have been run so successfully by the General Insurance Committee for some years now. They would be intended primarily for those actuaries and others who were professionally involved in the field and would assume those attending were well versed in the subject. Professionally they would take some of the load which is now becoming so heavy at biennial conventions, (there were twenty three separate papers for the Cairns Convention); they would also contribute towards the continuing professional education of members. In relation to proposed objective (c) in paragraph 2.13, they would serve the purpose of enabling actuaries to put forward their views amongst a group of those professionally interested. Financially, the aim would be to make a small profit for Institute groups. There seems in short to be much in favour of the proposal, the only drawback being the addition to the volume of work being handled by members of the Institute.

6.5 These thoughts are put forward in the context of superannuation, but they apply equally in other areas in which we are involved - life insurance, general insurance, friendly societies, health insurance, investments, workers' compensation and others. We can make a pretty good sausage, but we mustn't forget the sizzle!

SYDNEY

MR. G.B.K. TRAHAIR: My objectives this evening are to open the discussion on a short by challenging Presidential Address, to encourage Iain to be an active president and get the new vice presidential structure bedded down and to support his thought of getting the Institute to play a greater role in providing actuarial views on current relevant issues.

Iain in his introduction comments on things we have achieved in the 1980s and considers how that experience can help us do things better in the 1990s. Some of the achievements are well established exams, greater involvement in general insurance, new code of conduct, professional standards, heavy involvement in submissions to the Government, a compulsory professionalism course and well defined standards of professional competence and behaviour.

Iain comments on standards of competence and that is an area where we have some way to go. We have set up an excellent framework with the compulsory professionalism course and the senior actuary role. At this stage the senior actuary role is more a concept than an active function and we could strengthen the role by establishing guidelines and encouraging greater interaction between senior actuaries.

Iain discussed our role as "financial greenies" with the emphasis on preserving the financial health of financial institutions we advise so we hand them over to the next pair of hands in good condition.

He talked about avoiding the short term exploitation of assets which might have been built up over a long period. I can see at least two problems for us, one in the life office area and another in the superannuation area.

In the life office area there has been a significant change to unbundled contracts in the last decade which is presumably releasing some estate in the longer established companies. It is not clear how that is being used but I have the impression that there is still too much focus on encouraging a costly distribution system for delivering savings products. My concern is that too much of the estate released may be being used for that and for preserving the life office into the future and not enough for the benefit of policyholders.

In the superannuation fund area we have seen in the last 5 years significant surpluses in many defined benefit funds. We see companies moving to capture those surpluses and to reduce funding standards by contribution holidays or by adopting weaker funding methods like projected unit credit or FAS87.

While Iain sees a need to avoid short term exploitation of assets in the financial institutions we advise, that exploitation is going on pretty actively in two of our major areas of work.

Iain developed a definition of the Institute's objectives which in essence is to meet current community needs, to maintain and enhance standards, to provide an actuarial view on relevant matters and to protect the professional interests of members.

Was he proactive enough in that definition?

One of our essential roles is to add value and to be seen to add value and that goes beyond merely meeting current community needs.

If we do not ensure that we are seen as experts in areas where we do have expertise then there is the danger that we will vacate those fields to more aggressive professions or to skilled non professionals.

Let me question also whether we are doing enough to enhance standards. In the senior actuary role we could be more active. We should be enhancing our standards by moving towards a continuing education programme. Also we need to look more closely at the desirability of having specialisation or practice registers.

The last opens up the possibility of increasing the role of non fellows to meet some of the professional certification needs of our clients. We have very big demands on our resources (particularly the education process) and if we can get work done by non fellows we can free up resources and can probably provide a cheaper service to the community.

I am very much in support of the new committee structure discussed in the paper which we voted into place tonight in the amendment to the articles

When I joined Council I did not think I had enough involvement; I was not sure what I was doing and was concerned that I was not adding value. When I became President Elect I knew there was a large job in a year's time and realised I should start planning for it. I should have started as soon as I became President Elect but started about 6 months later. When President I had a very busy and interesting year but felt there was little scope for new initiatives by mid term. During my 6 years on council I contributed most over about 18 months, the year as President and about half a year as President Elect.

The new structure will mean not only that members becoming president will be more effective because they will go through a junior, senior vice president role but also that council members can play a more effective role because of the major committees.

Section 4 of the address deals with superannuation structures and the problems of politicians with short term horizons, of the absence of a bi-partisan view amongst the politicians and of the ability of politicians to tinker with structures and end up with complex regulations and no real retirement income policy.

Iain says we should be more proactive and put forward a logical approach to achieve defined objectives. I could not agree more but the major problem is to know who is defining the objectives. What is really missing in the retirement income policy area is somebody to set down a sensible set of objectives; we can play a role but we can not do it alone.

Section 5 dealt with Alice in Superland. He talked about 3 major issues; lump sums versus pensions, means tested social security and an absence of a national retirement income policy. Iain wants more emphasis on pensions and less on lump sums, wants to get rid of the means test and would like to see a national retirement income policy.

Social security systems have been a major problem for many countries and the root of it has been the lack of a funding approach. Over my career it seems that politicians with support from others in the community and particularly economists, have gone to great lengths to promise voters more social security in retirement than they were willing to pay for during working life. They have done this by adopting "pay as you go" schemes. They have not thought about the problems that are facing us now when the ratio of those in retirement to those in the work force is declining; actuaries probably should have been much more vocal about that in the past.

In Australia the problem has not been so severe as in other countries partly because of the ratio of retired to active is not as high and partly because of the means test. My thoughts about the means test have gone full circle several times over the past 20 years. I did not like it as a superannuation professional because of the problems of designing private sector superannuation funds. However it seems a good idea because it holds down social security costs. Currently I feel a means tested aged pension system is better than an unmeans tested aged pension system which is unfunded.

Productivity superannuation is extremely interesting relative to the social security system. It is tantamount to a national superannuation scheme for the employed. The design is pretty

primitive. It is an accumulation fund with lump sum focus and no indication of whether it will meet needs. But it is fully funded and the assets are not controlled by the Government. It also helps to keep down living standards now by diverting wage increases into savings.

Perhaps productivity superannuation is going to become national superannuation. If so should we start to focus now on how we can improve productivity superannuation, e.g. move to a better design. Perhaps the age pension should then become a welfare benefit for the needy, the unemployed and the disabled.

Let me close more or less as I started. Iain thank you for your Address. Be active, get on with the new structure. You have the support of the membership.

PROFESSOR J.H. POLLARD: I would like to begin by congratulating Iain on his election as our President. We have had a very successful year under Ron Hunter and I know we can look forward to another with Iain at the helm. Indeed, by the end of his term, we will have had two Scotsmen as consecutive Presidents, so our finances should be in a very sound position!

I recall that the first time I met Iain was in the late 1970s when we both served on Council. This was shortly after he arrived in Australia and it is clear that he has served our Institute from the very moment he decided to make this country his home.

One thing which is emphasised in our President's Address is the importance of setting objectives and assigning priorities. In some ways the 1980s were the decade of education development for our Institute and I believe that most of many goals have been achieved. There are some education issues which have arisen more recently and which require decisions. In particular I refer to:-

1) Making available Actuarial Studies to universities in addition to Macquarie, Melbourne and the ANU.

2) The teaching of Actuarial Studies to students from neighbouring countries.

3) The proposed Diploma program at Macquarie University.

4) The proposed Masters program at Macquarie University.

5) Continuing professional education.

Each of these requires resources and we need to assign priorities.

Our President referred to Government regulation in his Address. In this connection I would like to point out that the Federal Government has recently changed the rules about the charging of fees for programs such as our proposed Diploma and Masters degree. It seems that we will not be allowed to charge the fees we would like to charge and this Institute in partnership with Macquarie needs to plan its strategy almost from the beginning again.

Iain also raised the matter of meeting the needs of the community. An issue which I have mentioned before and I would like to mention again is the responsibility of the profession in Australia in assisting the development of the profession in neighbouring developing countries Do we have a responsibility to do this? Certainly in Indonesia there is a lot of interest in such a development. The questions I would like to put are:-

1. Does our profession believe it has a responsibility to assist in the education of students from countries in the region?

2. If the answer is yes, to what extent should spaces for Australian students be released to make space for foreign students? It is not so much a question of cost but the manpower and resources that we have available.

Those I think are important questions. If we decide we are not going to help countries within the region that is fine but I think we do need to make a conscious decision in this regard.

I would like to conclude then by thanking Iain for a very thought provoking and interesting Address. I wish him well with the year as President.

MR. G.M. ATKINS: I will restrict my remarks to three areas; our objectives, a few comments on education and one or two comments on superannuation.

I think the distinction Iain has made in his analysis between the external objectives relating to community needs and the internal objectives of the profession is very important. It is very hard to keep self-interest out of our Institute's objectives but I believe nothing will lose the respect of our audiences faster than being seen to be feathering our own nests.

Iain gave his own version of the objectives, which I am sure is an important part of his thinking process. I am curious as to the status of those objectives; what happens with them now? I would like to see something done with them to get them out into the public domain and see them being used.

I have one observation about Iain's careful statement of the objective of meeting the needs of the community. It seems to me that we have been well equipped to meet the needs as long as they pay. I wonder whether there are aspects of community needs

that are not being met simply because actuaries are too expensive and a way cannot be found to pay for them. I do not have an answer but I wonder whether we might consider the prospect of some form of "actuarial aid".

A concrete example may be the situation of the Australian Government Actuary. I am not privy to the discussions that were held leading up to and following John Maroney's appointment, but my impression is that there was a degree of "actuarial aid" on behalf of some combination of John, his previous employer and the Institute in making sure that the Federal Government at least has the services of a full-time Government Actuary.

How have we been doing in the last few years? Perhaps the crisis of supply has dominated our recent history. I was pleased to see that the increases in the combined numbers of Fellows and Accredited Members were 8.5% in 1988 and 6.5% in 1989, compared with an average over the previous decade of 5.3%. Good enough? I am not sure. I would guess that the population and GDP perhaps is growing at 2 or 3%. Perhaps the financial services sector as a whole is growing at 5 or 6%. Maybe we should be aiming at 8% long term, or even 10%.

That leads me directly onto the subject of education. I took on somewhat dauntedly the chairmanship of the Education Policy Committee a year ago. I believed that I was part of a very conservative profession. Let me tell you how pleased and impressed I am at the preparedness of my professional colleagues, in a profession renouned for its conservatism, to embrace change. I thank you all for that.

The other aspect with which I am very pleased is the willingness of our young members to accept work. In my personal experience (and I can only speak for myself) the very large majority of the people recently qualified that I have approached to help me have accepted and accepted willingly. They need to be free of intellectual pressure and judgement that they might not come up to standard. For those people that are involved with committees, if you can build your network and find the people who are young and give them a clear brief, you will find willing workers.

I will finish with a few comments about superannuation which I know nothing about. As an outsider I can only say that having observed what my friends and colleagues have gone through in the last 5 years I am very pleased that I do not work in the superannuation business. Nevertheless I will offer your a prediction.

In the last twelve months or so my observations have led me to predict the inevitable rise of accumulation plans and the corresponding demise of defined benefit plans. Two recent observations have firmed up my view. Firstly, the paper that Tony Lally and colleagues wrote on industry superannuation; I found it very informative, illuminating and convincing.

The second experience is my own experience as an employer in trying to resolve issues of superannuation for the firm for which I work. At every point, all the environmental forces led us right down the path of an accumulation plan. I do not suppose we are alone. I am sure it will take time for things to evolve, but there is my prediction for what it is worth.

Congratulations Iain. I look forward to working with you in the twelve months to come and I hope that I can make a contribution to your task ahead.

MRS. C.M. PRIME: I want to touch on only one or two of the issues in the paper.

We have in the Address some thoughtful comments, from a very broad perspective, on the superannuation industry.

Many of our profession are involved in this industry. It has been suggested that actuaries make it tick. This is in spite of the fact that much of the work actuaries do in the superannuation area is not actuarial. Many superannuation schemes are little more than bank accounts.

Nevertheless I think actuaries would probably claim to have invented superannuation and would chalk this up as a major good deed to the community on the part of the profession.

The situation described in the Address is one of government rules and changes of increasing complexity that do not really serve the objective. Perhaps these rules relate more specifically to retirement incomes policy objective rather than superannuation objective. This situation has romped away, out of the control of actuaries, even though it might be occupying a great deal of their time. It is said that the government, which has taken an interest in superannuation only really in the 1980s has not consulted actuaries in this area nearly as much as it ought, and does not appear to await their advice as it should.

Some actuarial attitudes to government proposals over the last few years have been high handed, although understandably so. The attitude is we are the experts, they do not know what they are doing and they did not even consult us.

Although there is truth in these statements many of our public relations efforts have been too late in the long chain of events that lead to government action. I suspect that the existence of the ISC has made a difference, and recent developments which may change this.

One factor which may have something to do with these observations and may have implications in other areas is that career public servants must have very little exposure to the

skills of actuaries. Like any decision maker faced with the problem, public servants must cast around in their store house of experiences for resources likely to solve that problem. Their experiences are not likely to include much by way of working with actuaries.

Enter the lawyers, the accountants the economists and the statisticians. There are few actuaries in government service. Even though we have federal and state offices of government actuaries we all know the difficulties that have been faced in attracting suitable people to these, and providing them with suitable staff.

I am not suggesting any solution to these difficulties for the future and I would not like to confine actuaries in government service to these offices. I am just expressing a view that lack of exposure to actuaries early in their careers is a reason for government policy makers failing to consult actuaries later.

What about the academics? Government and others readily consult academics. However, there too, we know the difficulties in building up resources available to our few, although very notable, actuarial academics.

A numbers problem may be solved in time and this is rightly part of our long term planning. However it is apparent that we need something more to take advantage of current opportunities.

In Section 6.1 of this Address we hear that we may now have a better opportunity than ever before to influence government superannuation policy, and that to do this we need more than to produce a piece of paper with some good ideas. The solution is usually seen in our public relations effort. Public relations is indeed more than producing a paper with good ideas on it. Many committees have worked very hard and produced some very fine pieces of paper that may not have had justice done to them. Public relations is more than getting press coverage for our conferences and comments. I think it has something to do with creating a state of mind where policy makers wish to consult us very early. Under the current circumstances we need some short cut to influence before policy decisions are made and we do need, as the Address suggests to walk in their mocassins. We do need a 'what to do next list'.

However I would like to dwell on one suggestion in the Address, namely the idea of short one subject conventions in addition to our biennial convention but for rather different purposes. This year particularly we have seen many commercially organised conventions come and go. The subject range of these is wide but it does include superannuation and life insurance. Some of these have been good, and others not so good. Some have sought and received the endorsement of our own Institute. These conventions usually have very high registration fees and their target market is corporations willing to send numbers of people along. Our general insurance committee is well experienced in

this area and has always had a good attendance from government policy makers at its seminars. Perhaps these seminars were not originally envisaged as a programme for influencing government. However I would like to ask the General Insurance Committee how successful they feel the seminars have been for this purpose. We could conduct superannuation, life insurance, investment seminars as well as general insurance and accident compensation seminars.

Could we make an early start here on influencing the wider field? What about the areas suggested in the key note address of the recent Cairns Convention, social security, nursing homes?

I do have a comment on the concept of the actuary as a 'financial greenie'. As the latest in a series of succinct expressions invested by actuaries to describe themselves, this one has some appeal. It is interesting that financial conservatism has been traditionally associated with the 'political right', whereas the green lobby started off more on the 'left'.

My final comment is intended to start members thinking about to what extent we wish to concern ourselves with the development of actuarial professions in, particularly, Asian countries. These countries do wish to develop their actuarial professions and may be expected to request us to help, particularly in the area of education.

If we are not prepared to help, others will fill the gap. This is a big issue and it needs a wide range of consideration from the membership.

Mr. President I have only touched on one or two aspects of your Address. I cannot speak from personal experience as to whether you will have fun this year but I do wish you well and thank you for offering us so many thoughtful comments tonight.

MR. R.H.S. LYON: Of the President's four objectives for the Institute in Section 2.12,

- the most important is service and community and
- the least important is the interests of members.

But the Institute hasn't been portrayed this way at all to the younger and future members of the profession. Prospects of financial reward are emphasised with Macquarie scholarships. Even the Institute's own "Looking Forward" recruiting brochure stresses the financial side:

* "The profession is unique in that it offers absolute security both to the employees in a large insurance company and self-employed professionals. The financial rewards are virtually top of the range too."

* "Actuaries are achievement-oriented people."

* "As far as financial rewards are concerned, the actuarial profession compares favourably with other professions..."

By comparison, the actuary's "responsible role in the community" rates but one mention.

I am concerned that we might be creating the wrong impression - have academic qualifications, will earn.

"Actuary" is not a job, but a profession, a way of life.

MR. R. ATFIELD: This paper is about structure and structure is much more applicable to engineers than greenies. We had the analogy in the key note address in Cairns of an actuary and an engineer. Now we have the analogy to a greenie. I do not think you could find two more opposing views than a greenie and a construction company or a construction industry. But should we need uninimaty of thought in our profession? Probably not. Most professions and most capable people are self critical and I believe it is necessary for our profession to always be self critical. Uninimaty of thought we will not get on all issues but by the process of debate and the process of contention maybe we can add value, as many people have said, to the community, and that is most important.

This paper is about structure, the structure of the profession and the structure of superannuation. Firstly superannuation. And I must borrow another line from Alice, not Alice in Wonderland but Lewis Carroll in one of his nonsense verses where he said - I have been working on a plan to dye ones whiskers green and always use so large a fan that they shall not be seen."

Superannuation is a bit like that. The life insurance industry and the superannuation industry know that the national income policy has got whiskers on it and probably those whiskers are green. But they have had so much change, they have handled so much disruption, that all they want now is peace and quiet. They want something that is constant, consistent for a while.

But should that be the attitude of the profession? Probably not. I think that the profession has a role to play in developing real national income policies and should not be overly concerned that that causes further disruption. There should be a separation between what the industry might want and what the profession might want, the difference between pragmatism and professionalism.

And now a little on the structure of the Institute itself. One of the changes in the structure that is very important has not necessarily been highlighted tonight and that is the use of task forces. We want the profession to be greater than the sum of its parts and so we must make greater use of the talent within the profession. It is difficult for many people to go on committees because of the time commitment. It is difficult while they are building their careers or building their practices to have that sort of time commitment. But if they were invited to join a task force on a specific issue, then, just as our experience has shown in those working in the examination system, the member will arise to that challenge.

One of the strengths we hope we will achieve through this restructure is the greater use of these resources in specific tasks through task forces.

In conclusion we look forward very much Iain to your year of office and congratulate you on your Address.

MR. T. JENKINS: I too would like to congratulate the Immediate Past President on a presidentcy which has shown great energy and purpose and I would like to congratulate the President on his appointment to the position. I wish Iain all the best for what I know will be a very successful presidency.

It has been a scintillating discussion and I am sure it is one of which Iain must be very proud. I think something quite important happened here tonight, although I am not too certain what it was. I think that what the planning committee did was to look at the environment in which the Institute, the profession and individual actuaries work. They must then have decided on a strategy to deliver objectives. As a result, the planning committee has come up with a structure. That has encouraged a lot of extra questions tonight.

People have said, "Okay, we have objectives and a structure, but so what. Let's look at the action plan". Other people have said, "Well that is all very well, but the objectives are not measurable. Let's introduce some measures." People have spoken about the value added by our profession and the need to demonstrate that we are adding value. Other speakers have pointed out that the regard in which we are held by the community and by government, and our ability to relate to the community, is determined in some way by this process of adding value.

The profession (or the Institute) must be producing results and somehow or other these are capable of being measured. They are part of the process of adding value and of establishing the merit of the profession in the community.

We have a structure which has standing committees, but it also has an issues committee. Now issues are all about scanning the environment so that one can prioritise issues and decide what projects one is going to work on by appointing task forces. It seems to me that what we were doing in that last decade as an Institute was building capabilities. A decision was made in the seventies to go our own way and over the last decade capability after capability has been put in place until Council decided to review a few fundamental questions. Out of that review has come a structure which most people have spoken about tonight. It has all sorts of interesting features, many of which have been referred to. It seems we are now on the edge of viewing the Institute as a system and a process. The capabilities are in place, it looks as if the nineties might be the decade in which the Institute evolves as a system for pursuing professional processes.

Perhaps a future President's address might include a flow-chart of what the Institute does so we can see where value is added, how we communicate it, how we monitor it and how we inject the feed-back loops that are necessary to keep the system alive. It seems that the Institute is about to evolve into something quite exciting during the nineties.

Two other main themes ran through the discussion. One was that of education, and Mr. President, you were encouraged to look seriously at the area of continuing education and at specialisation (or practice) registers. You were also alerted to the explosion of interest by tertiary institutions in links with Macquarie University - we do not want to overwhelm that very successful institution.

We were asked once again to try to get our capable younger people to pass more quickly through the educational process. We need to achieve a better balance between our educational and professional roles so that we do not waste the talents of these people. It has been a recurring theme over recent years.

The final theme running through the discussion related to the structure of superannuation. On the question of comfort someone once said the poor have more children but the rich have more relatives. So you have your choice whether you want to have those relatives or not. You heard the reinforcement of your own view of the confusion in superannuation on the one hand along with a view from the architects explaining that the structure was all coming together and a reminder of the complexity of coping with an ageing society.

I recommend to everyone a very good book by the author, Ken Dychtwald called "The Age Wave". It really is a powerful communication of the financial, demographic and sociological forces that are building up. An anecdote from it helps take things back to individuals. Dychtwald includes a section on the attitude of the ageing population to romance and he quotes a 63 year old retiree, "My girl friend aged 64 just lives down the

hall from me, and used to be very worried about our relationship because her daughter (who is aged 45) would not approve. Things are very much better now because she can spend the night at my place and bring her new cordless phone just in case her daughter calls her".

We should not lose sight of the fact that structures do have to cope with a whole range of individual situations that are not as homogeneous as they used to be, and the architects have to cope with it all.

Iain, I found your address a wonderful one and it involved a wonderful discussion to match. You are the herald of a new decade. I was impressed by your "green" analogy. "Greenies" are very concerned about precious resources such as the ozone layer, the supply of oxygen and clean water and so on. We as actuaries are similar to engineers and the key resource that we are vitally concerned with is capital and business. When interest rates are 20% or 23% the cost of errors is the depletion of capital very rapidly. We live in that sort of world and we are "financial greenies" protecting the financial world's key resource capital.

In your Address, Iain, you were to some extent a visionary, a visionary wanting to simplify the structures that we work with in society and to develop the processes of the Institute. I think we could do no better than to have you to lead us into the nineties and I think everyone will join with me in thanking you for your address, congratulating you on it and wishing you all the best in your Presidency.

MELBOURNE

MR. J.F.M. ROSS (President): I do not have to say to this audience that I am very honoured to be the President of this Institute - indeed I am humbled by the office and by contemplation of the abilities and the performance of those who have gone before me. I can only undertake to do my best.

I am greatly consoled in thinking of the work ahead of me by the experience I have had over the past few weeks in talking to members of this Institute about serving on committees and otherwise working for the Institute; I have found nothing but co-operation and willingness. Indeed I have volunteers we have not been able to use yet. It really is a great pleasure to be a member of an Institute which is given so much by its members.

As I say, there are many members of this Institute who do a lot of work for us, but as I become President there is one member I would like to mention in particular - Ron Hunter, who was our President last year. He did a great job as President for the Institute; his grasp of the Institute's affairs was wide, and quite awe-inspiring to this successor, who is still trying to

find out some of the things that he had at his fingertips. He put in a great deal of energetic effort and achieved a great deal of success for the Institute and we are very grateful to you for that Ron. I am personally very grateful to you because you have made it much easier for me to take the chair by involving me in what was going on and keeping me posted with the events of the Institute. Thank you very much for that.

I would ask the members of the Institute to join me in thanking Ron for the work he did for the Institute last year.

MR. J. KENT: It is indeed a pleasure to open the discussion on the President's Address. Firstly I must congratulate you Sir on your appointment, which all agree is well deserved. You have started off very well. You have presented us with an excellent Address which covers a very wide range of issues. Considerable wit comes through in the paper which I am sure is appreciated by everyone here. You are obviously up and running. You have asked us to consider the 1990 Address before 1989 is quite out. So we look forward to great things and your leadership in achieving our goals.

I agree with what the President said on superannuation structures; however I am going to leave that subject to the experts.

There are two issues I would like to take up from the paper. The first relates to communication which I will deal with very briefly. The second deals with education which is of considerable interest of course to many of us.

Firstly communication. The President illustrates some of his thinking by reference in his conclusion to the ministerial statements entitled "Better incomes, retirement income policies into the next century". I would just like to remind you of what the President says. The statement recognises the benefits of long term savings for superannuation. It links superannuation with investment and says - the key to providing better incomes for the growing number of older people is increased saving. The government recognises the need and the objectives. It is open to us to show how that can logically be achieved. We need to pay much more attention to the presentation of our proposals than we have done in the past. The President goes on to say we should give thought to the methods which might be used to help decision makers to appreciate our ideas and to adopt them because our training experience provides us with skills which could and should be used for the benefit of our fellow citizens.

This is an important set of statements which has been put forward by our President. It is an important challenge to members of this Institute.

I would add a couple of points for consideration. In order to communicate better we should, I believe, have recognised spokesmen or women to whom we can look to make our views known in the media. They do not need to be the most knowledgeable on the subject although they need to have a good grasp of the issues, but they must be our best communicators.

The other point is that our committees need to be close (perhaps closer than they are) to the decision makers i.e. the politicians and bureaucrats.

I now turn to education. I strongly believe that the future of any profession turns around this issue. I believe that the President recognises this with the establishment of the third mentioned committee in his paper, that dealing with all aspects of education. My concern relates to the narrowness of specific areas of so called actuarial expertise. It is difficult from the statistics in the annual report of the Institute to determine how our members are employed. We know they work but it is not so clear what they do.

That being said, I am sure that there has been a broadening of the jobs in which actuaries are engaged; in particular with respect to investment, general finance and management. I welcome this but I am sure as a body we remain basically mathematical experts in life insurance and superannuation. In some ways this is a strength but also I believe it is a potential weakness. our strength rests in our being at this stage a small and relatively cohesive group. The potential areas of weakness is that we are very dependent on two industries, life insurance and superannuation. Furthermore the expertise of others can be developed to encroach upon our areas of influence.

On reading a Society of Actuaries publication I understand that in 1985 its committee on planning presented a report for the Society's Board. Their conclusions included the following: FSAs have been trained to use unique actuarial knowledge and established techniques to solve a one dimensional well defined problem where there is a correct or optimum solution. But the major employers of actuaries, in other words financial institutions, and sponsors of employee benefit plans, today often face broad, ill defined situations in which the problems must first be identified, then addressed often in innovative ways effectively using inter-disciplinary teams. Actuarial training does not uniquely equip people to deal with these situations. In fact training in business administration or economics may provide more reliable starting points than the selection and educational process which produces FSAs. In a world of increased change, actuaries as a group need to increase their abilities to deal with change. We need to get better at problem identification and dealing with unstructured situations.

That was the comment in a publication of the Society. I do believe that we are in some ways better placed than American actuaries but I still think that a lot of what was said applies to us. I get particularly concerned when I see firms of accountants expanding more and more into the financial management and advisory areas where the actuarial profession can make major contributions.

I would like to see us as a profession move into this area of financial management. To use Ian Pollard's terminology we need to develop financial engineers with greater expertise in the commercial aspects of financial management, taxation and capital structures. I would like to see such subjects in our course.

One needs to ask what has to give way in our course to make way for such subjects. My suggestion is the Mortality subject (or is that too heretical?)

The study of mortality could be given less detailed attention these days; it could be covered quite adequately in life contingencies and the statistical subjects. It does not warrant a course of its own.

There is a window of opportunity for change at the present time. We now have university courses in both Melbourne and Sydney. We could attempt to use our influence to make some changes in the university course structures. I think we must look forward and prepare future generations for the rapidly changing world including and potentially volatile financial environment. Deregulation and the blurring of the differences between financial institutions can pose either a threat or provide an opportunity for us.

The profession has made major changes in the past as you, Mr. President, have pointed out. We can see that we are going to take significant strides forward under your guidance. You have produced well thought out structures for our future development. You have put forward before us an excellent set of objectives.

Mr. President I wish you well in your term of office and trust that we can give you the support required so that your objectives can be achieved.

MR. N.E. RENTON: The political aspects raised by the President in his Address are important. In Section 1.4(b) he states that there is no discernible structure in health insurance and workers' compensation. Actually, neither politicians nor bureaucrats distinguish between insurance and social security. They provide one under the guise of the other, with the result that neither objective is achieved.

The Leader of the Opposition recently made a quite unrealistic promise of a brand new national health scheme, one purporting to be revenue neutral yet involving lower contributions for everyone.

Furthermore, the fact that the total cost of providing health services depends on the money flowing to the providers of such services (doctors, hospitals, pharmacists, and so on) - and not at all on the bookkeeping arrangements for paying those costs - seemed to have been completely overlooked in those pronouncements.

In the absence of properly-assessed premium rates set by market forces there is no virtue in having a multitude of medical funds. Competitive advertising for members would serve only to increase the community's total costs.

Giving people the impression that a Medicare-type levy covers total outlays is counterproductive. It encourages people to make claims in excess of their payments.

Section 2.4 refers to the free reserves of life offices. Some offices have boasted of the size of their reserves, glossing over the immorality of their origin at the expense of past policyholders and also ignoring the fact that the existing reserves will become a lower proportion of liabilities as funds grow. The scare tactics in some advertisements could spark a run on weaker offices, with unpredictable results for the whole industry.

Annuities payable for longer periods than the investments held raise a matching problem.

With regard to the question in Section 2.6, the reality of the situation should be noted. Despite the rhetoric of politicians of all parties, the inflation phenomenon is not readily fixable. In fact, because inflation makes tax collecting easier in electoral terms, and because rising dollar incomes mislead most voters into thinking that they are better off than they really are, and also because inflation makes it easier to service the national debt, governments are not in truth very keen to eliminate inflation.

Superannuation will always be tinkered with by political parties, as these desire to demonstrate that they are different from each other. The profession should educate them, to ensure that adverse changes are not made in ignorance. Hostile legislation is usually the result of ignorance on the part of decision-makers rather than malice.

MR. B.C. AMOND: I am sure that all Presidents seek to do something a little different when preparing their addresses. I know I tried to and you have been very different with your last section, but you have shown throughout that you are going to have a good attempt at being an effective President. I wish you well and congratulate you.

One of the things which emerged in your paper is the combination of the political aspect, the Institute and individual members and the role which we should play in influencing governments in our areas of work. I have come to the conclusion that we are naive if we assume that a small profession located in very narrow business areas can really have much influence on either the present government or the opposition.

In my address I talked about publicity and the need to respond quickly to things that might happen overnight. At the time some members were concerned that I might express my own thoughts which would not necessarily accord with theirs or, more importantly, with their own organisation's. As you know there are such things as vested interests and it is easy for governments and bureaucrats to associate us very closely with the interests of the businesses we advise or work for.

Of course, we should try to influence governments in advance of their decisions and comment when things happen. But how often can we agree on a course of action? Let's take Alice in Superland and the terrible mess we have at the moment. I believe it came about simply because of one situation the government got itself into. It tried to avoid a wage increase and came to a deal with the trade union movement to have a 3% productivity contribution. It was absolutely political and had little to do with superannuation. However, there are other reasons why we deserve some of what we now have. I have said for a number of years that we had a product failure with occupational superannuation in this country. We did not have proper vesting or preservation. Those two points alone were enough to cause any thinking politician, looking for an opportunity, to walk straight through the door. In the past individual members voiced their own concern but it is difficult for the Institute to agree on a proposition that improvements needed to be made.

In the meantime, we should continue to build up the image of the profession. I am sure we are stronger than at any stage in the past. Our numbers are increasing rapidly and we are on the curve to the 1500 actuaries I forecast for the year 2000. I did glance at some of the other forecasts that I made in my address and I have a feeling that I totally underestimated the trouble that the entrepreneurs would get into in this country. That could well change some of the thoughts I had.

The new committee structure is interesting in that it shows how we are subject to constant change and evolution. More than anything else members and the Institute itself need to keep this at the forefront of their minds. I think we need to be more flexible in judging what might happen in the future. One of the dangers with much of our work is that we are involved in long term assumptions. We must be careful not to spend too much time on the minute detail of those assumptions but must more positively simulate alternative outcomes. Will there be a crash next year, will there be a big property slump the like that we have not seen for 30 years? What would that do to our funds?

It is interesting that a new committee structure was established in 1981 and is now being changed again. It will probably be changed again by the year 2000. Whatever the structure it is vital, in my experience, to ensure that the committees operate effectively. If there are weak links you must step in fairly quickly and ask the members concerned whether they would like to be replaced or moved to another committee. After all members on Council and committees are volunteers and often subject to other pressures which prevent them from committing themselves to the Institute. You really need to look upon it as a management job.

Thank you very much for your address. I look forward to your year.

ME. S.P. MILES: Like another speaker I have cause to frequently explain non actuarial terms to my board. At the last board meeting I presented a financial condition report. One of the requirements I had was a solvency margin of let us say 7.5 million dollars. I anticipated there would be a question on that so as I talked I said "Why 7.5 million dollars? Answer - because it is half way between 5 and 10". I noticed then that the board wrote that down, and accepted that explanation as perfectly true and logical, no doubt because I was an actuary.

I wish to talk about three items, exams and workload, professional crossroads and also professional standards.

Exams and Workload

One of the things I did not get a chance to say in Cairns was that I regard the magic number of the profession as being 80%. 80% is the pass rate at which the number of people involved in education reduces to one third of what it is now. Iain has highlighted in his paper the enormous number of people who are involved in education. If we can take two thirds of those people and put them into research, into streamlining committees, into talking more with government then I think we can really become a profession. Our current educational workload is crippling.

Professional Crossroads

As a profession we are standing at the crossroads. We have ourselves legislated into a small rump of the financial services sector where we are a highly paid and expensive profession. We now have to make a decision about whether we want to continue to concentrate on those areas, restrict supply and maintain our high salaries or perhaps try and emphasise greater supply of people Greater supply will mean a lower salary base but a much wider range of work for actuaries.

I believe we can achieve a greater supply without really reducing quality - but do we have the courage to adopt this strategy. A greater supply will mean more interesting areas of work, wider areas of work and that actuaries will be paid on merit rather than scarcity.

Professional Standards

Finally one of the things I was most worried about with the profession early in the 80s was the development of professional standards. As a fellow no one ever asked me whether I wanted professional standards and, by and large, I did not. I must say that my experience since that date has been that professional standards are a welcome move but they certainly are a two edged sword.

Professional standards become a weapon when an actuary says "I must do this because the professional standard says I must". But that makes non actuarial people more and more wary of using actuaries. If every time they come to an actuary they are hit with a professional standard, then they will start to think about accountants, lawyers, economists, anyone else who they can find who has the necessary skills. Many actuarial skills are shared by the other professions.

So whilst our experience with professional standards has been encouraging, I think we have to be very wary that we only really use them when they are beneficial to the people with whom we work, and to our clients.

MR. J.F.M. ROSS (President): Thank you Mr. Chairman and thank you gentlemen for your comments on my Address. There is a wide range of comments before me from many angles.

John Kent talked about the need for recognised spokesmen and spokeswomen for the Institute. I agree with that, though to some extent they develop naturally. People talk, journalists and others talk to individuals within the business areas that we are involved in. But by and large these people are speaking for their companies or possibly for themselves and not for the Institute. In fact it is very difficult under our system to develop recognised spokesmen for the Institute because normally when statements are being made on Institute policy the president is expected to make them. He may happen to be an expert in that

field but several times out of 10 he is not - and further he or she is only in office for one year. So it is very difficult for that process to end up with a recognised spokesman. Our major committees could develop spokesmen to make statements on behalf of the Institute; that I think is a trend developing already which could be encouraged.

John also made an iconoclastic suggestion, at least I thought it was iconoclastic, that mortality be removed from the syllabus - or at least he wanted to score it off the list and hide it away under statistics somewhere. The Education Policy Committee will no doubt take notice of that.

One speaker raised a question which was taken up by a number of other people on standards. He was concerned that we might be put into straightjackets.

Steve Miles mentioned this question also. He suggested that he had not been involved in the setting of professional standards; maybe that is because he is so young. But I can remember the Canberra Convention, when professional standards were very much in question and I remember vividly the two sessions which we had on that subject (which were divided by a tea break) when prior to the break everyone who spoke was against standards, and after the break all those pro-standard people were stirred up to come to the microphone and support the introduction of standards. There was a clear division between the two sessions. Those who spoke in favour of standards largely were thinking of the way in which standards protect the members of the profession when they are under attack. Steve mentioned this point too; that a member, when he is experiencing difficulty with a body to which he is responsible and to whom he has to proffer advice which may not be acceptable to the recipients, can be strengthened by the existence of standards.

Another speaker expressed concern about whether we had added value to the life insurance industry, bearing in mind that adding value is one of our objectives. The life insurance industry has been very stable over the last 10 years when other industries have had many problems - stable in the sense that the companies are providing a reasonably satisfactory benefit for most of the policyholders who have been with them for a long period of time.

On the PR side he talked about reacting quickly. Others took up this point. That is not the point that concerns me on the PR front. I am much more concerned that we take action before the event occurs; that we create the right climate in which the decisions that have been made do not require a quick reaction, that we nibble away at the essentials of what has to be done in superannuation and life insurance and other areas and create a climate of opinion in which we do not have to react quickly. That is a long-term prospect which may not involve short-term reaction.

One of the thoughts behind what I was writing was the need for structure and process in the Institute (and in superannuation) - a structure which leads from our objectives to our committees which are set up in order to achieve those objectives and a way in which one of the objectives, that of serving our community, is achieved on the public relations front by helping to get the areas in which we are involved on an even keel. That seems to me much more important than whether we react quickly to a particular incident. I am not sure that quick reactions are necessarily a good way of acquiring a reputation of knowing about the business.

Nick raised the question of matching liabilities and assets, in particular in relation to annuities, where he pointed to the need for long-term investments to match the long-term needs of annuitants.

I really do not think that with inflation at 8% and with the political pressures to which Nick referred (which almost build-in inflation into the Australian economy), long-term fixed interest investments are going to serve the purpose of backing annuities which can be sold with a clear conscience. A fixed annuity is not really going to be a reasonable buy for tomorrow's 60 or 65 year-olds unless they have other means of meeting the increasing financial demands which are going to come upon them down the years.

Could I turn to another comment about the absence of younger members - apologies to those who are younger members here tonight. This is one of the things that I am hoping our public relations committee will turn its attention to, because the discussions I have had with the possible new members of that committee raised the question of the internal public relations of the Institute. I would like to see more active and involved participation from our younger members in our sessional meetings. Perhaps we should have some changes in the format of our sessional meetings. We have had one or two discussion meetings, as opposed to papers, but I do think we need to rethink whether the menu which we are putting before our younger members is attractive enough for them. I do hope we can do something about this problem.

It was also mentioned about the thought that our politicians and bureaucrats believe we may be too close to our commercial masters. I certainly hope that this is not the case and I hope it is something that we can work away from if it is. I know the life insurance committee is very keen, and properly very keen, to comment on the Life Act in a non-commercial and actuarial way and I believe if we persist with that objective and consciously in all activities, we will disabuse them of that impression.

Steve Miles is expressing the view that we ought to have more of our education handled in the full-time professional educational field and leave actuaries to get on with being actuaries. That may well be a move we could make down the track. I certainly would not be opposed to it personally. I would be opposed to it in the next two or three years because I think we have enough on our educational plates coping with the changes that we have already agreed to, and other ideas that are already in the pipeline; but it may well be something we might have to do in a very short number of years.

Another speaker commented on the 3% "productivity" schemes and their being a catalyst for change. Again we have a question of structure, not of the way in which superannuation is provided. It seems to me we must have a structure which encourages superannuation to being at a low level. At the moment we have a structure which positively discourages superannuation at low levels. The combination of the means test and tax imposition on superannuation funds makes it completely unreasonable for anyone to contemplate setting up a low level superannuation scheme. A 3% scheme in conjunction with a means test makes absolutely no sense at all. The government has not tackled that problem. If the 3% is going to be real superannuation and provide for members some sort of income after they retire, the means test is going to cut into the benefits. (Or rather the means test is going to cut into the age pension benefit). That really does not make much sense to me at all and that structure is wrong. Whether the 3% is provided through an industry scheme, a union scheme or an independent company scheme, the structure is going to be wrong. The 3% schemes need not have been such a problem if the Arbitration Commission had not virtually forced so many separate new schemes to be set up and make it very difficult for the 3% to be added to existing schemes. However this is a whole subject that demands a discussion in its own right.

Thank you very much for the comments which you have made on my Address. There are thoughts both from this session and the Sydney session which I shall try to digest and use over the next few weeks or months as I begin my presidential year. Thank you for all your good wishes.

TREATMENT OF TAX ON INVESTMENT GAINS

by G.A. DUNSFORD, F.I.A.A., F.I.A., A.A.I.I.

CONTENTS

1. Introduction

1.1 Tax is payable in Australia by a variety of funds and other entities in respect of investment gains. For convenience in this paper all such entities will often collectively be referred to as "funds".

1.2 Investors in the funds may or may not be subject to tax on the gains arising from their investment in those funds.

1.3 This paper examines the current legislative position of funds in relation to tax on investment gains. It also examines the tax position of the individual to the extent of his or her investment in those funds.

1.4 The paper concerns itself only with the types of fund into which there has been significant investment in Australia. However, many of the principles and much of the detail should be applicable to other funds not specifically covered.

1.5 In general, tax is only payable on a gain when the investment is sold and the gain is realised.

1.6 At any time prior to sale there is therefore a potential tax payable. Accordingly, consideration should be given to making a provision for deferred tax in respect of unrealised gains.

1.7 This paper examines the need for such provisions and their calculation. It also suggests relevant accounting treatment.

1.8 Such examination and suggestions extend also to the determination of unit prices for unitised funds.

1.9 The existence of a period until the sale of an asset and the eventual payment of any tax suggests the possibility of discounting in the calculation of the provision for deferred tax on unrealised gains.

1.10 There is uncertainty as to the period until the actual payment of tax. Determination of the relevant tax provision for unrealised gains is therefore an activity for which actuarial training is useful.

1.11 Useful reporting demands consistency in accounting treatment as between similar funds and their underlying investments.

1.12 Actuaries are involved with many of the funds. It is therefore reasonable that actuaries should be in the forefront of the development of the methods involved for accounting treatment and reporting standards.

1.13 Actuaries have already been involved. In the UK various papers have been presented to the Institute of Actuaries and the Students Society which cover treatment of capital gains tax in life insurance funds, particularly with regard to investment linked business. In Australia, an IAA "Guidance Note for Treatment of Deferred Tax Liability for Unrealised Capital Gains", prepared by the IAA Investment Committee was issued in June 1989.

1.14 This paper intends to examine the relevant matters in more detail than in the Guidance Note. It also aims to assist in the development of a definitive actuarial standard for funds operating under Australian tax legislation.

1.15 To limit the length of the paper, consideration has been given only to the major forms of fund:-

(a) Life Insurance Company Statutory Funds for Life Insurance Business - separately for non exempt business, superannuation business and exempt business;

(b) Life Insurance Company Shareholders Funds;

(c) Proprietary Companies;

(d) Unit Trusts;

(e) Superannuation Funds;

(f) Pooled Superannuation Trusts.

1.16 The paper will consider the effect of tax on gains from the investments of those funds - but only in respect of the main forms of investment:-

(a) Ordinary Shares
(b) Preference Shares
(c) Fixed Interest Securities
(d) Commercial Property
(e) Bank deposits and other money market instruments.

2. Legislation

2.1 There is no separate "Capital Gains Tax" under Australian legislation. For the individual, fund, or other entity, capital gains (indexed if appropriate) are merely added to assessable income.

2.2 A capital gain may be defined:-

Consideration in respect of disposal of asset, less

Cost base of asset, indexed if appropriate.

2.3 For the purpose of this paper the "consideration in respect of disposal" will be variously referred to as "sale proceeds", "realisation proceeds", "sale value", "realised value".

2.4 An important point in this regard is that disposal is deemed to occur on the contractual transfer of the asset to another party - which may not necessarily be the date of receipt of the consideration.

2.5 A capital loss is defined similarly, except that the cost base may not be indexed beyond the point where a loss would be created. Capital losses are not directly deductible from assessable income. They may only be offset against other capital gains. Excess losses are carried forward to be offset against gains arising in future years.

2.6 For fixed interest securities, any difference between proceeds from sale or maturity and the cost of purchase is not treated as a capital gain or loss but instead is treated as positive or negative investment income in the year of sale or maturity.

2.7 The cost base of any asset includes any costs involved with the purchase of that asset. It will be reduced by any depreciation allowances deducted from taxable income on an annual basis.

2.8 Where indexation applies, the indexed cost base is equal to the cost base multiplied by the "indexation factor", i.e.

$$\frac{\text{Index number for the quarter of the year in which the asset was sold}}{\text{Index number for the quarter of the year in which the asset was purchased}}$$

where "index number" is the All Groups Consumer Price Index number (CPI), being the weighted average of those numbers for the eight capital cities, published by the Australian Statistician. The indexation factor shall however not be less than one.

2.9 Indexation will not apply in respect of assets disposed of within 12 months of purchase.

2.10 For an individual, any asset which was purchased prior to 20 September 1985 will not be assessed for a capital gain or loss.

2.11 In the case of superannuation fund assets and life company assets in respect of superannuation business purchased prior to 1 July 1988, the cost base will be deemed to be the market value at that date or actual cost whichever results in the lesser gain or loss when the asset is sold. Indexation will only apply from that date.

2.12 Proprietary companies are treated by the tax authorities, either as "trading" in investments or "non trading". Those treated as trading have no indexation applied to the cost base of their assets, and all gains, whether or not the asset was purchased prior to 20 September 1985, are subject to tax.

2.13 Proprietary companies treated as "non trading" for this purpose are taxed on indexed gains in respect of disposals of assets purchased since 20 September 1985 only. Any company treated as "trading" can appeal to have the treatment reversed.

2.14 Unit Trusts in respect of their undistributed realised gains are taxed as proprietary companies. Where the gains are distributed, the trust is not liable for tax, as the unitholders will be assessed for tax on the gains.

2.15 Life insurance companies, in respect of their non exempt business and shareholders funds, are treated as "trading" in investments.

2.16 In the case of a life insurance company, the date of purchase of an asset is the date it is acquired by the life company in any of its funds. Subsequent transactions between the funds are ignored for tax purposes. Disposal is only recognised when the asset is sold to a third party.

2.17 Normal procedure permits the rate of tax on the gain on disposal to be that which applies to the fund last holding the asset regardless of the time held in that fund or other funds.

2.18 Fundamentally the situation in 2.17 represents a loophole. However, the tax authorities have various anti avoidance measures open to them in the event of exploitation.

2.19 Where holdings of a particular asset have been purchased at different times, e.g. ordinary shares, the taxpayer has a choice of two basic approaches that may be adopted in identifying the holding attributable to any sale:-

(a) "First in first out" (FIFO), where the first holding purchased is identified with the first sale, and so on, or
(b) "specific identification", where the taxpayer adopts a particular method for such purpose.

If specific identification is selected, the method adopted must be adhered to by the taxpayer for future sales.

2.20 A summary of the way in which the capital gains rules apply to direct investments purchased by individuals, funds and other entities covered in this paper is as follows:-

Entity	Indexation	Tax Rate	Comment re treatment of assets purchased prior to relevant date
Individuals	Yes	Personal, max. 47%	Assets purchased prior to 20 September 1985 ignored.
Life Insurance Companies - non exempt business	No	39%	Not applicable.
Superannuation Funds and Life Insurance Companies - Complying Supn. business	Yes	15%	Assets purchased prior to 1 July 1988: market value established at this date.
Unit Trusts (distributed gains)		No taxation	
Proprietary Companies and Unit Trusts (undistributed gains)			
- Trading	No	39%	Not applicable
- Non Trading	Yes	39%	Assets purchased prior to 20 September 1985 ignored.

2.21 For an individual, the inclusion of a capital gain which may have accrued over many years in a single year's assessable income may suffer taxation at unreasonably high marginal rates. Accordingly a concession is granted by notionally averaging any gain over a nominal five year period for the purpose of determining the marginal tax rate.

2.22 The tax payable on the gain for an individual in respect of the year of realisation is made equal to 5 times the marginal tax that would have been payable on one fifth of the gain (regardless of the actual length of time that the asset was held).

2.23 A summary of the way in which the capital gains rules apply to individuals investing in the funds referred to in 2.20 is as follows:-

Fund	Indexation	Tax Rate	Comments
Life Insurance Companies - non exempt business, e.g. insurance bonds	No	Personal, max. 47%, less rebate at 39%	Tax reduces after 8 years to nil after 10 years, depending on year of investment and amounts and frequency of premium payments.
Superannuation Funds Life Insurance Companies - superannuation business	No	Nil	
Unit Trusts - distributed gains - sale of units	Yes	Personal, max. 47%	Investments in these funds prior to 20 September 1985, ignored.

2.24 It is worth noting that the tax payable by individuals on the surrender values of insurance bond and other life insurance non exempt products, is calculated on the excess of policy proceeds over premiums paid, i.e. after the life company has paid tax at 39%. Thus, on a "look through" basis the individual paying tax at 47% pays somewhat less than this on gross gains arising on the underlying investments of the life fund. On the other hand, the benefit of indexation is obtainable by investing directly or in unit trusts, but is lost by investing in the life fund product.

2.25 The above is a summary only of the main legislative provisions relating to taxation of investment gains in respect of individuals, funds and other entities covered by this paper. They represent the author's view only of the position current at the end of February 1990. The author disclaims any responsibility for advice based on the content of this paper.

2.26 No attempt has been made to examine the various definitions of "asset", "acquisition", "disposal", "market value", etc., as they are not relevant to the main content and purpose of the paper.

3. Deferred Tax - Accounting Standards

3.1 Normal standard accounting and auditing practices for most entities broadly demand either:-

(i) assets to be shown at the lower of book cost, written down value or realisable value in the balance sheet, with any directors' market valuations and unrealised appreciation referred to in notes to the accounts, or

(ii) assets to be shown at directors' market valuations, with the excess over book cost or written down value being shown as an asset revaluation reserve.

Where "realisable value" applies in (i) above this will equal the directors' market valuation.

3.2 Where entities have liabilities in terms which relate to the market value of the underlying assets, such entities are permitted to take changes in the value of assets representing those liabilities through the revenue account as capital appreciation or capital loss.

3.3 Under the "tax effect accounting" standard, entities with unrealised gains and no corresponding asset revaluation reserve must make a deferred tax provision in respect of those gains. In general this will be equal to the amount required to meet the tax liability if all assets were sold at balance sheet values on the day after the balance date. Discounting for the delay in payment of the tax is permitted.

3.4 In the case of unit trusts which declare an intention to distribute all gains on realisation, no deferred tax provision is required.

3.5 At the time of writing, it is believed that, for published accounts, the only entities which are allowed to provide for discounting of deferred tax liabilities on the basis of a reasonably expected delay in the sale of the assets are life insurance companies and superannuation funds.

3.6 The life insurance companies' standard in this regard (March 1986, attached to Circular to all Life Insurance Companies No. 241) says:-

> "To provide scope for the maintenance of equity between generations of policyholders, the provision for deferred taxation may be discounted to present values using reasonable assumptions as to interest and the timing of taxes payable. The basis of these assumptions must be stated in the Notes to the Accounts."

3.7 For unit pricing purposes most life insurance companies provide for some discounting in respect of the expected period until the sale of the assets and susbequent payment of tax on gains.

3.8 Notwithstanding permission to discount in the manner referred to in 3.5 and 3.6 above, not all life offices do so. Some offices discount in this manner for their investment linked business so that the valuation of liabilities according to unit prices declared can be matched by valuations of assets carried out in a similar manner) - but not for their other business.

3.9 Similarly for superannuation funds, practice in regard to market value accounting, and discounting in the manner of paragraph 3.5 varies widely. This comment applies equally to:-

(a) published accounts,
(b) any unit pricing,
(c) determination of members' account balances.

3.10 An AARF proposed accounting standard for superannuation funds which includes market value accounting and discounting deferred tax provisions to allow for the reasonably expected period until the sale of the assets has not been accepted by the industry or the relevant accounting bodies in its present form. It is understood however that the proposed treatment of tax and deferred tax on investment gains is not a major area of dispute.

4. Effects of Discounting

4.1 Consider the following investment held by a non-exempt life insurance fund:-

Book Value	$10,000
Market Value at balance date	$15,000
Estimated period to payment of tax on gain if investment is assumed to be sold on the day after the balance date	1½ years
Estimated period to payment of tax on gain if investment is assumed to be sold in the financial year 5 years hence	5½ years
Tax Rate	39%
Discount rate	10% p.a.

4.2 Provision for deferred tax may be calculated as follows:-

(a) full provision

$$0.39 \times \$5{,}000 = \underline{\$1{,}950}$$

(b) discounted for estimated period to payment of tax, if investment sold immediately

$$0.39 \times \$5{,}000v^{1\frac{1}{2}} = \underline{\$1{,}690}$$

for the purposes of this paper this form of discounting will be referred to as "delayed payment discounting",

(c) discounted for estimated period to actual sale and subsequent payment of tax

$$0.39 \times \$5{,}000v^{5\frac{1}{2}} = \underline{\$1{,}154}$$

for the purposes of this paper this form of discounting will be referred to as "future sale discounting".

4.3 If the investment is sold immediately after the balance date and tax is paid 18 months later, with the provision for deferred tax having been deposited in a bank earning 10% p.a. interest net of tax, the following profits would arise:-

(a) if full provision of tax had been made:
$1{,}950 \times (1.1)^{1\frac{1}{2}} - 1{,}950 =$ \$300

(b) if delayed payment discounting had been applied to the provision: $1{,}690 \times (1.1)^{1\frac{1}{2}} - 1{,}950 =$ Nil

(c) if future sale discounting had been applied to the provision: $1{,}154 \times (1.1)^{5\frac{1}{2}} - 1{,}950 =$ \$740 loss

4.4 Disposal of the investment on the day after the balance date represents the worst scenario as regards sale. Yet under (a) the provision made still results in a subsequent profit - effectively a transfer of profit from one financial year to the next.

4.5 Unless it is deemed necessary to allow for an instant change in tax legislation demanding immediate payment on actual sale of an investment, the full provision in (a) above is clearly unnecessary.

4.6 Future sale discounting under (c) results in a loss - suggesting that the delayed payment discounting under (b) is a more reasonable assumption.

4.7 However, it would be expected that the fund will have other investments. Accordingly, there should be a spread of actual dates of sale of the individual investments. In respect of these other investments, the tax on gains made to date will be delayed for the period to actual sale - as well as the subsequent period until the actual payment of tax.

4.8 In these circumstances, delayed payment discounting of deferred tax as in (b) above and ignoring discounting for expected periods to dates of sale, will clearly result in excessive provision.

4.9 Anticipating immediate sale of all investments is equivalent to anticipating full claims under all insurance policies held on the day after the balance date! The policy reserves in these circumstances will equal the full sums insured discounted only for the delay in actual payment of the claims.

4.10 Thus with a portfolio of investments, only part of which is turned over in a year, the deferred tax provision should be discounted for future sale in accordance with 4.2(c) i.e. discounted for the estimated period to actual sale and subsequent payment of tax.

4.11 If future sale discounting is to be adopted for the deferred tax provision on unrealised gains in respect of all the investments, then the assumption in 4.2 (c) of a fixed period to realisation in all cases is unnecessarily crude.

4.12 A better approach would be to base the calculations on the more reasonable assumption that each year there is a "risk of sale" of the investments.

Thus the discount factor could be:-

$$\{ qv + q(1-q)v^2 + q(1-q)^2v^3 \ldots\ldots\ldots\ldots \} \frac{x\ 1}{(1+i)^{d/365}}$$

where "q" is the "risk of sale" or proportion of investments expected to be realised in a year,

"i" is the expected rate of return (net of tax) from the investments in which the provision is held,

and "d" is the number of days after a balance date that tax is payable.

4.13 Summed to infinity this expression equals:-

$$\frac{q}{i+q} \times \frac{1}{(1+i)^{d/365}}$$

4.14 Examples of the results of using this formula with d = 182 are:

rate of realisation	tax provision discount factor		
q	i = .08	i = .1	i = .12
.1	.53	.48	.43
.15	.62	.57	.52
.2	.69	.64	.59

4.15 The approach suggested is suitable when there are a large number of investments in the portfolio so that it is reasonable to make an assumption of a level rate of realisation. If however, there are some disproportionately large assets which may become the subject of sale consideration within a short period, these will require special treatment in determining the level of discounting.

5. Discounting and Indexation

5.1 Where indexation applies, consideration must be given to the effect of this on the ultimate tax payable.

5.2 One approach is to make a deferred tax provision on the basis of the ultimate tax payable in respect of the gains to date -

i.e. $(MV - ICB) \times \text{tax rate}$

where "MV" represents the current market value of the asset, being in excess of
"ICB" representing the current, i.e. indexed, cost base of the asset.

5.3 However, at the end of the following year the ultimate tax payable in respect of the previous gains will have reduced to:-

$$\{ MV - ICB(1 + f) \} \times \text{tax rate}$$

where "f" is the inflation rate, i.e. rate of increase in the CPI.

5.4 The reduction in the tax provision would generate a revenue account profit. This suggests that the initial provision was excessive.

5.5 An alternative approach is to consider that the effect of indexation will make the ultimate tax payable:-

$$\{ MV - ICB\,(1 + f)^{t} \} \times \text{tax rate}$$

where "t" is the expected period to the sale of the asset.

5.6 However, this might easily be negative. Even if it isn't, it seems unreasonable to assume that the indexed cost base will grow with inflation but that no assumption is made as regards the future growth of the market value.

5.7 Investors in ordinary shares and property generally expect some increase in market values. The rate of increase expected is likely to vary depending on the particular share or property. This difference is usually reflected in the current dividend/rental yield available based on market value. A high yield may reflect a low future growth expectation (possibly in conjunction with some risk of non receipt of income or return of capital). A low yield may reflect high future growth prospects based possibly on substantial retained earnings in the case of an ordinary share, or growing demand in a particular property sector.

5.8 However, for the ordinary share and property markets as a whole, long term growth broadly in line with inflation may be a reasonable assumption.

5.9 If the market value grows in line with inflation over the following year, the "ultimate" tax payable in 5.5 becomes:-

$$\{ MV(1 + f) - ICB(1 + f)^t \} \times \text{tax rate.}$$

5.10 If the result in 5.5 is not negative, the growth in market value in line with inflation results in a charge to revenue in respect of an increase in deferred tax provision in the first year of:-

MV x f x tax rate x discount factor,

and in the following year, a charge of:-

(MV x f x tax rate x discount rate) x (1 + f), ...

and so on increasing each year by a factor of (1 + f).

This suggests that the initial provision was inadequate.

5.11 If growth in market value in line with inflation is reasonably expected, then it would be consistent with the indexation of the cost base to assume such growth in market value in determining the deferred tax provision in respect of (indexed) gains to date.

5.12 Thus the expression in 5.5 would become:-

$$\{MV(1 + f)^t - ICB(1 + f)^t\} \times \text{tax rate}$$

and there would be no charge to revenue in future years when the "expected" growth of the gain in line with inflation occurs.

5.13 The discount factor for deferred tax on unrealised indexed gains then becomes (with reference to 4.12):-

$$\{qv(1+f)^{\frac{1}{2}} + q(1-q)v^2(1+f)^{1\frac{1}{2}} + q(1-q)^2v^3(1+f)^{2\frac{1}{2}} \ldots.\} \times \frac{1}{(1+i)^{d/365}}$$

5.14 Summed to infinity this expression equals:-

$$\frac{q}{j+q} \times \frac{1}{(1+f)^{\frac{1}{2}}} \times \frac{1}{(1+i)^{d/365}}$$

where "j" = (1 + i)/(1 + f) - 1

5.15 Examples of the results using this formula, in conjunction with an inflation rate, "f", of 8% and "d" = 182, are:-

rate of realisation	tax provision discount factor		
q	i = .08	i = .10	i = .12
.1	.93	.77	.66
.15	.93	.82	.73
.2	.93	.84	.77

5.16 These factors are higher than the corresponding factors in 4.14 where there is no indexation. At first sight this may seem surprising. However, it must be borne in mind that these higher factors are applied to the indexed gain, a figure which is somewhat smaller than the straight excess of market value over the (unindexed) cost base.

5.17 Indexation of the cost base only applies if the asset has been held for more than 12 months prior to disposal. At a balance date, some assets may have been held for less than 12 months. Strictly therefore, an adjustment is required to the first item in the formula in 5.13 - in respect of those assets "assumed" to be sold prior to their first anniversary of purchase. However, unless the portfolio has a high proportion of under 1 year holdings, the adjustment required to the formula is insignificant.

5.18 The formula, factors and results developed in this section are based on the assumption that market values will grow in line with inflation. If this is unreasonable for a particular portfolio, the formula would need to be revised to take account of an assumed market growth rate different from the assumed CPI increase rate.

6. Purpose of Accounts

6.1 Accounts for many funds are produced for many different purposes.

6.2 Some examples are:-

(i) statutory accounts
(ii) management reporting
(iii) distribution of surplus under a life fund
(iv) treatment of surplus under a superannuation fund
(v) unit pricing
(vi) measurement of investment performance

6.3 The different purposes may lead to different accounting and valuation treatment of certain items. Some of these differences may be expressed in the form of the degree of conservatism.

6.4 Management reporting requires a realistic assessment of each accounting item in the context of the fund as a going concern. Realism demands expected values - neither being conservative nor optimistic.

6.5 Measurement of investment performance equally requires realistic accounting and valuation treatments. However, there is a strong secondary aim: consistency of treatment between funds to facilitate comparison of performances.

6.6 Unit Pricing demands equity between purchasers and sellers of units. This suggests adoption of the same realistic standards as required for management reporting.

6.7 All the other examples may include some degree of conservatism in either valuation methods or accounting treatment. Statutory Accounting requires "prudence", and conformity to legislative standards which cannot permit optimism for any item.

6.8 Prudence is also demanded when considering the allocation of any surplus in a life insurance or superannuation fund.

6.9 Different valuations of assets and liabilities and accounting treatments where the accounts are to be used for different purposes can cause confusion. A possible approach to avoid this confusion is:-

(a) use the same (realistic) standards for management reporting, investment performance measurement and unit pricing, and

(b) where different values are to be used for statutory accounting or allocation of surplus, identify the differences in the presentation of, or notes to, the accounts.

6.10 Thus, in respect of the provision for deferred tax on unrealised investment gains, future sale discounting for the expected period until the sale of the investments and subsequent payment of tax would be the realistic measure. If a more conservative assessment, such as no discounting or delayed payment discounting, was required for statutory or other purposes, the differences - both in the provision and the investment earnings on the provision - would be shown.

7. Unit Pricing

7.1 Consider the following unitised non-exempt life insurance fund:-

Book Value/Market Value of assets		$10,000/$15,000
Number of Units		10,000

	No deferred tax provision	discounting (refer 4.2) delayed payment	discounting (refer 4.2) future sale
	$	$	$
Provision for deferred tax on gain at 39%	-	$1950v^{\frac{1}{2}}$	$\frac{1950\,q\,v^{\frac{1}{2}}}{i+q}$
(i = 10%, q = 20%)	-	= (1,859)	= (1,240)
Net Assets	15,000	13,141	13,760
Unit Price	1.500	1.314	1.376
Investment income over next 12 months at 10% net of tax	1,500	1,500	1,500
Market Value of assets at end of period	16,500	16,500	16,500
Book Value	11,500	11,500	11,500
20% of assets sold during period			
Tax provision for realised gain at end of period at $0.39v^{\frac{1}{2}}$	(372)	(372)	(372)
Provision for deferred tax at end of period	-	(1,487)	(992)
Net Assets	16,128	14,641	15,136
Unit Price	1.613	1.464	1.514
Unit Price increase over period	7.5%	11.4%	10%

7.2 Original policyholders will have purchased their units for $1.00. Consequently their performance up to the commencement of the period examined varies significantly depending on the treatment of deferred tax.

7.3 Under delayed payment discounting the unit price at the beginning of the year of 1.314 is the lowest - indicating poorest performance up to that time. However, over the subsequent 12 months this method produces the best result.

7.4 However, the investment performance of the underlying assets over the year of the year was 10%, and this is what a unitholder purchasing units at the beginning is entitled to expect.

7.5 Thus unit pricing based on future sale discounting of the deferred tax provision provides the fairest result in the above scenario.

7.6 Alternative scenarios will produce different results. Indeed if no assets were sold during the period the only unit pricing method which would produce the 10% performance would be the one which made no provision for deferred tax.

7.7 Perhaps policyholders should be provided with (a) the excess of market values over book values (indexed where relevant) and (b) the amount of the provision for deferred tax. This would enable the policyholder to make his or her own judgement as to the suitability of the provision in relation to stated investment objectives and turnover history.

7.8 Such information could appear in brochures together with a statement regarding any planned changes of policy. It could also be provided with annual advices to policyholders, and on enquiry.

7.9 However, the disclosure of the deferred tax provision from time to time and any stated current objectives with regard to its calculation should not act to restrict the fund manager either in the turnover activity or in changing the deferred tax provision calculation methods if the manager felt such actions were necessary in the interests of policyholders as a whole.

7.10 At the same time, it would seem that there is an obligation on the part of the fund manager to determine the unit price adjustment for deferred tax on the basis of "reasonable projection" of expected fund turnover and fund earnings. In this respect, it is suggested that the future sale discounting method be adopted for the purpose of carrying out the necessary calculation.

7.11 The formula,

$$\frac{i}{i+q} \times \frac{1}{(1+i)^{d/365}}$$

derived in 4.12 provides a factor assuming a level rate of future turnover. If this is not reasonable for any reason, adjustment would be required.

8. Losses

8.1 For tax purposes, realised losses are set off against realised gains in the same tax year. Excess losses may be carried forward to be set off against gains in subsequent years.

8.2 If realised gains in the current tax year have already occurred, then any realised losses (amounting to less than the gains) will act to reduce tax.

8.3 The effective tax credit available from a realised loss may also be considered to be of value if realised gains are reasonably expected in the future - say, if there exist some unrealised gains. This position may apply whether or not the losses and expected gains are in different sub funds - provided the sub funds are taxed in aggregate rather than individually.

8.4 The tax effect accounting standard permits such a tax credit asset in the balance sheet as "future tax benefit" - but only if it is virtually certain that there will be future gains to absorb the carry forward losses.

8.5 The purpose of unit pricing is to obtain fairness as between purchasers and sellers of units. Allowing a tax credit in the determination of the unit price would thus seem quite reasonable.

8.6 Any unrealised losses may usually be set off against unrealised gains for the purpose of determining the deferred tax provision. Effectively any reduction in market value of an asset creates a deferred tax credit.

8.7 If there are net unrealised losses then a future tax benefit can only be included in the accounts if it is virtually certain that when such losses are realised they will be capable of being set off against realised gains. This relies on it being reasonable to assume that market values will rise sufficiently within a short period.

8.8 Similarly, a unit price adjustment for a future tax benefit can really only be justified, if there is a strong prospect of sufficient gains in the future - either within the fund or another fund which was included in the same tax net.

8.9 Any discount factor adopted must take into account the period until unrealised gains actually exceed unrealised losses as well as the period to actual sale and eventual payment of tax.

9. Expenses Relief

9.1 Certain expenses are deductible from the assessable income of all funds subject to taxation. Broadly these are all expenses incurred in the obtaining of assessable income, with the exceptions of entertainment expenses and fringe benefit tax.

9.2 Where a fund is unitised, the benefit of expenses relief may be reflected in unit prices by adjusting either:-

(a) the tax rate or rates to be applied to investment income, or

(b) the expense charges, or

(c) a combination of (a) and (b).

9.3 Expenses charged to a unitised fund may be levied:-

(i) as a specific charge or charges, allowing some profit element to arise in the hands of the fund manager, or

(ii) approximately on a continuing basis, with regular adjustments as the accounting catches up with the experience, or

(iii) a combination of (i) and (ii).

9.4 In the case of a single fund, operating in accordance with (ii) above is relatively straight forward. With multiple funds, an attempt would need to be made to attribute the expenses fairly - in particular for superannuation funds between relevant contribution income and investment income.

9.5 Tax relief on such expenses can be accommodated similarly.

9.6 For a life insurance company, expenses are attributed separately to:-

(a) investment expenses
(b) management expenses

9.7 Investment expenses are relievable against taxation in all funds, except that part attributable to immediate annuity business which is not taxed. However, management expenses are only relievable in full against assessable income for superannuation and other (non life) classes of business, and for shareholders' funds.

9.8 For the non exempt life business, management expenses are only relievable in the proportion that "investment" premium income bears to total premium income. At the time of writing this paper the legislation for this (which was announced in the Budget last August) has not been drafted. However, the intention is to exclude from tax relief that proportion of management expenses attributable to the amount or proportion of premium under each policy required for the insurance risk - on the grounds that mortality profits are effectively not taxed.

9.9 In calculating a life insurance company's superannuation expense relief, management expenses which are not directly attributable to any particular class of business must be apportioned to the separate classes in proportion to the assessable income of the classes. (The alternative approach of "fair apportionment" is rarely adopted - possibly because there may be some difficulty in persuading the tax authorities to accept a "fair apportionment" which produces a lower amount of tax!)

9.10 It is emphasised that this does not necessarily mean any change in the level of expenses attributed to each class for the accounts. The change need only occur in respect of the taxation calculation, i.e. in the amount of expense relief included. However, some companies may wish to allocate expenses for their accounts in this way as well.

9.11 At the present time, for the purposes of determining expenses relief for the superannuation business of a life company, the assessable income for that business is adjusted to exclude realised (indexed) gains and realised losses. This seems reasonable as the realising of gains is unlikely per se to result in any additional management expenses. There may be expenses incurred in the actual selling process - but these are treated as capital amounts to be deducted from the sale proceeds rather than considered as expenses incurred in the obtaining of income in the revenue account.

9.12 Interestingly, no adjustment to exclude capital gains is made for the other classes of a life company's business, when determining the apportionment of management expenses to those funds. In drafting the new legislation for management expenses relief in respect of the non exempt business, it is to be hoped that this adjustment will be introduced for all classes, to avoid distortion in the apportionment. If this is not done, the inclusion of realised gains in the assessable income for non exempt business could result in higher expense relief for that business - at the higher 39% tax rate!

9.13 For superannuation managers with more than one fund, expenses apportionment is determined by the trustees - both for accounting purposes and for taxation. Where however apportionment is decided to be in proportion to assessable income including realised (indexed) gains, some consideration may need to be given to the distorting effects on each fund's result.

10. Equity between Members and Sub funds

10.1 For convenience in this paper, I have used the expression "fund manager" to describe the individual or body responsible for all aspects of the fund. In practice, this responsibility may ultimately be carried by the directors (e.g. of a life company) or trustees (e.g. of a superannuation fund or unit trust).

10.2 Often though, responsibility for suggesting unit price calculation methods and deferred tax provisions may rest with the fund manager.

10.3 Any decisions made must of course be within the descriptions provided in relevant documentation - i.e. policy document, prospectus, trust deed.

10.4 With regard to taxation it is important to note that if the fund is subject to tax it is the fund as a whole that is assessed. Individual members' interests within the fund are not separately assessed. Accordingly, the effect of the fund's tax payment on individual members' interests in the fund is something which must be covered in the documentation.

10.5 Moreover, a superannuation fund or a life company statutory fund may have a number of sub funds for different classes of members or policies. The sub funds are not assessed individually. Again taxation charges on the sub funds must be provided for in documentation.

10.6 The provision for tax due on income and gains is clearly a current liability and is readily taken into account as is any other charge on the fund. Even so, the period until actual payment will usually be known and considerations of equity suggest adoption of a discount factor to allow for the delay - both for sub funds and members' accounts. In addition, individual sub fund credits for losses are acceptable under the "tax effect accounting" standard provided that the total fund has positive gains in aggregate, or sufficient gains to offset losses are reasonably expected in the foreseeable future.

10.7 With regard to deferred tax, the logical starting point is to levy the charge that would be applicable if the sub fund were separately assessed. However, it is reasonable for each sub fund to obtain the benefits of being part of the total fund, e.g.:-

(i) inclusion of a future tax benefit in respect of unrealised losses on the basis that the total fund will have sufficient gains.

(ii) avoidance of "small fund" conservatism in discounting.

10.8 Another area where responsibility and judgement must be exercised is in relation to transfers of assets between funds. Where the funds are separately taxed such a transfer is treated as a sale and purchase. The issue is then usually only the selection of a reasonable "arms length" market value.

10.9 Where, however, both funds are within the one tax entity, the transfer does not create a tax liability as the gain is not realised at this point.

10.10 At the same time, one fund is giving up a deferred tax liability, while the other fund is assuming one. If the same discount factor is adopted for each fund, the situation is relatively straight forward. If, however, different discount factors apply - say, because one fund was turning over its assets faster than the other - then consideration would need to be given as to the sharing of the profit or loss arising from the transfer of deferred tax liability.

10.11 Any superficial "fairness" from a 50/50 split of such profit or loss may need to be tempered by consideration of whether the first fund was in a "forced seller" position. The documentation should make fund relationships clear in this regard.

10.12 Even after the adjustments indicated above it is quite likely that the aggregate of tax charges on the sub funds may not equal the total tax liability (including deferred tax liability) of the fund as a whole. This can occur for a number of reasons. The main ones are:-

(i) If different sub funds are subject to different tax rates, the allocation of expenses formula for determining total tax may produce a different result from that arrived at by totalling the tax charges on the sub funds where expenses may be allocated on a different basis, albeit more appropriate from a management point of view.

(ii) The deferred tax liability determined for the fund as a whole may be different from the aggregate of the charges levied on the sub funds, due to different asset realisation timing assumptions.

(iii) A transfer of an asset between sub funds where different rates of tax apply can create a tax charge for the gain in the transferor sub fund, which will be different from the amount of tax in respect of that gain ultimately paid by the transferee sub fund.

10.13 Summarising, it is suggested that the following principles apply to taxation charges including provisions for deferred tax on sub funds:-

(i) charges are levied on each sub fund as if it were a single fund subject to tax at the rate for the relevant class of business, but as modified by the other principles below;

(ii) transactions between the sub funds are carried out on an arms length basis;

(iii) charges are levied on each member's account as if that member were the only member of a single fund subject to tax;

(iv) members' accounts and sub funds are allowed tax credits where it can reasonably be expected that for the fund as a whole realised gains will exceed realised losses in the short to medium term;

(v) discounting of tax and deferred tax liabilities may have regard to the timing of payments by the fund as a whole - separately as necessary for the different classes of investment;

(vi) broad adjustment may be made in respect of any sub funds where it is evident that the aggregate of tax charged to the sub funds will not equal to the tax liability of the fund as a whole.

10.14 With regard to taxation therefore, documentation should be drafted in a way that concentrates on the requirements of equity and fairness between members or unitholders of a fund - rather than providing factors which limit the manager's ability to obtain fairness and equity.

11. Gross Gains Linking

11.1 The method of linking life policy benefits to investment performance adopted in the paper so far may be referred to as "net gains" linking. This is because there is a continuous adjustment to gains in respect of deferred tax - so that only "net gains" are included in performance.

11.2 An alternative approach to investment performance linking under life company contracts is "gross gains" linking.

11.3 Under this method no allowance is made for deferred tax on any unrealised gains. Adjustments for tax are made:-

(a) when dividends are received and gains are realised from the underlying investments (or when these are assumed to occur under an indexed fund), and

(b) by deduction from policy benefits when these are paid - in respect of the potential tax on gains not yet realised.

11.4 The following example illustrates the difference between net gains linking and gross gains linking:-

Investment held			
- Book Value			10,000
- Market Value			15,000
Gross Assets			15,000
Number of Units			10,000
Gross gains Unit Price	$\frac{15,000}{10,000}$	=	1.50
Deferred Tax			
- undiscounted (39%)			1,950
- discounted (20%)			1,000
Net Assets	15,000 - 1,000	=	14,000
Net gains unit price	$\frac{14,000}{10,000}$	=	1.40

11.5 Since it will usually be the case that there will be new and additional premiums being received from policyholders at the same time as surrenders are occurring, the underlying investments will not need to be sold to meet the surrenders. The company will not therefore incur an immediate liability for tax on any gains included in the proceeds. Consideration may therefore be given to passing on this benefit in the form of a discounted policyholder deduction on surrender.

11.6 In the above example "equivalence" under the two methods would be readily found by making a deduction of 0.10 per unit from policy proceeds - but only if the units had been held throughout the period that the gains were made.

11.7 Let us assume instead that a policyholder had purchased units when:-

Market Value of investments held was	$13,000
Compared with Book Value of	$10,000
The gross gains unit price (assuming the same 10,000 units) would have been	$1.30

11.8 The deduction from policy benefits under a gross gains linked contract would need to take into account only the increase in unrealised gains made since the purchase of units - in this case $(15,000 - 13,000),i.e. $2,000 or $0.20 per unit. If discounting on the previously assumed basis was justified the deduction would be 20% of this, i.e. $0.04 per unit.

11.9 Gross gains linking appears attractive for selling new business since a "higher" investment performance will usually have been recorded compared with the equivalently invested net gains fund - although of course benefit illustrations would take into account the effect of the policy benefits termination deduction.

11.10 However, the life company assumes two forms of risk:-

(i) the actual timing of realising investments may not match that assumed in the discounting,

(ii) the rate of tax on gains may change.

Under net gains funds these risks are usually borne by the (remaining) policyholders.

11.11 A company managing a gross gains fund will therefore usually adopt a conservative approach in determining the level of the policy benefits terminal tax deduction. Certainly where there has been a loss on the policy the company would need to consider future prospects for the investments very carefully before giving any form of tax credit on benefits. For the net gains fund, the objective in the allowance for deferred tax in the unit price is "realistic fairness" as between incoming and outgoing unitholders. This is likely to mean that actual policy results from investing in a net gains fund will be greater than under a gross gains fund, on average in the long term.

12. Gross Gains Funds - Investment of Policy Deductions

12.1 Under gross gains funds deductions from policy benefits for tax must be held in the form of a reserve to meet the eventual liability for tax when the gains on the underlying investments are realised.

12.2 Where no indexation applies, the amount of the unrealised gain is crystallised at the time of the payment of policy benefits and the levying of the tax deduction. Any consequent gain from the underlying investments will be earned by other policies from which tax deductions will be made in respect of it on termination.

12.3 The most appropriate form of investment when a liability is fixed in money terms is a fixed interest investment of the same term as the liability. However, in this case, the term is uncertain. While an assumption may be made at the time of the tax deduction, actual realisation of the underlying investments may occur much sooner depending on other policyholders' voluntary redemptions, or the managers taking advantage of investment market opportunities.

12.4 Accordingly, cash is likely to be selected as the best form of investment for the deferred tax liability. Any discounting in the determination of the policy benefits tax deduction must therefore take into account the uncertainty of future interest rates on cash.

12.5 Prudence is likely therefore to permit only modest discounting. If the formula $\frac{q}{i + q}$ is used, both the parameters adopted are likely to be more conservative than under a net gains fund, i.e. a higher rate of realisation, "q", and lower discount rate, "i".

12.6 Where indexation applies, and it is (reasonably) assumed that market values will grow with inflation, the amount of any gain on the underlying investments will itself grow (refer paragraph 5.10). This means that the policy benefit tax deductions should be invested in an asset which will itself grow in line with CPI. Such growth, whether in the form of interest earnings or capital gains, will be net of any tax applying to the fund.

12.7 The uncertainty that future net interest returns will match inflation suggests consideration of an alternative investment to cash.

12.8 The same assets as those applicable to the investment link have some virtues:-

(i) If capital values increase at or faster than the rate of inflation (as measured by the increase in CPI) then the deferred tax liability increases at the inflation rate. Accordingly, the liability is covered by the growth in the value of the assets.

(ii) If capital values increase at a lesser rate than inflation then the deferred tax liability also increases at a lesser rate and is therefore broadly covered.

(iii) If capital values do not increase at all then the liability decreases as the indexation allowances on the cost base book values build up.

12.9 Provided therefore no tax credits are given to policyholders for any losses, investment of the deferred tax liability for indexed gains in the same assets provides reasonable matching. Any discounting in determining the tax deduction is likely however to be out of the question.

13. Net Gains Funds - Accumulation of Provision

13.1 In general, it is suggested that the provision for deferred tax at the beginning of a year, accumulated with interest net of tax, should provide

(i) the amount necessary to pay any tax on the realised gains during the year allowing for interest to the date of actual payment, plus

(ii) an amount sufficient for the provision for deferred tax at the end of the year in respect of the remaining gains, i.e.

$$R_o(1 + i) = \frac{t.q.G.}{(1 + i)^{d/365}} + R_1$$

where "G" is the total unrealised gains at the beginning of the year,
"q" is the proportion of G realised during the year,
and "t" is the rate of tax.

13.2 Where no indexation applies it can readily be demonstrated that this formula is consistent with the general provision developed in section 4 where

$$R_o = t.G. \times \frac{q}{i + q} \times \frac{1}{(1 + i)^{d/365}}$$

13.3 Where indexation applies the general formula in 13.1 requires modification to:-

$$R_o(1 + i) = R_o(1 + j)(1 + f) = \frac{t.q.G.(1 + f)^{\frac{1}{2}}}{(1 + i)^{d/365}} + R_1$$

where "f" is the rate of inflation as measured by the increase in CPI,
Market Values are assumed to increase at rate f, and
"j" = $(1 + i)/(1 + f) - 1$, i.e. the real rate of return net of tax.

13.4 Again it can readily be demonstrated that this formula is consistent with the general provision for unrealised indexed gains developed in section 5 where

$$R_o = t.G. \times \frac{q}{j + q} \times \frac{1}{(1 + f)^{\frac{1}{2}}} \times \frac{1}{(1 + i)^{d/365}}$$

13.5 The principle of the accumulation of the provision suggests that, for unit pricing purposes in respect of any period between valuations,

(i) the total provision for deferred tax at the beginning of the period be accumulated with interest net of tax,

(ii) a provision for deferred tax in respect of further unrealised gains arising (in excess of the CPI increase in respect of indexed gains), be added on the formula basis, and

(iii) on realisation of any gain the provision for tax on that gain be deducted from the total provision for deferred tax.

13.6 This procedure would ensure that on the sale of an asset for the value at which it was held, there would be no change in the unit price. This seems a desirable objective for unitholders.

13.7 In addition, the procedure would alleviate any concern by the fund manager that his or her act of selling an investment in favour of one with perceived better prospects would affect immediate investment performance detrimentally.

13.8 It would, of course, be necessary to ensure that the deducting of the provision for tax on realisation of any gain did not result in the provision for deferred tax on the remaining unrealised gains becoming inadequate. Nor should the accumulation of the provision for deferred tax with interest in a quiet trading period result in this provision becoming excessive.

13.9 It is suggested that the procedure suggested above operates within a minimum of the section 4 or section 5 formula result and a maximum of that result increased by one year's interest net of tax.

13.10 In addition, as mentioned previously it would be necessary to review the assumptions for the calculation of the provision for deferred tax from time to time.

13.11 Where the company's balance sheet was drawn up on a "realistic" basis the above procedure may result in a different provision for deferred tax within the unitised sub fund from that applicable to the total fund if the formula was used for the latter without adjustment. The provision within the unitised sub fund would always be the greater figure in these circumstances. Accordingly, it is suggested that an amount equal to the total of the sub funds' provisions be adopted for consolidated balance sheet purposes.

14. Unit Trusts

14.1 Unit Trusts, whether listed or unlisted, are taxed on income and realised gains which are not distributed. Any such income and realised gains which are distributed are not taxed when received by the trust, but are instead taxed in the unitholders' hands under normal tax rules.

14.2 Like much tax legislation, the basic principles seem fair, but examination of particular situations reveals anomalies.

14.3 One significant aspect for unlisted unit trusts is the effect of the legislation on sellers and purchasers of units. The following example illustrates the problems that can arise.

14.4 Consider a unit trust which purchases properties with $1m of subscriptions from unitholders who are given 1m units at a $1.00 each. Over a period the properties increase in value to $2.3m while the indexed cost base rises to $1.3m. Subsequently, over a short period,

(a) Unitholder A sells his units back to the Trust;
(b) Unitholder B buys units from the Trust;
(c) The properties are sold.

14.5 The transactions and tax consequences may be summarised, assuming the unitholders are 47% marginal taxpayers (and Medicare levy is ignored):

	Trust $	Unitholder A $	Unitholder B $
Properties purchased	1m		
Unit price		1.00	
Market value rises to	2.3m		
Indexed cost base	1.3m		
Unit price on sale/purchase		2.30	2.30
Unitholder tax on gain in price		(0.47)	
Properties sold:			
Distribution of gain	1.3m		1.30
Trust/Unit price reduces to	1.0m		1.00
Tax payable by unitholder			(0.47)

14.6 Unitholder A is happy. He/she has achieved a favourable investment return and has paid an appropriate amount of tax. The amount of tax paid corresponds to the amount of tax that would have been paid if a direct investment in property had been made. And the Treasurer is happy because the intended amount of tax has been collected on the realisation of an investment - in this case units in a unit trust.

14.7 Unitholder B is not so fortunate. He/she has purchased units at $2.30, received $1.30 in distributions and seen the unit price fall to $1.00. So far no profit and no loss. But the sale of the property within the trust and distribution of the gain has generated a tax liability equivalent to $0.47 per unit. Thus Unitholder B has received no benefit from the gain, but must pay tax on it!

14.8 Of course, Unitholder B could cash in the units to crystallise the $1.30 per unit loss, which could then be offset against the $1.30 per unit distributed gain. This action would neutralise the tax liability. However, the distribution and realisation would need to take place within the same tax year. Moreover, the unitholder would suffer the costs of redemption and new purchase if it were desired to maintain the investment in the same trust.

14.9 Arguably some adjustment could be made to the unit price to put the unit sale/purchase transactions on a fairer basis.

14.10 If a full provision for tax on the indexed gain had been made at 47% the unit price would have been $(2.30 - 0.47), i.e. $1.83. Unitholder B would then be in the "correct" position:-

Investment	$1.83
Unit value after distribution,	1.00
plus distribution of gain,	1.30
less tax on indexed gain	(0.47)
	$1.83

i.e. no gain no loss, but this time the tax has been paid.

14.11 Consider though, the position of Unitholder A on a per unit basis:

Investment	$1.00
Sale Proceeds	1.83
Indexed gain	0.53
Tax on gain at 47%	(0.25)

Even though the unit price makes a full provision for tax on the unrealised gain within the trust, Unitholder A must pay tax on the net gain in the value of his/her units. Unitholder A is clearly worse off. Moreover he/she is clearly worse off than if a direct investment in property had been made..

14.12 Thus, whether an adjustment for tax is made or not, the Treasurer benefits unreasonably through a form of double taxation in this situation.

14.13 Consider also the position of unitholder C who purchased units at the same time as Unitholder B, but whose income is insufficient for personal tax to be paid. Purchase of units at $1.83 will produce an unexpected bonus, since the distribution of $1.30 will now exceed the fall in the unit price by $0.47 - with no tax to pay.

14.14 Intermediate unit price adjustments for potential tax on unrealised gains can be considered. But none of these can properly take into account the different tax rates of unitholders. Accordingly, to my knowledge no adjustments have been made. In any case not all unit trust deeds would necessarily permit adjustment.

14.15 Despite much correspondence and many discussions between Treasury officials and interested parties, in particular, the Unit Trust Association of Australia, no acceptable method of dealing with the above anomalies has been agreed. While the above examples are based on an extreme situation (i.e. the sale of the whole of the investments of a Trust) the inequity (and iniquity) is quite clear.

14.16 The simplest solution would be to adopt the UK approach (as has been recommended by the UTAA). This ignores sales of investments within the Trust. Realised gains do not require distribution to avoid a trust tax liability. Consequently these are (usually) retained within the trust. The unitholder is then subject to tax on gains only when units are sold back to the Trust, or in the case of a listed trust, sold in the market.

14.17 This approach has the virtue that unitholders are treated fairly - but it does delay the tax take for the government compared with the present situation.

15. Pooled Superannuation Trusts

15.1 Pooled Superannuation Trusts are investment vehicles for superannuation funds, approved by the Insurance and Superannuation Commission for this purpose.

15.2 They are established in accordance with unit trust principles. However, the treatment of tax on gains varies from that applicable to unit trusts generally.

15.3 In this case the trust and the superannuation fund investing in the trust are subject to the same rates of tax on investment income, capital gains and contributions. Moreover, there are clear rules to indicate which body pays the tax, so that "double charging" should not arise.

15.4 Where the trust accepts the liability for tax, the treatment of tax on gains and deferred tax on unrealised gains varies widely - both in accounts and unit pricing.

15.5 It is suggested that the principles procedures and formulae set out in this paper in relation to the treatment of tax on investment gains can generally be applied to pooled superannuation trusts.

15.6 An area of particular concern is in respect of "active" superannuation funds. The trustees of some funds may perceive that maximising investment performance means switching investment managers relatively frequently on the basis of their short term performance results. Such funds, investing in and then within a short period disinvesting from a pooled superannuation trust, should not be given the benefit of heavily discounted deferred tax in their unit prices on redemption reflecting an expected low turnover rate of investments. Such a benefit would only be at the expense of longer term investors who find their unit prices depressed later as tax becomes payable on the gains earlier than provided for.

15.7 It would be desirable for documentation for superannuation trusts to provide some flexibility in determining the deferred tax adjustment in the unit price in the case of large redemptions.

16. Investment Strategy

16.1 Broad strategy requires consideration of the fund objectives. This is not intended to be covered in this paper - except in respect of taxation aspects.

16.2 Different forms of investment suffer tax in different ways. The client (trustees/policyholders/fund members) is interested in benefits payable out of the fund - which are after providing for any tax. Consequently prospective returns, net of tax, are more relevant than gross returns.

16.3 By way of illustration the following table compares prospective returns from different forms of investment for funds subject to different tax rules.

	Gross return % p.a.		Net Return % p.a.			
Type of Investment	Income	gains	Life Fund (non exempt)	Super-annuation Fund	Unit Trust Taxpayer 47%	Unit Trust Nil
Fixed Interest (10 year term)	13	-	7.9	11.1	6.7	13.0
Ordinary Shares						
- Divs. 100% franked	4	8	10.2	14.0*	11.6	12.3
- Divs. not franked	5	8	9.2	12.6	10.8	13.4
Preference Shares						
- Divs. 50% franked	11	-	8.3	11.6	7.1	11.0
Property, with 100% depn. alls. at 2.5%	5	8	10.7	13.0	12.1	13.4

* provided total tax on all investment income and gains exceeds share imputation credits and property depreciation allowances.

16.4 The expenses of management, including the expenses of collecting income and costs of buying and selling investments may impact differently for different forms of investment. Thus prospective gross returns in the above comparison should be on an "after expected expenses" basis.

16.5 The gross return assumptions are intended to be broadly consistent with each other and represent possible market expectations at the time of writing this paper.

16.6 The net returns shown are after tax on income at current rates: 39% for the Life Fund non-exempt business, 15% for the Superannuation Fund (and Life Fund superannuation business), and 48.25% for the 47% taxpayer including the Medicare levy. In respect of gains an 8% inflation (CPI increase) rate has been assumed which results in no tax on (indexed) gains in the case of the Superannuation Fund nor for unit trust members.

16.7 For the Life Fund non exempt business the impact of tax and deferred tax has been assumed to follow the fortunes of funds subject to the following experiences:-

	Ordinary Shares	Property
Rate of realisation (q)	20% p.a.	10% p.a.
Net return (i)	10% p.a.	10% p.a.
Deferred tax provision propn. of tax payable = q/(i + q)	67%	50%

16.8 It would be worthwhile carrying out simulations of returns using different assumptions, to test the impact of tax in different situations. In particular, simulations based on previous market experience are also valuable. These will also draw attention to the effects of tax when returns are negative.

16.9 The results of the simulations will be useful input to determining the overall investment strategy for the fund.

16.10 Another aspect of strategy is concerned with the principles to be adopted in selling one investment in favour of the purchase of another of a similar type. To what extent should the fund manager take into account the tax payable on the realisation of any gain?

16.11 This question is examined below in the form of alternative scenarios with different methods of providing for deferred tax on unrealised gains.

16.12 If no deferred tax provision was made within the fund, the fund manager has the concern that on the sale of any asset for a profit the unit price would fall - by the effect of the amount of tax on the gain becoming immediately payable.

16.13 Consider the following scenarios which, for simplicity:-

(a) are based on the results of retaining or switching an investment in a non exempt Life Fund portfolio which otherwise does not change, and

(b) ignore any need to discount tax due at the balance date in respect of the period from that date up to the date of actual payment.

16.14

	Portfolio $	Units	Stock considered for Switch $
Units		1,000	
Cost base	1,000		100
Value at time1	1,500		say, 151
Potential tax on gains at 39%	(195)		(20)

Unit Price:
- no deferred tax provision 1.500
- full deferred tax provision 1.305

Retaining existing holding		Switch to new holding (net proceeds from existing holding 131)	
Value at time2	say, 177		say, 167
Potential tax on gain	(30)		(14)

Effect on Unit Price: (a) if no deferred tax provision

Unit Price at time1	1.500	falls to		1.480
Fund at time2	1,526	(1,500 - 20 + 36)	1,516	
Unit Price at time2	1.526			1.516

Effect on Unit Price: (b) if full deferred tax provision

Unit Price at time1	1.305			1.305
Fund at time2	1,321	(1,305 + 36 - 14)	1,327	
Unit Price at time2	1.321			1.327

16.15 Ignoring the tax consequences, it is quite evident that, from the date that the switch is considered, the performance of the new investment is better than that of the original investment. However, if no deferred tax provision exists it appears that the switch cannot be justified. Certainly fund performance would be immediately impaired by the tax incurred on the gain.

16.16 The "no deferred tax provision" approach would apply to gross gains funds. However, the policyholder need not be concerned about fund performance per se. It is the comparison of benefits available after the tax deduction from policy proceeds that is relevant. Assuming that a 67% discount factor applies, the tax deduction from policy proceeds at time2 if no switch is made is $(0.195 - 0.020 + 0.030) \times 0.67 = 0.137$ per unit. If the switch is made, the deduction is $(0.195 - 0.020 + 0.014) \times 0.67 = 0.127$.

16.17 In this case the net result for the policyholder is a unit value of $1.516 - 0.127 = 1.389$ if the switch is made, and $1.526 - 0.137 = 1.389$ if the switch is not made, i.e. the same.

16.18 For a net gains fund, the simplest position for a fund manager is where full provision for deferred tax is made within the fund. There is no immediate effect on the unit price whether or not the switch is made. The switch can therefore be considered on its merits ignoring any immediate tax consequences - but of course taking into account future tax consequences in accordance with the principles discussed earlier in this section.

16.19 However, making a full deferred tax provision for the whole fund will be unreasonable where it is expected that only a part of the investments of the fund will be turned over each year. As has been illustrated earlier, there will be inequity between policyholders buying units in the fund and those selling them back to the fund.

16.20 Moreover, a full deferred tax provision reduces unit price performance (when investment gains are being made), which is not desired by the fund manager. This aspect is considered further in the next section.

16.21 The fund manager managing a net gains fund desires to have a deferred tax policy which:-

(i) as far as possible does not constrain him (or her) from selling investments which are not expected to perform as well as alternatives in the future, and

(ii) enables investment performance to be judged on a fair basis.

16.22 The future sale discounting method for deferred tax suggested earlier in this paper would provide the following picture for the portfolio and scenarios set out in 16.14.

Assume "q" rate of realisation = 10% p.a.
"i" net rate of return = 10% p.a.
Discount factor for deferred tax $q/(i + q) = 0.5$

	Portfolio $	Stock considered for Switch $
Value at time1	1,500	151
Potential tax on gains	(195)	(20)
Discounted Provision for deferred tax	(98)	(10)

Retaining existing holding		Switch to new holding (net proceeds from existing holding 131)	
Value at time2	177		167
Potential tax on gain	(30)		(14)
Discounted Provision	(15)		(7)
Effect on Unit Price:			
Unit Price at time1	1.402	falls to	1.392
Fund at time2	1,423	(1,392 + 36 - 7)	1,421
Unit Price at time2	1.423		1.421

16.23 As perhaps expected, the results are intermediate between those in 15.14 if no deferred tax provision had been made and those if there had been a full deferred tax provision. Even so, what appears to be fundamentally a good switch still does not achieve a better result in terms of unit price performance.

16.24 The rationale behind the use of the discount formula for the deferred tax provision makes the assumption that the assets representing the provision will earn an investment return.

16.25 Let us assume that at the time of the switch, $time_1$, the provision had been built up with interest at the 10% p.a. rate assumed, to say $108, instead of $98 without interest.

16.26 When the switch is made, the whole of the $20 tax due on the gain on the existing holding could have been paid out of the provision, leaving $88 for the remaining gains - still covering the deferred tax 50% discount level required.

16.27 In these circumstances the net proceeds effectively available for reinvestment are (151 - 10) = 141, i.e. the value of the stock sold less only the (50%) discounted provision for deferred tax - since the balance required to pay the full tax on the gain has been paid out of the total fund provision.

16.28 Moreover, the unit price,which would have been 1.392 with the higher provision,would not have fallen at the time of the switch. Accordingly, the switch could be justified purely on the merits of expected future performance.

16.29 The picture in 16.22 would then become:-

	Portfolio $	Stock considered for Switch $
Value at time1	1,500	151
Potential tax on gains	(195)	(20)
Provision for deferred tax	(108)	(10) (50%)

Retaining existing holding		Switch to new holding (net proceeds from existing holding 141)	
Value at time2	177	say, $167 \times \frac{141}{131}$	180
Potential tax on gain	(30)		(15)
Discounted provision	(15)		(8)
Effect on Unit Price:			
Unit Price at time1	1.392	remains at	1.392
Fund at time2	1,413	(1,392 + 39 - 8)	1,421
Unit Price at time2	1.413		1.423

16.30 It is suggested that this is the fairest picture out of those illustrated in this section. There is no fall in the unit price on the making of the switch, and the investment results over the whole period seems to provide a reasonable comparative representation of the performances allowing for taxation.

16.31 In adopting a flexible discounting procedure it would be necessary to:-

(a) ensure that the total fund provision for deferred tax never fell below a minimum acceptable level for fair unit pricing,

(b) ensure that the total fund provision for deferred tax never rose above a maximum acceptable level for fair unit pricing, and

(c) continually review the parameters adopted for discounting - in particular the assumed rate of realisation of investments.

Section 13 suggested possible theory and practice for (a) and (b).

17. Investment Performance Measurement

17.1 A number of aspects of investment performance measurement have already been touched upon. This section is intended to cover the subject more fully - insofar as tax on investment gains impacts on performance.

17.2 There are two major considerations: the impact of tax within the method of performance measurement, and the impact of tax in comparing the performances of different funds.

17.3 A possible solution might be to ignore tax completely. Unfortunately, this will rarely be an option: the trustees/policyholders/fund members are concerned with deliverable cash. In the case of unitised net gains funds, the only valid measure of performance to the beneficiaries under the fund is the change in the unit price - which is net of tax. Even in the case of gross gains funds, tax must be provided on realised gains within the fund.

17.4 Some variation in practice exists in regard to the provision for tax on realised gains (indexed as appropriate). Some managers make a full provision; others discount for the period to actual payment of the tax.

17.5 The area of greatest variability in practice is the allowance for potential tax on unrealised gains.

17.6 It is suggested that the flexible discounting approach to deferred tax outlined in paragraphs 16.24 to 16.31 and based on section 13, provides reasonable results.

17.7 A major problem exists in comparing the results of funds where different methods of providing for deferred tax apply. However, even if somehow agreement could be reached on adoption of the same method, different fund managers will make different assumptions as to the rate of realisation of investments. And these may or may not correspond with actual experience.

17.8 A solution that has been suggested in some quarters is for not only unit prices to be disclosed, but also:-

(a) the discount factor adopted for deferred tax provision, and

(b) the amount of the effective enhancement included in the unit price from the adoption of a discount for deferred tax provision, i.e. the amount by which the unit price would fall if there was a full provision for deferred tax.

17.9 Analysts may then make their own judgement as to whether to comment on the level of discounting adopted and any change in that level. Almost certainly, however, the trustees/policyholders/fund members will concentrate only on the change in the unit price!

17.10 I am unsure, however, whether this additional information is entirely helpful. What really matters is the extent to which the actual discounting differs from that which might be termed "reasonable" for the particular fund. Concentrating attention on the discount differences per se may ignore possible valid reasons for the differences.

17.11 It is clearly desirable that there should be some consistency in the methods adopted for investment performance measurement for the benefit of comparison by observers.

17.12 It is even more important for a standard to be developed which concentrates on determining reasonable assumptions and the responsibility of those involved in such determination. For this reason, it is suggested that the assumptions should be approved by the trustees, or the manager if there are no trustees.

17.13 It is hoped that this paper will have contributed further to the reasonable aim of adoption of a single method for the treatment of provision for deferred tax on unrealised gains, and will have drawn attention to the importance of making reasonable assumptions with regard to the discounting for the likely period to the sale of assets and the delay until actual payment of the tax.

18. Disclosure

18.1 With regard to the treatment of tax on investment gains, disclosure is required by law, or desirably should be made, in a variety of documents.

18.2 For unit trusts:-

(a) Accounts must disclose the amounts of realised and unrealised gains and tax and deferred tax provided.

(b) Prospectuses must indicate generally whether the trust intends to retain or distribute gains and how this will affect the unit price and the unitholder. Desirably they should also supply or offer to supply information regarding the amount of the unit price that is represented by unrealised gains and the present intentions of the trustee/manager with regard to future asset sales.

18.3 For unitised funds including pooled superannuation trusts:-

(a) Accounts must disclose the amounts of realised and unrealised gains, and tax and deferred tax provided. Desirably, full details of the basis of any discounting should be included in the notes.

(b) Prospectuses and policy documents must describe in detail how unit prices are calculated with particular regard to:-

(i) charges for tax on income including realised gains, and
(ii) adjustments for deferred tax.

Under recent "Disclosure Statement" rules introduced in the Insurance and Superannuation Commission Circular 276 to Life Insurance Companies, a description of the methods of calculating unit prices must be made in brochures inviting application for policies.

18.4 For life insurance companies, accounts must disclose the amounts of realised and unrealised gains, and tax and deferred tax provided. Desirably, full details of the basis of any discounting should be included in the notes.

19. Actuarial Standard

19.1 Like many matters involving actuarial reporting, it is desirable that there is an actuarial standard for dealing with taxation of investment gains.

19.2 It is accepted that the words "actuarial standard" mean different things to different actuaries (although the views of non actuaries might be closer to each other!). Most actuaries will accept a standard which merely demands the "taking into account" of a list of factors - albeit sometimes grudgingly. Even in these circumstances, published techniques which have broad support at a meeting of members can assist in obtaining some consistency across the profession.

19.3 In the case of the taxation of investment gains, however, there are accounting standards also to be considered.

19.4 My hope is that the content of this paper will assist in the development of suitable standards for both actuaries and accountants in dealing with these matters.

19.5 In summary, I propose the following for the valuation of assets and the treatment of tax on investment gains and deferred tax on unrealised gains.

19.6 The same treatment is adopted for:-

(a) published accounts, and
(b) unit pricing.

19.7 Assets subject to tax on gains in all funds are shown at market values.

19.8 The provision for tax payable on realised gains at a balance date is discounted for the expected period until the actual payment of the tax.

19.9 A separate provision for deferred tax shall be made in respect of unrealised gains under each class of asset.

19.10 The provision for deferred tax to be made in respect of unrealised gains or unrealised indexed gains arising during any period shall be equal to:-

(a) the potential tax payable if the assets were sold immediately at their current market or realisable values, multiplied by

(b) a discount factor determined in accordance with 19.11 below.

19.11 The discount factor shall be calculated having regard to:-

(a) the probability of sale of those assets in the future,

(b) the period until the assumed sale of the assets and the actual payment of the tax,

and, where indexation applies,

(c) future indexation of the cost base of the assets, and

(d) expected increases in market values consistent with the assumed rate of indexation.

19.12 The discount rate adopted for any provision for tax or deferred tax shall be equal to the rate of return expected to be earned, net of tax and expenses, on the assets representing that provision.

19.13 The provision for deferred tax in respect of the unrealised gains on all assets of a particular class may be accumulated with interest at the discount rate assumed, provided that the resulting amount does not exceed the total potential tax multiplied by the discount factor from 19.11 increased with interest at that rate for one year.

19.14 Where the accumulation in 19.13 is carried out, on realisation of any gain at any date under an asset of a particular class an amount equal to the (discounted) tax provision required shall be deducted from the (accumulated) provision for deferred tax for all assets of that class, provided that the total provision remaining shall not fall below the amount of the potential tax in respect of the remaining unrealised gains multiplied by the discount factor from 19.11.

19.15 The assumptions adopted and methods of calculation of the provision for deferred tax shall be determined by the directors on the advice of an actuary.

19.16 The provision for deferred tax published at any date shall be certified by an actuary.

19.17 The assumptions adopted for determining the provision for deferred tax shall be reviewed at least once a year.

19.18 Nothing in these proposals shall be construed as restricting the auditor in his/her role as auditor of the accounts of any fund.

20. References

20.1 Seymour P.A.C. "Unit linked assurances and capital gains tax", delivered to the (UK) Institute of Actuaries Students Society in March 1971.

20.2 J.M. McLeod "The indexation of capital gains", delivered to the (UK) Institute of Actuaries Students Society in March 1983.

20.3 R.J. Laker & R.J. Squires "Unit pricing and provision for tax on capital gains in linked assurance business", presented to the (UK) Institute of Actuaries in February 1985.

20.4 IAA Guidance Note "Treatment of deferred tax liability for unrealised capital gains", prepared by the Investment Committee and issued in June 1989.

SYDNEY

MR. G. DUNSFORD (Author): My paper is on the subject of capital gains tax. Not "speculative gains tax" or some other phrase that might be used by a particular political party.

Could I be forgiven if I hoped the coalition would lose this election. If the coalition had won, and they still might of course, or they might win in 12 months time when there is another election, then there would perhaps have been no need for my paper. Of course we would still have had the meeting anyway and in any case election promises are not always kept. Moreover it may always have been wishful thinking to have considered that the proposed speculative capital gains tax would have replaced income tax on gains for life companies.

I think there would have always been some need for discussion of the treatment of gains, at least for life companies. There are many situations where treatment of tax on gains is required both for accounting and for valuation purposes. I have the impression there are a wide range of approaches and methods in use. Nothing very much has been documented apart from the Investment and Finance Committee's publication last year "A guidance note on gains", and that was watered down very much before it was finally issued and did not achieve as much as it was hoped to. So my purpose in writing this paper is to assist in the development of methods and standards to achieve greater consistency of treatment.

It is intended to bring together in one document the full range of statements of fact and logic and formulae relating to this subject. Perhaps a side objective is to promote the use of the same methods for management accounts, published accounts, unit pricing, investment performance measurement, and the cause of realistic reporting generally. The content is intended to be mainly non-controversial. However this statement alone will be sufficient to invite challenge!

MR. C.B. GREGOR: This paper deals with an issue to which there is no obvious simple solution which fits all cases. This comment could be applied to many issues which actuaries deal with from day to day in their work. These sort of issues have been the foundation of our profession over the years - Problems that do not have a ready solution and require some hard thinking and explanation of the effects of different approaches. You can all think of similar problems but just a few are setting surrender value bases, deciding superannuation fund transfer values, distributing surplus through bonus policy of life offices and more recently advising superannuation fund trustees on credited interest rates.

So I think it is very appropriate that our Institute is at the forefront of continuing development of how to reserve for tax on investment gains and how to measure performance net of tax.

Geoff Dunsford is to be congratulated on providing us with a paper to discuss tonight which provides a clear statement of the current environment for tax on investment gains and provides a launching pad for further development of techniques for dealing with the problems which arise.

However before we get too carried away with our role as actuaries in this matter, I think we need to recognise that other bodies will have more significant influence than us in things like accounting and reporting standards and that they are in a better position to influence the end result.

But continued work such as this paper and further papers which it suggests are there to be written, will however ensure that actuaries are seen to have expertise to techniques to help solve these problems.

In introducing discussion on the paper I thought I should start by providing a summary of the content of the paper. With the paper only arriving for some people last week I imagine not all would have read it so this may help set the scene for those who follow me and who will discuss selected parts in more detail.

The paper does not really have, as I saw it, a single stated purpose although Geoff has just elaborated a little more on the purpose of the paper. There is not really a single conclusion to it except for the actuarial standards suggested at the close of it. However on reading through the paper in detail the purpose becomes evident and there are conclusions and recommendations scattered throughout the various sections.

Section 1 introduces the subject and provides some statement of the purpose. In Section 1.3 we read - 'This paper examines the current legislation in relation to tax and investment gains. It also examines the tax position of the individual to the extent of his or her investment in those funds'. In Section 1.7 we read that the paper examines the need for provisions and their calculation suggesting relevant accounting treatment. In Section 1.14 we read that the paper intends to examine the relevant matters in more detail than in the guidance note which I think members would be familiar with. This note really arose out of demands from institutions and those people without access to actuarial resources for help and guidance on some standardisation within the industry.

Section 2 provides a statement of the current tax legislation which is most conveniently summarised in two tables. In Section 2.20 we see the tax position of various funds, whether they are individuals, life companies, super funds or unit trusts. The key features to note here are how indexation affects different funds. Indexation of gains is not allowable for life insurance companies nor for trading trusts or for proprietary companies. The other thing to note is that unit trusts, so long as they distribute all gains, are not subject to taxation and finally the various dates of introduction of tax on gains.

For a large chunk of the business that we are all involved with, gains tax is a fairly recent thing for us to come to grips with. For many actuaries who have been working in life companies non exempt business, there are people who have been grappling with this for some time, and I guess it is people like Geoff that we are looking to take a lead from in what work has already been done there.

The second summary is the table in Section 2.23 where we see the way in which gains tax applies to individuals investing in these funds. So there is a two stage process to consider. The tax of the institution through which people are investing and the tax position of individuals themselves.

Although not the main focus of this paper I think it is worth commenting on the lack of tax incentives for investment through non exempt life insurance company products which have a significant equity content in their portfolio. This is brought out more clearly in a later section of the paper. The main reason is that whilst the life company tax rate is 9.25% (if we want to include medicare) less than the top marginal tax rate, the inflation component of equity growth for an individual is tax free through holding a direct investment. Through investing through the life fund the gain is fully taxed at 39% with no further relief possible. So whilst there is a significant amount of non exempt life company business currently on the books I suspect that future implications for new business, issue of prospectus and so on are really going to be more heavily focused on superannuation business and unit trust business in the future.

Section 3 summarises the current status of accounting standards and here we see firstly, in Section 3.4 in the case of unit trusts which declare an intention to distribute all gains on realisation, no deferred tax provision is required within the unit trust. Secondly, the only entities which are allowed to provide for discounting of deferred tax on the basis of reasonably expected delay to sale of assets are life companies and superannuation funds.

In particular, Geoff notes the provisions of Circular 241 which deals more fully with guidance for life insurance companies.

In Section 3.8 there is a comment that not all life offices are following the discounting route and those that do, are largely doing so through the unit pricing decisions they have made within their investment linked business which is therefore following through to their provisions within the total fund.

Finally under the accounting standards there is a reference to the AARF proposed accounting standards for superannuation funds which will not doubt affect not only pooled funds and life companies but the funds themselves. The proposal is for market value accounting and discounting of the deferred tax provisions. As yet this standard is not in force and has been the subject of quite a bit of discussion within the industry.

Sections 4 and 5 give detailed illustrations on three alternative approaches to tax reserves for unrealised gains and three terms are introduced here which will come up later in the paper. These are firstly 'full provision' where it is assumed that all investments are sold and the tax is paid at the balance date where the provision is being struck. Secondly there is 'delayed payment discounting' where all investments are assumed to be sold now but the tax paid at some later date when assessed and discounting allowed for the deferral of the payment of tax. And thirdly there is 'further sale discounting' where investments are assumed to be sold on a basis of realisation over time and tax paid as subsequently assessed.

In these sections I believe other speakers will take the discussion on the formulae that Geoff has put forward in more detail and I will just confine my comments to two sections of this which I think is the main thrust of the paper.

Firstly in Section 4.9 the author states that anticipating immediate sale of all investments is equivalent to anticipating full claims under all insurance policies held on the day after the balance date. Now I think this same logic could be applied to the actual market value struck for investments underlying the unit linked product and therefore from this I think you could argue that full provision is the way to go along these same lines of logic.

The second point I would like to comment on in this section relates to the provision for the effects of future inflation. In Section 5.6 we read that it seems unreasonable to assume that the indexed cost base will grow with inflation but that no assumption is made as regards the future growth of the market value and the paper then goes on to develop formulae involving future inflation. Now I understand the connection being made here that if you treat one aspect in one way then it follows you should account for inflation in the future. However I am concerned that any increase in tax provision over a current face value which arises from an assumption of future inflation is not really fairly attributable to a current investor. I would see that as an aspect of gain yet to arise in the future.

In Section 5.13 a formula is developed for discount factors allowing for future inflation of the indexed cost base. I think, whilst it is a neat expose of the effects of inflation, there is probably some more work that can be done here looking at a stochastic approach to the future effects of the change in the indexed cost base for future inflation and the change of the actual security value - particularly in share based funds.

Subsequent speakers will probably take this issue further but as a rough guide I have calculated a few figures based on the all ordinaries index. What I looked at was a holding of shares over a 6 years period and looking at the unrealised index gain half way through that period and then looking at what the result is three years later, assuming the securities are sold at the end of the 6 years. So I looked at rolling 6 year periods over the last 40 years based on the all ordinaries index and assuming we are taking a look at what tax provision would be there half way through a 6 year holding period. During the 35 6 year periods that I looked at there were 20 where the first three year period gave rise to a capital gain over the indexed cost base and of these there were 5 cases where in the second 3 years period, up to the eventual realisation, there was a reduction in the real gain and the average reduction was 30%, ranging from 5% up to 50%. So whilst inflation is useful to look at in terms of increasing the gain, there are many cases which will arise where the taxable gain will reduce.

So I believe if we are going to play with future inflation effects then we need to be aware that there is a wide range of outcomes possible. The stochastic approach can explore this a bit further. The author hints at it later in the paper where he does in one paragraph talk about the value of doing simulation.

Section 6 gives a general statement of the purpose of accounts which I will not explore. I think it is a fairly concise simple explanation of what accounts are all about.

Section 7 discusses the issues with respect to unit pricing in a non exempt life fund and there are two significant statements made here. In Section 7.7 the author suggests that policyholders be provided with information of the excess of market values over book values (indexed where indexation is relevant) and the amount of the provision for deferred tax.

He goes on to make the observation that in unit funds the calculation of the deferred tax provision should not inhibit a fund manager from turnover activity where there is a good reason to realise investments.

Section 8 deals with losses and because of the carry forward for future tax benefits there is a tax benefit factored into unit prices if losses are fully allowed for.

Section 9 deals with life office expense relief and highlights an anomoly in the current legislation where the expense apportionment basis excludes capital gain in superannuation classes of business but does not exclude the gain in the other classes as a base for apportionment for expenses.

Section 10 discusses the problem of equity between sub funds and the author puts forward a recommendation for how tax provisions should be allotted within sub funds.

Sections 11 & 12 deal with two different approaches to linking life policy benefits to investment performance. Gross gains linking and net gains linking with recommendations for the accumulation of tax provisions between balance dates. This suggestion is carried through into the actuarial standard suggested at the close of the paper.

Section 14 examines the dilemma of the tax position of unit holders buying and selling units from a trust and concludes that the treasurer benefits unreasonably through a form of double taxation. The author goes on to state that there has been an unsuccessful attempt to resolve this problem based on an approach that is followed in the UK. The lack of success is probably because a solution delays the tax take for the government and of course we are now in an age of bringing forward taxes not deferring taxes so I guess we can understand why it has not been successful!

Section 15 deals with pooled superannuation trusts. It recommends in Section 15.6 that because of the activity of investing funds switching between one pooled superannuation trust and another, there should not be a benefit arising through heavily discounted deferred tax in unit prices on redemption of those units which reflects a low rate of turnover in investments. It states that such a benefit would only be at the expense of longer term investors.

Section 16 deals with investment strategy and we find quite a neat summary of the effect of tax on investment returns for investors through the different products and funds that are being considered. This highlights the point I mentioned earlier concerning investment through life company non exempt products compared with investing through a unit trust. We see here that for a shares based investment the net return is 10.2% or 9.2% depending on the franking level versus 11.6% and 10.8%. In the property area we see that it is 10.7% versus 12.1%.

In Section 16.8 the author mentions the need for simulation studies and I think this is where others may take up the point on a stochastic approach to studying this matter.

Section 17 discusses investment performance measurement and deals with the impact of tax within the method of performance measurement and the impact of tax in comparing performances of different funds. The author comments on suggestions in some

quarters for freedom of method with disclosure. The disclosure suggested is the discount factor for the deferred tax provision and secondly the excess of the unit price over the price which would prevail with full provision for deferred tax. Now the author as I read it prefers the adoption of a single reasonable method if such can be found rather than freedom of method with disclosure.

Section 18 continues on the disclosure topic and deals briefly with the current requirements for disclosure of unit trusts, unitised funds and life insurance companies together with his comments for what is desirable in the area of disclosure.

My own view on the issue of disclosure and standardisation of performance measurement is that a single reasonable method is unlikely to be an achievable goal considering the variety of funds, the variety of investment profiles of those funds and the variety of realisation activity of the funds.

I favour freedom of method but with disclosure of three specific measures through unit prices, fund accounts and promotional brochures. These three disclosure items are all based on market values. The first is investment gain ignoring tax altogether. The second is investment gain allowing for tax provisions both current and deferred as determined to be suitable by the trustee, the fund manager or who ever is making the decision as regards tax provision for the fund, within allowable accounting standards.

The third disclosure item is the "full provision" for current and deferred tax with no payment discounting. This would have the advantage of providing bench marks for the full range of tax provisions possible and will also provide objective information for consideration by governments of the effective rate of tax on various investment institutions and products independent of their own particular reserving basis.

Finally Section 19 is the author's suggestion for an actuarial standard for the valuation of assets and the treatment of tax on investment gains and deferred tax on unrealised gains. It brings together the recommendations the author has presented in earlier sections of the paper.

Once again I thank Geoff for his interesting paper which I am sure will be a great benefit for both members and students of the Institute and to other professions and bodies involved with the subject of tax on investment gains.

MR. M. SHERRIS: I speak mainly as an interested observer. Bruce Gregor has alluded to a stochastic approach to the investment gains problem. I am going to discuss such an approach.

Firstly a few comments on the general problem of the tax. The problem arises because it is a tax which is paid on the realisation of assets and not on an accruals basis. This means that there are investment strategies that can be adopted to defer the payment of the tax by deferring the realisation of assets. The problem of determining an appropriate deferral period to present value the future tax payment is related to this optimal investment strategy. It would have been useful if Geoff had considered the possible investment strategies and their effect on the tax in his paper.

The other problem with the tax on gains arises from the indexation of the cost base. This indexation, when it applies, will only apply to gains and not to losses. The cost base is indexed in determining gains but not for determining losses. The net effect of this is that there is a lack of symmetry between gains and losses where indexation applies. There can be cases where the asset value in the future falls in a range where there are no taxable gains and no taxable losses. This occurs where the actual asset value is below the indexed cost base but above the non-indexed cost base. Accrued taxable gains and losses can disappear at future points of time because of this.

The basis that is proposed in the paper for determining the reserve, as far as I understand it, is to start by determining an estimated future date at which the tax will be paid. This is equal to the period from the current date to the date of assumed realisation plus a tax lag due to the fact that the tax is not paid immediately on realisation of the asset. The paper also uses q factors which are the equivalent of mortality factors for investments. The q factors which Geoff calls the risk of sale are probabilities that the sale of the asset will occur in each future period. There are some problems with the q factors which I will mention shortly.

The next step, having estimated the expected sale date of the investment is to work out the value of the gain or loss. In Geoff's paper he takes the current market value and subtracts off the cost base if there is no indexation and that is the amount of the gain. If there is indexation of the cost base then the gain is the current market value less the indexed cost base where the indexed cost base is increased at a rate of increase of f from now to the date of realisation.

Having worked out the gain or loss, the reserve or provision for the deferred tax is the present value of this gain or loss. The discount rate used in Geoff's paper is 10% but no basis is given for how this rate should be determined. Presumably the discount rate and the rate of indexation used are to be determined as expected values of future interest and inflation rates.

This is basically a deterministic approach which ignores the change in market value to the date of realisation which can affect the amount of the accrued gain or loss. It also ignores the uncertainty in the amount of the future gain or loss that arises from indexation of the cost base and also ignores uncertainty in the discount rate used to present value the realised gain.

I would like to suggest an alternative relatively simple stochastic approach that produces a relatively simple formula. In order to use a stochastic approach we need a simple stochastic model of asset returns and a simple stochastic model of the rate of indexation, which is the rate of change in the CPI. The finance and actuarial literature covers a wide range of such models. These stochastic models can then be used to determine the distribution of future gains and losses allowing for indexation where necessary.

We then determine the expected value of the future gain or loss based on our stochastic model of asset returns and rates of indexation. This expected value is then present valued using an appropriate discount rate which, provided the expected value has been determined with the correct probability distribution, will be a government bond rate for the relevant term.

The stochastic approach I have described is not a difficult thing to do and, in fact, people in financial markets do this all the time when they value options. You will no doubt recall that this Institute had a plenary session at its Cairns Convention on options and applications. It should come as no surprise that the stochastic approach basically considers the capital gains and losses in the option pricing framework, since we can express the future tax payments in a payoff format that fits an option pricing model.

The problem with option pricing approaches, apart from a complicated looking formula, is that the parameters of the model have to be estimated. I have criticised Geoff for pulling a discount rate of 10% out of the air. There are also assumptions of a similar nature that need to be made for option pricing models. These are the expected variability in the rates of return on assets and the rate of inflation as well as the covariability between these rates. You still need to consider the appropriate valuation basis to use but there is plenty of historical data to estimate these figures. You can also derive estimates from the markets that trade option contracts on these assets. Dealers' screens show the variance figures that they are actually using to price options on a range of traded assets.

One thing I should emphasise is that the option pricing, or stochastic approach is not inconsistent with Section 19.12 of the paper. This section says that the discount rate adopted for any provision for tax or deferred tax shall be equal to the rate of return expected to be earned net of tax and expenses on the assets representing that provision. That is exactly what option

pricing does in valuing a future option payoff. The stochastic approach recognises that the earnings rate on the assets backing the provision is in fact stochastic and that there is a constraint that applies and that is that the value of the provision on the date you actually pay the tax, or take the benefit of any loss, has to be exactly equal to the amount of the tax. With that constraint and the recognition that earnings are stochastic you have the option pricing approach.

The other benefit of the option pricing approach is that, because it is based on the assets that back the provision for the future gain or loss, it also provides the composition of the assets you should hold to back the provision. In fact, if indexation applies, these assets include the actual investment subject to tax, a non-indexed government security and an inflation indexed security which you have to short sell. If there is no indexation then the inflation indexed security is not included. The proportion of the reserve that these securities represent changes over time as their values change and that is part of the option pricing approach.

Once the total reserve is determined using the stochastic approach it needs to be allocated to time periods so that exiting policyholders or unitholders and future or remaining policyholders and unitholders are treated fairly.

I mentioned earlier that Geoff uses a q factor, or a risk of sale factor, in his paper. You can use the same procedure in the stochastic approach. There are however a number of problems with using these q factors. Let me briefly mention some of them. Firstly the q factor will be a function of your optimal tax deferral investment strategy. It pays to defer the realisation of gains for as long as you can. It may mean that you are borrowing or doing other transactions in the fund in order to avoid realising gains. It may also be optimal to realise losses provided there are gains to offset them against. Alternatively, transactions in the derivatives markets might be used to convert capital losses into income losses. Such strategies are difficult to foresee in advance and hence difficult to quantify in a q factor.

The q factors will also be a function of the structure of your liabilities. Obviously it will be necessary to realise assets to pay out liabilities so that is going to affect your q factors. Different funds with different liabilities will have different q factors. They are also a function of the fund's investment policy depending on whether you are a passive or an active investor. If you are a passive investor following a market index then you will need to rebalance your portfolio and will therefore realise losses and gains as you do so, which will have implications for the q factor. There are a multitude of other factors which could also affect the q factor. The whole problem can become quite difficult and very subjective.

As far as the stochastic basis that I have mentioned, and any other basis, goes it should be as realistic as possible. Such a realistic basis should be used for whatever purpose the calculation of reserves is required. Whether it is for unit pricing, management reporting, preparing accounts or performance measurement, as realistic a basis as possible should be used.

One final point on determining reserves and it relates primarily to Section 8 of the paper on the subject of losses. Once you start considering the impact of losses and you consider specific assets or specific groups of assets then you should realise that asset returns are not perfectly correlated. The net effect of this is that the tax benefit of realised losses can only be obtained if you can take gains on other assets. In other words there are portfolio effects so that if you put assets together in portfolios any realised losses will have tax benefits which would not be the case if you had one security or group of similar securities on their own. In terms of working out provisions for deferred tax this creates a problem when considering one class of assets where asset returns are highly correlated, or even one particular asset, because you have to decide what value to give to losses. You have to share the value around the assets in the fund.

I would like to make a few general comments on other parts of the paper. Firstly in respect of disclosure. What we are actually trying to do is to ensure that exiting policyholders and unitholders are given fair treatment as compared with new or continuing policyholders or unitholders. To do this it is necessary to use assumptions as covered in the paper and as I have mentioned earlier. To the extent that reality turns out to be a departure from those assumptions then it is the continuing policyholders or unitholders that wear any resulting gains or losses. Exiting policyholders and unitholders just take the money and run. It is important that we show clearly what basis has been used and to highlight the potential effects on both exiting and continuing policyholders or unitholders.

In Section 16 the paper mentions investment strategy and the allowance for tax reserves. As far as investment strategy is concerned any analysis of investment strategy should not be distorted by the method that is used for determining the deferred tax reserves. You should analyse the actual cash flows including tax payments and benefits, whether you are looking at switching alternatives or whatever. The method of determining deferred tax reserves should, if possible, be consistent with the assumptions used in assessing investment strategy and this would avoid the problems mentioned in Section 16.

As for unit trusts, which is covered in Section 14 of the paper, the basic situation should be that if the trust is not subject to tax then it should make no adjustments for deferred tax reserves. Tax effects in this case are the concern of the individual unitholder. They should of course be made aware of any problems that may occur because of anomalies in the Taxation Act that could result in adverse tax effects for them. The solution to the problem here is to educate unitholders about the problems which may arise because sales of assets by the trust may not be treated as a realisation of the assets for their own personal tax returns.

The other alternative that there is to Geoff's proposed solution to the unit trust problem is to change the tax laws to deem a realisation of assets in a trust to be equivalent for tax purposes to a realisation and repurchase of units for unitholders. This suggestion is unlikely to be welcome but it might make the politicians happy and it is a compromise on what is done in the U.K. where tax can be deferred in the trust.

Finally, to finish off, Geoff mentions in Sections 2.17 and 2.18 of the paper that there is a loophole for life offices. The tax rate that applies is that for the fund in which the asset is last held and the thought of minimising tax by transferring assets from one fund to another crosses our minds. It seems to me that it is quite rational, and eminently sensible, to realise assets in the fund with the lowest tax rate giving the lowest tax payment. The remedy is simple. The government should change the tax rules so that the whole position is much clearer and we do not have to feel guilty about taking advantage of poorly thought out tax rules.

I would like to thank Geoff for his paper.

MR. M. BARKER: I would start off by agreeing with the first half of the list of proposals. The proposed standard starts in Section 19.7 and goes down to Section 19.10. I have no problems at all. Certainly I agree that in general one should be discounting the tax provision. I agree with the approach adopted in Section 4. Although, as Mike Sherris says, stochastic methods are better than a deterministic approach, the latter is far simpler. It is where we get onto indexation that the problems start.

When I started calculating tax provisions last year, I developed the same formula as in Section 4 and then I tried to adjust it for inflation. It ends up that you are discounting at a real rate of interest instead of a nominal rate of interest. That sounds fine until you start to think about some of the assumptions.

Firstly, gains are not treated the same way as losses. You pay taxes on gains over and above indexation but you do not get the benefit of indexation for losses so there is no symmetry there. Perhaps you should treat the gains and losses separately.

The second problem is whether assets go up broadly in line with inflation. You would not expect a share portfolio that has an average yield of 8% to go up at the same rate as a share portfolio with an average yield of 2%. So, as indicated in Section 5.18, the formula needs to be revised. I split the formula into two parts, the market value which was increasing at one rate and the index cost base which was increasing at the other rate which was the rate of inflation. You can then get some gains arising in future which are very large and even when you discount them back you can get into some strange situations where, as you put an asset on the books, though you have not earned any gain to date, you are providing a fairly large amount for future tax.

You really have a problem of incidence. Just who does that tax belong to? I concluded that I would take a fairly simple minded approach, going back to Section 4 and forgetting all about indexation.

I am only too pleased if someone can come up with a formula of a deterministic nature that will give a reasonable answer but I have not yet found one. Mike Sherris's stochastic approach of integrating with the actual investment management process is a great idea, but I think we have to come up with something simpler and rather more practical.

Having dealt with indexation I would like to move on to Section 19.12. That statement as it stands seems acceptable. I agree with Mike Sherris that you should use a government bond rate. You have to decide which government bond rate as there are quite considerable differences when you have a yield curve such as we have seen in the last 12 months.

Sections 19.13 and 19.14 give me problems again. What is suggested here is that once you have calculated a reserve at a particular balance date then you go through the next year accumulating that with interest; every time you realise a gain you adjust that reserve for the amount of tax that you have realised.

What that does is achieve neutrality all the way through the year so that the investment manager realising gains during the year is not affecting the unit price during the year. However, when you come to the end of the year you have to do a clean up and so what you are really doing is swapping a lot of very small discontinuities during the year for a rather larger discontinuity at the end of the year. I would rather go back and have all the little discontinuities during the year. My preference would be to recalculate the tax provision every time you calculate the unit price.

Moving on to Sections 19.15 and 19.16 my feeling is that you will have to express it in a more subtle way if you want to get it accepted outside the life insurance industry. Maybe we can encourage the NCSC to flow the idea through to unit trusts but I think we have to find a more persuasive way of doing it than just putting it in an actuarial standard.

Those are basically my comments on the standard as proposed. Overall I believe that the thrust is an excellent one and that it has been a good idea to put up something on which we can comment.

MR. O.F. ROACH: Bruce Gregor made a good point with respect to Section 4.9: i.e. if market value is good enough for fixing the unit prices, in that you do not discount future cash flows for the fixing of the unit price, nor should you discount your expectation of future cash flows for the capital gains tax.

I am an advocate of a full provision, non-discounted, for capital gains tax. My responsibility is for a general fund and a discounted provision erodes the solvency margin at a future time when you are calling on the solvency margin. Assets will be sold at a time of high claims, thereby bringing forward capital gains tax.

In several Sections, 1.9, 10.6 and 19.11 it is said that the discount factor shall be calculated having regard to, inter alia, the period until the assumed sale. Now the period until the assumed sale is not as amenable to statistical evaluation as rates of mortality and so on. It is something that is going to be subjected arbitrarily to legislative change, to a change in policyholder preference or a management change. We have seen a significant shift of policyholders funds from No 1 funds to No 2 funds. That took place over a period, but it did lead in the No 1 funds to a change in the way in which capital gains were realised. This is likely to happen at a greater rate in future. The proliferation of funds caused by the taxation changes driving superannuation funds could see many current funds closed to new entrants and even run down quite quickly. We do not know when that might happen.

The fund manager has a very real problem in coping with future discontinuity. Even a full provision for tax on capital gains that have accrued to date is not sufficient protection against a change in the future rules. But it is at least better than discounting.

In Section 16 there is a discussion of the investment strategy. Full provision for tax on accrued capital gains removes any inhibition on sales so that the sales decision on an investment is made on investment grounds not on some artificial constraint because of a concern about unit prices.

The examples in Section 7 are static examples and only reflect the impact of actual experience being different to that expected. I have derived some algebraic results for steady expanding states under different conditions and found some similarities with bonus rates supported by an estate under different rates of growth. If the provision is not discounted, that is akin to having an estate in the provision: you have a higher provision than you strictly need.

The consequence of a provision higher (lower) than the technically correct provision for a given steadily expanding state is that the rate of increase in unit price will be higher (lower) than the correct rate, if the rate of growth is lower than the net return. For example, if a fund now had a non-discounted provision, and the rate of growth was lower than the net rate of return, then the rate of increase in unit price would be higher than for a fund with a discounted provision.

This does not address the issue of how a fund is moved from a provision currently discounted to one which is not discounted.

MR. S.P. MILES: Geoff's paper was a very timely paper for me. I have just spent the last four weeks doing tax allocations. Different tax allocation rules can change profit by the order of several million dollars and unit prices by up to 5% or 6%.

I believe I have emerged from this period rather well. The rules we have adopted have protected the policyholders. The strength I gained is in no small part due to the experience that I gained from playing monopoly with my children. Those of you who know a monopoly board will know that there are four streets, with each street increasing in value as you go around the board. My negotiation skills have been honed by having to deal with my children. In one particular game we all reached the stage where nobody had a complete set. We then had to negotiate to buy sets off each other. Now my son Alan is a typical capital guaranteed person; he goes straight for cash, no risk at all. My daughter Lisa is somewhere to the equity side of capital guaranteed and I am fully equity, go go go for the full risk. During one trade I paid an extortionate $1,000 for Angel Islington in order to get a set. Immediately after that deal my son then charged my daughter Lisa only $800 for Vine Street which is a full block around. I said to him "how could you charge me $1,000, and insist on $1,000, when you only charged Lisa $800." He said "Dad, I knew you would pay $1,000 and I knew Lisa would not."

So having honed my negotiation skills I had to turn to my analytical actuarial skills. I want to talk about the equity of tax allocation. This is mentioned in Section 10.13. There are four things to remember:

* the size of the tax provision

* the rate of the tax provision

* the allocation of these provisions, and

* the investment of these provisions

The Size of the Tax Provision

My world is a different one to Geoff's. I live in a world where funds are tax payable and tax gettable. Gettable is the word we use to describe tax credits, i.e. the opposite to tax payable. So how big are my tax numbers? Let us use spurious numbers for two funds. One fund (P) has $5 million of tax payable whilst the other (G) has $10 million of tax gettable. The alternative tax charges for each fund are:

* have nil for each fund

* charge P with $5m and G with nil

* charge P with tax of $5m and make G tax gettable by $10m. This means the total tax position is $5m tax gettable.

* charge P with tax of $5m and make G tax gettable for $5m.

I have chosen the last alternative. That is make funds tax payable to their full extent but only make funds gettable to the extent that tax gettable is covered by tax payable.

Rate of Tax Payable

But the story does not end there. I could also get to a nil tax position by charging P $2.5m and crediting G with $2.5m, and thereby splitting the taxation gain at 50 cents in the dollar. The higher the price that is paid for those tax losses the better the equity performance and the worse the capital guaranteed performance. My decision is to purchase tax losses dollar for dollar, and I will buy tax losses up to the tax payable.

Allocation of Provisions

Having decided on how much to pay and the rate at which to pay it, the next decision is how to allocate tax payable within a fund.

There are different types of statutory funds (unit linked, capital guaranteed etc), different types of policies (traditional, disability etc) each with different tax considerations. These different policies also have different dividends payable to shareholders.

My allocation rules are

1. allocate tax between statutory funds.

2. within the statutory fund allocate to non par (not investment account), then par and then investment account. Money allocated to non par goes to shareholders. Money allocated to par results in a 20% credit to shareholders. Money allocated to investment account policies will improve the investment return but will not pass to shareholders who receive a fixed deduction from fund assets.

Superannuation funds are almost always tax payable because of the quarantining of capital and revenue gains.

Investment of Provisions

Having made the appropriate provision we now need to consider the investment policy and asset allocation. If capital guaranteed is tax payable and equity is tax gettable do I transfer the assets from one to the other and give the interest profit to equity or do I hold the assets back in capital guaranteed and hold the interest profit there?

I have outlined the four issues you have to face when considering equity. The size, the rate, the hierarchy of allocations and the actual investment of provisions. I would now like to discuss Geoff's proposed standard.

Like Mike, I agree with Section 19 but, I really cannot understand indexation of capital gains. I thought Mike Barker had found the key for me when he said it means you are discounting at a real rate rather than a true rate. However that means I will have a higher tax provision if I allow for inflation than if I ignored inflation. As future inflation is not yet into my unit price I am making tax provisions on something that is not in my unit price. This approach seems illogical. My preference is to take the straight gain that is there, and apply tax to it. If you want to discount it by all means do that, but why index it?

MR. M. WEBB: Tonight's discussion has shown me that this issue is even more complex than the algebra in the paper, when attempts to allow correctly for uncertainty are incorporated.

This reminds me of the current evolution in life office financial reporting, where two views of the future are likely to be presented - the "best estimate" and the "safe" (or solvency demonstration). Although the concept of discounting tax on unrealised gains is akin to a "best estimate" the non discounting approach is very similar to the "safe" approach.

Many members of other professions, as well as some actuaries, would think the "safe" approach to be more applicable and responsible than the "best estimate" approach with its uncertainties.

If we as a profession wish to consider how best we can serve our various publics we need to come up with something that is workable, fair but also provide comparability. I doubt we will get anywhere by introducing a range of probability distributions and stochastic analyses although that might be appropriate if we were dealing with an extremely large fund situation. The reality is we are dealing with a whole lot of mostly small and medium investment managers.

We have to come up with something that is acceptable, credible and yet affordable. Not all the fund managers are going to get people to do stochastic analyses every tick of the clock and I feel that on balance a no discount basis probably meets those criteria better than anything else. It will not get we actuaries so much work but I think it is in the public interest.

MR. G.A. DUNSFORD (Author): Well thank you everyone who spoke and everyone else who came tonight. It was a very interesting discussion.

I certainly will not comment on everything that has been said.

I would like to make just a few points where perhaps I felt that I had not got my message over in a particular area and maybe a few extra words might be helpful.

Bruce Gregor referred to Section 17 and the way in which funds might disclose what they were doing with deferred tax. It was suggested that we give everyone full information and indicated what the unit price would be if there was a full provision for deferred tax, what the price would be it there was no provision for deferred tax, and what the price would be allowing for some discounting. That should be sufficient for individuals to then make their own judgements.

But I want to emphasise the point I made in Section 17.10 where what those statements do not say is whether the discounting method that has been used is a reasonable one having regard to the rate of turnover of the fund. Concentrating merely on the difference between the actual unit price and the unit price that might have been with a particular standard of discounting may ignore the possible valid reasons for the difference, particularly when you are comparing one fund with another.

In Section 17.13 I suggested that we want to aim for the adoption of a single method for the treatment of tax provision of the deferred tax on realised gains. One speaker pointed out that under the standard that I put forward, Section 19, the single method could provide, in the minds of some people for particular funds in particular situations, a "mark to market" approach. Equally within the same standard, where a fund was very inactive and it was growing rapidly and there was little turnover, a heavily discounted deferred tax provision might be very reasonable.

Adoption of a single method would mean that everyone talks in the same language. It is then only the parameters and the assumptions that need discussion.

Mike Sherris suggested that the paper could perhaps be a little larger to cover investment strategy in a little more detail. He also talked about perhaps putting in something about the stochastic approach. Of course I thought about these aspects but I decided that the paper at 154 pages would have been a little too much!

I was a little surprised at one comment that we do not have to become tax experts. I would have thought that if we are going to make any sort of pronouncement on the financial position of any fund we need to have tax expertise as it relates to that fund.

Another speaker also wanted a bigger paper. A number of people have said to me that they thought it was already rather large.

Now I would like to make a couple of comments about the question of whether or not you make any discount in the provisions. Owen Roach was quite emphatic that you should not make any provisions. To some extent he was also supported by Martin Webb. I think the difference between us in our views relates to what the purpose of making the provision is. If we are looking for a solvency standard or a conservative approach to ensure that we have got sufficient money to demonstrate we can cover our liabilities and so on, then undoubtedly the full provision for deferred tax is the approach to take. One must be in a position to say that if general insurance claims tripled or quadrupled next year or if surrenders occurred at 5 times the rate we were expecting, then we must be in a position to be able to cash in the assets at a value which is equivalent to the solvency reserve held for them.

However what my paper is particularly concerned with is the more normal situation in the case of life companies and superannuation funds where we are talking about a going concern. We are talking about equity between unit holders. Those who are

buying units and those who are selling units. Owen Roach's approach could lead to using different unit prices for those people buying and those people selling units because of their different attitudes at the time they make their decision. You then have the problem of what to do with the difference.

It is much more reasonable to arrive at a single price which is fair as between those people coming in and those people going out.

And as far as the reporting is concerned we are looking more and more these days with realism in reporting - realism for the organisation or the fund as a going concern. It is unrealistic to assume or effectively assume the immediate sale of all the assets.

Certainly you may well have an extra line in your accounts or in your balance sheet which identifies the additional reserve held for solvency. But in terms of attempting to demonstrate the current realistic position as a going concern, requires realistic assumptions as regards the expected sale of assets in the future. This leads to the appropriate discounting.

MELBOURNE

MR. G.A. DUNSFORD (Author): My paper is on the subject of capital gains tax, not speculative gains tax or anything like that. I hope therefore people could forgive me if I hoped the coalition would lose the election. If the coalition had won then there may have been no need for my paper. On the other hand, election promises are not always kept. Moreover it may have been wishful thinking to have considered that the proposed speculative gains tax would have replaced income tax on realised gains for life companies.

There are many situations where treatment of tax on gains is an accounting or valuation issue. I have the impression that there are a wide range of approaches and methods in use - often being applied in similar situations. My purpose in writing the paper was to assist in the development of methods and standards to achieve greater consistency of treatment. I have attempted to bring together in one document a full range of statements of fact and logic and formulae relating to this subject.

A secondary objective was to promote the use of the same method for management accounts, published accounts, unit pricing and investment performance measurement - and the cause of realistic reporting generally. The content is intended to be mainly non controversial. However, I expect that this statement alone will be sufficient to invite challenge.

MR. P. WORCESTER: Over 200 years ago, Benjamin Franklin wrote: "But in this world, nothing can be said to be certain, except death and taxes".

Actuaries have spent a long time bringing certainty to the timing of the average death. This paper starts to bring certainty to the timing of the average tax bill.

I congratulate the writer on this paper. It is long overdue, but I believe that the reason for this delay is that in a practical sense, actuaries have only been concerned with tax in the last few years. The reasons for this are:

1. Only in recent years have published balance sheets for taxable Life Insurance Funds been at market value. When assets were valued at cost, or even some form of written up cost, the asset value was highly artificial. Any tax reserving assumptions would be spuriously accurate, and so the actuarial profession did not need to devote much time to this area.

2. The Insurance Commissioner's Circular 276 requires information to be published on policy documents setting out market values and earning yields on an after tax basis.

3 The introduction of taxation on the investment earnings and realised capital gains of superannuation funds.

It is interesting to note that the Treasurer, Mr. Keating has stated that no "well-managed superannuation fund" need pay any tax, if it takes advantage of franking credits available via the purchase of shares in Australian companies that pay fully franked dividends. I believe that one of the main reasons the tax was introduced was to make franked dividends equally as attractive to superannuation funds as other investors.

This removes a large part of any secondary market in franked dividends, and helps make the Australian financial market playing field more level.

Rather than commenting on any specific points in the paper, I would like to make 3 general observations:

1. Taxation Reserves are just one part of the valuation basis that is used to determine surplus, whether it is in a Life Insurance fund, or a Superannuation fund.

   Whatever assumptions are used will not affect the total surplus, only the manner in which it emerges. However, the way in which surplus emerges will effect crediting rates, and thus equity between different generations.

2. Speaking as an investment manager, it would make sense if my decision to sell or hold an asset would not have any balance sheet implications. But tax is payable when I realise a capital gain, not when I have earned a capital gain. The very moment that I realise my capital gain, I have bought forward my tax payment. The balance sheet takes an after tax loss equal to the realised capital gain, adjusted for CPI movements if appropriate, multiplied by the difference between the current tax rate, and the deferred tax rate that is used in the balance sheet.

   The only way in which the balance sheet will not be affected if I sell an asset is if the deferred tax rate equals the current tax rate. This implies that there is no discounting for unrealised capital gains tax.

   The author has shown that if tax reserves for unrealised capital gains are not discounted, then the current generation is disadvantaged to the benefit of future generations.

   I agree with the author on this point. I believe that tax reserves should be discounted, despite the fact that this valuation basis penalises me whenever I sell an asset.

3. What are tax reserves on the balance sheet? The bottom line is that they represent an interest-free loan from the taxation department. What does this mean? If we take an asset, for which there is an unrealised capital gain, discounted or not, then, if that asset is not sold after one year, and we do not change the deferred capital gains tax rate, we have an emerging surplus equal to the (after-tax) return on that tax reserve.

   Effectively, the portfolio is geared!

   Over a period of time, there will be no effect on the balance sheet if the surplus arising from the earnings on the deferred tax reserves equal the extra reserves required when an asset is sold.

One small matter of detail has been puzzling me. If a portfolio does not receive the benefit of CPI adjustments for capital gains, then it is generally accepted that deferred tax reserves should be discounted at the after tax nominal rate of return for the portfolio. However, if a portfolio does receive the benefit of CPI adjustments for capital gains, then the author shows in part 5 that deferred tax reserves should be discounted at the after tax real rate of return for the portfolio. While I can't argue with the mathematics, my problem is:

> Deferred tax reserves represent an interest free loan. Hence these reserves should be discounted at the after tax <u>nominal</u> return on this loan.

> Why then is the discount rate much lower for the portfolio that receives the benefits of CPI indexation, despite this portfolio having a significantly higher after tax yield? I do not accept the author's comments in Section 5.16 that this is acceptable because the taxable gain is lower. I do not believe that this is relevant.

I support the general principles of the Institute's Guidance Note on this topic. That is, I support the principle that the actuary sets an appropriate deferred tax reserve, and discloses his methodology. I do not agree with the argument that there should be no discounting for tax reserves, or that every actuary must use the same methods and assumptions.

MR. F.M. McINERNEY: The point I take issue with in this paper is that set out in Actuarial Standard 19.10. Here the author says that in making a provision for deferred tax, an allowance for discounting must be made. In a practical situation this causes a problem in that I work for an office which currently does not discount its deferred tax provision.

In looking for a justification for not having to discount the deferred tax provision I came to the Institute's Guidance Notes on the treatment of deferred tax liability for unrealised capital gains and, lo and behold, all the reasons I wanted were there. In Section 3 it refers to the method of "marking to market" and it concludes:

> "The appeal of this approach is that it is consistent with the concept of valuing assets at market value. All aspects of the unitholders' returns are calculated on the same basis, i.e. that the assets are actually sold at the valuation date.
>
> The second advantage is that the method is impartial and relatively incapable of manipulation by, say, altering assumptions when it suits.
>
> And thirdly, it is easily understood by both fund managers and investors"

These seem very good reasons to me for not discounting deferred capital gains liabilities. My main point is that I do not see why any life office or Unit Trust which decided to adopt the approach of not discounting capital gains liabilities, and makes it perfectly clear to policyholders that that is what it is going to do, should not be allowed to do so.

In a large stable fund I agree that it is equitable to discount capital gains tax reserves and this should be the approach followed by the actuary.

However in small funds, and in some cases these can be very small, discounting can lead to great problems if there are sudden changes in investments. The investment manager may one day want to sell all the equities because the market is obviously going down. Equally a unitholder might terminate his holdings.

For some funds a single unitholder may hold 25% or more of the fund. For small funds I believe it is best not to have a discounted capital gains tax reserve.

Equity between generations is a problem if you do not discount the capital gains tax reserve. However, as long as you do not transfer the reserve out of the fund, all that happens if you do not discount is to delay the emergence of the benefit from discounting. This benefits those unitholders who stay in the fund to the detriment of those who withdraw early.

Another problem with a discounted capital gains tax reserve is what you do if you ever have to change the rate of discount. The paper sets out a fairly comprehensive method based on the probability of selling investments in any one year. Applying this you might conclude that each investment is held for 5 years. In the future this may change and a re-examination may conclude that 2 to 3 years might be more appropriate. The actuary now faces a problem because he has to either suddenly change the discount rate, which causes a jump in the price, or smooth it in some arbitrary fashion, which makes it difficult to explain the movement in unit prices. In summing up I would say that a case can be made for not discounting. I would be disappointed if the Institute of Actuaries Guidance Note forced actuaries to discount capital gains tax reserves for funds where that might not be appropriate.

MR. W. MATTHEWS: In a moment of weakness I was persuaded to speak tonight. The last time I actually said anything in public about tax was a couple of years ago at a staff briefing in the National Mutual theatrette on the introduction of the then new superannuation tax regime. That ended up as a four way debate with other members of the audience. Hopefully I will avoid a repeat performance tonight although .....!

The first thing I would like to do is congratulate Geoff Dunsford on the readability of his paper. I actually believe I understood most of it which was a plus.

Deferred Tax Provision Discount Rate

As usual I started by reading the paper back to front hoping to find a summary at the end on what it was all about. My first comment is therefore on point Section 19.12 regarding what rate of discount should be assumed in the calculation of deferred tax provisions.

Firstly, I see a deferred tax provision as representing a notional earmarking of part of the capital appreciation of each underlying asset. (This contrasts with the alternative, and I believe misleading, idea of a deferred tax provision operating as a separate banking account arrangement, accumulating interest at market rates but essentially completely divorced from the assets it relates to). On the assets eventual sale, the expected proceeds of these earmarked portions should be sufficient to meet the expected capital gains tax liability. Geoff's comment is Section 19.12 that the deferred tax discount rate should be based on the expected future net return on the underlying assets is consistent with this concept.

Further, while obviously the expected net running (i.e. income) yield on the underlying assets should be discounted for in full, the position with respect to expected future capital growth is not so clear. Hopefully the simple little example I am handing out (refer attached) will explain the point I am trying to make. The example seems to imply that theoretically to ensure stable net annual yield results, the deferred tax discount rate should be based on the underlying assets expected future net running yield plus approximately only half the expected rate of future capital appreciation.

I am not sure I can explain or justify this conclusion from a first principles approach and invite the audience for their thoughts on the matter. Just in case there are any mistakes in our example I would like to acknowledge the contribution of Andrew Gale in its production and he has kindly agreed (admittedly under duress) to take full responsibility for any errors and omissions.

Deductibility of Ordinary Business Expenses

Moving on backwards to Section 10. Geoff made the point that income tax is assessed at fund rather than sub-fund level. Expanding on this, in the case of a life office which runs multiple funds, tax is assessed not at fund level but rather on the office as a whole. Consequently, such life offices have the ability to effectively transfer any excess deductions they might have in one fund to another.

I now want to comment on the Expenses section of the paper. Geoff points out in Section 9.8 that from 1.1.90 all Ordinary business management expenses and commissions, with the exception of those related to the risk portion of the business, are now deductible in full. However Geoff also points out that for a life office which conducts both ordinary and superannuation business, while the tax office will accept the life office's own records to determine which of the two classes of business directly attributable expenses like commission belong to, it

will not similarly recognise for general management expenses a fair apportionment based on the office's own internal expense analysis. Instead for tax purposes total general management expenses are currently apportioned to ordinary and superannuation classes of business on the arbitrary basis of assessable income.

Unfortunately this arbitrary assessable income apportionment basis for general management expenses will generally result in a life office's superannuation business being deemed to have incurred more than its fair share of the overall expenses for tax purposes and its ordinary business less. This situation arises firstly because the tax office definition of assessable income includes (in addition to the usual realised investment income) assessable superannuation contributions but at the same time excludes corresponding ordinary business premiums. Secondly, because superannuation generally includes a substantially much greater proportion of group business, it has associated with it much lower expense rates.

Therefore while the new ordinary business tax legislation was presented on the basis of a full 39 cents in the dollar tax credit on all ordinary business expenses, in the case of offices which write both ordinary and superannuation business the net result in reality has been far less favourable. Effectively these offices only receive the full 39 cents tax offset on part of their actual ordinary business expenses with the balance only being credited with 15 cents as it is incorrectly being attributed to superannuation business.

These offices also face a further potential pricing problem in determining the actual size of their ordinary business expense deduction as it is not stable and will change due to elements not directly related to ordinary business expenses (i.e. realised investment performance, growth of assessable superannuation contributions).

This situation raises the issue of whether it would be worthwhile for life offices to consider setting up separate ordinary and superannuation companies to ensure they get full deductibility for all their legitimate ordinary general management expenses and what would be the tax office reaction to such an arrangement.

Finally it is worth noting that because ordinary business assessable income comprises essentially only realised investment income (unlike superannuation business assessable income which also includes assessable superannuation contributions) during poor investment years it is possible to end up with effectively little or no ordinary business assessable income. (Careful management of the realisation of investment gains would help in these circumstances). Obviously such a situation would further exacerbate the relative non-deductibility of ordinary business general management expenses.

DEFERRED TAX PROVISIONS

Assumptions:

Tax Rate:	39%
Capital Growth	10% pa
Running Yield	0% pa
Holding term	5 years

(1) Discount Rate	6.10%						
End of Year	Asset Value [1]	Increase in Asset Value [2]	Deferred Tax Provision Rate [3]	Deferred Tax Provision [4]	Increase in Deferred Tax Provision [5]	Net Asset Value [6]	Net Yield [2] - [5] / [6] t-1
0	1,000					1,000	
1	1,100	100	30.8%	31	31	1,069	6.92%
2	1,210	110	32.7%	69	38	1,141	6.75%
3	1,331	121	34.6%	115	46	1,216	6.56%
4	1,464	133	36.8%	171	56	1,294	6.35%
5	1,611	146	39.0%	238	68	1,372	6.10%

(2) Discount Rate	0.00%						
End of Year	Asset Value [1]	Increase in Asset Value [2]	Deferred Tax Provision Rate [3]	Deferred Tax Provision [4]	Increase in Deferred Tax Provision [5]	Net Asset Value [6]	Net Yield [2] - [5] / [6] t-1
0	1,000					1,000	
1	1,100	100	39.0%	39	39	1,061	6.10%
2	1,210	110	39.0%	82	43	1,128	6.32%
3	1,331	121	39.0%	129	47	1,202	6.54%
4	1,464	133	39.0%	181	52	1,283	6.76%
5	1,611	146	39.0%	238	57	1,372	6.96%

(3) Discount Rate	3.05%						
End of Year	Asset Value [1]	Increase in Asset Value [2]	Deferred Tax Provision Rate [3]	Deferred Tax Provision [4]	Increase in Deferred Tax Provision [5]	Net Asset Value [6]	Net Yield [2] - [5] / [6] t-1
0	1,000					1,000	
1	1,100	100	34.6%	35	35	1,065	6.54%
2	1,210	110	35.6%	75	40	1,135	6.55%
3	1,331	121	36.7%	122	47	1,209	6.54%
4	1,464	133	37.8%	176	54	1,288	6.53%
5	1,611	146	39.0%	238	62	1,372	6.52%

MR. R. McLEOD: I would like to talk mainly about Section 14 of the paper on Unit Trusts. The company I work for is a life insurance company with a unit trust subsidiary. I suspect that a number of people here are in the same position.

We seem to operate in two completely different worlds. In the life insurance side we are concerned with deferred taxation reserves and reserves for taxation that is already payable. On the unit trust side we basically ignore tax. It is considered to be borne by the unitholders and to a large extent it is, but by doing so we end up with a distortion such as is illustrated in Section 14.5.

A more general view of Section 14.5 is that each time a new unitholder buys units he or she is inheriting some of the potential capital gains tax from existing unitholders. In a small, fast growing trust this is a small effect, but the potential exists for a new investor say, shortly before a trust winds up, to be quite severely out of pocket.

My understanding is that virtually no unit trusts make provision for unrealised gains tax. The alternative, as set out in Section 14.10, of making allowance for this tax (whether on a full or a discounted basis) results in the unit holder suffering double taxation. As a manager, any such provisions you make reduce the apparent return to the unitholders. If everyone else is not making provisions it is going to be a very brave manager to be the first on the block to do so.

In our present economic circumstances there is a reasonable chance that one or two trusts may decide to wind up. There is also a fair chance that some recent investors will get their fingers severely burned.

Perhaps we will be lucky and the recent drop in property prices will wipe out most of the taxable gains, but this will be an accident more than anything else. I wonder if the Institute has thought of say lending its support to the Unit Trust Association's proposals on having the trust taxation basis altered. Our unit trust people do not believe the situation will change and were hoping the recent election would produce a new government, which would abolish capital gains tax in its present form.

MR. L.B. CLEMANS: I want to refer to one small point which I could not glean from the paper and which I do not think has been mentioned.

Some companies are still in a situation where there are deferred capital losses hanging around in their Funds. These deferred capital losses are actually assets and the logic of the paper implies that one should discount these assets. I can tell you

that it would take a lot of kicking and screaming to get a Board of Directors to actually reduce the value of these assets, especially as they would almost certainly be backed by their auditors who would prefer the simple unadulterated value of these assets.

I do think that this paper is a very clear and helpful confirmation of the deferred capital gain situation, but I think that one must take into account the special situation of deferred capital losses.

MR. A. BROWN: I would like to make just a few remarks about Section 17, Investment Performance Measurement. The problem I wish to address here is the distinction between trying to get a fair estimate of the deferred tax provision in the accounts and the measurement of the performance of the fund manager.

For the purposes of equity between the unit holders in the fund you will want to have the best estimate of your deferred tax provision shown in the accounts. This estimate will take a fair account of when the trading will actually occur.

The problem with measuring the performance of the fund manager is that you may wish to take a view that he should not trade at all, or as little as possible, so as to avoid incurring the tax as long as possible. If the fund manager does any selling you may wish to debit, as a cost against his performance, the tax incurred at that point. If he is going to sell on some chance event which he judges to make it opportune in the market, then that should be taken as part of his effort to add value.

So for judging the fund manager you may wish to take a much more passive view of investments. This leads to a basic assumption of much longer holding period in the calculation of the deferred tax provision for this purpose. When the fund manager trades at an early date, it is assumed that he made the wrong decision to buy in the first place. Therefore when he sells again he gets penalised accordingly in the judgement of his performance.

MR. I. MOORE: Rather than contest Mr. Matthews' example, I would like to reinforce the points that he made which struck a cord with some work I had done for a company of a totally different scale. This was in relation to expense relief. Mr. Matthews made the point that the rate at which expense relief may be obtained in the new ordinary deduction appeared to come out much less than 39%. In some work that I did the average rate of relief was coming out below 30%. Generally it was in the range 28% to 30% but could be even lower depending on the mix of business to be written in the current year.

The second point that Mr. Matthews made was that there is a real chance of a tax loss in the Ordinary fund due to the size of the Ordinary tax relief. In this case the relief for the excess may be obtained at the rate of 15% in the Superannuation fund and further reduces the tax relief for Ordinary expenses.

Frank McInerney pointed out some situations in relation to a small company where discounting may not be appropriate. Another situation that I have seen is where there is a change in the investment manager and the new investment manager may wish to restructure the investments quite radically so that the assumptions that might have seemed quite reasonable about rate of turnover of assets proved invalid.

MR. G. DUNSFORD (Author): I would like to thank everyone for coming along tonight. I am pleased that so many people spoke and on such a variety of aspects of the paper.

I was intrigued in one respect that no one picked up the deliberate error in Section 7.11. The formula should in fact be q over i+q times 1 over 1+i to the power d over 365.

We have Mike Sherris in Sydney. I think many of you may well have heard of him. He has a reasonable reputation that, whenever he gets up and speaks and whatever the subject is, he talks about "stochastic methods" and "Black-Sholes" and appears to apply option pricing techniques to every problem in the world. Deferred tax and unrealised gains was no exception. Mike gave a very good speech on how he had done some sums to demonstrate that stochastic methods could be used to determine the rate of discount. He said he was disappointed that these were not all set out in my paper!

I can now come back to a comment that was made earlier, and that is how easy the paper was to read. It has been suggested that when many actuaries pick up an actuarial paper the first thing they do is to flick through and see how many formulae there are. If there are too many formulae they immediately put the paper to one side with the possible intention of reading it later, but often not getting around to it at all!

I was told that if I got an audience of 30 tonight I was doing well. In fact it is nearer 40 and perhaps this is because there are few formulae!

Peter Worcester commented that when Paul Keating introduced tax on superannuation in conjunction with imputation credits, he said that the intention was to make the tax neutral. There should be no tax payable if trustees had a normal mix of investments and managed their funds properly. I personally feel it was a big con and this can be readily demonstrated in relation to capital gains. If anyone had done some historical work on superannuation funds to see what would have happened in the past if the current tax rules applied, I think one could easily see there would have been a significant amount of tax payable - particularly for funds starting some years prior to October 1987.

Peter noted that in looking to decide whether or not to sell an investment and buy another one there was a "neutral" position with regard to the provision for deferred tax disclosed in the paper. If there was a full deferred tax liability provided without discount then the position would be neutral.

Now the paper also suggests that a neutral position arises when deferred tax reserves are discounted, and accumulated with interest at the discount rate.

Frank Funder wondered whether I was interested in promoting the method in Section 13 or that in the latter part of Section 16, paragraphs 22 to 28. They are intended to be based on the same principles, and I am sorry if I did not get that message over. There are two purposes for the accumulation. The main one is to obtain equity between unitholders purchasing and selling units, and the other is to try and assist in solving the problem that the fund manager has when he or she is considering selling one investment with a deferred tax liability and buying another.

Alan Brown said that he was concerned with the problem of assessing fund managers. He recognised that discounting to get a fair price for entry and exit was right. But then there is the question of assessing fund managers, in which case you have got to allow for what tax they are actually going to incur as a result of selling. This penalises active managers.

This is a problem. But it can be resolved by an agreement between the investment manager and the trustees as to the likely rate of turnover, and hence the amount of discount in the deferred tax reserve.

If the investment manager keeps to this agreed rate of activity, the interest on the reserves from investments not sold will be available to meet the shortfall of reserve against tax due in respect of stocks sold.

On the other hand, the investment manager knows that if he or she is more active than this then this will result in a tax loss which will need to be set against investment profits.

Frank McInerney did not like being compelled to discount. I can accept that no one likes to be compelled to do anything. But I suggest a very careful reading of Section 19.11 does in fact permit no discounting or rather one can assume sale immediately after balance date if one wants to. Certainly I would expect this for small funds. The intention of the paragraph was to allow for no discounting or perhaps only for the normal delay in payment of tax, if expected turnover in future was high or uncertain. But again I would emphasise that for larger funds as opposed to smaller funds, the major purpose of discounting is to obtain fairness between people coming in and going out.

Another speaker suggested that life offices who reduced charges on new policies from the first of January jumped the gun. I was

not quite sure what he meant. He appeared to be suggesting that no life office should in fact have anticipated the legislation which I think still has not been passed. But then, where would we have been when tax was introduced for superannuation funds if we had not bothered to provide for tax until the 30th June the following year when the legislation was finally passed? No, I think it was quite right that offices reduced their charges from the 1st January. There were a number of offices which did so including mine.

Will Matthews quite correctly pointed out that it is the return on the underlying assets which would be the usual rate of return that would be assumed for the deferred tax reserve, because they would usually be the assets in which the deferred tax reserve is held.

I did not quite follow his comment that the rate of expense relief should be less than 39% for a life office. I would have thought that after allowing for imputation of share dividends, any marginal expense is relievable at 39%. Maybe if you do not gross up the share dividends you do get a lower average rate of tax. But surely, even in this case, marginal expense relief would also be effectively at 39%.

My feeling on expenses relief for life companies is that there are a few querks which I pointed out in the paper, but fundamentally they are meant to be more or less on a level playing field with other institutions now. Effectively the life office gets tax relief on all its expenses in respect of assessable income i.e. all premiums and investment income with the minor exception of premiums for death cover.

I am glad Rob McLeod pointed out the problems with unit trusts. I think it is important that everyone who has even the remotest association with unit trusts continually recognises the problem with capital gains. We are almost reaching the stage when we feel slightly embarrassed because prospectuses do not really give a clear picture to prospective unitholders. All I can say is that my understanding is that the Unit Trust Association is continually pressing this point with the government, as I indicated in the paper. Hopefully, if the Labor government does not expect to raise much tax from capital gains as they said in the election, maybe they can see their way clear to allowing realising of investments within a trust to be tax free. It should be only when the units are sold that tax should become payable.

I also thank another speaker for his helpful comments on Section 51. For this paper I decided the subject would not be tax on gains. It would be on the <u>treatment</u> of tax on gains. So I deliberately avoided the need to explain what gains were, and what tax on gains was. I also avoided defining what assessable income was and what deductible expenses were. I am sure all these matters have been covered extensively elsewhere.

Leslie Clemans raised a point about deferred tax losses. Certainly, I agree that with a small fund the "no discount" approach is quite reasonable.

Ian Moore mentioned that assumptions may prove to be invalid. Whenever you make assumptions at the beginning of a period they will always be invalid by the end. You may have the opportunity to adjust as you go along or at the end of the period. The whole purpose in my view is to try and be as realistic as possible. Experience profit or loss on deferred tax reserves reflecting the difference between actual and expected experience of rates of turnover and investment return can be shown as a separate contribution to the earnings of the fund.

That is all I have to say. Thank you very much indeed for coming along and for your comments as well.

BUYING AND SELLING
LIFE INSURANCE COMPANIES

by S. Miles, BA,FIA,FIAA & T. Fraser

INDEX

CHAPTER 1

OBJECTIVE AND SUMMARY

The objective of this paper is to provide a basic guide for those parties interested in buying or selling a life insurance business. As such, we analyse some of the major issues confronting buyers and sellers. We also look at the different methodologies that are used to determine the price. As anyone who has experienced the sale of a company will confirm, the approach adopted varies greatly with each sale. Nevertheless we believe the issues and techniques outlined in this paper will provide a useful starting point for intending players.

CHAPTER 2

INTRODUCTION AND OUTLINE

Over the last few years the Australian life insurance industry has experienced perhaps the greatest rate of activity of any life insurance market in the world. From 1979 to 1989, the number of registered life insurance companies has increased from 30 to 53, with the number of Australian controlled companies increasing from 7 to 23.

This activity ranges from setting up new life insurance companies through to acquisition, or partial acquisition, of both shareholder and mutual companies and portfolios. It has involved existing players and new players both in the life insurance industry and the financial services industry. Some new players have come from the financial services area, whereas others have come from unrelated fields. Existing players have left the game. Some similar players have adopted very different strategies. Variety certainly has been the spice of life!

In the past 5 years approximately 30 Australian life companies have been merged, acquired or established. We expect this trend to continue in the future, despite the recent slowdown in activity.

There are five arguments to support this view, three global and two domestic;

Global

- The changes in the European market in 1992 will see existing overseas insurance companies in Australia retire from the Australian market place and move their funds to Europe to prepare for the changes following the European deregulation in 1992. The recent events in eastern Europe will accelerate this trend.

- New entrants to the market will see Australia as a focal point for the Pacific Rim and a springboard into South East Asia.

- Continued weakening of the Australian dollar means Australian investment returns are falling in overseas currency terms. This has been particularly important for US based companies.

Domestic

- Existing companies looking for cross selling or vertical integration will either acquire or set up their own life insurance operations.

- Existing players will look for economies of scale through merger/acquisition.

Each of these reasons provides the background for the development of our paper. The remaining chapters of this paper will look at the following issues:

- Why Buy? Why Sell? We use recent purchases to illustrate the reasons for buying and selling.
- Methodology. Two different methodologies are described. Despite the differences, the two methodologies are really surprisingly consistent.
- Determining the Present Value. How to use the different methodologies.
- The Sale Process. An analysis of the roles of buyers, sellers and their advisers.
- Actuarial Issues. Important actuarial issues to consider.
- Accounting Issues. Important accounting issues to consider.
- Other Issues.
- Conclusion.

CHAPTER 3

WHY BUY? WHY SELL?

3.1 INTRODUCTION

As stated previously, the second half of the eighties saw a high level of takeover and merger activity in the Australian life insurance market.

This period was also characterised by four fundamental changes in the Australian Life Insurance market, namely

- Increasing non-commission expense losses for many companies as a result of inflation, inability to achieve critical mass and, in some cases, computerisation costs which were far in excess of original estimates.
- Downward price pressure as the result of intense competition for risk products and, particularly, for investment products.
- Loss of company surplus as a result of the stock market crash in 1987.
- Increased company surplus requirements to meet the demand for agency loans, volume related commissions and mismatching reserves (under Circular 273).

The Australian market therefore, was experiencing the twin pressures of falling profit margins and increasing capital requirements. Not unexpectedly the result was a rush of takeover and merger activities.

We have summarised some of the takeover and merger activity in Table 3.1 which gives details of major transactions obtained from public information - not we hasten to add, from our own private and confidential knowledge.

TABLE 3.1

LIFE COMPANY SALES

COMPANY	DATE	BUYER	PRICE ($ M)	VALUATION METHOD
MLC	1982	Lend Lease	$9 / share	ME
GPL	1984	ANZ	48	AV
MLC	1985	Lend Lease	$28 / share	ME
ANL	1985	Koitaki/Keywest	15	NTA
ANL/Clayton Robard	1986	Koitaki	240	ME
APA	1986	Unity	22	AV
Sentry Group	1986	National Mutual	US$60	
ANL/Clayton Robard	1987	Tyndall	500	ME
Occidental	1987	Battery	107	AV
BMA	1988	FAI	7	AV
AML	1988	Pacific Mutual	34	AV
Aetna	1989	Prudential	115	
AMEV	1989	Sun Alliance		AV
SCAM	1989	CML		AV
Royal	1989	Battery	15	AV
Liberty	1989	Tyndall	10	Agreed Value
Investors Life	1989	Prudential	16	

AV - "actuarial valuation"
ME - "maintainable earnings"
NTA - "net tangible assets"
The "AV" and "ME" methodologies are discussed further in Chapter 4.

To be successful in either buying or selling a life insurance business (or even a portfolio or a distribution system), it is very important to establish the reasons why, and the extent of the motivation to, buy or sell.

There may be a difference between the public reasons and the private reasons to buy or sell. Whatever the reason, the decision to sell is a very difficult decision to make. Understanding this reason is the key to successful negotiation for both buyer and seller.

In the following paragraphs, we outline what we see as the main reasons for buying and selling life insurance companies. Each of the reasons can be viewed from either a domestic or global perspective.

The major reasons for buying or selling life insurance companies are:-

- rationalisation;
- strategic positioning;
- economies of scale;
- management or shareholder ego; or
- special circumstances

Where possible, we use examples from Table 3.1. However, in other cases, prudence and confidentiality prevent us from using examples, and the reader must speculate on suitable illustrations.

3.2 RATIONALISATION

Before continuing, we have defined the terms 'rationalisation' and 'strategic positioning'.

Rationalisation is the negative forced action resulting from the need to re-establish profitability within a group. Such actions are often characterised, paradoxically, by selling the most profitable and viable sections of the business.

Strategic positioning is represented by positive actions rather than defensive actions i.e. through buying or selling a life insurance company the profitability of the parent is likely to increase.

Obviously, rationalisation is not only limited to selling a subsidiary but can occur through the sale of the business or part of the business. It is important to note the legal and tax issues are totally different when it is just the business being sold.

3.3 STRATEGIC POSITIONING

Strategic positioning should result in the improvement of company performance through buying or selling a life insurance company.

For a seller it means the resources invested (not just capital but also management) can be more effectively used to produce a greater return in some other investment.

The seller's reasons could relate to the past performance of the business but probably relate to the seller's perceptions of what is going to occur in the future. Such reasons could be:

- the amount of management time spent in running the business;
- a change of legislation making the market unprofitable;
- capital expenditure required to fund new business;
- expenditure required to keep computer systems up to date; or
- changes to competing products making the seller's products uneconomic.

For a buyer, strategic positioning is the belief that the purchase will increase profits or growth and fit with the other businesses in the group.

Most strategic positioning decisions can be categorised into the following areas:-

- **Investment** - the purchase represents a good investment opportunity;
- **Competition** - the purchase gives control of one or more of the following:
  - customer base
  - products
  - distribution networks
- **Synergy** - the buyer obtains opportunities for;
  - cross selling
  - vertical integration

Investment

Occasionally, good investment opportunities arise because:-

- Cheap Investment - the investment will yield a good return either through income generation or capital appreciation of the asset purchased. The Koitaki/Keywest purchase of Associated National Life was both. Shortly after this purchase, both parties achieved income returns considerably higher than the average rate of return on investments, leading to eventual divestment with a significant capital gain.

- Cash Flow - there is a belief (sometimes incorrectly based) amongst many people in financial markets that life insurance companies or businesses give good cash flow. This cash flow may be complementary to the cash flow needs of the buyer.

Competition

Competitive advantage can be gained through the purchase of:-

- Customer base - the belief that a particular life insurance company has a customer base which is considered desirable, e.g. the ANZ purchase of GPL.

- Products - the buyer gains access to products that it did not have before or increases its market share in certain product types e.g. the National Mutual purchase of Sentry.

- Distribution networks - the buyer gains access to distribution networks or a different type of network.

Synergy

Synergy can be achieved in many ways but the most common are:-

- Cross Selling - a potential buyer has an existing business that would complement a life insurance business. There have been a number of instances where organisations (such as banks and wholesale funds management groups) involved in financial markets offer investment services to clients and see life insurance as another extension of their existing business.

- Vertical Integration - buyers already in the life insurance industry either selling life insurance products or purchasing products decide to extend their operations. An example would be the MI Group in the United Kingdom. This life agency has recently purchased a life company in the UK.

.3.4 ECONOMIES OF SCALE

Life insurance business is volume related. Larger companies have lower expense rates because of the ability to spread fixed costs over a greater base. This fact has been supported by the expense surveys of various consultants along with the work by Peter Praetz (2). Not surprisingly, in a period where expense rates have been rising, many companies have sought a takeover prospect to reduce overall expense levels.

Examples in these areas would be Prudential's takeover of Aetna Life and Casualty, the Sun Alliance purchase of most of a majority of the Amev portfolio and the merger of Tyndall and Liberty Life.

Economies of scale can also occur in other areas, such as :

- Spreading of risk;
- Computer systems;
- Administration systems;
- Investment expenses;
- Asset allocations;
- Working capital;

Often the perceived economies of scale are very hard to attain. The easiest area to achieve economies of scale is investments; with probably the hardest being computers. However, the achievement of economies of scale is often very costly in the short term and needs to be considered carefully before purchasing.

3.5 MANAGER AND SHAREHOLDER EGO

Over the years, a number of life companies or businesses have been purchased for no apparent reason. One suggestion could be that management or shareholders obtain psychological pleasure out of the purchase. That is, the purchase has enhanced other non-related parties' perceptions about the buyer's power or influence or some other function.

The decision to sell however, is usually never made by management and only reluctantly made by shareholders.

3.6 SPECIAL CIRCUMSTANCES

Special circumstances occasionally arise where a life company or business has to be sold due to governmental requirements, liquidation of the parent company or some other reason.

An example of this was the sale by Nationale-Nederlanden of Associated National Life. The Foreign Investment Review Board made this sale one of the conditions in agreeing to Nationale-Nederlanden's purchase of Mercantile Mutual Limited.

CHAPTER 4

METHODOLOGY

4. INTRODUCTION

The previous chapter analysed the main reasons for buying and selling life insurance companies. Here, we examine the methodologies used to determine the price.

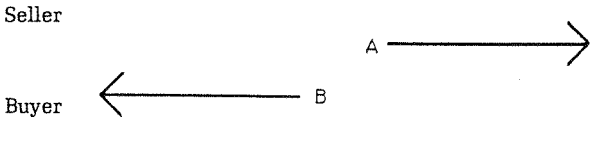
The final price paid is a matter for negotiation. As part of this negotiation process there are essentially two prices:

- minimum perceived value as a going concern to the selling company - price A.
- maximum perceived value to acquiring company - price B. This price will reflect some value added characteristics usually those the lines of the buyer's perception.

These perceived values are not constant, but vary over time.

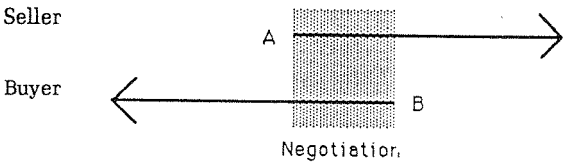
For the negotiation process to begin, price A must be less than price B. This is shown in figures 1 and 2.

FIGURE 1



NO SALE POSSIBLE

FIGURE 2



SALE IS POSSIBLE

Exactly what price is paid will depend upon the competitive nature of the market and the extent to which the buyer adds a unique value to the business. The more competitive the market, the closer the price will be to B.

However, where the buyer adds a unique value such as a client base, then the price will be closer to A than B because there will be no competition.

In determining the respective values of A and B, the buyer and seller need to consider three factors:

1) The current net asset position of the company – this could be expressed as the accumulated past undistributed capital and earnings and the increment or decrement between the book value of assets and the market value of assets. For the balance of this paper we will use the term Adjusted Net Worth for net assets;

2) The present value of future distributable transfers from –

   (a) existing business and

   (b) future new business.

   This item represents the future change in adjusted net worth; and

3) Goodwill – the balancing item.

4.2 TERMINOLOGY

There is no consistent terminology used for the components of value. The terms used here reflect the terms we have found most useful in describing the concepts to buyers and sellers.

Different terminology also used in the market is shown below.

OUR TERMINOLOGY	BURROWS AND WHITEHEAD TERMINOLOGY	ACCOUNTING TERMINOLOGY
Adjusted Net Worth	Adjusted Net Worth	Net Assets at Market Value
Value of Inforce	Value of Inforce	Goodwill
Value of New Business	Goodwill	
Goodwill	Allowed in the margins in above three components	

A brief discussion of these components is given below. A more detailed analysis is given in the next chapter.

The accounting definition of goodwill is very conservative and traditional. There are a number of examples where the balance sheet includes the value of inforce business. This has been taken up as an intangible asset and is not subject to the accounting rules governing goodwill.

4.3 ADJUSTED NET WORTH

The calculation of adjusted net worth is covered in a paper by Burrows and Whitehead (1) with some extra notes on Australia provided by Melville (3). In summary, it is the market value of assets less the statutory valuation reserve. The reader is referred to those papers for a full discussion. As Burrows and Whitehead point out, the usual preferred approach is to use market value of assets rather than the discounted value. Justification for this approach occurs in practice where buyers pay full dollar value for these assets when purchasing net assets of life companies. The same approach is used for purchases of other financial companies as well as manufacturing companies.

4.4 VALUE OF INFORCE AND VALUE OF NEW BUSINESS

The nature of life insurance products is such that in the first policy year, policy outgoings exceed policy income i.e. a negative statutory profit. As a result, capital is required to support the writing of new business. This capital is returned from the future excess of future statutory policy income over outgoings. This excess represents a return of capital as well as profits. For this reason, we have defined the difference between statutory policy income and outgoings as a distribution. This accounts for the problem of having to differentiate between capital and profit.

The value of inforce and new business is the value, to the buyer, of the future distributions which arise from the inforce (or existing) business and future new business respectively.

When determining this component of value it is important to ensure consistency with the valuation liability used as the starting point for determining future distributions and the valuation liability used in adjusted net worth. Future experience should be assessed on a realistic basis.

The extent to which a purchasing company will factor in favourable value added will depend upon the extent to which the buyer believes he is adding a unique value. In any event, a buyer should examine both the maximum price he is willing to pay and the minimum price the seller is likely to accept.

The present value of future distributions from new business transfers is the most difficult component of value. The assumption of rapid future growth rates can lead to high values. On the other hand, recent experience suggests the market does not attach a high price for this component. Perhaps this is because recent sales have involved companies which were unlikely to be selling profitable business either now or in the near future.

In theory, the value of future distributions should be determined by a full prospective valuation of distributions for existing business plus specific allowance for future new business, all discounted using the required rate of return.

In practice this approach has two major drawbacks:

- it can be complicated and involved; and
- there is little certainty about the composition of new business.

For these reasons the full projection approach is usually replaced by either of the following approximations:

1. Present value of

   - distributions from existing business plus

   - the value of new business expressed as a multiple of the present value of one year's new business.

   This multiple allows for the capitalisation of new business earnings.

2. Maintainable earnings for existing business multiplied by a capitalisation factor and another factor to allow for the effect of new business. In practice two separate figures are not calculated - they are combined into one multiple.

Given the magnitude of the estimates which are made regarding future experience and new business, the difference in assumptions can be more significant than the differences in methodologies.

Methodology 1 is usually adopted by actuaries and is called the "Actuarial Valuation" approach. It represents the 'economic' value of the company. This approach is discussed in the Burrows and Whitehead paper. Although this approach is common in the life insurance industry, it is not generally applied to other industries and is therefore difficult to verify in practice.

Methodology 2 is usually adopted by accountants and is called the "Maintainable Earnings" approach. It represents the market value of the company. It may be argued that there are more approximations involved in the capitalisation factors. However the method is commonly used in valuing other industries and can therefore be independently verified.

A more detailed description of each methodology is given in the next section.

4.5 GOODWILL

This is the balancing item. It reflects the premium which may be required to gain control or perhaps the value of some additional deals that will be consummated with the sale e.g. cross shareholdings. It includes the extent to which the price has been negotiated between A & B.

CHAPTER 5

DETERMINING THE VALUE

5.1 INTRODUCTION

In this section we describe the two different valuation methodologies (actuarial value and maintainable earnings) which are used to value inforce and new business. Whilst these methodologies are different in their approach, we believe they are similar in their outcome.

However, it is important to emphasise the value of a company does not necessarily reflect profitability. It reflects the future amounts that may be distributed to shareholders and is determined by an actuary following an actuarial valuation.

5.2 ACTUARIAL VALUE

The Model

Under the actuarial valuation technique the value of inforce is determined by discounting the expected flow of future distributions. This is usually determined by using a model of the life insurance company's portfolio of business.

Under a model, the portfolio of business is represented by a sample portfolio consisting of representative policies. As Melville says;

> "...it is important to test that the model does in fact provide a good representation of the actual portfolio and gives some examples of items to be validated. As many as possible of the relevant items appearing in the revenue account and the valuation balance sheet (including Form I of the Second Schedule) should be validated in this way. An error rate in excess of 3% for the important items should probably be investigated further. Of these, the validation of opening reserves in the model is the most important..."

However, when a potential buyer is assessing a company, there is usually no time to build a model, nor is there enough information to determine the appropriate assumptions. A reasonable approximation can be made by calculating projections for a sample of policies and looking at the values for representative durations.

These values can then be expressed as a percentage of reserves (for investment products) or premium (for risk products). These percentages can then be applied to actual reserves and premiums to determine the value of inforce business.

In theory, the value of new business should be determined by projecting future new business sales and their resultant distributions. In practice, the profitability of one year's business is calculated. The value of new business is then determined as a multiple of this value.

The Assumptions

Naturally, the value is highly dependent upon the assumptions used. Burrows & Whitehead discuss three different classes of assumptions:-

- Economic assumptions;
- Demographic assumptions; and
- Expense assumptions.

The reader is referred to that paper for further discussion of these assumptions.

Although expense assumptions are usually expressed in the form of unit assumptions (i.e. per policy, percent of premium etc.), it should be remembered this is only an approximation for the expected actual expenses that will be incurred. It is instructive to relate the amount of expense loadings to the number of staff required and the associated expenses including overheads. This is not as complicated as it seems.

For example, a buyer may assume one underwriter is required for every 2,000 policies per annum and one policy issue clerk is also required for every 1,500 policies per annum. This means that new business of 6,000 policies per annum will require three underwriters and four new business clerks. If underwriters have a salary of $40,000 and policy issue clerks $30,000 (after allowing for supervisors etc.) then total salary costs will be $240,000. If "on costs" are a further 75% of salary, then total costs will be $520,000 or $87 per policy.

The discount rate is also a very important assumption. In theory, it should be an after tax risk adjusted rate. In practice, rates such as 12.5% and 15% are used. Interestingly, discount rates should have fallen with the introduction of dividend imputation. No such fall seems to have occured.

5.3 MAINTAINABLE EARNINGS

There are three steps to determine the value of inforce plus the value of new business under the "Maintainable Earnings" approach:-

- Determine future maintainable earnings by estimating earnings excluding "extraordinary" items based on historic results and including sensitivity to key industry factors, including future growth prospects and the general economic outlook. Earnings should be defined on a realistic basis. For a mature company, statutory earnings may be suitable but for a newly established company, a GAAP approach is often used.

- Apply a multiple to the maintainable earnings.

  Determination of an appropriate multiple to reflect a required rate of return. Additional allowance is then made for:

  - growth in earnings for existing business;
  - growth in earnings for future new business;
  - an extra allowance for a temporary improvement (or otherwise); and
  - multiples used for similar companies in recent sales.

- Separate assessment of surplus or unrelated assets and liabilities, being those items which are not essential to producing the estimated future maintainable earnings.

It should be noted that testing the multiple against other multiples used for recent sales is an important component of this technique.

CHAPTER 6

THE SALE PROCESS

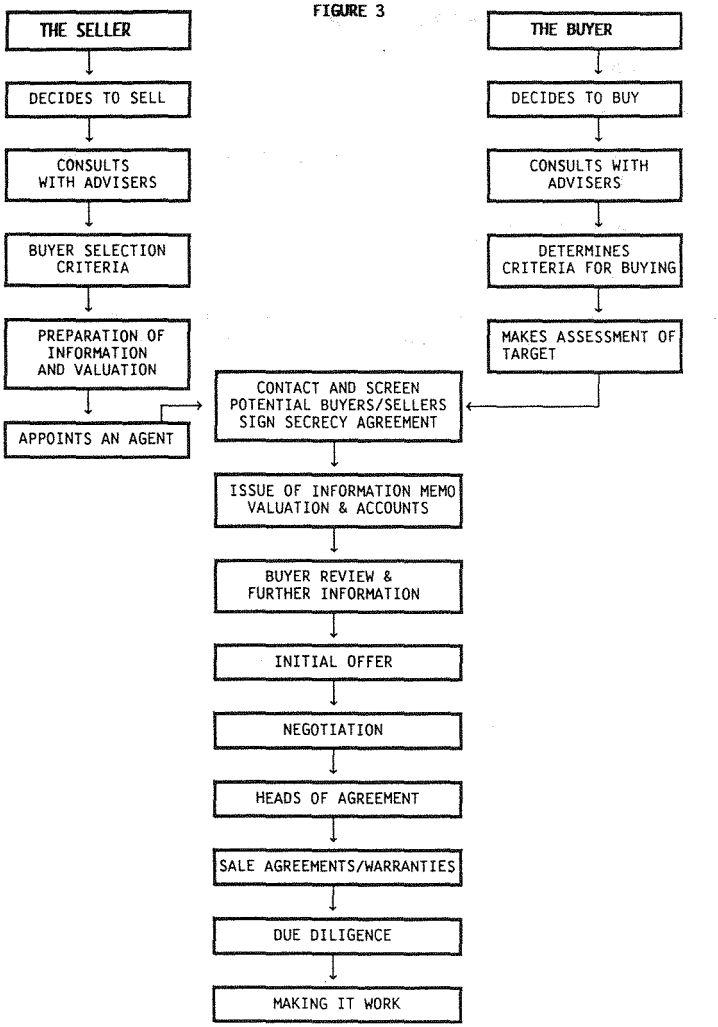
6.1 INTRODUCTION

There are three different methods of selling a life company

- on market takeover of a listed company (There are few listed companies in Australia);
- private negotiation; and
- tender process.

The steps involved in an on market takeover or a private sale may differ, but they will follow the general pattern of the tender process shown below.

FIGURE 3


THE SELLER
DECIDES TO SELL
CONSULTS WITH ADVISERS
BUYER SELECTION CRITERIA
PREPARATION OF INFORMATION AND VALUATION
APPOINTS AN AGENT
THE BUYER
DECIDES TO BUY
CONSULTS WITH ADVISERS
DETERMINES CRITERIA FOR BUYING
MAKES ASSESSMENT OF TARGET
CONTACT AND SCREEN POTENTIAL BUYERS/SELLERS SIGN SECRECY AGREEMENT
ISSUE OF INFORMATION MEMO VALUATION & ACCOUNTS
BUYER REVIEW & FURTHER INFORMATION
INITIAL OFFER
NEGOTIATION
HEADS OF AGREEMENT
SALE AGREEMENTS/WARRANTIES
DUE DILIGENCE
MAKING IT WORK

Notice, that the buyer and the seller start with separate paths and come together when contact is made to screen potential buyers. Of course, both the buyer and the seller may have started separately and be fully prepared for each other by the time contact is made. However, for many people the start down the buyer/seller track does not commence until initial contact has been made by the opposite party.

As a result one of the parties in this process is generally working under time pressures. Although the initial reaction is often "I haven't got enough time", it is quite surprising how much can be done in a short time and how a result can be achieved quite quickly.

In the section below we describe the initial processes followed by the seller and the buyer. Once contact has been made we describe the process by analysing each step, for both sides of the negotiating table.

6.2 THE SELLER – INITIAL PROCESS

The decision to sell often involves admitting a mistake, the loss of friendships formed over a long period of time and considerable disruption to the personal lives of many people.

Once the decision has been made, it is necessary to draw up an action plan. Advisers generally involved are merchant banks, actuaries, accountants and lawyers. The role they play at this stage may be specific i.e. relevant to their particular area of expertise or general involving the overall aspects of the sale.

At an early stage the seller selects the criteria which will be used to screen potential buyers. This also helps crystallize the reasons for the sale.

Time is usually a crucial issue. A drawn out sale has the disadvantage of devaluing the target company during the sale period because:–

- new business sales may decline as a result of the uncertain situation;
- discontinuances may increase as agents commence to write for different companies; and
- key staff may leave.

The next step involves the preparation of information for potential buyers.

The buyer information will include:

- an information memorandum, outlining the nature of the business, the recent experience of the company, the quality of assets and the reason for sale, etc. (for further detail please refer to the check list in Appendix 1);
- the latest first and second schedules as well as any internal accounts e.g. par, non-par split; and
- an actuarial valuation of the company or some other form of valuation by merchant bankers or accountants.

As the information is being prepared the seller's agent will usually make confidential contact with prospective buyers. Initial contact involves a phone call followed up by a brief letter outlining the process and also requesting the signing of a secrecy agreement.

6.3 THE BUYER – INITIAL PROCESS

If the buyer has been actively seeking takeover and merger targets then suitable criteria should have already been determined and perhaps even a short list of companies has been prepared. If the desired criteria for a target have not been identified then it should be done as a matter of priority. This will enable the buyer to make an early assessment on whether he wishes to be involved. The sale process also proceeds more quickly and is more likely to be successful when the buyer has clear pre-determined aims.

Once initial contact has been made the buyer generally has a short period to express interest. No price indication is usually required at this stage.

6.4 THE SECRECY AGREEMENT

The secrecy agreement is signed by the buyer and usually binds the buyer and his agents to secrecy and the return of all documents provided during the sale process.

The format of the agreement varies greatly from sale to sale and usually depends on the style of the seller's legal advisers.

Once this agreement has been signed, the information documents are sent out or made available.

6.5 INFORMATION MEMORANDUM

The information memorandum is provided by the seller to give an outline of the business for sale. Amongst other things it should include:

- history of the business;
- outline of the portfolio and recent experience (further detail may be provided in the actuarial valuation). Details of significant assets should also be provided;
- reason for the sale;
- description of the sale process e.g. tender for shares or transfer of portfolio;
- description of personnel, details of the transfer of staff and any redundancy provisions;
- details of what will happen between the time the price is determined and the sale is completed as there may be additional profits or losses in this period. Management control as well as investment control should also be covered.

Although the information memorandum is often ready before the professional valuation, it is preferable to distribute these items together. Simultaneous issue enables all parties to commence work immediately and avoids the wasted time answering questions from the information memorandum which are answered in the professional valuation.

During this period it becomes impossible to keep the sale a secret. The seller should therefore, have prepared appropriate communication to the staff and agents of the life insurance company. A careful decision needs to be made about when and how the sale is communicated to the staff.

6.6 PROFESSIONAL VALUATION

This is a detailed description of the portfolio outlined in the Information Memorandum. A valuation is generally performed for the major classes of business with approximations being used for the minor classes. Either an "actuarial value" or a "maintainable earnings" approach may be used.

Economic and demographic assumptions should reflect the recent experience of the portfolio and therefore represent the value the seller is giving up. However expense assumptions are rarely based on the seller's actual expense experience. More usually, expenses are based on the longer term expected expense experience of a successful buyer. Expenses assumed are often quite low because it is the extra cost to a buyer which needs to be estimated – not the average cost.

Where the "actuarial value" has been used the valuer should also supply sensitivities for the buyer to assess the effect of:

- "shock" lapses associated with the sale as well as higher lapses over the longer term;
- different expense levels;
- different claims experience; and
- the effect of various policy guarantees both explicit and implicit. This ranges from guaranteed premium rates to policyholder expectations that may have been raised by past subsidised investment performance.

It is also helpful if the valuation includes a projection of cash flows as this enables the buyer to assess financing requirements and determine the effect of different required rates of shareholder or policyholder return.

Clearly, these assumptions should be examined in accordance with the buyer's own experience. It may be necessary to initiate change to gain improvement. The split of distributable earnings between participating and non-participating classes of business is often a fruitful area of exploration.

At this stage the buyer should also be able to determine the extent of warranties required.

6.7 ACCOUNTS

The critical reasons for examining the accounts are:-

- to assess the differences between the buyer's accounting policies and those of the target company;
- to assess the accuracy of internal accounts compared to statutory accounts and figures used in the valuation process; and
- to reveal any obvious problems or major items in the accounts.

6.8 BUYER REVIEW AND FURTHER INFORMATION

The buyer will usually review the information in association with his advisers. The check list we have provided as Appendix 1 provides a useful starting point although it should not be regarded as a complete list for all occasions.

After review, the buyer will have a period during which additional information may be requested. This will be arranged at a meeting (or meetings) between the buyer and the seller.

An alternative arrangement may be to allocate the buyer time at an 'Information Room'. Such a room generally has a large amount of data which is listed for the buyer. The buyer then requests copies of the data required. We understand that all information in the room may be regarded as reviewed by the buyer regardless of whether or not it has been requested.

Any purchase by an existing life insurance company will often involve some form of merger or rationalisation of existing staff and systems. This may necessitate a meeting of the systems experts for the buyer and the seller.

6.9 INITIAL OFFER

Having reviewed the information, the buyer will then make an initial offer. The offer will usually include a price and a list of terms and conditions as well as warranties. The seller will be hoping for a fixed price whilst the buyer will want to offer a range of prices. Usually a minimum price is preferred.

The seller will review the offers. Although price is one of the (if not THE) most important factors, other factors considered will include:

- the quality of the buyer and how this will reflect upon the seller;
- the extent of warranties required;
- undertakings to policyholders, staff and agents; and
- ownership of company name.

6.10 NEGOTIATION

The most interesting part!

6.11 HEADS OF AGREEMENT

Once the negotiation has been completed a Heads of Agreement (sometimes called a Memorandum of Intent) may be issued. Whilst this is not legally binding it is generally regarded as binding by reputable institutions. The memorandum will mention the price and major warranties.

6.12 SALE AGREEMENT NEGOTIATION AND DUE DILIGENCE

This can be the most drawn out, frustrating stage of the process and for this reason it is recommended the seller commences drawing up a proposed agreement at an early stage. Most sale agreements will include a due diligence period before the price has been paid but after the "Heads of Agreement" has been signed.

During the "due diligence" period the buyer has the right to review all warranties given under the contract. If a warranty has been breached then the remedy is usually outlined in the sale contract. After the "due diligence" period no claim may be made for warranties unless such a claim has been specifically provided for in the contract or unless there has been fraud.

6.13 MAKING IT WORK.

A lot of purchases subsequently fail to realise full benefits because enough consideration has not been given to this item.

What a good title for another paper!

CHAPTER 7

ACTUARIAL ISSUES

7.1 INTRODUCTION

It is our intention to describe the important actuarial factors to be considered by buyers and sellers. We only concentrate on the important issues because a description of the technical issues involved and the basic methodology is contained in Burrows & Whitehead. We have also developed a check list of accounting and actuarial issues and this check list is given in Appendix 1. However, we would emphasise that each buyer has a different priority for each factor in the check list. This reflects, in part, different experiences as well as different strategic reasons for purchasing a life company.

Although most of the comments in this chapter relate to the determination of an actuarial value, many should also be considered when determining the maintainable earnings multiple.

What basis should be used for the assumptions? Should it be a worst case going concern or should the assumptions be an optimistic approach based on future improvements? One valuation cannot suit the purposes of all potential buyers.

Whatever basis is used the buyer and seller should be aware of the implications the assumptions have for the future management of the business.

7.2 ADJUSTED NET WORTH

- **Par/Non Par Split**

  Adjusted net worth needs to be split between participating and non participating lines. The shareholders' entitlement to surplus for each of these categories is defined in the Memorandum and Articles of Association. Although this entitlement may be changed by the company at any time, the Insurance and Superannuation Commission is not always happy to make these new splits retrospective. Furthermore, the maximum split that can be allowed under the Life Insurance Act is 100% of non par surplus and 25% of the cost of bonus for par surplus (which means that 20% of total surplus is eventually distributed to shareholders). Even though the emergence of existing par surplus is delayed because it must be distributed through future bonuses, it is not usual to allow a further discount factor for this delay.

Moreover, under a strong valuation basis the cost of bonus is overstated. When a policy lapses this overstatement falls into surplus and is available again for distribution. For this reason par surplus is sometimes given a higher distribution percentage than that stated in the Articles of Association. For example, shareholders may be entitled under the Articles to 25% of distributed surplus which is equivalent to 20% of total surplus. However, to allow for the overstatement factor, the 20% of total surplus split may be increased to 25%.

- **Non Par Investment Account Policies**

Many investment account policies are entitled to a fixed share of investment income even though they are non par. Therefore, when any investment surplus is realised a proportion of it will need to be distributed to these policyholders.

For example, a policy document may allocate 85% of investment earnings to investment account policies, as they also have a minimum guarantee. Effectively, shareholders are only entitled to a maximum of 15% of the undistributed investment surplus for these policies, notwithstanding the fact that the Articles of Association may show they are entitled to 100%.

- **Section 40 Split**

Where a company does not have an approved par/non par split, a split may be calculated at any time in the future under Section 40 of the Life Act. Under section 40, the accounts may be split in proportion to liabilities. It is worth noting that currently life offices write a large proportion of non participating business, especially in the form of single premium bonds. Therefore, over time, the proportion of non par business is increasing. For many companies this change is quite rapid and surplus which once would have been allocated to participating business is "dragged" into the non participating account via a Section 40 split. This may be a way for a buyer to add value to a company.

- **Release of Participating Surplus**

If a company no longer writes participating new business, eventually there will be a day when the last participating policyholder has left. This day may be accelerated by conversion programmes which encourage alteration into non participating products. When the last participating policyholder has gone, any remaining surplus may become non participating by default. This has resulted in some valuations placing a higher value on the level of participating surplus, especially when participating business has been closed for some time.

- **Tax Effect**

A tax effect must be calculated for each item of adjusted net worth. Tax is calculated in relation to cost which may not necessarily be book value. Also, note that under recent changes to taxation rules, expenses relating to ordinary investment business are tax deductible.

The calculation of any future income tax benefit should be consistent with the assumptions implied in the value of inforce and new business.

- **Miscellaneous Liabilities**

Liabilities such as "investment fluctuation reserves" and contingent reserves are generally not required to meet specific liabilities and hence can be released into surplus e.g. assigned a nil value. Occasionally these reserves may be held within the actuarial valuation, in which case the treatment is the same i.e. assign a nil liability.

An exception here may be mismatching reserves under Circular 273. However, these reseves can be realised at any time by converting all assets to cash.

It is important to maintain consistency in the treatment of reserves for determining the value of inforce business.

7.3 VALUE OF INFORCE

- **Consistency of Reserves**

When the value of inforce is determined using an actuarial value then it is important to reconcile the starting value of reserves used in calculating the value of the inforce with the level of reserves used to determine adjusted net worth.

- **Expense Overruns**

When using an actuarial valuation a certain level of future expense would have been assumed in the determining the value of business inforce. Expense loadings generated from this value should be compared with the extra administration expense involved in managing this block of business and any differences should be reflected in the value determined.

- **Conversion Costs**

Future expenses are often dependent on converting business to a new computer system. These costs can be substantial.

- **Extra Reserves**

  Extra valuation reserves may need to be held by the acquiring company. This often occurs because of prudent solvency requirements, in addition to statutory solvency requirements as well as the recognition of the level of reserves necessary to fund the continuation of business.

- **Shock Lapses**

  Soon after the acquisition there may be a sudden increase in lapse rates for a short period of time. This is called shock lapses and the effect of this should be assessed by calculating the value on different lapse assumptions.

- **AIDS**

  Although few statutory valuation bases include a significant allowance for AIDS it should be accounted for when determining the value of business on a realistic basis. AIDS has the largest effect on term insurance and disability business. There is very little effect on participating whole life and endowment business because of the margin available from adjusting future bonus rates.

7.4 VALUE OF NEW BUSINESS

The actuarial valuation discussed by Burrows and Whitehead has an explicit value of future new business. Under the maintainable earnings approach the factors described in this section are used to increase the multiple applied to maintainable earnings. The factors to be considered in determining the value of new business are:

- **Type of Business**

  Types of business which result in a large volume from exploiting a short term tax anomaly should of course be given a limited weighting. Lower weightings are also often used for single premium business to allow for the high variability of single premium production. Other types of business such as investment account business are proving to be particularly competitive and it is often difficult to obtain the margin assumed in the original actuarial costings. The actuarial valuation can allow specifically for the profitability of the individual products.

- **Expense Overrun**

  It is common for an expense overrun to exist in the target company. Hopefully the acquiring company can eliminate this expense overrun but it should be remembered that this elimination may be accompanied by a reduction in volume.

- **Quality of Agency Force**

  There is a difference in the degree of control a company may exercise over a tied agency force compared to an open agency force. In practice, tied agency forces are currently only found within large mutual life offices and are therefore unlikely to be encountered in the usual takeover situation. Although the future production of an agency force can be adversely affected by a takeover the effect on persistency can sometimes be surprisingly small.

- **Cross Selling Opportunity**

  Opportunities to add value may occur because life insurance products complement the existing product range of a potential buyer.

CHAPTER 8

ACCOUNTING ISSUES

8.1 INTRODUCTION

The accounts of the company and the state of accounting systems and controls play a key role in most acquisitions and mergers of life insurance companies. The figures in the accounts are crucial to setting a price. Therefore the accounting controls and systems should be examined prior to purchase.

The dominant issue for buyers and sellers is how the sale or purchase is to be reflected in their accounts. Unfortunately, this item is often overlooked until the untimely arrival of the end of the financial year.

Whatever the result, the buyer must be able to communicate, through the financial statements, what has been acquired and what benefits will be derived.

8.2 ACCOUNTING SYSTEMS AND CONTROLS

Good accounting systems and controls have a number of consequences for potential buyers.

Probably the most important of these is that figures in the accounts or in the company's data base can be used in the professional valuation. The figures used are more likely to be correct for companies with good accounting systems. Uncertainty in the basic information can often impact on the sale price. Even though a warranty on the data may be specified in the contract, buyers often cannot recover the overpaid price without considerable effort.

Potential buyers should assess the adequacy of accounting system and controls by:-

- carrying out discussions with the seller's
  - accounting personnel
  - internal auditors
  - external auditors
- reviewing management reports and comparing these to the accounts for consistency
- general discussions with the other parties dealing with the company being acquired e.g. banks, brokers, agents etc.

Another consideration is the cost in dollars and time required to establish accurate accounting systems and controls.

8.3 POTENTIAL ACCOUNTING PROBLEMS

Consolidation

Consolidation is one of the most controversial issues in the life insurance industry. The approach taken depends on who or what the owner is and whether or not minority interests exist.

Different approaches to the consolidation enable the same set of figures to be expressed in many different ways.

Goodwill or Premium

The key to the consolidation process is determining the value of what has been acquired.

Usually there is a difference between the purchase price and adjusted net worth. More often than not, it is goodwill (i.e. the purchase price is greater than the adjusted net worth) that arises from the purchase of a life insurance company rather than a premium (i.e. the purchase price is less than the adjusted net worth). The accounting standards require any goodwill to be written off over a maximum period of 20 years. However, under the life insurance accounting standards, life insurance companies are given the opportunity of valuing their assets at market value.

This creates a problem on consolidation because the adjusted net worth is usually far below the market value. We believe the correct course (under the life insurance accounting standards) is to value the investment at market value. This value should be the price that would be paid by an independent buyer in a "normal" market transaction. This value may be more or less than the price actually paid.

The difference between the assets consolidated and the purchase price would be described as "excess of market value over book value" or something similar. We do not believe this should be subject to any sort of amortisation. Furthermore, any rise or fall in market value of the buyer's investment should be reflected in the accounts as and when it occurs.

What Should be Consolidated?

There is no set criteria for what should be included in the consolidated accounts of companies who have life subsidiaries. Some companies consolidate all the policyholder and shareholder assets and liabilities on a line by line basis. Other companies consolidate the shareholders' assets and liabilities with policyholder assets and liabilities shown as two one-line items in the balance sheet. The remaining companies consolidate just the shareholders' assets and liabilities.

Accounting Standards

The life insurance industry in Australia is currently operating on totally different accounting standards to those applicable to other companies. When a shareholder life insurance company is being consolidated, the shareholder portion of the accounts is accounted for under the traditional company Australian Accounting Standards and the applicable approved accounting standards under the Companies Act 1981.

For life insurance operations, there is a life insurance accounting standard promulgated by the then Life Insurance Commissioner in October 1986 (Circular 241). Whilst this standard applies to Life Act returns, it is not always used in published accounts. This circular has major differences from other current accounting standards. For example, the revaluation of assets for life insurance companies passes through the revenue account. However, under AAS10, ASRB 1010 revaluations do not pass through the profit and loss account but go straight to a reserve account.

There are a number of other differences between the life insurance and traditional accounting standards. However it is important to note that under the Companies Act 1981 most life insurance companies are now bound to follow, where possible, the applicable approved accounting standards.

These standards are likely to be revised again when the Australian Accounting Research Foundation completes their review of life insurance accounting standards.

Realistic Reporting

There has been a considerable amount of discussion in Australia in the last 5 years about what "realistic reporting" is for a life insurance company. At the moment, there are a number of companies which are experimenting with various forms of what one might term "Aussie GAAP" which seems to be a cross between US GAAP under FASB 60 and 96 and Canadian GAAP. (See Miles and Gubbay [5]).

The form of GAAP accounting adopted should reflect the information needs of users. To date, GAAP accounts have only been published for proprietary offices. Understandably, these accounts are of limited value to policyholders as they do not give an explicit indication of the supportability of policyholder benefits.

Under solvency (Life Act) accounting, the only profit reported is the distribution from policyholders' funds. We have seen examples of companies which report purely that distribution, we have seen other examples where the distribution has been reported plus the shareholders' entitlement to any remaining surplus. Under some sort of modified insurance accounting the usual trend is to report as much as is available to the shareholders. In the latter cases above, usually what is required is a note in the account pointing out that although this has been reported in the shareholders' books, shareholders are not legally entitled to the money until it is distributed. Usually the unavailable money is allocated to a reserve account in the shareholders' books after having passed through the profit and loss account.

Accounting Policies

Another area of concern in buying a life company or business is calculating the effect of different accounting policies between the target company or business and the buyer. Generally accepted accounting principles dictate that where possible, buyers should alter the target company or business' accounting policies to those of the buyer. This can lead to major differences in goodwill and reported profits.

Other Assets & Liabilities

The value of other assets and liabilities needs to be examined closely. Some assets which could be justifiably included in a balance sheet on a going concern basis have inappropriate values when considering the takeover situation. For example, some companies capitalise the cost of computer development expenditure. This is consistent within the accounting definition of an asset as being a "deferred expense". After purchase, policies may be transferred to a new system and hence the value of capitalised computer development expenses should be taken as nil. Fixed assets such as motor vehicles, furniture and fittings etc also need to be examined for their realisable value rather than their going concern value.

CHAPTER 9

OTHER ISSUES

9.1 INTRODUCTION

In this chapter, we discuss the more important items on the acquisition check list (Appendix 1) which are neither actuarial nor accounting based. Because this paper is simply an introduction, our discussion has been kept brief. We would like to emphasise however, that this is one area where experience and thoroughness are very important.

9.2 THE COMPUTER

What ever happens, computer changes are likely to be necessary.

If you are buying a small life insurance company, eventually you will need a bigger or more efficient system. If you are trying to merge two companies, then one system will become redundant.

This is one of the most difficult areas to control. It needs to be assessed by computer experts. Unfortunately, these people tend to talk in terms of years and millions of dollars. Perhaps the best approach is to concentrate on achieving goals in a limited amount of time.

9.3 STAMP DUTY

The transfer of assets usually incurs a liability for stamp duty. Stamp duty rates vary by the type of asset. It may be to the seller's advantage to investigate the most tax efficient form for assets to be in, prior to transfer.

Where a whole company is being taken over through buying shares, stamp duty may be greatly reduced. However, where the property holdings are more than 85% of the share value, the stamp duty rate is usually the property rate. Stamp duty issues can be significant and affect the eventual structure of the transaction.

9.4 INCOME TAX

Changes in income tax rules have been frequent over recent years. There may be hidden tax penalties or tax liabilities and we recommend that past taxation returns and all correspondence with the Income Tax Commissioner be examined by an expert.

A warranty on future tax liabilities arising from prior purchase transactions should also be included in the agreement.

9.5 WARRANTIES

The extent and number of warranties vary greatly between each sale. Basically, a warranty should be given where the buyer has to rely on information supplied by the seller. Typical warranties are:-

- the data is complete;
- the accounts have been correctly drawn up;
- business has been conducted within accepted business practices; and
- all taxes have been paid etc.

It is also the usual practice to provide that no compensation shall be payable under breach of warranties unless the breach is greater than a certain amount.

9.6 DISTRIBUTION

One of the most powerful benefits to be obtained from purchasing a life company is the access to alternative methods of distribution. However, the very act of purchase may change the nature of the relationship these distribution sources have with the life company.

At an early stage, discussions should be commenced to determine whether or not the value of the distribution outlet is increased or decreased by a purchase.

It is surprising how resilient many agents are following a change in ownership. Provided their financial well-being is assured, there should be little loss of production.

9.7 MANAGEMENT AND STAFF

A company cannot be successful without the right people. An assessment should be made of the important management staff and in particular of the sales and marketing staff.

Staff who have a long experience with the company may be invaluable in providing continuity during transition of management or in providing details to assist with the successful merger of the two companies.

Where there may be potential redundancies it is necessary to enter into negotiations with the union. Redundancy payments may be payable from the superannuation fund.

One of the hidden traps with superannuation funds is whether or not any unfunded liability exists for which a buyer has to make up the short fall.

CHAPTER 10

CONCLUSION

We believe a high level of merger and acquisition activity will characterise the Australian life insurance market during the 1990's.

Much of this activity will involve interaction with players in different industries. It will also be necessary to constantly reassess company strategies and structures as opportunities evolve.

This will lead to the further development of the accounting and actuarial professions as well as the emergence of a more efficient life insurance industry. The question to be answered is will the policyholders see the benefit of that efficiency?

REFERENCES

[1] R.P. Burrows and G.H. Whitehead (1987), The Determination of Life Office Appraisal Values, JIA.,14, Part III.

[2] P.D. Praetz (1978), Cost Curves for Australian Life Insurance Companies, TIAA 1978.

[3] G.L. Melville (1987), Some Comments on a Paper entitled "The Determination of Life Office Appraisal Values", TIAA 1987, Vol I.

[4] P.A. Burns and D.A. Stanton (1977), Some Aspects of Amalgamation of Life Insurance Business, TIAA 1977.

[5] S.P. Miles and K. Gubbay (1978), Realistic Financial Reporting, TIAA 1987 Vol II.

ABBREVIATED ACQUISITION CHECK LIST

APPENDIX 1

1. Corporate Background.

   (a) brief description of present business
   (b) classes of shares and distribution of ownership
   (c) recent activity of shares sales and price ranges
   (d) subsidiaries and operating investments
   (e) review of minutes for Board of Directors and other committees etc
   (f) Memorandum and Articles of Association

2. Bases of Agreement.

   (a) methods of evaluation
   (b) highlights of agreement

   - warranties
   - share issues
   - arbitration claims

3. Financial Characteristics

   (a) statutory returns
   (b) financial condition reports
   (c) budgets and future expense projections
   (d) internal audit reports
   (e) future profit projections

   One of the most important things in this area is to identify the source and authenticity of data.

4. Assets.

   (a) investments – breakup of the investment into various categories
   (b) market values versus book values
   (c) security of assets
   (d) subsidised loans

5. Liabilities (other than actuarial)

   (a) validity of liabilities in financial statements
   (b) contingent liabilities
   (c) tax liabilities

6. Actuarial.

(a) experience studies
(b) portfolio structure (by line of business)
(c) valuation basis
(d) AIDS
(e) policyholder expectations
(f) underwriting rules
(g) sensitivities
(h) reinsurance

7. Products.

(a) details of major classes of policies including policy documents, commission rates etc.
(b) analysis of competitive position
(c) production by source

8. Agency and Marketing.

(a) distribution
  (i) types of distribution
  (ii) lists and ratings of principal agents
  (iii) convention details
  (iv) special deals

(b) details of marketing plan
  (i) organisation
  (ii) sales method employed
  (iii) compensation of sales

(c) National and State sales and marketing structure

(d) expenditure budgets

9. Management and Industrial Relations

(a) general organisation
(b) assessment of key personnel
(c) personnel policies including superannuation fund
(d) arrangements for staff

SYDNEY

MR. T. FRASER (Visitor & Co-Author): I would like to make a few brief comments but before I do I had better introduce myself. My name is Tom Fraser. I am a senior manager with Ernst & Young, specialising in insurance. I am a chartered accountant with 10 years experience and the past 10 years have spent about 80% of each year working on insurance and insurance related jobs. This work has ranged from performing audits on life insurance companies through to merger and acquisition work, and litigation work involving life insurance companies. Some of my past and present clients have been the AMP Society, Associated National life (now Tyndall), Occidental Life, Amev, Mercantile Mutual, to name a few.

Turning to the paper I would like to make a few brief comments about the paper. The first is that both Steve and I emphasised the paper is primarily a basic guide to buying and selling life insurance companies.

Steve and I were both very worried a couple of months ago because we did not think much was happening in regard to buying and selling of life insurance companies. In the last two months things have dramatically changed. Obviously what we have got in the last couple of months is the National Mutual/ANZ Bank merger/takeover and the Capita and MLC merger. At the same time there are a number of companies for sale. Some like Tyndall are obviously publicly for sale. There are a number of others that Steve and I are aware of, that are for sale, but are not public at the moment. The other interesting thing is that as far as Steve and I are aware there are about four companies in the process of putting in an application to set up life insurance companies.

I think there are a number of reasons why all of a sudden life companies have become very popular again to buy and sell. I think one reason is related to superannuation and the massive boost the government has given the life insurance industry through superannuation. Superannuation is an area that life companies have been involved with for a number of years.

I think another key factor in analysing the two mergers is a need for capital to fund their future business and also the ability to be able to create huge economies of scale which hopefully will generate extra capital.

I think one of the interesting things that I have noticed in the last say five or six years in the life insurance business is that the whole market has expanded, but not only has the market expanded, the big players in the market have actually increased their market share.

As a consequence I think there is a lot more pressure on the small and middle sized life companies to change the method of operation or to disappear from the market by either becoming part of a much larger financial services group or by being bought by another life insurance company. Consequently Steve and I believe that given the current financial situation in Australia there will be a lot more mergers and acquisitions and takeovers within the next 6 to 12 or 24 months.

The last two comments I have to make relate specifically to items in the paper. Table 3.1 is a table of some life company purchases and sales, and I emphasise it is some life companies sales within the last 4 or 5 years. The prices we slotted in came from the financial press. I am aware that some of the prices are probably wrong. In particular the price for Royal. The last comment I have to make on the paper is that unfortunately there is a deliberate mathematical error somewhere in the paper. It would appear that neither Steve nor I passed mathematics at school.

MR. C.C. McLEOD: I should like to congratulate the authors on their excellent sense of timing, as well as on their contribution to an important topic. The authors have chosen not to concentrate on the traditional actuarial/financial route of "how much is this company worth". This is good, because there is much more to buying a company than setting the price. In these opening remarks I would like to give some of my thoughts on the buy/sell process, as well as comment on some specific parts of the paper.

My first general comment is that too many acquisitions don't turn out as well in practice as had been hoped. This may happen for one of the following reasons:

a) Too much time is spent by the buyer in analysing the financials; not enough time is spent on considering what should happen after you have bought it.

b) Acquisitions are exciting! It may be difficult to say halfway through the analysis that it doesn't make sense. (i.e. price to be paid is too high or demands on scarce resources are too great).

c) The person (or people) charged with making the acquisition work may not have been (but should have been) involved in the acquisition process. This can be very dangerous. The acquisition team will presumably offer a certain price based on assumptions about what will happen after acquisition - levels of new sales, expense ratios and so on. Those assumptions may turn out to have been optimistic - particularly if the people making them are not accountable for making them happen.

I hope that the speakers this evening will include representatives of companies who have made acquisitions recently. Ideally at least one speaker will say his company's acquisition of company A was a success and why, and at least one speaker will be honest enough to admit that his company's acquisition of company B was a failure, (or less than successful) and why.

Turning to the paper, I disagree with the author's expectation in Chapter 2 that there will be continued activity in the merger and acquisition field. The numbers don't support this statement, particularly if you are looking at acquisitions that may add strategic value to the buyer, as opposed to near-rescue situations.

The number of registered life companies is stated to be 53; if you include the state insurance offices, you have about 60 life companies From this total, you should exclude the re-insurers, and double counting (e.g. Colonial Mutual/Scottish Australia or Prudential/Aetna) where the companies are likely to amalgamate or just run the acquired company like a separate division. This brings the total down to 44. (I have assumed that the proposed National Mutual/ANZ and MLC/Capita mergers will proceed).

There are six bank owned life companies. It's not impossible, but unlikely that any of these will be sold - except possibly the small ones. This leaves 38 companies.

Five of these are State Insurance Offices. These could be sold, but the decision to do so is likely to be a political one. If we exclude these, we are down to 33 companies.

Four of the remaining companies are very small. In 1989 each of them sold less than $2 million of new annual premium business and less than $5 million of single premium business. This is less than either AMP or National Mutual sell in one day. They may be sold, but they are not going to add much value to the buyer. We are now down to 29 companies.

Finally, there are another five companies such as NRMA or Le Fort which sell mainly to the customer base of their parent or have an unusual (but small) market niche. They are unlikely to be of interest to a new entrant or to the majority of existing insurers.

The result is only 24 "typical" life companies which sell more than trivial amounts of new business and are not reinsurers or owned by a bank or a state. Nothing is impossible, but it's hard to see some of these remaining 24 being sold - at least for a few years. For example, I expect AMP to still be a mutual in five years' time!

I think there are three reasons acting against the sale of many companies. Firstly, I disagree with the authors about new entrants (presumably foreign ones) seeing "Australia as a focal point for the Pacific Rim and a springboard into S.E. Asia". The facts don't support this. Foreign life companies (e.g. Royal Life, Amev, Aetna, Sentry, Occidental, Scottish Amicable, BMA) are tending to pull out of Australia, not vice versa. If you look at the North American companies developing their operations in S.E. Asia (such as Metropolitan Life, Equitable or New York, John Hancock, New York Life, Laurentian of Canada), I can think of only one (Cigna) which has even set up a life operation in Australia, never mind used it as a springboard. Aetna pulled out of Australia and New Zealand, but is developing its S.E. Asia operations from Hong Kong.

Secondly, the 1989 Federal Budget has given at least a breathing space to some companies - particularly those with expense overruns. Now that most expenses for Ordinary Insurance are tax deductible, the financials suddenly look better - at least until the tax savings are reversed or have to be passed on to someone other than the shareholders.

Thirdly, I think there is a realisation that there is not a big demand for small or poorly run life companies - particularly if the company sells through independent agents. What owners should be doing is to use the breathing space I just described to clean up their companies, so that when there is a more favourable economic climate they can offer for sale a more attractive product.

In summary, while sales of companies will continue, I don't expect to see many of them for a few years. Further, most of the sales that do happen will be forced sales. I think that most of the new companies to be formed will be other financial institutions who want to offer a broader range of services. What may become more common is the sale of part of a company (e.g. blocks of business).

I found Table 3.1 very interesting. Note that almost all the sales, especially the more recent ones, appear to have been based on Actuarial Valuations, not Maintainable Earnings. Question: Does this mean that Actuarial Valuations are becoming accepted as the best approach?

I would caution you against too much reliance on the prices quoted in Table 3.1, for three reasons. Firstly, the price paid will be partly dependent upon the general level of business confidence. If identical companies were sold in September 1987 and April 1990, the price of the company sold in 1987 would be higher. Secondly, it is rare that one knows both the purchase price and the other terms of the deal. What warranties were

given about tax liabilities? What was sold as well as the life company and what was it worth? Were some assets agreed to have a specific value? Thirdly, many of the companies sold in recent years have been small or not very successful. It would be very interesting to see what a well managed company like MLC would sell for, if put up for sale, but this will have to be hypothetical!

Section 4.1 is an interesting way of looking at the determination of price. I think it is worth adding that the seller's perception of value is sometimes unrealistic. About six years ago I was analysing a small company in the southern United States that was up for sale. The owner and manager was (literally) a little old lady who had inherited the company from her late husband. She wanted $8 million for the company. I couldn't see how it could be worth more than $3 million. I asked the lady how she had come up with her price of $8 million. "Oh", she said, "it's very simple. I have eight grandchildren and I want to give them each $1 million".

This is an extreme case, but I have more than once met seemingly intelligent people who say "Over the last 20 years we have put $X million into this company. Therefore, the selling price has to be at least $X million plus interest".

It should also be recognised that different buyers will place a different value on the same thing. It's just like buying a house. Some people will pay more for a house with a swimming pool; others will consider a swimming pool a nuisance and reduce the price accordingly.

In Section 4.2 I like the terminology proposed by the authors, but would like to see two further changes.

Now that most companies are valuing assets at market, in practice there may need to be very few adjustments needed to develop what the authors call Adjusted Net Worth. I am tending to simply use the expression "Net Worth" - although Shareholders' share of Net Worth is probably more appropriate.

I think the expression "goodwill" is potentially ambiguous (note the different meanings given to it in the table) and should be avoided. In practice there are likely to be a few things which are not specifically reflected in Net Worth, Value of Inforce and Value of New Business, and I would rather see them listed separately than grouped together as "goodwill". These would include:

- Expense overruns not reflected elsewhere
- Potential expense savings
- Premium for control
- Value of licence(s)
- Costs associated with acquisition (before and after).

In Section 5, I would have liked to have seen more about the maintainable earnings approach. I don't like it myself, and the table in Section 3 suggests that it isn't being used very much. Nevertheless, if it is proposed as a method of valuing a life company, a more thorough description of the method would have been helpful. Further, I had difficulty with some of the statements about the two methods in Section 4.4. The paper states; "Although this approach (i.e. Actuarial Valuation) is common in the life insurance industry, it is not generally applied to other industries and is therefore difficult to verify in practice". This is surely a non-sequitur. The authors appear to have demonstrated in Section 3 that the Actuarial Valuation approach does produce results fairly close to the price actually paid. In a recent overseas example, the AMP acquisition of Pearl, the final offer made by AMP was 690p a share which was about 90% of the Actuarial Valuation of 765p a share. This compares with a share price of only 394p the day before AMP announced it had increased its shareholding in Pearl to 18% and a previous high of about five pounds - share prices that were presumably based, at least partly, on maintainable earnings.

Section 6 gives a good description of the Sale Process. I would like to stress the importance of complete and accurate information. If I am acting for a potential buyer, and important information is missing (for example the last analysis of lapse/surrender experience is over two years old), I am likely to reduce my estimate of value. If the actuarial valuation has been put together hurriedly and I find errors in it, then I am likely to think that there may be other errors which I have not found. Again, my estimate of value is likely to be reduced.

Some sellers may resent the cost of a thorough Information Memorandum and Actuarial Report. In practice the cost may be a small percentage of the selling price, and may be easily recovered if the buyer's confidence in what he is considering buying causes him to pay more. There are also professional standards to consider.

I believe very strongly that when any of us prepare actuarial valuations, the assumptions used should be ones that we believe in, not assumptions (such as future sales levels or budgeted expenses) which were "given" to us by company management. It's not enough if we state in the appraisal report that we relied on certain assumptions provided by company management. Any intelligent buyer will discount overly optimistic assumptions and it does our profession no good if an Actuarial report says (or appears to say) that a life company is worth 2X, but the actual price paid is X. I think this has been a problem in the U.S.A. I hope it doesn't become a problem here.

Section 7 prompts me to make comments on Par/Non Par Split, and release of participating surplus.

The Deputy Commissioner, Life Insurance, is understaffed and has too many other issues to consider. I do wish that he had the resources to stop some of the abuses that may be happening in connection with par/non-par splits and the share of profits allocated to shareholders on participating business. Some of these are referred to in the paper (e.g. the Section 40 split), but these may not be all. For example, the comments in the second paragraph of Section 7.2 do not cover the situation where a policy does not lapse. Since bonuses paid to policyholders attract future bonuses which then attract further future bonuses, and so on, a 20/80 split may result in the shareholders getting more than 25% of distributed surplus.

If it is correct that when there are no more par policyholders, any remaining par surplus becomes non-par by default, this is morally wrong and should be prohibited.

Section 8 refers to the use of GAAP accounting. This can be very useful for management purposes, and may be required by some companies whose parents want to report GAAP profits. Until some standards are developed to limit the range of assumptions and methods used to determine GAAP profits (e.g. the incidence of expected profits), GAAP statements may be close to useless in determining a price for a company. Statutory earnings are a bad measure of company performance, but at least all companies are required to report statutory results in roughly the same way. Thus, although the statutory results are "wrong", by reviewing a company's Second Schedule and (possibly) its Financial Condition Report, I can usually get an idea of what adjustments are necessary to develop a likely range of possible values. The lack of standardisation with GAAP accounts means the same exercise is considerably harder with GAAP statements.

I hope we will have a good discussion this evening and in particular that those of you working for life companies who have relevant personal experience will contribute to the discussion.

MR. B. EDWARDS: The authors look at changes which have occurred over the last 5 and 10 years in the industry and conclude that these have been largely the result of expense problems within the industry, of increasing competition and of an increased need for new capital. They conclude that such changes are likely to continue in the years to come.

Industry Changes

I have done a little analysis of changes during the last 10 years. The first paragraph of Section 2 of the paper says that the number of life companies has increased from 30 to 53 during this period. That is incorrect. The paragraph should have shown 48 companies increasing to 53 and 13 Australian companies increasing to 22.

Those figures of course are licences rather than life companies. Some companies control more than one licence. If we define spare licences on that basis the number of spare licences over the 10 years has increased from 2 to 12. So if we consider the number of life insurance players rather than the number of licences, we find that the number of players has reduced from 46 to 41.

If we take out a couple of special groups, the reinsurers which have grown from 4 to 5, and the state government offices which have grown from 3 to 5, then the number of players has reduced from 39 to 31. Clearly the industry has already undergone quite a significant rationalisation.

It is interesting also to look at the companies which have left the industry. Of the 48 in 1979, there are 24 which have been merged into another company or have experienced a major change in ownership. By country of origin, US companies have experienced more changes and UK companies less changes than other groups. Also, 18 of the 24 merged companies were providing or apparently providing a fairly wide range of products to the multi agent market.

The authors have given a number of reasons for mergers, including rationalisation, strategic planning, economies of scale, management and shareholder ego and special cases. They have given examples of a number of those, but I was rather disappointed to see that they have not given any examples of mergers which occurred because of management or shareholder ego. I wonder whether the authors intended that all mergers that were not listed anywhere else came under that heading. I would not have put some of the mergers in the same classifications as the authors have done. I think that some of the mergers have not had a clear purpose.

I also counted 22 companies currently which did not exist 10 years ago. Of these, 14 are Australian owned and 5 are US owned. Six are owned by banks. The most interesting thing about them is that nearly all of them specialise either in the products they offer or in their distribution system. Some specialise in both.

So the new companies are specialists in various ways and are relying on specialisation to deal with the expense problem. It is a different approach to the economies of scale which I think many companies have sought to achieve through merger over the past 10 years. In the future we may see more companies looking at specialising and refining their products and distribution systems rather than attempting growth by acquisition.

My conclusions from that analysis are that the industry has already undergone a major rationalisation with new companies relying on specialisation to cope with expenses. While there will be more changes in future, I expect the pace of change to slow.

Valuation Methods

The authors have described the maintainable earnings method and the actuarial valuation method in Section 5 of their paper. Actuaries by their nature are more comfortable with the actuarial valuation approach. It is a more analytical tool. We can build a model of the data and we can test the model. We can make assumptions about the real business experience of the office and we can test those assumptions. We can then test the results for sensitivity.

The maintainable earnings method appears to have the value of consistency with methods used in other industries. The actuarial literature has quite a number of papers on the actuarial valuation method, but very little on the maintainable earnings method and this paper provides only a very brief description.

I must question the authors' statement that for mature companies the statutory earnings may be a suitable base for a maintainable earnings valuation. That seems to me to be a somewhat dangerous statement without some qualification, because of the changes that occur in statutory earnings because of changes in new business and other matters.

The authors also make the comment that the two methods produced surprisingly similar results. There have also been situations where the two methods have produced surprisingly different results. These differences may also have resulted from different valuers, different sets of assumptions, and different perceptions of the company being valued, and may not be entirely the result of the different methods.

My conclusion is that there is scope for some more work on the numerical relationship between the two different methods to provide better understanding between actuaries and security analysts. I would like to endorse that as being a worthwhile project.

Legal Issues

I would have liked a section of the paper devoted to legal issues, because they are quite important to people who are looking for a guide to buying and selling life insurance companies. The discussions I have had with people from outside the industry usually begin with a series of questions about legal or legal related aspects of the Life Insurance Act. These include the nature of Statutory Funds and the role of the Deputy Commissioner. There is a reference to Section 40 in the paper which deals with a split of statutory funds, which is very relevant in the buying and selling of life companies.

I did not see a reference in the paper to Sections 73 to 76 which deal with transfer of business between companies. Those sections of the Act set out the requirements for preparing a scheme of arrangement, for approval of the scheme by the court, the actuarial report, the role of the Deputy Commissioner of Life Insurance, and the information provided to policyholders. The action of merging portfolios usually occurs after the sale or purchase of the company, but an understanding of the legal issues is fairly important both in understanding the motivation for buying and selling, and in setting the assumptions for determining the price.

The authors also refer to the situation where a block of business is transferred between companies and the major difference there is that when you are dealing with the purchase of a company you can complete the sale of the company first and later merge the funds, while if you are dealing with the sale of a block of business the approval by the court becomes part of the sale agreement. It makes the sale agreement more complicated, which is probably why there have been so little transfers of blocks of business. That is unfortunate because I think transfers of blocks of business could well help the life insurance industry to become more efficient.

Approval is also sometimes required from other authorities. The Foreign Investment Review Board is still alive, although not taking very much interest in mergers within the financial sector. It has certainly been a major issue for some takeovers in the past and it may become important again in the future. Also stock exchange requirements may be an issue.

Actuarial Issues

I was not going to make a comment on actuarial issues, but I would like to support the authors and the previous speaker's comments that further legislative protection is required for participating policyholders in mergers and acquisitions.

Accounting Issues

The following comments are made from the perspective of a member of the Actuaries & Accountants Liaison Committee, which has representatives of the Institute of Actuaries, Institute of Chartered Accountants and the Society of Accountants. The Committee works on problems which are common to both professions. I must congratulate the authors on further enhancing the co-operation and understanding between the professions.

Section 8 of the paper refers to the current AARF (Australian Accounting Research Foundation) project on life insurance accounting and that appears under the heading of accounting standards. There is a separate heading which deals with realistic reporting. The current AARF project is very much about realistic reporting. In that respect we are following behind the Canadians who have already developed a realistic reporting standard for life companies with defined margins for solvency purposes. In the UK there is a committee of 7 actuaries and accountants which is working urgently on a similar project. In Australia we have had a number of preliminary discussions and meetings, one of which was held by our committee.

The ultimate result was that AARF has taken up the project of defining a standard. The AARF has taken a somewhat different approach to standards which have been developed in the past. Instead of having a single contractor to write this particular standard they have appointed two contractors, an actuary and accountant, and I think that is the right approach. Hopefully it will produce more satisfactory results than the previous efforts with the superannuation standard.

There is a need for uniformity in realistic reporting and hopefully this will be the result of the AARF project. The proposed ANZ/National mutual merger has increased the urgency in producing this standard for two reasons. One is because it has shown that realistic reporting can be relevant to large mutual life companies. Secondly it is virtually impossible at the moment for a security analyst to make an assessment about whether ANZ shares are priced correctly and this will add to pressures that already exist for realistic standards. In other words we need to do something ourselves or we will have something imposed on us.

I am fairly optimistic about that and hope to see this finalised within the next two years. When it is finalised, one of the longer term results may be that life companies can list on the stock exchange and expect their shares to trade at a reasonable price. At that point the capital requirements of life companies may be met to some degree from this source in addition to the other sources that already exist.

Conclusion

I think that we have already seen a significant rationalisation of the life industry. The two major problems which resulted in the rationalisation have been expense problems and capital requirements. I think we may see specialisation making some contribution towards the expense problem and I think we might see stock exchange listings making some contribution towards the capital problem over the next decade, and therefore I see some prospect that the rate of mergers and acquisitions might decrease in the future.

MRS. C.M. PRIME: When the authors referred to a recent slowdown in mergers and acquisitions activity it took me a minute to work out that the paper went to print more than a month ago, and the very high level of such activity in the last few weeks was since that time. Of the first few speakers, one feels that this activity will continue and the other two feel it will not.

My own feeling is that there probably is more activity to come, for a reason which is not referred to directly in the paper although it would fit in with several of the authors' 'why buy why sell' categories.

Any company is now often viewed as a commodity rather than a trading operation. More money is frequently made by buying and selling than it is by trading. Life insurance companies are no exception. This is one reason for the trend to corporisation of operating divisions. A corporate entity is a neater package to buy and sell.

In part eras we have seen times when the favoured chief executive of a life insurance company was variously; an actuary, an investment manager, perhaps an administrator, and perhaps more recently a marketing expert. We now have a new type of chief executive. This person may be located in the holding group, but the title does not matter if he is the one making decisions. He is an entrepreneurial negotiator. He negotiates sales and acquisitions. His expertise is very valuable in the current climate and so he has been promoted. He will make decisions to do what he does well and for this reason, I think merger and acquisitions activity will continue.

With policyholders and their interests so much in the way of this activity, it is inevitable that they will be bought out. This does not mean that policyholder equity will disappear as a concept. It will still need to be addressed in the Life Insurance Act as far as fairness in the distribution of profits is concerned. However, I think it likely that the ownership aspects of policyholder participation will disappear.

It is interesting to look at companies in the market which are left to sell, or possibly to sell again. One can look at them according to company profiles and problems, which is the technique the authors have used to analyse recently past sales and mergers. I do not wish to refer to individual companies; rather to groups of companies with recognisable profiles.

The information in these graphs is incomplete as a guide to buying and selling. It is not new information, merely a presentation of the ISC's December quarterly statistics which gives an interesting view of some of the problems. It is new premium income which is an inadequate measure for anything. However, it is information that is available.

The first graph is of the top 20 companies by this measure. Every company has a large amount of superannuation business. It is apparent how dependent the life insurance industry is on superannuation. One might say, how successful the big life insurance companies have been in attracting the superannuation dollar. This has recently been given as the reason for the ANZ's wish to merge with National Mutual.

As far as ordinary business is concerned, a typical big company profile shows a substantial ordinary investment account section. This reflects the time of major product development; some little while ago. It was easy then for these companies to develop such products because their No. 1 funds were well established. At that time they did not have reserving problems.

There is a small amount of traditional business reflecting the existence of traditional distribution systems, slow to move to something new. There is always a significant amount of last year's products sold.

More recently there are significant amounts of ordinary linked business.

The "bank" companies show much less superannuation, relatively speaking. Perhaps they reach the individual customer more successfully. They have a relatively large amount of ordinary unit linked business. They are not bound by traditional products.

The smallest 20 companies are a much more diverse group. In this group we see much of the recent acquisition and new establishment activity if one counts number of companies rather than the size of funds. I count only about 6 of these small companies unaffected by recent sale or merger or establishment; a fairly small proportion. The variety of profiles suggest a greater variety of reasons for this activity.

Middle sized companies tend, broadly, to be a little smaller than the bank companies. There is a group, right in the middle, clustered together, and all of somewhat traditional bent. These exhibit the big company profile on a small scale, with a large superannuation section, a small amount of traditional business and a large ordinary investment account section, because this product was easy for such companies to develop before they had reserving problems. I suggest that this profile does not indicate stability under the current control difficulties and distribution difficulties. It is no wonder they are the subject of so much speculation.

Reinsurers are shown separately because they are so different. They are traders, they are not commodities.

Finally, I would like to remark on a few of the authors' detailed comments.

There is an interesting outline of sales procedure in Section 6.9 onwards. I can only agree that sale agreement negotiation can be most drawn out and frustrating. However, if it is shortened unduly because a partner is in a hurry to conclude the transaction, details overlooked may subsequently prove to be important in dollar terms. This can have the unfortunate result of an attempt to twist the 'due diligence' process to rectify details in the sale agreement. This is usually accompanied by extra cost and a deterioration of relationships.

Even though a year may not be an unusual time to go through due diligence, purchasing a life insurance company rather than starting it from scratch does have the advantage that the new order effectively has control almost from when the heads of agreement are reached. This may be only a matter of weeks. Reviewing warranties usually results only in final price adjustment, allowing all parties to get on with business according to their new strategy. This does raise the relative importance of employing the right negotiators versus spending on detailed written agreements such as secrecy agreements, actuarial appraisal reports, and complicated sale agreements.

As actuaries we need to look at the value we can and do add to the buying or selling process. The cost of an actuarial involvement is usually high, whether internal actuaries or outside consultants are used. So long as the value of future

profits from business already in force forms a large part of the total value, actuarial involvement is important. If standards come into being for realistic reporting of earnings, rules of thumb may be developed which reduce the need for special actuarial involvement at the time of sale, giving a boost to the maintainable earnings approach. Standards, which are often desirable for several reasons, limit the use of professional judgement.

It is possible that full application of the steps in the flow chart which the authors have provided may cost a significant proportion of the value of a small life insurance company. Some corners need to be cut to make the deal worthwhile They must be the right corners, however. It is likely that an experienced actuary understands the life insurance business and its legislation, and is best placed to advise in this area.

Will the actuary's role decline with the decline in ownership rights of participating policyholders? This is very likely to happen.

This paper may not be deep in the technical sense. However it is topical, and of great value in ordering thoughts and recording practice in an important area. I would like to add my appreciation to what I am sure will be a hearty vote of thanks.

MR. P.S. CARR: First of all I would like to congratulate the authors on their useful and timely paper. A particularly pleasing feature is that the paper is a joint effort between an actuary and an accountant.

I have one or two comments of a minor nature. It is a measure of how quickly things are moving in the insurance industry that the authors' comment in Section 7.4 that a large mutual is unlikely to be met within a takeover is now out of date. The authors' comments on discount earnings rate in Section 5.2 puzzled me. The theory underlying the choice of a discount rate is so crude as to be unaffected by the introduction of dividend imputation: I am not, therefore, surprised that no fall has occurred.

My main comments relate to the issue of the method of determining the purchase price. The purchase of a life insurance company is similar to the purchase of a manufacturing company in that a present payment is made in the expectation of a future stream of profits. Manufacturing companies usually have a history of earnings performance: this is not the case for life companies. This has led to actuarial involvement to determine appraisal values.

I have difficulties with the use of actuarially determined values for life offices. Firstly, the result is sensitive to the assumptions made about future experience. This is true even if the value of current business and assessment of profits from new business yet to be written seems little short of absurd. This fact is recognised by the practitioners who calculate with utmost precision the profits from one year's new business then apply a factor. Secondly, the calculated value is sensitive to expense assumptions. It is difficult to estimate how much it will cost to manage business in the target company. This cost must depend on computer systems, which the authors point out in Section 9.2 is a difficult area to control. I therefore feel that their statement in Section 5.2 that expenses can be estimated by examining tasks and staff required is over optimistic.

A more significant problem I have with actuarially calculated values is that they can bear little relation to what the market will pay. They are distrusted by financial commentators other than actuaries. A recent takeover of a large British proprietary company was defended by an actuarially calculated appraisal value. This was subject to a deal of criticism in the British press where words like "actuarial gobbledy-gook", "waffle" and "rubbish" were used. Of particular concern was the fact that shares in the company had been traded over the previous year at no more than four pounds fifty per share but the actuarial value was seven pounds sixty five. It seems difficult to justify a mark up, on actuarial grounds, of 70%.

Finally, I note that a firm of consulting actuaries produces a quarterly Value Index which calculates on very simple grounds a value for each Australian life company. This Value Index seems to bear a remarkable degree of similarity to appraisal values as calculated fully. Perhaps life offices are wasting time and money by employing consultants to calculate appraisal values.

MR. D.I.C. KERR: In response to an earlier speaker I would like to point out that the Deputy Life Insurance Commissioner has the discretion to request an independent actuarial report on a proposed merger, and I believe he would always do so. I would now like to comment on three areas of tonight's subject.

Firstly some general comments on the paper,
secondly the concept of maintainable earnings, and
finally the issue of the actuarial management of assets

General Comments

To the fundamental changes in the Life Insurance Industry listed in Section 3.1 I would like to add the following:-

The focus by some companies on growth for growth's sake, leading to the so called "agency wars", to higher commission costs and to lower profit margins or even the complete loss of profit margins on some products. The agency wars also led to increased competition amongst smaller life offices for the independent agent network.

Guarantees that had been given freely at no or little cost were suddenly found to be affecting profitability, these guarantees came in three main forms:

(a) guaranteed insurance charges and guaranteed insurability options, that were not a significant issue in times of improving mortality, became a problem when AIDS could cause mortality to worsen

(b) guarantees on expense charges in unbundled products became a problem as inflation soared and stayed high for the whole of the 1980's

(c) investment guarantees given on single premium capital guaranteed bonds, when October 1987 led to a shift in demand from single premium bonds away from unit linked to capital guaranteed, at a time when reserves were already under pressure.

Other fundamental changes were the deregulation of the financial services industry and the entry of the banks into the life insurance industry. Major changes in the taxation and legislative requirements associated with the administration of superannuation which led to heavy demands on technical expertise and administration systems. Superannuation productivity funds which are generally running at very low profit margins have started to take business away from traditional superannuation products.

In summary, the effect of these fundamental changes was a reduction in profit margins and the running down of capital reserves. I therefore see more merger activity in the future.

Turning to Table 3.1, I would like to complete some of the entries. At the time of the purchase of part of MLC in 1982 for $9 a share, there were 8 million shares on issue, valuing the company at $72 million. At the time of the purchase of the balance of the company in 1985, there were 16 million shares on issue, valuing the company at $448 million. In 1990 the proposed merger of MLC and Capita was carried out using the appraisal value approach. Because the merger involved a mutual company, price was not the dominant factor, rather it was the long term best interests of policyholders.

In Section 3.1 the reasons given for buying and selling life insurance companies appear to omit the main reason, that is, after allowing for the cost of the merger process the buyer will make money at an acceptable level of risk. An additional reason

for buying or selling would be to allow a mutual company to raise or rebuild capital to protect policyholders security and to allow for future growth. I believe the Capita and failed National Mutual mergers are examples of this type.

The example shown in Section 5.2 has a slight arithmetic error, the total salary and on costs should be $420,000 or $70 per policy.

Moving on to Section 6.9, price is not always the main reason for choosing the successful tenderer. The boards of life companies not only represent shareholders, but they are also trustees for their policyholders, therefore there is a need to look after the best interests of policyholders.

In Section 7.2 there is an additional aspect to the tax issue. The rate of tax paid on the investment income earned on free reserves depends on the relative proportion of superannuation, non-superannuation and annuity liabilities. The merger of two companies is likely to change these proportions resulting in a tax saving or loss and a change in the net after tax investment return.

To the check list in Appendix 1, I would like to add the following items,

(2) Bases of Agreement
Proposed structure - subsidiary or combined company

(3) Financial Characteristics
Expense levels by type of expense
Overseas business by country

(4) Assets
Major contracts and leases
Fixed assets, their realisable worth
Interest earnings and declared rate history
Philosophy on determining declared rates
Intangible assets
Properties: Are they fully let, lease provisions, valuation basis

(6) Actuarial
Aids testing limits compared to the industry since 1987
Guarantees - expense fees
- insurance fees, options to increase
- guaranteed surrender values
- guaranteed capital values
Surrender Value basis, compared to asset shares

(7) Products
Profit tests for each major product line
Special lines of business

(8) Agency and Marketing
Agent support material, PC Disks and brochures
Agents by period of service and size of production

(9) Management and Industrial Relations
Staff by function, age and duration of service
Board of directors

(10)Computers and Administration
Extent of manual and PC based systems
Premium income by method, group deduction, bank warrant and direct.

I would now like to move onto the concept of maintainable earnings.

This appears to be the approach favoured for buying television stations and breweries. It is based on the calculation of an annual profit figure, which is one random number, and choosing a multiplier which is another random number. The result of multiplying two random numbers is of course a third random number.

Maintainable earnings would appear to be particularly unsuitable for life companies, where profits can fluctuate from year to year as new business strain is recovered from products with uneven profit streams.

By including new business in the same calculation as the in force it would imply that the risk associated with achieving expected profit is the same for both the in force and new business, whereas most purchasers would place a higher risk factor on the value of new business.

Maintainable earnings does not lend itself to sensitivity testing for changes in lapse, mortality and expense rates or to determining with any accuracy the value added by way of the merger or the new management. This makes it difficult to determine a fair breakup between the stakeholders of the benefits of the merger.

Maintainable earnings does not indicate the long term supportability of reversionary bonus or investment account interest rates. One of the main components of the company's value can be the balance of the fund remaining after all participating policyholders have left, depending on the bonus rates declared. This could be a large positive or negative value that is not allowed for using a maintainable earnings approach.

Maintainable earnings will give an indication of the present value of the company if the elements effecting profitability do not change. Most companies buying a life office would probably expect to change some components, such as expense levels or new business product mix and growth.

Finally tonight, I would like to turn to the issue of assets. If it is likely that the new owner will sell assets to change the asset profile, then normal market value may not be suitable. Allowance will need to be made for forced sales, which could reduce the value of properties or any large equity shareholdings. Fixed and intangible assets may turn out to be virtually worthless.

The company may have future commitments for asset purchases through calls on shares or on-going property developments.

The extent to which the assets can be realised for their cash value should be compared to the ability of policyholders to surrender their policies at guaranteed values. If a large proportion of the liabilities is in single premium capital guaranteed bonds, then there is a need for a high proportion of readily liquifiable assets.

The actuary should test the relative solvency of the company, and calculate the ability of the combined asset portfolio to withstand large falls in the equity and property market. What is the risk of insolvency if the share market falls 30% or 50%.

In general, because a merger creates its own level of uncertainty in the public's mind, the actuary needs to consider the suitability of assets taking into account the level of reserves and the extent of mismatching by term and currency.

MR. P. CARROLL: I congratulate the authors, especially on their attempt to tidy up the language. It has been my ambition this year to eradicate the word "methodology" from all uses that come under my control. In most places where it appears the word "method" would suffice, except in the philosophy departments of universities where the word "methodology" refers, correctly, to the study of methods themselves.

I think actuarial involvement in the purchase, sale and merger of life insurance companies is more important than in perhaps any other area. One simply has to look at the efforts of some of the other advisers to recognise this. I want to pose a few questions, which are fundamental to many mergers and are ones that purchasers and sellers often have in their minds. I do not have the answers but I do have some comments.

The first is, what value does the free estate of a life office have to a purchaser? The free estate is the unallocated assets, after allowing for policyholder liabilities on a realistic basis and any established liabilities for shareholders' capital and earnings. It is usually measured in the net worth and the value of in force business, the division being determined by the manner in which the valuation liabilities have been calculated in carrying out the appraisal of the in force business. The assumptions regarding the value of the free estate are implied in the way in which the in force runs off, in the bonus rates used and in the apportionment of future surplus.

In assessing how much of the free estate is going to be available to the purchaser, the starting point, in Australia, is Section 50 of the Life Insurance Act. If, as authors suggest, the whole business of the life company is migrated to the nonpar accounts and all of the par business is run off, 100% of the free estate can eventually be distributed to the shareholders. If, instead, it is distributed to par business by way of reversionary bonuses, the proportion is somewhat more than 20%. This is because the 80% that is allocated to policyholders is not actually given to them but is used to establish bonus reserves, on a stringent basis, and the excess amount of those reserves falls back into surplus when the bonuses are actually paid. The answer is more than 20%, even if the office writes nothing but par business.

In most of the appraisal reports that I have seen, the actuary has put a figure of 20% on the shareholders' portion of the free estate, without any further argument or consideration, but what really does stop the whole of the free estate being given to the shareholders? There are a number of constraints on the shareholders. The company's Articles were mentioned by the authors. The provisions of the policy documents themselves are also relevant, as are any requirements that the ISC has laid down in past mergers or transfers of business which have occurred. The Section 50 constraint on distributions is relevant too but my question really is, how effective a constraint is it? Let us suppose the free estate comprises $1 billion and the company sells participating business which generates future surplus (not profits) with a value of $4 billion. Even if the new business stands on its own, including the repayment of any financing costs, the stream of surplus distributed to it allows the shareholders to withdraw the $1 billion of value from the free estate.

A second question related to the issue of expenses. I agree with Peter Carr that the expense assumptions used are very important. Actuaries are accustomed to using average costs in their pricing, profit testing and appraisal values and certain

levels of production are implied in these. The same average costs are commonly used for valuing new business and in force business and whether examination is being given to an optimistic or a less optimistic scenario. The fact is the economics of a company simply do not work that way. Some substantial costs are fixed and some are marginal costs dependent on volumes.

The use of marginal costs for the business, with separate consideration of general overhead costs, is the proper basis of an appraisal value for sale or purchase and is essential when it comes to examining financial sensitivities. To most purchasers, all the relevant costs of an acquired company are marginal because, generally speaking, the purchaser has an established business already. Each block of business should be valued using its marginal costs and a further cost, that of acquiring and operating the company itself and all its infrastructure, should be considered separately. The factor which most affects how much of this latter cost will be incurred by the acquiring company is the scope of the guarantees given to the vendor and the staff.

A third question relates to the valuation of the new business and again I agree with Peter Carr. The common method, involving the measurement of the profits on one year's new business and the application of a factor to that, has always bothered me. It is highly subjective, difficult to understand and the answers are volatile. I view the outcome of this calculation as simply one figure which needs to be looked at, but it is not always the most useful. In our practice, we have developed a way of looking at the agents and agency relationships that are being acquired, and of valuing them, based on a grid which shows their distribution by volumes of commission. There is a marketplace which buys and sells agents and, by reference to this, the value of the sales force that is being acquired can be assessed. The value obtained by this means can be compared with the estimated cost of training an equivalent field force or purchasing it elsewhere on the open market.

I have two other comments, one of which is particular to Australia. In addition to the technical value of the insurance business and the corporate structure that is being acquired, there are financial engineering gains available through a life company. In the tax environment of Australia, life companies generate imputation credits, which are attractive to many shareholders, especially banks, and they also provide a tax shelter where money can be parked at an attractive rate of interest. These things have considerable value.

My other comment relates to the valuation of a mutual company and I refer to some comments on this by earlier speakers. I believe the conceptual starting point, for valuing a company that is going to be demutualised, is the issue to policyholders of rights to the shares and the estimated value those rights would have in capital markets. If there is a good reason for avoiding a rights issue to policyholders, there should be full

disclosure together with an independent actuary's report spelling out, publicly with full projections, what is going to happen in the post-demutualisation environment. Only by such a means can policyholders be fully assured of equity.

MR. B. VINCENT: I want to first thank the authors for providing us with the opportunity for considering this topic tonight.

When considering buying and selling life companies I believe it is first important to obtain an overview and understand one's own company and its position within the industry, also the state of the industry itself. There is a need to do an industry analysis and analyse the various strategic groups. An acquisition may not solve one's problems if the answer lies in switching strategic groups.

These days buying and selling life groups does not just cover acquiring or selling statutory funds. There can also be unit trusts and one needs to consider how to value the right to receive future management fees. Also there is the question of subsidiaries and the value of these in the accounts of the holding company.

On the issue of the reasons for recent activity I believe that dividend imputation has been an important factor behind recently announced demutualisations. The tax paid by the statutory funds in demutualised companies can now be used to frank dividends to shareholders. Previously this tax provided no additional value to the policyholders. This then is a real case of a value added transaction or, one plus one equals three. What is of real interest is how this added value is divided between the participants to the transactions.

There certainly has been a high level of takeover and merger activity in Australia over the last 5 years. It is interesting to compare and contrast this with the level of activity in other areas of the financial services industry. Across the board there have been rationalisations in the number of finance companies, merchant banks, stock brokers and building societies. In most instances the dominant players have been the four major trading banks.

The reasons for contemplating an acquisition are many but perhaps they can be characterised under two headings. The first is "rational reasons" and the second is "irrational reasons".

The irrational reasons, which centre on management and/or shareholder ego, are unfortunately prevalent outside the industry and are usually the basis for the subsequent failure of the acquisition as well as the acquirer itself.

A 1988 McKinsey study on the views of the acquirers post acquisition indicated that there was a 73% failure rate where the target had been a large company in a related business. One hopes that the longer term experience in the life insurance industry proves to be much better and I believe it is the professional responsibility of actuaries working in life insurance to help influence this issue in a positive way.

The subject of valuation for purchase or sale is an interesting one. At the outset I believe that there is a danger of being mesmerised by the techniques and failing to manage the process.

Valuation is extremely subjective. To interpret results correctly one needs to understand the techniques that are used. Invariably there is room for a number of techniques and the paper covers them. Judgement is then required to consider the relevance and accuracy of the techniques after which a final valuation or range of valuations can be produced. One needs to understand how and why the answers differ. The valuation process is a learning experience. It is not a black box.

Considering for a moment the discounted cash flow method it seems strange to me that discount rates of between 12.5% and 15% are invariably used despite the obvious differences between companies, purposes of valuations and the deemed riskless rate of return over time. I think more work needs to be done in this area and I believe Mike Sherris' 1987 paper to the Institute of Actuaries provides a very useful starting point.

The sequence of buying and selling is illustrated in Figure 3. Whilst it is mentioned in the text it seems sufficiently important to suggest that the illustrated buying process needs changing fundamentally if success is to be achieved. Deciding to buy is shown as the first step. I suggest that there are two important steps that should precede it. They are, "determining criteria for buying", and, number 2, "making it work". A plan needs to be developed before the purchase not at the end of the process. These two steps are arguably the most important but sometimes the most neglected. This sequence, on the other hand, may indicate the strength of the seller in the process who is able to orchestrate the steps and create a market for the company making potential purchasers compete against each other. I suspect, however, that the industry is now entering a period of a buyers market for all but a selected group of companies.

Once again my thanks to the authors for presenting the paper tonight.

MR. P.J. TWYMAN: I too want to congratulate the authors for a very timely and comprehensive paper. However as others have said, it is seldom that a paper is out of date so soon. The comments I would like to make are addressed at two levels, first of all some details that are within the paper and then some wider issues.

In Section 4 we have some suggestions on prices for buyers and sellers. In my experience a successful negotiation can only take place if the buyer makes an estimate of the seller's price and the seller makes an estimate of the buyer's price. Too often, however, the buyer focuses all his attention on the buyer's price and conversely. The real key is for the buyer to pitch his price at around what he believes the seller's price might be. And similarly the successful seller should pitch a price at around what the buyer's price might be.

The paper does well to suggest that the price will be different for different buyers and different sellers. That takes us to another issue - the value that should be included in the balance sheet of an owner of a company. There are a number of enterprises that have life companies as subsidiaries. What is the true market value for that transaction? I will come back to that question later.

Section 4.4 describes Method 1. It is hinted that it is used in isolation with insurance companies. I note that it is widely used for property valuations, for values of mines and other processes where discounted cash flow is appropriate. One of the difficulties in valuing a life company is setting the value of future new business. This problem has effectively been solved in the valuation of property. What is the value of a block of land in the CBD? It certainly is not what the dirt is worth. It is the value of the building that could be built on that block of land. The systems and the concepts have already been established; perhaps we delude ourselves that actuaries are the only ones who have found them.

The missing element in the methodology is the connection with actual transactions. I will come back to that too in the wider issues section.

In Section 6.2 a comment is made that time is crucial in these transactions. We were asked to mention our experience with different companies. My own office has been involved with two acquisitions. One had a very drawn out acquisition period. The uncertainty that that produced has resulted in declines in new business, difficulties with staffing and increases with discontinuances. The policyholders who caused most of the delay effectively damaged themselves!

There is no management magic wand that can fix these problems over night. I agree with a number of speakers who said the hardest job is making it work afterwards.

In Section 6.12 we see that it is normal to have due diligence before the sale. In fact, I would think that it was ethical to do so. Unfortunately, there are a number of people that normally do their due diligence after the sale. They negotiate a high price at the start and then have their lawyers find as much wrong as possible to drive the price down. If you are dealing with these people it is prudent to hold a margin in your price.

Now for some wider issues. In Section 3.1 there is comment about increases in expenses. I think they resulted in the main from shorter product life cycles and the scramble for market share. The price pressure probably results from there being too many companies and the scramble for perceived critical mass.

These pressures result partly from deregulation and partly from more efficiency within the system. All of these will lead to the weakening of some companies and the strengthening of others. Those that are weakening are closer to the cliff of insolvency.

Already the regulators have started to improve solvency requirements for some products. However I am not sure that the regulators will be able to prevent all companies reaching that point before they cease trading. The race at the moment is between the regulators and the regulated.

Sections 4.2 and 4.3 return to the value of an office. I mentioned earlier that there should be some anchor back to what people actually pay. I think it is important to separate two concepts - what is value and what is price? If we wish to value a work of art like Van Gogh's Irises it is not possible to use a discounted cash flow methodology. Yet it has a price which is freely quoted. In practice the price can be determined by reference to the prices for other works of art. The critical issue is a linkage between the method and market prices. Either of the methods describing the actuarial method, or the maintainable earnings method require a link back to actual market transactions.

In the property field that is reasonably easy because there is a large number of transactions on which to base a linkage. Until recently there were insufficient transactions with life companies to form a view on the linkage between the method and market prices.

The critical element in this linkage is being able to build an allowance for changes in market sentiment. This is probably the explanation for companies selling more in September 1987 than they do now.

Having determined a pricing method how should these companies be valued for inclusion in a balance sheet? We have been through that exercise ourselves with a recent acquisition and decided that you cannot really value it on the basis of what is it worth to you or what is it worth to someone else. If effect, you have to come as close as you can to what is it worth by reference to other transactions in the market place.

Another aspect related to market linkages is the price earnings ratios at which companies trade in the market place. Life companies tend to have relatively high price earnings ratios. It makes me wonder why a bank would want to buy a life office because banks traditionally have relatively low price earnings ratios. The market is likely to maintain the banks' price earnings ratio on the earnings that are disclosed from the insurance companies that are subsidiaries. That will tend to depress the value of the shareholders' interest in the insurance company subsidiary. Conversely, it would be of advantage for a life company to buy a bank and so have the life company's high P/E ratio applied to the bank's earnings.

Mr. President, I would like to close now by saying thank you very much to the authors for providing more information to the market. After all, it is only a well informed market that can avoid some of the excesses that would otherwise occur.

MR. J. ALTMAN: In contrasting the "actuarial value" approach with the "maintainable earnings" approach, my experience is weighted heavily towards the first. However, this experience has also demonstrated to me how sensitive any such calculated values are to the assumptions used.

To take just one example, the authors refer to expense overruns as a consideration in both the in-force value and the new business value. Are we kidding ourselves here? How realistic are the assumptions that we make on the reduction in future of these expense overruns? Can they possibly allow, for the results of any proposed sale or purchase? The crunch may well come a year or so after the date of the actuarial valuation when the buyer reassesses the value of his purchase under then current assumptions.

The point I am making is that this extreme sensitivity of the actuarial valuation approach has, in the eyes of non-actuaries, damaged the credibility of the results, and of the approach itself. The non-actuaries I am referring to often are the key management and their advisors who make the decision whether to buy or to sell.

The actuary who is doing a valuation for the purpose of sale or purchase has the luxury of being able to select his or her best estimate assumptions from the start. The actuary who is asked to provide regular 'realistic' valuations for the owner has the choice either to determine his or her best estimate assumptions totally afresh each time and then to try to explain the very large movement from year to year, or to aim for consistency (probably with a conservative bias and recognise changes in assumptions relatively infrequently).

I believe that the "actuarial value" approach has lost credibility, because the market is uncomfortable with values which fluctuate dramatically with changing assumptions and even with values which are shown to be highly sensitive to alternative assumptions. Perhaps this is reflected in the use of the "maintainable earnings" approach which Table 3.1, as I understand it, seems to suggest has been used in most of the high-value transactions reported.

I am also curious about the comment in Section 5.1 that the two methods, although they are different, have produced results which are similar in outcome. I am curious whether the authors have any supporting evidence for this.

Our challenge is to apply the disciplines of actuarial judgement to the "actuarial value" approach in a way which is both realistic and achieves credibility in the market place.

In Section 6.10 the authors identify the most interesting part of the buying and selling process as the negotiation over price.

Perhaps so.

I would regard the most challenging part of the process as coming under Section 6.13 , "making it work".

There is a miriad of details to be attended to following a company restructure, ranging from reassessment of investment policy, to the crucial issue of who gets undercover car parking spots. In all of this and particularly in the people related issues, it is essential to maintain a strategic direction and a management that can work in harmony with the rationale behind the purchase.

While this may sound like a truism, I would suggest that all the detailed planning, calculations, negotiations and agreements become irrelevant if senior management loses sight of the long term strategic issues. The buyer to be successful past the date of purchase must have a clear view of where he wants to go and how the purchase is intended to further this direction.

Development of a strategic plan, together with a capacity and readiness to review that plan on a regular basis, is the key to "making it work".

Components of the strategic plan will include distribution systems, coordinated administration systems, performance measurement, capacity to evolve new and relevant products, and readiness to improve or change existing procedures where performance is below target.

"Making it work", as the authors say, is certainly a good title for another paper. With the current level of activity in this area it may be a while before any of us have both the time and the experience to write it.

My thanks to the authors for a thought-provoking and well prepared paper.

MR. A.M. GARDNER: My congratulations to Steve and Tom on a very topical paper.

In Section 5.3 there is talk that the maintainable earnings method will produce similar answers to the appraisal method. In answer to previous speakers, it can be shown that these are directly relatable. later this year, in the next report by the sub-committee on realistic earnings, I expect that these formulae will be specified.

As a cynical consultant I guess that I will make one comment. It is amazing how often that the appraisal value answer, which one produces after two days work, is within 20% of the value produced after another 20 days work. I think Peter Carr made a comment which was similar to this.

MR. P. VINSON: I have been a bit busy lately and I have not had time to prepare any comments. However I have been provoked by the earlier speakers and, under the challenge of sharing some experiences, make a few comments spontaneously.

I do that with some misgivings because on the one hand I feel that my experience gives me a commercial advantage which I do not really want to give up and on the other hand my professionalism makes me feel that I have some responsibility to the profession. In the interests of good old fashioned comprise I will share some thoughts and not others.

Past experience. In the early 1970s I was associated with two mergers. There was a small company which merged with another company of the same size and doubled in size. A few months later it merged again with another company of the new size and it doubled again. It quadrupled in the space of a couple of years. Looking back I feel that those two mergers were very successful. I think that the reason they were successful is because the objectives of the merger were known at the beginning. They were worked on through the process of the merger. They were achieved because they were focused on and I would like to think that the merger I am currently associated with will turn out the same way. I feel the parties know what they are doing and why and will be working hard to make sure it

happens. I think that is absolutely critical. To make a merger work you really have to know what it is all about. I suspect that the odd one or two that have not been successful have gone wrong because the main party really was not quite sure what the objectives were.

There has been a challenge for people to predict the future. I would like to predict that there will be an enormous number of mergers in the next few years. I feel that the Australian market place is too crowded. I believe that there is only room for about 12 companies operating in Australia. A number of speakers were going through numbers earlier and I got a bit confused about the various categories. It seems to me that there will be a lot of companies that find that there is not room. I think that the major banks will stay in the market. They are here to stay. There are a few largish life companies that have ensured their being around for a while because they have reached a certain size. In realistic terms there are three companies in that category, assuming that the MLC/Capita merger goes through. Those three life companies will have about 65% of the market depending on how you measure it and another 30 or so will share the other 35% of the market.

If you look at other industries there has been rationalisation down to fewer and fewer numbers and in the extreme you had the situation in America where the car industry got down to 3 companies. Then one of those nearly went out backwards. I think that will be the situation in the financial services area in Australia. I think there will be a real scramble between the other 30 companies in Australia to get together into reasonable groupings to be able to survive in the near future. I think that will happen in the next five years. That is a prediction.

There has been comment about mutuals. I think that in this era of needing to grow to continue to survive inflation does not help. I think that mutuals are a dying breed. I would be very surprised if there is more than one mutual in existence in Australia in 5 years time and even one is an even bet.

Bruce Edwards asked a technical question of the authors and asked why they had not put in references to the legal and procedural side of a merger. Well I would like to remind him and perhaps others that might want to know. There was a very good paper on that subject written in 1977 by Philip Burns and David Stanton and that paper is still accurate in pretty well every regard in terms of all those issues. The legal framework has not really changed. Some of the technical issues of tax and stamp duty are a bit different but that is really about all. I cannot see any need to rewrite that paper all over again in slightly different words.

There has been reference to the accounting fraternity and actuaries working together. Like other speakers I would like to congratulate the two authors on having worked together as an accountant and actuary to present a paper to this Institute. I think it is an excellent development. I congratulate them and I would like to see more of it.

There has been reference to this issue of accountants and actuaries working together in a number of ways. One issue is the development of standards for realistic reporting of life offices. Here we see an accountant and an actuary being appointed by AARF as joint contractors to prepare a discussion paper on that issue. Further than that we have the situation where the Life Insurance Committee and a number of senior auditors are having a good dialogue and sharing thoughts about that issue. It is all looking very good to me for the future when we see the two professions working closer and closer together in relation to our industry.

There has been a lot of discussion about non participating versus participating and the idea that you can manipulate in some way the relativities of the two blocks of business. There were references to Section 40 of the Life Insurance Act. With my Life Insurance Committee hat on I would like to say that this whole issue is of concern to us as a committee. We are working very hard to present to the profession a draft exposure draft of a submission from the Institute to the Government on the rewriting of the Life Insurance Act.

A key issue in that matter is this whole issue of the ownership of, and rights to, the surplus from participating business. The Life Insurance Committee feel very strongly that the issue should be resolved a lot more clearly than it currently is. It is our hope that the profession will support that position when our draft is discussed. We did, of course, provoke discussion on the issue at the Cairns Convention when the Committee commissioned a discussion paper. In very broad terms there was not as much support as I would have wished for the ownership of participating surplus being clarified. Anyway the Life Insurance Committee continue to feel very strongly about it and in the light of comments here today we hope that we might get good support in a couple of months time when that comes up to be discussed.

There has been a reference to the sale of blocks of business. The company I am associated with has, in recent years, sold 3 different blocks of overseas business to different buyers in different countries and I think the question of valuation again depends upon the facts of the case. We sold a significant sized block of business in one country and an actuarial valuation was involved. We sold two trivial blocks of business in other countries to ensure improved service to the policyholders and a valuation did not really come into it. It was a very arbitrary sort of arrangement in the interests of the policyholders. It is really a question of what is the key issue?

I now turn to the subject of the general issue of prices paid in Australia. I do not think that this profession should be surprised that most of the transactions in recent years have involved actuarial valuations. After all actuaries are pivotal to the operation of a life company. They understand it. To merge Funds requires Court approval and to obtain that it is necessary to have actuarial reports and actuaries will be involved at that stage. Therefore it is not surprising that they are involved up front and included in the negotiations and pricing. I do not think any of us should be surprised that an actuarial valuation is involved right at the beginning.

Apart from a recent successful transaction which has just received publicity I have been involved with a number of recent failed bids. Clearly the value placed on a company by an actuarial valuation is dependent on the assumptions. I believe that best estimates about future experience are the appropriate bases to use for valuations. The discount rate is a very significant factor and I must admit that it has always puzzled me that the discount rate which seems to have applied to most of the recent transactions has been in a very narrow range.

I cannot really give an explanation to that and I have never really understood a rationale for determining it. It seems to be based on the fact that everybody uses much the same rate and you have the confidence of being in the crowd. Maybe it is like the price of gold. That has no real intrinsic value and it is no use for anything but its price remains high because people keep on buying and selling it.

One final comment is that the authors have perhaps overlooked one thing in the process which is what you might call non actuarial. That is management of the media. The two current transactions have provoked a fair amount of media comment. On reading it from the point of view of my interest in one of them from inside, and of close interest in the other professionally, I have been amazed at the utter rubbish in most media comment. In fact not only is it rubbish but half of it is completely unintelligible. Another thing the Life Insurance Committee believes in very strongly is more and better disclosure in relation to our industry. If the media are producing rubbish it is partly our fault and we can help to fix it.

At that point I will stop and again thank you very much to the authors for an incredible coincidence that this paper happened when it did.

MR. J. TROWBRIDGE: Numerous speakers have commented on the exquisite timing of this paper. Recent events are dramatic: two of the biggest acquisitions in the life industry in this country have been announced, one of which is probably the largest corporate transaction ever in Australia. Also, since writing the paper, Steve Miles has seen his own company put up for sale.

The paper is unusual because it is not of itself an actuarial paper. But it does cover a subject that actuaries giving advice to buyers and sellers of life companies need to appreciate.

Several speakers made some reference to the importance of understanding properly the process of selling a life company. As I see it, in these situations the actuary needs to give advice which is sound, which is professional, which is directed properly towards the client's purpose and which is useful. Regrettably, some of the advice I have seen in this field fails to meet one or more of these criteria. As indicated by some speakers, the sale process is complex, and there are great difficulties in making a merger work properly, and hence in the new owner obtaining value from his purchase. Hence realism in assessing value includes recognising reserving problems with investment account business, and recognising the significance of expense control difficulties and distribution difficulties. No wonder the future of some smaller companies is the subject of speculation.

Several speakers referred to looking at mergers or acquisitions after the event. Perhaps that is a way of understanding more about the real value of a company.

An actuary, during the course of a merger or acquisition, needs to give extensive verbal advice as well as some written advice. The advice must be practical and relevant, with each of the issues properly understood and at least approximately quantified.

On the one hand, there is a danger that the actuary will be very pedantic about minor issues which do not have great bearing on the negotiation or the sale process. On the other hand, numerous speakers warned us against the complexities of the due diligence process, including the dangers of not dealing fully with all of the financial and legal issues involved.

Predictions for the future were quite varied. Two early speakers said there will be very little future merger and acquisition activity. Most of the speakers from then on thought there would be considerable such activity. I would like to suggest that if the apparent tax advantages and access to the estate for new shareholders of some mutuals are real, we are certain to see two more mergers of mutuals within five years. I also think that many of the other difficulties that have been mentioned about a competitive market will lead to many more mergers.

Some speakers offered some details on the history of merger activity in Australia. It was not until David Kerr and then Peter Vinson spoke that we were offered analyses of the market place and attempts to look behind the circumstances of merging companies. I think that is the way in which you work out whether or not there will be more mergers.

David referred to matters such as chronic expense and persistency problems in many companies. Other factors include the stock market crash which led to the weakening of the asset position and the solvency position of many companies, and also deregulation, competition and the demands of shareholders. One speaker also referred to a kind of mentality about mergers and acquisitions, whereby many CEO's seem to be interested in buying and selling things in order to create more value rather than trading their way into a profitable future. Also mentioned were tax issues including dividend imputation. All of these factors have had, and will continue to have, a bearing on merger and acquisition activity.

Much attention was given to the question of appraisal values versus market values versus maintainable earnings I could not do justice to that discussion in 2 hours let alone 2 or 3 minutes, but let me make a couple of comments. The appraisal value versus market value is an issue that bothers many actuaries. How is it that we can produce appraisal values after carefully considering all of our assumptions, and then we find that the market value or the price turns out to be rather different?

It is important to understand this issue. Many critics suggest that actuarial appraisal values have lost credibility. We all need to recognise that there are difficult problems to be overcome here, and that appraisal values can easily be brought into disrepute. But as Peter Vinson pointed out, at the very least an appraisal value is a useful reference point.

Buyer and seller will both have a view about net worth, the value of the existing portfolio, and the value of other assets such as the distribution system. Hence each party can ultimately reconcile the price paid against the appraisal value. For example, in one situation that I was associated with, my impression at the end of the transaction was that the seller thought that he had sold the business for net worth plus present value of in-force business with nothing for the distribution system. The buyer believed he had paid for the distribution system. The difference was of course that each party placed a different value on each of the different components. That will always happen and that is how markets operate. It does not detract from the usefulness of appraisal values.

It was disappointing to hear so many negative comments about appraisal values. As a profession I believe we should work hard on appraisal values because there is no other way of valuing life companies. Maintainable earnings is not really workable. It is a useful concept and has its applications, but it has limited application to life companies. Maintainable earnings disguise too much of what is going on inside the company. In my view, therefore, it is worthwhile that we work very hard at appraisal values.

Looking at changes in market prices over the last few years, I accept fully something else that Peter Vinson said: It is hard to know exactly what happened. The paper gives us limited help, and we do not know if the table in the paper on past transactions is accurate. Nor do we know exactly what was purchased in each case. Indeed even when one is in the midst of a transaction, the buyer and seller and everybody else involved have to keep reminding themselves exactly what is being sold and what is not being sold.

Assessing a value can be quite a difficult process, but I believe that actuaries involved in the life industry are the best people to work at it.

Appraisal values and market values are a fascinating subject, and we have certainly not heard the last of it.

Let me finish with a few comments in the nature of the actuary's responsibility in this field. What are you trying to do if you are involved in a sale in an actuarial capacity? Are you trying to satisfy your client, or the legislation, or principles or equity? Are you trying to satisfy policyholders or the public interest? The last is what our code of conduct tells us we should do, and most of us would say that we are trying to satisfy all of these things. I suggest to you, however, that some of these are often in conflict with each other, in which case the actuary is put in a difficult position.

Take for example ANZs proposed purchase of a share of National Mutual. Here it could be said that a price of $3.4 billion is being offered for $5 billion worth of value. It this is so, who has the responsibility for satisfying principles of equity and protecting policyholders' interests? Is it the regulators, or National Mutual's actuary, or the independent consulting actuaries to National Mutual? It is very difficult to tell, especially as the consultants' report has not been published. I certainly believe that it should be published in full, and I would like to think that, on behalf of the profession, others of you here will try to arrange that it will be published. Incidentally, there is a requirements in the United Kingdom that such reports are made public.

Similarly, is it the case that MLC's acquisition of Capita gives Lend Lease several hundred million dollars worth of assets for a price of zero? Arguably this is so, but the press has not noticed this possibility, and the public information is very unclear. Perhaps it is not correct that Lend Lease is paying zero for several hundred million dollars worth of future profits, but it would be worthwhile for the profession to have a good hard look at this question.

The industry is at some kind of cross roads with these two announced mergers, because they have major implications for the future of mutuals in this country and for the future relationship between policyholders and shareholders of life insurance companies.

I wish to thank Steve and Tom for what is an excellent paper. It has provoked an extraordinary amount of very interesting discussion, and clearly it is a subject to which our profession has a great deal to contribute. We thank the authors for stimulating such a discussion.

MR. S. MILES (Co-Author): I would echo what John has said. Thank you for what I thought was a lively discussion.

One of the most pleasing aspects of writing this paper, was working with Tom. The mixing of accounting and actuarial cultures is an educational experience. Many times Tom and I were arguing late at night. I was quite often supporting the maintainable earnings approach and Tom was supporting the appraisal value approach. Tom being an accountant was lured, or mesmerised, by the size of the appraisal. I, being an actuary, liked the fact that at least the maintainable earnings approach, despite multiplying two random numbers, could have its feet in something that was concrete, that is a market price.

The mixing of cultures is something I have experienced again in the last two weeks as I and my family spent a week up in Mudgee. For my part I experienced the necessity of having to get home at 4.00 o'clock every afternoon. Now as most of you will know, at 4.00 o'clock there is a TV show called Teenage Mutant Ninja Turtles.

For their part the children had to learn about going around the Mudgee wineries. Now, I thought this would be rather boring for them until on our second last night when Lisa, who as you all know is my oldest child, grabbed the bottle of wine from the centre of the table and said "Dad, this does not smell as bad as the other wine you have been drinking". Perhaps it all came to a head when we got home. My son Alan grabbed my glass of wine from the table, swilled it around the glass, sniffed it and said "Shiraz". He did however get the year wrong!

Returning to more mundane matters, there was a lot of discussion on whether mergers will increase or decrease. I tend to have a vision of the industry somewhat similar to Peter Vinson - 4,5 or 6 big companies along with 10 or 15 small companies small companies. A small company will have $500m of assets and about $5m of new commission. To put it another way, something like $15m - $20m of expense loadings earned from its business. There are a lot of companies below that new definition of small and they are the companies that will be involved in merger and acquisition. There will always be new entrants as hope springs eternal. Probably 5 or 6 new entrant companies which will turn over every 5 years or so.

It was interesting to listen to several comments about what was paid for a company. Basically I think the experience in other industries is that in a competitive market buyers do not get the best deal. They compete against each other and bid up the price. Unless a buyer can add a unique advantage, that is an advantage that no one else can give, the buyer will be forced to pass that advantage over to the seller. David Kerr mentioned the main reason for buying and selling companies is to make somebody a lot of money. But buying and selling alone is not enough, there has to be a strategic reason as outlined in our paper.

There have been a lot of comments on appraisal values - how important they are, whether they are correct or whether they are perhaps too sensitive to assumptions. A lot of people distrust appraisal values. However as most speakers have pointed out, appraisal values are just tools. As John Trowbridge said, trying to justify an appraisal value after a market test is a great learning experience. That is why it is always important to anchor your appraisal value in what has happened.

Peter Vinson suggested a great idea - management of the media. MLC certainly has done a good job in the Capita case. As a profession we have a high profile in the buying and selling companies. That high profile will, of necessity, involve media contact.

As more mergers take place there will be more situations where it is one actuary versus another, or even an actuary versus another professional. Certainly, the Tyndall 1987 purchase was based on a value determined by merchant bankers. This can only mean interesting times ahead for everyone involved in buying and selling life insurance companies.

MELBOURNE

MR. T. FRASER (Visitor & Co-Author): I would like to make a few brief comments. But before I do I would like to put one thing in perspective in regard to the paper and that is introduce myself. I am a senior manager with Ernst & Young specialising in insurance. I am a chartered accountant with 10 years experience and in the last 10 years I have probably spent between 50 and 80% of my time working on insurance and insurance related jobs. This work ranges from performing the audits of life insurance companies through to merger and acquisition work and I guess perhaps the more dubious ends of buying and selling life companies which tends to be litigation arising as a result of buying and selling life companies. So turning to the paper I would like to make a few comments on the paper.

The first thing is that Steve and I both emphasise it is really primarily a guide to buying and selling life companies. Steve and I were pretty worried two months ago when the paper was due for publication because we sat around and said well there is not much happening at the moment which is public. In the last month or so we are quite pleased that lots of things have happened and perhaps the paper is a little bit more topical than it otherwise would have been.

In terms of the current mergers and takeovers, Steve and I have a feeling that they will continue into the future. We think there are a number of reasons for that. As far as what has happened to date we think that in the future there will be another big merger or takeover, we think there will be more middle sized firms bought and sold and we are aware of about 3 to 4 companies who are seriously contemplating obtaining life licenses starting off from scratch.

I think that there are a number of reasons for that -

1. Life insurance businesses have suddenly become very popular due to the government changes in superannuation.

2. I think that another obvious reason is the concept of capital. It has been widely broadcast that a number of the mergers that have occurred are due to lack of capital to fund future business. A number of companies are in the situation where they have either got to find someone who can pump in capital or can generate huge economies of scale. The Capita/MLC merger appears to be an example of this.

I think that one of the things that Steve and I sat down and talked about is why in the last three or four years mergers or takeovers have occurred. We believe there are three waves.

The first wave occurred very soon after 1987. It was primarily as a result of the crash. The second wave was the result of a shortage of capital which we believe came about probably because of the crash but also because of the pressure of obtaining new business. I think the second wave is likely to have a longer effect. It took a lot longer to happen than the first wave. The first wave was pretty much immediate where a lot of companies with a substantial investment in equities took a bad hammering with the crash.

The third wave we believe is starting to occur now and will probably carry on into the future and that is mergers and takeovers relating to distribution networks. I guess the comment about backwash was really that in the future we see that there will be a lot of new entrants moving in and out of the market. I think that if someone was to ask us for a prediction

as to where the industry will end up in 5 or 10 years time, our feeling is that in 5 to 10 years time there will perhaps be 5 large life companies and there will be 12 to 15 middle sized life companies. Of the 5 large companies perhaps 3 or 4 of them will be bank related life companies and there may be one independent company i.e. not bank related.

The 12 to 15 middle sized companies we believe will have assets of one billion to two billion dollars each and then there will be a series of new entrants that will come and go fairly rapidly in the market.

The last two comments I have specifically relate to items in the paper. In Table 1 there is a table with life company sales over the last 4 to 5 years. Steve and I obtained these from the financial press and various other documents that are publicly available. We have had a number of people say to us that a number of the figures are wrong and in particular the price for Royal. The actual price was apparently nothing like what was recorded in the press.

The other comment I have to make is that like all good papers there is a deliberate mathematical error in the paper. I would have to say that myself being an accountant and Steve being an actuary, neither of us obviously passed mathematics at school. Thank you very much.

MR. E.J. JONES: It is my pleasure to open the discussion on the paper we have tonight. The authors must be gratified to see such a full room here in Melbourne.

The paper is short but meaty. The essential points are there. The authors are to be congratulated for putting such a lot into a short space.

I particularly like things such as the first two tables. Apparently the first one about the prices paid for life offices contains inaccurate information which is no fault of the authors. But I think those sorts of summaries are very useful and the second one on definitions is also an extremely good thing to put in.

The subject is obviously very topical. It is topical not only for actuaries who can discuss these questions at any time at great length but also for the accountancy profession and the journalists. We have seen in the two last weeks merger and acquisition exercises going on. It is apparent just how little the financial journalists understand about life offices and life office accounting. Accountants are also displaying their ignorance on this question.

It is particularly pleasing that we have an accountant and an actuary combining in this paper and by reading it one can judge some of the flavour of the tension that there is between the two professions and how that tension is being resolved through

dialogue. I am pleased some accountants are here tonight from the major firms because the thrust of my remarks are to improve the dialogue and the direction in which the discussion ought to head. I think actuaries have a substantial educational job to try and explain what is going on inside a life office for the benefit of the investing public. Of course the "investing public" comprises not only shareholders but also policyholders.

In the United Kingdom at the present time there is a working party within the ABI (which is the equivalent of LIFA here) putting together, in a very short time frame, a paper that will give a better understanding to the investing public about realistic earnings or appraisal values or both. It seems from what I have been told that the result of the Pearl exercise is that the actuarial approach to appraisal values has lost credibility. There is a job to be done either to educate the public about appraisal values or to replace the basis on which values and prices are determined by better explaining the earnings of a life office so that the financial community can apply PEs to those earnings as they can with other financial enterprises.

I was pleased to see in Section 5.3 the discussion on maintainable earnings because this is the crux to the alternative (PE) pricing exercise. We ought to have greater understanding of maintainable earnings in a life office.

I hope we can look for a solution because there is a thirst out there for the PE approach. Anybody who has advised a company, especially a non insurance company, about mergers or acquisitions will understand the difficulty of explaining how the value that we arrive at is made up. They always look at a PE approach. We have to understand that and relate to it.

At this juncture I am going to read a section out of the paper I delivered recently about the PE versus the actuarial value approach. In it I illustrated the appraisal value exercise by analogy with a forestry company. Growing trees for pulp and paper is big business in New Zealand and a few years ago I made a study of the valuation of a forestry company. To take the simplest example, consider a new company which buys land on which to plant trees. It plants its trees in year one. Has it made a profit? Has the company increased in value? Ten years down the track the net cash flow is still negative. Has it made a profit? Has the company increased in value? What is the interplay between cash, profit, changes in value and earnings?

I think we may have to talk to other financial professionals in terms unrelated to money, because I think they get confused with a life office where we are talking in money terms. They expect to be able to understand it in a different sense than they would if we were talking about physicals. In my paper I went on to

make a comparison with a life insurance company which has an agency outlet which sells masses of new policy business. The cash flow is negative in respect of new policies during the first year. Has the company made a profit? Has it increased in value? What were its earnings? Exactly the same questions as for the forestry company. In the case of the forestry company an experienced valuer does a discounted cash flow of future income and outgo for each stand of trees using what is known as the Faustmann formula. That determines current day value. Year by year changes represent profit or loss - not cash!

In the case of life insurance the discounted cash flow technique is also used by actuaries. If the DCF is done on a statutory basis, profits are depressed when new business is increased. I understand this was the genesis of US GAAP. USA accountants pointed out that on any realistic reporting basis, increased sales should mean increased value. Ideally, increased profits should be reported.

There is a move to apply such changes in value, assessed by DCF, to all business enterprises. An alternative name is shareholder value analysis, SVA. This derives a measure of profits from changes in a long term view of expectations.

It is a process where the valuations are done at the beginning and end of the year on consistent assumptions and take into account potential profit.

If life company earnings can be determined, taking into account reality and what I call potentiality, then PEs can be applied. Even if the basis is governed by generally accepted accounting principles the earnings figures for a life office are and will be determined by actuaries not accountants. I think this is accepted by accountants but I mention it for completeness.

The UK actuaries do not accept US GAAP and no common basis of determining earnings has been agreed. Therefore PEs are not quoted at all for life companies in the UK financial press. You look up life offices and they just put an asterisk in the Financial Times - not valid - and they will not quote figures. However PEs <u>are</u> quoted in the USA and Canada and I am hopeful that in Australia actuaries and accountants will shortly agree on "Aussie GAAP" for life companies. Then PEs can begin to be developed reflecting one's current views of the status of a particular company, the industry as a whole, the general economic outlook, effect on shareholders profits, control premiums, etc. in the same way as applies in all other industries.

The authors say a valuation exercise is performed by an actuary in the classical way: net worth, existing business, new business and as they call it goodwill. This is where I start to depart from the authors.

I first want to give those four components a forestry connection. First of all is the adjusted net worth. You can think of that as the things external to the trees i.e. the assets that the forestry company has that are not related to existing stands of trees and that have a value to a new purchaser.

The second part is the profits to be made from the existing trees. The forestry company will do a discounted cash flow on when the trees are going to mature, how big they will be, what they will sell for, etc. etc. Estimate what the market will be worth. Discount that and the outgoings between now and the time when the trees are mature.

When you come to value the trees though you have to have in mind that the owners will have spent money in the past on planting. They "owe" a lot of money, which has to be written off, or depreciated, over the expected lifetime of the forest.

Our equivalent is deferred acquisition costs. We too have to write off expenses incurred in the past.

The third component is called in the paper, new business, depending which column you are looking at. In a forestry sense that is your empty land. There is some land that can be used to produce new trees. In a life office sense it is the agency force or distribution force, something that is going to give new growth.

When you look at an empty plot of land in a forestry company you say either we grow the same trees as we have grown in the past or you can use that land to grow a different type of tree with faster growth or a different end use and so on and so forth. It is the same when we are valuing this component of a life office. We do not actually have to value the products that are currently being sold. That distribution force could product other new business. One can put a value on it that is quite subjective.

Then the fourth component that the authors talk about is goodwill, with which I disagree. I think the classic fourth component is spelled out better in the paper Ron Hunter and I delivered to the Faculty of Actuaries a few years ago as the special factors which affect the price which do not come into the first three elements.

The first example is leases: does the company have leases on property or binding agreements to purchase or build which will no longer be needed by the purchaser? Secondly, contracts. Does the company have contracts of service which will have to be

bought out? Third, superannuation. What is the position of unfunded liabilities? There is discussion on that in our paper. The fourth item is income tax. Is there a dispute? Fifth is the question of redundancy and sixth is the question of legal problems. These and other things ought to be taken into account in determining the price.

I lead on now to a hypothetical question: - if life insurance companies formed the majority of listed stocks on the Australian stock exchange, what would the level of disclosure be that we would be faced with? I suggest it is not the sort of disclosure we see in published accounts now. We all know that over the years the level of disclosure and notes to published company accounts have grown and grown and grown. There is a need to have better explanations for the shareholders of what is going on. I suggest that if life companies were prevalent on the exchange we would have a special set of disclosures and notes to the accounts quite different from what we have now. For example it would be incomplete without some estimated cash flows because if, for example, you look at a forestry company you want to know when are the trees coming to maturity. How many acres have we got, where are they and what do they consist of? What is the cash flow like now and in future. The company I have shares in show you when the trees were planted, when they are expected to mature and the options the owners have between now and then.

That is the general thrust of my comments. I now want to touch on a few little things in the paper.

The first four paragraphs of Section 4.4 I think are very important. They are very succinct. The authors have done very well putting those concepts in such an abbreviated way but perhaps for me they were too abbreviated I would like an explanation of the last sentence of the first paragraph at some stage. I would recommend everybody to study that section very closely.

Section 4.5 I have already covered in that there are other matters to allow for and I have read out parts of Section 15 of Ron Hunter's and my paper.

Section 7.2 describes the shareholder share of adjusted net worth. This is a terribly important section. I had to remind myself that all those bullet points all relate to the shareholders' share of adjusted net worth. Some of those topics I thought were irrelevant to value of new business. I think there are some worries in that section. Somebody is going to pounce on the first section about par/non par split - the fact

that 20% nominal is at least 25% real. When you determine profits by valuation of bonuses and you are on a net premium basis the shareholders really have not only shared this year's profits but also have a share of the year after that and so on. That gives them a much higher proportion than the 20%, although everybody thinks that shareholders are getting only 20%.

Some would say these are devices for increasing the shareholder's share. It confirms the need for independent actuaries in mergers to see that everything is going on as expected. In the United Kingdom the Institute is shortly to issue a check list for independent actuaries in merger work. One would have thought that the role of the independent actuary is well spelled out now. Why therefore would they need a guidance note? Perhaps it is for reasons such as the above example of things not being what they seem.

Lastly, the check list in Appendix 1 is quite detailed but to anybody involved in these exercises I would refer them to the paper by Ron Hunter and myself. In our appendices B & C we go a bit beyond this paper. There is an overlap. This paper has some more points but I think we have a few that have been missed.

In conclusion I would reiterate the need for dialogue between actuaries and accountants. I am very pleased to see the co-operation evidenced in this paper. In that connection I think there is no better place to leave the discussion than Chapter 8 on accounting issues. There is a lot of work in that section, not only for accountants, I would suggest, but also for actuaries.

Thanks are due to both authors for a very stimulating paper.

MR. R. FRIEDMAN: Firstly my congratulations to the authors on an excellent and useful paper.

Towards the end of the paper the authors say "Although price is one of the (if not the) most important factors, other factors will include ....". I believe the authors have done a good job of spreading the content of the paper across a number of factors other than price and value. Most of my comments relate to value and actuarial issues, however, I will introduce a few other comments as well.

In Section 3.1 the authors discuss a number of issues relating to the reasons for buying and selling. I agree with the authors that the reasons for buying or selling must be clearly established. From the buyers side the reasons will have a significant bearing on the suitability of a target company and the determination of an appropriate purchase price. After the sale, and some years down the track it is important to evaluate the success of the acquisition in relation to the original reasons for the acquisition and the price paid for various components.

Moving on to the section dealing with economies of scales, there are a number of important reasons for addressing this aspect. Among these:-

- Are the economies realistic? For example, are the methods of operation of the two companies involved or the product lines such that economies can be readily achieved? If not the objective may be quite unrealistic.

- Ideally I would expect that economies of scale should imply that the acquiring company could operate the acquired business at or near to its own marginal maintenance expense rates. In other words, one set of overheads is assumed to be completely eliminated and it may imply that overruns, if any, on marginal maintenance expenses in the acquired company are also eliminated.

- It is also necessary to put a cost on the corporate structure as a separate item, as the cost of this is independent of the marginal cost of running various portfolios of business. For example, it may be only certain portfolios of business that are being sold, not the company.

The traditional appraisal valuation method of calculating the value of inforce business uses total maintenance expenses whereas from the buyers perspective, who can achieve economies of scale, only marginal expenses are appropriate.

I believe it is possible that the traditional appraisal valuation method may undervalue participating business. I will briefly explain what I mean. Let us take two companies, one with participating and non-participating business, which I will call company A, and the other with just non-participating business which is company B. Let us say that the value of the non-participating business free reserves in each company is 100. Let us further assume that there are participating business free reserves of 100 in company A. Traditional methods of valuation would attribute 20 of the participating reserves to the value of the shareholders interest and the remaining 80 to the participating policyholders estate. Let us assume that one year from now both companies have used their non-participating surplus to finance new business. This leaves company B with no residual free reserves, but company A has participating business free reserves.

I believe it is reasonable to argue that the shareholders of company A could use at least part of the participating surplus in excess of their 20% interest to finance new business. Company B, however, has no similar option and is therefore at a disadvantage relative to company A. Therefore the availability of the use of finance from the participating business estate in company A must have a value to shareholders. I stress that I am referring to financing and not subsidisation in this example, that is, the finance is ultimately returned to the participating policyholders.

I will now make a few comments about valuing new business. I agree with the authors that there are difficulties in valuing new business. It is not necessarily the last year's sales that need to be evaluated, but rather the distribution network. The value of the distribution network could be regarded as the cost of buying or establishing the existing distribution network and marketing infrastructure. I believe this has been the response by some companies to criticisms concerning agent development loans, that is, these loans should be compared with the cost of recruiting and training a productive agent. I expect that few will dispute that this is an expensive exercise.

I have some comment about risk discount rates which have not been discussed at great length in the paper. The authors say they would have expected risk discount rates to have fallen as a result of dividend imputation. While I agree with this expectation the balance between sellers and buyers for life companies appears to have shifted away from the seller towards the buyer in recent times. As a consequence, I would expect that risk discount rates would have risen and this may have offset the reduction due to imputation if in fact the market has actually recognised this.

My last comment relates to Section 6.13 headed "Making it Work". The authors suggest that this could be the topic of another paper but say little more. I agree this could be so and I would have liked to have seen more comment about this in the paper. I believe that the best analysis of the value of a company to establish a purchase price may be of little consequence if management action after acquisition does not "make it all happen" along the lines anticipated in determining the price in the first place. The buyer should understand what he has bought and how he has assessed the price in order to know what actions are necessary or unnecessary to realise the value of the purchase.

In conclusion I would like to thank the authors for their excellent work.

MR. D. FRENCH: I too would like to congratulate the authors, Mr. Miles and Mr. Fraser on a well written paper. Obviously it is dealing with an important and timely subject. Again, to strengthen Ron Friedman's comments, I think the strength of the paper is that it is not too technical and that it deals with other aspects of the buy/sell process rather than just actuarial or other financial issues.

Briefly, I would like to make a few comments on some practical aspects of the issues I have run across in the merger and acquisition process. In Chapter 2 the authors expect a continued activity with regard to mergers and acquisitions. I

really do not want to make any predictions but I think their arguments are pretty good. Except for one, I really do not think that foreign companies, and I think the paper implies foreign companies, are going to use Australia as a jumping point for South East Asia.

Although I do not know all the financial and tax ramifications of South East Asia, I would think that if you wanted to go into South East Asia you just set up a company in Singapore or Hong Kong.

Whether they are right or wrong regarding continued merger and acquisition activity really does not matter. But when looking at the argument there are a few things to consider. For one the 1989 Federal Budget. Now that ordinary expenses, or most of them are deductible, we have new breathing space for a few companies. They will have this breathing space until competition takes those margins away.

I think there is also a theory that the recent mergers are going to contribute to more efficient industry. Whenever you have a more efficient industry, you are going to have new entrants.

Finally, I think the economy in Australia is in a down turn and that is usually not a good time to sell your company. It will however, give you time to clean up your act and when the economy turns up you can sell.

I know it is difficult in Australia to sell blocks of business, but I think this might happen even though I understand that the Life Insurance Act makes it difficult. I think in the future even the AMP is not going to be able to do everything. Companies are going to determine that certain lines of business are not worth staying in. For example, in the US Allstate last year dumped their group line of business and this year Cigna has put their ordinary line of business up for sale.

I am glad the paper in Section 3.4 discussed economies of scale and gave a warning that they are hard to achieve. I think it is easy sometimes to achieve economies of scale with regard to a line of business or few lines of businesses but it is very difficult for an entire company. I have seen some companies go on for 2 or 3 years trying to achieve economies of scale, only to throw up their hands and give up.

In Section 4.2 I think the four component idea is a fine idea. I think it may clear up a lot of confusion with the Burrows/Whitehead definition of goodwill. When you are speaking to an actuary it is hard to explain where the goodwill margins are. I think that the goodwill part of the paper should go a little bit further. Goodwill should be itemised to show the parties the appropriate components. For instance, the premium they paid for the name or the value of the licence, potential expense savings, or expense overruns that are not reflected elsewhere.

I think in Section 5.2 it is good to mention indexed values and I am sure a lot of us use them. But I really think at the end of the day it is necessary to build a model. I think it adds credibility to the seller and it makes the buyer more comfortable with the buy/sell process.

In Section 5.2 under 'The Assumptions' there is a brief discussion on assumptions which is one of my pet peeves. I think it is really important that when we do appraisal values, that we validate our company experience and we as actuaries feel comfortable with those assumptions.

I know there is not a problem in Australia, but assumption setting was one of the problems in the US which has lead our Actuarial Standard Board writing appraisal value standards for us to follow. I think it is important for companies to set up and maintain experience studies, especially if they are going to sell their company.

Section 6.5 - on the information memorandum. There are two items here. I think it should also list current and potential litigation. I know in Australia that is not a problem right now, but it is in some parts of the world.

Also, I think it is good that we have mentioned the details of what will happen between when the price is determined and the sale is completed. I saw a case once where a company had a large expense overrun and surprising as it may be, the expense overrun was going up and the value changed quite a bit by the time they struck a buy/sell price and then completed the sale. The next year when they came in and redid the valuation for management purposes, they threw up their hands and asked what is going on. I think it is really important to get that defined.

Section 6.6 - I was happy to see some discussion on shock lapse. My experience with shock lapse is that it is hard to develop an assumption. Usually at the end of the day neither party is happy with it. I just want to describe one method that they have tried in the US. I do not know whether it works or not but it seems pretty logical. What they do, is break up the appraisal value into two pieces. The first part is paid now and buyer takes on the lapse risk, then the parties agree that after the first year the second instalment of appraisal value is going to be paid based on some measure of lapse. Measures could be for instance, premium income and/or premiums inforce. This method gets around having to come up with a shock lapse assumptions, which I think is difficult in practice to do. It also keeps the parties happy at the end. It might be worth some further investigation.

In Section 7.2 there is a discussion of miscellaneous liabilities. All I want to say here is I think we should proceed with caution. It basically states the contingent reserves should be released in surplus. I think there is no right or wrong answer in what to do with contingency reserves,

but I think there is some growing support in looking at required surplus versus free surplus. There is a growing argument to consider the cost of that required surplus and I think Circular 273 reserves are a prime example. There is a cost of putting up those reserves and I think you might, if you are selling a company have a problem trying to get dollar for dollar for that surplus. This is just something that people are beginning to look at but I think that it is going to become an issue.

It also says that we can release our Circular 273 reserves into surplus if we convert all our assets to cash. This is an argument that I have heard before but I think if you do that, make sure you "hump-up" the shock lapses to reflect the reinvestment risk you have taken on.

Section 8 discusses GAAP standards. When anybody talks in front of the Institute they have to mention GAAP in Australia. I think until there is a GAAP standard in Australia we should not use it in determining the price of the company. I know there is going to be argument for specific instances that we should, but GAAP is all over the board now. Let's just wait until we have a standard and, when that standard comes through depending upon what it is, see whether we can determine the true economic value of an enterprise with that GAAP standard.

Once again, I would like to thank the authors. I think it is a good paper and enjoyed reading it.

MR. J. KENT: There are a number of different ways of determining the value of a life company. The approach adopted need not always be just the appraised value in its four component parts.

Obviously one should be looking at the various components as the authors have done. I also see advantages in making calculations based on maintainable earnings on a GAAP basis or the amount of assets under management. In the latter case one should consider the margin one can reasonably achieve on such funds in the future.

A major concern I have is that we rarely see in papers dealing with the values of companies, in particular life companies, anything on dividend earning capacity. I often feel that dividends are included in the calculations of valuers only in an implicit way. Franking credits cannot be ignored and I suspect require explicit allowance to be made for dividends and tax.

One needs to look at valuations from a number of different angles to see whether they do make sense because if one finds that there is an inconsistency it is likely a problem exists and the valuation could be inappropriate.

It is easier I believe to value an office which just has investment linked business using appraised value techniques. It is a lot harder to deal with offices with investment account business and conventional business. For example I have concerns about the treatment of the investment reserves and general contingency reserves.

It may also be difficult to place an appropriate value on the net worth as these assets may not be capable of earning the rate of return used for valuation of the in force business.

However one determines the value, it is important to project results to see how the total office looks over a period of say 10 years and see whether the answers make sense having regard to the then emerging dividends.

MR. D. SHUTTLEWORTH: I would like to add my congratulations to the authors on the production of a timely and extremely topical document.

As we have heard tonight the authors did not anticipate in their wildest dreams when they concluded there would be a high level of merger and acquisition activity in the 1990s, that we would see two major proposed deals in one month just prior to their paper being presented. By my reckoning, two deals a month would see almost 250 such deals in the 1990s - an average of five sales per company and in fact if buyers are also mainly life companies, possibly ten deals per company in a decade!

It is interesting to speculate on how I could find myself working for the various groups in the year 2000. Will I still be with Australian Eagle Insurance or will it now be the mega company, Australian Zurich Adriatic Scottish American Eagle Insurance, specialising of course in multi-cultural coverages or maybe even ANZ-NML-MLC-CML Life specialising in providing the banks clients, who are the most important people in the world, with a golden nest-egg, the proceeds from which they can spend on boats or steam trains.

I invite other people to come up with interesting groupings and the marketing strategies these groups could adopt.

On a more serious note, I would like to restrict most of my comments tonight to Section 5 - Determining the Value.

Turning first to the Actuarial Value, I would like to raise the question of whether a professional standard or guidance note specifically covering this area should be drafted.

I have been involved in many merger and acquisition discussions and deals, in three different countries now, and the one thing I have noticed is the enormous diversity of approaches (and quality) in calculating the figures, in report presentation and in supporting documentation.

I believe there are two main problem areas professionally.

One danger is that the purpose for which the actuarial valuation is now being used, (i.e. a merger or acquisition) was not the original purpose of that valuation. It could have been performed for a different purpose, using particular assumptions and with the resources that were appropriate and these facts should be known.

Another danger is that some actuarial valuations, that are perceived to be independent, are really calculations performed by an actuary using the current owner's assumptions - with no commentary on these assumptions. I don't have any problem with this work being performed provided the situation is made clear at outset.

If this is not done, there is a potential for criticism of an actuary, or a firm of actuaries, or the profession, in the public arena.

The standard or guidance note could cover such areas as modelling the business, validation work, profitability of key product lines, sensitivity of product line results, rationale for the assumptions used, list of course documents and their summary findings. It would assist in the production of a professional document that a potential purchaser and his own professional advisers could examine and construct his own price based on his own assumptions and assessments. Obviously timeframes are always critical as to the amount of work that can be done, but this consideration can be and should be clearly stated in the document.

A suggestion is to have an actuarial certificate that could be issued supporting any valuation, stating the purpose for which the figures have been calculated, whether the figure is a truly independent value and if necessary highlighting any problem areas such as poor information (a common problem) or a lack of time, constraining full investigation. This would then be, in effect, a qualified certificate of value, or perhaps component values.

I would be interested in the views of both the authors and other attendees tonight on these matters and on any problems they have encountered.

Turning now to the issue raised as to whether the current experience (particularly expenses) should be used in deriving an actuarial value, or long term expected experience of a successful operation. I've found it helpful to calculate both values and I think this ties in with the author's diagram regarding possible purchase prices.

The difference between these two can be regarded as part of the negotiation ground. I would just add that for a purchaser to acquire at a price reflecting expected favourable experience, means they could be paying the seller for the hard work they themselves will have to put in to turn the company around.

Finally, some brief comments on Methodology 2, called the Maintainable Earnings Approach.

I would argue as stated in Section 4.5 there are many more approximations involved in deriving the combination of Maintainable Earnings and then the capitalisation factor. The Actuarial Valuation method whilst admittedly by no means an exact science, enables the various issues covering the price of a life company to be considered separately such as the profitability of current business being issued and the new business prospects. This must be a more sensible approach.

I question whether the Maintainable Earnings approach used in valuing other industries can be used to independently verify life office deals and I would like the authors to expand on this if they can. I believe in most cases the nature of the earnings of other industries are different - which is what presents us with all the problems in realistic reporting for life companies.

MR. F. McINERNEY: I would like to make a couple of comments about the practicalities of taking over existing business. I, along with a number of other actuaries, regularly see proposals for the transfer of business. These place values on the business which in my heart of hearts I know we would not be able to realise because of the costs involved in administering the business.

The major question in buying a block of existing business is - will you be able to administer the business within the expense margins included in the price. I think in a lot of cases the answer to this is "no". Within a number of companies, especially older companies, you have blocks of business which are not profitable and are no longer sold. It is difficult not to gain the suspicion that a lot of the business being offered around the market recently falls into that category, and that is the reason the company is trying to sell it.

Expense assumptions are probably the most important of the assumptions used in setting value on the business. Expense overruns are mentioned in the paper. The assumption always seems to be that expense overruns can be run off, i.e. that they are in fact true expense overruns. In a lot of cases I do not believe there are any expense overruns. The true cost of administering the business is higher than admitted and the reality is that you have unprofitable business.

in the last couple of years there have been a few fairly dramatic changes in superannuation which have turned, certainly in my opinion, profitable business into unprofitable business. We now have to administer superannuation contribution tax on contracts which are not designed for it. We have to issue ISC statements to all members giving great detail of contributions, charges, investment returns.

I have been mulling over the general question of why would anyone want to take over a life office. I must admit it has always seemed a bit strange to me. For the very large players there are advantages of size, reducing competitors and gaining a distribution network. However for a small life office it would seem much better to set up a new company than to take over an existing one. That way, you do not have the millstone of those policies from about 10, 20 years ago, which are not currently being sold, around your neck.

The best thing to do, if you can manage it, is to sell all existing unprofitable business and re-enter the market unburdened by previous errors.

MR. S. MILES (Co-Author): Thank you very much for what has been a very spirited discussion. Tom and I were hopeful that this paper would have a discussion which would contribute as much to the subject as the paper itself.

As I speak I am in a fairly unique position for two reasons. One is being the father of a newly teenaged daughter and two other children it is seldom that I get the chance to speak and not be answered back. Secondly, I am also the company actuary of one of the companies that is for sale at the moment. My company came to the rescue and made my paper both topical and timely.

Tom and I actually had a 25 page target for this paper and we were rather disappointed when it went to 41. But there was just so much to be included.

We deliberately left out many areas because we tried to concentrate on the broad issues, not the minor details. We were also mindful of the fact that we could not cover everything or there would be no work for consultants - and that would be unthinkable.

Neither Tom or I support any particular method and I am very glad that the discussion in Melbourne commented on the two major problems

- the determination of assumptions and
- how to explain the value of a company to other people.

Expense assumptions cause particular problems and usually generate the most discussion. We know there are people out there in the market who can administer business for $35 or $40 per policy. What is the appropriate level to use for the value of business to a potential buyer? Remember, a company that is being sold generally has a temporary expense overrun. Whilst many may argue that $70 is more appropriate than $35 or $40, I would argue that companies with a maintenance expense of $70 are operating inefficiently. Companies with maintenance expenses of $120 should be in the business of selling companies, not buying.

I would just like to summarise what I saw in the discussion in the areas of problems, price and predictions.

Problems

Most problems arise as the result of a lack of communication that often occurs, not only between companies and staff but also between the accounting and the actuarial profession.

The loss of credibility of appraisal values is a very crucial issue. People often expect too much from an appraisal value. An appraisal value is essentially a going concern value. As such it does not include the costs of buying, the costs of converting systems and so on. An appraisal value is only a guide. Several speakers mentioned the necessity to compare your initial assumptions with the final results. This is a crucial element in making it work.

The difficulties of achieving economies of scale were also mentioned by several speakers. It is just not a matter of attracting staff and say cutting expenses by say 25%. It is really a matter of looking at what work you do, prioritorising that work and eliminating functions which do not add value.

In order to regain some lost credibility for appraisal values several speakers suggested professional standards. I personally do not favour standards but I think we should always keep that in the back of our mind as the end solution if the profession cannot get its act together.

One speaker made a number of points on the importance of a timetable, particularly once the sale is announced. A timetable helps provide certainty for staff and agents. Keeping valuable staff and agents helps preserve the value of a company once a sale is announced.

Staff communications are also important. That is one way of maintaining value. The speaker also mentioned the importance of a draft contract. Whilst I agree with this I left that out of the paper for a very important reason. I thought that experience was fairly unique to AMEV and I, in a position of confidentiality, did not want to betray any trust. Thank you for sharing that experience with the rest of the profession. Defining the contract helps crystallise the important issues.

Price

There has been some criticism for not putting in more detail on maintainable earnings. Now that is my fault, not Tom's. Tom had five pages prepared on maintainable earnings but even that was only a very cursory treatment. It seemed that we could fit most of Tom's pages into the half page summary that I used or write a separate paper for it. We chose the former course of action.

There are two steps in defining maintainable earnings

- defining earnings. A separate paper could be written on this

- define maintainable.

Separating these issues helps to highlight the important factors - but the answer still isn't easy.

Eddie Jones gave a delightful talk about the interplay between cash, profit, and value earned. Eddie asked about the difference between capital and profit and the particular comment I had in one sentence. Non actuaries and non insurance people are often quite shocked at how valuable life insurance companies are. As Eddie has pointed out in his forestry example you have to separate the difference between capital, return on that capital and profit. Complicated arguments and definitions do not help in understanding the process. This is why we chose the term future ...

Determining a price for par business is always an enthusiastic discussion point. I have seen high values placed on par business and I understand why. There are a number of approaches ranging from valuing 10% of the participating estate (for a 90/10 company) up to 100% of the estate for the same company.

Doug, I like the idea of two instalments to allow for shock value. It is a very practical way around the argument over appropriate lapse assumptions. Using imaginative financing options such as this is an attractive way to avoid bitter arguments over assumptions.

Some predictions, ...

* eventually the current players will consolidate into 5 to 10 financial groups

* there will be a steady stream of new companies trying to exploit niche positions

* there will be a third wave of mergers caused by the need to reduce expenses.

Yes we do have a breathing space with expenses of deductibility of expenses. But we are at the top of the wave and like all good waves it depends on how you ride it. If it is a dumper then you cut across it and then try to ride it out at the bottom or if it is a smooth breaking wave you corner and get the advantage of speed.

But finally what we are really talking about is the difference between price and value. The best way I found to explain is given in figure 4.1 (note the use of imaginative names like price A and price B - is this the best an actuary and an accountant can do?). Basically the price that is going to be paid in the end depends on what buyers are in the market. If there are two buyers who can administer policies for $35 the price you get will reflect $35. If there is one who can administer for $35 and the rest can do it for $70 the price you will get will reflect $70 because the price will not be bid up to the level where that one buyer has a unique advantage.

Price versus value is the big issue, the more we think about it the more we learn and learning is the primary aim of institute meetings. I have learnt a lot from tonight's discussion and I hope you have done the same.

A RESIDENTIAL PROPERTY INDEX

Prepared by

M.D. Dwonczyk B.A., F.I.A.A., A.S.A.

"Since money is of no other use, than as it is the thing with which we purchase the necessaries and conveniences of life,".... "you must take the price of every particular commodity for as many years as you can (twenty if you have them) and put them all together, and then find out the common price; and afterwards take the same course with the price of things, for these last twenty years, and see what proportion they will bear to one another; for that proportion is to be your rule and guide."

William Fleetwood, D.D., Bishop of Ely, whose book *Chronicum Preciosum*, published in 1707, is the earliest known treatise on index numbers.

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SYDNEY

1st May 1990

A RESIDENTIAL PROPERTY INDEX

1 Introduction

Housing is an emotive issue. It therefore attracts considerable publicity of both a qualitative and quantitative nature. Unfortunately most quantitative analysis is either focused on a narrow section of the market or potentially misleading as an indicator of the general market.

The purpose of this paper is to introduce a definitive residential property index most appropriately described as a residence index. The paper therefore considers

- what makes a good index
- potential uses for the index
- the derivation of an index
- and whether the constructed index is a good index

By the time this paper is presented to the Institute the index or rather a group of indices will be very close to release to the market. It should be exciting to watch which segments of the market accept the index and the uses to which it is put.

Where an example is used to illustrate a point the Sydney residential market has been cited.

2 General comment

2.1 The residential market

Most people in Australia live in a dwelling which they either own or rent either individually or as a family unit. Part of the Australian ethos has been to own your own home. There are approximately 17,000,000 people residing in Australia growing at the order of 140,000 net immigrants and 130,000 births (net of deaths) per annum. Population is relatively concentrated in the cities.

For example there are 3,600,000 people living in Sydney and 1,400,000 dwellings. The population is growing by approximately 34,000 per annum and the number of dwellings is growing by approximately 50,000 per annum.

The number of houses sold in Sydney varies seasonally and with the general state of the market. During 1990 in a relatively poor housing market in excess of 3,000 dwellings are being sold per month.

The Real Estate Institute of New South Wales publishes median housing prices and median unit prices monthly. At February 1990 the median price of established houses sold was $189,500 and the median price of established units sold was $140,000. Median prices are thought to be less than average prices and it therefore seems likely that the current market value of the Sydney residential market is in excess of $250bn.

Many houses in Sydney are rented. The NSW Rental Bond Board is the bond holder for 214,000 rented dwellings. Many more properties are rented as rental property owned by Crown bodies are exempt from lodging their bonds with the Bond Board. For example the State's largest landlord, the NSW Department of Housing, currently manages 114,100 dwellings.

Houses, flats, semi-detached houses, units, retirement village units, co-operative housing units, institutional residences (eg armed forces) are all dwellings. For the moment the group of indices proposed to be released to the market excludes retirement villages, co-operative housing, and institutional residences. In time perhaps it will be possible to rectify this potential shortcoming.

For most Australians the principal residence represents their single largest purchase and their single largest drain on income. If renting, rent will usually be the single largest regular expense. Given that we live in a democracy, housing is therefore a very important and difficult political issue.

Political ambitions often include the desire to:

(i) provide housing for all;

(ii) make housing a secure and attractive investment for the principal resident; and

(iii) improve the standard of living.

Considering each ambition in turn will illustrate why the current housing climate remains.

Providing housing for all implies helping all Australians to own a dwelling or alternatively rent a dwelling. Rather than control the price of housing Governments to date have considered it more palatable to allow free market forces to operate and position the economy so that most can afford to own a home. Less well off Australians can purchase in cheaper areas (with infrastructure ramifications to Government) and/or be subsidized by Government assistance.

The Government has implemented various schemes to help fund the first home purchase eg mortgage payment deductibility, deferred stamp duty settlements, special loans at subsidized interest rates, and sale of housing sites at attractive prices.

Those unable to buy and those who do not wish to buy, rent. Hence to encourage private investors to make enough rental accommodation available the Governments reintroduced negative gearing and introduced a 5 year exemption from NSW land tax for investors. Also there exists in each state a Department of Housing or equivalent which provides subsidised rental accommodation to those in need. For example in Sydney the NSW Department of Housing manages 114,100 dwellings and purchases many more each year.

Secondly the public consider housing should be a good investment. Importantly it need not be a great investment, it merely need be viewed as a good, safe and affordable investment. This is a politically difficult area as it is so emotive and perception is more important than reality. Further it is a very personal area to many voters (are dwellings an investment or a necessary expenditure, are they a luxury or a right?).

It is the difficult nature of the area which impedes reform and contributes to many apparent anomalies, for example, principal residences are excluded from capital gains tax unlike most other investments, principal residences are excluded from the aged pensions asset test, mortgage payments and rent are not tax deductible, the 13.5% ceiling on interest rates on mortgages in force at October 1985 remains. All of these factors effect the degree of attractiveness of the investment.

Thirdly most Australians desire an improving (or at least constant) standard of living. Australians are used to a high standard of living and their home and land are large components of this standard. We have come to expect large houses on big blocks with good roads, lighting, sewers, public transport, schools etc... This living standard is expensive not only in terms of maintaining built up areas but in terms of providing services to new areas as they are developed (coupled with environmental issues). The issue of cost is of critical importance now more than in the past as Australia now owes the world well over $100bn and our indebtedness is increasing.

Hence the perplexing issues for the Government and the community are:

- a good investment for owners versus an affordable entry price for purchasers

- inefficient capital movement in the economy caused by taxation advantages in the residential market.

- the inefficient and expensive way in which the living standard need be maintained versus our current indebtedness.

Typically owners are individual principal residents, individual investors, co-operatives of individuals and Crown bodies. Institutional investors have made an indirect investment through mortgages but have not participated as equity investors.

In summary then the market is important and widespread, with many buyers and sellers, hedgers and speculators. For an individual the outlay is large and liability is limited to that outlay. Dwellings often take months to be bought or sold. The market receives much press and political attention.

2.2 A general comment on indices

An index is a pointer and relative measure of the underlying investment: A time series designed to show trends.

An index is often a snapshot of a continually moving process at the time it is calculated.

Advantages of indices include:

- distilling general trends from many individual movements.
- flexibility, adaptability and their wide field of application.

Limitations of indices include:

- the fact that they are guides and based on particular components is often forgotten and they are overrelied upon, taken to be ultimately accurate and/or misinterpreted.
- the suitability of the components may change over time destroying the worth of the index.

The suitability of an index depends on

- the assets underlying the index
- the internal consistency of the assets over time
- the calculation procedure and
- the proposed use for the index

Indices are commonly used to reflect relative changes to a given market. Therefore to be useful the underlying assets of the index need to comprise the market or at least an unbiased sample from the market which is expected to incur little if any tracking error over a very long period of time. In other words the underlying assets must develop over time and remain a suitable representative of the market.

The most appropriate calculation procedure depends on the most important use for which the index is most likely to be put and who is using it. For example if the index is being used to compare the performance of asset sectors then expenses and most particularly taxation will have a significant effect on the

eventual outcome of the comparison. However if the comparison is being made between two similar funds and/or a notional fund then perhaps only transaction expenses need be included in the index.

Also it might be that the analyst wishes to investigate separately various components of the market eg. capital (price), income, expenses, taxation. Total return is important when comparing different markets over a long period of time. Equally often only capital risk is appropriate as the purpose of the analysis is to determine the expected gain or loss of capital in real values over a long period of time eg. if capital is not placed in the market now whether it will be possible to place capital in the market at a later date. A group of indices is often required.

There are four areas which need to be considered when introducing any index namely:

- the components of the index
- the base date
- the weighting
- the method of construction.

2.3 General comment on property indices

In the past property indices have more often been proposed for commercial properties than for residential properties. It is instructive to consider the typical problems of these indices.

Often the index base was selective i.e. based on selected properties included subjectively rather than objectively. First the selection may not adequately reflect the underlying market. Secondly, as a consequence of this selectiveness the index performance could not be readily duplicated by purchase of physical properties as the investor could not buy the particular underlying properties.

There was considerable difficulty in obtaining data to calculate an index as:

i) data are particularly heterogeneous and by the time small subsets of homogeneous data were distilled the index was overly sensitive to particular properties; and

ii) more often than not the index was wholly dependant on valuations which are particularly subjective and provide scope for manipulation of the index.

Property is seen as particularly heterogeneous. Where attempts were made to sectionalise the market into relatively homogeneous sections argument focused on the choice of section. Even where agreement was reached regarding suitable sectionalising of the market place the individual properties placed within each

section were considered particularly sensitive to individual characteristics such as location, design, age, site on location, rent review etc. This individualistic nature of property meant correct weighting of the index was paramount and also virtually impossible.

3 Potential uses for the index

Many groups and individuals should find some use for the index. Users include Governments, individuals, institutional investors, public institutions, semi-Government Authorities and professional and political bodies. Some possible uses of the index follow.

3.1 Barometer

The index is a barometer of market conditions and hence can assist in timing decisions of investment. The index therefore needs to be released frequently and subject to little if any retrospective revision.

3.2 Benchmark

The index provides a valid benchmark for portfolio comparison and hence the index needs to address the issue of expenses although it probably needs not address the other issues of marketability, liquidity, risk/return etc.

The retrospective comparison can be of alternative investment strategies and/or other similar investments.

3.3 Risk/return analysis

The index enables quantification of holding period returns in a theoretical risk and return analysis. The index permits derivation of correlation coefficients of housing market returns with other investment asset sectors. It is therefore possible to compare both risk unadjusted and risk adjusted return and hence form a quantative view as to whether an active manager is out-performing a passive manager (notwithstanding that the period of time may be too short to confirm a deviation is nothing more than a random fluctuation).

3.4 Tracking

The index enables identification of long term trends and returns. Tracking progress allows substantiation of qualitative claims by real estate agents, government and other politically activated groups. For example did the removal and reintroduction of negative gearing create any discernible impact on the market?

3.5 Valuation

The index allows approximate and "average" valuation of dwellings. Such valuation would be extremely useful in the determination of the appropriate valuation in non-arms length transactions. Also it would, for example, help real estate agents to determine a fair market value and be able to substantiate that claim. Obviously in this instance the index (or the user) need consider the effects of capital renovation and other individual performance criteria.

3.6 Forecasting

The index is the definitive historic trend. If historic trends can be taken as a suitable guide to the future then statistical regression methods and technical analysis can be used to forecast the future trend. More importantly, the reasons for the trend can be better explored from the index using statistical techniques such as factor analysis. It is often remarked that various forces have caused the market movement including inflation, population movement, immigration policy, negative gearing, capital gains tax introduction, dividend imputation tax, medium density housing, mortgage interest rates, unemployment, real GDP growth, vacancy rates and new housing starts. The extent to which these factors determine the trend and how each factor determines the trend can be explored using statistical techniques. For example it may be that there is a significant time lag between increased unemployment and decreasing housing prices.

3.7 New financing structures and instruments

The housing market is large and has many players. Notably however the financial institutions are absent investors. The reasons for their absence have in the main been caused by the political nature of housing, the potentially high expense rates, the scope for adverse publicity, the relatively small outlay per dwelling and the potential for illiquidity. To date no financing structure of which I am aware has been introduced which satisfactorily addresses these issues. These problems are compounded by the fact that listed property trusts historically move less with the underlying property market and more with the underlying sharemarket, at least in the short term.

Commercial realities preclude the listing of all the potential uses of the index and hence the underlying market. However given the size of the market, its' high profile and that it affects virtually all of us it is easy to see many applications for the index. Some follow.

The index allows the introduction of futures, options and options on futures as well as numerous other derivatives. The index aids the establishment of property trusts both leveraged and non-leveraged as well as other property vehicles. In this environment both passive and active management might be conducted. Also portfolio insurance techniques can be introduced.

One specific example is that foreigners and expatriates may wish to invest in the market to avoid the risk it becomes unaffordable at a later date. Being a landlord is often troublesome particularly from another country. Hence an individual can stay in the market by buying the index. They have therefore hedged the capital risk.

Risk transferring using the index as an acceptable proxy to the underlying assets as the underlying assets can be easily purchased to closely duplicate the index. Risk transfer allows the introduction of securitised investments with different risk profiles which might be particularly useful in the superannuation and personal retirement planning arena.

It is not the purpose of this paper to generally compare physical markets with derivative markets. However a short time spent comparing the markets in broad terms may help the reader to appreciate the worth of a definitive index.

Investing in the physical market implies buying a dwelling which may be expected to perform differently from the market and will require at least notional renting. It will require householders insurance and will have residual risks e.g. floods. It will require maintenance and perhaps letting fees. It will perhaps require capital renovation. It may suffer from land tax, council rates and water rates. As a personal investment, entry price is generally quite large and will often demand a certain amount of leverage through a mortgage loan. Purchase and sale are subject to high duties, legal fees, loan establishment fees and search fees. Sale will also probably incur agents selling fees. Significant delays are incurred during purchase or sale although having found a dwelling or alternatively a buyer for your dwelling the price during the settlement delay is fixed.

If the investment is classified as a principal home then all expenses including mortgage payments are paid out of net of tax income. With the exception of stamp duty on first homes no expenses are subject to deferral. However if held for more than one year the capital gain on eventual sale is not subject to taxation.

If the investment is not classified as a principal home then the eventual sale is subject to capital gains tax although it should be possible to claim depreciation on new capital items and perhaps even building allowance. Further the excess of interest payments over rent is tax deductible (negative gearing).

However if one were to purchase a cash settled futures contract based on the residence total return index with expiry date in one year's hence then the end result might be similar to investing in a dwelling even though the investment characteristics may be quite different.

First one would pay a deposit followed by margin calls as appropriate. Interest is paid on margin calls. Return would be highly leveraged. At the outset brokerage and stamp duty is payable. At expiry net gain is taxable as income (unindexed) or net loss is tax deductible. At expiry the transaction would be settled in cash.

Theoretically the futures contract offers average performance and at least its theoretical price allows for discounting of rental receipt vis a vis cash deposits in a bank. No insurance, estate agents etc.... fees are payable and no residual risks remain. Conversely there is no chance of above average performances although one must never forget the contract may be more quickly marketable and may trade at above/below theoretical price offering scope for a different type of speculative gain.

One can live in a physical not a derivative. However one can invest in a derivative and rent a physical.

4 Components of the index

4.1 General comment

The components of the index; in this case the sales/rentals need be:

- relevant
- representative
- reliable
- comparable

As it is not possible to include the entire market, the market needs to be sampled. The sample is chosen so as to minimise the sampling error namely the difference between the population index number and the sample index number. I consider a sample population of all sales/rentals is acceptably random and is not subject to response sampling error. However the reader is cautioned that the sample may not be quite random as dwellings once sold/rented may be less likely to be sold/rented for a period into the future. Further it is possible certain types of dwellings are sold/rented more often eg 1. houses on busy roads, eg 2. certain dwellings are rented for a very long time and other dwellings are never rented.

The sample may be too small to be representative or reliable. The minimum acceptable sample size will be decided in part subjectively and in part by consideration of the relative sizes of the population standard deviation and the sample standard deviation.

It will never be possible to calculate the standard deviation of returns of the entire dwelling market and hence all one can do is calculate the standard deviation of the arithmetic mean over successive samples. For example the current sample of sales might itself be sampled to provide smaller samples and/or the standard deviation calculated at different index dates.

Once the standard deviation of the mean has been estimated and if it is assumed that the distribution of sampled returns is normally distributed then our

"confidence" in the mean can be calculated in terms of the laws of probability eg 95% confidence that population index number is within $\pm$ 1.96 standard deviations of the sample mean index number.

If we estimate the population standard deviation then it is possible to estimate the minimum sample size necessary to contain the confidence in the sample result within certain bounds using the formula.

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

where σ is population standard deviation

$\sigma_{\bar{x}}$ is sample standard deviation

n is sample size

The components of the index should be comparable over time. Unfortunately I consider this is unlikely to be the case for dwellings. Some are improved, some are maintained and some deteriorate. Many capital renovations are little more than maintenance. Regardless genuine capital renovations net of maintenance requirements and net of deterioration in other houses will if positive increase the index over time. It may therefore be that after some time the underlying market of today's index is not comparable with the underlying market of yesterday's index. This shortcoming is not particularly significant provided users are aware of its existence.

If net capital renovations were known it would be possible to deflate the index accordingly. However they are not known and it is not currently possible to exclude their presence from the index.

Finally it should be noted that from time to time there can be expected to occur particularly severe individual performance returns (outliers). These dwellings will be checked and if found to be accurate included; they are a valid part of the market.

4.2 Sale data

Ideally to calculate the indices described below the following data are required:

> for each dwelling at the time each sale is made, sale price, type of dwelling, contract exchange date, amount and date of net capital renovations during inter-sale period, original purchase price and purchase date.

Much of this information is already being collected by newspaper publishers and government eg. Councils, Stamp Duty Offices and Valuer General Departments. If not already being collected it is collectable from the major real estate chains and government.

For example the following data sets (address, sale date, sale price) were gathered from various Sydney Councils. Only houses were sampled for this example.

The Councils surveyed were chosen to be appropriate to the consulting assignment from which this paper evolved. The sample may not be representative of the Sydney market. Nevertheless I consider it confirms that the theoretical approach for the calculation of past index series will work in practice.

Persons recording information tried as far as possible to remove data points which were inconsistent (eg apparently land only, apparently a new house replacing an old one). It was not possible to remove the effects of significant capital renovations over the years.

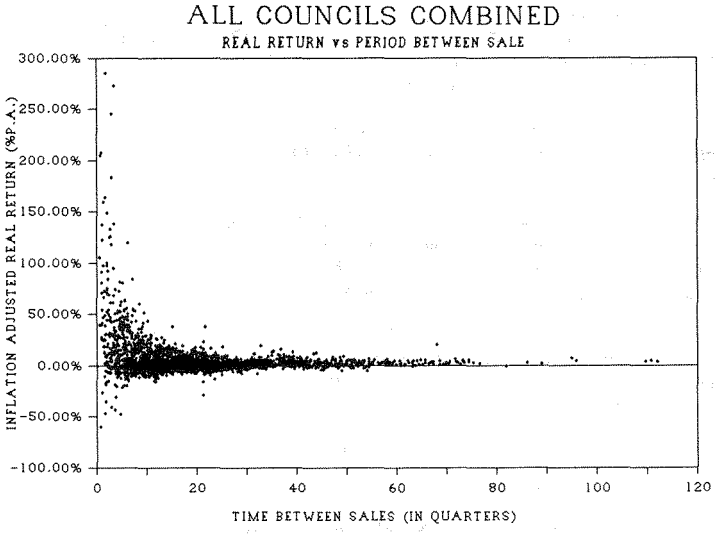
The number of data sets is shown in the table below.

Council	Number of houses included in the sample	Number of houses with two or more sales	Number of rates of return calculated (a)
Baulkham Hills	**719**	**360**	**802**
Blacktown	**417**	**149**	**184**
Campbelltown	**168**	**168**	**209**
Drummoyne	**429**	**112**	**159**
Holroyd	**367**	**172**	**268**
Leichardt	**612**	**38**	**40**
Penrith	**246**	**244**	**449**
Ryde	**197**	**197**	**191**
Total	**3155**	**1440**	**2302**

Notes:

(a) A rate of return is calculated between each sale date. Therefore for a house with "n" sales there are ${}^{n}C_{2}$ rates of return calculated.

The crude annualised real rates of return calculated from the data are plotted against the period of time between sales in the graph below.



4.3 Rental data

Ideally to calculate the indices described below the following data are required:

> For each dwelling at the time each lease is effected, date of effect, weekly rent, number of bedrooms, type of dwelling, address and term of lease.

For example, past Sydney rental data were gathered from three sources namely the Australian Bureau of Statistics, the NSW Rental Bond Board and newspapers.

The Australian Bureau of Statistics publishes the Consumer Price Index quarterly and one component of the index is movement in dwelling rental. The private dwelling rental index is not published and results from quarterly surveys of rentals conducted at approximately the midpoint of the quarter.

The NSW Rental Bond Board commenced in 1977. It is responsible for collecting private sector bonds for rental accommodation. Crown bodies are excluded from lodging rental bonds. Since 1987 each quarter the NSW Rental Bond Board produces statistics of average rental for new lettings over the quarter subdivided by the number of bedrooms and further subdivided by postcode. For example overall average rental for new lettings in metropolitan Sydney for the quarter ending 31 March 1990 was $202 per week. There were

33,848 new lettings over this period and included in the averaging process. Unfortunately data collected by the Board does not include the market value of the dwelling.

For Sydney, significant past data were only available from major newspapers. At the Saturday prior to 30 June each year a sample of rental accommodation and dwelling sales were chosen subdivided by number of bedrooms. The data were analysed to calculate rental yields over time. Summary details follow.

Year ended 30 June	Houses (c)			Flats (c)		
	Mean rent (a)	Mean sale price (a)(b)	Average rental yield (d)	Mean rent (a)	Mean sale price (a)(b)	Average rental yield (d)
	$ per week	$	%	$	$ per week	%
1968	30.45	13313	11.89	22.33	13206	8.79
1969	39.84	14746	14.05	22.74	12940	9.14
1970	40.34	16420	12.77	24.49	16716	7.62
1971	40.75	21793	9.72	30.12	17397	9.00
1972	41.22	22603	9.48	28.12	20479	7.14
1973	45.27	29698	7.93	29.12	22817	6.64
1974	52.22	33488	8.11	35.11	25237	7.23
1975	62.37	32645	9.94	38.66	27807	7.23
1976	68.07	37781	9.37	44.06	30536	7.50
1977	62.65	48404	6.73	45.67	34265	6.93
1978	71.64	50050	7.44	55.79	36053	8.05
1979	94.00	60179	8.12	67.38	47652	7.35
1980	90.21	79789	5.88	64.80	63096	5.34
1981	101.00	90318	5.81	71.49	70916	5.24
1982	115.61	87009	6.91	77.41	64894	6.20
1983	116.87	93088	6.53	80.98	67992	6.19
1984	218.48(e)	97452	11.66	163.94(e)	69296	12.30
1985	160.97	113958	7.35	92.31	71329	6.73
1986	182.04	100784	9.39	120.55	75022	8.36
1987	204.46	129806	8.19	148.47	77075	10.02
1988	237.26	196548	6.28	169.20	138816	6.34
1989	236.28	234923	5.23	167.03	161066	5.39

Notes: (a) The order of 100 dwellings were sampled per annum.

(b) Mean advertised price of dwellings for sale.

(c) Unweighted arithmetic mean.

(d) Calculated as:

$$\frac{\text{rent} \times 52}{\text{price}}$$

(e) The data are odd and would not be relied upon.

The three data sources are compared in summary form below.

Year	Increase in rent over preceding year			
	Rental Bond Board (a)	A.B.S. (b)	Newspaper (a)	
			Houses	flats
	%	%	%	%
1989	5.4		-0.4	-1.3
1988	21.8	15.7	16.0	14.0
1987	23.9	14.3	12.3	23.2
1986		11.8	13.1	30.6
1985		9.8	-26.3(c)	-43.7(c)
1984		6.2	87.0(c)	102.4(c)
1983		4.5	1.0	4.6
1982		10.0	14.4	8.3
1981		9.5	12.0	10.3
1980		8.4	-4.0	-3.8
1979		10.4	31.2	20.8
1978		9.0	14.3	22.2
1977		9.9	-8.0	3.7
1976		12.0	9.1	14.0
1975		13.7	19.4	10.1
1974		12.0	15.4	20.6
1973		7.8	9.8	3.5
1972			1.2	-6.6

Notes: (a) Year ending 30 June figures.

(b) Year ending 31 December figures.

(c) The data are odd and would not be relied upon.

The ABS figures appear particularly smooth and most unrealistic.

5 **Construction of index**

Before proceeding it is useful to define a few terms, namely:

Index date effective date of index

Index calculation date	date of calculating the index (ie some time after index date).
Inter-sale period return	uniform rate of return earned over inter-sale period

5.1 General comment

Section 2.3 considered the typical problems associated with property indices and hence their rather limited use in the past.

These problems can be adequately removed in the residential property market. There are many more residential properties than commercial properties and residential properties have much more in common. Further many are sold and/or rented each month.

It is proposed that the residence index be based on as many past sales/rentals as possible. Further it is proposed that the returns implicit in the sales/rentals be weighted by market value to better reflect the underlying market and in other words to remove sensitivity to the particular dwellings sold/rented.

The validity of the calculation process can be defended in two ways namely:

(i) if sufficient numbers are sold/rented to reflect the population and if the dwellings sold/rented can be considered to be an unbiased sample then the returns from sales/rental reflect the market; and

(ii) only the sales or rental process determines value. Therefore only actual sales or rentals should be considered. The return on unsold/unrented properties must be taken to be in line with the average return from similar properties which have been sold/rented.

It is proposed that there be a group of indices. The group would include price indices, income indices, and total return indices. These indices might be calculated both with and without allowance for expenses of investment including taxation. The indices might be further sub-divided into say the eight capital cities of Australia as defined by Government and at least for some cities further sub-divided by broad location. For example in Sydney it seems sensible to break the underlying assets into total Sydney, North Shore, Northern Districts, Inner West, Western, City and North Sydney, Eastern Suburbs and Southern suburbs. The index should be further subdivided into houses, and others.

Construction of the index would be much easier if all dwellings were sold and rented at each index date. Unfortunately dwellings are sold and/or rented infrequently and at no particular time resulting in a steady trickle of sales and rentals.

5.1.1 Price index

Turning first to the capital or price index the calculation procedure should:

(i) include as many past sales as possible;

(ii) extract from each sale the underlying average movements (clearly all dwellings do not perform the same);

(iii) consider the optimal time period between index dates;

(iv) consider the cost of calculating and publishing the index; and

(v) weight the returns made on sales to reflect the underlying market.

In order to achieve these aims the index needs to build up over time and in other words commence with retrospective index calculations. This approach is necessary as the index derives from inter-sale period returns. At a specific commencing date there are no inter-sale period returns. Therefore pre-index commencement date data need be collected.

From the inter-sale period returns rolling period returns need be calculated. As far as possible these calculations should be made for relatively homogeneous groups of properties eg same area, same market value group.

Finally weighting of returns need be considered. Clearly where dwellings are assumed to have the same rate of return there is no need for weighting. However when compounding sub-groups to calculate the overall index the return of the sub-group should be weighted by the market value of the sub-group at index calculation date.

Calculation of the index can depend on the time elapsed between index date and calculation date as houses sold during the period can be included in the calculation if they were previously sold prior to the index date i.e. an inter-sale period commenced prior to end index date.

When calculating the index series over the long term past for the many index numbers the delay between index date and calculation date is quite long. Many more dwellings have been sold during this delay which have an inter-sale period which in part includes the period the index number is seeking to reflect i.e. the potential sample size increases for many years into the future. Hence when calculating the past index series a different construction technique may be employed from the construction technique needed to calculate the index numbers from time to time in the future.

Section 5.2 below considers the calculation of past index values and Section 5.3 considers the calculation of index values in the future.

5.1.2 Income index

Turning now to the rental or income index the calculation procedure should:

(i) include as many current rental agreements as possible;

(ii) consider the rental as a percentage of the market value of the particular dwelling;

(iii) consider the optimal time period between index dates;

(iv) consider the cost of calculating and publishing the index; and

(v) weight the rental yields to reflect the value of the underlying market.

In this instance there is no particular need apart from generating past trends to commence the index by constructing an index over time. The difficulty is that for each rental one needs to know the corresponding market value of the dwelling. Unfortunately market value is only known when the property is sold. Few properties will be sold and immediately rented.

Assuming rental properties and principal residence properties receive identical capital appreciation then two acceptable approximate methods present themselves.

First one can simply calculate an income index i.e. increase in rentals over the period and compare it with the capital index derived over the period. It would be more time consuming under this method to take specific allowance for variation in size of dwelling.

Secondly an income yield index can be calculated by sampling rentals and sale prices in newspapers. This method suffers in particular from the divergence between asking price and eventual agreed rental and/or sale price. Also, as in the first method, the rentals and market values do not strictly correspond. Finally there is no guarantee that the proposed sampling procedure would not be biased. In fact it might be expected to be biased.

5.2 Past index values

5.2.1 Price index

Section 4.2 explains that from each Council surveyed particular houses were tracked and each time a sales price was recorded, data gathered comprised (address, date of sale, sale price).

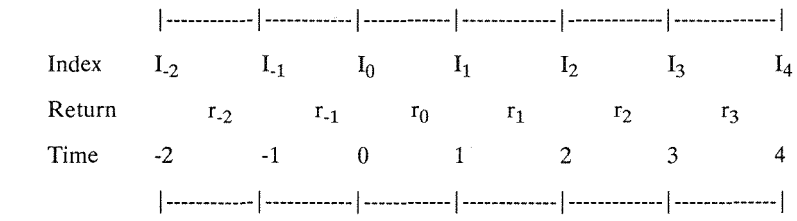
Including the effects of capital injection during inter-sale period cohort nominal (and real) rates of return during each inter-sale period are derivable. Two problems remain.

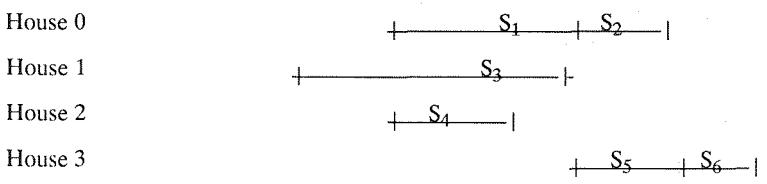
First we wish to calculate index values at regular periods and few if any dwellings are sold at regular periods.

Secondly the return from particular houses should be weighted appropriately so that the index represents the market and so that index performance is able to be duplicated. To explain, if one sets out to duplicate an index performance one need invest in the underlying assets of the index. In this case that is, say, all of the dwellings in a city. One must therefore purchase a cross-section of dwellings in the city and the number of purchases need be enough to minimise tracking error. Purchasing a cross-section results in weighting the portfolio by market value of houses.

The solution to these problems is to derive from the data the yearly index values which best fit the actual experience. The process I have used is known as least square regression fit to the data sets (i.e. purchase date, sale date, inter-sale return).

A graphical representation of the process follows.





where I_t is index at time t

r_t is rolling year rate of return during period t and t + 1

House t is a particular house

S_t is a uniform rate of return.

For example, r_1 is estimable from S_1, S_3 and S_4. Alternatively S_1 is the composite of r_0, r_1 and r_2. The derivation of the model using S_1 for illustration follows.

$$(1+S_1) = \exp(E_1)(1+r_0)^{f1}(1+r_1)^{1}(1+r_2)^{g1}$$

where

$$0 < f_1, g_1 < 1$$

$$E_1 \sim N[0,\sigma^2] \text{ for some } \sigma$$

Taking logarithms,

$$\ln(1+S_1) = f_1\ln(1+r_0) + 1\ln(1+r_1) + g_1\ln(1+r_2) + E_1$$

Let

$$\alpha_{1,1} = 0$$

$$\alpha_{1,2} = f_1$$

$$\alpha_{1,3} = 1$$

$$\alpha_{1,4} = g_1$$

$$\alpha_{1,5} = \alpha_{1,6} = \ldots\ldots = \alpha_{1,n} = 0$$

Now

$$\ln(1+S_1) = \sum_{i=1}^{n} \alpha_{1,i} \ln(1+r_i) + E_1$$

The α's are treated as independent variables in the regression, and the logarithms of the rates are estimated.

Note that the assumption of a normally distributed error for the logarithm of each uniform rate of return implies that the corresponding rolling period uniform rate of return will be distributed with standard deviation σ/t, where t is the period between sales. This observation is (qualitatively) in accord with the data representation set out in Section 4.2.

The potential existence of cycles implies autocorrelation of rolling year rates which conflicts with this analysis. This problem is still being investigated by the author.

It is considered the most suitable index is one which weights individual rates of return underpinning the index at each index date by dwelling value at the previous index date.

The best method of construction to incorporate weighting is not transparent as not all houses are sold at each index date and during the time to the first sale a dwelling has no particularly accurate estimate of value.

As only a subset of the population is known at each time and their average performance is calculated I consider it acceptable to calculate returns for subsets of the market without weights. I am of the view that suburbs tend to be fairly homogeneous in terms of market value of dwellings and it is therefore appropriate to:

(i) group suburbs according to average market value of dwelling;

(ii) calculate average return over period; and

(iii) calculate the overall index as the returns from the groups of suburbs weighted by the market value at the start of the rolling period of all of the dwellings sold and unsold in those groups.

A more complex weighting procedure relying on individual market values is not likely to yield better results as most dwellings will not have an inter-sale period overlapping with the period between index dates.

The minority of dwellings which do have an inter-sale period overlapping with the period between index dates can be relatively easily weighted although they still require market value estimation at either index date as they are unlikely to have been sold on either date.

Results follow.

Year ended 31 December	Sydney Residence Price Index (a)
1968	100
1969	115
1970	128
1971	160
1972	168
1973	248
1974	236
1975	263
1976	273
1977	306
1978	333
1979	411
1980	537
1981	593
1982	554
1983	621
1984	641
1985	663
1986	686
1987	832
1988	1374

Notes:

(a) Based on 1864 uniform rates of return using consecutive sale dates only.

The paper derives a yearly index as the sample size was not sufficiently large to derive a more frequently calculated index i.e. there was too much collinearity when shorter periods were considered.

The adequacy of the above result can be explored by comparing the results with other measures of capital return over time. This comparison is made in Section 6.2.

5.2.2 Income index

As noted in Section 5.1.2 in this instance there is no particular need apart from generating past trends to commence the index by building an index over time. If constructing a yield index the difficulty is that for each rental one needs to

know the corresponding market value of the dwelling. Unfortunately a market value is only known when the property is sold. Few properties will be sold and rented.

I consider it would be relatively easy to adopt an estimate of past rates of rental increase based on the combined results of various surveys together with a sample of rentals gathered from past newspapers.

Rental increase would need to be considered separately for different areas and for different numbers of bedrooms. If different rental growth rates are calculated then it would be necessary to weight the overall index taking account of the numbers of dwellings in each area and their distribution of numbers of bedrooms.

5.2.3 Accumulation index

The calculation procedure follows and is complimentary to the one proposed in Section 5.3.3 for calculating index numbers in the future.

(i) At base date a rental yield is calculated for each particular sub group.

(ii) working backwards in time the residence accumulation index for a particular sub group is then the following index number adjusted for movements in price and for movements in income net of movements in price.

(iii) The overall residence accumulation index is the sum of the corresponding sub group indices weighted by each sub group's market value of dwellings sold and unsold at the the previous index date.

5.3 Construction of index in future

As noted above the worth of the index is dependent upon its uses and certain potential uses rely on timely and comparatively frequent calculation. Once calculated it would be far better if the index were then not subject to later revision.

5.3.1 Price index

I have considered the better known methods of construction of indices including:

(i) choice of measure of central tendency (arithmetic mean, geometric mean, median, mode);

(ii) choice of weighting (value, number, no weighting); and

(iii) formula (fixed base, chain base, moving weights, link relativities).

My criteria for selection were in order:

(i) most accurate reflection of underlying market;

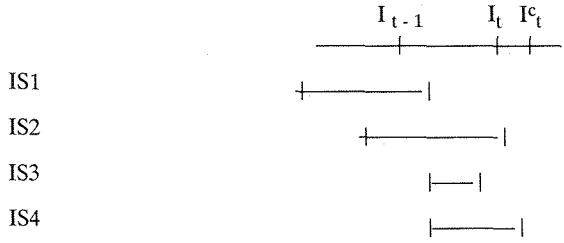
(ii) objective procedure; and

(iii) understandable and simple.

My choice of method is succinctly if not clearly described as linked market weighted arithmetic mean returns. The index is time weighted between index numbers and money weighted within the period between index dates. It is therefore implicitly assumed that to invest to duplicate the index performance one would need to at least notionally rebalance the portfolio each index date to the underlying market values i.e. as the relative weight of different types of dwellings changes over time so will the index.

This choice in construction most adequately reflects the average change in relative return in the market as the composition of the market changes.

Consider the following time line and inter-sale periods



where I_t is index at time t

I^c_t is index calculation date for I_t

ISn is inter-sale period "n"

Houses that are not sold and rented at exact time "t - 1" and again at exact time "t" require some adjustment before their returns may be used.

If it is remembered that an index is a snapshot of past performance at a particular date then what we have found is an uneasy balance between:

- the length of the period between index dates;
- the length of the delay period in calculation;
- the number of sales; and
- the variability in individual performance of dwellings.

The following comments explain.

Return from a dwelling depends on the date of sale. Dwellings sold prior to the index date are of reduced worth in calculating the index as considerable variability in return may have occurred between sale date and index date. This variability in return may be average or market related or it may be individual in nature. Hence:

(i) one needs to place most emphasis on whole period returns between index dates to calculate the index. Part period returns can be used as a guide to probable accuracy of whole period results.

(ii) the delay between index date and index calculation date should only be long enough to collect all sales occurring prior to the index date and some sales occurring after index date to be used as a guide to probable accuracy. There is no benefit in a longer delay as post index date variability in return will soon override the estimating power of returns of dwellings sold after the index date.

(iii) It is proposed that once calculated the index is not subject to later revision. Hence it is proposed that sales prior to the previous index date be adjusted to the previous index date using the index series. This raises two issues namely:

  (a) the period between index dates must be small enough so that not too much inter-period variation remains. The greater the inter-period variation the more inaccurate is the adjustment.

  (b) all of the difference between average return and individual return is brought to the current period between index dates. The dispersion in returns is therefore unrealistically amplified. However this will not change the calculated index number so long as the variation is independently and identically distributed with market value weighted mean equal to zero. The more sales which occur the more comfortable one can be in this approximation.

(iv) Provided the period between previous index date and current index calculation date is relatively short there will be few if any inter-sale periods of type 3 or 4 (see above time line). Given the comments made above they would be of little use in any event. Type 1 inter-sale periods offer a guide to the probable accuracy of the index number which is calculated from type 2 inter-sale periods.

The construction process is as follows.

(i) All dwellings with a type 1 or type 2 inter-sale period will be included in the appropriate sub-group.

(ii) Total market value of each sub group will be estimated from the previous estimate, recent sales, new dwellings and net capital renovations. Subjectiveness will be kept to a minimum and is not expected to be of particular impact on the resulting index number.

(iii) A market value at previous index date will be calculated for all dwellings in (i) above. The market value will be calculated from the starting sale price adjusted by the index series for the sub-group. An adjusted inter-sale period and return are then available.

(iv) The market value weighted arithmetic mean return is then calculated for each sub-group including all dwellings with a most recent sale within say 2 weeks either side of the index date. Algebraically:

$$I_t = \frac{\sum_{t=1}^{m} MV_t^0 \times \left(\frac{MV_t^1}{MV_t^0}\right)^{\frac{n}{p}}}{\sum_{t=1}^{m} MV_t^0} \times I_{t-1}$$

where I_t is index at time t

MV^0_t is the adjusted market value at previous index date for dwelling t

MV^1_t is the most recent sale price of dwelling t

m is the number of dwellings

n is the period between index dates in days

p is the adjusted inter-sale period in days.

(v) The accretion in index numbers is then compared with the trend in the past index series and with the part period returns of the current period to confirm or deny the calculation. Provided the number of sales was felt adequate it would be extremely unlikely that the index number resulting from (iv) above would be adjusted.

(vi) The overall residence price index is the sum of the corresponding sub group indices weighted by each sub group's market value of dwellings sold and unsold at the the previous index date.

The base date

Every index of relative performance needs a statistical hitching post. Whilst it is preferable to choose a period of relative normality it is not crucial particularly as a past index series will be available for many years into the past. Accordingly the base date will be chosen to be the earliest practical date.

5.3.2 Income index

The asking price of houses is likely to be in excess of eventual sale price and the excess can be relatively large on occasion. Section 6.2 shows that from time to time the rate of growth in asking prices may exceed the market rate of growth. The differential in growth is eventually nullified. Clearly asking rental may also exceed eventual agreed rental particularly in times of high vacancy levels. Regardless potential for error remains.

If the rental yield approach is to be followed through newspaper sampling then some adjustment in rental yield would need to be made to adjust for this inconsistency.

The proposed calculation procedure follows.

(i) A rental income index is established tracking relative movement in agreed rent for new lettings. The NSW Rental Bond Board is the obvious source of data for Sydney.

New lettings near the index date are averaged. Some regard will be paid to the extrapolated trend in lettings after the last index date and too far from the current index date to be otherwise included.

(ii) It is not proposed to publish a rental yield index based on newspaper samplings although it is proposed to continue to gather this data and provide sporadic comment on observed results particularly the differential between asking price and sale price from time to time.

(iii) Where possible rental indices will be maintained separately for dwellings with different numbers of bedrooms. Newspaper samples will be used to estimate the relative price differential between different size houses and the distribution of houses and flats by size by suburb. A weighted overall rental index is therefore calculable for each suburb or sub groups. The sub groups correspond to the price index sub groups.

5.3.3 Accumulation index

The calculation procedure follows.

(i) At base date a rental yield is calculated for each particular sub group.

(ii) The residence accumulation index for a particular sub group is then the previous index number adjusted for movements in price and for movements in income net of movements in price.

(iii) The overall residence accumulation index is the sum of the corresponding sub group indices weighted by each sub group's market value of dwellings sold and unsold at the the previous index date.

6 Confirmation of index

6.1 Suitability of index

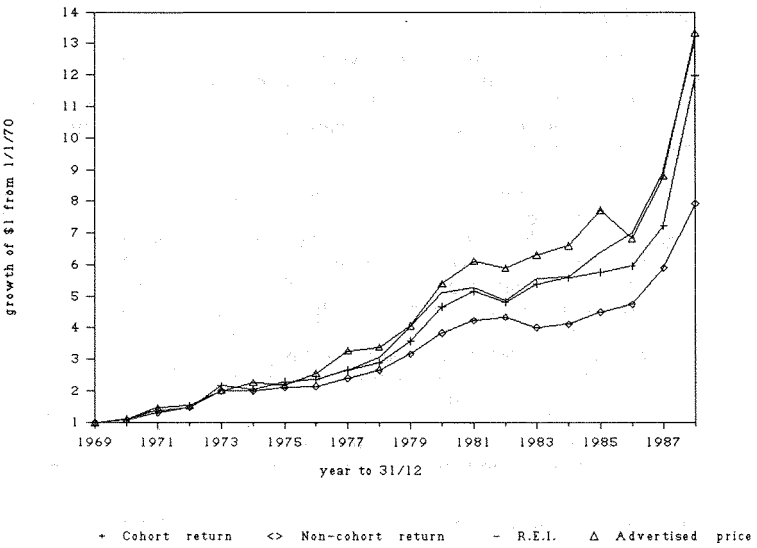
The index is initially broad and stays broad as it is based on every collected transaction which is designed to be every transaction or a very significant percentage of every transaction of actual sales and actual rentals. The index is therefore non-selective and non-manipulative if it is accepted that only sales/rentals make the market.

The calculation procedure is unconditional and with the aid of computers ensures that the results can be produced on a timely basis. Given the relatively large number of dwellings across Australia it should be possible to adequately duplicate the performance with very minor tracking error. Unfortunately the method by which past experience can be derived is potentially unsuitable to the market as it would mean that the calculated index would be subject to later adjustment perhaps for many periods to come. The reason for this is that the sample size of properties increases for any particular period for many years after the period as subsequent sales are made. Yet if the index is to be useful to the market then it need be confirmed soon after each period. Therefore a chaining procedure needs to be introduced as described above. Given large sample size of data it should mean that there is virtually no difference between the timely chain method and the regression fit method described above.

6.2 Comparison of past index series with other summarised data

In Sydney, the only generally available summarised data are the Real Estate Institute's median house and flat prices published monthly. Median house prices were available from May 1977. The following graph compares the derived capital index performance with median prices.

CUMULATIVE NOMINAL CAPITAL GROWTH



Returns as measured by the R.E.I. data were first available from 1978. For ease of comparison R.E.I. returns have been assumed to be equal to the cohort returns for all earlier years.

Cohort return refers to the method of tracking individual house returns over time. The method is detailed in Section 5.2.1.

Non-cohort return refers to the return calculated from movement in average house prices using the houses sampled to calculate the cohort returns. More particularly calculated as the average house price during year ended 30 June divided by average house price during preceding year ended 30 June. Calculated only if both averages are based on 7 or more house prices and there was at least one sale in each quarter of a year. The non-cohort return includes a number of house prices excluded from cohort returns.

Advertised price return results from the newspaper sample to estimate past rental yields. The returns have been calculated for years ended 30 June and are therefore 6 months out of step with the other returns.

Given that the house samples were relatively small the results cannot be expected to mirror the Sydney housing market and hence it is difficult to reach any firm conclusions on viewing the above graph. Nevertheless the following comments are useful.

The data to derive the cohort, non-cohort return, and advertised price return were gathered with a bias towards lower priced houses. They are therefore more likely to be close to a median house sale each month. The graph largely confirms this assertion.

The samples for cohort returns and newspaper returns were largely independent and small being the order of 2000 data points each or around 0.2% of the population. This suggests that adequate results can be obtained with a very small sample and in other words variation in individual performance is unlikely to hamper the accuracy of the new index.

Cohort returns outperformed the average returns of virtually the same houses. This may mean that once complete data are gathered the movement in the residence price index might exceed Sydney's median price movement. Of course for this to be true the sampled houses would have had to have underperformed the Sydney market.

To some extent the similarities in performance of the cohort returns and the REI returns confirm the separate data sources and calculation process. However one must be careful if promoting the median house price as a suitable guide as:

(i) as noted above average return and therefore most probably median return may perform differently from the overall market; and

(ii) median housing prices could never become a generally market accepted index as they are not properly weighted to the underlying investment i.e. it is not possible to duplicate the index performance.

The graph shows some divergence between rate of growth in advertised prices and actual prices received. Clearly if the percentage level of optimism in prices were constant then there would be no divergence in relative growth.

This divergence in relative growth might be a general market indicator of future direction of the market. For example it might be that advertised prices act prior to changes in supply and demand. Conversely it might be that this is a lag indicator ie reacting to changes in supply and demand. Nothwithstanding these remarks relative growth in advertised prices may forecast an upper bound on performance.

7 Conclusions

There is a need for a generally accepted index.

It is possible to construct a suitable index.

Actuaries have a role to play in the residential property market.

References

Australian Bureau of Statistics, *Australian Demographic Statistics September Quarter 1989* catalogue no. 3101.0, March 1990

Crowe W.R. *Index Numbers Theory and Applications*, MacDonald & Evans Ltd, 1965

Rental Bond Board of NSW, *Unpublished quarterly report as at 31 March 1990.*

SYDNEY

MR. M. BARKER: I have been a great supporter of actuaries moving into the so called wider field and the paper tonight is an excellent example.

The lack of consistent and reliable data on property markets is a problem not only in Australia but other countries as well. Many of us are making major asset allocation decisions between a range of asset classes when the largest asset class of all is the one in which we have the least reliable data. Hopefully the paper tonight will do something for that.

Just to put the figures into perspective, the current size of the capital markets in Australia can be ranked as follows. The total of all companies quoted on the stock exchange at 30 April, 1990 was $152 billion. In contrast the commercial, retail and industrial property markets probably amount to more than twice that with something like $350 billion. The housing market is nearly double again, with an estimate of over $600 billion.

1990 has seen some major work commenced by BOMA on the commercial market and I think we are going to see some results towards the end of the year. This paper gives us some methodology for producing a decent set of numbers on the housing market.

The introductory sections give a good idea of the size and importance of the housing market and the difficulties of developing indices. We have a popular conception that housing is a good investment but until now we have had to rely on the Real Estate Institute Median Price Series to tell us just how good. I have always suspected the value of medians and wondered just how bad those median figures were.

The firm of economists, BIS Shrapnel have used the median figures for some years. Only last Saturday in The Australian newspaper we had an article quoting BIS Shrapnel, that showed that over the last 20 years the housing market had clearly beaten commercial property, and had beaten equities by a wide margin. Unfortunately if you look more closely at the graph you will find that if you use 15 years instead of 20 years the order was totally reversed. As usual we can show anything with statistics.

Section 3 of the paper convinces us that we do need a well constructed index which will answer this problem and many others. My favourite paragraph in the paper is Section 3.7 which talks about new financial structures and instruments and which is certainly close to my heart. I will come back to this area of derivatives in a few minutes because it is not quite as simple as it looks. Before I do that I will go on and summarise the rest of the paper.

Section 4 gives us some very interesting sample data, both from sales and rentals over the last 20 years. Unfortunately the actual sample of sales data is only based on 8 suburbs which all are to the west of Sydney. Perhaps Dean will tell us why those 8 suburbs were chosen. They do not necessarily indicate results for Sydney as a whole, particularly over shorter time periods.

The rental data is over a broader range but it is only taken on one day of the year and it does contain a few items in 1984 which the author acknowledges are odd. I think he owes us a little more explanation as to why June 1984 should have produced these odd figures. It makes one wonder whether any of the others are inaccurate but not sticking out so much.

Section 5 deals with the construction of the index. I will leave this for the statisticians who are going to be much better than I am at picking up the technical detail. On the surface it looks a reasonable approach.

Finally we come to Section 6 which is headed 'Confirmation of Index'. I am not keen on that title because the limited sample of data is not good enough to confirm anything. I would have preferred it to be called an illustration rather than confirmation, but certainly the figures that have been produced in that sample look reasonable in comparison with the Real Estate Institute figures and with the newspaper advertisement figures.

I will come back to that because I do think it is important to realise the qualifications we place on those results. What the paper does not do is give us a set of numbers which we can take away and use in our asset allocation. We need more work for that.

The major area I want to talk about is the area of derivatives, or what Dean calls the 'new financial structures and instruments'. Certainly the idea of having futures and options on the residential property market is a very attractive concept. There is a group of people that are generally known to the real estate agents as the DDT's - deaths, divorces and transfers. Obviously you can see deceased estates having a need for hedging their remaining housing exposure, and you can see divorces and transferees wanting themselves covered in the market. Housing futures also would be an attraction for young couples. But just how is this futures market going to work?

The first problem in the futures market is that it tends to trade on a minute by minute basis and one needs to have reasonably good data on the underlying commodity index. Now this index that Dean is proposing to calculate is going to be based upon sales data that are not going to be reported until some time after the sales have taken place. I am not sure how long he thinks it is going to take to calculate the index but it could be a month or two. It certainly takes longer than that for most data to get into council records, although if you use stamp duty records you might be able to do it more quickly. It is rather difficult running a futures contract off an index if you do not know what the index is going to be for another six weeks.

The second problem which is perhaps more significant is what we call tracking error or basis risk, namely the risk of the futures price deviating significantly from the physical.

If you go back to some basic concepts of futures markets this is a very important one. I would like to quote from an article written by Professor Mark Rubinstein who is at the University of California at Berkeley. This article was in the Financial Analysts Journal September/October 1989. It is entitled Market Basket Alternatives and lists eighteen different criteria necessary to achieve ideal results. I am not going to read all 18 but the second one is low tracking error and certainly that is one of the most important.

What Mark Rubinstein says is that with futures markets in general the most serious deficiency stems from being in zero net supply. This means that it is possible to create a long position in the underlying index only if another investor is willing to go short. This seriously limits the size of the open interest.

If you think about these people who are going to be buying and selling housing futures, the vast majority of them are natural longs but there are not too many natural shorts. Certainly the newly marrieds are natural longs and so are the divorcees. The deaths are natural shorts. The transfers are equally balanced. Investors are certainly more likely to be long than short. We would probably have a situation where you have got a lot of people who want to go long in housing futures and not very many people who are prepared to short the market. What that is going to do is create a futures price that is well above the physical.

The only way to remove the problem is to have a simple ability to arbitrage which means that if the futures price is selling well above the physical you have to be able to sell the futures and buy the physical. If enough people do that the gap closes.

This certainly happens with the SPI futures contract. If the futures market goes up to more than about 2% or 3% above the physical All Ordinaries Index then the arbitrageurs move in.

With property the round turn cost is something like 7% or 8% for stamp duty and sales commission, and it takes an awfully long time to carry out. What we really need is something like a unit trust which has a large long position in residential property and has the ability to increase in size very rapidly and cheaply, or alternatively has very large holders who are quite happy to sell down their holdings in order to make the market. It is difficult to envisage that happening at this time but I know behind this paper there is some commercial work that Dean is doing. Maybe we can get him to tell us more about it afterwards. If the advantages of this housing futures contract are sufficiently great then it should not be beyond someone to come up with the means of doing it.

The other area which I said I would come back to is the use of the results achieved to date. Dean's conclusion to the paper is threefold. First of all there is a need for a generally accepted index. I heartily endorse that. Secondly it is possible to construct a suitable index. I think I agree with that, subject to what the statistically minded say later this evening. Thirdly actuaries have a role to play in the residential property market. I certainly agree with that and Dean has demonstrated it. However, while I think he has demonstrated that it is possible to construct a suitable index all he has done is show on a sample basis how it could be done in practice.

So that we do not regard the results in the paper as being any more than illustrations, let us just run through the qualifications.

Firstly all the sales data used is only a sample and it is mainly from the western suburbs.

Secondly the data is impure because there has been no adjustment for renovations, extensions, etc. Dean comments that renovations probably are offset by properties depreciating. There is some truth in that but I think he just dismisses it a bit easily because there has been a lot of major extension work.

The rental data has suspect numbers in it, whether it is just in 1984 or whether we have to suspect the whole lot.

The method of index construction seems reasonable to me but Dean does recognise that auto correlation may be a problem and he is thinking further about it. So let us wait until he has finished thinking before we believe his results too seriously.

In the light of all those qualifications it is perhaps surprising that the numbers at the end are so similar to the numbers produced by the Real Estate Institute median. Perhaps the median figures are not so bad after all.

The final thing is that the figures in this paper, the Real Estate Institute figures or Dean's figures, are only price indices and any asset allocation work we do needs accumulation indices.

I would certainly encourage Dean to continue in this work. I look forward to seeing the next stage of development which I think will be very meaningful. Perhaps institutions should be investing in residential property and certainly this paper has brought us a step closer.

MR. G. WALKER: It is always pleasing to see innovative work being performed by the profession and this paper certainly falls into this category. I thank the author for the thought which has gone into the paper.

The paper's first sentence is that "Housing is an emotive issue". How true! It is also an issue on which there is much hypocrisy. For example it is common for long established houseowners to lament the plight of first housebuyers trying to break into the market. The established houseowner will offer platitudes such as "The Government must make housing more affordable". However, in my dictionary more affordable means cheaper and any time a Government takes a step which might adversely affect the price of houses there is a united chorus of "Don't. It will reduce our property values!"

I found very interesting the statistics quoted in Section 2.1 on the growth in number of dwellings vis a vis growth in population. By making a few simple assumptions it appears that the number of dwellings required to house a population of constant size is growing by 1% per annum. Will this trend continue into the foreseeable future or is there a plateau at, say, 2 inhabitants per dwelling? If there is a plateau then does this indicate a future downturn in demand for housing with consequent price implications once the plateau is reached?

In Section 3.7 the author repeats the oft-quoted view that listed property trusts historically move less with the underlying property market and more with the underlying sharemarket, at least in the short term. It is often portrayed that an advantage of unlisted trusts over listed trusts is that unlisted trusts exhibit greater price stability than do listed trusts.

It is my view that a contributing factor to this stability of unlisted trusts is what I will term the "rigged" nature of the market for unlisted trusts. Prices of units in unlisted trusts are not set on the basis of willing buyer, willing seller. Instead there is a market maker, usually the trust's manager in one guise or another, who stands between buyers and sellers and makes prices based upon a valuer's estimate of what the underlying properties might sell for given an orderly realisation of assets, no matter what the balance, or imbalance, might be between buyers and sellers of the units in the trust. This can work, provided that supply and demand don't get too much out of balance. But when they do get out of balance, well ... just look at the Wool Corporation which is trying to rig a particular price at the moment.

The author has identified in Section 3 uses for the index, of which, as with the opener, the most exciting to my mind is the potential for new financing structures and instruments. He mentions futures, options and options on futures among others.

I think it might be worthwhile spending just a few minutes saying something on options on futures. When options on futures first appeared there were gasps of amazement at the degree of gearing up which could be achieved by their use. However, gearing is not the main reason why options on futures exist.

Option traders who attempt to manage their risk exposure by delta hedging need to be able to take physical positions in the particular security underlying the option. However, where the underlying security is a widely diversified index, such as the All Ordinaries Share Price Index or the proposed Residential Property Index, it is difficult if not impossible to take a physical position. By contrast it is simple to take a physical position in an index futures contract. Hence it makes more sense to have an index option based on an index futures contract rather than on the index itself.

An obvious group of potential purchasers of options, or futures, on the index are people saving for a deposit on a first house and who wish to avoid the risk that prices will have moved adversely by the time they have completed saving for their deposit. One word of caution for this group is that gains on their options or futures contracts will likely be taxable while any increase in house prices would be on capital account. Consequently homebuyers would need to gross up their futures or options positions according to their marginal tax rate in order to achieve a satisfactory hedge.

Tax is of more general application than just for homebuyers. In Section 3.7 the author suggests that an index futures contract plus cash might be a suitable alternative to physical residential investment. However, one of the attractions of physical residential investment, as with other "growth" investments, is the deferment of capital gains tax until actual

sale of the investments. The deferment of capital gains tax is enhanced by the offset for indexation of the cost base from the taxable gain. Both of these benefits are lost when using the cash plus physical alternative since realisation is deemed to occur whenever a futures contract expires even if it is intended to roll over the position. Consequently I think it unlikely that creation of the index and accompanying financial engineering will be a suitable vehicle for institutional investment in residential real estate.

A further point regarding tax. The author is proposing an accumulation index which strikes me as a worthwhile idea. However, tempting as it may be to compare the performance of such a residential property accumulation index with the performance of the All Ordinaries accumulation index, the comparison will not be perfect. This is because the All Ordinaries accumulation index makes no allowance for the imputation credits which attach to franked dividends. This of course is a fault with the All Ordinaries accumulation index rather than the proposed residential property accumulation index.

Finally, I think it worthwhile to say a few words on the integrity of the index, in particular the treatment of expenses.

Expenses can be recurring, such as routine maintenance or land tax or can be of a one-off nature, such as a major renovation. If the indexes are to be used for investment performance benchmarks then consistency demands that the benchmark performance be replicable. Consequently it will be necessary to remove the effects of expenses from both rentals and capital movements.

As far as recurring expenses are concerned perhaps the best that can be done is to assume a certain proportion of rental income is expended on maintenance. Perhaps a periodic sample survey might be of assistance, but certainly more information will be required than is available from the Australian Bureau of Statistics, the Rental Bond Board or newspapers.

On one-off renovation expenses the author comments in Section 4.1 that ignoring them is not particularly significant provided users are aware. I am not so sure. In any event I understand that council records of building applications include the estimated cost of renovations. It might be possible to access this data so as to remove the distortions from the index.

I too found the paper most stimulating and hope that it will act to raise the profession's profile in the investment community. Once again I thank the author.

MR. C. CONDON: I found Dean's paper particularly interesting because it provided not just a practical approach to a particular problem, but also a methodology that could be used for different types of problems. The paper set out a methodology of constructing an index of property values based upon the rate of return of observed on the actual sale of individual properties. It is the first time that I have seen a property index constructed in this way. It is quite different to property indices currently in use that are based upon either the prices of listed property trust units, or regular appraisal values of a set of properties.

Using appraisal values suffers from the problem of subjectivity. This, and the fact that there are lags associated with appraisals tend to mean rates of return based on appraised values are smoothed over time. This makes it very difficult to estimate the volatility of property and the correlation of its returns with other investment classes.

On the other hand, property indices based upon the unit prices of listed property trusts have the reputation of being more representative of the equity market than the property market. Whether this is in fact true is a matter of debate, but it is difficult to compare the returns on direct property investment with that of listed property trusts.

The particular property index that Dean has constructed overcomes these problems. It does, however, have a number of other problems which have already been discussed. The main problem relates to the injection of capital into the index. It should be remembered that a total return accumulation index should take into account all cash flows associated with the underlying assets. In the case of property, for instance, it is necessary for the investor to make cash flow injections not only for capital purposes, but also to pay for maintenance and for the general expenses in collecting rents.

Dean's index has been constructed from a separate price index and a separate income index. He has correctly identified that the primary concern with the price index is that cash flows associated with capital injections have not been adequately accounted for. One of the speakers indicated that it may be possible to overcome this problem by integrating the index with council building applications. That approach is not trivial, but may be appropriate depending on the extent of resources that are available to construct the index. An alternative approach may be to identify from regional building statistics, the rate of aggregate new construction cost to property values, and to use this estimate as an approximation of capital investment.

With respect to the income index, proper allowance should be made for cash flows associated with repairs and maintenance as opposed to capital improvement, and also the regular cost of collecting rents and other property management expenses. These amounts are not trivial. For instance, I believe that the commission for collection rent is in the order of 7%.

Apart from these weaknesses, there is one technical point that confused me. It concerns the calculation of the historical index. Section 4.2 states that all combinations of purchase and sale price are combined to calculate rates of return. Thus, in an instance where there were two observed sales, three rates of return would be generated. In other words, the rate of return from the first purchase to the first sale, the rate of return from the first sale to second sale, and finally from the first purchase to the second sale. I am not clear whether all of these combinations were actually used in the regression. The diagram in Section 5.2.1 implies that they were not and I hope that this is true. If they were all used in the regression, then there is a statistical problem in that some of the observations are not independent of others. I felt that the paper was not clear in explaining the methodology here, but it appears that the correct approach has been adopted.

That is the extent of my comments regarding the technical issues associated with the paper. I would now like to comment on the proposed uses of this index. In particular, the paper places a lot of emphasis on the usefulness of the index to institutional investors, opening up a new asset class for their portfolios. In Section 3.7, the paper speculates as to why institutional investors to date have not been interested in the residential property market. Five reasons were mentioned:

. Political nature of housing

. High expense rates

. The scope for adverse publicity

. Small outlays

. Illiquidity

I agree with all of these reasons, and can add a couple of others which have already been touched upon by some of the other speakers. The first relates to taxation. An owner occupier has considerable taxation advantages over a property investor. I believe that this means that the price of residential real estate tends to be set by home buyers. In other words, the marginal investor is the individual home buyer. If proper allowance is made for not having to pay rent, the after-tax investment return associated with an individual's home is generally much higher than would be available to that investor for other types of investment, even through a superannuation vehicle.

Comparing property investment for different investors must of course be done after adjusting for risk. It is common practice to talk about risk as being volatility of investment returns. Under this definition, the risk associated with residential real estate would be broadly similar for all potential investors. Even using this definition of risk, I believe that the taxation concessions available to home owners would still be a massive incentive to owning your own home rather than making other types of investment.

However, I contend that volatility of investment returns is actually not a good definition of risk from the point of view of a home buyer. By buying his or her own home, the home buyer implements a near perfect hedge against the risk of future changes of the cost of shelter. This would indicate that the individual home buyer may be prepared to pay a price for the home that yields quite a low expected rate of return. The non-home buying investor would not consider real estate to be riskless, and would require a greater expected rate of return on the asset. Thus, I contend that, for reasons to do with taxation concessions and different perspectives of risk, the home buyer is the price setter in the residential property market and this market is unlikely to be attractive to institutional investors.

The paper also talked quite a lot about derivatives. These have been discussed extensively tonight and I will not repeat the discussion but endorse the comment that, if arbitrage is difficult, then derivative securities are unlikely to trade in any volume.

I do congratulate the author on many aspects of the paper. Planners at all three levels of government, together with private developers and building companies, should find the index useful both as a barometer of what has happened in the past, and also as a basis for making projections. Lobby groups will also be able to use the index for their own purposes. For instance, the index will be able to demonstrate the impact on property values of changes in regulations associated with negative gearing, different council rates, land releases and other such factors. All of these issues are very important to policy formulation and must not be underestimated. At the moment there is little available good information for planning and I do congratulate the author for extending his skills to this area. There is no doubt that actuaries have a lot to offer social statisticians and economists, and this paper is an excellent example of the wider application of actuarial science to the broader community.

MR. J. PURVIS: I would like to open with a quotation from Mr. de Gourmant who said that property is necessary, but it is not necessary that it should forever remain in the same hands. I think what Dean has done is give us an indicator of the value in a fairly useful form, of the value at which property does change hands in Australia.

Michael Barker opened up by putting it all in perspective by saying that the stock exchange was a mere fraction of the residential housing market. Yet we all know, from all the statistics which are produced of rates of change of value and the levels of trading and so on which takes place on the stock exchange. I think it is well overdue that we see a similar development in the housing market which is such an important part of the assets of individuals.

The author himself made the comment that property is an emotive issue and it is emotive because every one of us in some way or other has to come to grips with the problem of where to live and most of us are either renting or buying. I do not think there are many of us who can avoid one of those two options. It is interesting to note that Michael commented that BOMA is in fact working on an index of some sort in the commercial market and I think we would certainly look forward to completing the picture by getting that sort of index calculated as well.

Michael was critical of a number of things. He said that the sample size was somewhat limited and I agree that if we were dealing with a sample size of that sort of limitation it would be a problem but I get the impression that we have just seen the tip of the iceberg that in fact we have residential property indices in the offing for just about every suburb of Sydney, Brisbane and Melbourne. It is just a matter of collecting the data. I will comment in a moment on how we could perhaps go about foisting the cost and trouble of collecting the data onto some other worthy bodies, whilst allowing the Institute to retain the credit for developing the method.

A number of the speakers foreshadowed the use of futures and options and discussed it in some detail. There was an indication that the major users of this index would in fact be the institutions. I would like to differ on this in the sense that I think it is counter productive to try to encourage the institutions to put money into the residential property market. I think the Treasurer and other people are trying their best to try and divert national savings going into productive assets which can improve the level of production in the country. I know we all have to live somewhere but I think Australians generally have a fixation about property and the value of it. So whilst I do not think that the institutions are going to be major users of this index I do think though that financial planners at the retail level will be potentially very large users of this index given that occupied residences are a very big part of every individual's personal portfolio. The introduction of an index of this sort will in fact help greatly in the forward planning of individual's finances.

While we are talking of futures perhaps another quotation is relevant. George Bernard Shaw said that gambling promises the poor what the property performs for the rich. Something for nothing. I do not think you can get something for nothing and I think he was wrong on that score. Investing in property is the always a fairly risky business and we tend to underestimate the risk involved.

There were some comments made on the extent to which property values are rigged and I certainly agree with the comments that valuations of properties which are not actually sold are rigged in one way or another if we can use his term. It you are an owner of a property, such as a unit trust manager, it is in your interest to rig a slightly high value. If you are a lender or a potential mortgagee it is in your interests to come up with a low value and you will brief your valuer accordingly.

We have to stick with the idea of basing an index on actual sale values which are realised and indeed trying our best to get as broad a sample of actual sale values in whichever area is the subject of the index.

Michael's commentary on the imbalance between the investors on the one hand and the hedgers on the other hand would in fact defeat the efficient operation of a futures market.

One potential way out of this I can see is that if in fact the government here were to introduce an investment rule similar to the one that they introduced into New Zealand some years ago where they compelled superannuation funds to invest in the housing sector. Some of the older members of the Institute may remember the trouble that that caused when unit linked funds in the superannuation area in New Zealand had to open up housing sectors. To the extent that superannuation funds were compelled to hold investments of this sort then there may well be a development of a need for a hedging mechanism such as a futures contract on residential housing.

I would like to pass on to some comments which another speaker made on the unsuitability of using valuations when they did not actually relate to sales. He also made a comment on the integrity of the index and that the effects of expenses needed to be removed. Whereas on the other hand I think Chris Condon was arguing that you actually had to allow for these. I do not see the treatment of expenses as being a major issue in the sense that a lot of them are pretty well known and I think you can come up with some pretty close estimates if you are not actually allowing for the actual dollars and cents. The actual average cost of having a real estate agent run a rental property for you can actually be allowed for. In the scale of things the residual error that would remain after making such estimates

would not in fact defeat the overall usability index from the point of view of say a financial planner or individual who is wanting to keep track of the likely cost of housing although it may be that such residual errors might be in fact enough to defeat the usability index from the point of view of a cash settled in a futures contract.

Chris Condon made a comment that he was concerned about the differential taxation situation of private investors and actual owner occupiers of houses. To get a complete picture of that I think you need to look at how houses are financed and you have to take into account that while home buyers do not pay capital gains tax they in fact do not get any tax deduction on the mortgages which they most commonly use to finance these investments, whereas private investors do. I do not think it is fair to say that you can in fact achieve a perfect hedge, so that really raises a whole other issue which is alluded to in part by the author and that is perhaps we need to construct an index of housing costs as a percentage of average weekly earnings. That might actually be something which is a lot more meaningful to the man in the street.

Turning to the man in the street I would agree with the author's last comment in the paper that actuaries have a role to play in the residential property market. I think the publication of this paper and the discussion of it and perhaps the future refinement of it by the author and others gives the Institute a great opportunity to bring something to the broader public which is actually a demonstration of how relevant actuaries can be. I think this is something that the Public Relations Committee should perhaps be making a note of.

This is a paper which comes up with a better measure of value than any that we have seen so far. It may have some faults, it may have some refinement that is needed, but it is a paper which goes to the heart of a lot of the financial well being of the Australians. I think it could be a great opportunity for the Institute of Actuaries to sponsor such a measure, calculate it (helping to create a methodology if I can use that term) and to publish such an index whilst at the same time getting some worthy body such as the Australian Bureau of Statistics to actually calculate it on a quarterly basis in much the same way as they calculate the consumer price index. I do not think the calculation of this index would be all that much more difficult than the calculation of the CPI. Perhaps an index named the Actuaries - ABS Residential Property Index would give suitable acknowledgement and of course the author would have to give permission for the use of that name given that he has put in all the work. In much the say way as the FT Actuaries Index in the UK, I would think it would just help enhance the standing of the Institute.

I would like to thank the author for obviously a lot of work that has been done and bringing the importance of the residential property market which as we said is very important in size and in terms of personal assets for many Australians, fairly and squarely into the ambit of the actuarial profession.

Due to the loss of the tape of the Melbourne meeting there is no transcript of the Melbourne discussion in these transactions.

HEALTH CARE IN AUSTRALIA

By P.M. Carroll, BA, FIAA

CONTENTS

1. INTRODUCTION

1.1. Amendments to the National Health Act in June 1989 established a formal statutory role for actuaries in the health insurance system of Australia. In September 1989, the Institute of Actuaries of Australia gave consideration to this new role and, in particular, discussed a paper proposing professional guidelines and standards. During those discussions, there were numerous calls for the publication of information to assist actuaries in their work within this new field. The purpose of this paper is to provide a broad statistical review of the health care industry in response to those calls.

2. BACKGROUND

Historical development

2.1 Australia is a geologically ancient island-continent located in the south-west of the Pacific Ocean. Its coastal climate ranges from tropical in the north to temperate sub-tropical in the south, and much of its inland areas are flat and arid. During a long period of isolation, the continent evolved a distinct flora and fauna uniquely adapted to its geology and climate. There has been human habitation for at least 40,000 years, probably much longer, and it is evident that early inhabitants had a significant impact on the ecology, particularly through the introduction of the dingo and the use of fire as an agricultural technique. Some archaeologists have claimed the Aboriginal population had stabilised at about three quarters of a million people.

2.2 After some minor contacts with foreign traders over the centuries, and sporadic visits by Europeans since the 1500s, Australia was colonised by the British in 1788. This had a devastating impact upon the local population and environment, through the introduction of exotic diseases and widespread disturbance of the ecology. Because of these experiences, public health measures during the 1900s concentrated on quarantine measures.

2.3 During Australia's first 50 years of British settlement, the Europeans lived in small isolated communities and struggled for mere survival in what was perceived as a hostile environment, while entire communities of Aboriginal people became extinct. Following the end of convict transportation in 1840, the settler communities also began to decline. There were periodic outbreaks of smallpox, plague, influenza, measles and scarlet fever and conditions such as gastroenteritis, dysentery, diarrhoea, bronchitis, venereal diseases and a variety of eye and skin infections were endemic. At this time health care services relied upon the enterprise of local doctors, nurses and midwives. Institutional care was provided by charitable and religious organisations, catering almost exclusively to the very poor, and admission to hospital was viewed widely as a death sentence. The total population at the end of this period, both Aboriginal and non-Aboriginal, has been estimated at fewer than half a million persons.

2.4 The discovery of gold in the 1850s stimulated a long economic boom, which transformed living conditions in Australia. By the 1890s, the Australian colonies had a total population in excess of 3 million and enjoyed the highest per capita income in the world. The private economy featured a thriving banking and insurance industry and, in the public sector, there were a number of pioneering social security schemes for the sick and aged. Rapid urbanisation led to disease patterns similar to those in industrial cities elsewhere and tuberculosis, in particular, became a major cause of death by the 1880s. By the end of the 1800s, though, rates of mortality and morbidity in general were declining quite markedly. The quality of institutional care had improved, with the use of antiseptic procedures and anaesthetics, and a number of hospitals had introduced facilities for private patients who were able to pay for services.

2.5 Today, Australia enjoys living standards similar to those in North America, Europe and Japan and has an extensive system of modern health care delivery and finance, extending through both the private and public sectors. Under the Constitution, the provision of health care services is a State matter and, in practice, the regulation of health professionals and the administration of hospitals and other caring institutions occur at the State level. The Federal Government has extensive powers, in the areas of taxation, social security and insurance, and it plays a very substantial role in the financing of health care industries. Local governments play a significant role in public health measures, such as environmental hygiene, screening and preventative care programs.

2.6 Total expenditure on health care in Australia amounts to approximately 7.8% of GDP, about the same as in Canada. This is less than in the USA (about 10.5%), Sweden (9.2%), France (8.3%) and Germany (8.0%), but more than in Japan (6.5%), the UK (5.6%) and New Zealand (5.5%).[1]

Demographic profile

Size and distribution

2.7 The Australian population was 16.02 million as at 30 June 1986, the date of the most recent census. The State by State distribution of the total population is shown in the following table.

	Population [2] *30 June 1986 (millions)*	%
New South Wales	5.53	35%
Victoria	4.16	26%
Queensland	2.62	16%
Western Australia	1.46	9%
South Australia	1.38	9%
Tasmania	0.45	3%
ACT	0.26	2%
Northern Territory	0.15	1%
TOTAL	16.02	100%

2.8 The population is concentrated in the major coastal cities. As at 30 June 1986, there were twelve cities with populations in excess of 100,000 containing, in total, 70% of the Australian population.[3] These cities are listed below.

City	*Estimated* [4] *population 30 June 1986 (millions)*	%
Sydney	3.47	22%
Melbourne	2.93	18%
Brisbane	1.20	7%
Perth	1.05	7%
Adelaide	1.00	6%
Newcastle	0.42	3%
Canberra	0.28	2%
Wollongong	0.23	1%
Gold Coast	0.21	1%
Hobart	0.18	1%
Geelong	0.15	1%
Townsville	0.10	1%
Sub Total	11.23	70%
Other	4.79	30%
TOTAL	16.02	100%

Growth

2.9 The Australian population has grown and continues to grow faster than that of most developed countries in the world. The table below shows the net average annual rate of population increase in a range of OECD countries.

	Net rate of population increase 1975-1985 [5]
Australia	1.3%
Ireland	1.2%
Canada	1.1%
United States	1.0%
Japan	0.8%
New Zealand	0.6%
France	0.5%
Sweden	0.2%
United Kingdom	0.1%
Germany	-0.1%

2.10 The present rate of increase is low compared with those of the past. The table below shows the overall rates of growth in each decade since 1860.

Decade	*Increase in population* [3]	
1860's	44%	
1870's	35%	
1880's	41%	
1890's	19%	
1900's	18%	
1910's	22%	
1920's	20%	
1930's	9%	
1940's	17%	
1950's	25%	
1960's	22%	
1970's	17%	
1980's	15%	(estimate)
Average per decade	23%	

The most significant features are -

- the marked reduction in the growth rate in the depression years of the 1930s, when birth rates fell and migration virtually ceased
- the fall in the growth rate since the 1960s.

In the 1980's the annual rate of natural increase has been steady, at about 0.8%, and the annual rate of net migration has fluctuated between 0.3% and 0.9%.

Age/sex structure

2.11 The table below shows the most recent estimate of the Australian population of males and females by attained age.

POPULATION AT 30 JUNE 1986 [2]

Age Group	*Males*	*Females*	*Total*	*%*	*Proportion of females*
0-4	619,020	589,465	1,208,485	7.54%	48.78%
5-9	604,878	574,610	1,179,488	7.36%	48.72%
10-14	672,202	639,343	1,311,545	8.19%	48.75%
15-19	688,551	658,671	1,347,222	8.41%	48.89%
20-24	680,422	656,287	1,336,709	8.34%	49.10%
25-29	681,757	666,710	1,348,467	8.42%	49.44%
30-34	635,695	633,512	1,269,207	7.92%	49.91%
35-39	641,746	624,946	1,266,692	7.91%	49.34%
40-44	520,117	494,215	1,014,332	6.33%	48.72%
45-49	433,181	409,091	842,272	5.26%	48.57%
50-54	376,999	359,852	736,851	4.60%	48.84%
55-59	384,834	370,702	755,536	4.72%	49.06%
60-64	351,599	367,834	719,433	4.49%	51.13%
65-69	266,052	304,099	570,151	3.56%	53.34%
70-74	209,344	263,853	473,197	2.95%	55.76%
75-79	132,742	191,700	324,442	2.03%	59.09%
80-84	66,341	118,684	185,025	1.16%	64.14%
Over 84	34,707	94,589	129,296	0.81%	73.16%
TOTAL	8,000,187	8,018,163	16,018,350	100.00%	50.06%

Overall, females outnumbered males for the first time in modern history in 1978, following a fall in births and immigration since the 1960's. At advanced ages, the preponderance of females is much higher than the overall average, due to the lower mortality of women.

2.12 The most significant feature of the age distribution is the "baby boom" bulge, born in the period 1945 to 1975, that had moved into the 10 to 40 year age group in 1986. Over the next three decades, the population as a whole is expected to grow by 12% per decade, while the age groups affected by the baby boom will grow by 40% per decade. This is clear from the figures below.

POPULATION INCREASE OVER DECADE [6]

Age group	*1986-1996*	*1996-2006*	*2006-2016*
30-40	13.6%	6.0%	-2.2%
40-50	41.5%	13.4%	5.7%
50-60	22.3%	40.9%	13.2%
60-70	7.1%	22.7%	39.8%
70-80	26.7%	6.8%	23.3%
All ages	14.4%	11.6%	9.2%

Between 1986 and 2016, the over 40 population will almost double, while the under 40 population will remain almost static.

The baby boom generation, which has strained education and housing resources over the past 30 years, will soon be transferring its demands to health care.

Fertility

2.13 Approximately 250,000 births occur each year in Australia, equivalent to 1.5% of the population.[4]

There has been a fall in birth rates since the 1960's. In part, this reflects the ageing of the population but the dominant factor has been a decline in the fertility of women of childbearing ages. The table below shows the numbers of births per 1,000 women, for each of the relevant age groups, over the period 1956 to 1987.

AGE SPECIFIC BIRTH RATES [7]

Births per 1,000 Women aged

	15-19	*20-24*	*25-29*	*30-34*	*35-39*	*40-44*
1956-60	44	216	212	126	64	19
1961-65	47	204	207	122	59	18
1966-70	49	173	188	103	47	13
1971-75	48	154	167	85	34	9
1976-80	31	116	144	74	24	5
1981-85	26	101	145	82	25	4
1986	22	90	143	89	27	4
1987	21	85	140	91	29	5

The most significant decline in fertility has been among younger women, but it has been evident at all ages. Recently, there has been some reversal of the trend at ages above 30 years.

Clearly the overall change has reduced demand for obstetric and pediatric health care but has increased demand for contraception and terminations.

Mortality

2.14 There are about 120,000 deaths each year in Australia. The table below shows the pattern of deaths, by cause and age, in 1985.

PATTERN OF DEATHS IN 1985 AT AGES: [8]

Cause	*0-14*	*15-24*	*25-44*	*45-64*	*65+*	*Total*
Numbers:						
Circulatory	65	85	958	8,872	47,548	57,528
Cancer	175	185	1,245	8,663	17,401	27,669
Respiratory	112	61	194	1,392	7,405	9,164
Motor vehicle	269	1,053	829	457	399	3,007
Other accident	242	277	523	510	1,011	2,563
Diabetes	4	5	37	325	1,545	1,916
Gen-urinary	4	9	29	207	1,611	1,860
Birth anomalies	1,790	40	50	47	46	1,973
Other	873	738	1,651	2,474	7,392	13,128
TOTAL	3,534	2,453	5,516	22,947	84,358	118,808
Proportions:						
Circulatory	0.1%	0.1%	0.8%	7.5%	40.0%	48.4%
Cancer	0.1%	0.2%	1.0%	7.3%	14.6%	23.3%
Respiratory	0.1%	0.1%	0.2%	1.2%	6.2%	7.7%
Motor vehicle	0.2%	0.9%	0.7%	0.4%	0.3%	2.5%
Other accident	0.2%	0.2%	0.4%	0.4%	0.9%	2.2%
Diabetes	0.0%	0.0%	0.0%	0.3%	1.3%	1.6%
Gen-urinary	0.0%	0.0%	0.0%	0.2%	1.4%	1.6%
Birth anomalies	1.5%	0.0%	0.0%	0.0%	0.0%	1.7%
Other	0.7%	0.6%	1.4%	2.1%	6.2%	11.0%
TOTAL	3.0%	2.1%	4.6%	19.3%	71.0%	100.0%

It is clear that the principal risk is circulatory disease in persons over age 65, which accounts for 40% of all deaths in Australia. Cancer and, to a lesser extent, respiratory diseases are also significant at older ages.

Morbidity

2.15 Approximately 13% of Australians suffer disabling handicaps, as defined by the Australian Bureau of Statistics in its most recent survey (1988). The proportion varies with attained age, as shown in the following table.

Age group	*Proportion of persons handicapped* [9]
0 - 4	3.3%
5 - 14	6.1%
15 - 29	5.1%
30 - 44	8.4%
45 - 59	16.9%
60 - 64	31.0%
65 - 69	31.9%
70 - 74	39.3%
Over 75	58.2%
Average	*13%*

2.16 The significance of the principal handicaps is summarised in the table below.

	% of handicaps [9]
Musculoskeletal	27%
Hearing	14%
Mental	12%
Circulatory	11%
Respiratory	8%
Sight	6%
Nervous	6%

2.17 Approximately 45% of Australians report suffering chronic conditions.[10] The patterns also vary with age. The table below lists the most common chronic conditions reported in each age group in the most recent ABS survey of such conditions (1977-78).

Age group	*Chronic condition*	*Percentage of group affected* [10]
0-15	Bronchitis	5.0%
	Skin diseases	4.6%
	Asthma	4.5%
	Hay fever	3.1%
15-44	Hay fever	10.3%
	Migraine	6.1%
	Skin diseases	5.6%
	Bronchitis	3.3%
	Asthma	3.2%
	Arthritis	3.2%
45-64	Arthritis	19.5%
	Hypertension	16.2%
	Hay fever	8.5%
	Varicose veins	6.4%
	Deafness	6.1%
	Migraine	5.7%
	Heart disease	5.5%
	Skin diseases	5.2%
65+	Arthritis	31.1%
	Hypertension	20.7%
	Heart disease	16.0%
	Deafness	12.4%
	Varicose veins	6.7%
	Bronchitis	6.6%
	Hay fever	6.3%
	Rheumatism	5.5%

2.18 It is estimated that about 70% of the Australian population takes some "health-related action" every two weeks. A survey conducted by the Australian Bureau of Statistics recorded the following reported actions during a two week period in 1983.

PERSONS WHO REPORTED ACTION [11]

	Males	***Females***
Took medicine	4,497,300	5,612,800
Consulted a doctor	1,145,900	1,525,700
Consulted another professional	429,500	549,900
Consulted another	347,400	407,200
Took days off work	287,800	201,600
Took days off school	180,200	200,800
Population, 1983	7,676,248	7,700,852
Proportion taking action	63%	77%

2.19 The most reported conditions, of people who experienced illness during the two week period referred to in the above survey, are listed in the table below.

Condition	***Proportion of population reporting condition*** [11]
Headache	13.5%
Skin complaint	9.2%
Hypertension	6.8%
Common cold	6.4%
Dental problems	4.2%
Injuries	3.9%
Arthritis	3.7%
Influenza	3.1%

2.20 There has been a marked improvement in dental health following the widespread fluoridation of water supplies. Brisbane is the only capital city in Australia without treated water. The following table shows the proportion of the population using fluoridated water in each state.

State/Territory	*Proportion population using fluoridated water* [12]
New South Wales	81%
Victoria	71%
Queensland	5%
South Australia	70%
Western Australia	83%
Tasmania	77%
Northern Territory	69%
Australian Capital Territory	100%
Australia	*66%*

2.21 The table below shows the trend in the average numbers of decayed, missing or filled (DMF) permanent teeth in 12 year old children in the period 1955 to 1987.

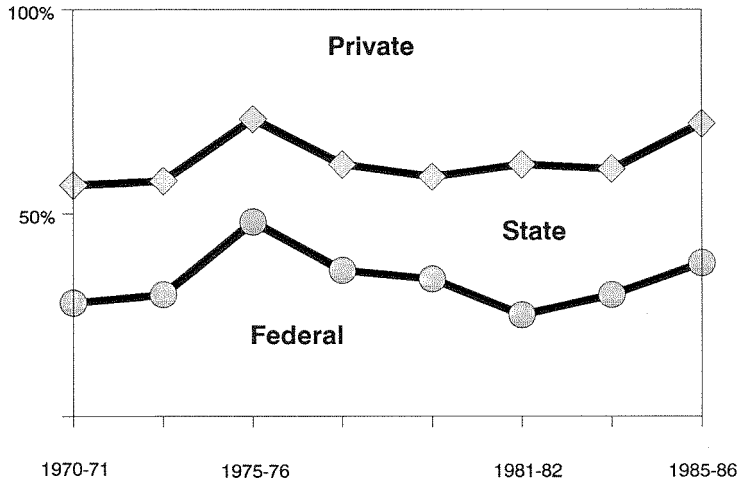
Year	*Average number of DMF teeth in 12 year old children* [13 & 8]
1955	8.8
1977	4.8
1982	3.0
1987	1.0

TOTAL HEALTH CARE EXPENDITURE [15 & 16]

	Federal government	*State/ local government*	*Total government*	*Private sector*	*Total*
Amount ($m):					
1970-71	562	567	1,129	863	1,992
1971-72	690	652	1,342	968	2,310
1972-73	786	744	1,530	1,089	2,619
1973-74	947	962	1,909	1,239	3,148
1974-75	1,274	1,429	2,703	1,529	4,232
1975-76	2,720	1,446	4,166	1,553	5,719
1976-76	2,752	1,663	4,415	2,188	6,603
1977-78	2,712	1,913	4,625	2,845	7,470
1978-79	2,934	2,214	5,148	3,091	8,239
1979-80	3,171	2,426	5,597	3,848	9,445
1980-81	3,644	2,782	6,426	3,798	10,224
1981-82	2,964	4,400	7,364	4,433	11,797
1982-83	3,499	4,614	8,113	5,214	13,327
1983-84	4,498	5,163	9,661	5,278	14,939
1984-85	6,215	5,660	11,875	4,691	16,566
1985-86	6,953	6,364	13,317	5,147	18,465
Proportions:					
1970-71	28%	28%	57%	43%	100%
1971-72	30%	28%	58%	42%	100%
1972-73	30%	28%	58%	42%	100%
1973-74	30%	31%	61%	39%	100%
1974-75	30%	34%	64%	36%	100%
1975-76	48%	25%	73%	27%	100%
1976-77	42%	25%	67%	33%	100%
1977-78	36%	26%	62%	38%	100%
1978-79	36%	27%	62%	38%	100%
1979-80	34%	26%	59%	41%	100%
1980-81	36%	27%	63%	73%	100%
1981-82	25%	37%	62%	38%	100%
1982-83	26%	35%	61%	39%	100%
1983-84	30%	35%	61%	39%	100%
1984-85	38%	34%	72%	28%	100%
1985-86	38%	34%	72%	28%	100%

These proportions are illustrated graphically below.

MIX OF TOTAL HEALTH EXPENDITURE



It is apparent that the government share increased significantly with the advent of Medibank in the mid 1970s, and then after falling back, increased again with the advent of Medicare in the mid 1980s. There has been a shift in the federal/state mix, but the proportion of total government expenditure is now almost as high as it was at its peak in 1974-75.

Components

3.4. The table below shows the major components of the total health care expenditure in 1985-86.

HEALTH CARE EXPENDITURE - 1985-86 [16]

	Federal government	*State government*	*Private sector*	*Total*
Amounts ($m):				
Recurrent:				
Institutional	2,767	4,792	1,706	9,265
Non-institutional	3,665	472	2,714	6,851
Other	447	222	275	944
Capital:	84	879	452	1,415
TOTAL	6,963	6,365	5,147	18,475
Proportions:				
Recurrent:				
Institutional	15%	26%	9%	50%
Non-institutional	20%	3%	15%	37%
Other	2%	1%	1%	5%
Capital:	0%	5%	2%	8%
TOTAL	38%	34%	28%	100%

3.5. The comparative figures for 1975-76 are shown below.

HEALTH CARE EXPENDITURE - 1975-76 [15]

	Federal government	*State government*	*Private sector*	*Total*
Amounts ($m):				
Recurrent:				
Institutional	1,193	1,009	593	2,795
Non-institutional	1,175	38	770	1,985
Other	126	105	83	314
Capital:	214	193	62	469
Total	2,708	1,345	1,508	5,561
Proportions				
Recurrent:				
Institutional	21%	19%	11%	50%
Non-institutional	21%	1%	14%	36%
Other	2%	2%	1%	6%
Capital:	4%	3%	1%	8%
Total	49%	24%	27%	100%

The most significant change in the period has been a shift in recurrent expenditure on institutional care from the federal to the state governments.

4. INSTITUTIONAL CARE

4.1. Institutional care refers to health care services provided in the form of caring accommodation, in a hospital, nursing home etc., where a patient can be kept under continuous observation and treatment by skilled staff.

4.2. Of the $18,465 million spent on health care in Australia in 1985-86, recurrent expenditure on institutional care amounted to $9,264 million (50%). The breakdown of this expenditure is given in the table below.

INSTITUTIONAL EXPENDITURE - 1985-86 [16]

	Federal government	*State/local government*	*Private sector*	*Total*
Amounts ($m):				
Public hospitals	1,116	4,026	431	5,573
Nursing homes	1,086	72	306	1,464
Private hospitals	168	0	810	978
Repat and mental hospitals	319	580	54	953
Other institutions	77	114	105	296
TOTAL	2,766	4,792	1,706	9,264
Proportions:				
Public hospitals	12%	43%	5%	60%
Nursing homes	12%	1%	3%	16%
Private hospitals	2%	0%	9%	11%
Repat and mental hospitals	3%	6%	1%	10%
Other institutions	1%	1%	1%	3%
Total	30%	52%	18%	100%

Obviously, the major item is state government expenditure on public hospitals. The federal government also spends significant amounts on public hospitals and nursing homes.

Public hospitals

4.3. Public hospitals are predominantly government funded and, under Medicare, all Australians are entitled to admission and treatment, without charge, in a public hospital. Public hospitals also accept private patients, who are prepared to pay for the services they receive, and who wish to retain the choice of doctors who treat them in hospital. Most private patients have private hospital insurance but there are also private patients who are compensable at law or under workers' compensation insurance and some patients are not eligible under Medicare (e.g. some foreign visitors).

4.4. As at 30 June 1987, there were 720 public hospitals providing 66,159 beds. Trends over the past 25 years are evident from the following table.

PUBLIC HOSPITALS [8, 17 & 18]

Year	*Number*	*Beds*	*Average bed/ hospital*	*Total population*	*Beds per 1,000*
1963	745	57,842	78	10,969	5.3
1965	753	59,042	78	11,389	5.2
1970	764	62,401	82	12,774	4.9
1975	780	68,727	88	13,893	4.9
1980	791	71,668	91	14,695	4.9
1983	771	74,229	96	15,379	4.8
1984	748	71,054	95	15,650	4.5
1985	745	70,817	95	15,859	4.5
1986	734	69,739	95	16,018	4.4
1987	720	66,159	92	16,178	4.1

The following are significant

- the numbers of public hospitals and beds increased through the 1960s and 1970s, but fell markedly after the advent of Medicare in the early 1980s

- the average size of public hospitals increased through the 1960s and 1970s, but has fallen slightly since 1983

- on a per capita basis, the provision of public hospital beds has *fallen* by almost one quarter over the past 25 years.

4.5. The average size of public hospitals is a little under 100 beds, however the distribution is highly skewed. The table below lists, in order of size, the 8 public hospitals with 900 or more beds, all of which are located in major metropolitan areas:

Name of hospital	*Location*	*No. of beds* [19]	*Type of care*
Prince Henry and Prince of Wales	Sydney	1,253	General, pediatric, infectious diseases
Royal Prince Alfred	Sydney	1,196	General
Princess Alexandra	Brisbane	1,184	General, geriatric, psychiatric
Parramatta/Westmead	Sydney	1,135	General, maternity, pediatric, geriatric, psychiatric, dental
Royal Brisbane	Brisbane	1,104	General, psychiatric, cancer, infectious diseases
Prince Charles	Brisbane	929	General, geriatric, psychiatric
Royal Adelaide	Adelaide	927	General
Royal North Shore	Sydney	900	General

4.6. There are another 60 public hospitals with between 400 and 900 beds. Also, among the major public hospitals are 7 special purpose repatriation hospitals, which cater to members and former members of the Australian armed services and their families, under special Federal legislation. They are as follows.

Name of hospital	*Location*	*No. of beds* [19]
Repatriation General	Sydney	725
	Perth	654
	Adelaide	537
	Brisbane	427
	Melbourne	375
	Hobart	100
Repatriation Mental	Melbourne	174

4.7. The table below shows the number of bed-days provided in public hospitals, to Medicare and private patients respectively, in 1987.

NUMBER OF BED-DAYS IN 1987 (000's) [8]

	Acute	*Long term*	*Total*	*%*
Medicare	9,924	1,305	11,229	70%
Private	3,944	220	4,164	26%
Other			637	4%
TOTAL			16,030	100%

Private hospitals

4.8. Private hospitals are funded mainly from charges to patients who are prepared to pay for the services they receive. Private hospital patients retain the choice of doctors who treat them in hospital and, overwhelmingly, have private hospital insurance. Until recently the federal government provided subsidies to private hospitals based on "occupied approved bed days" but these subsidies were abolished as from 1 October 1986. Minor federal subsidies are now made only to a few private hospitals which have traditionally catered to uninsured patients. State governments play virtually no part in the financing of private hospitals.

4.9. As at 30 June 1987, there were 333 recognised private hospitals in Australia providing 21,427 beds. Trends in private hospital provision over the past 25 years are apparent from the following table.

PRIVATE HOSPITALS [8, 17 & 18]

Year	*Number*	*Beds*	*Average bed/hosp*	*Total population*	*Beds per 1,000 population*
1963	395	11,772	30	10,969	1.1
1965	376	12,251	33	11,389	1.1
1970	322	13,033	40	12,774	1.0
1975	336	16,570	49	13,893	1.2
1980	349	23,004	66	14,695	1.6
1983	341	20,132	59	15,379	1.3
1984	338	20,600	61	15,650	1.3
1985	335	20,724	62	15,859	1.3
1986	333	21,049	63	16,018	1.3
1987	333	21,427	64	16,178	1.3

The following are significant

- the numbers of private hospital beds increased through the 1960s and 1970s, but have virtually stabilised since the advent of Medicare in the early 1980s

- the average size of private hospitals increased through the 1960s and 1970s, and has also stabilised since 1983

- on a per capita basis, the provision of private hospital beds has *increased* by about one quarter over the past 25 years.

4.10. The average size of private hospitals is 64 beds, about two thirds that of the public hospitals. There are only six private hospitals with more than 300 beds. These are listed below.

Name of hospital	*Location*	*No. of beds* [19]	*Type of care*
St John of God, Subiaco	Perth	355	General, maternity
Sydney Adventist	Sydney	317	General
Wesley	Brisbane	314	General, pediatric, cancer
St Francis Xavier Cabrini	Melbourne	310	General
Epworth	Melbourne	307	Acute medical, surgical
St Andrews	Melbourne	306	General, maternity

Nursing homes

4.11. Although nursing homes are mainly private sector institutions, they are effectively government controlled through the provision of finance at the federal level and licensing regulations at the state level. Where subsidies are received, all nursing home patients are required to make a minimum contribution towards the cost of their accommodation and care, related to the social security age benefits for a single person. Some nursing homes are operated by the government itself and the balance of the cost of these, after allowing for patient contributions, is met from government funds. For certain private non-profit nursing homes catering to the disabled, the government covers their approved operating deficits. Other private nursing homes, which meet the conditions for government approval, receive a basic federal government subsidy on a complex formula - essentially designed to put them in a breakeven position if they have 70% of their beds occupied by patients paying the minimum contribution only. A further subsidy of $6 per day is paid for patients who need and receive "extensive care".

4.12. As at 30 June 1987 there were 1,486 approved nursing homes, receiving government subsidies. They provided 75,932 beds. They are summarised in the following table.

	Approved number	*Nursing home beds*	*Average bed/home* [20]
Government	177	14,645	83
Private			
deficit financed	426	19,382	45
other	883	41,905	47
Total:	1,486	75,932	51

4.13. Trends in the provision of nursing home beds over the past 25 years are apparent from the following table.

18, 20, 21 & 22

	Approved Nursing Home Beds				*Population aged 65+ (000's)*	*Beds per 1000 65+ population*
Year	*Government*	*Private*	*Total*	*% Private*		
1963	9,405	16,130	25,535	63%	931	27.4
1965	10,648	20,642	31,290	66%	968	32.3
1970	12,495	30,408	42,903	71%	1,070	40.1
1975	12,593	42,163	54,756	77%	1,207	45.4
1980	14,790	50,348	65,138	77%	1,411	46.2
1983	15,069	57,530	72,599	79%	1,541	47.1
1984	15,218	59,365	74,583	80%	1,584	47.1
1985	14,746	60,456	75,202	80%	1,627	46.2
1986	14,848	60,861	75,709	80%	1,670	45.3
1987	14,645	61,287	75,932	81%	1,713	44.3

The following are significant

- the numbers of nursing home beds has increased threefold in the past 25 years
- the proportion of private sector provision has increased steadily and is now more than 80%
- on a per capita basis, the provision of nursing home beds increased dramatically from 1963 to 1975, but has stabilised since then.

5. NON-INSTITUTIONAL CARE

5.1. Non-institutional care refers to health care services provided by doctors, dentists, nurses, pharmacists and others, where the patient deals directly with the provider of the service, without the intervention of a health care institution such as a hospital or nursing home.

5.2. Figures from the 1986 census show that there are about 450,000 persons employed in the health care industries in Australia, of whom about 250,000 are "professionals". The table below shows a breakdown of the numbers by area of employment and, in the case of professionals, nature of employment.

		No. of persons employed [23]	%
Total:	Hospitals & nursing homes	317,916	70%
	Medicine	64,990	14%
	Dentistry	22,274	5%
	Community health	13,691	3%
	Ambulance	6,158	1%
	Optometry	5,239	1%
	Other	21,594	5%
	Total	451,862	100%
Professionals:	Nursing	185,995	72%
	Medical practitioners	32,788	13%
	Pharmacists	10,637	4%
	Dentists	6,310	2%
	Physiotherapists	5,928	2%
	Radiographers	4,274	2%
	Occupational therapists	2,774	1%
	Optometrists	1,470	1%
	Chiropractors & Osteopaths	1,374	1%
	Speech pathologists	1,322	1%
	Podiatrists	978	0%
	Other diagnosis & treatments	3,881	2%
	Total	257,731	100%

More than two out of three workers in the health care industry are employed in hospitals and nursing homes and more than two out of every three professionals in the industry are nurses.

Medical practitioners

5.3. There are commonly expressed views that Australia is well supplied with medical practitioners and that the supply will increase substantially faster than the population over the next two to three decades. A report of the federal Department of Health in March 1984 estimated that the number of medical practitioners in Australia would increase by 63% between 1981 and 2001, while the population as a whole would increase by only 27% over that period. Various federal government enquiries in recent years have recommended reductions in medical school intakes of between 10% and 20%

The table below, taken from the OECD Economic Survey of March 1987, shows the number of doctors per 1000 of population for a number of countries surveyed.

	Doctors per 1,000 population [5]
Germany	2.5
Sweden	2.5
New Zealand	2.4
United States	2.3
France	2.1
Australia	1.7
Japan	1.3
United Kingdom	0.5

From these figures, Australia does not appear to be "oversupplied" in comparison with other OECD countries.

5.4. It is evident, however, that the proportion of medical practitioners has increased sharply in recent years. The table below shows the numbers of practitioners recorded at each of the last three censuses, and the most recent available estimate.

MEDICAL PRACTITIONERS [24]

	1976	*1981*	*1986*	*10/1988 (Estimate)*
Number	20,480	27,128	32,788	35,506
Population (000's)	14,033	14,923	16,018	16,610
Population/doctor	685	550	489	468

5.5. The table below shows an analysis of doctors, by location and nature of employment, based on data published by Permail P/L in October 1988.

	Metropolitan	*Country*	*Total* [25]
Numbers:			
Private - Fee for service:			
General Practitioners	10,976	5,307	16,283
Specialists	8,787	2,378	11,165
Salaried:			
Hospital	6,071	1,240	7,311
Other	597	150	747
Total	26,431	9,075	35,506
Proportions:			
Fee for Service:			
General Practitioners	31%	15%	46%
Specialists	25%	7%	31%
Salaried:			
Hospital	17%	3%	21%
Other	2%	0%	2%
Total	74%	26%	100%

It is clear that more than half the doctors work in metropolitan areas as GPs or specialists on a fee for service basis. Most of the others work as fee for service GPs in the country or as salaried employees in the metropolitan hospitals.

5.6. The table below shows the areas of practice of the specialists.

Area of practice	*Number employed* [25]	%
Physicians	1,637	15%
Surgery	1,433	13%
Anaesthetics	1,280	11%
Psychiatry	1,270	11%
Gynaecology	975	9%
X-Ray	734	7%
Pathology	733	7%
Eyes	566	5%
Paediatrics	563	5%
Orthopaedic	467	4%
Ear, nose, throat	294	3%
Heart	278	2%
Dermatology	221	2%
Urology	209	2%
Neurology	148	1%
TB & Chest	122	1%
Rheumatism	116	1%
Neurosurgery	78	1%
Allergy	40	0%
Sterility	1	0%
Total	11,165	100%

5.7. Almost all private services by medical practitioners in Australia are covered by Medicare. The table below shows the number and value of relevant services in Australia, processed by Medicare in 1987-88.

Nature of Service	*Total value ($000s)*	*Number (000s)*	*Average value $* [26]
GP attendance	1,183,097	74,841	16
Specialist attendance	474,775	12,227	39
Pathology	469,341	29,252	16
Operations	332,425	3,843	87
Radiology	294,378	5,970	49
Anaesthetics	80,561	2,059	39
Obstetrics	46,483	542	86
Total	2,881,060	127,734	22

5.8. By dividing these totals by the relevant numbers of doctors (27,448)[25] and by the relevant population (16,500,000), the following figures are obtained.

	Number	*Value $*
Total private services (000s)	127,734	2,881,060
Average per doctor	4,654	104,964
Average per person	8	175

In 1987-88 Australians, on average, claimed 8 medical services worth $183 and doctors, on average, provided 4,654 services worth $104,964. Assuming medicare claims cover 85% to 90% of the cost of medical services, the total value of private medical services provided was of the order of $120,000 per doctor.[26]

Dentists

5.9. The table below shows the numbers of dentists recorded in each of the last three censuses and the most recent available estimate.

DENTISTS [24 & 25]

	1976	*1981*	*1986*	*10/1988 (Estimate)*
Number	4,630	5,585	6,310	6,123
Population (000s)	14,033	14,923	16,018	16,610
Population/dentist	3,031	2,672	2,539	2,713

Despite the apparent effectiveness of fluoridation and other preventive measures in reducing dental caries, the number of dentists continued to increase faster than the population as a whole, at least until the mid 1980s. The latest figures from Permail indicate some falling back may now be occurring.

5.10. An analysis of the nature of employment of active dentists, based on 1981 census data, gave the following figures.

	Number [24]	%
Private practice	4,941	93%
Hospitals	233	4%
Other	156	3%
Total	*5,330*	*100%*

5.11. In 1987-88, Medicare processed 3,205 dental claims worth $419,000, on average, per dentist in private practice, of about half a claim and $85 a year. Evidently, Medicare claims represent only a small fraction of dentists' revenues.[26]

Nurses

5.12. Nurses are, by far, the most numerous group of professionals in the health sector.

The table below shows the numbers of nurses recorded in each of the last three censuses. The figures include all forms of nurses, including "nurse aides" and trainees.

NUMBER RECORDED AT CENSUS [23 & 24]

	1976	*1981*	*1986*
Total	117,562	139,434	185,995
Population (000s)	14,033	14,923	16,018
Population/nurse	119	107	86

It is evident that the supply of nurses has grown faster than has the population.

Pharmacists

5.13. Although the 1986 census recorded more than 10,000 pharmacists, only 5,559 pharmaceutical chemists were approved under federal legislation, as at 30 June 1987, for the purpose of supplying prescription drugs and other restricted pharmaceutical items. There were also 81 medical practitioners approved, for the purpose of supplying items in areas where there were no other approved suppliers. Public hospitals and approved private hospitals may also supply restricted items.[8] Total expenditure on restricted items in 1987-88 amounted to $1,083 million, equivalent to $67 per person. Of this, $946 million (87%) was government financed.[13]

5.14. Also, there is an enormous market in pharmaceutical items which do not require medical prescription. An ABS survey in 1983 showed that more than two thirds of the population took medications in a two week period. Usage of common items, not generally requiring a prescription, is shown below.

REPORTED USAGE IN TWO WEEK PERIOD [11]

Form of medication	*Number using (000s)*	*% of population*
Common pain relievers	4,968	33%
Vitamin/mineral supplements	3,825	25%
Skin ointments	1,757	12%
Cough and cold remedies	1,365	9%
Laxatives	1,022	7%
Total population (1983)	*15,167*	

6. HEALTH INSURANCE

6.1. The dominant factors in the health insurance market in Australia are two-fold, namely

- the existence of a compulsory universal health insurance scheme known as Medicare, operated by the federal government
- the strict regulation of the private health insurance industry by the federal government.

Medicare

6.2. Medicare was enacted in its present form by the federal government, in 1983, and commenced operations in 1984. It replaced an earlier, much amended, government health coverage scheme known as Medibank, which dated from 1974.

6.3. Medicare is financed totally from taxation - partly from an earmarked levy of 1.25% of all taxable personal incomes and partly from general tax revenues. Medicare provides basic coverage of 75% (in hospitals) or 85% (outside hospitals) of the "schedule fees", for services provided by private medical practitioners, and provides treatment without charge in public hospitals. Persons relying solely on Medicare coverage in public hospitals do not have the right to choose the practitioners who treat them in hospital. They retain this choice outside hospital.

6.4. Within hospitals, doctors treating Medicare patients are remunerated by the hospitals either by salary or by "sessional" payments, based on time spent on duty rather than according to services rendered to patients. Some groups of doctors, notably orthopaedic surgeons in New South Wales, have refused to accept either salaries or sessional payments and have sought to work in public hospitals on a fee for service basis only or, where patients are genuinely unable to pay, as "honoraries" (i.e. without any payment).

6.5. Outside hospitals, doctors treating patients do so generally on a fee for service basis and may set their own fees and bill their patients directly. Patients may claim refunds from Medicare for the services received and must bear any difference from their own resources. Alternatively, doctors may bill Medicare directly for services rendered to patients ("bulk billing"), in which case they are entitled to the Medicare payments only and are prohibited from charging patients any additional fees. Private "gap" insurance is prohibited for services outside hospitals.

6.6. A feature of Medicare and it predecessor Medibank is an elaborate system of checks on doctors' patterns of treatment aimed at reducing "over" servicing and fraud. This has been seen by some doctors as an unwelcome intrusion into their practices and relationships with patients.

6.7. Details of public hospital usage and of government hospital expenditures have already been given. The table below shows details of medical services reimbursed by Medicare in 1987-88.

MEDICARE SERVICES 1987-88 [26]

Service	*Number (000s)*	*Value ($000s)*	*% Value*
GP attendance	74,841	1,183,097	38%
Specialist attendances	12,227	474,775	15%
Pathology	29,252	469,341	15%
Surgery	3,843	332,425	10%
Radiology	5,970	294,378	10%
Anaesthetics	2,059	80,561	3%
Optometry	2,027	66,013	2%
Obstetrics	542	46,483	2%
Dental	3	419	0%
Miscellaneous	4,037	142,243	5%
Total:	*134,801*	*3,089,735*	*100%*

6.8. The table below shows the trends in payment patterns in the first four years since Medicare was established in its present form.

TRENDS IN MEDICARE CLAIMS 1984-1988 [26]

Year	Total services Number (000's)	Total services Value ($m)	Per capita services Number	Per capita services Value $	% Bulk billed
1985	113,011	2.280	7.12	144	45%
1986	121,353	2.609	7.50	161	49%
1987	128,611	2.883	7.79	175	52%
1988	134,801	3.090	8.00	184	53%
Change pa	6.1%	10.7%	4.0%	8.5%	

6.9. The table below shows the distribution of Medicare claim rates, by sex and age, in the most recent year for which statistics have been published.

MEDICARE SERVICES PER PERSON 1987-1988 [26]

Age group	Males	Females	Ratio F/M
0 - 4	8.21	7.43	91%
5 - 9	4.62	4.59	99%
10 - 14	3.89	4.06	104%
15 - 19	3.89	6.73	173%
20 - 24	4.21	9.63	229%
25 - 34	4.59	10.69	233%
35 - 44	5.40	9.38	174%
45 - 54	7.22	10.67	148%
55 - 64	9.92	12.33	124%
65 - 74	10.81	14.71	136%
75+	14.12	16.64	118%
All	*6.28*	*9.72*	*155%*

6.10. A number of features of Medicare claims experience are evident.

- the number of services claimed has increased faster than the rate of population growth of 2% pa
- the popularity of bulk billing has increased and more than half of all claims are now bulk billed
- the claims experience for females has been significantly heavier than for males, particularly during the child-bearing ages of 15 to 45 years
- claims have been strongly age-related.

Private health insurance

6.11. The regulation of private health insurance is extensive. Those offering health insurance are required to register with federal authorities and must offer a standard schedule of "basic" hospital insurance benefits. "Gap" insurance of medical services provided outside a hospital is prohibited, although it can be offered in association with hospital insurance for medical services rendered within a hospital.

6.12. Premiums, referred to as contributions, can be set at any level but must accord with the "community rating principle" - that is, they must be the same for all policyholders irrespective of age or medical condition. The only protections a private insurer has against anti-selection is the imposition of waiting periods on benefits and the exclusion of pre-existing ailments. These too are also controlled by regulation.

6.13. All private insurers are also required to participate in a pooling arrangement, for sharing the claims of privately insured patients. All hospital benefit claims, for persons over age 65 years, and hospital benefit claims for periods in excess of 35 days in any year for persons under age 65 years, are pooled and borne by all registered health insurers, according to a formula specified by the regulatory authorities.

6.14. The main forms of coverage offered by private insurers are

- basic hospital tables, designed to primarily cover treatment as a private patient in a public hospital
- supplementary hospital tables, designed to upgrade basic hospital tables to cover treatment in a private hospital
- ancillary benefits tables, for items such as gap insurance for private medical treatments in hospital and coverage, of other forms of care such as dentistry, optical, aural, physiotherapy, chiropractic, ambulance, appliances, and pharmaceutical expenses both in and out of hospital.

Following amendments to legislation in 1987, private insurers are now permitted to offer some cheaper forms of coverage using deductibles, but the pricing of these products is still subject to the community rating principle.

6.15. The table below shows the reported number or persons with various forms of private insurance as at June 1988, when a detailed survey was conducted by the Australian Bureau of Statistics.

PRIVATE HEALTH INSURANCE COVERAGE [27]

	Number of persons covered (000s)			
	Single	*Family*	*Total*	*%*
Hospital and ancillary	1,068	5,023	6,091	38%
Hospital only	362	1,247	1,609	10%
Ancillary only	106	399	505	3%
Other	34	64	98	0%
Total covered	*1,570*	*6,732*	*8,302*	*51%*
Not covered	*2,496*	*5,155*	*7,651*	*49%*
% covered	*36%*	*56%*	*51%*	

These figures include all forms of health insurance and include dependants living in family units reporting only single rate coverage.

6.16. The table below shows the recent trend in total persons covered for private basic hospital insurance, since 1983, according to statistics published by the Department of Health and Community Services.

Year ended 31 March	*Persons covered* [8]	*% Population*
1983	9,986	65%
1984	8,415	54%
1985	7,531	48%
1986	7,795	49%
1987	7,915	49%
1988	7,739	47%
1989	7,676	46%

It is evident that

- private insurance is more popular with families than for singles
- the most popular type of coverage is Hospital and Ancillary
- about two thirds of the population had private hospital coverage, before Medicare, but this has now fallen back to less than half the population.

6.17. The tables below show the patterns of health fund coverage, by age income and family status, reported in the most recent ABS survey (1988).

PROPORTIONS OF POPULATION WITH PRIVATE HEALTH INSURANCE [27]

Age (years)	%	*Family income (per week)*	%
15-24	33.8%	<$126	21.8%
25-34	47.4%	$126 - 250	28.6%
35-49	58.1%	$251 - 400	41.9%
50-59	59.6%	$401 - 600	59.5%
60-64	52.2%	$601 - 800	67.3%
65-69	39.0%	$801 - 1,000	74.1%
70+	36.2%	>$1,001	80.5%

FAMILY STRUCTURE

	%
Couple and children	62.0%
Couple only	55.4%
Single only	38.6%
Single and children	23.2%
Total	47.2%

It is evident that coverage is skewed towards those

- of working age, particularly 35 to 60 years
- with high family incomes, particularly above $400 a week
- living in families with two adults.

6.18. In 1988, there were 68 Health Benefits Organisations registered to operate as health insurers in Australia. They fall into three groups

- those operated by the federal government, through the Health Insurance Commission, and known as Medibank Private - there were six such organisations, one in each State
- "restricted membership organisations", generally operated by employer groups for the benefit of their employees -there were 23 such organisations
- other private funds operating for the benefit of the general public in open competition with the other funds - there were 39 such active organisations.

6.19. The market shares held by the three groups were as follows.

AMOUNTS [28]

	Premiums	*Benefits ($000s)*	*Assets ($000s)*
Medibank Private	581,643	467,746	397,378
Restricted	192,191	154,328	111,323
Other funds	1,729,822	1,365,677	989,521
Total	2,503,660	1,987,751	1,498,222

SHARES

	Premiums	*Benefits ($000s)*	*Assets ($000s)*
Medibank Private	23%	24%	27%
Restricted	8%	8%	7%
Other funds	69%	69%	66%
Total	100%	100%	100%

6.20. The table below lists the 10 largest funds. For this purpose, although they are registered as separate organisations in each state, the major funds - such as Medibank Private and MBF - have been treated as single organisations.

Names	*States in which active*	*Contributions* [28] *(000s)*	*% share*
Medibank Private	All States	581,643	23%
MBF	NSW, ACT, QLD, TAS	535,211	21%
HCF	NSW, ACT	232,459	9%
HBA	VIC	195,345	8%
Mutual Community	SA	189,164	8%
HBF of WA	WA	169,993	7%
NIB	NSW, ACT	107,923	4%
Manchester Unity	NSW, ACT, VIC	79,607	3%
ANA	VIC	67,135	3%
Geelong	VIC	25,439	1%
Other Funds		319,741	13%
Total for all Funds		*2,503,660*	*100%*

7. ACKNOWLEDGEMENT

The assembling of all the data of this paper has been a very substantial task. I acknowledge gratefully the assistance of my colleagues at Trowbridge Consulting and in particular my secretaries (Jenny Adams and Janet Pether), who patiently typed all my corrections, and Blair Nicholls who assisted me in assembling the data.

REFERENCES

(1) Australian Institute of Health, *Australia's Health 1988,* AGPS 1989

(2) ABS *Estimated Resident Population, Australia States and Territories, 30 June 1986* (3217.0), ABS, October 1987

(3) ABS *Australian Demographic Trends 1986*, (3102.0), ABS, 1986

(4) ABS *Australian Demographic Statistics, March Quarter 1988*, (3101.0), ABS, July 1988

(5) OECD, *Australia*, OECD March 1987

(6) ABS, *Projections of the Populations of Australia, States and Territories 1984 to 2021*, (3222.0), ABS, May 1985

(7) ABS, *Births Australia 1987* (3301.0), ABS September 1988

(8) Commonwealth Department of Health *Health Statistical Supplement 1986-87,* AGPS 1987,

(9) ABS, *Disabled and Aged Persons* (4118.0), ABS February 1989

(10) ABS, *Australian Health Survey 1977-78 Chronic Conditions* (4314.0) ABS July 1980

(11) ABS, *Australian Health Survey 1983*, (4311.0), ABS 1986

(12) Commonwealth Department of Health, *Annual Report of the Director-General of Health 1982-83*, AGPS 1983

(13) Commonwealth Department of Health, *Annual Report 1987-88*, AGPS 1988

(14) Australian Medical Association, *Medicover, Reform of Australia's Health Insurance Systems,* May 1989

(15) Australian Institute of Health, *Australian Health Expenditure, 1970-71 to 1984-85*, AGPS 1988

(16) Australian Institute of Health, *Information Bulletin No 3*, AGPS 1988

(17) Commonwealth Department of Health *Annual Reports of the Director-General of Health 1963-64 to 1980-81*, AGPS

(18) Commonwealth Department of Health *Annual Report 1985-86*, AGPS 1986

(19) Peter Isaacson Publications Pty Ltd *Hospitals & Health Services Year Book and Equipment Catalogue*, 1988, Peter Isaacson Publications Pty Ltd

(20) Commonwealth Department of Health, *Annual Report 1986-87*, AGPS 1987

(21) Commonwealth Department of Health, *Private Nursing Homes in Australia*, AGPS 1984

(22) Commonwealth Department of Community Services *Statistical Supplement to the Report December 1984 - June 1985*, AGPS 1986

(23) ABS *Census Data*, Microfiche 1986

(24) ABS *1981 Census of Population & Housing*, Unit Record File Validation Tables, ABS 1982

(25) Permail Pty Ltd, *Medical Practitioner Listing*, Permail, October 1988

(26) Health Insurance Commission, *Annual Report 1987-88*, November 1988

(27) ABS, *Health Insurance Survey Australia June 1988*, (4335.0), ABS, October 1989

(28) Department of Community Services & Health, *Operations of the Registered Health Insurance Organisations Annual Report 1987-88*, AGPS, May 1989

GERONTH INSURANCE By B.W. Walker, FIA,FSS,ASA,FIAA

Gerontology - the scientific study of old age and the process of ageing and of old peoples special problems - **Oxford Dictionary.**

1. INTRODUCTION

1.1 There have been major improvements in health and longevity in Australia in the second half of this century. These changes have occurred because of:

a) improvements in public health measures in areas of sanitation, pure food and water, fluorodation, refrigeration of meat, packaging, vaccinations. etc.

b) major improvements in medical techniques in prevention, diagnosis and treatment of illnesses, disease and accidents.

c) changes in community attitudes to health, fitness and harmful substances.

1.2 The long term effects of the changes in health and longevity are considerable. It will take decades for the full impact of these changes and the more recent reductions in fertility rates, to be completely understood by the community. In the meantime, there will, no doubt, be even more important changes to our environment, public health and medicine which will almost certainly lead to further increases in health and longevity.

1.3 The actuarial profession, has a responsibility to the public of Australia to ensure that our governments and institutions recognise the long term financial impact of demographic changes in our society. We also have a duty to assist our governments and institutions to design appropriate financing mechanisms to meet the long term cost consequences of the changes in health and longevity. Hitherto, the profession has risen to the occasion in respect of the more immediate problem, the expected increases in the numbers of retired people in Australia. Much actuarial endeavour is now involved in post retirement income funding in one form or another. So far, however, very little actuarial effort in Australia has gone into determining the financial effects of the expected increase in numbers of very old people many of whom will become frail and will then have very considerable personal, health and financial needs.

1.4 This paper is written with the object of stimulating the actuarial profession into designing very long term geriatric or "geronth" insurances as one important contribution to the financing the considerable care needs of elderly Australians in their last and often very dependent years. The paper only discusses the design and actuarial issues of "geronth" insurance, leaving marketing, underwriting, investment and other issues for later papers.

1.5 Before commencing on the technical details of this paper, I must acknowledge Australian Reinsurance Co. Ltd who have allowed sections of a report prepared for them in March 1990 to also be used in this paper.

1.6 **Contents**

The Contents of the Paper are:-

2. THE IMPACT OF THE CHANGING AGE STRUCTURE OF THE AGED

2.1 A phenomena which is common to many industrialized countries is the increasing proportion of the aged populations - usually referred to as "over 65's" - who are very old, ie. over 85. The same phenomena is also starting to occur in Australia as in 1990 only 7.7% of the over 65 population are over the age 85 but within 20 years 12.2% of the over 65 population will be over the age 85. Table 1 shows the changes as indicated by the D series of the Australian Bureau of Statistics [1]. Series D has the lowest fertility and population migration rates of the four series that are published. The two series of inwards migration rates used by Australian Bureau of Statistics give virtually the same numbers of projected very elderly persons in the projection period.

2.2 The rate of growth of the population over age 85 will average around 3.3% per annum for the next 40 years. This should be contrasted with the rate of growth of the Australian population as a whole of less than 0.7% per annum over the next 40 years (Series D) or around 0.9% per annum (Series C) which has the higher inwards migration assumptions. Figure 1 provides a vivid picture of the changes in structure of the population by the year 2010. Figure 2 shows the more startling changes to the year 2030. Both these figures are based on the Series D projections. Using Series C would have mainly caused the graphs to shift slightly upwards at the younger ages.

2.3 The "baby boomers" do not really start to impact the numbers of persons over age 85 until the 2030's so we can expect that after year 2030 the rate of growth of the over age 85's will again increase. Male baby boomers can also be expected to have considerably increased longevity as the strongest and fittest of this generation of Australian males has not been culled out by any major war.

2.4 These changes in numbers of very old persons in Australia will have considerable impact on health care expenditure, particularly the costs of Medicare, as both medical and hospital expenses of the very old are very much greater than for the population generally. To illustrate this Figure 3 uses data published by the Australian Institute of Health and Figure 4 uses data provided by the Health Insurance Commission. In interpreting the data on medical services, it should be appreciated that medical services provided to public hospital patients who are not private patients are provided by the hospital and therefore, do not get recorded by Medicare. As almost all very elderly persons are currently not covered by health insurance their true medical costs are very considerably understated as almost all medical services provided in hospital to these persons are not recorded, whereas, for the population under 65, only between 50 and 60% of medical services provided in hospital would not be recorded in the medicare data.

2.5 The changing structure of the aged will have a major impact on the provision of long term care in Australia. The remainder of this paper looks at the issues of long term care and long term care (geronth) insurances. The paper concludes that Australian Life Offices should now be preparing to market long term care (or Geronth Insurances) to the Australian public.

TABLE 1

PROJECTED ELDERLY AUSTRALIAN POPULATION

At June 30	MALES OVER AGE 65	80	85	90	FEMALES OVER AGE 65	80	85	90
1990	815461	125218	42430	10426	1093107	246368	105323	34206
1995	948109	166010	58406	14331	1228056	303904	128740	40308
2000	1024254	195005	77590	19913	1314142	350343	163179	51214
2005	1108893	237769	89766	26449	1413128	418434	188967	66908
2010	1235893	270599	110492	30204	1559367	469397	230656	78114
2015	1455382	279936	125057	37613	1814881	492702	260128	98320
2020	1658561	304046	127441	42306	2088141	536966	272650	111894
2025	1878028	354322	140809	42598	2389133	623888	304693	118050
2030	2077642	443792	168063	48154	2685735	785367	367211	137249

ELDERLY AUSTRALIAN POPULATION AS % OF TOTAL - SERIES D PROJECTIONS

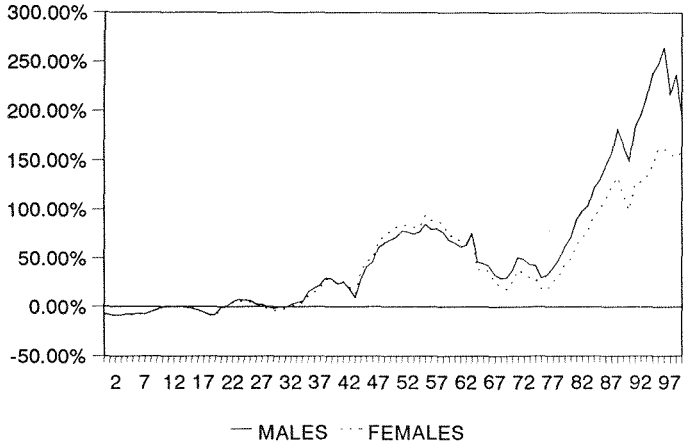
At June 30,	MALES OVER AGE 65	80	85	90	FEMALES OVER AGE 65	80	85	90
	%	%	%	%	%	%	%	%
1990	9.58	1.47	0.50	0.12	12.81	2.89	1.23	0.40
1995	10.39	1.82	0.64	0.16	13.42	3.32	1.41	0.44
2000	10.71	2.04	0.81	0.21	13.69	3.65	1.70	0.53
2005	11.16	2.39	0.90	0.27	14.14	4.19	1.89	0.67
2010	12.05	2.64	1.08	0.29	15.07	4.54	2.23	0.75
2015	13.80	2.66	1.19	0.36	17.00	4.62	2.44	0.92
2020	15.38	2.82	1.18	0.39	19.03	4.89	2.49	1.02
2025	17.13	3.23	1.28	0.39	21.29	5.56	2.72	1.05
2030	18.76	4.01	1.52	0.43	23.51	6.88	3.22	1.20

AVERAGE ANNUAL GROWTH IN ELDERLY AUSTRALIAN POPULATION

5 Years to June 30,	MALES OVER AGE 65	80	85	90	FEMALES OVER AGE 65	80	85	90
	%	%	%	%	%	%	%	%
1995	3.06	5.80	6.60	6.57	2.36	4.29	4.10	3.34
2000	1.56	3.27	5.84	6.80	1.36	2.88	4.86	4.91
2005	1.60	4.05	2.96	5.84	1.46	3.62	2.98	5.49
2010	2.19	2.62	4.24	2.69	1.99	2.33	4.07	3.15
2015	3.32	0.68	2.51	4.49	3.08	0.97	2.43	4.71
2020	2.65	1.67	0.38	2.38	2.84	1.74	0.94	2.62
2025	2.52	3.11	2.02	0.14	2.73	3.05	2.25	1.08
2030	2.04	4.61	3.60	2.48	2.37	4.71	3.80	3.06
40 Years to 2030	2.37	3.21	3.50	3.90	2.27	2.94	3.17	3.53

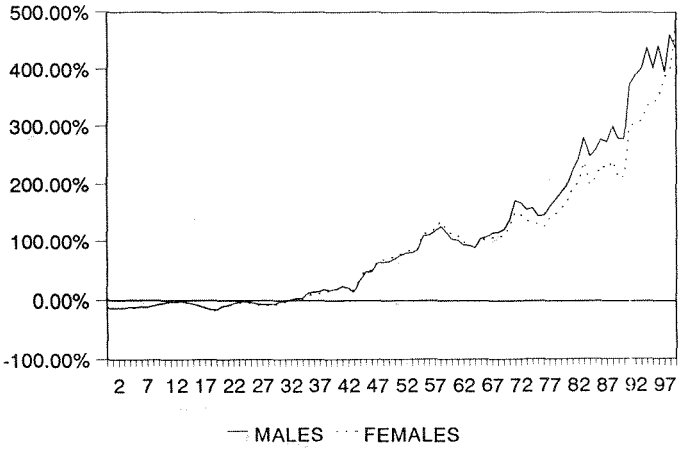
40 Years to 2030 Average Annual % increase in total population:- (Series D) 0.66% (Series C) 0.94%

PERCENTAGE INCREASE IN AUS. POPULATION 1990 - 2010 A.B.S. - SERIES D - FIG. 1



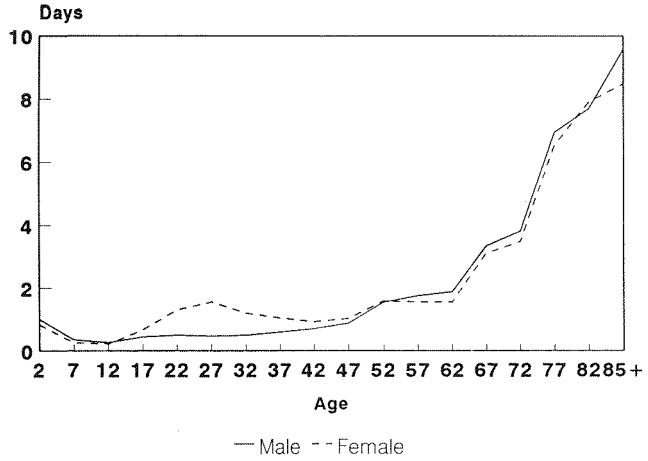
(Source - Aust Bureau of Statistics)

PERCENTAGE INCREASE IN AUS. POPULATION 1990 - 2030 A.B.S. - SERIES D - FIG. 2

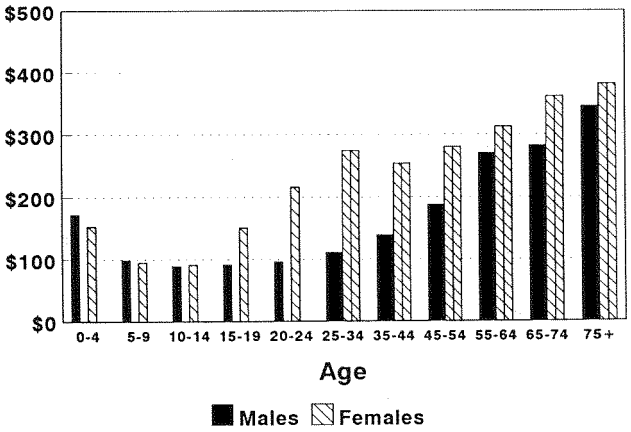


(Source - Aust. Bureau of Statistics)

HOSPITAL UTILISATION DAYS PER ANNUM BY AGE IN N. S. W. - 1985 (est.) - FIG. 3



AVERAGE MEDICARE BENEFITS PAID FOR 1988/89 FINANCIAL YEAR - FIGURE 4



Source - H.I.C. 1988/89 Annual Report)

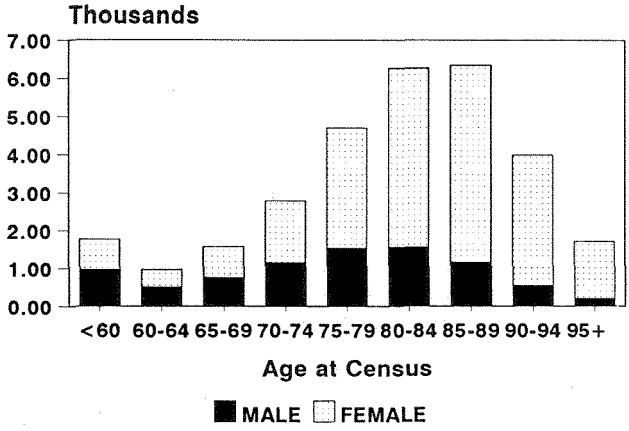
3. THE DEMAND FOR LONG TERM CARE

3.1 Let's assume, for the time being, that long term care is long term nursing home care or nursing home type care in a hospital. Long term care census data has been obtained by the New South Wales State Department of Health [2], and has been analyzed to examine the proportions of the population by age who require long term care, as well as admission rates by age and average lengths of stay by age. The summarized raw data is provided in Appendix 1.

3.2 The New South Wales long term care census data that has been used in this exercise relates to a census of all nursing home and nursing home type patients on 4th November 1987 and consists of 30,381 patient records of which 30,059 were patients that had stayed or were expected to stay institutionalized for at least 5 weeks. The balance being 322 patients were either respite care patients, patients convalescing after hospitalization, or short term terminal illness patients. The patients that had stayed or were expected to stay at least 5 weeks were then classified into age and average lengths of expected stay obtained assuming that on average, the patients had been in long term care for half the total length of stay, as at the night of the census. This assumption was tailored by an indicator on each patient record, which indicated whether the patient was expected to have a total length of stay of more, or less than 6 months (a third indicator indicated expected length of stay less than 5 weeks). Where, for a patient, the indicator suggested the total length of stay was expected to be less than 6 months, and twice the length of stay on census night was greater than 6 months, then the total expected length of stay was set at 6 months exactly. The data was then analyzed by sex and age at census night, as well as age at admission and expected length of stay to obtain numbers at each age on the census night, at each age admitted and average length of stay on admission. Figure 5 shows the numbers of patients by age group that were nursing home or nursing home type hospital patients on the day of the census.

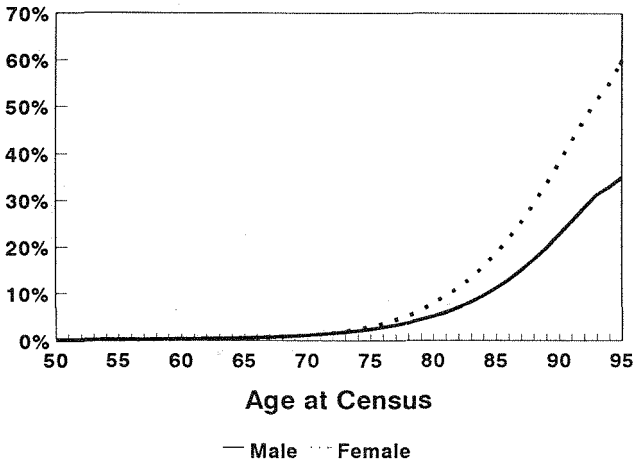
3.3 The numbers in long term care at each age on the census night (4th November 1987) were then compared with New South Wales census data at 30 June, 1986 projected to November 1987, to obtain approximate proportions of persons in long term care in New South Wales. Figure 6 illustrates the results of this study and shows how after about age 75 the proportion of the New South Wales population in long term care starts to increase rapidly with age. The graph only shows data up to age 95, as the data becomes very scanty beyond that age. It would appear, though, at very advanced ages around 50% of males and almost 100% of females are in some form of long term care.

NUMBERS OF LONG TERM NURSING PATIENTS 1987 CENSUS (N.S.W.) - FIGURE 5



Total Number of Patients - 30,381

LONG TERM NURSING PATIENTS % OF POPULATION BY AGE - FIGURE 6



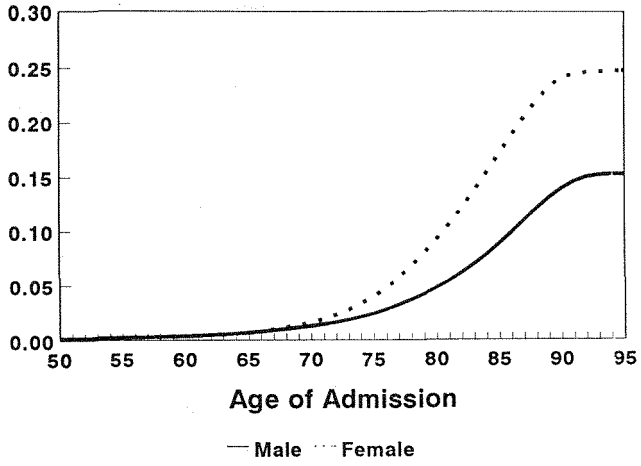
3.4 To obtain male and female admission rates into long term care, a double decrement table was set up with the decrements being admission to long term care and death. The broad assumptions underlying the use of this technique are:

(a) the rate of mortality by age is the same for long term care patients and persons who are not in long term care. The Australian life table 1980 - 82 [3] was used as the mortality basis. This assumption is not too unreasonable, given the reduced external stresses on a person when they are admitted into long term nursing care. But note that generally people who enter long term care at a relatively young age will generally be in very poor health and thus experience above average mortality. On the other hand people who enter long term care at an advanced age will probably experience below average mortality.

(b) once a patient is in long term care, the patient is in long term care until death. This assumption is usually thought to be reasonable and the elimination of short term (under 5 weeks durations) patients from the data analyzed enable a greater reliance on this assumption. Note, though, that the average lengths of stay (Figure 8) are generally shorter than the expectation of life for the few who enter at a young age and longer than the expectation of life, for those persons who are the majority, who enter long term care at very advanced ages. Part of this phenomena will be due to some younger patients being rehabilitated and discharged from the institution. Appendix 1 data excludes the under 5 week duration patients.

(c) a long term care patient, once admitted to a particular institution, remains in that institution. This assumption is generally valid for older nursing home patients particularly after the first few weeks. Some new patients do find a particular nursing home is not to their liking and transfer to another in the first few weeks. Hence, the elimination of stays of under 5 weeks duration helps to reduce this effect. The data, however, also includes 2,533 long term patients of acute hospitals (both public and private) and 325 patients of long term public institutions (rehabilitation units, hostels, etc). Some long term patients of the acute hospitals can be expected to be transferred to nursing homes, and so their lengths of stay are generally shorter than average nursing home patients lengths of stay. In calculating the average lengths of stay, the exclusion of acute hospital patients appreciably increased the average lengths of stay of the remaining patients, so the average length of stay data shown in this report excludes acute public and private hospital long term patients.

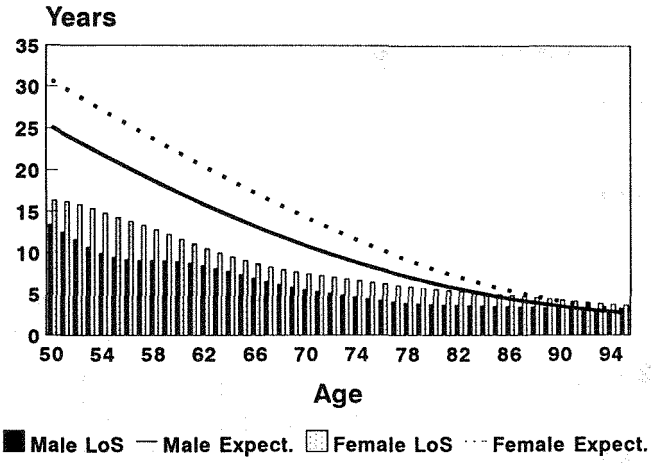
LONG TERM NURSING PATIENTS ADMISSION RATES - FIGURE 7



3.5 Figure 7 sets out the admission rates by age of admissions for males and females. Admission rates start to rise rapidly after age 75 for females especially, and keep climbing to around age 95 where they tend to level off at around .4 for the remaining population not already in long term care. For males the admission rates appear to level off at around .15 after age 95. Because the data is very scanty at the very advanced ages the admission rates produced by this data at the very advanced ages should not be relied on.

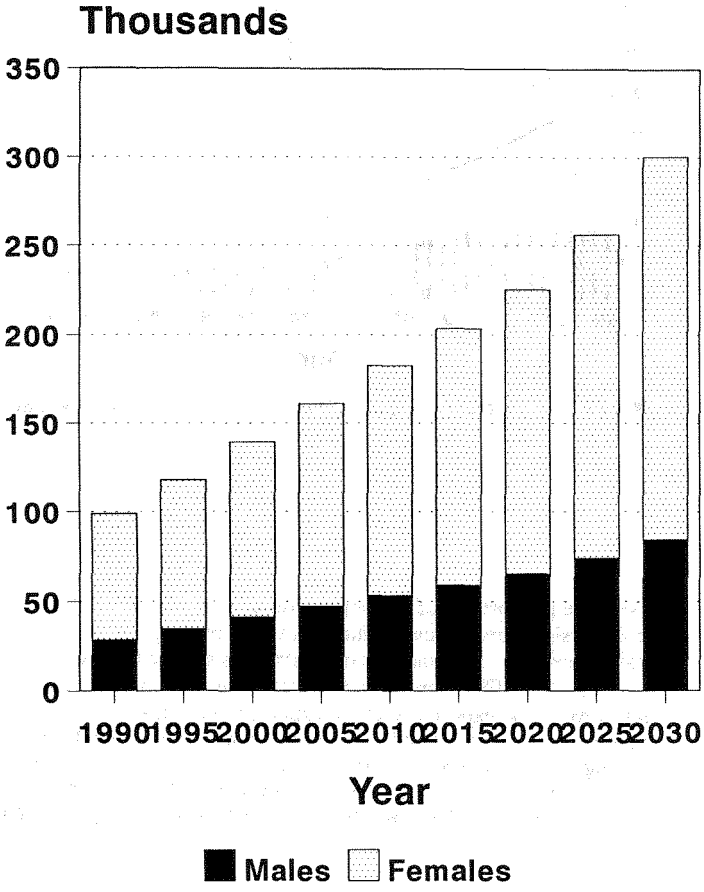
3.6 Figure 8 sets out the average lengths of stay by age for long term care and these show quite clearly the expected effect of reducing average lengths of stay by age of admission. Also included in Figure 8 is the expectation of life at each age. It should be noted that at all ages up to about around age 85 the length of stay of patients is less than the expectation of life at that age. This is probably reasonable since some patients will be rehabilitated and others discharged into other forms of care such as acute hospitals, hostels, other nursing homes and domiciliary care. Also, the broad assumption in 3.4 (a) may not be quite correct, the mortality rates of persons who do not become institutionalized could well be lighter than the mortality rates of persons who do. The data shown in figures 6, 7 and 8 has been graduated by Spencers 21 term graduation formula with some minor hand polishing of the rates above age 92 where required.

LONG TERM NURSING HOME PATIENTS LENGTH OF STAY & EXPECTATION OF LIFE - FIG 8



3.7 Using the proportions of the population at each age group that are in long term nursing care in New South Wales, and making the bold assumptions that the experience of the rest of Australia is similar to New South Wales, and that the 1987 New South Wales long term nursing statistics are indicative of the experience to the expected in Australia in the future, then Figure 9 provides the results of a projection of the demand for long term nursing care from 1990 to 2030. The projection shows that the number will increase more than 40% in the first 10 years to the year 2000, by 85% in the first 20 years to 2010 and by over 200% in the 40 years to 2030.

LONG TERM NURSING HOME PATIENTS AUSTRALIAN PROJECTION TO 2030 - FIG. 9



3.8 The numbers in Figure 9 for 1990 can be approximately reconciled with existing data for 30 June, 1989. The following details have been obtained or estimated at 30 June, 1989.

Long Term Care Patients in Australia

at 30 June, 1989

Nursing Home Patients	72,335
Long Stay Patients in Hospitals	6,000 est
Domiciliary Care Beneficiaries	28,000 est
	106,335

3.9 The long stay patients in hospitals has been estimated from Commonwealth data on the numbers of nursing home type patient bed days in both public and private hospitals in 1988/89. The Domiciliary Care Beneficiaries has been estimated by the Commonwealth Department of Community Services and Health. Domiciliary care benefits are paid to carers of patients living in their own homes, who would otherwise have been admitted to nursing homes.

3.10 Of the approximately 40,000 patients in hostels in Australia an unknown number would be admitted to nursing homes if a bed was available, but a further unknown (but possibly smaller) number of nursing home patients require a level of care that is more appropriately provided in a hostel setting. Figure 9 therefore, provides a conservative estimate of the projected numbers of long term nursing patients in Australia, less conservative figures would be as much as 20% higher.

4. FEATURES AND ISSUES OF LONG TERM CARE

There are five (5) major forms of long term care provided in Australia:-

- Nursing Home Care
- Nursing Home Type Patient Hospital Care
- Hostel Care
- Domiciliary Care
- Psychiatric Institutional Care

4.1 Nursing Home Care

This is the most prevalent form of long term care provided in Australia. There were 72,716 approved nursing home beds in Australia at 30 June, 1989. These are split into three (3) categories:

a)	Private Enterprise, Religious and Charitable	(42,069 beds)
b)	Religious and Charitable funded through National Health Act	(17,362 beds)
c)	Government	(13,285 beds)

Each are funded by the Commonwealth Government as follows:

NURSING HOMES

Recurrent funding in 1988/89 by Commonwealth Government

	$000	Per Bed P.A. $	Average Per Bed Per Day $
a) Private	766,520	18,211	51
b) Religious and Charitable	348,150	20,052	56
c) Government	175,060	13,177	40
	---	---	--
TOTAL	1,289,730	17,737	50

The principal differences in funding are as follows:

a) and b) The private homes are currently deficit financed but new funding arrangements from 1 July, 1991 will treat the funding of categories a) and b) equally, except for a small number of nursing homes that will have special arrangements. From 1 July, 1991 the funding of non-government nursing homes will be such that the nursing home will charge the patient an amount equal to 87.5% of the standard pension plus rental assistance (currently $20.15 per day) and the remaining costs of the nursing home should be met by Government funding assistance via a rather complicated formula that is determined by the category of each patient. There are five (5) such categories which are determined by the level of dependency i.e. need for nursing of a patient.

c) The level of Commonwealth funding for State Government nursing homes has now been frozen since 1 July, 1985 so that State Governments now participate more in the funding of these homes than prior to 1985/86. Again, the fee charged by State Government nursing homes cannot exceed the standard fee of 87.5% of the pension plus rental assistance (currently $20.15 per day). There is no requirement, however, for State Government Nursing homes to charge the full 87.5% of the pension.

Special arrangements are provided for a small number of exempt nursing homes which will be able to charge higher fees in return for a lower subsidy from the Commonwealth. The Commonwealth subsidy will be reduced by 50c for every $1.00 charged above the standard fee formula. Eight (8) homes in New South Wales are currently in the special arrangements which at present are to be limited to 6% or 7% of the nursing home beds.

4.2 Nursing Home Type Patient Hospital Care

A patient in a hospital becomes a nursing home type patient if the patient has been in hospital more than 35 days and is no longer receiving "acute care" as certified by the patient attending doctor, and as prescribed under Section 3 of the Health Insurance Act 1973. The principal effect of this legislation is to ensure that nursing home type patients in hospitals have no financial incentive to remain in hospital when a bed become available to them in a nursing home. There are approximately 1800 - 2000 privately insured patients who are currently long term nursing home type patients in hospital and around 4000 long term nursing home type patients who are not insured in public approved hospitals. Of the privately insured patients around 2/3rds are in private hospitals and 1/3rd are in public hospitals. A nursing home type patient is required to pay the hospital at least the standard fee, currently $20.15 per day, and the same amount that would be payable in the majority of nursing homes.

The remaining costs for private patient hospitalization are met by health fund benefits of $80.80 per day, (private hospitals) and from around $35.00 to $70.00 per day depending on the state in which the patient is hospitalized (for public hospitals).

The remaining costs of treating non-insured patients are met by the State Government and in effect by the Commonwealth Government via the Medicare Agreement funding arrangements which provide a block grant to the State Government determined by the demographic characteristics of that state.

4.3 Hostel Care

Hostel care is an additional form of residential care suitable for persons less dependent than nursing home patients. There is, however, some overlap at the present time, but recent changes in the admission requirements to nursing homes and hostels will considerably reduce the number of patients that are inappropriately in a nursing home or a hostel. There were 42,421 approved hostel beds in Australia at 30 June, 1989 making the total Commonwealth subsidized residential care beds at just over 115,000 beds at that date. Approved hostels receive a level of funding from the Commonwealth Government which is much lower than nursing homes.

COMMONWEALTH SUBSIDIES TO HOSTELS

Category of Care	**Daily subsidy from 7/89**
Hostel Care	$ 2.45
Personal Care	$17.25
Respite Care - Hostel	$ 9.25
- Personal	$21.55

For approximately 50% of patients hostels would be receiving the personal care subsidies, although the proportion of patient in personal care varies considerably from hostel to hostel.

Approved hostels are permitted to charge patients more than 85% of their pension and rental assistance but patients must be permitted to keep at least $20.15 before tax per week out of their pension and other income.

The balance of funding for hostel care comes from "up front" charges to enter a hostel. There is a Government requirement that hostel residents may not be charged "up front" fees that absorb all their assets. At present, they must be left with at least $15,500 in assets and residents with less than $15,500 can not be charged an "up front" fee at all. There are also refund requirements where a prospective resident who has paid a fee subsequently decides not to enter the hostel or where residents leave after a period of residence.

4.4 Domiciliary Care

There are two (2) forms of Commonwealth assistance to the frail or disabled aged who decide to remain in their own homes. The first is the Domiciliary Care Benefit program which provides $21.00 per week to the carer of a patient who has remained at home and who would otherwise require admission to a nursing home. Approximately 28,000 - 30,000 persons are in receipt of this subsidy which costs the Commonwealth Government approximately $30 - $35 million p.a. The Domiciliary Care Benefit is not regarded as income for income tax purposes.

The second program is the Home and Community Care (HACC) program which is a joint Commonwealth and State Government program and is funded 57.5% by the Commonwealth Government. It is designed to provide a range of care options outside residential care to the aged and disabled. Funding is for the provision of home help and personal care; home maintenance and modification; food services; community respite; transport services; community paramedical services; community nursing; assessment and referral; education and training for service providers and users; and information and co-ordination. In 1988/89 the Commonwealth Expenditure on this program was $205.1 million and the States expenditure was $144.5 million. The HACC program is designed to provide a social structure outside of nursing homes and hostels to enable more aged persons that would otherwise be admitted for residential care to remain in their own homes, and, as such, provides services to many whose carers receive the domiciliary care benefit and, presumably, to many other frail and disabled persons.

4.5 Psychiatric Institutional Care

Long term care patients with Alzheimer's disease or with mild forms of senile dementia and other milder organic psychotic conditions are usually managed in nursing homes and, in some cases hostels. Elderly people with more severe psychoses such as schizophrenia and manic disorders including paranoid and depressive types usually have to be treated in state run psychiatric institutions. The numbers in psychiatric institutions are relatively few, (less than one half of one percent of long term care patients in the New South Wales census referred to previously), and their complete needs are taken care of by the state. Where patients with milder forms of psychotic diseases are cared for in nursing homes, there is often additional caring expenses which have to be met by the nursing home, but are further subsidized by Government.

5. AUSTRALIAN GOVERNMENT POLICY ISSUES

The main government policy issues to be considered in the development of long term care insurance in Australia are:-

- Regulation and Control of Long Term Care Beds
- Admission Controls
- Taxation
- Pension Means Test
- Health Insurance

5.1 Regulation and Control of Long Term Care Beds

Each state government has its own licensing procedure for hospital nursing home and hostel beds. Where these beds are to receive subsidies from the Commonwealth Government then the Commonwealth Government also exercises controls. In practice this means that the Commonwealth must approve all hospital beds, all nursing home beds and most hostel beds. Some hostels (of a kind) appear to operate without Commonwealth approval. It is theoretically possible, however, for a state licensed nursing home to be set up and operated without Commonwealth approval, but the costs, which must be borne by the patient (or relatives) make this proposition rather unviable at the present time.

5.2 Admission Controls

Admission criteria to long term stay government funded institutions has been progressively tightened since the mid 1980's, and now all nursing home admissions have to be geriatrically assessed by a geriatric assessment team, or in some locations, a Commonwealth Medical Officer. The key aspects of this assessment are:

- accurate medical diagnosis and provision of appropriate medical management of disabling conditions;
- accurate description of the person's disabilities, as well as their capability to perform activities of daily living, and the provision of appropriate retraining/rehabilitation; and
- accurate description of the family, social and community supports available to the person.

The guidelines for approval of admission to a nursing home provided by the Commonwealth Department of Community Services and Health [4] (written in 1987) indicated that many current nursing home patients required only personal care which could be adequately provided in a hostel and that the release of these patients to hostels would enable long term nursing home type patients in hospitals to be relocated in nursing homes. The guidelines also suggested that the optimum number of nursing home beds for persons over age 70 is 40 per 1000 persons and that the current provision was around 70 per 1000 persons.

Government policy is to have combined nursing home and hostel beds for about 100 of each 1000 persons over aged 70. Government policy, however, may not be taking into account the increase in the proportions of the very old in the numbers of persons over age 70, and the impact that will have on the general demand for residential accommodation for the aged as a whole.

5.3 Taxation

Any benefit payments provided in the form of income to disabled aged persons will be taxed as income and may affect any government pension that is payable. On the other hand, any benefit payments that are made as a reimbursement of expenses incurred in obtaining long term care services should not be taxed. If the insurance principally provides income benefits it would be equitable for the premiums paid for long term care insurances to be wholly or substantially tax deductible. If the insurance provides both income and capital benefits (eg. a death benefit) then only a proportion of the premiums could possibly be allowed as a tax deduction. If the insurance, on the other hand, principally provides expense reimbursement benefits and/or capital benefits then the premiums paid for the insurance could not be tax deductible.

Whilst the Australian Taxation Office's treatment of the benefits of long term care insurances is reasonably clear, the office's treatment of premiums for income type policies is not so clear. The important ruling relates to disability income insurances and is IT208 (1981) which resulted from the decision of the High Court in the Federal Commission of Taxation v. D.P. Smith 81 ATC 8114. The ruling states that *"The decision (to allow tax deductibility of premiums) should be applied in all cases where tax payers have paid premiums in respect of personal disability insurance policies which provide for payment of periodic benefits of an income nature during a period of incapacity. The insurance policy under consideration by the High Court did not provide for non assessable benefits such as a lump sum payment in the event of death, permanent disablement, loss of limb, etc. so that the previous instruction to disallow premiums to the extent that they provide such benefits remains operative".* This ruling was also backed up by IT2270 (1986) which stated that *"Deductions should be allowed for premiums in respect of personal disability policies providing for payment of periodic benefits of an income nature where those benefits would be assessable in Australia".*

Advice from the Australian Taxation Office, however, suggests that considerable care should be exercised in interpreting the current law and rulings in relation to long term care income benefit products. Design of the policy documents will be critical and the law (or rulings) may have to be developed in conjunction with the development of these insurance contracts.

It will be important that the appropriate persons in the Australian Taxation Office are consulted prior to the launching of any products that provide income benefits with the expectation that the premiums will be deductible. The issues which will be important in the design of these products are:-

- The essential nature of the product is the same as a disability income policy.
- There is no capital benefit (ie. no death benefit lump sum total disability benefit, loss of use of limb benefit etc).
- There is no surrender value.
- There is no expense reimbursement benefit (ie. benefits that would not be taxable).

If the Australian Taxation Office does allow tax deductibility of premiums for long term care income type policies then it will need to be very certain that these policies are not going to be used as a device to perpetrate "tax rorts". It should be remembered that the life insurance industry does not have an exemplary record in this regard.

If policies that combine both a capital content and an income content are desired then perhaps the capital content of the contract could be paid for by a clearly distinct premium (even a single premium) to ensure that there is a clear distinction between the two classes of benefits and premiums.

Whilst there will be a requirement that the income benefit contracts do not have a surrender value it would still be theoretically possible to have some form of non forfeiture arrangements should an insurer wish to reduce its lapse rates and protect the interests of the insureds' during downturns in the Australian economy.

A further tax deduction issue may arise if the premiums of income type long term care insurances are to be paid by a third party.

5.4 Pension Means Test

The benefits of an income supplement insurance will directly affect the old age pension if the insurance beneficiary is in receipt of the pension. However, expense reimbursement benefits probably would not affect the old age pension. This means that the designer of a long term care insurance product should take into account whether the intended insureds are those persons who are most likely to have substantial superannuation provisions or persons who, through the lack of superannuation, expect to "be on the pension".

If the long term care insurance has a surrender value then this amount will probably also count as an asset for the pension assets test. This may be an important issue for some pensioners.

In the longer term, if substantial amounts of long term care insurances are sold in Australia, some changes might occur to social security legislation to enhance the attractiveness of long term care insurances as the Commonwealth Government would see long term care insurance as the private sector alternative to the public section funding of long term care. Future major savings to Commonwealth long term care outlays would be a strong incentive for some minor tinkering with the Social Security Act 1947 to increase the incentives for would be pensioners to carry this form of insurance.

5.5 Health Insurance

If a long term care insurance policy was to provide income benefits, then this policy would be classed as sickness and accident insurance business, and as such, would not be regarded as health insurance business - the same as other disability income policies. If on the other hand, the policy was to provide a reimbursement of costs of care for long term care patients, then it could be regarded as being "health insurance business" as currently defined in Section 67 of the National Health Act, 1953. If, however, the policy was clearly not providing benefits for the provision of medical and hospital services, then the general principles by which Section 67 of the National Health Act was designed would not be infringed.

Long term care insurance business is not business an open registered health insurer would wish to participate in, while it is required to community rate its traditional health insurance business, because the provision of long term care insurance would attract and retain a high claiming membership to its traditional health insurance benefit tables.

To ensure that an expense reimbursement long term care policy does not infringe Section 67 of the National Health Act, it may be necessary to obtain the advice of the Department of Community Services and Health on the wording of the proposed contract and it may also become necessary for the Minister of Community Services and Health to make an appropriate prescription under the definition of "health insurance business" - clause e of the Act.

To obtain this change it will be necessary for a strong case for the change to be made to the Secretary of the Hospitals and Insurance Branch of the Commonwealth Department of Community Services and Health.

It should be noted that breaches of Section 67 of the National Health Act carry a fine of up to $20,000 per day and that actions regarding such breaches may be taken by any person or organisation in Australia.

6. DEFINITION OF DISABLEMENT

There are several possible ways of defining disablement for the purpose of commencing benefit provision under a long term care contract. When determining the definition, it will be important to weigh up the moral hazard aspects of the definition with the Commonwealth Government Policy and the community interest generally. Partial disablement conditions, exclusions and waiting periods also need to be decided when defining disablement.

6.1 Alignment to Government Policy

A definition that would align an insurer to Commonwealth Government Policy would be as follows:-

"Disablement means being sufficiently in need of nursing and personal care services, such that, in the opinion of the geriatrician or a psychogeriatrician advising the insurer, the insured would be admitted to a government subsidized nursing home".

This definition would expose the insurer to risks associated with changes in Government policy. Whilst policy changes are only expected to make it harder and harder for a frail aged person to enter a nursing home, a future socialistic government could significantly expand its aged persons residential care program, relax it requirements for entry into a nursing home and cause significant difficulty for insurers who have adopted this form of definition. One way of overcoming this disadvantage would be to add the words *"at the date of issue of this Policy"* at the end of the definition to ensure that the policy conditions did not change with government policies. This form of appendix to the definition however, could well work against the office if government policies were to change to make it significantly harder on medical and social grounds to be admitted to a nursing home.

6.2 Office Criteria Definition

A definition which ensure an office's independence from government policy would be as follows:

"Disablement means being sufficiently in need of nursing and personal care services, such that, in the opinion of the insurer having regard for the advise of the geriatrician or psychogeriatrician advising the insurer the patient should be admitted into a nursing home".

The danger with this form of definition is that the public may possibly see it as being insufficiently objective. However, this objection might be overlooked if the insurer is a large well known Australian based financial institution - since such an insurer would find it difficult to use disablement criteria significantly different from that which the public would ultimately regard as reasonable.

6.3 Objective Definition of Disablement

An objective definition of disablement would spell out the degree of disablement required to trigger benefit commencement, such a definition might be along the following lines.

"Disablement means:

a) being unable to independently perform any part of five or more of the following six activities of daily living:-

- *ambulating by walking with aid or wheelchair.*
- *transferring to/from chair/bed/wheelchair.*
- *bathing/showering/washing.*
- *dressing/undressing.*
- *eating,*
- *toileting; or*

b) being unable to independently perform any part of four or more of the six activities of daily living in a) and is substantially incontinent at least once per day with either urine or faeces or both; or

c) being unable to independently perform any part of two or more of the six activities of daily living in a) and being unable to be left unattended for more than eight hours at a time, due to a chronic organic psychotic condition that frequently causes wandering and/or other severe forms of disruptive behaviour that is not able to be controlled by medication; or

d) being unable to independently perform two or more of the six activities of daily living in a) and being permanently confined to bed and requiring attention more than six times per day to prevent or care for pressure areas".

This form of definition has very different social implications to the definitions that are generally used in the United States which invariably require the insured to be institutionalized. See Appendix 2.

6.4 Partial Disablement

It would be possible to allow partial disablement of say a) 50% benefit if the five, four, two and two activities of daily living in a), b), c) and d) in the disablement definitions are reduced to four, three, one and one respectively. If the definition of partial disablement was relaxed much beyond this, the claim rate of the insurance would significantly increase.

6.5 Exclusions

It would be reasonable to exclude from benefit disablements substantially caused by or attributed to excessive intake of alcohol or non prescribed drugs. It would not, however, be reasonable to exclude conditions such as Alzheimers or Picks disease of the brain or any of the pre-senile dementias, arteriosclerotic dementias and the like.

An AIDS exclusion would also not be unreasonable in this form of insurance, although it would have little, if any, utility. An insurer would however, need to be careful about excluding psychotic mental disorders, such as schizophrenia and manic disorders as these conditions in themselves would not necessarily lead to disablement according to the objective definition above. Excluding unnecessary psychiatric conditions could well cause a community reaction against the long term care insurance product.

A pre-existing exclusion for say the first two years of the contract would be a desirable feature. A longer term pre-existing exclusion would, however, be seen as quite unfair in the Australian environment.

6.6 Waiting Periods

Two forms of waiting periods could be built into long term care insurances. The first would be in respect of the first year or more after the insurance commenced. Some policies issued in the USA have waiting periods of up to 10 years from inception before benefits can be paid. These lengthy waiting periods are usually scaled down at older ages. This waiting period could be tailored to coincide with any selection assumptions in the premium rates.

The second waiting period would be in respect of a period from the date the insured became disabled (ie. date of geriatric assessment) to the date the benefits commence. This period, often called the elimination period, might be 60 or 90 days. It would mean in the case of an insured entering a nursing home a period of time (the elimination period) would have to be served prior to the benefit payments commencing. This elimination period is important as it acts as a deterrent to early claims as in the case of an insured entering a nursing home approximately $80 - $100 (1990 dollars) per day would needed to be paid by the insured during the waiting period, before benefits commenced.

6.7 Rationale behind the Objective Definition Approach

Attachments A & B (pages 61 - 63) are the assessment parts of the forms known as the Application For Nursing Home Admission (NH5) and the Resident Classification Instrument (NH4). The NH5 is designed to measure the dependency level of the applicant and is part of the geriatric assessment process, whereas, the (NH4) is designed to measure the level of need of a nursing home patient for the purposes of funding from the Commonwealth Government.

There is an elaborate weighting system for the answers on the NH4 which was determined from a national trial of the Resident Classification Instrument in 1987. The weighting system enables the prediction of the persons overall service need.

The weightings for each response are shown in Table 2 below.

TABLE 2

Question	Response Weighting			
	A	B	C	D
Q 1 Transfer	0	1.23	2.51	4.37
Q 2 Ambulation	0	0.54	1.11	1.75
Q 3 Toileting	0	1.48	2.57	4.71
Q 4 Bathing	0	0.42	1.01	2.48
Q 5 Dressing	0	0.82	1.90	4.21
Q 6 Eating	0	1.79	3.00	4.20
Q 7 Incontinence-Urine	0	0.43	0.62	1.00
Q 8 Incontinence-Faeces	0	1.05	1.49	1.75
Q 9 Pressure Care	0	2.63	5.02	6.91
Q 10 Special Nursing	0	0.64	2.37	4.97
Q 11 Behaviour	0	1.50	5.05	8.67

The zero score in A does not mean that the patient has "no service need". It is simply a reference point for ranking needs.

To determine the patients overall service need, the scores for each question are added together.

Nursing home residents are classified into five (5) categories depending on their overall score as set out below.

Residents Total Score	Category
0 - 13.99	5
14.00 - 24.87	4
24.88 - 33.31	3
33.22 - 39.94	2
39.95 - 45.02	1

Recent policies of the Commonwealth Government appear to suggest that category five (5), patients could gradually be shifted out of nursing homes into hostels, and possibly also category four (4).

An objective definition of disablement should therefore, attempt to exclude from benefit those persons who, if the RCI was applied, would score less than around say 14 or 15.

The objective definition outlined in section 6.3 has been developed by approximately applying the weightings of the RCI to give, in a rather crude form, results which would tend to fit in with current Commonwealth Government Policy.

An indication of the percentages of nursing home patients in each category in each state was provided by the Commonwealth Department of Community Services and Health as at January 31 1981 and is detailed in Table 3. Just over 44,000 residents had been assessed on the RCI, 47% of these residents were admitted prior to July 1988 when Geriatric Assessment became virtually mandatory.

TABLE 3

Classified Residents
State by Category
All Current Residents as at 28 February 1990

STATE	CATEGORY				
	1	2	3	4	5
	%	%	%	%	%
NSW	5.4	20.8	34.0	24.1	15.5
VIC	10.1	31.6	41.0	14.3	3.1
QLD	5.4	25.0	40.4	19.3	9.9
WA	9.0	28.9	29.7	21.4	11.0
SA	8.0	28.4	36.0	19.0	8.7
TAS	6.4	23.9	35.2	23.5	11.0
NT	8.6	27.6	26.7	17.1	20.0
ACT	17.1	34.4	30.2	12.8	5.2
AUST	6.9	25.1	36.2	20.6	11.1

The sum of individual items may not total 100 per cent due to rounding.

7. POLICY DESIGN ISSUES

The main design issues to be considered when drafting a long term care policy include:

- The Central Strategy of Government.
- Ordinary or Superannuation Business.
- Stand Alone Policy or Rider Benefit.
- Benefit Inflation.
- Automatic Benefit Commencement.
- Moral Hazard.
- Joint Life Option.

7.1 Central Strategy

Central to the Commonwealth Government's long term strategy for the management of the frail aged is to match the provision care with the needs of the patient. This should be central to the strategy of the insurer, and so the benefit provision should, at the very least, provide no financial incentives for any particular provision of services, and preferably provide incentive for rehabilitation, restoration of function and self-help, rather than incentives to become more dependent, particularly if that dependency is to be subsidized by Government. This means that the benefits should be designed to encourage patients to remain at home and become less dependent, or at the very least use accommodation and services which have little or no impact on Government finances ie. use residential accommodation and nursing care that is not subsidized by Government.

There will be two types of long term care benefits:- income type benefits, which will conform with the central strategy of the design of these contracts, and expense reimbursement benefits, which will require a very careful design if they are to remain adequate and conform with the central strategy. Expense reimbursement benefit contracts are predominately issued in the USA and European countries because of the lack of comprehensive and controlled geriatric assessment arrangements in those countries.

7.2 Ordinary or Superannuation Business

Another issue that will impinge on the design of the long term care product is whether the product should be provided as ordinary or superannuation business. If the benefits are to be paid as income to persons who have retired from the workforce, then a case could be mounted for a form of long term care benefits that are provided as an adjunct to the benefits of a superannuation scheme.

Since the initial market for a superannuation product is likely to be amongst persons who can expect superannuation benefits that are close to the Reasonable Benefit Limits, it will be necessary to have some negotiations with the Insurance and Superannuation Commissioner before products of this type can be offered as superannuation business.

A further complication in the development of superannuation long term care products, will be the taxation treatment of benefits for reimbursement of long term care expenses. Since these benefits would generally not be taxable, but the premiums, or a substantial proportion of them will have been paid out of pre-tax income, then the extent to which a superannuation long term care product could provide such benefits would have to be extremely limited - or the taxation commissioner would have to make a ruling that the reimbursement of expense benefits are taxable income.

7.3 Stand Alone Policy or Rider Benefit

Long term care insurance could be written as a comprehensive policy, or as a rider benefit. In a comprehensive policy, the long term care cover would be the main (or only) benefit. The policy would, theoretically acquire a surrender value after a number of premiums had been paid, but the taxation status of the premium would probably be changed if such a surrender value was available. Active life policy reserves would be built up in the same manner as "disability" insurance, though, they would be at a somewhat greater level. The policy could be sold for a single premium, a fixed or inflation linked annual premium, or a fixed or inflation linked annual premium with a provision for reduced premiums after retirement and/or a one time "top up" benefit option provision on retirement if the insured takes the option to not reduce the premiums.

A rider benefit on the other hand could be attached to an existing regular whole of life or universal life product, and would enable the sum insured to be advanced in the form of an income stream or benefit payments to the life insured if the life insured becomes disabled according to the policy definition. This advancement of the sum insured could be either by an interest bearing lien on the policy (similar to non forfeiture provisions) or a true advancement of the sum insured (similar to dread disease riders) in which case the premiums of the rider benefit would reflect the additional interest costs of converting part of the death benefit into a possible income stream prior to death. A long term care rider benefit to an existing whole of life policy that has been in existence for a considerable number of years, could also be paid for by a one time (or periodic) deduction from the policy value (and hence its sum insured and/or bonuses).

7.4 Benefit Inflation

Long term care policies will be very long term insurances. A policy may cover the insured for 50 or 60 years, or even longer if it is issued to a person under 40. There will be no point in issuing policies that do not provide benefits that are realistic at the time they are needed, therefore, benefits will have to be adjusted periodically (probably annually) in line with inflation. This may be done in two (2) ways.

Firstly, a benefit inflation factor should be built into the premium rate, and secondly, the policies should have an additional built in mechanism for providing benefit increases, which might be by some form of benefit commencement bonus. This would be like a terminal bonus on a whole of life or endowment contract, but accruing from the time the benefits are commenced.

Long term care insurance products could therefore be designed as a form of "with profit" insurances.

7.5 Automatic Benefit Commencement

A feature of long term care insurances, which would be very attractive, is an automatic benefit eligibility clause. This clause would make the benefits automatically payable at an advanced age, say at age 95, irrespective of whether the insured was eligible for benefit under the disablement definition. This feature would cost very little and would be seen as a reward feature for continued good health and longevity. It would also get over the initial pricing problems that arise out of the paucity of data at the very old ages. Many Australian life officers already have a policy of paying out the proceeds of whole of life insurances at an advanced age, so this suggested clause would only extend this common practise.

7.6 Moral Hazard

If a long term care insurance product is to provide benefits as reimbursement for services rendered, then it will be very important to design the benefits in such a way that any level of moiety does not unduly influence the insured or the persons advising the insured to excessively use a particular service, particularly if that service is going to cost the insurer much more than an alternate service. It may, therefore, be important to include a co-insurance amount of a reasonable level, say 20% to reduce the moral hazard exposure.

Insurers would also be able to influence the provision of services in particular directions by careful design of benefit structures and their associated co-payments and co-insurance. This, however, will be extremely difficult to accomplish unless policy conditions allow benefit changes to be made "on the run", but if the insurer gives itself too much flexibility it will run the risk of generating a good deal of suspicion about the value of its product.

7.7 Joint Life Option

The need for institutionalisation is considerably reduced when a frail aged person has a live in carer. Often the carer will be the marriage partner and the continued existence of the marriage appears to have the effect of slowing the onset of frailty. It would be reasonable to offer a joint life option which would be cheaper than two stand alone contracts. The joint life option's premiums could also be paid until the death of the survivor of the marriage.

8. TECHNICAL ACTUARIAL BASES

Technical actuarial bases need to be considered for:

- Net Premium Rates.
- Gross Premium Rates.
- Reinsurance.
- Reserves.

8.1 Net Premium Rates

The calculation of the net premium basis of a long term care insurance policy will require consideration of the following factors. Illustrative Net Premiums are provided in Tables 4 and 5.

The Underlying Morbidity Basis

Whilst the morbidity basis provided in this paper will enable an actuary to develop net premium rates for long term care insurances, the basis should not be used without adjustment for the particular features of the policy and the intended underwriting standards. Further morbidity data will become available in the second half of 1990. It is anticipated that this morbidity data will provide a more reliable basis on which to set premium rates for these contracts. It will be critical for the viability of the long term care insurance product that the morbidity basis be not understated. The morbidity basis for the net premium rates in tables 4 and 5 are included in Appendix 3.

Mortality Table

The underlying mortality table will also be important as the long term care incidence rates will be affected. The incidence rates in Appendix 3 have conservatively used ALT 80-82 as the mortality basis. Using a life insurance mortality basis reduces the incidence rates and hence the net premium rates. The choice of the mortality table will depend on the underwriting standards to be adopted.

Marriage Status

The marriage status of an insured will have a considerable effect on the likely morbidity experience. Adjustments to the incidence rates are appropriate for singles as compared to couples. Also premiums for couples can be payable until the last survivor is deceased.

The Net Interest Rate

The net interest rate assumption will be critical to the viability of the proposed long term care insurances given the very long term nature of these products. Issues of appropriate types of investment, marketing and whether the product is unit linked will need to be considered before determining the interest rate assumptions.

The Benefit Inflation Rates

The benefit inflation rate may be varied before and during periods of claim. The relationship between the benefit inflation rate and the net interest rate will be very important. As long term care costs are likely to rise faster than inflation the "gap" between the net interest rate and the benefit inflation rate should probably be quite small unless a benefit commencement bonus is contemplated. A unit linked approach would be one method by which a guaranteed benefit inflation rate could be avoided.

The Premium Term

The premium term might be limited for the duration of the contract or the premium might be waived whilst benefits are being paid. Also the premiums may be structured to reduce on normal retirement age or at some other age after retirement, or after a fixed term.

The Premium Inflation Rate

If benefits are to be increased from time to time the premiums should be increased as well, perhaps by the same order.

Smoker/Non Smoker

Smoker/non smoker assumptions could be included in the calculation of premium rates. The proportion of smokers is, however, very small at advanced ages and the ratios of smoker/non smoker long term care incidence rates and lengths of stay are unknown, and no data appears to be available as to the effect previous smoking habits might have on the incidence of requiring long term care let alone the length of stay in long term care. It could well be that the incidence for former smokers is much higher but the average duration is much lower. Until data on these issues becomes available these products should not be smoker/non smoker rated. Such data is unlikely to be available for at least 10 to 15 years.

Illustrative Net Premiums

Tables 4 and 5 set out some specimen net single and annual renewable premiums for a long term care benefit of $400.00 per week escalating on average 4% p.a. using a net interest rate of 8% p.a. and assuming automatic benefit payment from age 95. The incidence and length of stay rates are those included in Appendix 3 with the underlying mortality rate being ALT 80-82.

The annual premiums are assumed to increase by 4% p.a. and at age 65 the premiums are assumed to reduce to 25% of what they would have otherwise been. For couples the premiums are assumed to be paid until the death of the survivor. The premiums are not assumed to be waived during any benefit period.

TABLE 4

Long Term Care Net Single Premium Rates

Automatic Benefit Payment from Age 95 (Benefit $400.00 a week)

Age	NET SINGLE PREMIUMS Male	Female	Couples	Age
30	8,072	20,729	28,801	30
31	8,333	21,468	29,801	31
32	8,599	22,229	30,828	32
33	8,870	23,014	31,884	33
34	9,144	23,823	32,967	34
35	9,421	24,655	34,076	35
36	9,699	25,512	35,211	36
37	9,977	26,392	36,369	37
38	10,253	27,296	37,550	38
39	10,527	28,222	38,750	39
40	10,797	29,170	39,966	40
41	11,061	30,135	41,197	41
42	11,321	31,118	42,439	42
43	11,575	32,117	43,692	43
44	11,826	33,131	44,956	44
45	12,073	34,160	46,233	45
46	12,317	35,207	47,524	46
47	12,560	36,271	48,831	47
48	12,802	37,358	50,160	48
49	13,044	38,470	51,514	49
50	13,286	39,613	52,899	50
51	13,530	40,791	54,321	51
52	13,774	42,009	55,783	52
53	14,016	43,270	57,286	53
54	14,256	44,574	58,830	54
55	14,489	45,922	60,412	55
56	14,714	47,311	62,025	56
57	14,928	48,738	63,666	57
58	15,130	50,197	65,328	58
59	15,320	51,683	67,003	59
60	15,498	53,185	68,683	60
61	15,664	54,691	70,355	61
62	15,817	56,190	72,007	62
63	15,958	57,660	73,617	63
64	16,086	59,081	75,167	64
65	16,201	60,429	76,630	65
66	16,304	61,677	77,981	66
67	16,395	62,793	79,188	67
68	16,471	63,746	80,217	68
69	16,534	64,496	81,030	69
70	16,578	65,005	81,583	70

Interest Rate	=	8.00%
Escalation Rate (prior to payment)	=	4.00%
Escalation Rate (when being paid)	=	4.00%
Premium Escalation rate	=	4.00%

TABLE 5

Long Term Care Net Annual Premium Rates

% of Premium after Maximum Age 65 = 25% (Benefit = $400.00 a week)

Age at Entry	NET ANNUAL PREMIUM Male	Female	Couples	Age
30	413	1,030	1,395	30
31	432	1,080	1,461	31
32	452	1,133	1,530	32
33	473	1,190	1,603	33
34	496	1,250	1,680	34
35	520	1,314	1,762	35
36	544	1,382	1,849	36
37	570	1,454	1,941	37
38	598	1,532	2,038	38
39	627	1,614	2,142	39
40	657	1,702	2,251	40
41	688	1,796	2,367	41
42	722	1,896	2,491	42
43	757	2,004	2,623	43
44	794	2,120	2,764	44
45	834	2,244	2,916	45
46	877	2,379	3,080	46
47	924	2,525	3,257	47
48	974	2,685	3,450	48
49	1,029	2,861	3,662	49
50	1,090	3,056	3,897	50
51	1,157	3,272	4,157	51
52	1,231	3,515	4,448	52
53	1,315	3,790	4,775	53
54	1,409	4,103	5,147	54
55	1,516	4,461	5,572	55
56	1,638	4,877	6,061	56
57	1,780	5,363	6,630	57
58	1,948	5,940	7,302	58
59	2,150	6,635	8,104	59
60	2,399	7,487	9,081	60
61	2,717	8,559	10,298	61
62	3,137	9,950	11,855	62
63	3,726	11,832	13,921	63
64	4,614	14,532	16,804	64
65	6,122	18,761	21,117	65

Interest Rate	=	8.00%
Escalation Rate (prior to payment)	=	4.00%
Escalation Rate (when being paid)	=	4.00%
Premium Escalation Rate	=	4.00%

A selection effect has been allowed for in the premium rates. This selection effect would be matched by policy waiting period conditions. The selection effect is:

Curtate Duration Since Issue	Incidence Rate is Multiplied by
0	0
1	0.1
2	0.2
3	0.3
4	0.4
5	0.5
6	0.6
7	0.7
8	0.8
9	0.9
10 +	1.0

Some long term care insurance products have waiting periods as long as 10 years. This form of increasing benefit during the waiting period would seem a lot fairer and would, hopefully fit in with the expected requirements of the Australian Taxation Office, which would not allow tax deductibility if the insured is committed to pay premiums for many years before a benefit could ever be paid.

The premium rates provide for immediate payment of benefits from date of geriatric assessment of insureds who meet the comprehensive definition of disablement.

8.2 Gross Premium Rates

The definition of Gross Premium rates should be carried out using projection techniques. The following additional factors will need to be taken into account.

Commission Rates

Since long term care insurances will be an entirely new insurance product in Australia, there is an opportunity for life insurers to reduce the commission expectations of their intermediaries, at least in respect of this product.

Is it a pious hope that actuaries certifying premium rates for these new insurances will only certify initial commissions that are on average considerably less than the first year's premium? Commission rates could be a function of the initial value of the weekly benefit. Perhaps initial commissions of 2 times the initial value of the weekly benefit limited, including overriders etc., to the first year's premium would be a start in the right direction!

Other Expense Loadings

Office expense loadings will be for the management of the policy while it is in force plus the management of any benefit payments to be made. There will also be an up front underwriting cost and a periodic (or perhaps one time) cost of the geriatric assessment of claimants. The expense should be linked to the premium rates if premiums are to be increased periodically or they may be changed from time to time under a unit linked approach.

Lapse Rates

If there is no surrender value attaching to the contract then the lapse rate assumption will be very important. Lapse rate assumptions should be ultra conservative, ie. low, until some underlying experience is obtained.

Non Forfeiture

If there are non forfeiture arrangements built into the policy then some assumptions will need to be made about the extent of use of these arrangements and the costs of conserving and reviving the business.

Marketing

The target market for long term care insurance products is probably the 45-65 age group. Further research is needed into the socio economic status of the likely buyer of this product. Perhaps couples who have finished putting their children through private schools would be likely buyers of this product. USA marketing experience with long term care insurance products might be relevant. The age, sex and married status of projected applicants will be important although projection techniques should also be employed for individual ages.

Profitability

A profit factor should be built into the gross premium rates. This should be greater than normal levels for life insurance products to include an innovation profit margin. Perhaps the profit level could be some fixed (high) percentage of the commissions costed into the premium rates.

8.3. Reinsurance

Insurance products for long term care may provide substantial and increasing amounts of benefits for very long periods of time. The statistics illustrated in Figure 8 of this report have shown that average lengths of stay could be greater than 20 years for persons entering long term care at an early age. Actual lengths of stay by admission age will vary considerably, and it will not be impossible for a person being admitted for benefit at age 70 to receive benefits continually for 30 or more years. If the average benefit paid in this case was $400.00 per week in current dollar terms, then the total benefits paid could be more than $625,000 in current dollar terms. Actual monetary payments would be much greater as benefit inflation factors will have to be built in to the benefit design if the insurance benefits are to be realistic to the insured when and if they become payable.

Despite the substantial data upon which premiums can be based in Australia, providers of long term care insurance will still be moving into a relatively unknown and uncertain area of insurance, and therefore, caution will need to be exercised. Long term care products providing benefits that are meaningful should be reinsured until sufficient experience has been gained. Because of the very long term nature of these products, it will be 30 - 40 years before sufficient claims experience will have been obtained to verify the accuracy of the premium basis.

8.4 Reserving Bases

Long term care insurance products will need two (2) reserving bases as do disability income insurances. There will be a reserving basis which will need to be set up for " not currently eligible for benefits" or "active life" insureds which will take into account latest available data on the incidence of becoming eligible for long term care, and the duration of such care where the duration may in fact be the expectation of life at that age. There will also be a reserving basis for "currently eligible for benefits" or "on claim" insureds which should be an increasing annuity of the average benefit payable for the duration of life of the insured (or perhaps the expected length of stay).

The National Association of Insurance Commissioners in the USA have included the following in the reserve standards section of their long term care model insurance regulation.

When long term care benefits are provided through the acceleration of benefits under group or individual life policies or riders to such policies, policy reserves for such benefits shall be determined in accordance with ..... Claim reserves must also be established in the case when such policy or rider is in claim status.

Reserves for policies and riders ..... should be based on the multiple decrement model utilizing all relevant decrements except for voluntary termination rates. Single decrement approximations are acceptable if the calculation produces essentially similar reserves, if the reserve is clearly more conservative, or if the reserve is immaterial. The calculations may take into account the reduction in life insurance benefits due to the payment of long term care benefits. However, in no event shall the reserves for the long term care benefit and the life insurance benefit be less than the reserves for the life insurance benefit assuming no long term care benefit.

In the development and calculation of reserves for policies and riders .....due regard shall be given to the applicable policy provisions, marketing methods, administrative procedures and all other considerations which have an impact on projected claim costs, including, but not limited to, the following:

1. *Definition of insured events;*
2. *Covered long term care facilities;*
3. *Existence of home convalescence care coverage;*
4. *Definition of facilities;*
5. *Existence or absence of barriers to eligibility;*
6. *Premium waiver provision;*
7. *Renewability;*
8. *Ability to raise premiums;*
9. *Marketing method;*
10. *Underwriting procedures;*
11. *Claims adjustment procedures;*
12. *Waiting Period;*
13. *Maximum Benefit;*
14. *Availability of eligible facilities;*
15. *Margins in claim costs;*
16. *Optional nature of benefit;*
17. *Delay in eligibility for benefit;*
18. *Inflation protection provisions; and*
19. *Guaranteed insurability option.*

Any applicable valuation morbidity table shall be certified as appropriate as a statutory valuation table by a member of the American Academy of Actuaries.

The development of reserving basis for long term care insurances will undoubtably be the subject of much actuarial literature in the future.

9. CONCLUSIONS

9.1 The population of Australia that is in the oldest age groups is going to increase at a phenomenal rates over at least the next 50 years. This "gerontification" of grey Australia will create new demands and new opportunities for actuaries and insurers.

9.2 One new form of insurance that should find a ready market is long term care or "geronth" insurances. These insurances will give very old dependent persons who require so much expensive care a measure of choice and financial independence.

9.3 Provided "geronth" insurances are carefully and sensibly developed a new and very significant long term risk business will eventuate. The new form of long term risk business could well be regarded as being a traditional form of life insurance business in the future.

APPENDIX 1

Admission Age	MALE LIVES			FEMALE LIVES		
	Number	Total Days To Date	Total Days Expected	Number	Total Days To Date	Total Days Expected
0	24	12,880	25,673	33	2,792	5,516
1	5	1,443	2,821	4	203	406
2	2	436	872	6	932	1,864
3	5	827	1,649	6	4,301	8,602
4	5	1,390	2,780	5	3,205	6,397
5	1	465	930	6	266	532
6	3	4,250	8,467	2	387	774
7	1	21	42	1	3,596	7,192
8	1	2,280	4,560	4	5,913	11,826
9	2	1,649	3,298	3	2,615	5,230
10	7	9,273	18,546	7	15,534	31,068
11	2	1,393	2,786	2	225	295
12	3	10,272	20,544	1	2,564	5,128
13	4	2,640	5,280	1	2,220	4,440
14	3	2,903	5,806	2	11,038	22,076
15	2	2,608	5,216	5	11,671	23,342
16	9	37,454	74,908	8	28,885	57,770
17	10	15,215	30,365	7	7,508	15,016
18	18	33,664	67,285	4	9,653	19,205
19	10	5,739	11,432	7	7,665	15,330
20	10	32,072	64,144	12	29,075	58,121
21	11	13,919	27,838	5	23,692	47,384
22	15	19,793	39,565	12	42,939	85,878
23	10	10,441	20,882	7	22,910	45,820
24	11	24,626	49,252	7	23,296	46,592
25	12	10,372	20,655	7	18,201	36,402
26	6	19,816	39,632	8	2,005	4,010
27	7	21,165	42,330	6	8,422	16,844
28	12	16,987	33,907	8	19,397	38,794
29	12	31,330	62,591	14	21,638	43,276
30	19	28,984	57,933	12	17,204	34,337
31	13	15,420	30,840	11	27,166	54,332
32	6	2,448	4,896	7	24,392	48,784
33	16	49,882	99,753	8	22,742	45,484
34	17	16,452	32,783	10	22,561	45,122
35	10	21,104	42,208	11	34,185	68,370
36	13	27,355	54,710	12	26,743	53,486
37	13	15,396	30,715	22	46,692	93,345
38	16	34,732	69,464	16	37,141	74,282
39	25	50,802	101,573	16	55,858	111,716
40	19	47,194	94,387	19	55,770	111,540
41	17	40,243	80,486	18	56,144	112,288
42	20	38,898	77,725	19	79,648	159,296
43	30	67,952	135,761	16	50,800	101,600

Admission Age	MALE LIVES Number	Total Days To Date	Total Days Expected	FEMALE LIVES Number	Total Days To Date	Total Days Expected
44	19	41,161	82,208	25	38,367	76,734
45	30	68,198	136,396	18	37,460	74,920
46	24	42,755	85,510	25	68,223	136,446
47	27	66,488	132,976	38	92,819	185,638
48	39	98,371	196,742	26	77,525	155,011
49	38	79,946	159,833	37	104,379	208,706
50	48	130,194	260,282	38	112,613	225,222
51	39	78,071	156,142	55	128,341	256,687
52	50	86,089	172,032	51	134,629	269,142
53	58	75,269	150,538	53	141,786	283,576
54	62	81,725	163,242	73	178,690	357,163
55	63	114,055	228,110	63	163,073	326,125
56	69	97,696	195,353	69	152,600	305,123
57	90	136,739	273,426	62	144,424	288,831
58	77	116,764	233,492	94	195,359	390,709
59	98	144,498	288,800	98	212,246	424,445
60	113	152,430	304,528	84	154,970	309,844
61	112	150,463	300,751	111	191,803	383,532
62	117	181,007	362,001	136	250,766	501,534
63	127	175,745	351,394	139	246,734	493,418
64	122	150,595	301,185	141	223,939	447,625
65	150	168,442	336,829	183	284,053	567,924
66	157	189,451	378,818	192	266,127	532,259
67	193	177,109	353,707	206	311,781	623,133
68	179	194,991	389,716	240	301,676	603,253
69	185	181,295	362,345	301	411,064	822,101
70	239	222,871	445,388	333	436,278	872,369
71	237	208,892	417,574	374	459,546	918,828
72	241	210,038	419,894	467	600,364	1,200,635
73	269	215,328	430,527	540	588,504	1,176,476
74	269	205,315	410,545	524	635,972	1,271,598
75	287	223,206	445,906	646	740,809	1,481,473
76	288	232,454	464,459	749	766,313	1,532,188
77	334	218,732	437,070	817	854,261	1,708,263
78	304	194,742	389,392	855	899,955	1,799,838
79	298	187,459	374,678	901	889,267	1,778,169
80	308	188,149	375,732	923	891,608	1,782,932
81	294	193,192	386,144	1,011	984,579	1,968,652
82	311	181,427	362,628	1,084	1,028,139	2,056,017
83	267	178,632	356,985	1,064	939,595	1,878,903
84	261	166,502	332,902	1,048	926,129	1,851,776
85	216	122,202	244,367	1,045	904,006	1,807,729
86	220	132,122	264,022	1,018	888,731	1,777,018
87	189	117,605	235,047	984	826,379	1,651,986

Admission Age	MALE LIVES Number	Total Days To Date	Total Days Expected	FEMALE LIVES Number	Total Days To Date	Total Days Expected
88	174	93,866	187,641	794	642,016	1,283,768
89	126	61,766	123,407	718	601,694	1,202,996
90	116	82,407	164,539	657	478,259	956,154
91	83	56,320	112,624	547	408,517	816,972
92	83	41,933	83,866	448	302,586	605,063
93	53	28,529	57,058	344	243,312	486,595
94	42	18,100	35,974	268	186,133	372,127
95	36	19,133	38,255	204	123,077	246,138
96	24	9,095	18,190	118	69,810	139,401
97	15	6,948	13,896	91	53,011	105,891
98	13	6,632	13,264	69	39,967	79,934
99	7	2,222	4,444	32	26,471	52,942
100	3	685	1,370	33	11,596	23,192
101	1	482	964	16	7,900	15,800
102	1	694	1,388	15	6,743	13,486
103	1	83	166	7	5,290	10,580
104	1	623	1,246	2	529	1,058
105 +	0	0	0	4	2,113	4,226
TOTAL	**8,354**	**7,812,118**	**15,615,198**	**21,705**	**22,984,700**	**45,959,386**

APPENDIX 2

Long Term Care Insurance - USA Policy Conditions

USA Policies typically pay benefits only to patients in nursing homes and then on an expense reimbursement basis.

The following key definitions and benefit provision features were found in recent policies being issued in the USA.

(A) "Nursing Home" means a place which:

1. is legally operated to provide nursing care (skilled, intermediate, custodial) for sick and injured persons at their expense.
2. has 24 hour nursing service by or under the supervision of a licensed nurse where required by law;
3. has beds for patients who need nursing care; and
4. operates under the supervision of a doctor where required by law.

"Nursing Home" also means a wing, area or floor of a hospital specifically set aside for nursing care.

It doesn't mean: a hospital, a place that primarily treats the mentally ill, drug addicts or alcoholics, or a place owned or operated by a member of your family.

Nursing Home Care Benefits

We'll pay Nursing Home Care Benefits when you are, for medical reasons, necessarily confined in a Nursing Home due to injury or sickness. We'll pay the Daily Benefit for each day of confinement beginning after the Elimination Period, if any, for any one period of confinement. The Daily Benefit, Elimination Period and the Maximum Benefit Period are shown in the Schedule.

Before benefits are payable, the Nursing Home stay must be certified by your doctor that the Nursing Home stay, whether for skill, intermediate or custodial, is medically necessary.

Exception

This policy doesn't cover loss:

1. Due to war or act of war;
2. Due to intentionally self-inflicted injury while sane or insane.
3. For stays in government facilities unless a charge is made for which you are obligated to pay; and
4. Due to mental illness or nervous disorders without organic disease. (Loss due to Parkinson's Disease, Alzheimer's Disease or senile dementia are covered).

(B) **Skilled, Intermediate, or Custodial Nursing Facility:**

A facility which is licensed as such by the state in which it is located. It does not include: a facility, or any of its sections, which is primarily a place for drug addicts, alcoholics or persons suffering from mental disease; residential homes; rest homes; personal care facilities.

Facility Confinement:

If you require skilled, intermediate or custodial care in a Skilled, Intermediate, or Custodial Nursing Facility, we will pay the Daily Benefit for each day of such care. Benefits start after the Elimination Period and are payable up to the Maximum Benefit Period. You must receive a planned program of observation and treatment which is: recommended by your physician as necessary; in accordance with the usual standards of medical practice for your injury or sickness. We may require your physician to recertify such necessity each 6 months. The physician can not be your relative or the proprietor or employee of the Facility.

Exclusions

This policy does not cover any care which results from; war or act of war, declared or undeclared; mental or nervous disorder without organic disease; injury or sickness covered by worker's compensation, employer's liability, or similar law; alcoholism or drug addiction, suicide or attempted suicide, while sane or insane; intentionally self-inflicted injury; confinement or services rendered outside the United States or its possessions; care for which you are not legally required to pay, except when payment is made by Medicaid. This policy will not provide any coverage while confined in a hospital.

.....

(C) **Long Term Care Benefit**

In order to be eligible for Long Term Care Benefits under this Rider, a confinement in a Long Term Care Facility must:

- be medically necessary;
- be based on physical limitations which prohibit daily living in a non-institutional environment; and
- have continued until the end of the elimination period.

Home Convalescent Care Benefit

In order to be eligible for Home Convalescent Care benefits under this rider, Home Convalescent Care must:

- have continued until the end of the elimination period.
- be medically necessary; and
- be ordered by a physician and furnished by a Home Health Care Agency under a Home Convalescent Care Plan.

Home convalescent Care services include (but are not limited to) helping the Insured with:

- ambulation;
- appliances, including wheelchairs, binder, walkers, etc;
- colostomy care;
- medications;
- prostheses;
- care of catheters;
- change dressings;
- measuring intake and output;
- washing lacerations;
- reporting changes int he Insured's condition to the supervising nurse; and
- other such services.

Home Convalescent Care services do not include:

- services which are not part of a Home Convalescent Care Plan
- services of a person who lives in the Insured's home or is a members of the Insured's immediate family;
- domestic, housekeeping or other services that are unrelated to the Insured's medical care;
- services that provide a protective environment when no skilled service is required (such as companionship or sitter services);
- anything excluded under the Confinements that are Not Covered provision of this rider.

Amount of Home Convalescent Care Monthly Benefit

The amount of the Home Convalescent Care monthly benefit will be 25% of the amount of the Long Term Care monthly benefit.

Long Term Care Facility

Means a facility which is licensed, by the jurisdiction in which it is located, as a Skilled Nursing Facility, or an Intermediate Care Facility, or a Custodial Care Facility. Long Term Care Facility does not include:

- a hospital;
- a facility which primarily treats drug addicts or alcoholics;
- a home for the aged or mentally ill;
- a communal living centre or a facility which primarily provides housekeeping; residential or retirement care; or
- a facility owned or operated by a member of the Insured's immediate family.

Skilled Nursing Facility

Means a facility for skilled nursing care which:

- provides skilled nursing care under the supervision of a physician.
- provides continuous 24 hour a day nursing care by or under the supervision of a registered nurse; and
- keeps a daily medical record of each patient.

Skilled Nursing Care

Means medically necessary care furnished on a physician's orders which requires the skills of professional personnel such as a registered nurse or a licensed practical nurse.

Intermediate Care Facility

Means a facility for intermediate nursing care which:

- provides continuous 24 hour a day nursing care by or under the supervision of a registered nurse or a licensed practical nurse; and;
- keeps a daily medical record of each patient.

Intermediate Nursing Care

Means medically necessary basic care, including physical, emotional, social and other restorative services under periodic medical supervision. This nursing care requires a registered nurse in administration. Administration includes observation and recording of reactions and symptoms, and supervision of nursing care.

Custodial Care Facility

Means a facility for custodial care which:

- provides nursing care under the supervision of a registered nurse; and
- can accommodate three or more persons for a charge.

Custodial Care

Means any care intended primarily to help a physically impaired person to meet basic personal needs when:

- there is no plan of active medical treatment to reduce the severity of the impairment; or
- the plan of active medical treatment cannot reasonably be expected to reduce the impairment.

Basic personal needs include feeding and personal hygiene. Custodial care may be given by persons without medical training under the supervision of a registered nurse.

Medically Necessary

Means confinement, care or treatment which:

- is appropriate and consistent with the diagnosis in accord with accepted standards of community practice; and
- could not have been omitted without adversely affecting the Insured's condition or the quality of medical care.

Confinements that are Not Covered

This rider does not cover confinement:

- or treatment, provided without cost to the Insured, in any facility contracted for or operated by the United States Government;
- for rest cures or nervous or mental disorders which have no demonstrable organic cause;
- covered by Worker's Compensation;
- in a Long Term Care Facility located outside the United States of America.

This rider does not cover confinement resulting from:

- injury or sickness caused by war or any act of war, declared or undeclared;
- intentionally self-inflicted injuries or attempt at suicide;
- chronic alcoholism or drug addiction unless addiction results from administration of drugs for treatment by a physician;
- committing or attempting to commit a felony.

.....

(D) We will pay the Monthly Long Term Care Facility Benefit if you are confined in a Long Term Care Facility and:

1. you cannot perform at least 2 out of the 5 activities of daily living defined in the Important Words provision below; and

2. such confinement has continued through the end of the elimination period.

Long Term Care Facility

Means a Skilled Nursing Facility, an Intermediate Nursing Facility or a Custodial Care Facility. Long Term Care Facility is not:

1. a hospital;
2. a mental institution;
3. a rest home;
4. a home for the aged;
5. a facility for the treatment of alcoholics or drug addicts; or
6. a facility owned or operated by a member of your family.

Skilled Nursing Facility

Means a facility for skilled nursing care which:

1. is licensed as a Skilled Nursing Facility in the jurisdiction in which it is located;
2. provides skilled nursing care under the supervision of a doctor;
3. provides continuous skilled nursing care 24 hours a day by or under the supervision of a Registered Nurse, and
4. maintains a daily medical record for each patient.

Skilled nursing care

Means care furnished on a doctor's orders which requires the skills of professional personnel such as a registered nurse or a licensed practical nurse.

Intermediate Nursing Facilities

Means a facility for intermediate nursing care which:

1. is licensed as a Intermediate Nursing Facility in the jurisdiction in which it is located;
2. provides continuous intermediate nursing care 24 hours a day by or under the supervision of a Registered Nurse; and
3. maintains a daily medical record for each patient.

Intermediate nursing care

Means basic care, including physical, emotional, social and other restorative services under periodic medical supervision. This nursing care requires a registered nurse in administration. Administration includes observation and recording of reactions and symptoms, and supervision of nursing care.

Pre-Existing Conditions Exclusion

If you are confined due to a pre-existing condition within six months after the issue date of this rider, we will not pay benefits for such confinement.

What is Not Covered By This Rider

We will not pay benefits for a confinement which is caused by or occurs as a result of:

1. War - your involvement in any period of armed conflict, even if it is not declared;
2. Flying - your operating, learning to operate, serving as a crew member of or jumping or falling from any aircraft, including those which are not motor-driven.
3. Illegal Activities - your participating or attempting to participate in an illegal activity;
4. Suicide or injuries which you intentionally do to yourself - your committing or trying to commit suicide and your injuring yourself intentionally, whether you are sane or not;
5. Mental or nervous disorders - however Alzheimer's Disease and other senile dementias are covered under this rider;
6. Alcoholism or drug addiction, except for drugs taken as prescribed by your doctor;
7. Pre-existing conditions as described and limited in this rider.

We will not pay benefits for treatment or confinement provided:

1. in a Long Term Care Facility located outside the United States;
2. in a government facility (unless otherwise required by law);
3. for which benefits are available under any state or federal workers' compensation, employer's liability or occupational disease law, or any motor vehicle no-fault law; or
4. for which no charge is normally made in the absence of insurance.

.....

(E) **Activities of Daily Living**

These activities are a measure of the Insured's need for long term care. The attending physician must certify, in writing, those activities which the Insured is unable to perform. The activities include the following:

1. eating;
2. dressing;
3. bathing;
4. walking;
5. getting in and out of bed;
6. taking medications; and
7. using the toilet.

Adult Day Care Centre

An organisation that provides a program of adult day care and that fully meets all the following tests:

1. It is established and operated as an Adult Day Care Centre in accordance with any applicable state of local laws.

2. Its staff includes all the following:

   a. A full time doctor;
   b. One or more registered graduate nurses (RN) in attendance during operating hours for at least 4 hours a day;
   c. Enough full time staff members to maintain a client-to-staff ratio of 8 to 1 or better;
   d. A dietician;
   f. A licensed physical therapist;
   g. A licensed occupational therapist.

3. It operates at least 5 days a week for a daily minimum of 6 hours and a daily maximum of 12 hours.

4. It maintains a written record of medical services to each client.

5. It has established procedures for obtaining appropriate aid in the event of a medical emergency.

Nursing Care Facility

A facility which meets all the of the following standards:

1. It is licensed by the state in which it is located.
2. It is a separate facility or a distinct part of another facility physically separated from the rest of such facility.
3. It provides Skilled, Intermediate or Custodial Nursing Care to individuals who are not able to care for themselves due to sickness or injury and who require nursing care.
4. Its primary function is to provide, for a charge, room and board and nursing care. The care must be performed under the direction of a licensed physician, registered graduate professional nurse (RN), or licensed practical nurse (LPN), except when receiving custodial nursing care.
5. It is not, other than incidentally, a hospital, a home for the aged, a retirement home, a rest home, a community living centre, or a place mainly for the treatment of alcoholics, mental illness or drug abuse.

Skilled Nursing Care

Care which uses professional nursing methods and procedures administered by licensed health care personnel. This care consists of one or more of the following:

1. intravenous injections;
2. tubal or intravenous feedings;
3. oxygen therapy;
4. catheterization; and
5. administration of medications.

It is performed under the orders of a licensed physician by a registered graduate professional nurse (RN) or licensed practical nurse (LPN) and is available on a 24 hour basis.

Intermediate Nursing Care

Care which includes physical, emotional, social and other restorative services under periodic medical supervision. This care requires the skill of a registered graduate professional nurse (RN) or a licensed practical nurse (LPN) in administration, including observation and recording of reactions and symptoms, and supervision of nursing care.

Custodial Nursing Care

Care which is designed to provide personal assistance with the Activities of Daily Living which the Insured is not able to perform.

Exclusions

We will not pay for the benefits of the contract for that portion of any expenses which is:

1. for care or treatment for which no charge is normally made to the Insured;
2. for care or treatment where the person performing the service is the Insured's spouse, child, parent, sibling, spouse's child, or spouse's parent.
3. for care or treatment received outside the United States;
4. caused by declared or undeclared war or any act thereof;
5. caused by any attempt at suicide, within the first 2 years, while sane or insane; or intentionally self-inflicted injury;
6. payable under any federal, state or other governmental health care plan or law (except Medicaid);
7. caused by mental or nervous disorder, alcoholism, or drug abuse without demonstrable organic disease.

(F) Long Term Care Facility

A facility which:

1. is licensed and operated as a long term care facility according to the laws of the state in which it is located; and
2. is licensed as an intermediate care facility and a custodial care facility according to the state in which it is located.

Long term care facility does not include:

1. a hospital;
2. a place that primarily treat drug addicts or alcoholics;
3. a home for the aged or community living centre;
4. a place that primarily provides domiciliary, residency or retirement care;
5. a place owned or separated by a member of the Insured's immediate family; or
6. a place that primarily treats the mentally ill.

Home Convalescent Care

Health care services provided under a planned program for continued care and treatment which is established and approved in writing by the Insured's attending physician. Such health care services must be provided by a long term care facility, a home health agency or a hospital. These services include nursing and related personal care services under the direction of a registered nurse including the services of a home health aide. Eligible home convalescent care services include assistance with:

1. ambulation;
2. appliances, including wheelchairs, binders, walkers, etc;
3. colostomy care;
4. enemas;
5. medications;
6. prostheses;
7. care of catheters;
8. change of dressings;
9. measuring intake and output;
10. washing lacerations;
11. other such medical services and health-related support services;
12. physical, speech respiratory and occupational therapy;
13. medical social services;
14. homemaker services, preparation of food and similar nonmedical services; and
15. nutritional services provided by a licensed dietician.

The Benefit

We will prepay a portion of the death benefit provided under the policy, subject to the terms and conditions of this rider, upon our receipt of due proof of the Insured's:

1. confinement in a long term care facility; or
2. receipt of home convalescent care.

Confinement in a long term care facility must be medically necessary and prescribed by a physician.

Home convalescent care must be:

1. medically necessary and prescribed by a physician; and
2. certified by the physician that without such care, confinement in a long term care facility would be necessary.

APPENDIX 3

ILLUSTRATIVE INCIDENCE AND LENGTH OF STAY RATES

Admission Age	Incidence Rates Used		Length of Stay in Years	
	Male	Female	Male	Female
50	0.00156	0.00166	13.40	16.33
51	0.00174	0.00187	12.53	16.20
52	0.00192	0.00207	11.58	15.85
53	0.00210	0.00225	10.67	15.36
54	0.00229	0.00241	9.93	14.81
55	0.00250	0.00256	9.42	14.29
56	0.00274	0.00271	9.14	13.81
57	0.00299	0.00289	9.04	13.32
58	0.00326	0.00310	9.02	12.79
59	0.00354	0.00336	8.98	12.22
60	0.00386	0.00369	8.89	11.64
61	0.00424	0.00409	8.70	11.05
62	0.00471	0.00460	8.42	10.49
63	0.00530	0.00524	8.08	9.96
64	0.00602	0.00604	7.70	9.48
65	0.00688	0.00705	7.30	9.03
66	0.00788	0.00828	6.88	8.62
67	0.00898	0.00976	6.49	8.25
68	0.01018	0.01153	6.12	7.92
69	0.01146	0.01364	5.79	7.65
70	0.01290	0.01624	5.51	7.41
71	0.01453	0.01943	5.26	7.20
72	0.01645	0.02333	5.04	7.00
73	0.01869	0.02804	4.84	6.80
74	0.02134	0.03367	4.62	6.59
75	0.02448	0.04034	4.41	6.38
76	0.02819	0.04825	4.21	6.19
77	0.03245	0.05740	4.04	6.00
78	0.03717	0.06778	3.89	5.83
79	0.04239	0.07940	3.78	5.68
80	0.04809	0.09224	3.70	5.53
81	0.05442	0.10610	3.64	5.40
82	0.06144	0.12100	3.60	5.27
83	0.06945	0.13681	3.55	5.15
84	0.07842	0.15344	3.50	5.03
85	0.08839	0.17042	3.45	4.91
86	0.09890	0.18737	3.41	4.79
87	0.10988	0.20366	3.37	4.67
88	0.12059	0.21868	3.34	4.55
89	0.13058	0.23128	3.30	4.41
90	0.13898	0.24042	3.25	4.26
91	0.14553	0.24300	3.19	4.11
92	0.14968	0.24475	3.10	3.97
93	0.15142	0.24550	2.99	3.83
94	0.15200	0.24600	2.85	3.71
95	1.00000	1.00000	2.71	3.61

10. BIBLIOGRAPHY

1. Projections of the Populations of Australia - States and Territories 1987 to 2031. ABS cut 3222.0 1988 (actual data used was obtained from microfiche at ABS).

2. Census of Mental Health and Long-Stay In-Patient in Hospitals and Nursing Homes - New South Wales 1987. ABS 4310.1 1988. (actual patient by patient data used).

3. Australian Life Tables 1980-1982 - Office of the Australian Government Actuary, Australian Government Publishing Service, Canberra 1985.

4. Guidelines for Approval of Admission to a Nursing Home 1987. Commonwealth Department of Community Services 1987.

Figure 3 - Hospital Utilization and Costs Study
Volume 3 - Australian Institute of Health 1989.

Figure 4 - Health Insurance Commission Annual Report 1988/89.

Other Reading Material

1. Long Term Care Insurance - Swiss Reinsurance Company, Zurich Switzerland 1989.

2. Health care for older people - Program Development Branch, NSW Department of Health 1989.

3. Better Incomes: Retirement Income Policy Into The Next Century, Australian Government Publishing Service, Canberra 1989.

4. Chris Foster - Towards a National Retirement Incomes Policy, Social Security Review, Commonwealth of Australia 1988.

5. Commonwealth Guidelines for Assessment Services, Department of Community Services and Health, February 1987.

6. Nursing Homes and Nursing Home Type Patients - Health Services Bulletin No. 12, Department of Health NSW, November 1989.

7. Alan Jordan - Sickness Beneficiaries, Background/Discussion Paper No. 16, Social Security Review, Department of Social Security, Woden, February 1987.

8. James Webber, BSc FIA - Financing Healthcare for the Elderly, Staple Inn Actuarial Society (London), January 1989.

9. The Circumstances of Long-term Sickness Beneficiaries: Past Present and Future, Policy Paper No. 54, Department of Social Security, July 1989.

10. Annual Report 1988-89, Department of Social Security, Canberra 1989.

11. Annual Report 1988-89, Department of Community Services and Health, Canberra 1989.

12. Coopers & Lybrand W D Scott - Cost of Nursing Home and Hostel Care Services, Department of Community Services, Canberra 1985.

13. Bettina Cass, Francis Gibson and Fiona Tito - Towards Enabling Policies: Income Support for People with Disabilities, Social Security Review, Canberra 1988.

14. Nursing Homes and Hostels Review, Department of Community Services and Health, Canberra 1986.

15. Chris Ronalds - "I'm Still an Individual", A blueprint for the rights of residents in nursing homes and hostels:, Office for the Aged, Department of Community Services and Health, Canberra, February 1989.

16. R.H. Plumb, B.Sc., F.I.A.,F.S.S., A.S.A., etal - Insurance - It's potential role in the Provision of Medical Care for the over 60's, Institute of Actuaries, London, January 1990.

17. Survey of Long-Term Sickness Beneficiaries, Research Paper No. 39, Department of Social Security, March 1988.

18. Report of the Committee on Care of the Aged and the Infirm, Australian Government Publishing Service, Canberra 1977.

19. Disability, Society, and Change, A resource kit explaining Commonwealth Government Statement of Principles and Objectives, Canberra 1988.

20. Miscellaneous Home and Community Care pamphlets, brochures and newsletters 1989, Commonwealth Department of Community Services and Health, Canberra.

21. Residential Care News, Department of Community Services and Health, Canberra, March 1990.

22. Paul Dudgeon & Anna L. Howe - Monitoring Regional Geriatric Assessment Teams: Analysis of Client Flows and Outcomes, Community Health Studies Volume X111, Number 2, 1989.

23. Sean Sullivan and Marion Ein Lewin - Economics and Ethics of Long Term Care and Disability, American Enterprise for Public Policy Research.

24. Hospitals and Residential Programs Circular CNH 88003 (NG), New Nursing and Personal Care and Staffing and Funding Arrangements, Department of Community Services and Health, June 1988.

25. Towards a National Retirement Incomes Policy - An Overview, Issues Paper No. 6, Social Security Review, Department of Social Security, Woden 1988.

26. Agreement between the Commonwealth of Australia and the State of New South Wales in relation to the provision of Hospital Services, Australian Government Solicitor, Canberra 1988.

27. Long Term Care Insurance, Health Section News Society of Actuaries, USA, May 1988.

28. Residential Programmes Circular CNH (NG) 89015, Arrangements for Exempt Nursing Homes 1989/12867.jljldfjlafjlafjlafj

ATTACHMENT 1

Applicant's condition *(to be completed by assessment service, registered nurse or qualified medical practitioner)*

1 **Does the applicant use any of the following services? If Yes, how often per week?**

- home nursing Yes ☐ → per week ☐ No ☐
- meals on wheels Yes ☐ → per week ☐ No ☐
- home help Yes ☐ → per week ☐ No ☐
- day care centre Yes ☐ → per week ☐ No ☐

2 **Has the applicant used respite care services?** Yes ☐ → • when was the last time? ☐ month ☐ year
No ☐

3 **Applicant's mobility:** walks unaided ☐ | walks with stick/frame/tripod ☐ | walks with assistance of one person ☐ | walks with assistance of two people ☐ | wheels self ☐ | wheeled by others ☐ | is bedfast ☐

4 **Does he/she fall?** rarely ☐ | occasionally ☐ | frequently ☐

5 **Functional profile**

	independent (able to perform activity without assistance)	**needs assistance** (able to perform part of activity but requires supervision/assistance)	**dependent** (unable to perform any part of activity; requires complete assistance)	
transferring to/from bed/chair/walking aid	☐	☐	☐	requires lifting device ☐
bathing/showering/washing	☐	☐	☐	
dressing/undressing	☐	☐	☐	tube fed ☐
eating	☐	☐	☐	
toileting	☐	☐	☐	not applicable ☐
catheter/colostomy	☐	☐	☐	

6 **Is the applicant significantly incontinent?**
(Note: minor stress incontinence, dribbling or faecal staining should not be regarded as incontinence)

	never	**sometimes in day**	**night only**	**always**
urine	☐	☐	☐	☐
faeces	☐	☐	☐	☐

7 **Is the applicant**
always aware of place and time ☐ | sometimes disoriented/confused ☐ | always disoriented/confused ☐

8 **How often does the applicant exhibit each of the following behaviours?**

	never	**rarely**	**occasionally** (2 or 3 times per week)	**frequently**
wandering	☐	☐	☐	☐
sleep disturbance	☐	☐	☐	☐
disruptive behaviour	☐	☐	☐	☐

9 **Do you have anything further to add to this application?**

Signature and date	Name (please print)	Profession	Phone No.
/ /			

Medical condition *(to be completed by a qualified medical practitioner)*

1 **Major medical diagnoses**

Major medical diagnoses	Duration	Medication/treatments

2 **Do you have anything further to add to this application?**

3 **Has the applicant been assessed by a geriatric or rehabilitation unit or service?** Yes ☐ → • What is the name of the unit or service? ☐
No ☐

4 **For how long should the applicant be admitted to a nursing home?** → ☐

I certify that the above-named applicant by reason of infirmity or illness, disease, incapacity or disability has a continuing need for nursing care.

Signature of medical practitioner	Name (please print)	Date
		/ /

Address ☐ Phone No. ☐

ATTACHMENT 2

Section 1. Resident classification

- This section is to be completed by Director of Nursing or trained Nurse in Charge, Assessment Service or Commonwealth Medical Officer.
- Based on your knowledge of the person, select the response that most accurately describes his/her average nursing and personal care requirements, and write the appropriate
- Day or Daily refers t

1. Transfers – includes all transfer activities i.e. to, from and within bed, chair, wheelchair, walking aids etc. Rate bedfast residents (e.g. terminally ill) C or D as appropriate.	A Requires no assistance.	B Requires observation/ encouragement but no 'hands on' assistance.	C Cannot transfer without 'hands on' assistance from one person.
2. Ambulation or wheelchair – Rate resident on mobility ONLY, not transfers to and from mobility aids; these have already been accounted for in Question 1. Rate bedfast residents C or D as appropriate.	A Requires no assistance to walk or use a walking aid or wheelchair.	B Requires observation/ encouragement but no 'hands on' assistance to walk or use a walking aid or wheelchair.	C Cannot ambulate or use a walking aid or wheelchair without 'hands on' assistance from one person.
3. Toilet – If resident has colostomy OR catheter but not both, answer this question for the function that does not require nursing intervention. If resident has colostomy AND catheter and does not self care, required care should be included in Question 10 and resident rated A for this question. Rate residents who require bedpans, urinals and commodes, B, C or D as appropriate.	A Requires no assistance or has a colostomy and a catheter.	B Requires observation/ encouragement but no 'hands on' assistance.	C Cannot toilet without 'hands on' assistance with some but not all activities.
4. Bath/Shower – Rate sponge baths C or D as appropriate. Do not include need for assistance with transfers (Q1), mobility to bath/shower (Q2), or dressing (Q5).	A Requires no assistance.	B Requires observation/ encouragement but no 'hands on' assistance.	C Cannot bathe without some 'hands on' assistance.
5. Dressing – includes grooming, fitting of artificial limbs, hearing aids and calipers.	A Requires no assistance.	B Requires observation/ encouragement but no 'hands on' assistance.	C Cannot dress without some 'hands on' assistance.
6. Eating – includes fluids as well as solid food. Does not include food preparation (e.g. cutting up, vitamising).	A Requires no assistance.	B Requires observation/ encouragement but no 'hands on' assistance.	C Cannot eat without some 'hands on' assistance.
7. Continence: Urine – If resident is catheterised, rate A and include required care in Q10.	A Continent or has a catheter.	B Incontinent but not daily.	C Incontinent once daily.
8. Continence: Faeces – If resident has a colostomy, rate A and include required care in Q10.	A Continent or has a colostomy.	B Incontinent but not daily.	C Incontinent once daily.
9. Prevention of pressure areas – refers to frequency of attention required to prevent and care for pressure areas, including changes of position.	**This resident regularly requires and is provided with:** A Infrequent or no attention.	B Attention 1 - 3 times per day (every 8 hours).	C Attention 4 - 6 times per day (every 4 - 6 hours).
10. Specialised nursing procedures – Do not include routine nursing procedures. Some examples of procedures to include are colostomy/catheter care, unstable diabetes, extensive topical skin care, isolation/barrier nursing procedures, extensive complicated dressings, inhalation therapy, administration of complex medication etc.	**This resident regularly requires and is provided with:** A No specialised nursing procedures.	B Less than 1/2 hour of attention per day.	C 1/2 to 1 hour of attention per day.
11. Behaviour – refers to behaviour which results in additional NPC requirements (usually a manifestation of the resident's mental state). Examples include disorientation, confusion, aggressiveness, severe agitation or extreme anxiety, wandering and noisy, disruptive or self-destructive behaviour. Exclude routine or normal levels of social and emotional support.	**This resident regularly requires and is provided with:** A No additional attention.	B Less than 1/2 hour of direct individual attention per day except for crisis as in C (ii).	C (i) At least 1/2 hour of individual attention per day. OR (ii) Attention for 2 or more hours at least once a week on an episodic basis.

This resident's overall service need is:

12. Overall service need – Answer for resident's overall need for NPC services. A Low | B Fairly low | C Medium | D Fairly high | E Hi

letter in the space provided.

) a 24 hour period.

D Cannot transfer without the assistance of at least two people (includes the use of a lifting device). 1

D Cannot ambulate or use a walking aid or wheelchair without the assistance of at least two people. 2

D Requires full assistance with positioning, toilet hygiene and adjusting clothing. 3

D Requires full assistance with bathing/showering. 4

D Requires full assistance with dressing. 5

D Cannot eat at all without full assistance. 6

D Incontinent regularly more than once daily. 7

D Incontinent regularly more than once daily. 8

D Attention more than 6 times per day (more frequently than every 4 hours). 9

D More than 1 hour of attention per day. 10

D More than 1 1/2 hours of individual attention per day. 11

)h F Very high 12

Section 2. Particulars of person being assessed and declaration

NH 4

• Please print clearly in BLOCK LETTERS.

Surname

Given names

Date of birth / / Sex: Male ☐ Female ☐

Reason for this application:

Pre-admission assessment ☐ New admission ☐ Date of admission / / Annual re-assessment ☐ Review ☐ Date of admission / /

Is this resident a Benefit Respite Care resident? Yes ☐ No ☐ Type: Nursing Home initiated ☐ State Office initiated ☐

Type of resident *(please tick one of the boxes, if appropriate)*:

DVA ☐ Third Party Insurance ☐ Workers' Compensation ☐

Address to which notification of category should be sent *(please include postcode)*:

Declaration - I certify that the particulars given in Sections 1 and 2 of this application are true and correct.

Name *(block letters)*

Signature / /

Position held

Section 3. Application for classification

• If person has already been admitted to a Nursing Home.

Name of Nursing Home

Signature of proprietor / /

• If admission will be arranged by an Assessment Service on behalf of the person.

Name of Assessment Service

Signature of Assessment Service member / /

This section to be completed by the Delegate

Application for review is:

Approved ☐ Not approved ☐ Delegate ID No.

Signature / /

This section is for office use only

SCOHM Key

NH Appr. No. AS Id. No.

NH 4 checked (initials)

Rejection code Date

Keyed (initials) / /

Category Date

Advice despatched (initials) / /

SYDNEY

MR. M. GALLAGHER: It is indeed an honour to be the opening speaker for this pioneering paper. The subject is one which I have had an increasing interest in over the last eighteen months or so and I find it more intriguing the more time that I spend at it. I am sure that there will be quite a lively discussion today and I will attempt to keep my comments to a minimum to allow the maximum involvement of others.

I intend to broadly cover the following -

1. The Big Picture.
2. Product Design and Marketing.
3. Technical Issues.
4. Conclusion.

The Big Picture

Brent has covered in admirable detail the subject of care for the aged in this country. I would like to however, give you a broad brush picture so that we can consider, laterally, some of the major issues.

1. Our Federal and State Governments are providing our ageing population with almost a complete range of care services, from personal care all the way through to intensive nursing care essentially at little or no charge. Demographic factors summarised by Brent are indicating a burgeoning deficit resulting from the health area. Government expenditure restraints mean either a lower quality of service or a rationing of services or both in the future. I must emphasise the essential monopoly control that the Government has in the area of providing care for our aged.

2. Welfare services should be regarded merely as a safety net because the scarcity of resources in the public sector means the aged cannot be given the quality or level of service that they would award themselves. Many would argue that there should be provision for individuals to purchase higher levels of service, and this could well be through an insurance system. The opportunity to opt out of the Government system entirely or partially would allow individuals to choose an appropriate level of service and would also reduce the Government expenditure in respect of them. Some fiscal support could be argued as a means of achieving this.

3. As indicated in Brent's statistics, a major market for this type of cover is old and female. There will thus have to be a major shift in the marketing focus of current insurance organisations if they are to be successful in a large scale involvement in long term care.

Product Design and Marketing

In Section 1.4 Brent restricts the scope of his paper to design and actuarial issues, and I am happy to do the same, but in a broader sense. Regrettably we cannot, in this insurance area, consider the question of financing of nursing home care as the main part of our product. Older people don't want to consider insuring the possible cost of accommodation in a nursing home. What they want to see is assistance to remain in their own home for as long a period as possible. The process of ageing is typically a gradual progression from independence to total dependence. The first assistance an older person will require will most likely be in the personal care area, and the last will be final days in a nursing home. Emphasis on the benefits payable in the early days of this natural decline in abilities will be what sells this type of product, I believe.

I also believe it is important to emphasise that the old want to be able to ensure that the care will be there when they need it, not necessarily merely the finance to provide that care. There is thus a strong need to have good case management for long term care claims which will not only benefit the insured, but will also have cost control implications for the insurer. The possibility of similar institutions to health maintenance organisations or preferred provider organisations is something that may develop down the track. Costing of the benefits paid outside the nursing home will be a challenge to our skills.

From a funding point of view we really have two choices:

1. The expected cost of care during retirement is funded during working life. This really means that the reserve accumulated by retirement age is the single premium used to purchase cover.

2. An annual premium is paid for the cover, commencing either during retirement or at some previous time.

Whichever medium is adopted, it should be emphasised that this product should merely be part of the total financial planning necessary to achieve one's goals in retirement.

At the moment we are probably in a transitional stage from lump sum retirement benefits to income benefits. No matter what system ultimately prevails, it is most likely that guaranteed

premium rates are really the only possible route. A single premium is the ultimate in guarantees. If a retiree is on a pension, the contract with most appeal to him or her is one with guaranteed premium rates so that tight budgeting is possible.

One final point on product design which I regard as being very important is that, with the possible exception of nursing home benefits, it is desirable to tie payment of benefits to utilisation of a service. It is also desirable to have a coinsurance factor as an incentive to limit utilisation. I would link this with the need to have objective assessment of claims, and I heartily endorse Brent's comments in this area.

Technical Issues

The statistics which Brent has included in his paper are the first of their kind I have seen published in Australia. Our health insurance system is unique in the way services are delivered to the aged in our society, and it is unlikely that overseas experience can be used without heavy adjustment. I should say however at the outset I don't believe that statistics up until now will be more than a mere guide in pricing because the existence of the insurance contract will surely have a major influence on the ensuing experience. We do however need a starting point and I am grateful to Brent for putting these numbers together. I assume that the basic data in Appendix 1 has been used to arrive at the illustrative incidence and length of stay rates in Appendix 3. I would welcome a more detailed exposition on the origin of these latter rates.

I am a firm believer in that old actuarial rule that once you arrive at an answer, if you don't like it, there must have been something wrong with your assumptions. In looking at the length of stay rates in Appendix 3 I find them intuitively very high. The only other source of data with which I have to compare these numbers is the 1985 National Nursing Home Survey from the United States (See my Appendix A). Appendix 3 male rates for age 72 indicate an average stay of 5.04 years or roughly 1850 days. I assume that short term stay patients, that is patients under five weeks duration, have been excluded. My American data, shows that at age 72 for males, the average length of stay is, in round numbers, 400 days for all people admitted, 600 days for those who are still in the institution after 30 days, and 800 days for those staying beyond 3 months. There is thus a very wide discrepancy, and I would be interested in Brent's comments on this.

Another aspect which is of major interest is the widely different experience of females in relation to males when comparing these two studies. The American study shows that female incidence rates are roughly 15% higher than males for ages over 70. Appendix 3 shows the result to be more like plus 75% for Australia.

I indicated above that the major market for this cover is old and female. This is because women have longer life expectancies than men and generally act as carers for their older spouses in the final years of their life. They are then very largely left without the support mechanism that their husbands had. The Australian statistics certainly support this logic, and Brent's comments in Sections 7.7 and 8.1 regarding the likely effects of marital status on pricing. It would be interesting to know why the American statistics are different.

I am thus faced with somewhat of a connundrum in that I can see the logical pattern of incidence rates, but the overall length of stay illustrated by Appendix 3, seems much higher than I would intuitively have guessed. This guess is supported by the American data, where I don't have much confidence in the incidence rates!

I couldn't let the mention of a Spencer's 21 Term Graduation Formula pass without comment. I may be exposing fatal ignorance, but its use is too far in my student past for me to judge its applicability. I am quite sure however that there will be no other paper presented to this Institute this year which will mention its use!

Fiscal treatment of long term care, or give it its new technical name Geronth Insurance will be the key to its future. I must take issue with Brent's comment in the second paragraph of Section 5.3 where he says "whilst the Australian Taxation Office's treatment of the benefits of long term care assurance is reasonably clear, the office's treatment of premiums for income type policies is not so clear." I would have thought the opposite was true.

My understanding of the logic of the deductibility of disability income premiums is that they are a legitimate business expense incurred in producing assessable income. In other words, if the insured becomes disabled, the benefits flowing from the policy replace income, and will be taxed accordingly.

The logic of taxation in this particular area must be totally different. I don't believe we should be restricting ourselves to narrow interpretations of existing taxation law as the viability of any product will depend on future taxation policy of the Government. I don't believe that there will be a large market for this type of product unless there is significant fiscal support, that is an encouragement by the Government to shift the responsibility of care for the aged from the public sector to the private sector.

Brent has rightly raised the perennially thorny issue of whether or not benefits would be regarded as health insurance business as currently defined. It is my belief that if the Government does radically overhaul the delivery of health services in this country, the distinction between health insurance and other forms of insurance will gradually disappear. I think I am

saying that the winds of deregulation will be blowing in the health insurance area before long. Regardless of what may happen in the future, long term care insurances are unlikely to provide the reimbursement of medical or hospital expenses and it therefore seems unlikely they could be classed as health insurance.

In Section 6 Brent considers in great detail the question of definitions of disablement. Brent has argued the merits and demerits of three types of definition. There are two very good reasons why an objective definition of disablement is the only route which an insurer could follow:

1. It would be very difficult to sell a policy where the major definition relied on "the opinion of the insurer".

2. Claims administration would be so much easier where objective compliance can be readily certified. This is especially important when we are looking at paying benefits for degrees of care required long before admission to nursing homes. The scoring system in Section 6.7 is admirably suited therefore to the type of contract that I envisage.

There are many matters of technical importance which Brent has covered that deserve more detailed comment, and I am sure that these will be addressed by succeeding speakers.

CONCLUSION

I would like to conclude by making the following comments:

1. An observation: In 1984 there were only 15 companies selling this product in the United States. There are now 100. In 1986 there were 150,000 individual policies in force. At the end of 1988 this had grown to 1.1 million, with an additional 200,000 covered in group plans. The average age at issue on the individual contracts was 70.

2. A personal view: As actuaries, we should be providing the technical advice to give birth to a product which can be successfully marketed. Derivation of a successful policy design is therefore more in the province of our marketing colleagues, than ourselves.

3. A prediction: Product development in this area will be gradual with the most likely area being direct mail working of policyholders in the appropriate age group who currently have a permanent policy. Sale of an acceleration benefit, especially if this makes provision for long term care for the policyholder's spouse, whether this is required before or after the policyholder's death will be very attractive.

I know from attending discussions of Brent's papers in the past that "pioneering" is an adjective often used in association with his work. This paper certainly breaks new ground for our profession. I have every confidence that in years to come it will be looked back on as the beginning of a major area of our work. I would like to congratulate Brent for bringing together in one place all the issues surrounding the long term care area.

Appendix A

Summary of Incidence Rates and Length-of-Stay Data from the 1985 National Nursing Home Survey

Entry Age	Incidence Rate ‰	Percentage Distribution of Length of Stay 1-30 days	31-90 days	91-180 days	181-365 days	12-24 mths	25-36 mths	>36 mths
Males								
<45	0.3	30.3	24.2	11.9	12.9	14.9	2.0	3.8
45-49	2.2	64.3	16.6	4.4	1.0	2.7	0.0	10.9
50-54	1.9	39.7	23.5	0.7	12.6	9.8	5.8	8.0
55-59	3.5	38.1	21.7	6.0	9.9	4.9	1.9	17.4
60-64	4.8	17.7	25.0	19.1	13.8	11.6	5.2	7.5
65-69	7.6	30.1	15.8	12.8	17.8	6.7	4.0	12.8
70-74	18.0	34.6	20.5	13.5	11.1	8.7	2.5	9.0
75-79	40.7	41.0	14.3	10.9	12.2	10.1	4.4	7.0
80-84	78.5	35.2	23.8	10.9	10.0	8.3	4.5	7.2
85-89	120.9	36.5	19.5	9.0	12.3	9.8	6.0	6.9
90-94	169.0	36.2	15.6	14.6	12.2	12.3	2.6	6.5
95-99	286.7	20.9	45.0	12.1	10.2	6.2	2.0	3.5
>99	130.5	57.9	15.2	19.0	7.9	0.0	0.0	0.0
Females								
<45	0.1	25.7	12.5	14.1	13.3	13.6	8.3	12.5
45-49	0.8	28.4	15.0	11.8	4.3	10.3	6.8	23.5
50-54	1.1	21.0	30.2	15.3	8.2	8.1	0.0	17.2
55-59	1.7	17.0	32.4	5.1	5.4	13.1	10.8	16.2
60-64	4.2	25.2	27.6	11.6	8.5	10.5	4.2	12.3
65-69	10.2	32.3	23.4	6.9	9.5	8.7	8.4	10.8
70-74	20.8	29.3	21.0	12.3	9.7	9.1	5.1	13.5
75-79	43.0	27.6	24.3	11.2	9.2	9.5	6.5	11.6
80-84	95.0	30.6	20.1	10.2	11.6	7.6	5.3	14.6
85-89	140.8	25.9	20.4	11.3	12.4	10.6	6.7	12.6
90-94	195.3	29.9	17.9	9.6	12.3	12.2	6.5	11.6
95-99	208.9	23.8	23.9	17.6	9.8	9.8	7.3	7.8
>99	138.0	18.2	24.2	21.0	3.5	24.6	6.8	1.7

MR. P. CARROLL (Author)

Introductory remarks

I am grateful for the opportunity to make a few introductory remarks, because the paper is full of statistics and it may be helpful to highlight the features which are likely to be of most interest to actuaries.

The starting point in looking at health care in Australia is of course the demography of the community and there are two overwhelming features which are evident.

The first is the impact of the two baby booms, which are still working their way through the Australian population. One was born in the decade after the first world war and the other was born from the end of the second world war through to the 1960s. There is a trough in the growth rate of the population, arising from the relatively low birth rates between these two baby booms, and the people born then are now moving through the 60-70 year old age group. This does not augur well for retirement villages and long term care insurance in the immediate future.

The second significant factor in current Australian demography is the decline in birth rates since the 1960s. In the last 30 years, births have fallen by a half among women in their early 20s and by a quarter among women in their late 20s. It is women of these ages to whom most births occur. There has been a minor increase in birth rates for women in their late 30s; however, the effects of this have been quite slight.

This recent decline in the birth rates will affect the numbers of future tax payers in Australia, the very ones who will be required to support social services to the ageing baby boomers. Clearly, in the welfare and public health care system, something has to give.

Health care in Australia is a very big industry. In physical terms, every fortnight, two-thirds of the population - over 11 million people - consume some health care service as defined by the Australian Bureau of Statistics. 5 million take a common pain reliever; 4 million take vitamin supplements; 2.5 million attend a doctor; 2 million claim to experience a headache; 5,000 die. The industry that caters for all this is very large in financial terms also. $1 in every $13 spent in Australia goes on health care.

Spending on health care, as a percentage of gross domestic product, is small in Australia, compared with much of Europe - West Germany, Sweden, France - and the United States. There are only three countries of similar nature to Australia that spend

less - New Zealand, Japan and the United Kingdom. From observation of the different systems, it appears that health care has the characteristics of a luxury good - the richer the country becomes, the more it spends on health as a percentage of its income.

There are variations in the public/private mix also, both from country to country and over time, which are quite significant. During the past 20 years, the system in Australia has been dominated by the waxing and waning of Medibank/Medicare, under which free public hospital services are now available to all, without means testing, and free doctor services are now available to all through bulk billing. Something like 53% of doctors' services are bulk billed and this proportion is steadily increasing.

The public system does not cover private treatment in hospital, nor does it cover gap payments to doctors or, in most cases, the services of dentists, physiotherapists and other health professionals. It does not cover private pharmaceutical costs either. It is these gaps that provide the opportunity for private insurance although, under present law, gap insurance for doctors' services is proscribed except in hospitals.

A feature of Medicare experience has been the rapid rate of growth in its costs. Although there has been some evidence of a reigning in of this growth recently, the medical costs of Medicate grew 27% in the first two years after it was introduced in 1984, compared with 21% growth of average weekly earnings, 14% growth in the CPI and 4% growth in the population.

The private health insurance market in Australia is very large. It covers 7.5 million Australians, almost half the population. Premiums amount to $2.5 billion a year and have been growing at the rate of 20% a year for the last three or four years. It is the biggest private insurance protection market, approached only by that for motor insurance. 26% of all insurance premiums, excluding those on savings products in the life insurance industry, are spent on health insurance. The figure for motor insurance is 25%, for householders' insurance is 10% and for fire insurance is 9%.

Although there are now over 60 funds, the health insurance market in each State is dominated by one, or at most two, major funds. MBF dominates New South Wales; HBA and Medibank Private dominate Victoria; Mutual Community dominates South Australia; HBF dominates Western Australia.

The private health insurance industry is strictly regulated under the National Health Act 1953. There are three salient features of this regulation - community rating is compulsory, all insurers must provide a basic table product, for which the benefits are prescribed by law, and there is a reinsurance arrangement which is used to reinforce community rating. Through the reinsurance fund, all claims in the industry for people over age 65 and for claimants who have more than 35 days a year in hospital are pooled.

Hospitalisation rates have a familiar actuarial shape, slightly different for each sex but varying with age. Female experience is significantly different from male experience at child bearing ages but, otherwise, men generally have higher hospitalisation rates. Men also tend to have more serious illnesses, the more severe forms of cancer, heart disease and so on. Women are heavy consumers of health services generally but they experience less serious forms of illness and hospitalisation patterns reflect this.

Finally, of interest to actuaries is the pattern of private health insurance coverage by family status and age. Coverage tends to increase with age up to retirement and then falls away. Double income families and those with children are most likely to take out private cover. Clearly, issues of affordability, affected by family income and occupation, and of value for money, under community rating, play major roles in decisions by consumers whether or not to purchase private health insurance.

MR. D.L. LOADER: The two papers cover a wide range of topics, but their main emphasis is on care for the elderly, and it is on this aspect that I propose to concentrate my remarks.

The ageing of the Australian population is amply demonstrated by the statistics in the papers. Whilst the provision of services for the elderly by Government and charitable organisations has been broadly satisfactory, the increasing proportion of aged persons in the population will put more and more strains on the system, leading to deterioration of standards or to pressures for more costs to be met by the recipients.

Up to now, actuarial involvement in the ageing question has related principally to the pre-retirement provision of superannuation. However, the financial aspects of lost retirement services are also amenable to actuarial techniques, and the opportunity for our involvement is to be welcomed.

If we look at overseas countries, we find great variations in the way this product has developed (or not developed), even between countries of similar age patterns and living standards. These dissimilarities usually reflect differences in legislative health care and social service structures. It is therefore important to adapt experience derived from overseas to allow for Australian conditions.

The net premiums given in the paper are of the order of three times those currently charged in the U.S. Yet our morbidity investigations suggest claims costs of around 70 per cent of U.S. experience. This divergence is curious, even allowing for the prevalent opinion that U.S. premiums are understated, and indicates that currently available statistics need to be applied with caution.

Turning to product design, a policy renewable by increasing yearly premiums is undesirable because it would give a steeply increasing cost just at the time that cover was most required. The lack of reliable statistics would rule out guaranteed premium rates, and some form of indexation would be preferable. There are obvious problems with indexation of level premium products (as the premium and cover cannot both be indexed at the same rate). Possibly a with-profit or unit-linked policy could be developed to give a partial solution to the problem of inflationary erosion of the value of the cover.

Reinsurance would be desirable for two reasons: firstly, as a buffer against adverse experience in an unknown area, and secondly to facilitate the revision of premium rates, should this be necessary. Reviewable premium rates are not necessarily the solution to the problem of adverse future experience, because premium rates can in practice only be revised if market forces allow. A company must therefore ensure that its experience does not deviate too far from that of the market as a whole. One way of achieving this is through reinsurance (as is the case in general insurance).

MR. C. GITTINS: If, as Pope pompously opinioned, the proper study of mankind is man, we have some distance to go in our proper study. Item: the difficulty of providing adequate health care (or any other social benefit, for that matter) to those in the community who need it without at the same time encouraging or allowing over-use or overservicing.

A glance at communist countries confirms the great difficulties which confront any attempt by the state to set prices. I wonder why, therefore, we in Australia thought we could, in any meaningful way, establish a set of scheduled fees for medical services? If the disciplines of the market are removed, how do we deal with excessive demand and with supply which may itself be excessive if the scheduled fee is too high, or deficient if the scheduled fee, plus any addition to it that may be arranged, is too low?

With these basic questions in mind I turn to Sections 6.10 to 6.13 of Mr. Carroll's paper.

The growth in the number of Medicare services per capita per annum may be the result of adequate health care being now available to people who previously could not afford it. It may be a reflection of the ageing of the population, since we know that in general claim rates rise with age. It may be a result of improved living standards, as we know health care is a luxury good, or it may be supply driven, as the ratio of doctors to population continues to increase.

Bulk billing may be popular with patients, but I guess not so popular with doctors, who may be forced to bulk-bill to build and retain a clientele. The newly-elected President of the AMA, Dr. Shepherd, deplores the competition that has resulted in lower fees in some areas.

Despite the rise in the level of claims, the general patterns of heavier claims for females and the strong relationship of claims to age have been preserved.

The only direct protections against anti-selection may be waiting periods and PEA exclusions, but skilful advertising will help move the membership profile in a desired direction. Are advertisements and brochures adorned with single yuppies, young married couples, or retired persons? Do the ads appear in Confessions, Ita, or Prime Time?

MR. T. KARP: It has already been mentioned that Peter stated the purpose of the paper was to provide a broad statistical review of the industry and he has certainly done that. His paper of 47 pages has got 48 tables of information and we have got a kalidoscope of information there related to health care and health insurance. I think more importantly what we have also got is an extremely useful set of references at the back of the paper for anyone who wants to take it further.

In understanding the demand for health care services it is paramount to have some sort of background knowledge of the Australian population, its demographies and its distribution and Peter does this throughout Section 2 and part of Section 3. He has given more information along those lines today with his overhead. This is the area where I suppose the actuary tends to be more attracted to normally, in terms of the utilization of services and demand for services.

I just want to spend a little bit of time talking about the supply side of health care because it is more complex. In my view it also is extremely important to understand that supply side because it has direct impact on the utilization of services and overall expenditure.

There are a variety of institutions and professionals providing the services and while the different groups often do not directly compete there is some potential for what I would call service substitution between those groups. With the ageing population the substitution to lower cost services may emerge. We should hope it will emerge and indeed it needs to emerge if we are going to keep paying health care costs.

Unfortunately our health care system has not shown it is able to change with any degree of rapidity and it is recognised that there are significant lead times in training most of the health care professionals. Also, there are numerous strong and influential interest groups and there is an ever present heavy political factor which involves both the federal and the state governments and therefore it is not surprising that we have got a considerable degree of inertia.

The tables shown in Section 3.3 which talk about the percentage of health expenditure met by the private sector and the State and Federal Governments over the period 1970-86 show the variations; they have substantially come about because of the introduction of Medibank which has come and gone and more lately Medicare. Reference has also been made to Section 3.1 in terms of the expenditure as a percentage of GDP and Peter has commented on the large degree of stability of those figures after the mid 70s when Medicare was introduced.

To me this highlights that in fact very little has been done in any way to alter health care delivery to meet any changing demands. All that has really occurred is that the government has in a sense effectively kept a lid on total health care expenditure and if you look at Medicare, it in a sense was really only a programme to shift some of the costs back to the public sector. This shift in cost has been essentially covered by the levy. Although that might be changing a bit now. Since September 1985 we have been able to see a shift back to the private sector with the movement of a portion of the hospital and medical services being covered by private health insurance.

In my mind all this is doing is altering the financing mix when really the main game of more efficient and effective health care delivery is being sidestepped entirely. If the strategy continues then all we are looking at is some sort of blow out in health care as the population is ageing and the services are going to be demanded eventually. It is unlikely that the public sector financing will increase dramatically so there will be some break on health care costs but I believe the private sector expenditure would eventually increase as people really want those services provided anyway.

Supply or induced demand is a phrase that is thrown around the health care, health insurance industry a bit; intuitively it exists, but it is extremely difficult to prove in any rigorous way that it is there. I do not know, as one reasonably prominent health economist has mentioned to me, that if you look at regression models trying to relate supply and demand you only end up getting reasonable results when the supply becomes an independent variable and sits with the demand. So he certainly has some views on supply and induced demand.

In the long run I have some concerns about market forces generally keeping demand down, even if a significant proportion of expenditure is funded from the private sector. I find it difficult to see pricing of itself being an effective break to serious and life threatening illness where health services are required. It could be of course an effective way of controlling a blow out in the utilisation of minor services such as occasional visits to the doctor when you can take a few cold tablets or the like.

Throughout the paper Peter has concentrated on the global picture so it is a national comparison. All of the references that he has given, or most of them, do provide quite a lot of detailed information at the state level and anyone who wants to get a bit further into this subject is probably well advised to look very closely at those state figures. They do vary enormously. Geographic distribution between states varies and that affects the health care costs dramatically as does the age/sex mix. The different figures in terms of providers and suppliers varies enormously and that also affects the figures. Just as an example, examining Medicare services. I have not actually got the figures on the providers per head of population, but it is relatively high in NSW. While nationally the percentage of General Practitioner services which are direct billed are something like 62%, in NSW the figure is as high at 71% of general practitioner services being direct billed, whereas no other state gets above just over 60%. To my mind there is a degree of competition going on there because you have got a large supply of providers. The utilization of Medicare services (and here we have got to be a bit careful, because I am talking about Medicare services and not total medical services) varies considerably between states. Again to quote an example, which it is dependent upon the age/sex profile of the state. I am talking about services per head of population and in NSW it is 9.3 while no other State gets above 7.7. So there is a lot of variation and if you are getting involved in that, be careful about precisely which state figures you are using.

Peter showed in one of the slides the increase in Medicare benefits significantly outstripping population, CPI and AWE growth. I think one of the reasons for that is what has been referred to by many in the health care or health insurance industry as benefit drift. In Medicare you have a schedule of benefits and the medical practitioner is remunerated x dollars for the particular service that is provided in that schedule. Like all human beings they learn to play the system and what tends to happen is they all of a sudden shift from low cost services to high cost services. Because you have a schedule which is maintained and controlled by the bureaucrats in consultation with the medical profession it takes some time for that schedule to get updated and inevitably in the meantime there is a drift towards more expensive services. Just as an example, I think it took a very long period of time for the schedule to be altered in terms of the benefits that were provided for lens removals, the lenses of the eye. The technology changes were quite dramatic; it used to take 6 hours or so on an operating table and the benefit payable under Medicare was getting up towards $1,000. With laser surgery these days they can have them out in less than half an hour. It took a long time for that schedule to be updated and for the benefit to come down when really the cost is effectively reflecting the surgeon's time. So that benefit drift will go on whilever you have a schedule which takes a long time to get updated.

Peter goes on in the health insurance section to talk about coverage, ABS Health Insurance Survey and Department of Health data and then premiums, benefits and assets from the Report of the Health Benefit Organisation.

Another useful source is the quarterly statistical returns of health funds. Previously they were turned to the Department of Health, now it is to the Private Health Insurance Administration Council. They are essentially confidential returns, but aggregates of that information are available, not usually readily available publicly, but they are fed back to the funds and they can be got without a great deal of effort. They do provide information on the coverage side, namely number of members, people covered, single and family members, not only in total by fund but also by table. Probably more importantly on the services side or claims side they provide figures on numbers of services or days in hospital; and dollar amounts paid out. For some of the ancilliary services, as well as the dollar amount of benefits paid out by the funds, the actual level of charges that were made by the type of paramedic profession are provided. So for instance you can get information about the level of benefits paid out and charges made for dental services, optometrical services and the like.

Of course it is still only paid out by the health fund so you are not getting a total picture, but it does go some way towards putting some of the picture together.

I was interested to note the table in Section 2.20 about the proportion of the population using fluoridated water. I am an ACT resident and the ACT has got 100% there. I would just like to bring you up to date and inform you that we have self-government in the ACT and we have a speaker of the House who was elected on a handful of votes but who had a penchant for getting rid of fluoridated water. So we had fluoride out for a little while, but it is now back in and we have got an inquiry on whether we are going to keep it or not. We might need more dentists in the ACT.

That is really about all I had to say. Thank you very much Peter for a paper that gives us a very very useful thumbnail sketch of the health care industry and its associated industries I really would reinforce that it is, in my mind, a very good beginners directory in terms of the references that are in the back of the paper. There is a wealth of information out there, unfortunately it takes a lot of ferreting out. This is a really good start for anyone who needs or wants to get involved.

PROFESSOR A.H. POLLARD: There are two sources of information concerning disability that are not mentioned in the paper. One is the cancer registry in NSW and in other States. They have been producing data since the 1970s. It was then made compulsory for all hospitals and radiological clinics to register any diagnoses they made of malignant disease under about 50 separate sites. The annual report of the cancer registry in NSW gives incidence rates by sex and by age that is the first occurring of malignant disease at any of the sites. Rates on mortality are also given. When people die of some malignant disease, if they do not happen to have been reported from a hospital or a radiological clinic, then the medical history is searched and so a very good record of incidence and of mortality from malignant disease from any of the sites is available.

This of course enables multiple decrement tables to be constructed. Hence one can obtain the average age at which cancer of the breast occurred, the average age when death occurred, the average length of time that a person was suffering from this particular disease, the probability having got the disease of dying from something else and all sorts of interesting information.

The other source of information on morbidity is an extraordinary collection of data prepared over the years by private enterprise. Intercontinental Medical Statistics is a company which operates in about 46 different countries including Australia and amongst their activities they have, since 1969, carried out quarterly surveys of doctors. They select 220 GPs scattered throughout all the states in country and city and 4 times a year the general practitioners report on every person

who consults them during a specific week. That report contains in respect of each person the age, the sex, the diagnosis that was made, the drug that was prescribed, but most particularly whether it was the first occasion in which that person had consulted a doctor for this complaint. Medicare would have a great volume of statistics, but they would not have the key information, namely whether this was the first occasion on which a doctor was consulted for this complaint. There are 400 separate diagnoses reported following the United Nations recommendation. The number of people in Australia per year aged between 25 and 30 who are female and who consulted a doctor for migraine is thus available. So is the particular drug treatment prescribed. Their main purpose for being in existence was to serve the pharmaceutical profession. It is really concerned with an analysis of the useage of particular types of drugs but from an actuary's point of view it is a unique source of information to provide the rates of onset of any of 400 diseases by age and sex. Having this information a double decrement table giving onset (say) of diabetes and subsequent death from diabetes or other causes can be constructed. All sorts of probabilities and length of time of suffering from diabetes or breast cancer or any one of a host of other things thus become available.

I do not know what it costs, but I do know that when I did a job for them in the late 70s they were marketing this at $16,000 per year. I fortunately had it "for free" as a consultant to them and I wrote a paper to the London Institute in 1980 setting out a number of these double decrement tables.

I also compared their results for malignant disease with those from the cancer registry. This was some sort of a check on the accuracy of their sample, and it did convince me that their results were pretty reliable. It is a most useful, but costly, source of information.

I had to do an exercise the other day on the economic effects of the declining birth rate. It is interesting to note that if the birth rate in Australia had been maintained at the 1971 level there would be in Australia today 1.3 million extra children under the age of 16. Those 1.3 million extra children would require an extra sixty five 70-bed hospitals. Twenty five of those would be maternity hospitals and forty would be general hospitals. This assumes the same occupancy rates. Demographic changes do have a very significant effect on the demand for hospital and health services.

MR. M. SHERRIS: I am here, I guess, as a representative of Macquarie University's demographic expertise. I am not a demographic expert but the experts at Macquarie are not available to speak. I tried to find two of the experts but they are both overseas, one in Italy on a trip which is totally unrelated to the World Cup and the other is in New York. I do not know what sporting event the United Nations is sponsoring. So it came down to me to come and speak. I have only a few comments to make. I would like to thank Peter, along with all the other speakers, for his excellent reference paper indicating the statistics available and some of the problems that are obviously coming up in the health area which the actuarial profession can become involved with.

I have a few questions particularly on the statistics side. It seems to me that in the health care area overseas, particularly in North America, there is a lot more actuarial involvement than here and presumably they are collecting statistics which are relevant for actuarial purposes. I wondered if the Australian statistics were deficient when compared with, say, the North American area, particularly from an actuarial viewpoint. Along with Alf Pollard's suggestions perhaps we should be talking to the ABS about the sorts of information they should be collecting because that is the cheapest way to go about doing that. Finally, I guess it is obvious that this area is going to become one where a lot more actuaries will be involved in Australia compared with what exists at the moment. Presumably this means that there is a need in the education system to bring the issues in the health care area to the attention of up and coming young actuaries and the question is, 'Where do you do that?' Do you introduce these statistical ideas into the mortality statistics subject or do you do it at the higher level in the B group general insurance type subject? Once again I would like to thank Peter for his excellent paper.

MR. G. WADDELL: I would like to thank the author for a paper that I found both informative and easy to read. I gave the paper to my wife to peruse and she is a professional counsellor. She often counsels people who have health problems. She was surprised to see that an actuarial paper contained a quote from a book such as Love your Disease. She had not realised how progressive the actuarial profession is. This book is a popularisation of a theme that has been around for some time, namely that there is a psychological component to disease.

The paper in its conclusion states that women have a higher incidence of minor ailments and non fatal illnesses. Also, that men have a higher incidence of chronic disabling and potentially fatal conditions.

Like other speakers I have reservations about the applicability of the statistics. However, if we assume that they are valid, my thought was - why does this pattern occur? I think it is both fallacious and paternalistic to say that it is because women are the weaker sex. Undoubtedly there are different body structures for women and men. However I would look more to the psychological factors. For example it is generally accepted that at present women are in conflict about their role in society. Women are expected to fulfil the nurturing role. This applies even when both adults are working. There are many books dealing with the stress that this places on women. Our society also accepts the idea of women having illness. It also accepts that women can deal with it by visits to those in the healing professions. Hence some action is often taken before a crisis point is reached.

For men there is not the same conflict or confusion about what their roles are. Rather, what can occur is resentment at having to perform these roles. For men society puts much more emphasis on performance and achievement. This creates a different stress than that for women. However, society does not encourage men to deal with stress. It is often considered macho to carry on regardless. Unfortunately this build up of pressure often results in serious illness.

It is quite plausible that the different stresses of men and women are a contributing factor to the different health patterns between men and women. So what does this mean for the future. Society is changing. More women are entering the workforce in more responsible positions. Men are changing their views on work. Some are deciding that lifestyle is important in their consideration of a job. It is becoming more acceptable for men to want to participate in the nurturing role. At this time in the United States there is a questioning of the basis for men's role in society. It has an interesting parallel to the women's liberation movement but hopefully it will not have its excesses.

Overall I do not believe that there will be any marked change in the current pattern. Any changes are likely to be both minor and gradual. Nevertheless for some groups of the population there will be a change in the pattern of women's and men's health experience in both minor and major diseases. It will be interesting to watch what develops.

MR. P. CARROLL (Author)

Closing Remarks

In the discussion of the paper this evening, there have been three themes on which I would like to comment - the economics of the health care system, the availability of data and what I will call interesting relationships.

The economics of health care is a complex field and many specialist economists work in it. One speaker referred to cost and access problems in North America. Tom Karp referred to supplier-induced demand and also to the failure of the price mechanism when people believe they have a life-threatening disease. These features are well known and recognised and, in Australia, they are used to justify extensive intervention in health industry markets, as they are in other communities.

Both Alf Pollard and Mike Sherris called for more statistics, especially from the ABS. The Australian Institute of Health was recently established in Canberra with the specific function of collecting and collating statistics on the health care industry and making them available publicly. Unfortunately, in Australia, the collection of data on health care is bedevilled by politics and by the constitutional problem that health care delivery is the province of the individual States, although much of it is financed at the federal level. In Victoria, for example, no statistics are collected on private hospitalisations - the State will not collect them and private hospitals refuse to make them available. This is simply one example of the nature of the problem.

The AIH was established to attempt to co-ordinate data collection from the States across Australia. The ABS would prefer to avoid the political problems, although it does in fact conduct Australia-wide health surveys from time to time.

On the matter of interesting relationships, there are a couple in particular on which I would like to comment. The relationship between marriages and births in the 1930s was mentioned and one speaker commented that this relationship was less clearly evident today. If we go back in history, to when doctors were planting vines at Sydney Cove, the relationship between marriages and births would also have been unclear, so I suppose we have not really changed much in that regard. The relationship between doctors and wine production is one that I found particularly comforting from tonight's discussion. In future, I will feel much better when I imbibe and I would certainly appear in the category of doing so at least once a fortnight.

A relationship which is of particular interest to me is that between income levels and expenditure on health care. In my view, the recent baby boomer generation is going to transform the health care market totally. It is a self-indulgent generation and it will do to the health industry what it did to maternity hospitals and kindergartens in the 1950s, high

schools, universities and popular music in the 1960s and 1970s, stereos and videos in the 1980s, blue jeans and all those things. In about 20 years time, the market in health care services will probably be unrecognisable, compared with what it is today. I believe no government of any colour is going to be able to hold our health care costs down to less than 8% of gross domestic product.

Thank you very much for the reception you have given my paper.

MELBOURNE

MR. P. CARROLL (Author)

Introductory Remarks

I would like to introduce my paper by highlighting some of the features of the health care industry in Australia, starting with the major demographic influences.

Everyone is aware of the boom in births following World War II. There was also a relatively smaller one in the 1920s, following World War I. These earlier baby boomers are now moving into their late 60s and 70s. Between these two baby booms there was a trough in births - during the 1930s and early 1940s which does not augur well for long term care insurance and retirement villages over the next 20 years.

The other salient feature of Australian demography has been a substantial decline in birth rates since the 1960s. Births to women between the ages 20 and 24 have declined by 50% and births to women between the ages of 25 and 29 have declined by one-third. There has been a small increase recently in births to women in their late 30s but this has had only a trivial effect in the overall numbers of births.

The overall effect of the fluctuations in fertility since World War II is that, over the next 30 years, the population in Australia above the age of 40 will almost double, while the population under age 40 will grow by less than 10%. When the post World War II group of baby boomers reaches retirement, people born in the last 30 years will be the taxpayers. There will not be enough of them to finance an adequate standard of health care through a public system, without massive readjustments to taxes and government spending.

The health care industry is enormous. Each fortnight, eleven million people in Australia consume some health service, two and a half million people attend a doctor, five million take a common pain reliever, one and a half million experience a cold and two million claim a headache. Five thousand people die each fortnight.

One dollar out of every $13 spent in Australia goes on health care. This amounts to a total of $30 billion a year. In real terms, this is about 8% of GDP. There are only three countries of similar nature to Australia that spend less - New Zealand, Japan and the United Kingdom. Many countries - for example West Germany, Sweden, France and the United States - spend considerably more.

The public/private mix has fluctuated in Australia during the past 20 years, reflecting changes in Medibank/Medicare. Since 1984, "free" doctors' services, through bulk billing, and "free" public hospital services have been available to all, with no means test. More than 50% of doctors' services are now bulk billed and the proportion is steadily increasing.

Private health insurance has a role in covering gaps in the public system of health care financing although, by law, it may not cover gap payments to doctors. Nevertheless, the private health insurance market in Australia remains large - almost half the population retains some private cover. Premiums amount to nearly $3 billion per year and have been growing at an annual rate of 20% in recent years. If savings products in the life insurance industry are excluded from consideration, health insurance accounts for 26% of all insurance expenditure in Australia, about the same as motor insurance. Death and disability cover accounts for only about 5%.

In all, there are more than sixty health funds throughout Australia but the market in each State is dominated by one or, at most, two major Funds. The industry is, in fact, quite oligopilistic.

Private health insurance remains strictly regulated and, in particular, is compelled to use community rating. Recent changes in the National Health Act extended the reinsurance arrangements so that, now, all hospital insurance claims for people over the age of 65, and for claimants who have more than 35 days a year in hospital, are shared among all the Funds. This is simply the latest in a sequence of regulatory measures which have been used to preserve community rating over the years.

Hospitalisation rates have a shape which is familiar to actuaries - slightly different for each sex and rising with age. Women are heavier consumers of health services generally but men tend to experience more of the serious forms of illness, particularly cancer and heart disease, and hospitalisations reflect these differences.

Finally, private health insurance coverage forms a pattern of what economists call a "luxury good" - high income families are far more likely to be covered. Many people drop their private health insurance when their income falls at retirement. Young people are affected by value considerations too and, due to community rating, have become increasingly reluctant to buy private insurance.

MR. S. MILES: Illth is a word with 5 letters, it is worth 8 points on the Scrabble Board, 24 on the triple word score. Wellth is 6 letters worth 10 points, 30 on the triple word score but Geronth is worth 11 points, 33 in a triple word score but more importantly uses all 7 letters in your Scrabble hand and entitles you to a further 50 point bonus if you get the first play. Alternatively during the game you may be able to get a 50 word bonus if you can use Geronth as part of the overall mix of words or in its plural form, Geronths. I would suggest that in your case and certainly in my case, playing scrabble with my wife and children, that this would be a very dangerous strategy to take.

Although today's papers appear to be different they are in fact very complementary. Brent has outlined in his paper a health insurance product. Any health insurance product needs to be considered in the context of total health insurance environment which Peter has clearly in his paper.

Before we look at Brent's product we must appreciate that health insurance is a geographic product in Australia. Health varies from state to state. Brent's product itself has been based on NSW experience. As Peter has said, health insurance is a product which can be subject to induced demand. Indeed the very arguments used to conclude that the long term care claim rate would reduce in future could also be the same arguments which would lead to the conclusion of increased claim rates, ie greater availability of the long term care product could lead to higher claim rates.

Both papers, particularly Peter's, emphasise the problem that the Australian nation is facing with a greatly increased number of aged people compared to a very slight increase in the number of taxpayers who can pay for their care.

I have got a few comments here that relate more to Brent's paper than to the product he is talking about.

How big is the market? From Peter's paper you can say that there are about 2.5 million males who will be in the 40 to 55 age group. If we assume a market penetration of 4% and a $600 per annum annual premium the market comes up at something like $60 million. In other words the market is just as big as the individual term market and the individual disability market.

If females buy insurance that figure goes up even more. If the market penetration rate is 5% a year, that figure goes up even more. On the single premium side there is probably even more potential. There may be some big advantages there, especially as people become overfunded for RBLs. What better way to get rid of an excess RBL than by putting it into a tax deductible single premium long term care health policy.

Long term care is a product where insurance can help. There is a probability that you will need long term care, but it is a very high probability. The event is so far off there is definitely a financing need. The big issue is that we have a situation where the insured is competing against the life office. With life insurance nobody is particularly keen to claim. The outcome of being a claimant on a term insurance policy is not very appealing to the life insured. A different situation applies to long term care. As many people have said, it may well be a pleasant environment, in your ageing years, to be in a long term care institution having an insurance policy paid in advance.

We have very little information on the likelihood of claims. We know it is greatly affected by geography, by the producer induced claims. We know it is many years off in the future. There is also direct competition between the insured and the life office. If one profits the other one does not.

There are also some other important issues which Brent did not cover -. although he did say that they were deliberately omitted.

* Marketing. Who is the target market for this policy? We have already talked about retirees who are excessively overfunded. Do we just market it to males because it is cheaper and they make insurance decisions? If so, what are our responsibilities to the female part of the population? How do we get to them?

* Distribution. One possibility is agents working around people who retire, the retiree list. Certainly, sources of big retiree lists will be the institutions which provide superannuation benefits. For a life company with a big whole life portfolio there is a possibility of direct mailing a product which would advance the sum insured to pay for long term care.

There are many potential opportunities once you start to examine the options in a market as big as the term insurance market. Think of all the work effort that goes into term insurance marketing yet here is a market, just as big, waiting to be exploited. Tax of course will be a dominant issue in this

market. Brent's paper has been arguing that the likely tax treatment at this stage would be tax deductible premium and tax assessable benefit. That is a great situation to be in. I think you all appreciate that has given a big lift to superannuation. It gave a big lift to personal insurances in the early 70s. It is always an advantage to have premiums tax deductible when you are paying tax at 47% and have the benefit tax assessable when you are paying tax at much lower rates.

Finally Brent does mention that terrible spectre of commission and the rates that are paid to agents. I believe the maximum commission rate on any long term care policy should be linked to the maximum hourly charging rate of consulting actuaries who work on those policies. That should provide protection for all.

MR. R. ATFIELD: I want to make three points. Firstly tell a story against myself which will illustrate the mortality argument. Secondly to speak about government interference in this area and thirdly perhaps suggest an alternative to Geronth insurance.

Firstly the story against myself. In a private capacity I was on the board of management of a retirement village. This retirement village is a typical one. Health care units, hostel units and nursing home. I was asked to do some financial projections which would try to estimate the amount of founder donations that this village could expect to achieve. This was based on turnover rates. A rather dreadful term when you consider that turnover in that environment means death. We had to estimate this turnover ratio. So I got out the old generation tables from the annuitants believing that if anybody buys an annuity from me they are going to live forever. I lightened the mortality considerably and I still severely underestimated the longevity. I should say that this was a church run retirement village and they looked after them so well that literally they were living forever and having 90th birthday parties was a very common occurrence. I was reminded of this on the news the other day when one particular patient from that nursing home just turned 107. She was on the news talking about how good it was in the village and that she had just received a card from her 104 year old sister. So they do live forever if the care is correct.

Secondly government interference. My organisation entered health insurance some time ago seeing that this was a very big market. We decided that community rating was not the way to go. So we had a quasi community rating if you like in that we used some form of selection of risks. This was the subject of some considerable opposition and the main reason we felt for this opposition was that the ologopoly that had been amply demonstrated by the size of the funds within MBF and Medibank in particular meant that there were great vested interests in stopping any other organisation entering this market. The government set up a working party to investigate this and I was

secconded to this working party on behalf of ICA. The working party in my view was a complete farce because they had decided the outcome before the question was asked and I guess that goes on all over Canberra. The upshot was that the '85 amendment outlawed our form of health insurance but we did get the one concession that we were able to honour guaranteed renewable contracts. Well that was a reasonable concession and we have kept a reasonable amount of business. But of course as soon as they extend a benefit such as the medical gap in hospital we were barred from providing that benefit because it was not in our original contract. Again the size of our business to the total market I believe was so small it was not a threat to perpetuating the ologopoly.

The second area in which we got involved was when we were developing the variable or flexible income annuity. People will say that that always had to be shot in the foot because it was a tax deferral scheme. But it was sold substantially because people wanted to preserve capital to pay for long term health. Many of them were sold on that basis that people would need flexibility in retirement. The biggest objection, apart from unattractive rates, perhaps of annuities, is when people lose track of their capital.

So that was another instance where we attempted to get into the long term health market and were frustrated by government intervention and we believe in both cases unnecessarily. Both could have been modified to a certain degree and still achieve their objective. A very heavy hand. This makes underwriters a little bit reluctant to enter new fields. I think the discussion tonight and in Sydney was very heavily dominated by the consultants and the reinsurers both of whom you may say have a slight vested interest perhaps in this line of business. But underwriters I suggest would be very reluctant to enter the business at least at this moment because of the high government intervention in health insurance and health related matters.

But now on a more positive note, is there a way of handling this problem?

Firstly I believe that to handle the problem effectively with the ageing population there has to be a long funding period. So health care provision could well be incorporated in the superannuation area to allow funding to be built up over the working lifetime of a person to enable them to afford the cost of long term health care. Make no mistake the baby boomers are going to demand a greater standard of care than has existed up to date. They do demand a greater quality of life and they will expect that same quality of life in a nursing home. So the funding time has to be a long term period. I would suggest then that we should be able to fund for long term health care in addition to the normal reasonable benefit levels available for superannuation.

Then on attaining retirement age there should be an annuity type basic contract that would preserve that level of capital, preserve it in the annuity to be used solely for health related items. If that were done it does remove a big area of concern for retired people, that is how can they afford that long term health care. Secondly, it enables them to keep track of their capital. Both of those objectives I would suggest would alleviate the long term problem that all future governments will have in providing the quantity and quality of long term health care.

MR. G. WHITTAKER: First of all I would like to congratulate both of the authors for two very readable, up to date and educational papers. We can all learn a lot about this future area for the actuarial profession. The papers are complementary to each other too.

I would like to concentrate like other speakers on the long term care insurance issue. But I would like to include a few remarks about marketing and underwriting because I really think we cannot talk about a future product without considering these two issues. After all it is a risk product we are talking about and we will not be able to sell it unless there is a market.

Turning first to the issue of the taxation and regulatory government environment, I believe that it is essential for this product to even start off and to flourish that there be some form of government support in terms of known tax treatment, known means test treatment and a known regulator. The most appropriate regulator I would believe is the Insurance and Superannuation Commissioner. It is a long term type product and who knows at the moment whether there will be superannuation products, insurance products, disability products or health insurance products. There may be several. I think we do need to know which regulator or regulators we are dealing with before we go to the market with it, otherwise there is too much risk associated with putting the capital into this product.

Secondly what is the market for long term care insurance? I would have thought it would be essential that there be some market research rather than guess work, so the actual market needs to be researched.

It would appear to me what we are saying is it should be private sector market and it is important to get that agreed with government.

It would also appear to be an upmarket market. Several speakers have said "Who can possibly afford this product?" But I guess many of us if we think we may survive a long period after retirement will also be thinking about who is going to take care of us when we need institutional care. So I believe there will be a big market and the demographics and wealth projections show the number of people who could be targetted will grow very rapidly.

In terms of selling the product who will the agent or whoever be selling to? It seems somewhat a different market to the traditional markets we are in. I think we will be selling to older people, both middle aged and some retired people.

What are the client's financial needs? A number of people have speculated on this. I believe as well as thinking about nursing home care we should think about hospital insurance as Steve Miles has said, but I think the basic need and the area that most old people would like is to be able to stay in their own home or at least remain as independent as possible. So it is interesting to see, looking at the statistics, that there is a much larger proportion of women at a specific age who need long term care than men. A lot of males are being taken care of by their wives and then die before their wives. I do not see any reason why the product cannot provide as one of its benefits or its whole benefit, finance to help people stay at home or to afford the more expensive forms of communal housing and care.

Turning now to the underwriting issues. I am speaking mainly as an underwriter which is my present area of responsibility. I am working for a company that has sold a lot of disability insurance, disability income and lump sums on disablement and I only warn people who wish to enter this type of market that good underwriting and claims management is absolutely essential for a product like this. For example, there could be a lot of claims disputes and litigation.

The different age groups of the proponents will be quite a challenge. Underwriters are scared stiff of underwriting people over 65. They will have to get used to the idea but how will we underwrite the pre-existing conditions and heredity problems? The business is likely to be medical rather than non medical business I would guess.

Moving on to product design, the papers have pointed out some of the possible product designs. I think it is important for a company entering the market to be very careful about how they make those decisions. Could the product, whatever it is, be grafted onto existing products? I think that is maybe a safer way to enter the market. Or should it be a stand-alone product?

One comment I would make about one of the papers; surrender values have been mentioned as not being available. Something needs to be added there. Nobody is going to pay level premium for increasing risk without value being maintained on cessation of premiums. Maybe what is meant is that there should not be surrender values but there should be paid up values.

Another important design decision is the type of benefit. Should it be based on a lump sum, a lump sum spread over a short period, over a longer period or should it purely be an income benefit?

Also should benefits be just at one level? Should there be partial benefits? My belief is that if partial benefits are paid to enable people to stay in their own homes you will actually reduce your claims quite substantially. That would be a good underwriting device.

Consideration of forms of guarantees, I would have thought are absolutely essential, as well as the means by which this new risk is pooled if you like. I believe there is a need for some sort of pooling arrangement whether it is through with profit devices or whether it is by the use of reinsurance by an innovative method. If you think about it somebody taking out a stand-alone policy early on should not know whether they are going to get their sum assured or a reduced amount. It should depend on the experience of the pool as it grows up. From the insurer's point of view risk sharing reduces capital needs and risk. Maybe it needs some very careful thought as to how risk sharing can be designed with the product.

We do have to bear in mind that the actual risk increases very rapidly with age and becomes very costly. There would have to be an appropriate mechanism for the actuary reviewing the pricing as time goes by, even if there is some form of guarantee. Looking at it another way, guaranteed fixed benefits will produce either large profits or large losses, with the client group correspondingly winning or losing.

In summary, underwriting, claims and financial management are essential issues before we start marketing. Consider where we are experienced in death cover, lump sum disablement, disability income and health insurance products. I think this new product will require underwriting techniques as well as management techniques which are a blend of each of those. There will be unique forms of underwriting and claims management and financial management techniques.

Again I would like to thank the authors.

MR. P. CARROLL (Author)

Closing Remarks

I have a few quick comments to make in response to the discussion.

Several speakers referred to aspects of the sex ratio in Australia. In fact, the female population exceeded the male population for the first time in 1978, reflecting the decline in birth rates since the late 1950s. There is no doubt that future Australian populations will be increasingly female as the average age increases and, if you visit any retirement village, you will see the reason - women simply outlive men. About 70% of retirement village occupants are widows and most of the others are couples. There are very few single men. The differences in mortality between the sexes show little sign of disappearing.

One speaker referred to the apparent increase in the numbers of disabled in the Australian population, comparing the ABS Surveys of 1981 and 1988. The ABS itself has commented on this and believes that about half the increase is attributable to a change in community attitudes, following the International Year of the Disabled in 1982. Much of the stigma attaching to the disabled had been reduced and the ABS surveys relied, to a large extent, on self-reporting.

One speaker asked why the subsidies were not sufficient to allow people to continue their health insurance after retirement. I put the blame squarely on community rating. Because of the poor value, young people have been dropping out of the market and it is these people who subsidise the over 65s.

The only practical way in which subsidies to the aged can be increased significantly is by spreading the burden over the whole community, rather than focusing it on those young and healthy people who choose to take out health insurance.

A number of speakers commented on the micro-economics of health care provision. Similar comments were made in the Sydney discussion. The salient features which are peculiar to the health care market are the presence of producer-induced demand and the failure of the price mechanism to regulate markets effectively when consumers are in severe pain or in fear of their life. These factors are well recognised and provide the rationale for much of the bureaucratic regulation which now occurs in health care industries. Personally, I believe there is more scope for the use of the price mechanism.

There are a number of comments which I would classify as political. I refer to the remarks on the transfer of wealth to the aged, comments about government interference and Steve Miles' discussion of tax deductibility. I agree with much that was said. To me, the overwhelming influence on health care and health insurance of the future is likely to be the ageing of the post World War II baby boomers. It is another 20 years before these people will be in the high using ages. Nevertheless, I believe the health care market will be transformed, in ways that are impossible to predict, when the baby boomers finally reach their 60s and 70s. I think it is obvious that the baby boomer generation cannot be served and will not be satisfied with a health care industry dominated by the public sector.

REVIEW OF LIFE INSURANCE ACT

SUBMISSION TO DEPUTY COMMISSIONER (LIFE INSURANCE) BY THE INSTITUTE OF ACTUARIES

DISCUSSION DRAFT PREPARED BY

The Life Insurance Committee

CONTENTS

1. INTRODUCTION

1.1 As part of the process of reviewing the Life Insurance Act, the Deputy Commissioner Life Insurance (DCLI) has asked for a submission from the Institute of Actuaries of Australia.

1.2 The actuarial profession, by nature of its training and experience, feels that it can make a worthwhile contribution to the review of the Life Insurance Act (the Act) and welcomes the opportunity to make a submission.

1.3 Actuaries occupy many senior positions in the life insurance industry: such positions range from purely technical to chief executive. Nevertheless, this submission is intended to cover only those aspects of the Act of relevance to actuaries as professionals. Those matters of more general concern will be covered in submissions from other bodies.

1.4 The practicability of implementing any suggestions has been borne in mind in preparing this submission.

1.5 The life insurance industry has changed dramatically in the forty five years since the Act was first introduced. The techniques available to the actuarial profession have also changed markedly in that time. We thus submit that a major restructuring of the Act is necessary: it is not sufficient to tamper with a few details.

1.6 The process of change is likely to continue in the future. The revised Act must thus be able to deal with a changing environment. We therefore regard it as essential that the Act should deal only with matters of principle: matters of detail should be covered by means of Professional Standards issued by the Institute and ISC Circulars which should have the backing of the Act and can be readily amended. Statutory Regulations as currently used for some matters of detail are not appropriate because of the difficulty and delay in changing them.

1.7 The principles should be laid down by the elected Parliament and would be expected to stand the test of time. They would create the framework for the detailed rules and, in doing so, would create limits for public servants. Change to the principles would require the approval of Parliament. The detailed rules in the ISC Circulars and Professional Standards can be changed regularly to deal with new products, the changing environment and changing community attitudes - but always within the limits of the principles in the Act.

2. EXECUTIVE OVERVIEW

2.1 The Institute submission covers 13 topics. In broad terms we have tried to follow a uniform style and each topic consists of a summary of the present position, a brief discussion of the topic and finally the Institute's recommendations. Where the Institute's position is self evident the discussion has been omitted.

2.2 A very brief summary of the changes recommended by the Institute is as follows:

(a)	Definitions	- we make various recommendations.
(b)	Role of the actuary	- we support the continuation of the Appointed Actuary concept.
(c)	Premium Rates	- we propose that no policy be issued unless the Appointed Actuary has approved all terms and conditions of that policy.
(d)	Surrender Values	- we are opposed to minimum surrender values but, should minimums be imposed, make suggestions as to possible scales.
(e)	Statutory Funds	- we support retention of the Statutory Fund concept.
(f)	Assets	- we are opposed to control of investment policy but propose that the Appointed Actuary should be responsible for valuing assets for solvency purposes.
(g)	Liabilities	- we recommend a realistic basis for valuation of liabilities with additional reserves for solvency.
(h)	Reporting of Earnings	- we recommend that earnings be reported on a realistic basis which is consistent with the treatment of solvency.
(i)	Solvency	- we recommend major changes to allow reporting of solvency on a modern basis.

(j) Allocation and Distribution of Profit - we recommend major changes in the interests of equity.

(k) Annual Reporting - significant changes are recommended.

(l) Statistics - we recommend that collection of statistics be dealt with by ISC Circular.

(m) Disclosure - we recommend greater disclosure of policy benefits at the point of sale and subsequently.

2.3 The recommendations on disclosure are critical to the rest of our recommendations. The Institute believes in "freedom with publicity". Adequate disclosure of policy benefits, terms and conditions at point of sale and financial benefits year by year considerably reduces the need for cumbersome devices to protect policyholders.

2.4 The Institute is recommending significant changes to the basis of reporting the financial performance of life insurance companies. We believe that major changes are essential in this area and that the recommendations we have made will give policyholders, both prospective and existing, shareholders and the Commissioner a much clearer picture of the financial position than the current methods. We also believe that our proposals will solve the problem of maintaining equity between participating policyholders and shareholders.

3. DEFINITIONS

3.1 Miscellaneous Definitions

The current Act contains many definitions in S4(1). As part of the revision of the Act this section will need to be amended. The Institute wishes to make specific proposals about a number of matters:

(a) **Participating Policy**

One of the fundamental objectives of the Act is the protection of participating policyholders. The Institute supports this and is making specific proposals for improvement (see Section 12 below). For these proposals to be effective it is essential that a participating policy be defined.

The current situation, where the participating status of a policy is decided by the company, is not satisfactory and the Institute believes that the Act must provide a definition to ensure that those who need the protection do receive it and that there is an industry-wide definition. The proposed definitions are:

"Participating Policy" means a policy which is issued on the basis that it participates in the profits in a Statutory Fund and includes any policy under which any part of the benefit payable is determined retrospectively at the discretion of the company, other than where the discretion relates to apportionment of investment income or expenses or making provision for taxation or other statutory charges.

"Participating Policyholder" means the owner of a participating policy.

This means that a policy may be non-participating even if any part of the benefit payable is determined prospectively at the company's discretion - provided that the policyholder is able to surrender the policy immediately on terms which have been defined in advance and do not allow the office any discretion.

(b) **Continuous Disability Insurance**

The current definition applies only to benefits which are incorporated in a life insurance policy. This leaves it unclear as to whether stand-alone disability policies are covered by the Act. The Institute believes that disability policies which are guaranteed renewable for more than one year's duration cover complex risks which require the prudential controls and actuarial supervision provided by the structure of the Act.

The Institute recommends that the definition should be changed to include all disability policies with guaranteed renewability of more than one year's duration either on a stand-alone basis or coupled with other types of life insurance. It is recognised that a small number of general insurance companies registered under the Insurance Act transact such business and it is suggested that they could continue to do so by "grandfathering provisions."

(c) **Investment-Linked Business**

Elsewhere in this submission (7.13) is a recommendation that it be a requirement that this type of business be in a separate Statutory Fund. For this to be effective a definition will be necessary. The following is recommended:

"Investment-Linked Policy" is a policy under which the benefits are defined as being based on the value from time to time of a specified pool of assets, whether by means of division into units or otherwise.

(d) **Investment Account Business**

The Act will need to refer to this type of business. We suggest that a definition based on the description given in ISC Circular 273 be adopted.

(e) **Annuity Business**

The Institute feels that the need for prudential control of this class of business is self-evident and that it should be covered by the Act. There will thus be a need for a definition. The following is recommended:

"An Annuity is a policy under which the policyholder, in exchange for a single payment or a series of payments which cease before the income commences, receives a stream of income for a term which either depends on the duration of human life or lives or is for a specified term."

(f) **Deeming Provisions**

We support the continuation of the existing "deeming provisions" to cover odd cases.

Industrial Business

3.2 At present S4(3) divides business into three classes - Ordinary, Superannuation and Industrial. The reasons for this seem to be historical and no longer appropriate. In particular, Industrial business is no longer written by any company and all such business in force has been deemed to be Ordinary business by the Commissioner. In these circumstances the Institute recommends that all references to Industrial business should be removed from the Act and Part V of the Act should be repealed.

Classes of Business

3.3 The division of other business into Ordinary and Superannuation was perhaps based on the fact that Ordinary business was subject to tax and Superannuation business was exempt. This is no longer the case: both are subject to tax, albeit in different ways and at different tax rates. In addition, for tax purposes there are three different categories of Superannuation business. Finally, another category of business - Immediate Annuity Business - is exempt from tax. For tax purposes, these categories of business are now fully defined in the Income Tax Assessment Act. Tax law

changes so rapidly that it seems unlikely that these categories will remain unchanged for long. Accordingly, the Institute believes that there is no longer any reason relating to the basic objectives of the Act to separate business into classes and recommends that S4(3) should be repealed.

4. THE ROLE OF THE ACTUARY

Present Position

4.1 The Act has always recognised the importance of professional actuarial advice in the financial management of a life insurance company by requiring

(a) actuarial approval for premium rates,

(b) regular actuarial reports on the financial condition, and

(c) actuarial approval for the distribution of surplus.

4.2 In the original form of the Act these actuarial tasks could have been carried out by different actuaries. Recent legislation introduced the concept of the Appointed Actuary who is solely responsible for all these tasks.

Recommendations

4.3 The Institute supports the Appointed Actuary concept and recommends that this be carried over to the revised Act. We also propose that the definition of Appointed Actuary should be extended to include Accredited Members of the Institute of Actuaries of Australia.

4.4 The current Act, (S42, S42AA, S42A and S42B), requires a company to apportion receipts, payments and tax in an equitable manner, eg. between Australian and overseas business. The Institute supports retention of this requirement and recommends that such apportionments be approved by the Appointed Actuary.

5. PREMIUM RATING

Present Position

5.1 The current Act states that no policy can be issued unless the rate of premium is approved by the Appointed Actuary as suitable. In giving approval the Appointed Actuary must have particular regard to the maximum commission payable.

5.2 A feature of the Act is that no definition of "suitable" is given. It should also be noted that, for investment account and investment-linked policies which have been developed since the

Act was introduced, approval of premiums has come to mean the approval of the charges to be made for expenses and any guarantees together with the premiums for any associated life cover.

5.3 The Institute has issued a Professional Standard which gives comprehensive guidance to the Appointed Actuary about the considerations to be observed in determining premium rates.

Recommendations

5.4 The financial stability of a life insurance company depends on the levels of premiums and charges. These in turn must be relevant to the other terms and conditions of the policies concerned, of which commission is only one element. The Institute therefore recommends that the new Act should omit any references to premiums and commissions: it should prescribe instead that no policy may be issued unless the Appointed Actuary has approved in writing all terms and conditions of that policy.

5.5 It is also recommended that the Act should only make this prescription in general terms and that details of the approval be in the hands of the Institute to oversee by means of the appropriate Professional Standard, with the Commissioner having the right to see, at any time, the report by the Appointed Actuary meeting that Professional Standard.

5.6 We also recommend that the Act should require the Appointed Actuary to review all product terms and conditions at least yearly and, if appropriate, withdraw approval.

6. SURRENDER VALUES

Present Position

6.1 The current Act provides for minimum surrender values for whole of life, endowment and pure endowment policies, coupled with a discretion to the Commissioner to suspend or vary a life insurance company's obligation to pay those values if to do so would endanger its financial stability. The surrender value basis prescribed is a prospective one using out of date parameters.

6.2 Statutory minimum surrender values for investment account policies have recently been imposed by way of guidelines in ISC Circular 273 and include a similar dispensation at the Commissioner's discretion. The basis is a retrospective one which should cause no problems to a company for regular premium policies but could be difficult for single premium policies in an adverse investment environment.

6.3 Currently no minimum surrender value scales exist for investment-linked policies.

Recommendations

6.4 The Institute, while acknowledging that there are strong social arguments for the protection of policyholders by prescribing minimum surrender values, is concerned about the number of guarantees which are being included in both investment account and investment-linked policies. Guarantees of minimum surrender values could, in certain circumstances, prejudice the interests of continuing policyholders while the ability to obtain dispensation from the Commissioner is likely to be time consuming and hence ineffective.

6.5 The Institute's recommendation is that there should be no prescribed minimum surrender values. Should the Parliament wish the Act to retain minimum surrender values, our recommendations are given in Attachment 1.

7. STATUTORY FUNDS

Present Position

7.1 The current Act requirement for the establishment of Statutory Funds to segregate the assets and liabilities relating to all or a defined part of a company's life insurance business, serves three main purposes:

(a) to assist in the equitable management of the business,

(b) to protect policyholders' entitlements in the event of a winding up or amalgamation of funds, and

(c) to regulate transfer of surplus to shareholders or other classes of policyholder.

7.2 The current Act allows a company to establish separate Statutory Funds as a right in respect of any part of its Superannuation business or any part of its overseas business. Subject to the approval of the Commissioner, a company may establish a Statutory Fund in respect of part of a class of business.

7.3 The Commissioner has required separate Statutory Funds for investment-linked business. As we understand it, this requirement stems from concern to protect the position of investment-linked business, relative to other business in the same Statutory Fund should a company be wound up as a result of a fall in asset values. The argument is that, following a fall in asset values, investment-linked policyholders will already have

suffered a reduction in benefits. If on winding up, the assets attributable to them are to be pooled with those of other policies in the same Statutory Fund, they suffer a further unjustified reduction in benefit. We support this argument.

7.4 In practice some companies have established separate Statutory Funds for overseas business. Some companies have established separate Statutory Funds for Superannuation business for reasons of tax effectiveness or optimising investment policy.

7.5 While we strongly support the concept of Statutory Funds and the protection they afford, it should not be thought that they are a perfect solution to all issues of solvency and equity. We have concerns that some aspects of their operation are not well understood by the public at large, namely:

(a) Policyholders in general do not appreciate that their policies are secured first on a particular Statutory Fund. In the event of an insolvency, we foresee considerable public disquiet if some policyholders' benefits are significantly reduced whilst those in other Statutory Funds are unaffected.

(b) If a company is unable to meet its obligations, either the company or the Statutory Fund may be wound up. Once the obligations in a particular Statutory Fund have been met, any remaining funds may be available to meet obligations outside that Statutory Fund.

Recommendations

7.6 The concept of the Statutory Fund has been an effective part of life insurance regulation since the present Act was introduced. Although life insurance business can be regulated without the introduction of Statutory Funds, we recommend that the concept be retained.

7.7 The question has been raised whether composite companies transacting life and general insurance business should be permitted in future. If the Statutory Fund concept is adequate to protect the interests of life insurance policyholders, we see no compelling reason to preclude a company from transacting any type of business, be it general insurance or other, outside its Statutory Funds.

7.8 We see no good reason why participating business should be isolated in a separate Statutory Fund(s). However, if participating and non-participating business are in the same Statutory Fund, it is necessary to ensure that the interests of participating business are fully protected. We believe that this is best done by identifying that part of the Statutory Fund which

relates to participating policyholders. Further, once this identification has been made, we see no objection to participating policyholders' retained earnings being used to finance new business in any other Statutory Fund as long as they maintain their identity and those policyholders gain an equitable share of the profits arising in the new Fund (see 9.13 and Section 12).

7.9 It is necessary to consider whether more than one Statutory Fund should be permitted or required. More specifically, whether:

(a) the Act should require the establishment of separate Statutory Funds for defined parts of a company's business, or

(b) the establishment of separate Statutory Funds should be at the option of the company.

7.10 The Institute recommends that overseas business should be held in separate Statutory Funds. This will minimise the difficulties faced by the Commissioner in supervising overseas business. Indeed, it is our view that the Act should be concerned primarily with the protection of Australian policyholders: establishment of separate Statutory Funds for overseas business is essential for this.

7.11 Distinctions between investment-linked and other types of policy are not always clear. It is possible for investment-linked policies to include guarantees in certain eventualities (death, maturity etc.) and such hybrid policies are likely to increase. We recommend that guarantees are best dealt with by reinsurance out of the investment-linked Statutory Fund.

7.12 The establishment of a Statutory Fund is usually a matter of judgement. The Institute recommends that a company establishing a new Statutory Fund should require the approval of the Appointed Actuary.

7.13 A summary of our recommendations in respect of Statutory Funds is:

(a) The concept of the Statutory Fund should be retained.

(b) A company should be required to establish one or more separate Statutory Funds for its overseas business.

(c) A company should be required to establish one or more Statutory Funds for investment-linked business.

(d) The requirements in (b) and (c) could be waived should the liabilities in such a form not exceed 5% of total actuarial liabilities or at the discretion of the Commissioner should the company so request.

(e) A company should have the right to establish a Statutory Fund for any defined part of its business.

(f) Where a policy has a range of benefits normally covered by separate Statutory Funds, the policy should be written in one fund only and the benefits retained or reinsured as appropriate. Any reinsurance between Statutory Funds must be on terms approved by the Appointed Actuary.

(g) Some companies have adopted a system of hypothecation of assets within a Statutory Fund to improve the management of particular blocks of business. This may be done either by creation of individual sub-funds or by unitisation of all investments within the fund and particular blocks of business holding particular mixes of unit. We believe that such hypothecation is reasonable as a means of determination of benefits and management of solvency margins. It should be permitted subject to disclosure and the overriding principle that in the event of a winding-up, all the assets of the Statutory Fund are available to support all the liabilities.

(h) Transactions between Statutory Funds or between a Statutory Fund and the shareholders' fund involve judgement. The Appointed Actuary should be required to approve any transfer between funds.

(i) Joint ownership of an asset by different Statutory Funds should be permitted, providing the interests of each fund are fully specified and documented. This will avoid the need for more complex structures to achieve the same purpose.

(j) Shareholders' funds and non-life insurance business should continue to be held outside the Statutory Funds.

(k) Where participating policyholders are entitled only to a share of the profits generated by their own business, that part of the Statutory Fund which relates to participating policyholders must be identified.

(l) Participating Policyholders' Retained Earnings can be transferred to support other Statutory Funds but must retain their identity in the new Statutory Fund.

(m) A company establishing a Statutory Fund should require the approval of the Appointed Actuary.

8. ASSETS

Present Position

8.1 The current Act, Section 39, places certain restrictions on the investments of Statutory Funds. In broad terms these are that, except with the approval of the Commissioner: -

(a) the fund can not be invested in a related company (other than a subsidiary), and

(b) no more than 5% of a fund can be in trust schemes, e.g. unit trusts.

8.2 The restriction on investment in trust schemes is understood to be causing considerable practical difficulties at present and some companies have sought the Commissioner's approval to exceed the 5% limit. The restriction on investment in related companies could easily be circumvented by investing in a subsidiary which in turn invests in a related company. In summary the current rules appear to prevent certain forms of sensible investment but do not prevent fraudulence.

8.3 The current Act is silent on the question of the valuation of assets other than intangible assets (S49[5]) and merely requires that signed copies of the audited accounts and balance sheet be supplied to the Commissioner.

Recommendations

8.4 It is the Institute's view that the current rules on investments need to be completely revised. The current restrictions on trust investments can preclude a company from taking sound investment opportunities and should be eliminated. As a general principle, the Institute recommends that a life insurance company should have complete freedom to invest the assets of a Statutory Fund, subject only to: -

(a) any restrictions which may be included in the company's Articles of Association,

(b) policy conditions, and

(c) a prohibition on investments in, loans to, deposits with related companies (other than wholly-owned subsidiaries) or controlling shareholders without the express approval of the Commissioner.

The prohibition in (c) is required to ensure that at all times the funds of the company remain under the control of the directors. There should be appropriate "look-through" provisions to prevent the intent of the prohibition being avoided by channelling the investment or loan or deposit through subsidiary to other related companies.

8.5 It is essential when considering the solvency of a Statutory Fund to pay careful attention to the value placed upon the assets. The value of the assets for solvency purposes may well be different from the value placed on the assets in the balance sheet. Accordingly, we recommend that the revised Act should require the Appointed Actuary to adopt a valuation of the assets for the purposes of a solvency valuation.

8.6 It is recommended that the valuation for solvency purposes be on a market value basis with adjustments for asset liability mismatching, liquidity etc, in accordance with Professional Standards issued by the Institute.

8.7 The Institute will develop Professional Standards for the guidance of Appointed Actuaries carrying out such a valuation and proposes that the Act should restrict itself to considering only the broad principles of asset valuation. Suggested wording is as follows:

"In assessing the value of an asset for solvency purposes, the Appointed Actuary should have regard to such factors as: -

(a) the nature of the asset,

(b) the price of the asset as quoted on a recognised exchange if applicable,

(c) for specialised assets such as real estate the value as recently assessed by a recognised expert,

(d) the expected future cash flows from the asset,

(e) the amount which could reasonably be expected to be recovered on sale or assignment of the asset,

(f) the marketability of the asset, and

(g) such other matters as the Appointed Actuary considers relevant."

8.8 The treatment of "synthetic" assets such as futures and options will need special care. The Institute notes that this is the subject of a current Commissioner's committee of enquiry and is reluctant to comment in advance of publication of the committee's report.

8.9 Particular care will be necessary in placing a value on such items as -

(a) deferred tax benefits,

(b) investment in controlled or related companies, and

(c) non-traded assets.

8.10 The Institute's Professional Standards for the valuation of assets will expand on the factors in 8.7 above as necessary and will, because of the solvency nature of the valuation, provide for a zero value to be assigned to certain asset types. The Professional Standards will be regularly updated to reflect changes in investment practice.

8.11 Assets which may be assigned a zero value for solvency purposes could include -

(a) unsecured loans to directors, staff and intermediaries,

(b) unpaid premiums which are not secured by the valuation of liabilities,

(c) computer software except to the extent that it has a known resale value,

(d) office fittings, and

(e) intangible assets.

8.12 The company should be required to publish details of the valuation of assets adopted for the purposes of the solvency valuation and also to publish details, at individual asset level, for all assets exceeding, say, 1% of the fund.

9. VALUATION OF LIABILITIES

Present Position

9.1 The current Act requires that a life insurance company shall, every five years at least, cause its Appointed Actuary to make an investigation into its financial condition and to produce a written report thereon. ISC Circular 154 currently requires an annual report.

9.2 Part of the financial condition investigation is a valuation of liabilities on a "proper" basis. There is a requirement that the value of liabilities in aggregate is not less than the value calculated on a prescribed minimum basis. This basis is prescribed in the Act for whole of life, endowment insurance and pure endowment business and in ISC Circular 273 for investment account business.

Recommendations

9.3 It is the Institute's view that the Act should be concerned with the solvency of life insurance companies and should, therefore, be concerned with the valuation of liabilities. However the legislation must be updated to recognise recent work done on valuation for solvency.

9.4 We believe that the revised Act should recognise that the nature of life insurance contracts is changing rapidly. Prescribing minimum valuation bases for specific classes of business will soon become out-of-date. The Act should, therefore, be concerned only with principles and leave detailed regulation to Professional Standards established by the Institute (see 9.14).

9.5 Elsewhere, (see 13.7) we recommend retention of the requirement that a financial condition report be produced. It should be a requirement of that report that a valuation of liabilities be performed by the Appointed Actuary. This valuation will demonstrate solvency and establish realistic earnings.

9.6 The approach recommended identifies two reserves in respect of policies, ie:

(a) "Policy Reserve", and

(b) "Solvency Reserve".

9.7 The Policy Reserve can be defined as the reserve required for policies calculated on a realistic basis comprising the Appointed Actuary's best estimate of the expected outcome of all contingencies affecting the policies, including reasonable benefits to participating policies, and allowing for planned margins. Note that the Policy Reserve may be negative or less than the current surrender value under certain circumstances.

9.8 The Solvency Reserve represents margins for adverse deviations, asset liability mismatching, investment risk etc. It will also be required to ensure that the sum of the Policy Reserve and Solvency Reserve is at least equal to the current surrender value of the policy (see 9.17[a]).

9.9 A company would be required to hold assets of a value as adopted by the Appointed Actuary (see 8.5), at least equal in value to the sum of the Policy and Solvency Reserves. For convenience this sum is called the Statutory Reserve. Each Statutory Fund would then comprise the following:

(a) Policy Reserves }
} The sum equals Statutory Reserves
(b) Solvency Reserves }

(c) Other Reserves

See also 9.13 and Section 12.

Policy Reserves

9.10 The Institute recommends that the method adopted for calculating Policy Reserves be the Margin on Services Method. A feature of this is that, in carrying out the valuation, the Appointed Actuary should make assumptions about the future cost of the risks accepted and services provided by each type of contract, taking account of expected investment earnings and contract discontinuance rates. These assumptions should be the most realistic that can be made using judgement, experience and professional training and should allow for reasonable benefits to participating policyholders. In addition, allowance should be made for planned margins.

9.11 The method ensures that:

(a) the Policy Reserve requires no initial finance: this is provided in the form of a Solvency Reserve;

(b) the provision of the initial finance is a capital item and is not recognised as a loss; similarly the repayment of the initial finance is not recognised as profit;

(c) future profits are not capitalised but future losses are; and

(d) profit or loss will be recognised at the sale of a contract only to the extent that the capitalised value of the allowance for acquisition costs in the premium payable differs from the acquisition costs actually incurred.

Solvency Reserves

9.12 The Institute recommends that the method adopted for calculating Solvency Reserves should be to calculate the Statutory Reserve, ie. the sum of Policy Reserves and Solvency Reserves, by:

(a) recalculating the liabilities using assumptions which include margins for adverse deviations, and

(b) calculating the additional reserves required for the pricing risk, asset default risk and mismatching risk. This calculation would be carried out for each type of policy using parameters depending on the characteristics of the liabilities and the assets supporting them.

The Solvency Reserve is then equal to the Statutory Reserve less the Policy Reserve.

9.13 On writing new business, the requirement to establish a Solvency Reserve may cause a strain. This strain may be financed by transfer from shareholders' funds - either capital or retained earnings - or from participating policyholders' retained earnings. This finance can be from within the Statutory Fund or by transfer from outside. Where participating policyholders' retained earnings are transferred to support business in another Statutory Fund, they must be identified and gain an equitable share of the profits. It is suggested that participating policyholders' retained earnings transferred from another Statutory Fund be denoted Participating Policyholders' Capital. The reserves in a Statutory Fund (see 9.9) are thus supported by:

(a) Participating Policyholders' Retained Earnings (PPRE);

(b) Participating Policyholders' Capital (PPC) - identified by original Statutory Fund;

(c) Participating Policyholders' Capital Retained Earnings (PPCRE) - identified by original Statutory Fund;

(d) Shareholders' Funds - which are identified as Shareholders' Working Capital (SWC); and

(e) Shareholders' Retained Earnings (SRE); and

These items are dealt with more fully in Section 12. See also the proposed Balance Sheet - Attachment 7.

Legislative Framework

9.14 The Institute recommends that the Act should require that the Appointed Actuary carry out a valuation of the liabilities to determine the Policy Reserve, as defined in 9.7, and the Solvency Reserve, as defined in 9.8. Reference should be made to the fact that the Institute will produce detailed Professional Standards specifying bases to be used for particular classes of business.

9.15 The Institute undertakes to develop detailed Professional Standards for the calculation of Policy Reserves and Solvency Reserves.

9.16 In general, the Appointed Actuary would be required to follow the Professional Standards. However, different approaches or assumptions could be followed, if supported by detailed scenario testing, but the departure would have to be reported and may need to be justified to the Institute and the Commissioner.

9.17 Features to be incorporated in the Professional Standards include:

(a) Benefits, premiums and expenses should be valued to the end of the benefit period, not to an earlier renewal date.

(b) The use of discontinuance assumptions would be required.

(c) In no event should the Statutory Reserve, on a policy by policy basis, be negative or less than the current cash surrender value (even if not guaranteed). Note that the Policy Reserve could be less than the current surrender value and may be negative with the Solvency Reserve making up any amount required to reverse a negative Policy Reserve or to build up the Statutory Reserve to the current surrender value.

(d) The discontinuance, mortality and morbidity assumptions may be based upon the recent experience of the company provided this is relevant and credible: otherwise industry or other relevant experience must be used. The minimum margins for adverse deviation would be specified.

(e) In selecting expense assumptions, the Appointed Actuary may assume (unless inappropriate) that the company will continue to write new business in the future, but the assumed levels of new business must be realistic. Provision should be made for future inflation, and this provision should be consistent with assumed future interest rates, and any indexation of benefits and premiums. The expense assumptions must provide for maintenance expenses in future years consistent with those currently being incurred.

(f) For non-participating business, a specified (maximum) long term interest rate to be adopted for the investment of premiums and the reinvestment of investment income will be given.

(g) In calculating the reserves for participating business, provision must be made for future distributions of profit and the assumed rates must be consistent with other assumptions. (Note that distributions at the current valuation are not included in the Policy Reserve at the valuation.)

(h) The Statutory Reserve for any policy must be sufficient to ensure that, on the basis adopted, there will be no need for future external finance.

(i) The Appointed Actuary should include a special reserve to reflect the difference between the value for the assets held in the Balance Sheet and that adopted for the solvency valuation.

(j) The methods to be used to allow for the pricing risk, asset default risk and mismatching risk will be specified.

10. REPORTING OF EARNINGS

Present Position

10.1 Financial reports prepared in accordance with the current Act have two purposes:

(a) to demonstrate the solvency of the company, and

(b) to demonstrate that the distribution of surplus complies with the requirements of the Act.

Details of these reports are published in the First and Second Schedules. The Financial Condition Report (see 9.1) gives further information to the company but is not published.

10.2 A Professional Standard exists to guide Appointed Actuaries preparing Financial Condition Reports but currently the Commissioner has no redress against an Appointed Actuary whose report does not meet the Standard. The reports are not designed to demonstrate the profit made by a company and they do not do so. Published financial reports are potentially misleading to an uninformed reader. Taken at face value they appear to show that most life insurance business makes large losses in the year of sale and large profits in subsequent years. This is not a realistic view.

Recommendations

10.3 There would appear to be a case for the financial reports of a life insurance company to be prepared along similar lines to those required by the Companies Code and, accordingly, the Institute recommends that the Act be amended to incorporate a section requiring realistic reporting.

10.4 The recommendations in Section 9 above on valuation of liabilities give a framework under which realistic profit can be calculated. A feature of the Policy Reserve calculation method suggested is that it establishes a progression of reserves over the life of a contract such that:

(a) planned profit will be recognised each period in relation to the planned margins included in the premium rates for risks, services and the interest on the finance provided; and

(b) experience profit will be recognised each period in relation to the difference between the actual experience and the assumptions for the period made at the previous valuation.

10.5 The profit emerging each year is simply the growth in the fund less the increase in Policy Reserves. This is the Operating Profit of a Statutory Fund. It should be stressed that the Operating Profit of a Statutory Fund in a period will be calculated before profits have been distributed, ie. the Operating Profit arising in a period includes any interim distribution of profit to participating policyholders in that period.

10.6 It is recommended that calculation of Operating Profit will be carried out for each Statutory Fund and details shown in the Revenue Account. See Attachment 3. In summary Operating Profit is -

(a) Operating Income less

(b) Operating Expenditure less

(c) Increase in Policy Reserves

10.7 It is recommended that Operating Profit be allocated fully between shareholders and participating policyholders at the end of each period - see Section 12. The suggested form for reporting this allocation of profit is the Allocation of Operating Profit Statement shown in Attachment 4.

11. SOLVENCY STANDARDS

Present Position

11.1 Under the current Act solvency is demonstrated by the use of conservative bases for valuing liabilities . These bases are specified in the Act for conventional business and by ISC Circular 273 for investment account business.

11.2 The current Act requires that a company have a minimum paid-up share capital of $2m before it is registered. This presumably is intended to provide an additional reserve for solvency.

11.3 The operation of a life insurance company means that determination of solvency is not an easy exercise. For a typical cohort of life insurance policies, reserves are built up in the early stages, when premiums exceed claims and expenses; these then run off in the later stages as claims increase. At any point in time the adequacy or otherwise of these reserves built up to meet policy liabilities depends on the future experience in investment performance, expenses, claims and withdrawals. None of these factors can be known with certainty. Accordingly, the statement that a Statutory Fund is solvent must be a statement of probability.

11.4 The following points should be borne in mind:

(a) Solvency must depend ultimately on sound management. No level of reserves will protect a Statutory Fund against the consequences of poor decisions.

(b) In connection with (a) above, a critical determinant of solvency is product design. Clearly a life insurance company issuing single premium investment account contracts offering full guarantees at any time is more at risk than one issuing contracts with limited guarantees and the same loadings.

(c) A life insurance company may expect to generate large surpluses in the future (ie. it has a large embedded value) and yet currently be insolvent on a statutory basis. This fact is not necessarily a cause for panic. Under sound management the life insurance company could trade out of its difficulties.

11.5 There are various types of solvency standard. Within the Australian actuarial profession, strong support has been expressed for an approach which adds margins for various contingencies to base reserves for liabilities.

Recommendations

11.6 The approach recommended has been outlined earlier (Section 9) when discussing the valuation of liabilities. It must be stressed that adoption of this approach will give strong solvency standards for the Australian life insurance industry. These standards address the issue of solvency both now and in the future.

11.7 The Institute recommends that companies be required to report on solvency using the Solvency Statement set out in Attachment 5. This Solvency Statement should be approved by the Appointed Actuary.

11.8 The approach recommended could be used to calculate a simple solvency ratio for each Statutory Fund where:

$$\text{Solvency Ratio} = \frac{\text{Total funds available for Solvency Reserve}}{\text{Solvency Reserve required}}$$

11.9 Use of the ratio in the above form would enable companies and the Commissioner to manage solvency and to take early avoiding action when problems loom but before they have become critical. As an example, the solvency ratio could be used by the Commissioner when exercising judgement about possible courses of action along the following lines:

(a) If the ratio exceeds 1.0 then the company could normally be considered sound and no action is required.

(b) If the ratio is less than 1.0 the Commissioner might investigate along the following lines:

(i) If the ratio lies between, say, 0.75 and 1.0 there is no immediate cause for concern but it is necessary for the company to specify a course of action to bring the ratio above 1.0 within 3 years.

(ii) If the ratio is between, say, 0.25 and 0.75 new business should be stopped and action as in (i) above is required.

(iii) If the ratio is less than, say, 0.25 an Administrator should be appointed.

It is worth stressing that in case (ii) it is possible the company could meet its current obligations unless experience is very adverse.

11.10 Provided that overseas business is kept in separate Statutory Funds, these solvency standards should, at the discretion of the Commissioner, not apply to business outside Australia in countries with acceptable solvency standards.

11.11 The Institute believes that the establishment of solvency standards as set out above will eliminate the need for specific minimum paid up share capital requirements.

12. ALLOCATION AND DISTRIBUTION OF PROFIT

Present Position

12.1 Distribution of surplus is dealt with in accordance with the company's Articles of Association. However, this is subject to overriding Act provisions - S50 of the Act. The current Act does not provide for surplus to be distributed but if surplus is distributed, Australian participating business must receive at least 80% of that part of distributed surplus arising from this business. Distribution of surplus must be approved by the Appointed Actuary.

12.2 No distinction is made between the rules for transfers out of a Statutory Fund to shareholders and those to another Statutory Fund to support its business.

12.3 The current Act does not provide for surplus arising from Australian participating business to be separately identified. This can lead to difficulty and argument.

Recommendations

12.4 The Institute believes that the use of the concept "surplus" for the purpose of allocation and distribution of profit is not helpful. We have earlier recommended the adoption of realistic reporting and have defined the concept of "Operating Profit" (see 10.6).

12.5 The Institute believes that when considering profit, two issues must be taken into account:

(a) the allocation of profit between shareholders and participating policyholders, and

(b) the distribution of that profit, once allocated, by way of reversionary bonus, interest credit or dividend.

The revised Act must pay particular attention to these topics and detailed recommendations are set out below. The Institute recommends that the allocation and distribution of profit must continue to be subject to approval by the Appointed Actuary.

Allocation of Profit

12.6 The Institute believes that it is necessary to identify the entitlements of participating policyholders and shareholders in each Statutory Fund. In order to do this it is essential that Operating Profit be allocated fully between shareholders and participating policyholders at each year end.

12.7 Clearly, the profit arising in a Statutory Fund must be allocated to those providing the capital supporting the Statutory Fund, ie. the shareholders and participating policyholders. Where capital has been provided by participating policyholders, profit allocation must be made on the same terms as for shareholders' capital. Accordingly, in the allocation of Operating Profit within a Statutory Fund, we need only consider participating policyholders and external capital providers. The latter group includes both shareholders and any participating policyholders from another Statutory Fund who have supplied capital. In other words, when considering a Statutory Fund we have two sources of capital: internal from the participating policyholders of that Statutory Fund, and external from all other sources.

12.8 Rules for sharing of profits between participating policyholders and shareholders will normally be set out in the company's Articles. For the protection of participating policyholders it is necessary to have some restrictions in the Act.

12.9 When a Statutory Fund involves only non-participating business, any Operating Profit may be allocated entirely to the external capital providers. The allocation between different groups of external capital providers should be determined on the basis of capital commitment.

12.10 Where a Statutory Fund includes both non-participating and participating business, a company which desires to allocate profits from the two sources separately may elect to establish separate revenue accounts. Any such election should only be reversed with the approval of the Commissioner.

12.11 For a Statutory Fund, and revenue accounts, involving participating business, equity between participating policyholders and external capital providers needs to be considered when Operating Profit is being allocated. There is no method by which such equity can be guaranteed but the Institute feels that a reasonable approach is as follows (see 9.13 for definitions):

(a) Participating Policyholders' Retained Earnings (PPRE) of that Statutory Fund and external capital providers (ie. SWC, SRE, PPC and PPCRE) should receive the fund earnings rate applied to their capital and any existing retained earnings.

(b) The difference between fund earnings calculated under (a) and any Operating Profit can be allocated between participating policyholders and external capital providers as the company thinks fit, provided that at least 90% is allocated to participating policyholders of that fund and any balance is allocated to external capital providers in proportion to the capital committed.

(c) SWC is a capital item, accordingly Operating Profit determined under (a) and (b) above in respect of SWC is added to SRE. Similarly, that in respect of PPC is added to PPCRE.

(d) The allocation of Operating Profit to PPRE, SRE and PPCRE must be approved by the Appointed Actuary.

12.12 Fund earning rates and Operating Profit can, of course, be negative. After allocation, therefore, PPRE, SRE and PPCRE could be negative. This is acceptable for solvency provided that the Statutory Fund contains sufficient capital in total.

12.13 The Institute recommends that the Allocation of Operating Profit Statement be published in the form set out in Attachment 4.

Distribution of Profit

12.14 The recommendations above establish ownership of Operating Profit and apportion it, for each Statutory Fund, between Participating Policyholders' Retained Earnings (PPRE), Participating Policyholders' Capital Retained Earnings (PPCRE) and Shareholders' Retained Earnings (SRE) - (see 9.13). Distribution of profit is, therefore, a transfer from PPRE and PPCRE to participating policyholders and from SRE to the Profit and Loss Account.

12.15 To protect participating policyholders from undue delay in distributions we recommend the following:

(a) Any transfer from SRE to the Profit and Loss Account or to another Statutory Fund should be limited to the same proportion of SRE that distributions to participating policyholders bear to PPRE. Similarly, any transfer from PPCRE back to its own source Statutory Fund (or any other Statutory Fund) should be so limited.

(b) Where there is a transfer from Retained Earnings to another Statutory Fund the amounts transferred from each of SRE and PPRE should be proportionate to the amounts of SRE and PPRE held. A similar restriction applies to PPCRE.

Note that there are no restrictions on transfer of Shareholders' Working Capital and Participating Policyholders' Working Capital, provided they are not required to support the Statutory Reserves.

12.16 The Institute believes that once ownership of Operating Profit is established there should be minimal constraint on distribution or transfer. The requirements which we see as necessary are set out below:

(a) No distribution or transfer may be made which would cause a Statutory Fund to become insolvent.

(b) There should be no other restriction on the transfer of retained earnings to another Statutory Fund. However, any amounts transferred should be identified by original Statutory Fund as capital amounts in the target Statutory Fund.

12.17 Any distribution or transfer must be approved by the Appointed Actuary.

12.18 The Institute will produce Professional Standards to assist Appointed Actuaries in dealing with the allocation and distribution of Operating Profit.

12.19 The recommendations above constitute a major change from the current law on distribution and allocation of profit. Attachment 2 sets out the Institute's recommendations on transitional procedures to move from the current position to that proposed.

12.20 Illustrations of the way in which the above may be presented for reporting purposes are included in Attachments 3 to 7.

13. ANNUAL REPORTING

Current Position

13.1 The purpose of reporting is to inform stakeholders and other interested parties on the financial health of the life insurance company. These include:

(a) Shareholders,

(b) Policyholders,

(c) the Commissioner, and

(d) Future Consumers (possibly represented by financial analysts)

13.2 Each of these stakeholders has different requirements but it is our opinion that it is possible for one set of reports to satisfy them all. The requirements of each of the stakeholders are:

(a) Shareholders

- what is the profit for the current period?
- what is the prospect for future profits?
- how much dividend is payable?
- what capital is involved?
- what are the likely future capital requirements?

(b) Policyholders (Present and Future)

- how secure are policy benefits?
- what are the prospects for interest and bonus rate declarations?
- what share of profits is allocated to policyholders?

(c) the Commissioner

- how secure are the policy benefits?
- how secure will benefits be if the company continues to write new business?
- how fair is the allocation of profit between shareholders and different groups of policyholders?

13.3 Current reporting requirements are designed to meet only one objective ie. to satisfy the Commissioners' need for knowledge on the security of current policy benefits.

Recommendations

13.4 We recommend that reports should be based on a format similar to that required under the Companies Code. We feel that there should be consistent financial reporting requirements for all types of financial institution.

13.5 To comply with recommendations made earlier the Institute recommends that the following be produced:

(a) Revenue Account for each Statutory Fund, in the form set out in Attachment 3,

(b) Allocation of Operating Profit Statement for each Statutory Fund, in the form set out in Attachment 4,

(c) Solvency Statement for each Statutory Fund, in the form set out in Attachment 5,

(d) Profit and Loss Account, consolidated, in the form set out in Attachment 6,

(e) Balance Sheet, consolidated, in the form set out in Attachment 7, and

(f) Valuation Summary as outlined in Section 13.6.

13.6 Publication of results and bases of the valuation of liabilities and assets is necessary to enable the Commissioner to monitor life insurance companies. It is recommended that the current Second Schedule should be altered to show, by Statutory Fund:

Number of policies
Sum insured (Account Balance for investment account business)
Bonus
Office yearly premium
Policy Reserve
Solvency Reserve
Statutory Reserve
Summary of bases

To enable effective monitoring, the results should be available within 3 months of the end of the financial year.

13.7 The Institute also recommends that the requirement for the Appointed Actuary to produce a financial condition report be retained, but that such reports be required yearly. Furthermore, the Commissioner should be able to produce such reports as evidence before a Tribunal of Actuaries if a complaint arises regarding adherence to Professional Standards.

14. STATISTICS

14.1 The Institute regards the collection of statistics on the life insurance industry by the Commissioner as being outside its professional sphere of interest. It is recognised that the Commissioner and the industry have a valid need for statistics relating to various categories of business. The statistics required are likely to change frequently. Accordingly, the Institute recommends that the Act be changed to empower the Commissioner to require companies to provide such accounting and statistical information relating to different categories of business as considered appropriate. The detailed statistics required could than be specified in ISC Circulars without the difficulty of changing the Act itself.

15. DISCLOSURE

Present Position

15.1 There appears to be a general wish by the community for consumer protection in the financial services sector, particularly by disclosure at the point of sale. New investors in unit trusts and companies receive considerable protection through regulations of the Companies Code and by the NCSC. Indeed most forms of investment require prospectuses to be individually approved by the NCSC which requires very full and detailed disclosure of the terms and conditions attached to the investment and considerable information about the recent financial results of the company or trust. After sale, investors must be provided with detailed information on a timely basis about emerging financial results.

15.2 It seems reasonable that institutions competing with unit trusts should be treated similarly. In this light the position of the life insurance industry looks anomalous. Purchases of single premium life insurance bonds or deferred annuities are very similar to unit trusts. Purchases of regular premium savings contracts are also in the nature of investments; indeed buyers of such contracts are likely to be less sophisticated than buyers of single premium contracts and to need even more protection.

15.3 The current Act provides some protection: Section 77 gives the Commissioner the right to object to proposal forms or policy documents if they are considered likely to mislead. ISC Circulars are developing guidelines about disclosure standards for investment-linked and investment account policies covering promotional material, policy documents and regular statement of investment results to policyholders. These requirements are weaker than NCSC standards for similar investments.

15.4 The Institute supports the concept of investors in the various types of financial services companies receiving broadly similar protection and the various companies being subject to broadly similar rules about disclosure. The Institute is of the view that each type of company should be regulated by only one Government Department. Where a particular industry, such as the life insurance industry, is governed by a specific Act and principally regulated by one Government Department, that Department should be responsible for regulating all aspects of that industry.

Recommendations

15.5 The Institute believes that life insurance consumers should receive protection by means of disclosure of relevant information at the point of sale and at regular (at least yearly) intervals during the life of the contract in the case of savings and investment type policies.

15.6 The Institute believes that the NCSC regulations relating to prospectuses for unit trusts and other prescribed interests have gone too far. As a result prospectuses:

(a) are so complex that it is likely that most investors do not read them or, if they do, do not understand them; and

(b) cause the promoting companies unreasonable cost and delay.

They therefore do not provide the consumer protection intended and are not cost effective.

15.7 The Institute believes that the disclosure rules applicable to the life insurance industry should take the form of brief statements of principle contained within the Act supported by ISC Circulars containing more detailed rules about each of the principles. The Institute recommends that the Act be expanded to contain a new section specifying that:

(a) a proposal form can only be supplied attached to a disclosure statement which satisfies the principles specified;

(b) disclosure statements need not be individually approved by the Commissioner but the Commissioner should monitor them for compliance and should have the power to require them to be changed if they are found to break the rules; and

(c) all disclosure statements should clearly describe in simple language the terms and conditions of the policy, including:

(i) the benefits provided by the policy on the happening of relevant events including those on surrender;

(ii) the charges to be levied during the life of the policy together with any right which the company has to change them;

(iii) the nature of any guarantees (including those relating to capital) and any limitations;

(iv) the Statutory Fund in which the policy will be written;

(v) an offer to provide on request a copy of the policy document; and

(vi) an offer to provide on request a copy of the most recent accounts of the company including names of the Directors and Appointed Actuary.

15.8 All disclosure statements for policies with investment or savings type components should, in addition, clearly describe in simple language:

(a) the broad principles of the company's investment strategy for the relevant Statutory Fund or sub-fund together with any right which the company has to change it. Note: the objective of this requirement is to be informative, not to create restrictions;

(b) the current proportion of the Statutory Fund or sub-fund investment in broad asset categories;

(c) the company's philosophy and principles in relation to bonus or interest rate declarations, as the case may be;

(d) the general basis on which tax is currently levied on the company and the buyer with a statement that these are subject to change by the Government;

(e) the earnings history for the past few years (say 5) of the relevant Statutory Fund or sub-fund;

(f) the history for the past few years (say 5) of bonus or interest rate declaration for the product; and

(g) in the case of superannuation business the legal restrictions which currently apply (in brief and broad terms) with a statement that these are subject to change by the Government.

15.9 The Institute recommends that the Act be further expanded to contain another new section specifying that if a company provides benefit illustrations in disclosure statements or to potential buyers in individual cases, these shall be on standardised bases to be specified by the Commissioner from time to time in ISC Circulars. The Institute has already made recommendations to the Commissioner as to the basis it considers appropriate at present. This is:

(a) Benefit illustrations should show two values, both of which are calculated using specified interest rates -

CB x (1-t) + 3% and

80% of the above,

where CB is the average 10 year Commonwealth Bond rate over the past 3 years and t is the basic tax rate applicable to the fund.

(b) Actual projections should be carried out using the specific allocation of bonus or investment return method appropriate to the contract, having regard to expense and/or policy charges, both implicit and explicit.

(c) In the case of traditional participating policies the Appointed Actuary should approve the bonus rates considered most likely to be declared if these earnings rates are experienced in the future.

(d) In addition, a rate of inflation should be specified as 2/3 of CB and inflation reduced amounts for at least the longest duration should be shown with an explanation along the following lines:

"The value of projected benefits in terms of their real value for spending purposes will be reduced by the effects of future inflation. Adjusted figures to correspond with today's monetary values are shown, assuming an inflation rate of xx%".

(e) Illustrative amounts payable on death and surrender at duration 2 years, 5 years and 10 years should be shown as a minimum. If the surrender value basis can be changed, a statement to that effect should be made.

15.10 The Institute is aware that other information is required in, for example, unit trust prospectuses but considers this serves no useful purpose and serves to make the disclosure statement more complex and confusing. In particular:

(a) a copy of the policy document should not be required as this can be considered by the purchaser during the 14-day "free look" period required by the Insurance Contracts Act, and

(b) abbreviated accounts should not be required as they are not useful to the vast majority of purchasers.

15.11 The Institute believes that, providing proposal forms are only available attached to the disclosure statement, there need be no further control of "interest arouser" brochures whose purpose is to alert possible buyers to the existence of products and invite them to ask for a disclosure statement. The Trade Practices Act provides protection against misleading statements in such documents.

15.12 The Institute recommends that the Act should be expanded to contain a new section specifying that regular statements should be issued at least yearly to all holders of policies with investment or savings components. The minimum content of such statements should be:

(a) current death and surrender values;

(b) new and total bonus in the case of traditional participating policies;

(c) in the case of investment-linked and investment account policies a brief "statement of account" showing the value at beginning and end of the period and the main contributing elements to the change;

(d) a statement that company accounts relevant to the policy will be supplied on request;

(e) a reminder about the investment strategy of the appropriate Statutory Fund or sub-fund; and

(f) the current asset allocation proportions in broad categories.

16. CONCLUSION

16.1 The Institute recognises that the changes recommended represent a significant revision of the Act but feels that major changes are needed. This may well cause transitional problems. The Institute is ready to help the ISC to manage these difficulties or to assist in the preparation of the revised Act.

ATTACHMENT 1

SURRENDER VALUE BASIS - RECOMMENDATIONS

1. In the event the Parliament regards it as necessary for minimum surrender values to be provided, the following features should apply:

   (a) the scales should be set out in ISC Circulars rather than in the Act;

   (b) the requirement for minimum values should apply to Australian policies only;

   (c) paid-up values should be derived from surrender values rather than vice versa as currently applies;

   (d) different scales should be prescribed to recognise the impact of tax on investment earnings and expenses;

   (e) the process for dispensation in the event of the financial stability of the Statutory Fund being endangered should be capable of speedy implementation; and

   (f) transitional arrangements may be necessary, particularly if the new scale were to specify lower minimum values than the current one.

2. The Institute's preferred basis for capital guaranteed business is for a retrospective basis to apply in the early years of a policy, with allowance for acquisition and other expenses and the cost of any life cover. For later years a prospective basis should be used for whole of life, endowment insurances and pure endowments, while for investment account business the basis should be a minimum proportion of the Account Balance with recognition of any future guarantees.

3. For the retrospective basis referred to in 2, the Institute considers the approach adopted in ISC Circular 273 to be adequate for investment account, whole of life, endowment insurance and pure endowment business. It would be appropriate to refine the ISC Circular 273 basis to use a gross interest rate of 7% with adjustments for the basic tax rates and to change this from time to time.

4. For the prospective basis referred to in 2, the following approach is recommended for whole of life, endowment insurance and pure endowment business:

ATTACHMENT 1 CONTINUED

(a) the surrender value be taken as a proportion of the Policy Reserve (as defined in 9.7); and

(b) the proportion of the Policy Reserve referred to in (a) is 85% until ten years prior to -

(i) the maturity date of the policy,

(ii) the attainment of age 85 of the life insured for whole of life business,

and the proportion then increases by 1% pa to a maximum of 95%.

5. The minimum surrender value is the greater of the surrender value calculated on the retrospective and prospective bases described in 3 and 4.

6. We reiterate that we are opposed to minimum surrender value scales being set by the Parliament. Guarantees inhibit investment freedom and thus reduce returns. Accordingly the Institute feels that protection of policyholders is better served by disclosure at the point of sale than by minimum scales.

ATTACHMENT 2

ALLOCATION OF SURPLUS - TRANSITIONAL PROCEDURES

1. Some companies may wish to split accounts between participating and non-participating business: this need not be compulsory under the Act and there should be a variety of positions which could be adopted to suit different companies' needs.

2. The Act should provide for apportioning Statutory Fund balances between shareholders and participating policyholders at the commencement of the new Act or at some time in the future at the election of the company. Some of the possibilities for apportionments are:

   (a) approved apportionments already in place

   (b) for a company with little non-participating business all Operating Profits could be regarded as participating

   Any such election should only be reversed with the approval of the Commissioner.

3. If neither of the options above is suitable the company would split the excess of the Statutory Fund balance over the Policy Reserves as set out below:

3.1 **Non-Mutual Companies**

   (a) The capital transferred into the Statutory Fund by the shareholders over the years should be identified as such. This is identified as Shareholders' Working Capital.

   (b) Amounts transferred from another Statutory Fund would be identified as that Statutory Fund's Participating Policyholders' Capital.

   (c) Undistributed Operating Profit which can be identified as having arisen from non-participating business should be identified as Shareholders' Retained Earnings.

   (d) The remainder of the excess of the balance of the Statutory Funds over Policy Reserves at the election date, after allowance for (a), (b) and (c) would be deemed to be participating business profit and should be apportioned between policyholders and external capital providers according to the allocation rules in the company's Articles, but subject to any overriding provisions in the new Act. The policyholders' component would become the Statutory

ATTACHMENT 2 CONTINUED

Fund's Participating Policyholders' Retained Earnings. The external capital providers' component would be added to Shareholders' Retained Earnings and to Participating Policyholders' Capital Retained Earnings.

Note that this remainder may be negative.

(e) Shareholders' Working Capital and any other Statutory Fund's Participating Policyholders' Capital would not be subject to any distribution restrictions, although they could only be transferred to Shareholder Funds or other Statutory Funds to the extent they are not required to support the Statutory Reserves.

3.2 **Mutual Companies**

(a) Transfers of a capital nature into a Statutory Fund (eg. from another Statutory Fund) should be identified as the transferring fund's Participating Policyholders' Capital.

(b) The remainder of the excess of the balance of the Statutory Fund over Policy Reserves in each Statutory Fund at the election date would be deemed to be participating business profit and should be apportioned between that Statutory Fund's PPRE and the other Statutory Fund's PPCRE according to the sharing rules in the new Act.

ATTACHMENT 3

XYZ Pty Ltd
REVENUE ACCOUNT
Year Ended 31 December 19X2

	Statutory Fund No. 1	Statutory Fund No. 2
OPERATING INCOME		
Premium Income		
Single Premiums		
First Year Premiums		
Other Premiums		
Total Premiums		
Investment Income		
Interest Dividends & Rents		
Realised Profits less Losses on Sale of Assets		
Unrealised Gains Less Losses		
Total Investment Income		
TOTAL OPERATING INCOME	396	17
OPERATING EXPENDITURE		
Claims Paid (subdivided according to cause)		
Commissions on Acquisition		
Commissions on Servicing		
Total Commissions		
Other Expenses including Provisions		
- In Respect of Single Premium Business on		
Acquisition		
Maintenance		
- In Respect of Annual Premium Business on		
Acquisition		
Maintenance		
Investment Expenses		
Total Other Expenses including Provisions		
Income Tax & Other Taxes		
TOTAL OPERATING EXPENDITURE	184	8
NET INCREASE IN FUND BEFORE TRANSFERS	212	9
INCREASE IN POLICY RESERVES ON SAME BASIS AS PREVIOUS YEAR	180	11
VALUE OF CHANGE IN BASIS FOR POLICY RESERVES	4	-
OPERATING PROFIT	28	(2)
BALANCE OF FUND BROUGHT FORWARD	825	34
NET INCREASE IN FUND BEFORE TRANSFER	212	9
TRANSFER (TO)FROM PROFIT AND LOSS ACCOUNT	(1)	-
TRANSFER (TO)FROM OTHER STATUTORY FUNDS	(6)	6
BALANCE OF FUND CARRIED FORWARD	1030	49

ATTACHMENT 4

XYZ Pty Ltd
ALLOCATION OF OPERATING PROFIT STATEMENT
Year Ended 31 December 19X2

	Statutory Fund No. 1	Statutory Fund No. 2
Operating Profit from Revenue Account	28	(2)
Add interim distributions to Participating Policies becoming claims or surrendered	1	-
TOTAL OPERATING PROFIT	29	(2)
Allocated to		
- Participating Policyholders' Retained Earnings	22	-
- Shareholders' Retained Earnings	7	(1)
- Participating Policyholders' Capital Retained Earnings - No. 1 Fund	-	(1)
PARTICIPATING POLICYHOLDERS' RETAINED EARNINGS		
- brought forward	96	-
- from Operating Profit	22	
- distributed to Participating Policyholders	(16)	-
- transfer from(to) Statutory Fund No. 2	(6)	
- carried forward undistributed	96	-
Supporting		
- Solvency Reserves	94	-
- Other Reserves	2	-
SHAREHOLDERS' RETAINED EARNINGS		
- brought forward	17	-
- from Operating Profit	7	(1)
- transfer to Profit and Loss Account	(3)	-
- transfer from(to) Statutory Fund No. 2	-	-
- transfer from(to) Statutory Fund No. 1	-	-
- carried forward undistributed	21	(1)
Supporting		
- Solvency Reserves	13	2
- Other Reserves	8	(3)
PARTICIPATING POLICYHOLDERS' CAPITAL		
- brought forward		8
- transfer from(to) Statutory Fund No. 1		-
- carried forward		8

ATTACHMENT 4 CONTINUED

	Statutory Fund No. 1	Statutory Fund No. 2
Supporting		
- Solvency Reserves		5
- Other Reserves		3
PARTICIPATING POLICYHOLDERS' CAPITAL RETAINED EARNINGS		
- brought forward		3
- from Operating Profit		(1)
- transfer from(to) Statutory Fund No. 1		-
- carried forward undistributed		2
Supporting		
- Solvency Reserves		2
- Other Reserves		-
SHAREHOLDERS' WORKING CAPITAL		
- brought forward	21	
- transfer from(to) Profit and Loss Account	-	
- carried forward	21	
Supporting		
- Solvency Reserves	21	
- Other Reserves	-	

ATTACHMENT 5

XYZ Pty Ltd
SOLVENCY STATEMENT
Year Ended 31 December 19X2

	Statutory Fund No. 1	Statutory Fund No. 2
Policy Reserves at end of period	876	40
Distribution of Profit to Participating Policyholders	17	-
less interim distributions to Participating Policies becoming claims or surrendered	(1)	-
TOTAL POLICY RESERVES	892	40
Solvency Reserves at beginning of period	123	5
Increase (Decrease) in Solvency Reserves required	5	4
Represented by		
- transfer from(to) Shareholders' Working Capital	-	3
- increase (decrease) in Participating Policyholders' Retained Earnings	2	1
- increase (decrease) in No. 1 Fund Participating Policyholders' Capital	-	-
- increase (decrease) in No. 1 Fund Participating Policyholders' Capital Retained Earnings	-	-
- increase (decrease) in Shareholders Retained Earnings	3	-
TOTAL SOLVENCY RESERVES	128	9
TOTAL STATUTORY RESERVES	1020	49
Other Reserves at beginning of period	10	-
Increase (decrease)	-	-
Supported by		
- transfer from(to) Shareholders' Working Capital	-	
- increase (decrease) in Participating Policyholders' Retained Earnings	-	-
- increase (decrease) in No. 1 Fund Participating Policyholders' Capital	-	-
- increase (decrease) in No. 1 Fund Participating Policyholders' Capital Retained Earnings	-	-
- increase (decrease) in Shareholders' Retained Earnings	-	-
TOTAL OTHER RESERVES	10	
BALANCE OF FUND at end of period	1030	49

ATTACHMENT 6

XYZ Pty Ltd
Shareholders' Fund
Profit and Loss Account
Year Ended 31 December 19X2

PROFIT AND LOSS ACCOUNT	
Profit and Loss Account balance brought forward	1
Transfer from (to) Share Premium Reserve	0
Transfer from (to) Statutory Fund No. 1	3
Transfer from (to) Statutory Fund No. 2	-
Dividends	(3)
Profit and Loss Account balance carried forward	1
SHARE PREMIUM RESERVE	
Share Premium Reserve brought forward	3
Transfer from (to) Profit & Loss Account	0
Share Premium Reserve carried forward	3

ATTACHMENT 7

XYZ Pty Ltd
BALANCE SHEET
Year Ended 31 December 19X2

Investments	
Cash	
Promissory Notes	
Money on Deposit	
Total Short Term Investments	
Government Securities	
Semi Government Securities	
Debentures	
Secured & Unsecured Notes	
Loans on Mortgages	
Loans on Policies	
Loans on Bills of Sale	
Other Secured Loans	
Unsecured Loans	
Bonds	
Outstanding Premiums	
Accrued Interest	
Total Fixed Interest Investments	
Ordinary Shares	
Preference Shares	
Property & Mortgage Trusts	
Futures	
Freehold Property	
Life Interests & Reversions	
Total Equity Investments	
Total Investments	
Other Assets	
Office Furniture, Motor Vehicles	
Loans to Controlled Companies	
Total Other Assets	
TOTAL ASSETS	
Less Current Liabilities	
Claims Admitted or Intimated but not yet Paid	
Sundry Creditors	
Provision for Income Tax	
Provision for Annual Leave	
Provision for Long Service Leave	
TOTAL CURRENT LIABILITIES	
PROVISION FOR DEFERRED INCOME TAX	____
ADJUSTMENT FOR SOLVENCY VALUATION	
NET ASSETS	1084

FUNDS

SHARE CAPITAL			1
SHARE PREMIUM RESERVE			3
PROFIT AND LOSS ACCOUNT BALANCE			1
STATUTORY FUND NO. 1			
- Policy Reserves		892	
- Solvency Reserves		128	
supported by			
- Shareholders' Working Capital	21		
- Participating Policyholders' Retained Earnings	94		
- Shareholders' Retained Earnings	13		
- Other Reserves		10	
supported by			
- Participating Policyholders Retained Earnings	2		
- Shareholders' Retained Earnings	8		
STATUTORY FUND NO. 1 BALANCE			1030
STATUTORY FUND NO. 2			
- Policy Reserves		40	
- Solvency Reserves		9	
supported by			
- Shareholders' Retained Earnings	2		
- No. 1 Fund Participating Policyholders' Capital	5		
- No. 1 Fund Participating Policyholders' Capital Retained Earnings	2		
- Other Reserves		-	
supported by			
- Shareholders' Retained Earnings	(3)		
- No. 1 Fund Participating Policyholders' Capital	3		
STATUTORY FUND NO. 2 BALANCE			49
TOTAL FUNDS			1084

EXPLANATORY COMMENTS BY LIFE INSURANCE COMMITTEE ON THEIR DRAFT SUBMISSION

A. Preamble

A1. Introduction

A1.1 The Deputy Commissioner Life Insurance has let it be known that the Insurance and Superannuation Commission wishes to modernise the Life Insurance Act as soon as possible. The Institute has been asked to make recommendations about changes it believes are desirable. Submissions are required by mid 1990 if possible.

A1.2 As part of the process of preparing a submission, the Life Insurance Committee commissioned three authors to prepare an issues paper to assist wide ranging debate among members of the profession. Such a paper was indeed prepared (1) and discussed at the Cairns Convention in October 1989. With that paper a questionnaire was issued to enable members to express their views on the matters raised. The responses were analysed and the results have been issued to members who requested them. These results will be referred to throughout these explanatory comments as the "Cairns Survey Results".

A1.3 The present paper represents the next stage of the process and is a Draft Submission from the Institute. The views of members expressed at Cairns and subsequently in writing as well as the Cairns Survey Results have been taken into account. The intention is that this Draft will be discussed by members of the Institute. The Life Insurance Committee will take account of comments made, following which a final submission will be prepared.

A2. Purpose of These Comments

A2.1 The Committee has prepared the draft submission in a fairly concise style. There is a certain amount of explanation included but this has been kept at what is felt to be a minimum level in the interests of maintaining focus. These comments are aimed at providing more background and explanations to help members understand, and make up their minds about, the position adopted.

A3. General

A3.1 The Act is 45 years old and over the years has only seen relatively minor changes. During that time conditions, products and practices have seen major changes and a number of features of the Act are regarded as needing significant alteration. Indeed the Committee has taken the view that several matters are in need of major reconstruction. "Tinkering" is not enough.

A3.2 The Committee believes that the central concern of the Institute should be the reasonable protection of the consumers of life insurance products by means of the "New Act" providing:-

(a) a framework of prudential controls aimed at maintaining the financial soundness of life insurance companies;

(b) that companies must provide full disclosure of product information at point of sale and financial results thereafter to enable consumers to make informed choices and the ISC to monitor financial soundness;

(c) a framework for maintaining equity (or fairness) between participating policyholders and shareholders, each of whom is accepting some risk in relation to the running of the business.

A3.3 The general theme of the proposals is "freedom with disclosure" within reasonable limits. The disclosure recommendations are critical to the integrity of the remainder. The Committee believes that this approach is more in the interests of consumers than, for example, a high level of minimum guarantees and rigid constraints.

A3.4 The Committee believes it has developed an integrated set of recommendations which effectively deal with all the issues of concern and will achieve the fundamental objectives described in A3.2 above. Some of the proposals represent a completely new approach which has been developed from basic principles without feeling constrained by the current Act.

A3.5 Some members will regard some of the proposals as rather radical. The Committee asks members to take time to think about them carefully whilst

forming an opinion. At first reading some of the proposals - particularly those aimed at equity between stakeholders - may be viewed as complex. However the Committee believes that they have an inherently straightforward logic and coherence which can lead to ready acceptance if the effort is made to understand them in terms of basic principles. More than anything else these explanatory comments are aimed at helping that process.

A3.6 The Draft Submission is not a legal document. The words used have been chosen by the Committee to reflect the basic intentions. Members are asked not to attempt to interpret phrases legalistically but to look for the intended meaning behind the words in terms of principles and concepts. If it is apparent that the Committee's intentions have not been conveyed correctly then the words used can be changed.

A3.7 If the Institute adopts these recommendations and the Authorities regard them favourably then considerable further work will be needed over the next eighteen months to "flesh out" the principles and concepts into full details. In addition a full set of detailed Professional Standards will have to be developed to give the proposed regulatory framework sufficient "teeth" to be effective. The Committee undertakes to ensure this is done and is confident that there are enough suitable volunteers waiting in the wings to form task forces to achieve it.

A4. The Regulatory Framework

A4.1 At present there are:-

(a) The Act which contains within its Sections what are effectively a set of principles;

(b) Schedules to the Act which contain technical detail about various processes;

(c) Statutory Regulations which add further detail to the Act;

(d) ISC Circulars which provide detailed interpretation of some of the principles and, in some cases, new principles to fill voids in the Act, but do not have the force of law.

A4.2 It is generally recognised that it is hard to get the Act changed. It is almost as hard to get the Statutory Regulations changed. That is why there have been so many ISC Circulars as a practical means of more or less overcoming the difficulty.

A4.3 The Committee believes that the New Act should be structured to "stand the test of time" and likely to need little change in the future. Principles are likely to change little. The Act should contain principles. Details will change often as conditions, products and practices change. Details should be outside the Act. Because Statutory Regulations are also hard to change, the Committee believes details should be contained in ISC Circulars and Professional Standards. The Act should give authority to the ISC to issue Circulars and the Institute to issue Professional Standards which become the "official" expansion or interpretation of the principles in the Act as conditions change.

A4.4 A framework of prudential controls requires judgement to be exercised in carrying them out. The current Act places heavy dependence on the Appointed Actuary to make those judgements as a recognised professional. The committee believes that in all matters where the Appointed Actuary is required to exercise judgement, or to approve actions of a company, then the Act should authorise Professional Standards as the "official" means of expanding the principles. In all other cases the Act should authorise ISC Circulars.

A4.5 If the Authorities are unable to accept this recommendation then ISC Circulars should take the place of Professional Standards. However, it is suggested that as a practical measure the ISC could adopt properly developed Professional Standards into its Circulars as it seems unlikely that it has the resources to develop the standards on its own.

A4.6 It is believed that for this purpose Professional Standards will have to contain considerably more detail than they do at present if the Authorities are to have confidence that the objectives of the legislation are being met. The Committee has in mind that Professional Standard No.1 - Actuarial Reports and Advice to a Life Insurance Company would become virtually a "Handbook regulating the statutory obligations of the Appointed Actuary".

B. Specific Explanatory Comments

B1. The comments which follow relate to the Draft Submission and refer to its sections by their number.

B2. For convenience the sequence below follows that of the Draft Submission.

B3. Definitions

B3.1 The Committee has focused on items of importance to actuaries. If the proposals for fundamental change are adopted then many additional definitions will be required to bring them into effect. These are left to the Parliamentary draftsman.

B3.2 There has been considerable debate about the need for a formal definition for "participating business" rather than merely "as determined by the company" under the present Act.. The Cairns Survey Result showed a large majority of members supported the need for such a definition. The Committee has made a new attempt at a definition it believes is satisfactory.

B3.3 The Committee believes that any policy where the benefits depend on the company or the Appointed Actuary exercising discretion from time to time retrospectively should be classified as participating. This does not include a right to adjust future mortality or expense charges from time to time in the light of experience, and it does not include an investment account policy which receives interest additions which are declared in advance even if they can change at intervals - providing the contractual surrender value at any point of time is not subject to discretion by the company or its Appointed Actuary.

B.4 The Role of the Actuary

B4.1 It is proposed that the approval of the Appointed Actuary should be required by the New Act in considerably more instances than at present. A summary of these is as follows:

(a) Apportionments - any apportionment of receipts, payments and tax between Statutory Funds (or Revenue Accounts) must be approved by the Appointed Actuary [4.4]

(b) Premium Rating - no policy may be issued unless the Appointed Actuary has approved all terms and conditions [5.4]

(c) Premium Rating - all product terms and conditions must be reviewed at least yearly by the Appointed Actuary [5.6]

(d) Statutory Funds - reinsurance between Statutory Funds is permitted subject to the approval of the Appointed Actuary [7.13(f)]

(e) Statutory Funds - any transfer between Statutory Funds must be approved by the Appointed Actuary [7.13(h)]

(f) Statutory Funds - the establishment of a new fund must be approved by the Appointed Actuary [7.13(m)]

(g) Assets - the Appointed Actuary is required to adopt a valuation of the assets for solvency purposes [8.5]

(h) Valuation of Liabilities - the Appointed Actuary is required to produce a valuation of liabilities to demonstrate solvency [9.5]

(i) Allocation of Profit - any allocation of Operating Profit must be approved by the Appointed Actuary [12.11(d)]

(j) Distribution of Profit - any distribution to participating policyholders or shareholders must be approved by the Appointed Actuary [12.17]

(k) Solvency - the Appointed Actuary is required to approve a Solvency Statement [11.7]

(l) Financial Condition Report - the requirement is retained but should be framed in such a way that the Commissioner is able to produce the Report as evidence if a formal complaint is brought by the ISC against the Appointed Actuary [13.7]

B5. Premium Rating

B5.1 The Committee believes that the approval of the Appointed Actuary should be required for all the

terms and conditions of a policy before it can be sold and that the approval be renewed yearly. On that basis it is difficult to see a case for specifically mentioning commission even though historically commission has been a contentious issue in a number of ways. The phrase "all terms and conditions" clearly includes commission so it will be within the actuarial approval process without any doubt.

B6. Surrender Values

B6.1 The Cairns Survey Result showed a clear majority of members in favour of the Act continuing to specify minimum surrender and paid-up values. However the provision of guarantees in policies has a cost and creates a risk for the company. The Committee believes that any legislative guarantee cannot be at a level which is attractive to a policyholder yet it must inevitably restrict the investment freedom of the company to some extent and reduce the ultimate returns.

B6.2 On balance the Committee believes the Institute should oppose a provision for minimum values. Nevertheless it is recognised that the Authorities may regard this as politically unacceptable and if they do the Institute would wish to influence the basis. Accordingly the Committee has proposed a basis considered suitable in those circumstances. (Attachment 1)

B6.3 The Committee is proposing a retrospective basis in the early years changing to a prospective basis where this produces a higher result in later years. It believes the retrospective basis should be a more refined version of that in ISC Circular 273. More specifically it believes the basis should be more dynamic (i.e. change from time to time as conditions change) than that implied by the very conservative approach taken to interest rates in Circular 273. It is proposed that a gross interest rate is specified with a requirement that it be adjusted appropriately for tax from time to time.

B6.4 The Committee recognises that this will require companies to keep accumulations on the "Act Minimum Basis", as well as based on declared rates, or alternatively store all transaction details so that they can be calculated as needed. However it is considered that this is a necessary cost to achieve

a realistic approach if the Authorities do impose minimums.

B7. Statutory Funds

B7.1 This part of the Draft Submission contains a reasonable amount of explanation and it is felt that little expansion is required. The proposals follow the Cairns Survey Results where large majorities of members were opposed to a requirement for separate Statutory Funds for participating/non-participating or for ordinary/superannuation business.

B7.2 Members should note that in the case of "hybrid policies" the Committee is proposing that in the first place the policy should be backed by one fund only. Then appropriate benefits such as guarantees, mortality risks, etc. should be reinsured with another fund on terms approved by the Appointed Actuary. The Committee is opposed to "split fund" policies where the policy purports to be partly backed by one fund and partly by another, as in the extreme situation where one fund is deemed insolvent, it may be difficult for the policyholder to deal with the policy.

B8. Assets

B8.1 This part of the draft submission is based on the views of the Investment and Finance Committee of the Institute who are the Institute's advisors in that field. That Committee believes that the Act should not contain restrictions on investments (except in relation to "related companies") nor any form of "prudential guidelines". Companies sell many different types of product with weak/strong/no guarantees such as investment-linked, immediate annuities, traditional participating business etc. There are hybrid products. Companies have varied capital strengths backing their funds. The environment, products and even types of asset are changing fairly rapidly. In those circumstances it is believed that it is inappropriate to attempt to draft investment guidelines or restrictions.

B8.2 In the case of related companies restrictions are needed to ensure that Statutory Fund assets remain under the control of the life insurance company directors. Investment in subsidiaries should be acceptable but only if there are "look through"

provisions. Otherwise the subsidiary can reinvest with, for example, the parent and the restrictions are circumvented.

B8.3 On the other hand, when it comes to a valuation for demonstrating solvency both committees believe it is appropriate to require the Appointed Actuary to give very careful consideration to the relationship between the assets and the liabilities. The values at which the assets are held in the balance sheet should not be blindly accepted. The Appointed Actuary should adopt more conservative values in some circumstances and for solvency purposes some assets would be ascribed nil values. Such adjustments will be made for the purpose of a solvency valuation only. They will not be made for the purpose of reporting earnings. It is recognised that detailed standards will be required for this process and the Investment & Finance Committee has undertaken to prepare them in consultation with the Life Insurance Committee.

B8.4 It is proposed that there should be a requirement for publishing details of each asset which is more than 1% of a fund. Members' initial reaction may be that 1% is a little low. However, it is suggested that most companies will have a low proportion of assets which exceed 1% of a fund. The majority will normally be less than 1%.

B9. Valuation of Liabilities

B9.1 The Committee is proposing that the New Act requires the publication of both "realistic earnings" and a demonstration of solvency within the annual reports of all companies. To achieve this the draft submission introduces the concept of "Policy Reserves" for the purpose of calculating realistic earnings and "Statutory Reserves" for the purpose of solvency demonstration. The difference between the two has been called a Solvency Reserve.

B9.2 For Policy Reserves the Committee is proposing the use of the "Margin on Services Method" whose principles were established in a draft standard (2) in 1988/89. The issue of realistic reporting is currently being reviewed by the Australian Accounting Research Foundation (AARF) and it is envisaged that eventually formal accounting standards will be issued by the Accounting Standards Review Board (ASRB).

B9.3 It is appreciated that at present no detailed methodology has been published but the "Actuarial Valuation for Earnings Standards Sub-Committee" has been re-activated for this purpose. It is worth repeating for members' benefit that the whole object of the method is to create a sequence of reserves by duration which ensures that the margins built into the product pricing emerge each year as planned profit.

B9.4 The draft standard for the Margin on Services Method proposed that, for capital guaranteed business, profits emerging should be smoothed to reflect the smoothed bonus rates declared to policyholders. It became clear that this approach is not fully compatible with realistic reporting. The Committee is now proposing that asset fluctuations on a market value basis should be recorded as experience profit / loss in the year they occur and not be smoothed. This will also remove a point of difference between the Accounting and Actuarial professions. The allocation / distribution methods proposed in Section 12 allow for the volatility by proposing a two stage approach. Firstly the volatile earnings will be allocated between shareholders and policyholders. Then the distribution is to be treated as a separate matter with appropriate smoothing.

B9.5 Detailed standards for Statutory Reserves will have to be developed for all products during the next few months. The Committee envisages these will be along the lines of those proposed by Carr et al (3) and Carr and Vinson (4) in previous papers submitted to the Institute. The Solvency Sub-Committee will start work immediately on this task.

B.10 Reporting Of Earnings

B10.1 The Committee is proposing a single set of financial statements, based on the Companies Code format which both demonstrate solvency and disclose current year earnings on a "realistic" basis. In addition the statements will trace the movement of retained earnings which will retain their identity and ownership once established.

B10.2 The Cairns Survey Results showed only a small majority in favour of this approach. However the Committee feels strongly that this is the best practical way to disclose properly the financial dynamics of a life office and hopes that a larger

majority will see the merit in the light of the integrated structure of the proposals.

B11. Solvency Standards

B11.1 It is appreciated that legislation will require a standard which regards as solvent a company whose value of assets exceeds the value of its liabilities using appropriate valuation bases and the opposite case to be a cause for investigation and possible action.

B11.2 It is easy to assume that solvency is an absolute concept. For life insurance companies where long term contracts are involved it is not. The Statutory Reserves proposed will ensure a high level of probability that a company will be financially sound now and in the future (as long as it continues to manage its affairs soundly).

B11.3 If, on the basis proposed, assets do not exceed liabilities the Committee suggests that the Commissioner should recognise that there are degrees of insolvency requiring careful management and, only in the extreme, winding up.

B11.4 The Committee is suggesting that a simple solvency ratio would be helpful to the Commissioner in monitoring the solvency of companies. The classifications suggested in 11.9 are presented as a guide to the Commissioner. It is not proposed that they are included in the legislative framework. It is suggested that the Commissioner must use discretion and judgement in circumstances of less that "full solvency".

B11.5 There was strong support for this approach in discussion in Cairns on a paper by Carr (5).

B11.6 At the same time it must be stressed that no single ratio can satisfy all purposes. This comment applies not only in respect of supervision of life insurance companies but also to financial analysts intent on "grading" the strength of companies.

B12. Allocation and Distribution of Profit

B12.1 The Cairns Survey Results do not show majorities favouring major changes to this issue which is currently dealt with by Section 50 of the Act. The Committee would not normally pursue a major change

unless it was supported by a substantial majority of members. However, there are acknowledged problems with Section 50 and the Committee will be very disappointed if Section 50 remains unaltered because the issue is put aside as "too hard".

B12.2 The unsuitability of Section 50 can be readily demonstrated. For the purpose of this example we have a Statutory Fund consisting entirely of participating Investment Account business under which the surrender value equals the account balance and the account balances are $100 million being premiums received on the last day of the period. The assets are held in fixed interest securities such that B from ISC Circular 273 is 10%.

Following the dictates of Circular 273 the valuation reserve is $110 million and the company concerned would have to inject $10 million of capital into the fund to support the liabilities.

According to current interpretation of Section 50 the company would not be able to recoup the capital injected except to the extent of 25% of surplus distributed to policyholders. If, in the example, $99 million was surrendered on the first day of the ensuing period the remaining liabilities would drop to $1.1 million, the assets would drop to $11 million but the surplus of $9.9 million could not be released back to the company. Although this example is extreme it demonstrates a fundamental flaw in the current Section 50 - i.e. surplus as currently defined comprises both "profit" and "capital movement".

B12.3 The Committee has put an enormous amount of time and effort into developing a coherent, integrated new approach. It believes the approach successfully creates a framework for achieving equity between different groups of policyholders and shareholders. Although it can appear complex at first sight, particularly with multiple funds, the Committee believes that the concepts are straightforward and logical.

B12.4 The concepts depend on the following principles:-

(a) profit should not include the release of capital previously committed to support a fund - i.e. capital movements and profit

should be determined and shown separately. The Margin on Services Method is designed to do this.

(b) there should be no restriction on the movement of capital between funds (as long as a transfer does not make a fund "insolvent"). Any transfer must consist of equal proportions of the shareholders and policyholders retained earnings in the transferring fund.

(c) the sharing of each year's profit between shareholders and policyholders should be determined as it arises and any retained earnings not distributed must retain their identity and ownership until they are distributed.

(d) retained earnings from one fund can be used to finance business in another fund (as long as a transfer does not make a fund "insolvent") but they retain their identity and ownership (which includes the originating fund in the case of participating policyholders retained earnings which becomes participating policyholders capital in a new fund). Ultimately they must be distributed to their owner.

(e) profit arising must be allocated as it arises between the parties entitled according to some straightforward rules:-

(i) profit from non-participating business may, if the company wishes, be allocated entirely to the external capital providers (but, among them, pro rata to the capital and retained earnings they have in the fund).

(ii) profit from participating business must be allocated by a two stage calculation. The first stage will allocate an amount equal to the current year fund earning rate applied to all the capital and retained earnings provided (external and internal) - shareholders working capital, shareholders retained earnings, participating policyholders

retained earnings, participating policyholders capital (from another fund) and participating policyholders capital retained earnings respectively (note - the earning rate can be positive or negative).

The second stage will allocate the balance of the year's profit between external capital providers and participating policyholders with the restriction that at least 90% of the balance must be allocated to participating policyholders of that fund (note - the balance can be positive or negative). The portion not allocated to that fund's participating policyholders must be apportioned between the external capital providers pro-rata to the amount of capital and retained earnings they have in the fund.

(f) distribution of allocated profit will not be required but if a company wishes to distribute some it can distribute to external capital providers no greater proportion of their retained earnings than the proportion of participating policyholders retained earnings which it distributes to those policyholders.

B12.5 The 90% in B12.3 (e) above has been chosen by the Committee based on its judgement. The 80% currently in Section 50 relates to surplus which includes capital release. The proposed allocation method uses two stages. The first stage gives a fair return to capital and retained earnings supporting a fund and it is felt that 10% of any balance is a fair limit for external capital providers to receive. This gives them an opportunity for gearing their total return in a successful scenario which is not unlike the present situation.

B12.6 Since it is being proposed that asset fluctuations on a market value basis should emerge as profit/loss as they occur then a company will have to manage the smoothing of distributions to participating policyholders by holding "smoothing reserves" in relevant funds. The reporting format

being proposed will provide for full disclosure of what is actually happening and the judgements the company is making. The Committee believes the community is entitled to no less.

B12.7 In the Appendix to these explanatory comments are shown some simple scenarios to show how this might work in practice.

B13. Annual Reporting

B13.1 This part of the Draft Submission proposes possible layouts for the various financial statements which will be required to fully disclose the financial position of a company together with the allocation and distribution of profit and the tracing of the movements of capital and retained earnings. Variations in the layout are possible without changing the effect. The accounting profession will probably have views on the descriptive phrases to be used as well as the layout.

B13.2 The Committee feels strongly that expenses of acquisition and maintenance should be shown separately. To enable these to be related to the appropriate premiums it is proposed that "regular premiums" should be divided into "first year" and "other". The Committee believes that this approach is far more helpful to the recipients of financial reports and should replace the current approach of showing expenses by type (e.g. salaries, rent, telephones, depreciation, etc.).

B14. Statistics

14.1 In general the Institute itself collects statistics and prepares standard tables for important experience elements such as mortality and morbidity. This is done with professional care and using scientific standards. The statistics collected by the ISC tend to be for general or commercial interest. Some of the statistics currently collected by the ISC are of interest and use to actuaries. This is expected to continue to be the position. However the Committee feels that the Institute should not seek to rely on ISC statistics. Accordingly no view is being expressed in the Draft Submission.

B15. Disclosure

B15.1 This part of the Draft Submission contains a reasonable amount of explanation and it is felt that no expansion is required. The proposals follow the majority views expressed in the Cairns Survey Result.

B16. References

(1) GARDNER, A.M., PRIME, C.M., VINSON, P.L., (1989) Life Insurance Act Review (Convention Paper)

(2) The Life Insurance Committee (1989) Realistic Reporting of Earnings of Life Insurance Companies.

(3) CARR, P.S., GARDNER, A.M., MCLEOD, C., MCMULLEN, L.J., PRIME, C.M., SWINHOE, P.R., (1989) Solvency Principles (Convention Paper)

(4) CARR, P.S., VINSON, P.L., (1987) Solvency Standards for Life Insurance Companies.

(5) CARR, P.S., (1989) Publishable Solvency Ratios (Convention Paper)

Appendix

ALLOCATION / DISTRIBUTION SCENARIOS
FUND B PARTICIPATING BUSINESS

General

- These scenarios are fictitious but are realistic. A sequence of 4 years is shown with a mixture of positive and negative earning rates (appreciation of asset values is not smoothed).

- The Operating Profit is arbitrary but taken as roughly the fund earning rate multiplied by the policy reserves.

- The distribution to policyholders and shareholders in year 1 is roughly equal to that year's operating profit. A similar level is maintained in subsequent years but growing slowly.

- The fund requires finance. In years 1 and 2 it is decided to make transfers from Fund A. In year 4 (a bad year) it is decided to transfer additional shareholders capital into the fund. Transfers are made at the end of the year.

- The allocation of Operating Profit follows the principles in B12.4 with the "second stage" [see B12.4(e) (ii)] being allocated 90% to PPRE.

Scenario	Year 1	Year 2	Year 3	Year 4
Fund earning rate	10%	0%	20%	-10%
Sales / New Bus Strain	High	High	Low	Low
Policy Reserves movement (before bonus allocation)	Down	Down	Up	Up
Income	200	150	330	20
Expenditure	300	250	80	100
Change in Policy Reserves	-200	-100	50	30
Operating Profit	100	0	200	-110
Policy Reserve				
b/f	1000	879	859	994
Change	-200	-100	50	30
Bonus Allocation	79	80	85	93
c/f	879	859	994	1117
Solvency Reserve				
b/f	200	227	262	267
Change	27	35	5	10
c/f	227	262	267	277
Other Reserve				
b/f	100	100	100	113
Change	0	0	13	-103
c/f	100	100	113	10
Total Reserve c/f	1206	1221	1374	1404

	Year 1	Year 2	Year 3	Year 4
Operating Profit	100	0	200	-110
Allocated to -				
PPRE	79	0	130	-77
SRE	21	0	38	-20
Fund A PPCRE	0	0	32	-13
Participating Policyholders Retained Earnings				
b/f	155	155	75	120
From Operating Profit	79	0	130	-77
Bonus Allocation	-79	-80	-85	-93
c/f	155	75	120	-50
Shareholders Retained Earnings				
b/f	95	100	105	110
From Operating Profit	21	0	38	-20
Tr from Fund A	8	30	0	0
Dividend	-24	-25	-33	-40
c/f	100	105	110	50
Shareholders Working Capital				
b/f	50	50	50	50
From Share Prem Reserves	0	0	0	150
Tr from Fund A	0	0	0	0
c/f	50	50	50	200
Fund A Participating Policyholders Capital				
b/f	0	22	132	100
Tr from Fund A	22	110	-32	0
c/f	22	132	100	100
Fund A Participating Policyholders Capital Retained Earnings				
b/f	0	0	0	0
From Operating Profit	0	0	32	-13
Tr from Fund A	0	0	-32	0
c/f	0	0	0	-13

Explanation

Year 1 Sales are high and hence so is new business strain. Policy Reserves fall as a result. However Solvency Reserves increase. The company expects next year to be a high sales year so it transfers more capital into the fund (SRE and PPRE from Fund A pro rata to the amounts in that fund). The total of Solvency Reserve plus Other Reserve is represented by the total of PPRE plus SRE plus SWC plus Fund A PPC plus Fund A PPCRE (as it always must). The company decides to distribute to P/H and S/H roughly their "earnings" as it regards 10% as a "normal" earning rate.

Year 2 Another year of high sales. Again the company expects a similar year to follow and again transfers more capital from Fund A. It decides to distribute to P/H and S/H about the same as the previous year.

Year 3 Sales are unexpectedly poor so Policy Reserves increase but Solvency Reserves rise only slightly. Although the earning rate is high the company again distributes much the same as the previous years (the business has been sold on the basis of "smoothed" returns). It decides to return some PPC to Fund A.

Year 4 A bad year all round. The company still decides to distribute "smoothed" earnings to S/H and P/H. However to cover the Solvency Reserve it has to inject a significant amount of Shareholders Working Capital. Note that PPRE c/f is now negative and will have to be replenished in future "good" years or again supported by SWC.

THE ACTUARIAL MANAGEMENT OF CONVENTIONAL LIFE INSURANCE

by David Kerr B.A., F.I.A., F.I.A.A., A.S.A.

The Actuarial Management of Conventional Life Insurance

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1.0 Introduction

1.1 The actuarial management of conventional life insurance is built on the foundations of the uniform reversionary bonus system and the prospective method of valuation.

1.2 This has resulted in a complex and inflexible interrelationship of premium bases, surrender values, bonus distribution and valuation.

1.3 Redington in his 1982 paper, The Flock and the Sheep, highlighted some of the problems associated with current products and practices

- whole of life products cannot mitigate the effects of inflation
- the lack of the ability to take care of the sheep as well as the flock (i.e. to provide equitable treatment at the individual level)
- the problem of stable with profit premiums in a changing world (other than the sledge-hammer answer of a new series)
- pooled funds are only capable of the roughest of justice, and we have no means of telling how rough that justice is
- providing equity between the major product lines of whole-of-life, endowment insurance and investment account.

1.4 These problems affect both in force policies and future new business, and it is the purpose of this paper is to consider an alternate approach through the use of asset shares.

1.5 This paper has been written against the background of current legislation and practice, and some details of this alternate approach may need modification if the Life Insurance Committee's proposal for the revision of the Life Insurance Act and the publication of corresponding professional standards are accepted; the principles however remain unchanged.

2.0 Glossary of Terms

2.1 A number of terms are used in this paper, and their definitions may need clarification.

(a) Conventional Life Insurance covers participating Whole-of-Life, Endowment Insurance and Pure Endowments.

(b) Declared Interest Rate, is the smoothed yield on the fund that the office expects to be able to maintain in the long term. It would be equivalent to the rate required to support the uniform reversionary bonus.

(c) Earned Interest Rate, is the actual earned yield on the fund that would be expected to fluctuate each year. It would be equivalent to the rate required to support both the Uniform Reversionary Bonus and the Terminal bonus.

(d) Fees, are those amounts charged to clients for insurance and administration expenses, they normally contain a profit allowance.

(e) Costs, are the amounts actually incurred by the office for insurance and administration.

(f) Guaranteed Maturity Value is the amount contracted to be paid at the maturity date, or at age 95 for whole of life products. It is represented by the sum insured plus any reversionary bonuses added in the meantime.

(g) Death Cover Shape is how the death benefit amount changes over time, and it is a gross figure. The net death cover is the amount at risk, being the gross amount offset by the reserve or asset share.

3.0 Historical Development of Conventional Products

3.1 Life insurance started as a yearly renewable term product (assessmentism) whereby the premium charged each year was sufficient to meet the cost of death claims and expenses incurred during the year.

Such contracts had a limited appeal for two main reasons,

(a) The policy was renewable at the option of the office, and would only be renewed if the insured remained in good health

(b) The premiums increased with age, and substantially so after age 60.

3.2 A solution to these problems was the introduction of a whole of life contract which had guaranteed renewal and level premiums. Premiums were higher than the underlying cost in the early years to cover the higher cost in later years.

These contracts had a problem of excessive profits due to improving mortality, conservative assumptions about future experience, and large contingency loadings.

3.3 The calculation of the amount of profit achieved was considered from two views, retrospective (what has happened) and prospective (discounting future guaranteed values).

When the premium, valuation and experience basis are identical, the retrospective and prospective methods give the same answer. In times of manual processing the prospective method was chosen as it was a simpler method of calculation.

3.4 Profit which arose mainly from mortality profits was distributed by means of a Uniform Reversionary Bonus through an addition to the sum insured. This was done on the grounds of simplicity, and, unlike the alternate of a cash bonus, it contributed to the strength and stability of the office.

3.5 As the source of profit shifted from mortality to investment and then to growth investments, the uniform reversionary bonus system was found wanting, and it has been refined to increase the degree of equity over time into three main variants,

(a) Simple, where the bonus is allotted in proportion to the sum insured

(b) Compound, where the bonus is allotted in proportion to the sum insured and existing bonus

(c) Two Tiered or Super Compound, where the bonus is allotted at one rate on the sum insured and a different rate, normally higher on the existing bonus.

To each of these variants can be added a Terminal Bonus as a final adjustment to achieve an equitable allocation of profit and investment income.

4.0 The Structure of Conventional Life Insurance Products

4.1 From the client's perspective there are three benefits associated with conventional products,

(a) Death Cover (sum insured plus bonuses)

(b) Guaranteed Maturity Value (sum insured plus bonuses),

(c) Investment (surrender value)

Traditional actuarial management techniques combine these components tightly together in a complex inflexible interrelationship.

4.2 The traditional method of allocating profit to a policy is dictated by the issue of an equitable share of investment earnings. This usually results in the use of the two tiered reversionary bonus. Allocating reversionary bonus to a policy changes all three client benefits, the death cover is increased, the guaranteed maturity value is increased and the investment value is also increased.

When considered from the perspective of the amount of death cover provided, a two tiered bonus is certainly peculiar if not inappropriate. A death benefit that increases at one rate on the original sum insured, and at a higher rate on previous increases is difficult to explain to clients.

4.3 If we can unbundle the components of death cover, maturity value and investment and manage them separately, then all aspects of the management can become simpler and more equitable.

5.0 Asset Shares

5.1 With the power of today's computers and the administration techniques developed for unit linked and investment account products, it is possible to run a retrospective asset share account for each traditional policy. The asset share is made up of,

(a) Premiums as and when received

(b) Insurance fees, based on the amount at risk, being the death cover (sum insured) offset by the balance of the asset share account.

(c) Administration fees to cover the expense of establishing and maintaining the business. These fees will include an allowance to meet losses on early lapses, and the cost of guarantees.

(d) Credits from a share of profits through an interest credit at a declared interest rate. Profits made through expense loadings or margins in the insurance charges can also be credited in proportion to the fees previously deducted, but interest is the main source of profit.

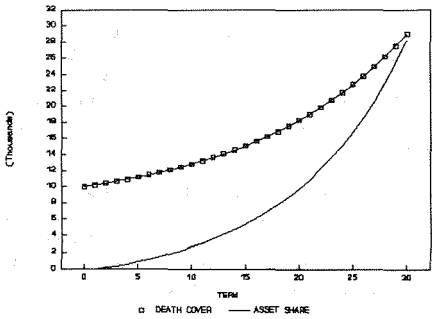

Figure 1 Asset Share and Death Cover

5.2 Figure 1 shows the growth in death cover and the build up of the asset share for a 30 year Endowment Insurance policy. The gap between the death cover and the asset share is the amount at risk for insurance charges.

5.3 As profit is credited to the asset share, the shape of the gross death cover can be made independent of the rate of profit distribution. Cover shapes meaningful to the client can then be offered, e.g.,

(a) level cover

(b) cover increasing at 5% or the CPI rate each year

(c) cover increased at 10% for the first 10 years when death cover is important to the client, and then level, when the need for high cover has reduced as the client has built up some capital of their own.

The gross cover amount can also be increased in the early years of a contract, even if no profit has yet been earned.

Under the traditional approach it is difficult to justify a share of profit through bonus allotments to first year contracts, where expenses probably exceed premiums.

5.4 The cover shape could be set as a 4% increase on the original sum insured and a 7% increase on previous increases. This is in fact the cover shape resulting from the two tiered uniform reversionary bonus. This type of cover shape has a number of practical problems,

(a) it is difficult to explain to clients, and results in low death cover in the early years when higher cover is required and high cover in later years when it is not so necessary and it is highly expensive,

(b) cover is automatically extended when it may be desirable to reduce the office's exposure; the impact of AIDS may be that an office would prefer not to give increases in cover,

(c) superannuation business, because of the higher after tax investment return has higher bonuses, and thus higher increases in death cover. Why should superannuation policies get cover increasing at a greater rate than non-superannuation?.

5.5 Profit distribution to the asset share is also independent to some extent of the guaranteed maturity value. The guaranteed maturity value could be increased by the amount of declared profit divided by a reversion (on a conservative basis), or for solvency and stability reasons, by some lower amount.

It may be necessary to taper the increases given in guaranteed maturity values to the underlying asset share by the guaranteed maturity date.

If the asset share exceeds the guaranteed maturity value at the maturity date, then the excess can be paid as a terminal bonus. Any shortfall must be met by a charge on profit to continuing policies.

5.6 The rate of interest used in the asset share accumulation is a question of major importance. In the interests of policyholder expectations of a stable return, it should be a smoothed rate that the office expects to be able to maintain for the foreseeable future (say 5 years). After the initial expenses are recovered a smooth increasing surrender value is then achieved.

To the extent that the declared interest rate asset share is perceived as a guarantee, it may be prudent in the interests of solvency to set a lower smoothed declared rate with higher levels of terminal bonus.

5.7 The asset share will be debited with the administration fees to cover the costs associated with establishing and running the business.

In the early years the establishment and maintenance fees may exceed the premiums received, resulting in a negative balance in the asset share. This negative asset share reflects the demand for capital financing to cover the new business strain. The interest rate used in the asset share accumulation when the balance is negative could be the same as that used on positive asset shares, or it could be

at a rate that reflects the cost of providing capital finance.

5.8 The office could report the asset share balance to policyholders as part of the annual statement. However this may create policyholder expectations of a strong capital guarantee which may not be appropriate if the office is investing in equities. For marketing reasons, the office may not want to report a negative balance in the early years of the policy. Therefore the asset share may only be calculated internally and policyholder reporting may be limited to changes in the death cover and maturity guarantee as is the current practice for conventional business.

6.0 Treatment of Existing Business

6.1 The calculation of an appropriate asset share for existing business raises some interesting practical issues. For recent business, it may be feasible to calculate the asset share based on historical records. For older business, this approach would be impracticable, and the asset share may have to be based on the current surrender value.

6.2 The allocation of additional death cover to existing business could be made using the existing two-tiered approach, or it may be possible to switch to a single tiered increase in death cover. Alternatively the policyholder could be given an option as to how future increases in death cover are to be applied by illustrating future amounts of death cover and their associated policy values.

7.0 Equitable Distribution of Profit

7.1 The requirements of a Good Profit Distribution System are,

7.1.1 Equity.
Each contract should receive its fair share of the profit and investment income earned by the office on its behalf.

7.1.2 Knowledge and Consent of the Policyowner.
A method of distribution will have been represented at the point of sale, a radical departure from this could be seen as misrepresentation.

7.1.3 Good Repute of the Office.
The system should contribute to the stability and good repute of the office.

7.1.4 Consistency with other Bases.
The actuarial bases used in the premium scales and the valuation should be consistent with the method of distributing bonus.

7.1.5 Simplicity.
The system should be simple to apply in practice and capable of ready explanation to the policyowner.

7.1.6 Competitive.
A bonus system should be competitive when compared with other financial institutions.

7.2 The traditional approach to conventional life insurance is to determine the total amount available for distribution; and then, by applying an average reversion, convert this into a uniform reversionary bonus rate. By its nature a uniform reversionary bonus system is a compromise of the requirements in 7.1, and as such cannot satisfy all of them.

7.2.1 Equity.
The uniform reversionary bonus by crediting an average bonus, obviously over credits some groups of policies at the expense of others. It is especially difficult to maintain equity between different product lines in the same fund, such as whole of life, endowment insurance and investment account.

The provision of quotation and illustration facilities through personal computers to agents has meant that inconsistencies in the application of the uniform reversionary bonus system are being highlighted, queried and exploited.

7.2.2 Knowledge and Consent of the Policyowner.
Any distribution system explained properly to the policyowner must be continued unless the consent of the policyowner is received.

Because of the complex nature of the uniform reversionary bonus system, it is unlikely it was explained properly.

7.2.3 Good Repute of the Office.
An inequitable distribution system that is difficult to explain is unlikely to contribute to the good repute of the office, and therefore in the long term does not support the stability of the office.
We must not only be fair, but be seen to be fair.

7.2.4 Consistency with other bases.
Traditional actuarial management techniques involve a complex interrelationship of premium bases, surrender values, bonus distribution and valuation. It is difficult to know to what extent consistency is achieved.

7.2.5 Simplicity.
This together with the question of equity are the real problems of the uniform reversionary bonus system. A two tiered bonus is seen as necessary for equity reasons, but it is difficult to explain to the client in a meaningful manner what is happening to the policy.

7.2.6 Competitive.
A reversionary bonus is unique in the financial market place, it is therefore difficult for clients to compare a life contract to other financial products, and often results in uninformed comparisons.

7.3 The asset share approach avoids most of these problems.

The true contribution to profit by each policy is credited to that policy. Using a concept of a uniform interest credit system.

7.3.1 Equity.
By crediting each contract with its contribution to profit and investment income, equity is achieved. Because expense and insurance fees are used in the asset share calculation, and not actual costs, then some pooling of risk still occurs, but this is subject to the actuary's full knowledge and control. Profit can be distributed based on the source of that profit,

(a) investment in proportion to asset share balance

(b) mortality in proportion to insurance fees charged; this could be across all policies, or for that section of the business experiencing an improvement or deterioration in mortality

(c) expense in proportion to expense fees charged

(d) miscellaneous (surrender, lapse, non participating business), in proportion to asset share balance

7.3.2 Knowledge and consent of policyowner.
If a reversionary bonus system was agreed with the policyowner, then the growth in the guaranteed maturity value must follow that agreement.

The asset share can still be used to determine an equitable increase in the guaranteed maturity value, and for surrender values.

7.3.3 Good Repute of the Office.
When interest is credited at a smoothed declared rate, then the policy reserves will grow at a stable rate, with fluctuations in investment earnings handled by a volatile terminal bonus.

7.3.4 Consistency with Other Bases.
Under an asset share approach there is no need for consistency with the premium bases; any anomaly in the premium rates will be handled fairly by basing the policy benefits on the premiums received in the asset share accumulation. The liability valuation basis must be consistent with the asset share, and is likely also to use an asset share approach.

The asset valuation basis must also be consistent with the liability valuation basis, and market values would seem appropriate.

7.3.5 Simplicity.
The asset share uses the same techniques developed for Investment Account and Unit Linked products. These techniques are readily accepted by clients and are straightforward when compared to reversionary bonus methods.

7.3.6 Competitive.
The asset share build up is certainly used elsewhere in the finance industry and makes it simple for the client to compare the return from the policy with

other investment products and other life company performances.

It is also easier for the client to understand the cash flows within the policy.

7.4 Shareholder Profit Entitlement.

Current participating policies are generally based on a guaranteed increase in account value at around 4% p.a., and the balance of earnings being shared between policyholders and shareholders (if any) subject to a maximum shareholder entitlement of 20% under Section 50 of the Life Act.

The asset share approach lends itself to the shareholders taking a proportion of all earnings and the actuary should recognise this when recommending the distribution of profits to policyholders and shareholders.

8.0 Surrender Value Bases

8.1 The requirements of a good surrender value basis are similar to those for a good bonus system outlined in 7.1, but the major components are,

- Equitable treatment of policyowners
- Simple to apply in practice, and capable of justification.

8.2 The traditional approach is a prospective one of discounting the guaranteed maturity value to the present time.

8.2.1 Equity.
For policies near maturity this gives a reasonable value if the guaranteed maturity value itself is equitable and proper allowance is made for terminal bonus. For policies with many years to maturity the prospective surrender value is unlikely to reflect the true contribution to the office by the policy.

Changes in surrender value bases produce sudden falls or rises in surrender values which need special treatment to avoid loss of confidence in the office.

8.2.2 Simplicity.
Although the basic surrender value is a reasonably simple calculation, alterations to the contract or midterm increases introduce complications to surrender value formulae.

8.3 An asset share is a simple surrender value on a retrospective calculation of the true contribution to the office.

8.3.1 Equity.

Equity is in the full control of the office with the ability to determine the degree to which the pooling of expenses, insurance and interest is undertaken.

Changes in the bases of accumulating the asset share only impacts future values; there is no sudden fall or rise in the current surrender value.

Using asset shares, the actuary is aware of the full extent of any cross subsidy between classes or by duration.

It is immediately obvious to what extent early surrender values are being subsidised by other policyowners.

8.3.2 Simplicity.
The asset share is calculated in the same manner for all product types; there is only one system to implement and maintain. Only the levels of expense and insurance fees vary by product type. Alterations or increases have no sudden impact on surrender values.

8.4 An unbundled asset share approach to surrender values could be seen as providing strong capital guarantees, especially if the balance of the asset share is reported to clients as part of the annual review or bonus certificate. However the asset share calculation may only be calculated internally, and the office could allow the surrender values to fall to an act minimum basis if asset values fall significantly.

9.0 Valuation Bases

9.1 The purpose of the valuation will determine the actual method used. The main purposes are,

(a) demonstration of solvency

(b) to determine the rate of bonus which could be distributed

(c) tax proportion of superannuation and non-superannuation liabilities

(d) management information.

9.2 Solvency Valuation.

9.2.1 The net premium valuation with an allowance for future bonus emergence does demonstrate solvency. However it does not demonstrate how strong an office is compared to its competitors, or how strong it needs to be.

9.2.2 A Life Act minimum valuation that is based on asset shares is product independent, and is therefore likely to stand the test of time. It would be necessary of course to eliminate any negative asset shares in a solvency valuation.

9.2.3 The solvency reserves that a company has available to it can be measured for comparison purposes as,

(a) First Level Solvency Ratio is the excess of the asset market value over current surrender values divided by those current surrender values.

(b) Second Level Solvency Ratio is the excess of the asset market value over Life Act minimum surrender values divided by those minimum surrender values.

Both these ratios give a realistic comparison between offices, both to their strength and security, and to their distribution performance relative to the minimum guaranteed under the Life Act.

Market value of assets has been chosen as it also gives a realistic comparison between companies. Both market and book value may be historical random numbers, but at least market values are at a known and comparable date.

9.2.4 The solvency reserves that a company requires for prudent management can be built up from,

(a) a realistic basic policy liability based on current surrender values

(b) any additional amount of assets required to support the current smoothed distribution rate and the guaranteed level of future insurance and expense fees compared to the best estimates of actual costs; these guarantees can be absolute, or implied through policyholder or shareholder expectations

(c) Asset Default Risk Reserve (Canadian C-1) that will vary according to the type of assets held.

(d) Pricing Risk Reserve (Canadian C-2) that will vary according to the size of the risk and the guarantees given in terms of mortality and expense fees.

(e) Interest Mismatching Risk Reserve (Canadian C-3) that will vary according to the degree of mismatching and the guarantees and options given in terms of surrender values and interest declarations.

9.2.5 An unbundled approach to solvency thus gives both the amount of solvency reserves that a company has, and what it requires. If a company's reserves fall short of what it requires, then it should be liable to being wound-up by the supervisory authorities. If a company can only meet its solvency requirements by a small margin, then it should be liable to withdrawal of its licence to write new business, but it could continue in business as a closed fund.

9.3 Valuation to Determine the Rate of Bonus

9.3.1 The amount of profit to be distributed should be determined on an equitable basis using projection techniques on several different scenarios. It will be a smoothed declared interest rate expected to be

earned and maintained in the future, plus miscellaneous profits actually earned.

9.3.2 It is only the uniform reversionary bonus system that requires a valuation under an artificial basis designed to release profit in a controlled manner.

With an equitable distribution of profit based on asset shares, this need for an artificial net premium valuation disappears.

9.4 Valuation to Apportion Liabilities for Tax

9.4.1 The requirements of the Tax Act to determine solvency and the relative proportion of superannuation and non-superannuation business entails a traditional net premium valuation.

9.4.2 If the actuarial management valuation is carried out on a realistic basis, then a net premium valuation may still be required for the Tax Act.

9.5 Management Information Valuation

9.5.1 Management will need to know the company's liability for its in force business, plus the sensitivity of that liability to changes in future experience.

9.5.2 The basic liability at the date of valuation is the current surrender value, but there is an additional liability for any committed build up of policy values.

9.5.3 Future Liability will depend on,

(a) the current surrender value

(b) the smooth interest rate that is planned or guaranteed to be added each year

(c) the level of future insurance and expense fees that can be charged under the policy guarantees; these guarantees can be absolute or implied through policyholder or shareholder expectations

(d) the actual lapse and interest rates, insurance and expense costs that the company expects to incur.

The insurance costs incurred could exceed either the insurance fees that are permitted under the terms of the contract, or those that the company is prepared to charge in a competitive environment.

(e) The guaranteed maturity values including any future increases in those values, should be equal to the asset share on the date of maturity.

9.5.4 To support the future growth in liability it may be necessary to set up extra reserves over and above the current level of asset shares. The size of these reserves will depend on the assumed future experience, and it will be necessary to test the sensitivity of the reserves by carrying out scenario testing.

10.0 Analysis of Profit

10.1 The actuarial control of a life office revolves around two fundamentals, the achievement of profits within the fund and the equitable distribution of those profits.

Both of these fundamentals require information on the contributions to profit from the various risk taking activities of the office.

10.2 The analysis of profit should be broken down by source of profit; insurance, expense and investment. It will then be necessary to categorise these items by product line.

If the individual policy asset shares maintain a history of entries by type and are accumulated not only by using fees charged to the client, but also by using best estimates of actual costs incurred, then the difference between fees and costs is the profit split by source. Since the asset shares are kept at policy level, then the profits emerging can be aggregated into sub-groups as required. For example, insurance fees and costs can be aggregated for male lives written by a particular class of agent outside metropolitan areas. Prices can then be adjusted, or product lines expanded or withdrawn.

10.3 Profit contribution can be further split into planned (or expected) and experience (or windfall) components. If the original profit test for a product assumed that a particular expense item would cost $50, and a fee of $80 was charged, and the actual experience was $70, then there has been an experience loss of $20, not a profit of $10.

To achieve this breakdown of profits, the asset shares can be accumulated in three ways,

(a) using fees charged

(b) using planned costs

(c) using actual costs (or current best estimates)

The difference in the first two is the planned profit, whilst the difference between the last two is the experience profit.

The planned costs could be locked in from the original profit test or, when a product is re-profit tested, the planned costs could be changed to the new assumptions.

It should be noted that planned profits are a necessary contribution to the overall profit of the product. Some costs incurred will not be directly charged for. At the individual item level the variance between planned costs and actual costs is of more importance than the difference between the fees charged and the costs incurred.

10.4 For policies that lapse in the early years of the contract, the asset share balance will probably be negative. This balance will represent the loss made on early lapses. This loss will need to be offset by a charge to all continuing policies as a lapse establishment fee.

11.0 Policy Alterations.

11.1 Under the two tiered reversionary bonus system policies that have been in force longer with higher existing bonus, receive a higher share of profit. This is equitable as they earn a corresponding higher amount of profit.

However, if existing bonus is reduced through cashing of bonus or by an alteration, then the policy is penalised through lower bonus allocations at each subsequent annual declaration.

11.2 Conventional treatment of altered policies has become very complex under the two tiered reversionary bonus system. There are two possibly conflicting requirements, the surrender values before and after the alteration should be identical, and the ratio of sum insured to bonus should be maintained.

11.3 The use of an asset share for the surrender value means that the surrender value before and after an alteration is always identical. The only change would be if a fee was charged for the alteration. The ratio of sum insured to bonus is irrelevant under the asset share approach.

11.4 Using an asset share means that a change requested by a client only involves altering what the client wants changed.

For example, an increase could be for death cover (sum insured), investment (premium) or both. The future growth in the asset share will handle the changed policy in an equitable manner. Traditional administration requires a tight fixed relationship between premium and sum insured, a request to increase the investment (premium) also involves an essential increase in death cover (sum insured), whether the client wanted the extra cover or not.

11.5 Using asset shares, also means that conventional products can now cope with inflation, by increasing the premium each year to maintain the real level of investment.

11.6 The new superannuation contribution tax has caused difficulties in administering conventional policies.

Different offices have tried different solutions, but none of them are ideal.

An asset share approach can handle this tax reasonably easily, with the tax deducted from premiums received before they are credited to the asset share.

12.0 Terminal Bonus

12.1 Terminal Bonus, or Capital Growth Bonus, has been introduced to distribute to withdrawing policies profits that have been retained for smoothness and possibly security and solvency reserves. Terminal bonus often represents unrealised capital appreciation. It is usually distributed on an approximate basis such as a multiple of sum insured and declared bonus.

12.2 Terminal Bonus is paid on death and maturity claims, and in some offices on surrenders. In these offices the terminal bonus is discounted.

12.3 The non-payment or discounting of terminal bonus on surrender is sometimes justified on the grounds that the basic surrender value is too high, or that the client has broken a long term contract.

Both of these reasons appear spurious. We should be correcting the basic surrender values and not adjusting the terminal bonus in what is often an arbitrary manner. Although the client has broken a long term contract there may be valid reasons and the investment has earned the undistributed profits.

12.4 There are however, justifiable reasons to discount the terminal bonus on surrender,

(a) unrealised capital gains involve a deferred tax provision and selling assets to pay terminal bonuses brings this provision forward, therefore terminal bonuses should be discounted for the difference in the deferred tax reserve and an undiscounted amount. Allowance should also be made for the outstanding term of the contract so that the terminal bonus on surrender approaches that paid on maturity.

(b) Life insurance is a long term investment, and as such can invest in long term growth assets. To the extent that surrenders inhibit this policy, the surrender value of terminal bonus should be reduced.

(c) Solvency and strength require an orderly withdrawal of funds and temporarily high terminal bonuses in surrender values should not have the effect of encouraging surrenders. We

must consider the security of the continuing policyholders.

12.5 The calculation of an equitable terminal bonus can be achieved by measuring both the smoothed declared rate and the actual earned rate during the term of the contract. Thus an additional asset share accumulated at the earned rate is required, and the terminal bonus is the difference between the two accumulations. Any undistributed profits from sources other than interest can also be credited to the earned rate accumulation.

13.0 Premium Bases

13.1 Traditionally, premium rates have been calculated by the use of formulae. These formulae have then been carried forward to the surrender value and valuation bases.

13.2 Projection techniques can be used to set premium rates on an unbundled approach, with the cash flows by source and year being determined on a best estimate basis, including allowances for inflation and lapses. These projections give a better feel for the product than traditional formulae, and are easy to adjust for sensitivity testing under different assumptions.

13.3 The traditional management of conventional products is based on sum insured related benefits for all claim types, surrender, death and maturity. This means that if the premium to sum insured relationship at entry was calculated incorrectly for a group of policies, or for an individual policy, then the error can only be fixed through the broad brush of changing the reversionary bonus scale.

13.4 Under the unbundled approach, an error in the premium to sum insured relationship is somewhat irrelevant. The surrender value is calculated from the premiums actually paid, and the death cover is charged for according to the amount actually provided. The only possible problem would be if the guaranteed maturity value was unattainable.

13.5 Also under an unbundled approach, as the policy benefits are based on premiums actually received, rather than premiums due, then premiums received late or early can be treated equitably by giving

credit from the date of receipt. Similarly short and over payments will be included for the exact amount, rather than having write off provisions to avoid chasing insignificant amounts.

14.0 Concluding Remarks

14.1 Conclusion

This paper advocates major changes in the administration and management of conventional products. These changes are now becoming possible with cheaper computer power.

To meet the challenges of a rapidly changing world and to achieve proper management and equity these changes are essential.

14.2 Summary of proposed changes in the actuarial management of conventional life insurance,

(a) The client benefits of conventional products, namely the death cover, investment and maturity guarantees should be unbundled and administered separately.

(b) Asset shares as a basis for the investment component of the policy, and hence for surrender values, valuation and analysis of profit.

(c) Investment earnings distributed by uniform interest rates, not uniform reversionary bonus.

15.0 References

P.S.Carr and G.C.Ward
Distribution of Surplus From Appreciating Assets to Traditional Contracts (TIAA 1984)

J.Kent
Valuation, Bonuses, Investments - Some Observations (TIAA 1978)

R.S.Skerman
The Assessment and Distribution of Profits from Life Business (JIA 94)

H.F.Fisher and J.Young
Actuarial Practice of Life Assurance

P.S.Carr and P.L.Vinson
Solvency Standards for Life Insurance Companies (TIAA 1987)

F.M.Redington
The Flock and the Sheep and Other Essays (TIAA 1982)

T.C.Jenkins
Equity and the Liability Estate (TIAA 1982)

SYDNEY

MR. D. KERR (Author): I would like to express my thanks to my colleagues for the help and encouragement in the development of this paper. Following the Life Insurance Committee's draft paper on the review of the Life Act I have got two aspects that I would like to comment on. Firstly a minimum act surrender value. The Life Insurance Committee thought that may prejudice the interests of continuing policy holders but it does provide a base for comparing the distribution performance for different companies by comparing actual surrender values to the minimum.

Secondly terminal bonuses reflect the policyholders retained earnings and capital allocated to its reserves. I believe it would be instructive from an equity point of view to compare the cost of terminal bonuses if all policies surrender to the participating policyholders retained earnings and capital.

MR. M. WEBB: This paper centres around the unbundling of whole life and endowment insurances. While there are distinct communication advantages in this, I would like to review some of the hazards involved. Perhaps the path to unbundling is not worth travelling, or needs to be accompanied by certain reforms. I have four points to make.

1. Will unbundling be accepted by our salesmen and customers? Explicit identification of significant up front charges is a problem. Hiding such charges by use of initial units or initial accounts on which a heavy additional asset charge is taken and present valued reintroduces complexity. Combining the up front commission concept with allowing flexible payment of premiums is also very complicated.

   I have seen some indications both here and in America of a trend back to Whole of Life contracts. I think part of the reason for this is to avoid the above complexities.

2. The issue of high levels of acquisition costs and who pays for them on early termination is not created by unbundling but is sharply focused by it. The industry's current practice is to charge the terminating policyholder as far as possible, and not charge the salesman at all after the first year or two. Most people surrender their policies before death or maturity - these are times of change. I believe we need to look at ways to charge the salesman and policyholders at large more of the cost of early terminations.

3. Unbundling brings with it a requirement for much greater computer capacity. Not only is there detailed subdivision of policy records into components for protection, savings, administration and profit. There is also a demand to keep historical details to enhance detailed equity and a requirement to project such information forward to more accurately assess risks and profits. Finally there is a requirement to provide on line enquiries and updating. All this adds up to an enormous increase in computer operating capacity which I am not sure is viable or affordable.

4. My last comment has to do with providing options, particularly the option to take a cash surrender value. This is another issue not created by unbundling, but heightened by it.

   I believe we have to move in the direction of giving policyholders a choice - maintain the option to take cash at any time coupled with short term investments or get into long term growth opportunities and accept some restrictions on cash options.

   Fundamentally life insurance is to do with income replacement, and the drawing of up to say 1% each month of policy value is fine. It is the taking of full cash which is switched to an alternative investment medium that is the problem.

   There is probably a case for having less restriction on small policies or regular premium policies with heavy acquisition cost related surrender penalties.

MR. R. LYON: David Kerr has identified communication as a significant problem with the existing conventional business. I suspect that it is a problem which exists with all kinds of business. I would imagine that most offices had significant communication problems, following the share crash in 1987, explaining to investment linked policyholders that investment linked really does mean investment linked and that share prices really can go down; and just because the office itself is a reputable, secure, financial institution does not mean that the value of the investment does not go down. The real problem is the whole presentation which comes from the agent at sale and comes then from the office yearly thereafter.

The average policyholder does not really know whether his policy is investment linked or not, nor even whether it is bundled or unbundled. He does not know very much about it at all - he just knows that his agent knows a lot more about life insurance than he does and has chosen this policy for him because it best fits

his needs. We can be cynical about commission levels, but the point is that that is the relationship between the agent and the client. Future communications from the office must recognise this and aim to help the policyholder to understand his policy.

That does not change the nature of the conventional contract. But it does change the way in which we would look at the administration of the contract. It takes me on to asset shares, which are David's solution to the communication problem. I tend to feel that the expression "asset share" is much abused. It belongs in the same category as "realistic assumptions", "realistic liability" and "profitability" - deterministic measures which are used for completely the wrong purposes. How often have you heard the expression "the asset share"? Two people's measures will be different and they will both be "The Asset Share". I have a lot of concern with the asset share calculation. At best it is a "best estimate". At worst it contains very dangerous distortions.

One of those distortions comes when you smooth investment returns before you calculate the asset share. The answer is extremely sensitive to investment returns. If you smooth those investment returns, you lose much of the understanding that you might have of the relativity between different cohorts.

So, by all means use your asset shares to indicate the overall level of terminal bonus that you might want to pay out; use your asset shares to test the surrender value scales from time to time; but I would be very alarmed if somebody actually wanted to use asset shares to pay out surrender values. After all, when we test our surrender value scales on all forms of contract - bundled and unbundled - we always have to pay more than the asset share on lapses in the first two years. So, clearly, we cannot pay asset shares then. Are we going to pay asset shares thereafter and institutionalise the early losses?

David suggests that the conventional contract cannot cope with today's needs. This is not strictly true. Options have already been mentioned tonight, and I would like to add riders. Witness the widespread use of mortgage endowment policies in the United Kingdom, using a simple decreasing term rider to blend the immediate need for cover with the ultimate need for cash on maturity to repay the loan.

To sum up, I believe that our problems lie not with the contract but with the way in which we administer it and present it to our clients. If David's paper encourages us to re-examine our administration, then he has done the industry a service.

MR. M. TURNER: One disadvantage of going on slightly later is that everyone else has covered all the topics you were going to speak about. So I shall be short.

First of all I would like to thank David for a very useful paper on a topic which I regard as very important, asset shares.

I think his ideas on unbundling are more than feasible, in fact they have actually been put into practice in the UK. There are UK companies going down this track, or very close to it, under the banner of "unitised with profit". There are products which look very much like the one he describes.

I must echo Richard Lyon's comment that there is no such thing as a particular asset share. There are many opportunities for differences in opinion between actuaries on how asset shares should be calculated.

Some of the areas where there are problems in working out asset shares have been mentioned by previous speakers. I would like to add a few comments.

Choice of the interest rate. I think David's smoothing idea is not commonly used. Asset shares I have seen calculated elsewhere have not used a smoothed interest rate when calculating the number. More commonly, any smoothing occurs after the asset share numbers are calculated.

Some actuaries might like to consider whether they would wish to vary the interest rate according to the duration into the contract. If you have got a contract with a guarantee which becomes more and more significant as you approach maturity, then you might wish to switch towards a fixed interest type of portfolio as the policy matures. Therefore it might make a lot of sense to vary the interest rate you use. I know that some companies actually do.

Another area of difficulty is the choice of the experience assumptions.

Should you use average expenses? Is it fair to affect all the contracts in the year when the development expenses occur or should the estate bear some costs? What do you do with unrealised gains? There are lots of opportunities for differences of opinions there.

I think all of these difficulties point to the idea that you should not disclose if at all possible.

David mentions certain historic problems in calculating asset shares on existing blocks of business. In particular, I think that he mentions the idea that you should use surrender values where you have inadequate investment records.

All of these historic problems tend to suggest that David's idea should be used for new series contracts. I think that if you wish to actually start capturing asset shares by policy then it would have to be for a new contract. People I know who calculate asset shares tend to do it from sample policies on blocks of business and I am only aware of one company that actually keeps the asset share on the policy record, again in the UK. However the success of that company implies that it is feasible to do what David suggests, despite all those computer complications mentioned by a previous speaker.

DR. S. BYRNES: I would like to thank the author for an interesting paper. I believe that an office could issue the sort of unbundled contract described in the paper. However, if I had a conventional policy with such an office then I would be rather unhappy if the office changed to this suggested method for my policy. This is because the method is not what I would have expected when the policy was taken out and, in fact, the method does not even describe what I would call conventional life insurance.

Asset shares can be useful when setting surrender bases or deciding terminal bonus rates but they are not the only consideration. Projections are needed for testing solvency, for bonus determination (as stated in Section 9.3) and for tax purposes. A number of specific objections to the suggestions in the paper are as follows:-

1. The suggested method is stated to be 'simple' in a number of places, (eg. Section 8.3). I don't believe this. For example, to calculate surrender values as per Section 12, one asset share is accumulated at the smoothed rate and one at the total rate. The surrender value is the smoothed rate asset share plus the discounted value of the excess of the total asset share over the smoothed asset share. I would prefer to justify the traditional method (which discounts the maturity value) than to justify this suggested method to a policyholder. The method does not seem particularly simple to manage, either. The paper seems to envisage accumulating a large number of items at individual policy level which is difficult. How are past errors corrected, for example? Also, a 'smoothed interest rate' is no easier to determine than a bonus rate.

2. One of the many asset share calculations in the paper uses actual costs, as stated in Section 10.3. However, it is not possible to use actual costs until well after the event ie. the data base could never be 'up to date'. To get actual costs, expenses need to be apportioned which takes time. There are also problems if the philosophy of how expenses are split, is changed.

3. A fee for early lapse is suggested in Section 5.1. This would be very hard to explain to policyholders. A continuing policyholder would tend to say "I did not lapse so why should I pay a lapse fee?' My preferred approach would be to make surrender profits at later durations so as to have the maturity value approximately what it would have been if there were no surrenders.

4. Consistency between death, maturity and surrender benefits could be a problem with the suggested method. The proportion of the premium used to pay for insurance benefits needs to be restricted in order for the total asset share to equal the guaranteed amount at maturity (as required in Section 9.5.3(e)). Such restrictions can become quite severe, even impossible to meet, if the actual experience turns out to be worse than originally expected. Such restrictions are not recognised in Section 5.3 which basically says there need be no such restrictions.

5. In Section 7.2, the traditional method is said to be calculate surplus and then divide by an average reversion to determine bonus. However, I believe, that the traditional method is to determine the amount of bonus (using asset shares, projections, competitive environment etc) and then see if sufficient unrealised appreciation can be released, or, if necessary the valuation basis weakened so as to give the required surplus, and still demonstrate strength.

6. Changes in surrender value bases using traditional methods are stated in Section 8.2.1 to produce sudden falls or rises in surrender values. However, traditional methods need not produce discrete changes in value. For example, surrender values can be equated at the date of change to determine the new net premium. This is, in fact, what my own office did when the surrender basis was changed a few years ago.

   There are situations, though, when a discrete change in surrender value is required eg. to protect the office after a dramatic fall in asset values. Such a discrete change would be hard to manage and explain with an asset share approach.

7. Section 9.2.2 suggests that asset shares be used for solvency purposes. To prove solvency, you have to prove that future guarantees can be met. A prospective reserve can do this but a retrospective reserve cannot. Hence the Act minimum reserve must be a prospective reserve.

8. Some anomalies with traditional methods are listed in Section 11, and also Section 7.2.1. Problems with the same bonus rate for different product lines can easily be overcome by having table dependant bonus rates. Also, if

the policyholder can deal with sum insured, reversionary bonus and terminal bonus separately then the surrender or alteration basis of each component needs to be set separately. It is not sufficient for the total to be reasonable for a policy with no previous changes. For example, for surrender values, a lower interest rate should be used in the surrender of reversionary bonus basis than in the surrender of sum insured basis because with 'super compounding' of bonus, a unit bonus is worth more than a unit sum insured.

9. Section 12.3 argues that the basic surrender value should be 'corrected' rather than use discounting for surrender of terminal bonus. However the minimum surrender provisions of the Life Insurance Act often prevent this.

MR. J. SLACK: David's paper has pointed out quite a few problems, as he sees, it with traditional contracts:

- bonuses based on sum assured give a much higher surrender value in the early years than perhaps an asset share would suggest

- issues such as contribution tax are difficult for conventional business to deal with.

He suggests that a new approach is needed. I suggest what he is really saying is that it is time to close down traditional business as we know it. There is a saying I rather like which states that if it looks like a duck and it swims like a duck and it squawks like a duck then it is probably a duck. I think if we move to giving traditional contracts flexible death cover like unbundled contracts and earnings declared like unbundled contracts and a surrender basis very similar to the investment account contracts then it becomes an investment account or very similar to it!

There are a number of companies selling both traditional business and unbundled contracts - I thought it would be useful to look at industry statistics to see how the sales of the two contracts compare. After all if traditional business has all these drawbacks, presumably we are not selling very much. Looking at the top five companies that sell both traditional business and unbundled, I found that in the superannuation areas 25% of the total traditional and unbundled business is traditional type business and in the non superannuation area it actually adds up to 75% of the total. This is a contract that has got a lot of drawbacks from the clients point of view!

I tried to think of reasons why this would be the case. I have crossed commission off the list because my understanding is that the commission is basically the same for traditional or unbundled so there is no commission bias. I have also crossed off that old selling habits take a long time to die. With the turnover of agents and the fact that investment account business has been around for so long, it cannot really be that either.

I feel that there are three main reasons for it. One is the point that David makes in Section 8.2.1 that the early surrender values are greater than their asset shares. The second refers to the business assurance market where a lot of these sales are made based on policy loans. The interest rates used for policy loans are much less than the commercial rate of interest. Thirdly, as David points out in Section 7.2.1, agents have access to sophisticated software programmes - you can spend all day finding out all the anomalies in the contracts, then exploit them.

I do see moves within the industry to overcome a lot of these problems but if we keep moving along the lines that David has suggested, then I suggest that traditional business, as we know it, will die.

MR. P. CARR: I would like to congratulate Mr. Kerr for his courage in tackling what is probably the most difficult problem facing the life office actuary - the management of conventional business. We spend several years acquiring the expertise to enable us to manage this business and in so doing we forget how strange it really is. Perhaps the strangest thing is that this business has lasted in its present form, with some relatively minor alterations, for over one hundred years. At this point I would like to take issue with Mr. Kerr's statement in Section 1.2. If the interrelationships of premium bases, surrender values, bonus distribution and valuation were complex and inflexible the conventional life contract would not have survived. In fact it is the simplicity and power of this contract that have led to its longevity. Its survival in early years was ensured by the fact that surplus from excess interest can be fairly dealt with by a uniform increase in reversionary bonus. Other simple amendments enabled the contract to handle appreciating assets. This was shown by myself and Garth Ward in our 1984 paper - which is in the list of references to Mr. Kerr's paper but is nowhere referred to. It is interesting to note that Mr. R.A. Buchanan in his comments on that paper outlined a system for distribution of surplus based on asset shares. I quote:

> "It is well within our capacity to calculate an asset share for each policy on the basis of actual past performance and to compare this with the asset share expected. The difference can then be recast as a reversionary bonus."

The fact that it has taken 6 years for this approach to be presented more formally is an indication of the difficulty in unbundling conventional business in the way suggested by Mr. Kerr. These problems lie at the very heart of the nature of life insurance and, in particular, of participation. Some idea of this can be obtained by examining in more detail the nature of calculation of an asset share.

An earlier speaker mentioned the problem of determining expenses - do we use marginal or average costs and how do we cope with variable expenses? The most difficult area is that of determining the rate of interest; there will be considerable practical difficulties in determining a "smoothed rate which the office expects to be able to maintain for the foreseeable future". In Section 5.6, Mr. Kerr suggests the use of such a rate with a terminal bonus. It is difficult to see how this will work in practice and, in fact, in Section 12.5 he seems to suggest that the terminal bonus rate is used to make the performance of a conventional contract equivalent to that of an investment-linked contract. Surely more thought must be given to the smoothing process than that.

A major factor in asset share determination is the use of the estate, particularly interest thereon. Management of the estate is critical to management of conventional business and it is surprising that this concept received no mention in Mr. Kerr's paper.

Mr. Kerr spends considerable time discussing equity. He overstates the cases against reversionary bonus system and for the asset share system.

When discussing solvency standards the longevity of conventional business must always be remembered. This has arisen because of the strength of the net premium valuation basis. Any discussion of a replacement solvency basis must always bear this in mind.

The conventional contract is far from perfect. It requires regular premiums and a fixed link between sum insured and premium. Such rigidity seems out of place in today's world. Nevertheless there is still a demand for such contracts. The great American humorist and writer, Mark Twain, woke one morning to read his own obituary. He wrote to the offending newspaper saying "Reports of my death are greatly exaggerated." The same can be said of conventional business.

I congratulate Mr. Kerr again for his courage in tackling this difficult subject. He certainly has shown that much work remains to be done.

MR. C. NEWMAN: I would like to join with the other speakers in congratulating David on an interesting paper. It is good for actuaries, I believe, to analyse things as they happen and not become too obsessed with present values which, whilst they are powerful in themselves, do not always tell us what is happening.

A point of particular interest from David's paper that struck me was that we could apply the asset share concept to annuity business. Since becoming a middle aged actuary, I have acquired an increasing interest in seeing a competitive annuity market develop in Australia. The concepts of a disinvestment curve and the asset share could be used in analysing the ongoing profitability of a pool of annuity business.

In the case of annuities, the asset share would comprise the original purchase price, less the initial costs (including commission), plus investment income earned on the pool of capital, less instalments paid and associated administrative expenses.

The asset share each year would need to be compared with the reserve or purchase price required to secure the ongoing annuity payment. The critical feature here is not only the rate of interest at which the original purchase price was invested but also, as time goes on, the need for reinvestment and therefore the investment return available in future together with, hopefully, continuing improvements in mortality

The new money concept, which needs to be used in determining annuity purchase prices, necessitates each cohort of annuities being treated separately to ensure a comprehensive analysis of their respective profitability. This needs to be thought through of course, but as I see it David's concepts could conceivably be applied to participating annuities. Most annuities in Australia seem to be purely the guarantee type and I think there is a need for a participating annuity market to emerge, particularly as the Federal Government wishes to encourage annuities. There should be an increasing interest in annuities and consumers will demand a more competitive range of products to choose from.

Each year one would go through the unbundled analysis, calculate the profit emerging and either apply that as profit distribution in that year or, preferably, to purchase an increase in the annuity itself.

A particular problem I think we need to address is paving the way for developing a competitive CPI indexed annuity, for which there is going to be an increasing need. Conceivably, it could be possible to develop one with some sort of associated profit sharing, provided that this does not cause problems with compliance with the regulations for maximum benefits and complying annuities under the Occupational Superannuation Standards Act.

It is interesting there has been no discussion tonight on equity linked business. At this stage, whilst there is heavy demand in investment business for equity linked contracts, I do not see it as being a major demand area in the foreseeable future in the annuity market, but of course this may be something where I may well be wrong.

MR. B. PALTE: I would like to congratulate David on his paper. I have done a lot of work with David in this area, it is something that is close to my heart. I will try and keep my comments short.

Martin Webb and a number of other speakers have referred to the fact that the simplicity of the conventional with profits policy appeals to our policyholders. Perhaps we should be differentiating between how we actually administer the contracts in house and how we present it to the policyholders. I feel in today's times with rapidly changing circumstances management needs to know a lot more detailed information on conventional policies.

Another link that I would like to make is our discussion 2 weeks ago on the Life Insurance Act. There were two issues which were brought up which this paper has relevance to. The first one was disclosure. If the argument of a number of people here is to be followed the logical extension is that disclosure applies to all policies except to conventional with profit policies and I do not know if that is in keeping with the general feeling amongst regulators.

The second area concerns the margin on services valuation method. This was discussed in a paper last year and is referred to again in the life insurance committee submission. Nobody has yet clearly defined exactly what the margin on services valuation method is and I would put forward that this is one particular definition of that particular method.

I agree that there are problems with it but again going back to the example I gave with disclosure, is the margin on services valuation method to be applied to every type of contract except with profit conventional policies?

Fundamentally I think the contract that David was describing in his paper is a universal life style contract. I have had experience with that in South Africa and there has been a great deal of experience of that particular type of contract in the USA. My understanding is that in the USA companies are actually moving away from universal life style contracts, the reason partly being that universal life style contracts clearly set out what the charges are to the policyholder and as a result it has become very competitive. The result is that very few companies are making money on these contracts and therefore perhaps we should be saying that the real desire to keep with profit conventional policies is a result of companies making more money from them than from other more unbundled contracts.

One final point I would like to bring up. A while back, I think it was about 2 years ago, the President of the Institute in London expressed his problems with the fact that more and more risk was being placed on the policyholder and less and less risk was being taken on by the life insurance companies. I would like to turn that around and say is it acceptable in these times for all the risk to be placed on the life insurance company. Who amongst us could have forecast that Saddam Hussain would invade Kuwait and the Nikkei Dow would drop 35% in a month, etc. etc. Is it acceptable in these constantly changing times for life insurance companies to be taking on this risk?

MR. B. WELLAND: First of all I would like to commend David for a timely and most interesting paper. I applaud particularly his provision of a glossary which avoids many of the problems of interpretation that we find so often in these technical times.

I see his basic theme as being a description of the unbundling of conventional business using the mechanism of asset shares. This mechanism has been widely used in recent years as an aid to equitable bonus allotment and, as others have pointed out, as a check on surrender value scales. David is going a great deal further and I would like to echo the point made by some earlier speakers that there is not just one set of asset shares. There is a whole family of them, and I believe there is considerable difficulty in using them for the purpose he describes.

I have some concern as to whether his approach is viable and saleable. I wonder about it being viable because he proposes accrual at a smoothed declared interest rate able to be maintained for 5 years. However we are living in times of great variability and we do not now expect reversionary bonus rates to be sustainable for anything like 5 years. I also wonder about viability because, whilst his proposed guaranteed maturity value structure may be flexible, there needs to be strict controls so as to avoid shortfalls at maturity requiring funding by other policyholders as envisaged in Section 5.5.

My concern about saleability arises from both the flexible guaranteed maturity value structure and the profit distribution mechanism described in Section 7.3.1. My view is that they are just as complex to explain to policyholders as two-tiered reversionary bonus systems. I wonder also about saleability in the context of reporting asset share build-up to policyholders, and the author clearly has similar reservations. If the build-up is reported, guarantee expectations are created, apart from the actual difficulties of providing a reasonable explanation. If build-up is not reported, the policyholder sees very little - much less in fact than he sees with the conventional reversionary bonus build-up on his traditional contract. I wonder whether he will buy such a contract.

I would like to conclude with two matters of detail. The author suggests in Section 6 that the structure of existing conventional business could be altered to accord with his model. In company with a previous speaker, I dispute this. I think the expectations of existing policyholders have been established on a quite different structure.

Finally, in Section 7.2, the method of determining a uniform reversionary bonus rate is described as being division of the amount available for distribution by an average reversion. Certainly in my experience there is much more science and much more quest for equity than that. I would consider bonus support results for different types of contract and policy terms. I would also use asset share methodology to give an indication of appropriate bonus rate levels for existing business, as a guide to determination of equitable bonus rates for all classes.

In conclusion I do thank the author for producing this valuable paper. It has forced us to look much more deeply into the intricacies of the conventional business range.

MR. M. FREEMAN: I would just like to add a couple of practical points from my experience of using asset shares in the UK and then offer a theoretical suggestion as to how asset shares could be used in the management of the fund as a whole.

As has already been mentioned asset shares are becoming increasingly popular in the UK. However, in my experience emphasis is not put on the absolute amount of asset shares calculated but simply on an examination of asset shares for sample policies and the relationships between them.

The net premium method of valuation is still used to determine the level of surplus which can be distributed. The asset share is simply used as an indicator of how to distribute that surplus and how to allocate terminal bonuses.

In my experience not only is the methodology used to calculate asset shares open to many possible approaches but there is also tremendous difficulty in establishing historical data. The two must difficult areas are typically expenses and investment returns. Many offices may not know what their actual investment returns have been on the assets held in the fund. However, I think it is not unreasonable for large offices to use investment indices as a proxy for the investment returns achieved, taking into account the actual historic asset mix of the office.

On a further practical point, the author mentions the possibility of allowing for profits on surrenders. These profits can be allowed for directly by deducting the cost of surrenders from the asset shares themselves. Since typically the surrender value is less than the asset share, inclusion of surrender profits in the asset share calculation is likely to increase the amount of the asset shares for the remaining policyholders.

I move now briefly to my conceptual suggestion about the use of asset shares in the management of the fund as a whole. My suggested approach is firstly to use retrospective asset shares for maturing policies to indicate the possible current bonus declaration, and secondly to project asset shares forward and determine a method or a form of future bonus declaration which is consistent with those projected asset shares.

In this way one can generate a form of bonus declaration which is equitable between policyholders and hence in Redington's phrase, to which the author refers, one can look after the interests of the sheep.

Further, one can then use that projected bonus philosophy to examine the impact on the fund as a whole, using if possible a model office and allowing also for new business. In this way one can determine whether the proposed bonus distribution philosophy ensures the security of the flock.

If it is shown that the office is likely to be insolvent or conversely if it is shown that the office is likely to be flush with assets then one should at this point return to the projected individual asset shares and review the proposed bonus philosophy. In this way one can verify that the bonus philosophy adopted is both consistent between policyholders and ensures the security of the fund.

MR. C. McLEOD: In reading David Kerr's paper I wondered, like other speakers, why traditional business had remained in its present form for so long, not only in Australia but also in other countries of the world, in view of its many weaknesses, most of which are described by David and most of which I agree with. Further, alternatives already exist to overcome any of these weaknesses, such as universal life or other unbundled products, or even the North American three factor contribution system of distributing dividends which was in place far earlier.

I thought of five reasons why traditional business is still with us, most of which I think are not flattering to either the industry or our profession. The first reason is that with traditional participating business shareholders get a steady dividend each year, a percentage of the cost of bonuses declared. While there will be some fluctuations in this from year to year, they will be far less than any dividend that is based on profits (however profits may be defined).

Secondly, I think agents like the traditional contract for two reasons. Firstly it is confusing to the policyholder, as other speakers have pointed out, so it is hard to compare different companies' traditional policies. It can be done, but it is hard

to assess the cost of mortality when the cost of mortality is not disclosed! As a result, it is easier for agents to make sales. Conversely the structure of the policy, as pointed out by David Kerr, where one is trying to get broad equity rather than individual detailed equity, has allowed some enterprising agents to take advantage of some loop holes in the pricing and use these to their advantage.

I see companies liking traditional policies because they can have heavy expenses and do not have to disclose them. Further, with participating business, 80% or more of the expenses are picked up by the par policyholders, not by the shareholders.

Finally I think the policy is confusing to the tax authorities and that provides further incentive for life companies not to change it. I think tax people in general find life insurance confusing, and traditional whole of life even more confusing, and it is very hard to tax a policy on an accrual basis when it is not clear what the interest actually credited to the policy is.

I went a step further and thought what factors might cause the demise of traditional policies. I thought of five reasons, at least one and possibly two or more of which has to happen before traditional par business really does die.

The first is better disclosure requirements, so that policyholders can see what they are getting or not getting for their money.

The second is better pricing, to eliminate some of the inconsistencies and loop holes that exist at present and which agents have been using to their advantage.

A third factor is the change in the rules about the allocation of shareholders' entitlements for par surplus along the lines the Life Insurance Committee has been proposing.

The fourth is a macro economic event which disrupts the total pricing or the attractiveness of the product. An example of this would be what happened in the United States in the early 80s, when there was a very rapid rise in new money interest rates. The traditional policy where the dividends were related to average fund earning rates looked like poor value compared with universal life which was being priced on new money rates.

The final factor is the attitude of the people who sell the product. Many agents have a herd mentality and will sell what everyone else is selling. If traditional business is viewed as no longer attractive, this may stop the agents selling it. I think it will need at least one, and probably more than one of those reasons before traditional business finally dies.

MR. G. DUNSFORD: I was not intending to speak tonight but I have put a few notes down as comments made by some other speakers have struck a few chords with me.

The conventional business methods of distribution of surplus have a simplicity about them. Because of the intention of having a simple way of distributing surplus, the actuaries have always recognised that there are elements of broad equity involved in allocating that surplus between policyholders. Some might say: "rough justice".

David's paper shows us how we can use asset shares in analysing the derivation of profit under conventional policies. I think to that extent the paper is excellent and is very helpful. I wonder really whether he is helping us by going further and suggesting that those complex asset share derived profits are then distributed to the conventional policyholders who have taken out what they thought was a simple policy!

Indeed I think that he comes to the conclusion that it is virtually impossible to be totally fair and equitable because inevitably the resulting profit must receive some forms of smoothing, if only of investment returns. We then must have some broad equity as between policyholders having different sized policies, between those of different ages, and between those having policies of different durations in force.

A couple of people, including David Kerr, suggested that there is a problem with a distribution of surplus to conventional policies which have only been in force a very short period. Indeed there is a suggestion that in year 1 there really is not any profit available. So how can we really justify allocating a reversionary bonus under the current method for distributing profit for conventional business?

Well if I was a policyholder I would see this somewhat differently. I would say: "I have paid you a large premium and you permit me no surrender value. Therefore you have taken virtually all my premium. Because not much of it is really required to cover death costs, you have made a very large profit in the first year. Therefore it is only reasonable that you should give me a large share of it back again."

MR. D. KERR (Author): Thank you to all those who contributed and to all of you who have come along.

There are a couple of points I would like to comment on. Disclosure is one and we have to decide who are we going to disclose the financial position of our liabilities to. Do we disclose to the client, the agent or to management or do we keep them all in the dark?

Certainly management needs to know what is going on with the policy. It needs to know if we are making losses on early surrenders. It would be nice sometime in the future to let the client know what is happening too.

It is a question of who meets losses on early lapses and surrenders. Most agents think it is that anonymous thing called 'the company' or the reserves. It is certainly not the agent, he does not have to pay it through a flow back of commission. It is not the staff through a salary discount because there are high surrenders this week. In the end it has got to be the other policyholders who pay for those lapses.

On the question of computer capacity there is obviously a problem, but some people suggest that it is already being handled overseas.

On the question of expectation of existing policyholders. I suggest all that is, is the highest possible surrender value or maturity value. They never understood the contract and quite a few of them when they get their reversionary bonuses, write out a cheque for the amount and post it in.

The use of asset shares to check surrender values seems strange to me. We have this black box which calculates the surrender value and we are not sure whether is has done the right number or not so we calculated an asset share just to check it has got the right number in the first place.

In other words we do not trust the initial method.

Finally the application of rough justice of the uniform reversionary bonus I do not believe is no longer good enough with agents having access to PCs, and hence the ability to select holes in the product range.

MELBOURNE

MR. D. KERR (Author): I would like to express my thanks to my colleagues for their help in the preparation of this paper. Secondly I refer to a LIFA booklet which came out very recently which has a comment on surrender values. The surrender values are based on a number of factors which can be broadly described as total premiums paid, plus interest, less the cost of cover insured expenses including taxes. So LIFA has already gone to an asset share approach, that is what they use to justify surrender values rather than how they are calculated.

MR. R. FRIEDMAN: It is about ten years since I have worked in an office which writes conventional business. Therefore much of the pain associated with dealing with conventional business on a

day-to-day basis has disappeared into the past. In some cases, however, it has been replaced with the pain of dealing with business which, at least theoretically, is supposed to be based in some way or another on asset shares - the topic of this paper.

The author has brought together a number of interesting issues of equity, complexity and presentation to name a few. These give much food for thought. I find the idea of asset shares quite attractive in principle, however, practical constraints seem to create some limitations particularly regarding equity. The author has, I believe, acknowledged this in Section 6.1 where he says, "For recent business, it may be feasible to calculate the asset share based on historical records. For older business, this approach would be impracticable, and the asset share may have to be based on the current surrender value".

With the general decline in sales of conventional business over the last ten years the older business may well be the major proportion of inforce conventional business for a number of offices and therefore the constraints the author refers to could apply to significant blocks of business.

I am not sure, however, whether the author is advocating an internal mechanism for distributing profits for conventional business or a way of making conventional business look like investment account type business.

The author makes a comment in Section 7.2.2 that "any distribution system explained properly to the policy-owner must be continued unless the consent of the policy-owner is received". This seems perfectly reasonable but I am a little perplexed as the author, in Section 7.2.3, seems to be arguing for changing a complex inequitable system. I wonder if it's really appropriate to change a system because it was not properly explained at outset? Nevertheless, I have interpreted, perhaps incorrectly, that the author is proposing that conventional business be altered de facto to investment account (Section 7.3.5). I have no "sacred cows" about conventional business, but is it really appropriate to attempt to change a policy or the mechanics thereof after the sale of the policy?

I have a few other general questions or comments.

. Section 4.1 - The author refers to three benefits associated with conventional business. I think that G.M.V, that is, guaranteed maturity value and surrender value are both perceived by the client as the investment benefit. The G.M.V. is simply the minimum at a particular date.

. Section 4.2 - I agree that the way in which the death cover increases as a consequence of bonus additions may seem inappropriate but this is the contract the policyholder has bought.

. Section 5.3. - The author questions the justification of a share of profits in the first year. This is a very reasonable question. Most conventional business companies, while allocating a bonus in the first year, do not provide any cash values for two or three years. Hence in the policyholders hands a tangible value only accrued after two or three years.

. Section 5.5 - The author talks about the G.M.V and asset shares. If there is a shortfall, that is, the GMV exceeds the asset share, this "must be met by a charge on profit to continuing policies". This seems to me to be a real problem. If the asset share is intended to be realistic and equitable why should future policyholders pay for current policyholders GMV's payments?

. Section 7.2 - The author suggests that a uniform reversionary bonus system is a compromise. I agree. In practice uniform interest declarations on investment account policies are a compromise as well.

. Section 9.2.4(a)- An interesting point. The author suggests that a realistic basic policy liability be based on the current surrender value. The Life Insurance Committee of the Institute, in its draft submission on the review of the Life Act has suggested that, if minimum surrender values are to be retained (and I should say the committee is opposed to this), the surrender value should be based on the realistic policy reserve!

. Section 9.5.4 - The author makes a reference to the possible need to set up extra reserves over and above the current level of asset shares. Which generation of policyholders will meet the cost of these?

I have a couple of suggestions building on the author's comments in Section 9.3.1. The author says "The amount of profit to be distributed should be determined on an equitable basis using projection techniques on several different scenarios". This seems to me to be the central issue in the management of

conventional business. If profits can be distributed on an equitable basis a lot of the other problems associated with conventional business become less significant.

As a starting point, accepting the practical constraints on assessing asset shares for older business, Section 6.1, existing conventional policies will have:-

- an established system of reversionary bonuses,
- an established surrender value basis (whether complex or simple)
- an established policy reserving basis. (This would be of little interest to the policyholder).

These items are then combined in a projection together with realistic estimates of:-

- future expenses of maintaining the policy
- future discontinuance and mortality rates
- future long-term investment returns, and
- allowance for profits to shareholders and a contribution to overhead costs.

By a process of sensitivity testing using projection techniques an appropriate reversionary bonus rate, or different rates of bonus for various generations of policies, can be assessed. On a year-by-year basis adjustments to the level of bonuses can be made in the light of actual experience - which will likely be most affected by fluctuating investment returns. To achieve some smoothing a bonus stabilisation reserve would be appropriate.

It seems to me that this approach possibly solves many of the problems I think the author is trying to deal with. It does not solve the problem of showing the return to the policyholder in a way which can easily be compared with other investments. I have two suggestions. These are to show the cash and maturity values as:-

- a return per $1 of annual premium, or
- as a net earned rate of interest on gross premiums paid.

I thank the author for presenting a thought provoking paper on a topic which has no perfect solution.

MR. D. KERR (Author): The thing that set me writing this paper was a question from an agent. He was looking at writing a whole of life contract on his client. He did not know whether to write one with premiums limited to 10 years or to age 85. After 10 years a policy that has premiums limited to 10 years has got lower death cover, lower surrender value and lower commission. He could not understand why that was so. It took me some time to understand why it was so, but having understood why it was so I could not go back to him and give him a valid reason.

I think I made something up which was pretty meaningless. It set in train this paper, that we really have to understand what is going on underneath policies that justifies discrepancies between different contracts.

One of the purposes in writing a paper I am told, is to stimulate discussion. I claim a success on that. The discussion was very good tonight.

There was a comment that we should give more extensive treatment to analysing the cost of guarantees and I fully agree with that. It is a very difficult subject. The potential cost of guarantees to Pyramid could be minimal if everything goes alright or a couple of billion dollars. I do not know how you calculate the premium for the cost of guarantees for Pyramid. I think the Victorian Government went to one of our large life companies and said - how much do we charge for that guarantee and they threw up their hands in horror.

On the question of pooling we can go too far with pooling or too little. If we go too far with pooling or charge everybody with what their underlying insurance cost is then for those who are about to die next year the premium is going to be very high.

Underwriting is a perfect science that puts itself out of business. I think there is a need for some pooling but the actuary has got to understand what that level of pooling is.

A question was raised - can we convert existing whole of life to investment account? I believe we can. If existing whole of life business in future was given a reversionary bonus of 5% of the existing sum assured and bonus as the death benefit then that would not be in conflict with what was agreed with the policyholder at entry but the surrender value of the investment would be a lot higher than it would be otherwise.

The question was raised why should future policyholders face any loss at maturity? One of the problems with the existing treatment of reversionary bonus policies is the broad assumption that there is no profit or loss on maturity, that the asset share exactly equals the maturity value. The graph in the paper very nicely had the maturity value equalling the asset shares. Of course that never happens in practice. There is a profit or loss on maturity. We should know what it is and it has obviously got to be paid by the other policyholders.

On the question of the philosophy of terminal bonus. The Life Insurance Committee's changes to the Life Act talk about measuring the policyholder's retained earnings and policyholder's capital, being their share of the reserve. I believe one of the checks on terminal bonus is that the amount of the policyholder's capital should equal the total surrender value of capital growth bonus if all the policies surrendered. It is theirs, they should get it back.

There is a trend for investment account contracts to replace whole of life. One of the issues about those is the disclosure to policyholders. The main advantage of whole of life it seems, is that there is very little disclosure to policyholders. The agent can get a high commission and the policyholder does not understand. I think with consumer education and protection, investment account and unit linked will replace whole of life over time.

One speaker mentioned Paul Keating's request on superannuation for companies to declare our charges and fees. I have got some concern with that because I do not understand what the charges and fees are for a whole of life policy. So how are we going to tell the policyholders what his fees and charges are under a whole of life contract.

By Sean McGing, FIA,ASA,FIAA

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Part II
An Integrated Life Actuarial Computer System

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1 Introduction

1.1 Business Background

The use of computers and computer systems has increasingly become the major strategic tool of almost all business entities. The financial services industry has been at the forefront of this evolution. All members of our profession should have a reasonable basic knowledge and understanding of these tools and how they can make our businesses more efficient, thereby increasing profitability and enhancing service.

1.2 Actuaries and Computer Systems

Mention of the word "computer" to actuaries, can create a range of emotions from hostility through to enthusiasm, according to the personality, education and work experience of the individuals, and the context of the discussion taking place. Add the word "Systems" and we get a different although loosely related wide-ranging set of reactions!

1.3 Motivation for Writing this Paper

Perhaps this range of emotions is the reason why few actuarial papers, focusing on the technology itself, have ever been presented. Australian actuarial literature is particularly devoid of such papers.

The most likely reason is that the subject area has been developing at an extremely fast pace. This has two effects:

(i) Most reference parts of a paper will get quickly out of date

(ii) Actuaries who are very interested in the technology, treat it as a hobby, and spend a lot of their time simply keeping up with the latest development

On the work application side, computer system projects tend to be intense and not short term, and absorb a lot of time that might otherwise be available to write papers.

As with most computer system solutions, almost all life actuarial systems work tends to relate to solving a specific problem now, computerising a specific pre-existing task now, or making that task more efficient. The tendency is to determine a very specific solution and in doing so fail to look at the fundamental principles - the "big picture".

The urgency of such work means that actuaries do not get a chance to stop, take stock, question, research, document and report on our new technology based environment.

The motivation for this paper was to attempt to fill those gaps and to look at the "big" picture, for alternative solutions.

1.4 Dual Purpose of Paper

First Purpose

The first purpose in writing this paper, is to enable at least some other members of the actuarial profession to take a short cut in acquiring and having access to computers and computer systems information which is directly relevant and useful to actuarial work in general and in particular to life office actuarial work. Some of the benefits of this are:

- reduced time required to understand computer related projects and problems
- increased confidence on the part of the actuarial person
- easier separation of the real business issues from that of the technology itself

Of course the level of the benefit, if any, will depend of the pre-existing knowledge of the individual.

Second Purpose

The second purpose is to illustrate and promote discussion on how a re-examination of the basic principles of actuarial science yields a more efficient and more easily maintainable integrated life actuarial computer system which can be used to produce a logically simple method.

By publishing the methodology and basic "computer" formulae for such an integrated life actuarial system, members of the profession can then use or incorporate relevant aspects in the development or enhancement of their own actuarial computer systems. Some of the benefits that may flow from this are:

- reduced analysis time and hence reduced costs of actuarial people involved
- increased consistency of treatment among actuarial business functions
- reduction in extent of duplication among life actuarial systems

1.5 Division of the Two Themes of the Paper

The fulfilment of these two distinct purposes is best undertaken by pursuing each one as a theme in itself. The paper is thus physically divided into two parts, each reflecting one of the themes. Part I is quite independent of Part II. It can be read as a paper in itself.

Part I

Life offices' actuarial staff use a wide range of computer hardware and software, for a broad band of business functions. For each of these functions, business background including purpose, brief description of the theory, and calculation details will be described. Current and possible, selections of hardware and software are also described.

Part II

All actuarial work in a life company is inter-related. This interrelationship comprises 2 parts:

(i) the same basic principles of actuarial science

(ii) related business requirements.

It can be used to minimise duplication of computer systems development and maintenance, while at the same time ensuring consistency of treatment.

This is illustrated in Part II by

(i) examining the relevant actuarial basic principles

(ii) setting up a single relatively simple computer system comprising a projection mechanism, and tracking a single policy example through the full list of life actuarial business functions, which are described later in Part I.

Each of the calculations that occurs is explained and the inter-relationships between the different business functions are highlighted.

1.6 Target Audience

Part I

Part I is aimed primarily at experienced life insurance actuaries who have never had the opportunity to become familiar with computers to any level of detail, and conversely to those newcomers to the actuarial world, who have some computer knowledge. Much of the material is equally relevant to those practising outside

the life insurance arena. Computer terminology is kept to a minimum and where necessary is explained in a "user friendly" learn as you go, way.

Part II

Part II should be of most interest to those with an interest in all actuarial aspects of the ongoing financial management of a life insurance office. The level of detail therein requires a minor degree of familiarity with computer systems.

1.7 Originality of Material

Much of the material in this paper comes from other sources in both actuarial and computer literature. Where known those sources are acknowledged in the main bibliography at the end of the paper. I have also included a further list comprising those many papers which document the benefits of computers and related techniques. The balance is from my own observations of the life insurance and computer industries. Hence the contents reflect my personal views, which I expect will differ from other actuaries and give rise to some healthy discussion. Finally it should be remembered that I am not a computer expert.

Part I

Life Office Actuary's Computing Environment and Business Tasks

2 Life Office Actuary's General Environment

2.1 History of Hardware

Hardware is the general term given to the machine or "hard" object, used to facilitate the processing of instructions or calculations.

The first hardware item was probably the abacus which originated in India thousands of years ago and then spread to China. (ref. Lewin 1989). In 1621 the first logarithmic slide rule was invented, following the 1614 invention of logarithms by John Napier. Next came rather bulky mechanical calculating machines, based on the principle of a tooth representing a digit or multiples of a digit. The first use of punched cards for processing data was in 1890 for the U.S. census (ref. Lewin 1989).

The first electronic computers were built in 1946 and the years following. Thus began the pattern of computer performance increasing exponentially relative to price and physical size. When the first mainframe computers arrived in Sydney in 1958 (ref TIAA 1981 p572), life offices were foremost among the users and actuaries in life offices were put in charge of these new developments. It also started a practice of most actuarial students spending a period in the computer department, thereby providing them with valuable hands on experience for later and in some cases a change in career direction.

Around this time, in 1956, came the first electronic calculator. The 1970s saw programmable models. Both types were of course used extensively for actuarial calculations of every type in life offices.

The early years of the 1980's ushered in a new area - the arrival of the Personal Computer or PC as it came to be known. These machines gave actuaries relatively large amounts of computer power at their fingertips, thus providing the opportunity of achieving the results they required without having to depend on the uncertain performance of others (ref Harsant 1989).

Over the last 30 years, large mainframe computer evolution has also greatly improved the performance to price relativity.

Even in the last year, the increasing miniaturisation of computer components and the partly related enormous increase in power of both PCs and larger computers

has led to performance, storage and easy use capabilities that were not imaginable even 3 years ago. The Intelligent Workstation has just recently arrived, and marks the latest in a long line of hardware evolution.

2.2 The Computer as a Tool

The actuary has always had specialist skills related to financial risk assessment and its management. In doing a job that is the important issue. The computer is simply a tool of the trade - in the same way as the electronic calculator was fifteen years ago and a slide rule for hundreds of years before that.

2.3 Advantages of Computers to the Actuary

It is useful to recall the main underlying advantages of computers to the actuary:

- high speed of complex calculations;
- accuracy;
- easier to deal with first principles rather than convoluted approximate formulae;
- manipulation and organisation of large amounts of data;
- consistency of treatment;

These combine to give other benefits such as:

- ability to repeat calculations or tests using a range of different parameters (eg modelling what-if scenarios), and/or data (eg surrender values on a specific policy);
- transfer of tasks to other areas of the company;

2.4 Life Office Actuary's Current General Hardware

In terms of decreasing cost, performance and physical size, hardware ranges from Mainframe, through Mid-Range and Mini, to Intelligent Workstations and finally to Personal Computers. Each of these four areas have tended to be quite separate in terms of their physical components and how they operate. The latter has meant that a staff member's expertise usually resides in one of these areas. In the last few years a blurring of some of these distinctions has commenced. In particular the business need may allow several of these hardware "platforms" as they are commonly called, to be considered as practical for the task at hand. It

should also be remembered that within each platform, there exists a wide range of models covering a very large range of power. Overlap of power also occurs at the edges of each platform.

The advantages of one particular hardware platform over another are the product of the hardware itself, the software that runs it - i.e. the "operating system", and the software you run on the machine to carry out your business functions - the "applications software".

IBM has been the dominant supplier of hardware both worldwide and in Australia. Despite increasing competition it still holds this position in the mainframe market. The markets for other platforms have largely been developed by other companies and IBM has followed those in, and become a major player. A lot of readers will have come across examples of the IBM model names, so to help relate the following section to the world we work in, I have given an IBM model name as an example.

Taking each hardware platform in turn, the reader should of course bear in mind the decreasing costs thereof.

2.4.1 Mainframe

All the larger Life Offices use a Mainframe. The primary reason is for the day to day administration of the business. Where an office already has a mainframe, marginal costing plus the importance of easy communication of data and integration of other functions such as valuation, usually mean that valuation and often other actuarial functions like modelling will also use the mainframe. This is particularly the case where the actuarial systems have been developed over a period of time in the past.

Advantages

- Sheer processing power - volume and speed of access
- Huge data storage capabilities
- Security of data
  (i) if a processing transaction fails in mid-stream, there are good built in recovery mechanisms
  (ii) well developed anti-fraud facilities
- Communications - distribution of terminals around the branch offices is relatively easy
- Proven technology

IBM examples: 3090 and 4381 series.

2.4.2 Mid-Range / Mini

Mini was the term applied to computers developed to meet the needs of organisations whose processing requirements were too small to justify the expense of a mainframe. Several computer manufacturers saw and exploited this gap. Over the ten years or so since these first appeared, the power has grown to a level, where such machines are now called "Mid-Range". The level of power and costs are appropriate to a small to medium sized Australian life office. For start-up life offices expecting to grow rapidly, it is an effective route to take.

Advantages

As for mainframe, but to a lesser degree and a matching lesser cost.

IBM examples: AS-400 series.

2.4.3 Intelligent Workstations

The Intelligent Workstation is effectively an extremely powerful stand-alone desk-top personal computer with a very high quality screen. Initially they were used almost exclusively in the field of Computer Aided Design and Computer Aided Manufacturing (CAD/CAM), where their high-speed calculation capability made them excellent tools for the engineer. The price of these workstations has dropped dramatically in recent months, to a level where they now can be looked on as the top end of the PC market.

This gives them enormous potential as number crunching machines for life office actuaries. Modelling, simulations and sensitivity analyses are tasks which appear well suited to the workstation.

Advantages

High speed and volume calculations at a low price

Disadvantages

Communication capability is limited but should be overcome in the not too distant future.

IBM example: RISC 6000 series eg Powerstation 320
Other example: Sun SparcStation SLC

2.4.4 Personal Computers (PCs)

As the cost of the PC decreases and the performance increases, the productivity gains arising from having a PC for each actuarial person in an organisation, can usually justify that expense. However it is important that the person has some

training in understanding its potential and how to use it effectively. That training can be formal and/or experience based, preferably the former.

General Advantages of PCs

- Low Price
- Increasingly adequate storage capability
- Increasingly adequate memory
- Abundance of third party software
- User friendly
- With laptops - portability

The PC hardware market is broadly split into 3 areas, which are based on instructions which make the machine work (operating system) and interact with the user. The three areas and their main characteristics are:

2.4.4.1 Apple (Macintosh)

- Evolved from the very first PC.
- Current range of computers called "Macintosh" or "Mac" for short
- The most user friendly - hence easier to learn
- Has high quality screen as standard
- Pioneered the use of the mouse - a device used instead of the keyboard to enable users to select options on the screen.
- Pioneered the use of graphics (symbols and pictures rather than words) as a means of communication with the user
- Users tend to have very strong loyalty to the format, for the above reasons
- Very strong in the education market
- Strong in the business market where high quality presentation type material is the outcome
- Uses microchips made by Motorola with numbers 68000 etc.

2.4.4.2 DOS based IBM and Compatibles

- Market started by IBM in response to the first Apple PCs
- Other companies produced PCs which worked in the same manner as IBM's and these became known as "Clones" and "IBM Compatibles"
- Fierce competition and technology advances has led to progressively lower prices and increased performance
- Has the lion's share of the business market
- Uses Microchips made by Intel with numbers 8086, 8088. Next generation was 80286, followed by 80386 and most recently 80486, each rise of 100 representing a new generation of power. (Motorola's 68020 is broadly equivalent to Intel's 80286)

For both (i) and (ii) actuaries make use of special "Maths Co-Processors" chips - for Intel the numbers end in "87" - which are bought as an optional extra and installed in the machine. This greatly enhances the speed of calculations.

2.4.5 IBM PS/2

The limitations of the original IBM and Compatible machines' memory and operating system (DOS), meant only one task could be run at a time. The user has to wait until that task is finished, before initiating another.

IBM, in recognition of the increased need for communication and "connectivity" between different hardware platforms had been developing its strategic direction in this regard. Its blueprint is called "Systems Application Architecture (SAA)". In view of IBM's dominant position in the computer industry, including the life insurance segment, SAA is likely to become a de-facto standard at least in broad thrust. For this reason a description of the standard is given in Appendix A.

IBM introduced the PS/2 as the PC to meet these standards. In the light of its previous experience, it made many of the internal features of the PS/2 proprietary, both on the hardware and the operating software.

Advantages

An inherent part of IBM's future direction - less likely to become redundant/longer expected life span

Conforms to SAA with its advantages of
- Connectivity to other hardware including the office mainframe
- Runs business applications (tasks/programs) that can also be run on other hardware
- Same user access as for other hardware applications

Can run both the old and new operating systems - DOS and OS/2 respectively

Disadvantages

- More expensive than other PC hardware
- OS/2 operating system and associated tools still need further development to unlock the hardware's full potential
- Only slowly gaining business community acceptance
- Third party software still being developed and less common than for DOS based IBM and Compatibles

2.5 Life Office Actuary's Current Programming Environment and General Software

For the purpose of discussing the programming environment in a life office, the range of hardware discussed in Section 2.4 can be narrowed down to two areas - Mainframe v. PC. Midrange falls into the former and Workstations fall into the latter.

The differences can be immense, often leading to conflict. An understanding of these differences should be helpful to the actuary in understanding the views of the Data Processing (DP) Manager.

2.5.1 Mainframe Environment

Features:

Historically the mainframe has been managed by the Data Processing Department (DP). As the use of computer technology has expanded to encapsulate more than just processing data, other self explanatory names have evolved - Management Information Services (MIS) and Information Technology (IT), being just two. A recent practice has been to form a separate Information Services company and for the user departments to purchase services at commercial rates.

The MIS Department recruits and trains people for the specialised roles of Operator, Programmer, Systems Analyst, Systems Engineer, Project Manager, and Manager. Over the span of their careers, individuals move through these roles, but at any one time they tend to be quite narrowly defined.

The extent of specialist roles means the Department includes a lot of people who are not familiar with the life insurance business, which can lead to misinterpretations and misunderstandings of user requirements.

There is a very structured and ordered environment. Generally everything is logically organised, well documented, with well defined roles for individuals.

The application development (AD) cycle is clearly defined and adhered to. The AD Cycle is the plan by which a business function idea is converted into a working computer system.

The cost of maintaining this structure is large, but it can be also be argued that the cost of not maintaining it is larger due to the loss of order.

Generally the screens presented to users have not been user friendly, or where they are, it has cost a lot of money to get them that way.

2.5.2 PC Environment

In most ways the PC environment has been the exact opposite to that of the mainframe. Actuaries have looked on the PC as the tool to develop by themselves or within their own department, the computer system or subsystem that the DP Department could not envisage doing for at least another six months and only then subject to what further crises had arisen in the meantime.

The PC systems developed were generally reasonably successful because the controlled environment of the mainframe was not a necessity:

- The actuary knew what was required and was able to define it well, even if this knowledge was only in the actuary's own mind. Sometimes it was only necessary to be able to communicate it well enough to an actuarial student interested in PC work who understood the broad requirement.

- The PC allowed fine tuning to be done as part of the testing and changes could be made and tested immediately and without outside dependencies.

- The actuarial tasks were generally self contained and the dependencies were reasonably limited. If things went wrong other non actuarial users would not be affected.

Features:

One to one - person and machine interaction.

User friendly.

Allows interactive development i.e. programs can be run until they crash, with realistic test data, without time consuming other steps such as program compiles to convert code from source language to machine language.

Use of the PC has not forced an organised structure on the developer. This makes for fast creative development of programs and systems. It is also great for "one-off" type work, where effectively the PC plays the role of calculator cum data organiser.
If the development needs to be repeated, maintenance of the programs can be a problem if some of the discipline characterising the mainframe environment is not used; eg lack of documentation.

In recent years the availability of third party general software at relatively low costs means PC developments do not have to be built from scratch.

2.5.3 PC General Software

"General" is taken as not specific to the financial services or life insurance industry.

The range of general software available to PC users and developers is now very large and it is exceptionally powerful. This software undergoes constant improvement. Its an extremely competitive market. I class this software as personal productivity tools. The software most useful to actuaries is:

2.5.3.1 Spreadsheets

- best for relatively simple iterative calculations, where you may want to change some of the parameters, or simply some of the figures, and recalculate the full set of figures. Several actuaries have developed Product Development spreadsheets but this is not generally advisable as the more complicated the spreadsheet the much more complicated it gets to document it adequately, and hence the much more difficult it is to maintain and enhance. Often testing such changes requires thorough testing of the whole spreadsheet rather than being able to concentrate on the parts just changed.

An example of the effective use of a spreadsheet is the production of Form I of the Second Schedule. Invariably there will be minor adjustments just before signing, so it is nice to know that the changes will be carried through to all subsequent totals.

The industry standard is LOTUS 1-2-3, but in the last 2 years there have been an increasing number of arguably better spreadsheets, such as Excel, entering the market.

2.5.3.2 Word Processing

The extent to which this will be used personally, depends on the speed of the actuary's typing, bearing in mind that those who are computer literate and have programmed a lot can get to reasonable speeds. In many cases word processing facilities can be used efficiently to

- write draft reports and letters as you think
- write, electronically file and send fax messages directly
- search a report for key words

The most commonly used word processing packages are WordPerfect, MS Word, Multimate and Wordstar.

2.5.3.3 Databases

Sometimes it is necessary and useful for an actuary to set up or maintain a collection or database of records, separate from the rest of the company's data

which normally reside on the mainframe. An example might be details of death claims to enable cause of death investigations to be carried out later, and the mainframe development priorities have this requirement a long way down the line.

As a general rule, the creation of a database away from the main repository of data, should be actively discouraged, as it complicates the maintenance of data function. Specifically where data is common on more then one database, more than one update may be required.

The PC database software will allow a record definition to be changed immediately and dynamically in one step.

The industry standard is dBASE. The most up to date version is dBASE IV, but such was the level of implementation and satisfaction with dBASE III, it is still the most common standard.

2.5.3.4 Personal Organisers

These encompass diary upkeep, and name address phone and fax number databases for contacts. These facilities are usually "memory-resident" so that they can be called up while in the middle of another task. Often facilities extend to note taking and copying information into or out of the screens or files of the main task being run. This can be particularly useful for documenting program testing.

An example of such a program is Borland's Sidekick.

2.5.4 Operating Systems and Related Utilities

A computer requires a set of instructions to tell it how to organise itself and how to provide an environment in which programs can be run. This is known as the Operating System. Each hardware platform has a range of competing companies, and over this range there may be one, two or many operating systems, and related utilities. The letters OS in most of the names refer to Operating System. This "technical" side of computers has its own terminology, so I have listed and explained the most commonly used terms, and given examples.

2.5.4.1 Mainframe

Operating System:

Examples are mainframe DOS; VM or VMS; MVS or MVS/XE.

TeleProcessing (T.P.) Monitor:

This is the mechanism by which screen input and output is handled. An example is CICS.

Technical Development Environment:

The mechanism which is used by the programmer and operator to write, compile, link and run programs and examine the output. Examples are TSO, CMS.

Databases and File Structures:

How data is organised on part or all of the mainframe. Examples are VSAM, DB2.

Other common "technical" mainframe terms used are:

CPU the Central Processing Unit, the "heart" of the machine
DASD Direct Access Storage Device - the hard disk where data is stored
MIPS Millions of Instructions Per Second - the processing speed of the computer. The term is now used widely for all hardware platforms.

2.5.4.2 Mid-Range / Mini

Operating System:

Tends to be either company specific or UNIX. An example of the former is OS/400 for the AS/400 machine. UNIX on the other hand exists in a number of different forms and is steadily gaining support.

2.5.4.3 Intelligent Workstations Operating System:

Mostly UNIX based with variations thereof by some companies.

2.5.4.4 Personal Computer

Operating System:

The Apple Macintosh uses its own "Apple" and "Mac" operating systems which are graphics based.

DOS based IBM and compatibles, to repeat the classification used in the Hardware Section, up to now have used either IBM DOS or Microsoft - MS DOS. This is an old operating system that does not allow more than one task to be run at any one time, and was based on the memory in the PC chip being limited to 640,000 bytes. This was the "640K" limit. The newer chips have much larger memory, but new operating systems are needed to tell the machine that programs can make use of it.

The PS/2 Operating System - OS/2 and its latest "Extended Edition" version OS/2EE does this. Along with Presentation Manager, this gives a graphics based system, often referred to as a Graphical User Interface (GUI).

Another recent development is the use of the add-on product Windows (for Data), which can be run simultaneously with DOS, to give Graphics based interaction with the user, for DOS based machines with the larger memory chips.

2.5.4.5 Graphics Based User Interface

It is likely that over time all communication between person and machine will be graphics based, i.e. the person selects options from the screen, rather than having to remember very specific, rather esoteric commands. This approach makes people much more comfortable with a machine as well as speeding up the learning process.

Mainframes in particular have a long way to go down this track, and this in itself is one of the reasons for expecting mainframe tasks to be moved to workstations and PCs in the medium term.

2.5.4.6 Debugging and Other Tools

Application development is the term given to the specification, programming and testing of a computer system. A tool can be described as third party software which speed up and/or increase the quality of the system being developed. With the increasing power, memory and storage, the decreasing cost, the user friendliness of PCs, and most importantly the development of third party software for simulating the Mainframe environment and debugging programs, the focus for development is likely to shift to the PC. Testing would be completed on the mainframe by uploading the programs from the PC. This is particularly likely to appeal to medium and small life offices where the number of programmers is not too large, as the tools are purchased on a per unit basis. For Cobol based systems an example of such a product is Micro Focus Workbench.

2.5.4.7 CASE

A particular type of tool is CASE, which stands for Computer Aided Systems Engineering. Many papers have been written on this topic alone and readers interested in an actuarial view are referred to John Harsant's October 1989 paper to the Staple Inn Actuarial Society which goes into some depth on the subject.

When a new computer system is envisaged, the most important aspect is that the design is correct. The design is the foundation. Structured systems analysis is one way of determining the design. The analysis of the system required should take place in an organised and methodical fashion, taking the designer or the design team, through all aspects of the application development life cycle.

CASE software simply puts structured systems analysis on to a computer.

2.5.5 Communication between Computers - "Connectivity"

Communication can be defined as the transfer of electronic information.

This has been an area where computer industry rhetoric has failed in the past. Trying to get valuation data from the mainframe to a PC was supposedly not difficult in theory, but in practice it was. The main reason for this is that the data is stored in two very different ways. On the mainframe its usually in EBCDIC (pronounced ebb c dick), while on the PC it ASCII (pronounced as key). This was exacerbated by most manufacturers, having their own different compatibility standards.

Thankfully there is now a general acceptance in the industry that everyone would be better off if computers of all shapes and sizes could communicate with each other. IBM's SAA (see Appendix A) standard also embraces this principle and third party software such as Attachmate enables the user to transfer files between Mainframe and a PC relatively simply.

Communication between PCs has also advanced considerably in the last year or two, so that generally speaking Local Area Networks (LAN), which connect a number of PCs to the main network PC - the "Server", work well. This allows sharing of data, which is stored on the "Server", and peripherals such as printers. Another advantage is the easier logistics of organising regular back-ups of important data on the "Server". Having third party software reside on the Network instead of having a copy on each "local" PC, is less costly. Such an arrangement is generally quite useful within an Actuarial Department

2.5.6 Portability

With communication between different computer platforms becoming a reality, and bearing in mind the long term need to update hardware, it would be best to write programs in such a form that they do not have to be changed to run in different environments, i.e. the programs should be "portable". The benefit from portability is one of the reasons for developing the integrated life actuarial system described in Part II of this paper.

2.5.7 Languages

Programs comprising a system are generally written in a single language. They may interact with third party utilities such as a file handler or help facility.

2.5.7.1 Third Generation Languages

The languages we are most familiar with such as Fortran, Cobol etc are referred to as third generation languages. They are written in pseudo english. Most need to be specifically "compiled" by the compiler software for that specific language, at

the programmer's request. This process results in an "object" module in "machine" code, which can be interpreted by the computer.

The alternative is an "interpretive" language, which the programmer simply executes, and the built-in language support mechanism simply interprets the original code in its machine equivalent as it runs.

While languages were originally developed for a specific hardware platform and specific purposes, the last few years has seen most languages become available on both mainframes and PCs. This does not necessarily mean full portability, as there can be subtle and not so subtle differences between computer company specific versions of the same language. The computer industry standards are in practice set by the American National Standards Institute (ANSI). However this tends to be the lowest common denominator so there are often strong reasons for choosing a non ANSI standard version provided by one of the large international software companies. Such versions can have very powerful additions. IBM's SAA includes a limited number of mainstream languages which it will support in the long term.

2.5.7.1.1 Cobol

Cobol has the most common mainframe business language since the 1950s. Most life offices have their adminstration systems written in Cobol. Hence they have a huge investment in Cobol programs and programmers, which means it will be around for quite a while, yet, despite its age. It is an SAA language.

2.5.7.1.2 RPG II and RPG III

Another mainframe general business language, whose forte is in printing. Again this could be found in life office administration systems.

2.5.7.1.3 Assembler

This is the nearest language to the machine code which a compiler produces. It is complex and difficult to learn, but was efficient in its use of the computer. From an actuarial viewpoint it was useful for intensive calculations, but now that the cost of the computer's power is much cheaper the extra time spent programming in Assembler would seldom be recouped. It has seen its day.

2.5.7.1.4 Fortran

Fortran used be the first and often only language a life office actuarial student learned. It was the main scientific language and dates back to the 1960s. To a great extent "scientific" or "engineering" meant "capable of exponentiation". It is an SAA language. Most valuation systems have been written in Fortran, so it is still a very important part of the life office actuary's world.

2.5.7.1.5 APL

APL stands for A Programming Language. It is the nearest thing to an actuary's language. It comprises a range of symbols which act as specialised operators in addition to the normal arithmetic operators. For example, it will calculate actuarial functions in a couple of lines. Examples are shown in FARFAR's 1989 U.K. Institute Paper entitled "Using APL for Financial Calculations". It is powerful, fast, and extremely concise. It can effect operations on figures represented as single items, vectors (one dimension), matrices (two dimensions) or arrays (multiple dimensions). This is excellent when dealing with for example a mortality table from age 0 to 120, or multiple assumption bases simultaneously.

Some disadvantages are:

maintenance of another person's programs can be more difficult than with less specialised languages, if the programs have not been documented thoroughly:

the relative shortage of suitably skilled APL programmers compared to languages such as C.

2.5.7.1.6 C

C has become the standard language for PC development. It is looked on as being "low level", meaning the instructions given to the computer can be very specific in terms of the actual machine make-up. To achieve this, the code can get quite complicated but the balance of the equation is that it is a very powerful and efficient language. Hence it is quite suited to actuarial calculations, with the proviso that standards for programmiing are very important, and documentation is also important.

Third party software that might be used by the actuarial Department (eg Communication software, Help facilities, Screen painters) are often written in C.

2.5.7.1.7 Basic

As the first and most common language developed for the PC, Basic is likely to be the first PC language learned by users of PCs. It is a general purpose language and hence from the pure language angle, is not particularly efficient at fast calculations, compared to some of the alternatives such as APL.

However given that it was until relatively recently the PC standard, some life offices' actuarial departments will have PC based programs written in Basic. Examples are quotations and internal alteration calculation programs.

2.5.7.1.8 PL1

An older mainframe business language, not used much by life companies.

2.5.7.1.9 Pascal

An older PC language, with many of the characteristics of C.

2.5.7.2 Fourth Generation Languages

A step further on is the fourth generation language commonly known as a 4GL. These are written in english with some mathematical relationships and within certain rules. There are two forms -

2.5.7.2.1 Code Generators

These translate the English directly into a third generation language such as Cobol. They are more useful to general business than to actuarial or mathematical applications. An exception is a screen painter, which can be very useful for automatically generating the code required for a screen.

2.5.7.2.2 Database Interrogators

These enable the user to make selections and if appropriate printed output of data according to specific criteria based on equal to, less than, greater than etc, and calculations based on the field values within the records of a file. This is one of the most powerful computing tools available on the mainframe to the life office actuary. An example of its use is during the reconciliation of old in force and movements to new in force.

2.5.8 Actuarial Systems Development

Within a life company, development of actuarial systems including programming may be done by any one or more of:

- non actuarial personnel in the DP Department
- actuarial programmers, either in the DP Department or more likely in the Actuarial Department
- the actuary in person.

This will depend on the size, level of complexity, priority and urgency of the proposed system as well as who has the requisite actuarial skills.

2.5.8.1 Application Development Cycle

The discipline of the Applications Development Cycle, is very beneficial. In its simplest form it acts as a check list of the stages of development, and helps to illuminate where the responsibilities of each individual lie. It offers a means of control, and the bigger the project the more crucial the management of that project becomes. It is still very useful to use the same framework for small projects. The

application development cycle subdivides a project, facilitating estimating times and hence costs of each stage. It helps encourage thorough testing of the final system, by virtue of a relatively large amount of time for that testing having been specified up front.

2.5.8.2 Documentation

Probably the most fundamental of all is to document all parts of the exercise thoroughly! The topics and the perceived method of implementation may appear simple and obvious to the person on the job at the time, but it will not necessarily appear that way to the next person charged with enhancing the system. The documentation should be checked to ensure it is adequate. Written office standards are a great help in this area.

2.5.8.3 Actuary's Role

Within the application development cycle, when the DP Department is involved, the actuary's role is usually confined to:

2.5.8.3.1 Identification of Requirements by the Actuary

With any computer system, no matter how big or small, the most important item is to correctly identify and decide what you want a system to do. A lot of time should be spent on getting this absolutely correct and finalised. Changes later cause extra work, blowouts on time and cost, confusion for all working on the system development, not to mention the demoralising effect. Product development in particular can suffer very seriously from this. These requirements are usually referred to as business or functional requirements.

2.5.8.3.2 Documentation of these Requirements

Easier said than done. The actuary may know exactly what he wants, but communicating this in writing or orally to a non actuarial person who is writing the business requirements can be quite difficult. In particular all jargon should be avoided. All possible items should be specifically addressed. Never leave anything to chance - don't assume insurance market knowledge. Review the document when its written and get a "non actuarial" colleague to read it and to ensure it is understandable. If not, rework it.

As part of your explanations give presentations and prepare worked examples.

2.5.8.3.3 Testing

At the end of the programming, the actuary as business person must test the finished system. Allow plenty of time as a thorough testing takes a lot of time.

2.5.8.4 "Quick Solution" Actuarial Systems

The actuary's "quick solution" actuarial systems are unlikely to be encouraged in the future. As time passes the cost of maintaining many of these almost "personal" systems is not inconsiderable, and there is also the risk of the person leaving.

Circumstance, technology, level of knowledge, experience, range of products and working environment change rapidly. The actuary must have an objective attitude, to the development or purchase of new software to replace older systems the same actuary helped develop.

3 Life Office Tasks Supported by the Actuary

This section lists and gives a brief description of each of the tasks making up the work of the actuary and the actuarial team in a life office, and where relevant relates them to the ongoing administration of the company. In smaller organisations, many and sometimes all of these jobs are the responsibility of one person.

From the early development of life insurance companies , the role of the actuary has been one of guiding, leading, and protecting the interests of others. This has been enshrined in legislation with the special powers accorded the actuary with respect to approval of Premium Rates (Section 78 of the Life Insurance Act 1945) and signing of the Financial Condition report and the Second Schedule (Section 48 of the same Act). The actuary is the recommendor of the level of bonuses on with profit policies and hence plays a major role in determining the benefits to policyholders on termination of their policies.

It is interesting to draw the analogy of the actuary's work in a life office corresponding to that of a Life itself through Conception, Pregnancy, Birth, Planning Environment and Finances both Pre and Post Birth, Raising the Child, Taking Stock of Progress, Assessing as a Prelude to Continuous Planning, Accidents, Requests and finally Death.

In real life there is seldom much time between these tasks. Often the boundaries are not obvious and there is overlap. So too with the life office actuary's work and this applies equally to the computer support and systems we use. Indeed the closer we look at computer support the more we realise the sizeable benefits that await us from a greater integration of the systems comprising this support. This is the Theme of PART II of the paper.

Conception *The Original Product Idea*

The marketing manager, the general manager, (either of whom could of course be an actuary themselves), or the actuary, has a bright idea for a new savings or risk product.

It is sometimes planned, sometimes a bolt from nowhere and sometimes depends on market pressures.

Pregnancy *Product Development*

The actuary with responsibility for product development is given the task of converting this idea into a marketable and profitable life, disability, trauma and/or savings product.

Sometimes the final product has only minor resemblance to the parents (the original ideas), but may have stronger resemblances to its brothers and sisters (the previous products its supposed to replace), and always ends up being a nine month task even if people would prefer it to take less time!

Pre and Post Birth Planning of Environment and Finances
Model Office Projections inc. Asset/Liability Matching

The actuary blends the latter parts of product development into full model office projections of future cash flows of liabilities, based on estimated volumes of both new and existing business. The more volatile conditions of the world investment scene in the last few years have led to a greater need to match the liability projections with model office asset projections. Projections are made of future Revenue and Profit and Loss Accounts and Balance Sheets.

Birth *Policy Issue/New Business - Administration*

This is indeed a highly significant event and can promote much celebration. On the life office side volume is a vital ingredient for such celebration.
The actuary's main interests are:

- the administration system - clerical or computer based - must be capable of capturing the data accurately
- how does volume actually written relate to those expected in the premium calculation basis?

Raising the Child *Administration*

This is a huge job and tends to dominate life. A myriad of different tasks need to be carried out in parallel and on an on-going basis, always remembering that consistency is important because they are inter-related. The life office ideal for this is called "servicing the client". The practicality often approaches survival. Through all of this the actuary finds that understanding the environment is a tremendous help in making decisions.

The actuary's main interests are:
- the administration system must be capable of
  maintaining the data accurately
  providing the correct data from time to time for investigations including valuation.

Taking Stock of Progress Statistics, Valuation

Statistics

Actuaries tend to be closely involved in production of statistics for both the Insurance and Superannuation Commissioner and the company's management. The fun comes when the "production" statistics do not match those from the intervaluation movements. Often this is due to the administration system's statistics programs interpretation of the rules, which can become quite complicated when you try to distinguish between policies, benefits, riders, options, and indexation and other increases.

Valuation

In practice this is a continuous subconscious process, but it is important to objectively assess the situation from time to time.

For the life office actuary the primary focus is the annual published valuation which reflects the solvency aims of the Life Act. Valuations on several other, mostly more realistic bases are also carried out to determine a "best estimate" of the current financial position of the company and its policyholders. The actuary's detailed work is on the liabilities side of the equation, while ensuring that the assets are valued on a basis consistent with the liabilities.

Realistic valuations help quantify levels of expected future bonus and in so doing help with the determination of current levels of distributed and undistributed surplus.

Assessing as a Prelude to Continuous Planning
Profitability Measurement and Analysis

The "taking stock" exercise provides the information and mechanisms for a much more detailed look at the current situation and what the future might hold. By extending it to a detailed analysis of the movements experienced, and comparing with those expected on the premium and on realistic valuation bases, we can assess current profitability.

We can extend this to project the future profitability of the company. The exact definition of profitability is something that will differ by company.

The analysis of such profit into its components - essentially each of the elements in the valuation / premium basis - and the examination of the profit by product line or subset thereof, can help in the allocation of scarce capital from shareholders or policyholders. The revealing of this level of detail can be very helpful in the effective and efficient management and control of financial aspects of a life company.

Interested readers are referred to some relevant background reading in Goford's The Control Cycle (JSS 1985).

Accidents and Requests — *Partial Payouts / Alterations* — *Special Quotations*

Life is not all preplanned smooth sailing so from time to time there are interruptions.

In the life office, the actuary is usually responsible for determining the bases for changes to a policy and often is required to produce the answers too, whether as part of the administration system or on a stand-alone basis.

Death — *Terminations*
ie Lapse, Full Surrender, Maturity and Death Claims

The policy benefit eventually finishes. Where there is a value to be paid, that value is often calculated by the Actuarial Department or, at least the actuary has some responsibility in setting the basis. This may be as part of the administration system or on a stand-alone basis.

The Next Generation — *Agency Support - Quotations*

New policyholders are enticed to enter into life insurance contracts by "agents" who sell the benefits of such policies. These agents may be the company's own employees in the "tied" case, may be independent insurance brokers, or somewhere in between. The actuary is mostly concerned with ensuring that the quotations or "illustrations" that the agent gives to a prospective policyholder are both fair and mathematically correct. Usually the responsibility for the actual provision of those quotations lies with the actuary.

4 Computing Background to Life Office Tasks Supported by the Actuary

Projection Techniques.

The projection mechanism is the fundamental method used in almost all actuarial software.

A projection is a study of expected experience at future intervals of time. That expected future experience comprises the expected "cash flow" amounts of income and outgo. For a life insurance benefit, the former comprises premiums, interest earned/investment income while the latter comprises deaths, lapses, surrenders and maturities, for both the basic benefits and any bonus attaching, as well as a range of expenses.

Disability income is more complex with outgo having the added item of sickness, and recovery of health leading to additional expected premiums under the income part.

The same techniques are used for non traditional products such as investment account and investment linked, but the focus tends to be on the expense elements as the risk to the life office under risk guarantees tends to be limited in current policy design.

When this "basic" expected experience has been calculated, the projection results can be extended by calulating other more complicated future items. An example is the total value at the end of a period.

Changes in the value of other items over each time interval are also often calculated. The most crucial of these for the actuary is a change in reserve values.

For each task the following matters are discussed:

Business requirement
Actuarial Theory / Elements of the Calculation
Method used including software and hardware
Future

4.1 Product Development (Premium Rates)

Business requirement

To calculate a set of premium rates for a new product.

Actuarial Theory / Elements of the Calculation

Actuarial Theory

The basic formula is based on:

Initial Premium = (Present Value of Future Benefits plus Future Expenses, at issue) DIVIDED by (Present Value of payment multiples, starting at 1, at each interval a premium is payable.)

This basic formula still holds, even when each of the benefit, expense and premium multiples get very complex in themselves.

If using projection techniques, all that happens is that the year by year cash flows and assumption parameters will vary. With a generalised projection, which can still be simple on the concepts and principles in our basic formula, such variations can be easily handled relatively easily.

For those interested in the actual details of calculation, refer to Chapter 13 "Methods of Calculation of Premium Rates" of the IAA LIfe Insurance textbook "The Practice of Life Insurance in Australia" by Carr. This is right up to date and explains both projection and traditional techniques.

Elements of the Calculation

"Policy Parameters"

A specific selection of fixed or what I shall call "Policy Parameters" defines the core of the contract:

Age, Sex, Smoker status, Term, Product Type (eg Whole Life, Term, Endowment etc.).
The product type helps determine the settings of Death, Cash Surrender and Maturity Benefits for both Basic and Bonus elements.

"Assumption Parameters"

Then there are the variable parameters which are being tested in the Premium Rate calculation. These I shall call the "Assumption Parameters" and include the assumptions on :

mortality,
withdrawals,
interest earned,
inflation of expenses;
expense levels per policy, per benefit, per $ and % of premium, per %0 sum insured, per $ and % commission, and
the commission levels themselves as % of premiums and %0 sum insured.
expense assumptions are normally divided into initial and renewal expense.

Method used Including Software and Hardware

Traditional Method: Pen, paper, tables and calculator.

As stated above even when this method is used, it is just the first step and one of the following methods is also used.

Spreadsheet.

In the last 5 years the spreadsheet has been used extensively by life office actuaries for all sorts of self contained calculations, and is ideal for simple cash flow projections. Variations in both policy and assumption parameters can be tested easily. Most of those systems still in use were designed for the simple individual case projection and because they did the job very well have often have been extended to do other more complex calculations such as reserve calculations, transfers and multiple records. The methods below are more suited to the more complex tasks.

PC programs

PC programs to carry out the cash flow projection and premium rate calculations offer a lot more flexibility with respect to variation of policy and assumption parameters, with the ability to store sets of such information more simply. Further, the ability to program specific more complex calculations in a much more easily understood manner capable of easier documentation, increases flexibility, makes the system easier to use and hence provides quicker results when sudden changes are required. In addition it should give the actuary more confidence in the results.

The best current languages to use are APL and C. Other languages in which companies may have a pre-existing investment and support mechanism are Fortran, Basic and to a lesser extent Pascal.

These programs have historically been developed within the Actuarial Department (i.e. "in house") in Australia.

Mainframe.

In some offices, the product development software will have been developed on the mainframe, particularly where that initial development took place more than 5 years ago. This has the advantage of using the full power of the mainframe and can be very useful for migrating the product development parameters and product rules directly into the administration system.

Third Party Software

Recent years have seen the development of generalised product development software. Initially such programs were "fancied up" versions of consulting actuaries' own internal programs as used for company product development assignments. The client companies wanted to have the flexibility to fine tune their products and rerun the software in their own time and comfort, but did not want to have to get consulting actuaries to attend to this detail. However, particularly with legislative changes in the U.S., and the size of that market, a specialised actuarial software market has developed there, with firms of consulting actuaries and specialist actuarial computing firms or divisions of firms emerging. This has been mirrored in both the U.K. and Australia, although the actual numbers are limited here due to the smaller size of the market. The increasing "internationalisation" of the life insurance business and actuarial techniques has meant that the use of software from overseas is becoming a reasonable option for life offices to pursue.

The final option, which is particularly important for start-up and very small companies is for consulting actuaries to do all the premium rate calculations, using their own software or one of the above third party software products.

Future

Ultimately I would expect this task to be run mostly on workstations and written in C. This is the case with almost all of the life office actuarial functions.

4.2 Model Office Projections

The calculation of premium rates and the testing of the sensitivity thereof can be looked on as "pure" product development. Most actuaries see these elements as just the first stage of the total product development process with the second stage

encompassing the effect on the total business of the life company of the proposed premium rates.

Business Requirement

To calculate estimates of Liabilities and Assets, and construct the resultant Revenue, and Profit and Loss Accounts and Balance Sheets, for periods, and at points in time, between now and a date in n years time.

Actuarial Theory / Elements of the Calculation

Actuarial Theory

There is no new actuarial theory required for most of this exercise. On the liabilities side, the only major adjustment is that values are discounted to the projected date, rather than the start date as in the premium rate calculation.

For both sides of the balance sheet, but particularly the assets, simulation techniques can be used to determine future portfolio characteristics and ultimately cash flows and values.

Elements of the Calculation

In the past the actuary's most detailed interest and energies have gone into the liabilities aspects of these items, but increasingly the assets side is being investigated and modelled in great detail.

This requires essentially a full and detailed projection of all income and outgo over that period for both policy benefits and the assets in which the net income is invested. The amount of that future income and outgo is affected by the "assumption" parameter items used in the premium rates calculation, albeit at different levels if required, and a similar set of "asset assumption parameters".

Liabilities

We need to:

(i) Combine a range of selections of the premium rating policy parameters, such as age, sex, smoker status etc. to give the company's expected selling distribution.

The determination of the expected distribution of business across the premium rating factors will be based primarily on the office's current new business distribution, and adjusted for specific elements of its business strategy which involve changes in its distribution channels, and/or changes in its target marketing.

(ii) An estimation of the future volumes of the product being introduced

(iii) An estimate of the future new business volumes of existing products.

(iv) Associated future start dates.

Future New Business volumes for both new and existing products will be based on the same factors.

(v) The "Policy Parameters" and "Liability Assumption Parameters"

(vi) Duration of the model office projection.

In the past the actuary's most detailed interest and energies have gone into the liabilities aspects of these items, but increasingly the assets side is being investigated and modelled in great detail.

This requires essentially a full and detailed projection of all income and outgo over that period for both policy benefits and the assets in which the net income is invested. The amount of that future income and outgo is affected by the "assumption" parameter items used in the premium rates calculation, albeit at different levels if required, and a similar set of "asset assumption parameters".

Consistency between the elements of the liabilities and assets projections is important, but at the same time the use of inconsistent assumptions in the model enables the actuary to quantify the "risk" of mismatching.

Assets

We require, as Assumption Parameters for assets:

(i) dividends, rent, interest, realised capital gains, tax
(ii) periodical growth and decline of the expected income and asset value for each type of asset - fixed interest, equity, property etc. and subdivision therein
(iii) an initial investment portfolio based on business in force
(iv) a strategy (set of rules) for investment of monies arising from future new business.

One of the most important parts of the Model Office projection is the calculation of reserves on one or more of a range of valuation methods and bases.

The calculation of such reserves are examined separately under the term valuation, but ideally the model should calculate the values in an identical manner to those in the main valuation work area of the life office.

Model Office v. Individual Benefits.

Future new business is not yet on the companies books and hence of necessity the policy parameters must be modelled. However the companies existing business could in theory, be used directly for the policy parameters aspects. In practice companies determine model points - a summary of its business formed by grouping and averaging this business by the premium rating characteristics. The main reason for this in the past has been to reduce the enormous volume of repetitive calculations.

Method used Including Software and Hardware

Model Office projections are only possible in practice with computer based solutions.

Spreadsheet

Simple extensions to the Premium Rate Calculation spreadsheet can give a crude model office projection of the liabilities, but this approach lacks the flexibility to be of much use in the practice.

PC programs

The addition of the two extra dimensions of
(i) results at and over a series of time points and intervals
(ii) introduction of several valuation bases
makes the flexibility of a programming language essential.

The ease with which the APL language can use multi-dimensional variables, and its capability to perform arithmetical calculation thereon very simply, makes it a prime candidate.

The flexibility of C, its abilities in mathematically based applications, and its acceptance in the computing marketplace make it also a sound language choice.

Mainframe

Use of the mainframe is of some benefit for model office, due to the easier collection of model points from the mainframe based administration, the easier use of the administration systems actual data, if required, as well as harnessing the greater processing power of the machine.

Third party software

Because of the degree of complexity of the calculations and the greater number of dimensions or levels over which they are carried out, it is both a time consuming and expensive task for a life office to develop a full model office system.

The sellers of the third party product development software discussed in Section 4.1, have until recently looked on the model office area as its main selling point. In the last three years, the focus of developers in the U.S. market has switched to the asset/liability matching area, primarily due to the introduction of legislation in New York state, requiring simulation of future asset/liability interaction. Most, if not all, third party software products in this area now sell one package covering both areas.

Future

The use of Asset/Liability matching software will increase.

As the speed of hardware increases, as the degree and reliability of communications or "connectivity" between PCs, Workstations and Mainframes increase, and the transportability of the programs increases, there will an increasing degree of projections based on the office's actual data.

4.3 Policy Issue/New Business and Ongoing Administration

In most life offices, the actuary does not have direct responsibility for the administration of the company's individual life insurance policies and benefits after they have been sold to the public. However the life office actuary has a very strong interest in that administration being effected correctly, as it affects both directly and indirectly most of the other areas of specific actuarial responsibility. Administration was the first and is still the most computerised area within a life company, so the actuary's interest is directly translated into a concern for many of the details of the computerised administration system

Business requirement

The specific requirements of the life office actuary are:

The administration system must be capable of capturing and maintaining the data for each policyholder and policy accurately. This extends to associated data such as agency, reinsurance, accounting, and the parameter information such as rates which enable the system to process and calculate all other required data.

A minor amount of specific data will be required only for "actuarial" functions such as valuation, or experience investigations.

In previous days these included items such as valuation factors which were included in the main policy records. Current examples will vary with the system but can include health loading details, such as "number of years addition to normal age", and cause of death.

Actuarial Theory / Elements of the Calculation

Actuarial Theory

None.

Elements of the Calculation

With so much of the actuary's statutory responsibilities depending on the integrity of the data in the administration system, the actuary who understands the detail of that particular system or other systems, is in a much better position to judge where there might be errors in the data and offer advice how they can be avoided and corrected.

This same actuary is also in a much stronger position to sensibly influence administration system design at both the general and specific level, when major enhancements to the system are being planned. This can save a lot of heartache to the actuary later, when it might be discovered that sufficient information is not held within the system. In practice the actuary's valuation requirements including those for assisting with investigations such as for the Financial Conditions report, are looked on by most other life office people as "not real" requirements, because they have no obvious direct and specific benefit to the policyholder.

Method used Including Software and Hardware

As this is the core element of running a life office, the administration system will be found on the computer with the greatest processing capability.

Whereas the actuary's greatest need is usually the ability to carry out complex mathematical calculations, the administration system is primarily concerned with manipulation of large volumes of data. In simple terms this comes down to reading and writing information to and from records on the system.

Both these factors point to a mainframe or mid-range computer as the hardware, and it is only small and start up companies that can manage on one or more PCs.

Most companies will already have developed and indeed are continually developing their systems over time. As already indicated in Section 2.5, Cobol will be the language used in most cases, and the development environment is generally very ordered.

Third Party Software

Because of the complexity and integration of the many administrative functions, a life office administration system takes a lot of time and money to develop. In fact industry practice, legislation and technology can change considerably between planning and the development being completed. Third party software offers an alternative route to in-house development, and can be particularly useful for a start-up life office. There are several third party systems available. From the actuary's viewpoint, there can be a wide range in the level of support for actuarial functions from such products.

Rates and Factors

The actuary's main responsibility within the administration system is the set up of the rates and factors required for all calculations - premium rates, surrender, paid up, death, disability, and maturity values, addition of bonuses or crediting of interest rates, unit prices, etc. Sometimes too the actuary may have specific responsibility for the sending of bonus notices and policy value statements.

In these areas, flexibility of the administration system in accepting and changing these rates and factors, is the vital ingredient. Of particular use when a new product is being added is the ability to directly transfer the rates used as assumptions in the product development routine into the administration. Another useful facility is the ability to develop rates and factors on the PC and upload them to the administration system's parameter files with a minimum of fuss. This is faster and saves errors on re-keying, thereby reducing the time spent rechecking that the correct rates have indeed been accepted.

Future

This is an area likely to see the least amount of obvious change. The administration system will tend to stay on mainframes. However some major changes, many of which will be transparent to the user will occur. These main trends will be

- the increase in connectivity of the mainframe and its administration system to its associated systems, such as valuation and profitability measurement system

- the use of this increased connectivity and portability of program code to enable detailed calculations for individual benefits to take place on local terminals of the mainframe (distributed processing)

- the increased use of third party general utilities and tools to make the system more user friendly, and to enhance development quality

4.4 Statistics

Statistics

Business Requirement

To ensure that the statistics produced for the Insurance and Superannuation Commissioner (ISC) and for internal management purposes correctly reflect the changes to and status of policyholders' benefits.

To carry out investigations into the office's mortality, morbidity and lapse/surrender experience.

Actuarial Theory / Elements of the Calculations and Method used Including Software and Hardware

4.4.1 ISC and Management Statistics

The ISC returns - Forms 3 and E,F,G show the total In Force at the beginning and end of each quarter and the movements - the ons and offs in between.

These are usually obtained from the administration system with the movements being created and recorded as the changes to the policies actually occur. The reason for the actuary's responsibility or interest in this area, is the ability to compare these figures with those which arise from the valuation data. By comparing the administration system movements with the differences arising between the old valuation in force and the new valuation in force figures, data errors can be identified, and the reconciliation of such differences enhances the integrity of the data.

Policy v Benefit

The definition of a policy as distinct from a benefit is an area of some practical difficulty. In recent years products have got more complex, the concept of client servicing as opposed to policy servicing has grown, and the administration system has become correspondingly more complex. Different administration systems can hold identical policies as one policy with many benefits, or one client or master policy with several policies. It is often necessary to introduce specific policy and benefit count fields, so that statistics are consistent.

4.4.2 Internal Management Statistics

Can often comprise a whole suite of programs, again usually within the administration system. Items of interest include

- ISC type statistics but at a much greater level of detail - specific products and by agent within agent type and country, state or territory

- Major areas of interest are volumes and the financial characteristics of new business, and lapse or persistency ratios.
- Commissions paid, particularly bonuses on volume production.

These items are very relevant to the actuary as background to the company's long term soundness and specifically to work on the Financial Condition Report. Sales and commissions by product can be compared with the basis on which the premium approvals were granted.

4.4.3 Experience Investigations

Generally the standard management statistics are inadequate for experience investigations for mortality, morbidity and withdrawals. The actuary will usually carry out separate investigations for these and has a choice of the valuation data, which is taken directly from the Administration data at the valuation date, or the administration data itself. Usually the actuary will use the valuation data as

- the actuarial people working on the investigations will be more familiar with it,
- it will exclude a lot of non-relevant general administration data,
- nobody else within the organisation is interested in that data, so there is freedom of action.

The software for experience investigations will usually be developed in-house in the Actuarial Department Because the actual individual policy benefits data is at the core of the requirement, the first choice for the hardware and the programming language is that of the valuation system itself - usually mainframe and Fortran or APL. If the valuation system is written in Cobol, the actuarial department will adopt one of the following approaches:

- write the business specifications, have the programming done by the DP Department and then test the system, or
- write a mainframe program in a mathematical language, or
- arrange for the download of the relevant information to the PC and write the analysis programs in the PC environment, or
- use a Fourth Generation Language as described in Section 2.4. to either extract the required data from the valuation data or to do the full calculation as part of that selection process.

Future

Greater use of Fourth Generation Languages for selection and minor calculations, thus enabling a more rapid development of the actuary's requirements.

4.5 Valuation

Business Requirement

To calculate the liabilities the company has to policyholders in respect of all of their policies.

Actuarial Theory / Elements of the Calculation

To calculate these liabilities, the actuary looks forward and exercises judgement in estimating the future conditions which will affect the payment and receipt of all monies for each policy benefit. This leads to a "prospective" valuation, and it is this view, the standard approach, which is explored in this paper.

The general formula for the calculation of the valuation reserve at a valuation date is:

Present Value of Future Outgo MINUS Present Value of Future Income.

This can be converted to policy terminology as:

Present Value of Future Benefits PLUS Present Value of Future Expenses MINUS Present Value of Future Premiums

Valuation Methods and Bases.

The actuary may use a different valuation method and/or basis depending on the purpose of the valuation. The two extremes are:

(i) Net Premium method on a conservative "Statutory" basis

This has been traditionally used to demonstrate Solvency and is the method currently prescribed by the Life Act.

(ii). Gross Premium method on a Realistic basis.

This is being increasingly used to determine best estimates of the offices's liabilities for production of internal and external realistic earnings statements.

There are many variations within the Gross Premium method, but from a computerisation viewpoint, such differences are relatively minor. The underlying projection mechanism as the heart of a computer based valuation system can be made to handle them all. Examples are:

- Margin on Services, which is the Institute's draft standard for Realistic Earnings Valuations, [Institute 1989]
- U.S. GAAP.
- Solvency with Explicit Margins [Carr and others 1989]

In addition simply changing the level of the same wide range of assumption parameters introduced in the premium rate calculation section, especially to and from zero, will alter the reserve values.

Method used including software and hardware

Accessing the policy information

The valuation system's primary use is to calculate the liabilities on the office's current portfolio of policy benefits which are "live and in force" at the valuation date. This policy information must be read from the administration system, which is invariably on the mainframe computer. Hence the valuation programs both for reading the data and for the calculations have almost always been developed and run on the same mainframe computer.

The standard method to get the relevant data, is for the actuary to specify exactly what policy information, item by item, is required, and for the DP Department then to produce a file known as "the Valuation Extract", containing a copy of those items as they existed on the administration's "live" policy files or database, at the valuation date itself. This extract program is normally written in the office's mainframe business language (usually Cobol).

For valuation the full valuation calculations should be done at the lowest benefit level. Hence an extract record needs to be created at that lowest level. After the valuation has been run, the benefit results can be recombined at policy level, if required. This may require extra edits and cross references during both the extract creation and the valuation itself. An example is an investment linked policy which in addition to the savings benefit has a life cover benefit equal to the difference between a nominal sum insured and the value of that savings benefit, and each benefit may in theory reside in a different statutory fund.

Calculations

In simple terms, the valuation program reads the Extract file, calculates the reserves and along the way various intermediate values, and writes these results to the Valuation Output file.

Factors

The use of a net premium valuation started in pre computer days, so one of the main valuation tasks was the grouping of the policy data so that net premium, assurance value and annuity value factors could be applied to the data grouped by a common range of sex, ages and term to expiry. Reversionary bonus was determined and distributed in the same manner.

The first computerised valuation systems simply continued this practice and as they did the job quite well for traditional classes of business, many survive to this day.

First Principles

As Valuations became more dependent on computers, there also became an awareness that valuation calculations could be carried out directly by using the "first" or basic principles of actuarial science as they impinged on compound interest and life contingencies. Ashurst and Days' 1977 paper illustrated these principles for superannuation benefit valuation.

Having a first principles computerised valuation system, gives the actuary enormous flexibility in varying the basis assumptions being used, and hence by rerunning the valuation getting a range of results, either for all the business or more commonly for a specific subset, e.g. a particular product. Most life offices have valuations systems which embrace first principles. Generally speaking, mainframe processing power is needed for individual policy benefit valuations because in addition to the sheer volume of calculations, there is a lot of reading of policy data and this is most efficiently handled by mainframe internal processors.

Analysis of Output

The actuary spends a lot of time analysing the output from the valuation. The more detail held on the output file the easier it is to check its correctness and consistency. One of the actuary's most useful tools in checking the valuation results is a Fourth Generation Language (4GL) "database interrogator". As explained in section 2.5.7 this gives control to the user - the actuary and staff in our case - and enables the selection of valuation input data and results by any criteria - eg product, sex, age, start date, premium or benefit level, etc. right down to individual policy benefit level. On the downside, if used in an inefficient way, they can place great strains on the computers processing and data storage, thereby impacting ongoing administration work, so some training in their use is very worthwhile.

Future

As computer power becomes relatively less expensive on all hardware platforms, and the need to produce realistic valuation reserves becomes increasingly urgent, the trend to generalised first principles valuation systems is likely to accelerate. The Institute's likely requirement for a Margin on Services valuation method for realistic valuations, and its already published views on Solvency valuation, will cause companies to re-examine their existing valuation systems and increase their desirability to have just one single valuation system to cover these capabilities along with the outcome from the current review of the Life Act.

At this stage if the rapid development in Workstation power and capability, it is difficult to predict future effects on individual policy valuations, but in time I would expect to see the valuation extract data being moved to the actuarial Department's powerful workstation and the valuation programs being run there independently from the administration and thereby more directly controlled by the actuary.

4.6 Profitability Measurement and Analysis

Business Requirement

To measure and analyse the profit currently being earned, and likely to be earned in the future, by the company.

Actuarial Theory / Elements of the Calculation

Much has been written and debated by actuaries in recent years on the subject of what exactly is profit and how can it be measured and reflected in "realistic" earnings statements. I refer the interested reader to the papers in the bibliography by Goford, Miles & Gubbay and the Life Insurance Committee. I do not propose to enter that debate, but rather illustrate computer practice and methodology with respect to the general principles involved.

In simple term profit can be viewed in the time honoured actuarial way as being the Actual minus the Expected, for all of the Revenue account income and outgo items, with one of those Revenue account items being "Change in Reserves" over the intervaluation period. The Expected is calculated on best estimates of the assumptions affecting the revenue account - i.e. a realistic valuation basis is used.

Method used Including Software and Hardware

There are a number of steps in getting to both the expected and actual components.

Value Movements on Realistic Basis

The valuation section above described how the reserve is calculated for an in force policy benefit. For profitability measurement we need to also value the Movements on the same Realistic basis. This can be an area of some practical difficulty for companies as a Movements Valuation Extract file ideally should be created continuously throughout the year when the movement actually occurs. Some companies create the Movements Valuation Extract file at the same time as the In Force Extract file, by searching back in time through the administration policy records, but this involves some loss of accuracy.

The Movements Extract file is then valued on a realistic basis, with the valuation date ideally being the exact date of movement. In practice few valuation systems

currently in operation have that level of sophistication, so approximations such as the end date of the inter valuation period are used. This gives the Reserve held at the date of Movement, which is important for use in the calculation of the Expected Death Strain and related items.

Post Movement Valuation

Ideally each policy benefit would have the end of period reserve compared with that calculated on the same realistic valuation basis at the beginning of the period, allowing for alterations and movements in between.

Company practice however, varies considerably, particularly to the extent to which the process is computerised. It is generally a question of doing what one can given the practical limitations of data available. The actuary will use the investigation to become more familiar with the characteristics of the portfolio, and will concentrate on the more financially significant product lines.

The Fourth Generation Language database interrogator will be used extensively for summarising data input and results.

The actuary may have an extra program to calculate some of the Expected results such as the Expected Death Strain and Expected Withdrawal Strain. This would normally operate on the Valuation Output file and would be written by the Actuarial Department in its own calculation based language eg Fortran. It would normally be run on the same hardware platform as the valuation itself - the mainframe.

Alternatively a spreadsheet might be used with the data grouped into quinquennial ages. Practice varies considerably.

Extraction of Actual Revenue Account Items

The company's accounting system (general ledger) will not have this information at the individual benefit level, and often the administration will not either. The matching of benefit payments and premium receipts between the policy administration and hence valuation data and the accounts data has a lot of practical problems arising from delays and differences in actual and effective dates of payment or receipt.

The lower the level of detail within the general ledger for recording flows of money, the more specific and accurate the comparison of Actual minus Expected will be. This has to be tempered of course by the additional cost of maintaining records at that lower level.

The accounting system will be on the mainframe along with the policy administration system, and is often an integrated part of it.

Earnings Statements

The production of Earnings or Profitability Statements, will normally be on the same machine as the valuation and accounting data - normally the mainframe. Given this scenario, one would expect that the programs will be written in the main business language - usually Cobol.

Platform Programming Language

The hardware platform may be a powerful PC with the programming language used being APL, C or Fortran if the actuary has been the major party in the development of the system, as is often the case.

Some offices will have realistic valuation systems which they have developed on the PC. This is quite a logical step if the actuary already has PC based premium rates and model office calculation software, as this provides the basic projection mechanism together with the facility to vary both policy and assumption parameters. Developing on the PC would also have been an inexpensive way of determining what the exact requirements for the office should be, by prototyping both valuation bases and earnings statements formats, while the industry is still debating the issues. Such PC based systems are likely to be model point based rather than using actual policy benefits.

If the latter, there would be some practical problems in coping with the downloading and running of large volumes of data.

Future

The trends applicable to Valuations are even more applicable to Profitability Measurement - i.e. greater use of generalised first principles valuation systems and a longer term move to Workstations for the calculations and analysis work. The former will have more flexibility in aspects such as the setting of the valuation date equal to the date of movement.

In the short term, the strategic importance of the profitability measurement and analysis system to the company and the move to working on the individual benefit data, will see a move towards greater integration of such a system with the accounting system and the individual policy benefit valuation and administration systems, thus encouraging a move to the same hardware platform - the mainframe.

4.7 Partial Payouts, Alterations and Special Quotations

Business Requirement

To calculate the amounts to be paid or received, to, by or from policyholders or prospective policyholders, and the changes to be made to policyholders records, in response to a request from such a person.

Actuarial Theory / Elements of the Calculation

Actuarial Theory

The actuarial theory varies with the specific request, which is one of the reasons why the Actuarial Department has to handle these requests. They fall into the Policy Services Department or Sales and Marketing Department "cannot cope" area.

Method used Including Software and Hardware

The common characteristic is that the theoretical background can be looked on as similar to that already in existence for a similar mainstream calculation, and hence the best starting point is any software dealing with the mainstream function. Taking a copy of that program and making some "quick" changes, without worrying about the cosmetics, should enable an actuarial person to provide the required information relatively quickly, without a big software development bill. The base software could, for example, be the product development, quotation or valuation program. If the request is likely to be made relatively frequently, a more ordered approach to producing a more lasting solution is required, either from the base program or by writing one from scratch. In the latter case, the program would invariably be PC based and the language used could be any one of a number - eg Basic, C, APL or Fortran. A programmable calculator could be used in some instances.

4.8 Terminations ie Full Surrender, Paid up, Maturity and Death Claims.

Often calculated by Actuarial Department

Business Requirement

To calculate the amounts to be paid to a policyholder on Surrender, Paid up, Maturity or Death.

Actuarial Theory / Elements of the Calculation

The actuarial theory varies with the specific request and in particular according to the type of product.

Traditional endowment and whole of life policies:
In its more simple form:

- Interim and terminal bonus, if applicable, must be calculated up to the date of claim.
- For paid ups and surrenders, may have t/n factors applied to the sum insured and bonus, with the later application for surrenders of an "assurance" factor.
- For death or maturity, the full sum insured plus bonuses is payable.

Investment Account and Linked
In its more simple form:

- This can be interest bearing or unit linked. The determination of the value of the policyholder's account for interest bearing, will usually require calculation of the interim interest to be credited since the last declaration of interest. For unit linked the value of the account is the number of units multiplied by the unit price. The full value of the investment account is usually paid, subject to deduction of a charge on surrender, which varies according to the method of recouping expenses as set out in the policy document.

Method used Including Software and Hardware

Usually the mainframe based administration system handles the actual calculation. Calculation can be more realistically described as:

- the reading of the particular policy benefits - sum insured, bonus declared to date, investment account or number of units etc
- a check of the premium payments situation
- a calculation of interim and/or terminal bonus or interest, and
- the calculation and deduction of any penalties.

Often the life office actuary is only involved in the business specification of the calculations, including providing the values of the factors involved. In those instances, the mainframe language is likely to be used. Sometimes, in smaller life offices, the actuary will be responsible for the full application development life cycle including the programming, and the actuarial programmers will have to use a language they are familiar with - Fortran etc. Record reading is more important than the actual calculation from the point of view of language selection, and so the choice of language may even depend on the computer supplier's enhanced version of the language.

The final possibility is that the values are calculated on a "stand-alone" basis by a program written by the actuarial department, but which does take any of the required data directly from the administration system. In this instance, the program would usually be written on the PC using an Actuarial Department language but it is even possible to fit some of the simpler programs on a spreadsheet. The

program requires as input all the policy data, which is simply rekeyed, after the person prints or reads them from the mainframe.

Future

Those companies which do not have such calculations as an integrated part of their administration system, will integrate them.

4.9 Agency Support - Quotations

Business Requirement

To enable agents (including the life office itself) to provide illustrations of future values of proposed new policy benefits, and the cost thereof.

Actuarial Theory / Elements of the Calculation

For traditional policies, such values can be calculated in advance and simply tabulated by age and term. These are not normally committed to computer programs, although they could be quite easily.

Their primary use is for the projection of "unbundled" products, where the prospective policyholder can choose both the level of premium and the level of death and/or disablement benefit. The policy mechanism will deduct the cost of those risk benefits and any one or more of a wide range of possible charges based on premiums, benefit costs, and account values. The quotation should replicate this policy mechanism, although in practice simplifications and approximations are made, to avoid the illustration program becoming too unwieldy.

Method used Including Software and Hardware

The illustration projections are in fact a single case of the final product development premium rate projection. They can also be looked on as a particular case of what will actually happen during the administration of the product over the next n years. Hence in theory the same basic program should cater for all three instances.

Historically all three functions - product development, quotations and administration have been on three different hardware platforms - desktop PC, programmable calculator and mainframe, and used three different languages - typically fortran, basic and cobol. Quotation capabilities were usually at the front end of the technological revolution as the ability to produce illustrations instantly in the field required hardware portability.

The actuary should try not to commit to maintaining more than one version of a quotation program as this multiplies the maintenance work every time a change to

the program is made, whether to fix an error or to add a new product or variation thereof.

In recent years the advent of the laptop, its reducing cost and the tendency for the agent to use a PC - laptop or desktop - for the agency's own administration purposes, and for transferring proposal data to the life office, has helped lessen the education and training process previously required, and improved understanding of the technology. Because of the need to cater for the lowest common denominator in hardware, the programs are generally kept as simple as possible.

Future

The basic program for the calculations will be generalised and will be used for all three instances, thus ensuring consistency between quotations and what actually happens as part of administration, as well as economising on program maintenance. The increase in laptop processing power and speed will enable this to occur.

With increasing disclosure to, and communication with, the policyholder, being a major element of the Life Act revision, the ability to provide consistency of treatment between agent's quotations and actual administration will become more important.

5 Conclusion to Part I

The influence of computers on the day to day work of the life office actuary is enormous. To acquire a reasonable basic knowledge and understanding of the aspects affecting that work is important, but can be quite difficult in practice, simply due to the volume of computer related information available and the speed at which new developments occur.

In writing Part I, I have tried to explain the background to computers and system development from a life office actuarial viewpoint, in a manner that will be useful in practice, while keeping the paper to a reasonable length. Some people may find it useful as a reference document for a particular section with which they need to become familiar - e.g. languages, valuation etc.

Part II

An Integrated Life Actuarial Computer System

6 Introduction

6.1 Purpose

As stated in the introduction to the paper, the purpose of PART II is to illustrate and promote discussion on how a re-examination of the basic principles of actuarial science yields a logically simple method, which can be used to produce a *more efficient and more easily maintainable integrated life actuarial computer system.*

By publishing the methodology and basic "computer" formulae for such an integrated life actuarial system, members of the profession can then use or incorporate relevant aspects in the development or enhancement of their own actuarial computer systems.

6.2 Theme

All actuarial work in a life company is inter-related. This interrelationship comprises two parts:

(i) the same basic principles of actuarial science

(ii) related business requirements.

It can be used to *minimise duplication of computer systems development and maintenance, while at the same time ensuring consistency of treatment.*

This is illustrated here by

(i) examining the relevant actuarial basic principles

(ii) setting up an integrated computer system comprising a projection mechanism based on a simple formula, and tracking a policy example through the full list of life actuarial business functions, which have been described in Section 4 of Part I.

Each of the calculations that occurs is explained and the inter-relationships between the different business functions are highlighted.

6.3 What the Actuary wants in an Integrated Life Actuarial Computer System

6.3.1 Minimal Duplication of Business Function and Program Code

This requires careful identification of *all* business requirements of the system and based on this a careful planning of the full design of the system, to ensure that any particular type of calculation or data access is programmed only once, and that this particular program module is called by the system in all cases of need, irrespective of the particular business function.

While extra time will be needed on the analysis and design stages, this results in only one module being written for the full system. It shortens initial programming time and also reduces maintenance time and costs later, when the module need to be changed.

6.3.2 Consistency of Treatment among Business Functions

By having the identical actuarial treatment accorded to all business functions within a system, the scope for differences in results both within the office and to the public is greatly reduced and often eliminated. An example might be new business quotations from agents and from the Actuarial Department

A further benefit is the elimination of "forgetting" some minor part of a formula. An example might be an omission from the actual administration programs making the deductions for cost of insurance and charges, as compared with the product development cash flow projection program.

6.3.3 Simplicity of Design

The easier it is to understand how anything works, the easier it is to fix it or change it. It takes less time, with less fuss and the result is more likely to be correct.

This is even more important in the special case of actuarial software, where the actuary has more to do with time than explain in detail how an actuarial calculation should occur, and where it is usually more cost efficient to have non actuarial personnel maintaining the programs. This last point makes a simple design crucial. At the minimum, it saves a lot of explaining later, while usually it ensures a much closer matching of programs and final system to stated requirements.

It is very frustrating to have to investigate a program which has lots of "special ways of doing things", which were great ideas at the time but now require a lot of figuring out.

6.3.4 Flexibility

The ability to quickly vary selection of bases and assumptions and their constituent values, is essential, i.e. a screen based "parameter driven" system is required.

6.3.5 Ability to run the Same Programs Irrespective of Hardware

Why should we have to spend time and money changing and retesting our programs, simply because we get a new computer? If we upgrade from a PC to a workstation, a mid-range or a mainframe, the same question applies.

6.3.6 Ability to use the Most Cost/Benefit Efficient Hardware Platform for a Particular part of the System

Thus for example large volumes of calculations on a particular policy benefit or model element, would, all else being equal, be best carried out on a workstation.

6.3.7 A Common "Friendly" User Interface to all Parts of the System

Techniques for inputting data, selecting and running jobs and viewing the results, should be common across all business functions within the system, thus requiring once only learning, and in practice meaning a pre-existing knowledge of how to navigate around the system and get the best out of it.

6.3.8 Ability to use the Actual Live Data where Possible

The more realistic the data used for any investigation, the less sampling error introduced and hence the more accurate and reliable the results. The degree of confidence in the results is increased.

6.3.9 Ability to Download and Upload Policy, Parameter and Program Results Data between the Different Hardware Platforms

The downloading enables the actuary to carry out further detailed checking and analysis on the PC.

Uploading avoids rekeying of data such as premium rate assumption paarameters.

6.4 Why the Actuary is on the Verge of such an Integrated Life Actuarial Computer System

Most of the above "wish list" items are getting closer to fulfilment, as the pace of technological development continues. IBM's Systems Application Standard (SAA) (see Appendix A) sets out many of our "wish list" requirements as the principles of their development, and while the practice always lags considerably behind the

theory, a lot has happened and is happening in the computer industry which suggest the overall goals will be achieved.

The main points in practice worth noting are:

- Communication between PCs has greatly improved in the last year, to the point of being very reliable.
- Communication between different hardware platforms (mainframe - mid-range - workstation - PC), and between different companies proprietary operating systems is becoming easier, although, in general, it still has a fair way to go.
- Languages - some languages are now appearing on the full range of hardware, in workable format; eg Cobol.
- The range of third party software "tools" has increased enormously and has been a major reason for the progress on the communication and language fronts, as well as improving the "friendliness" of machines to end users.
- The sheer increase in power of the hardware, particularly in the workstation area, has meant that much greater volumes of more complex calculations can be performed in less time.

7 Predictions for the Future

The actuary's computer requirements and the computer industry's movement in the same direction, as detailed in the last two sections, lead to an expectation of the following developments in the life office actuary's computing environment over the next few years:

- Less pure modelling - more use of actual data. With the recent rapid increase in processing power of the hardware likely to continue at the same pace, with little increase in cost, the actuary's use of actual policy data, as opposed to model points, in future cash flow projections should become much more common.
- More integration of actuarial software across hardware.
- Most current mainframe and PC applications will migrate to Intelligent Workstations, but these workstations will have a different focus to those currently in the market in that they will not be stand-alone machines. They will be linked to other workstations and PCs as well as the mainframe.

- More controlled actuarial systems developments, as the cost of software developments greatly increases relative to hardware costs, and such software costs form an increasing percentage of the life office and actuarial budget.

- A more company integrated approach to development of some actuarial related software; eg accountants to have more responsibilities in specifying details of realistic earnings systems.

- Increased use of formulae for detailed calculations which require computer support, in legislation and associated regulations. There is an increasing expectation on the part of those framing rules, that "computers can do the job". The recent New Zealand life office taxation is an example of such a formula.

8 Principles and Techniques of Proposed Integrated Computer System

8.1 Ashurst and Day Principles

In 1979, in the introduction to their paper, "The Emerging Benefits of Computer Techniques or the Computer Techniques of Emerging Benefits", Ashurst and Day wrote: " Most of the calculations involved in conventional actuarial work are not, in concept, particularly difficult; in general they take the form:

Value = Amount payable x Probability of payment x Discounting factor

Much work had gone into the development of ingenious techniques to reduce the computational problems to manageable proportions. Commutation functions were one such example. Initially the tendency was to simply computerise these techniques "lock, stock and barrel". While serving a very useful purpose at the time, such techniques have the disadvantage of distracting users and developers from the relatively simple principles and concepts, thus making computerisation a more complex, time consuming and costly undertaking.

8.2 Extension to give VALUE Formula

By expanding slightly this fundamental equation, to bring in the extra dimension of time, thus relating each of the factors to a date, we have

a simple formula that can be used as the central formula at the heart of ALL Life actuarial Computer programs.

Expand	*Amount payable*	to equal
multiplied by	*Amount of Benefit* AT a particular date *Assumption Rate* applied to that Amount of Benefit AT that date.	
Expand	*Probability of payment*	to equal
multiplied by	*Probability of Survival* TO a particular date *Probability of Decrement* AT that date.	
Expand	*Discount factor*	to equal
	Discount factor applied TO that date.	

We can refer to these factors by their two letter shortened form, defined as:

AB - the Amount of Benefit AT a particular date
AR - the Assumption Rate applied to that Amount Benefit AT that date
PS - the Probability of Survival TO a particular date
PD - the Probability of Decrement AT that date
DF - the Discount Factor applied TO that date

Ashurst and Days' basic formula of

VALUE = AP x PP x DF

becomes in the more detailed and specific form, the VALUE Formula:

VALUE = AB x AR x PS x PD x DF

8.3 Use of VALUE Formula in Projections

At the heart of the integrated computer system illustrated in the rest of this paper is the projection mechanism. The general form of the technique has been described in Section 4, but it is now necessary to examine it in more detail.

The first stage in a projection is to calculate the expected amounts of income and outgo, which are independent of each others own calculation. This gives what can be termed the *"Basic Projection Matrix"*, with time varying by row and item varying by column. An example of such a Basic Projection Matrix for premium rate calculation is shown in Appendix D.1. The term "element" is defined as being the value for a selected item at a selected time.

Each element within this basic projection matrix can be calculated by executing this VALUE formula.

Since most actuarial calculations of consequence to the life office actuary require a projection mechanism, by incorporating this simple VALUE Formula as the basic building block in a standard projection mechanism, in a computer system, that system can be used for most life office actuarial calculations.

Use of the VALUE Formula greatly simplifies programming and is a very ordered way of looking at the required calculations. It is just a technique, but if this structure is followed it keeps maintenance relatively simple, as it meets the earlier requirement that a computer system design is best if it is simple and easy to follow and understand.

8.4 Expansion of Projection Matrix

The second stage in a projection is to determine those additional items which are calculated directly and simply from the values of the elements in the Basic Projection Matrix, and include them as additional columns.

This gives what can be termed the *"Intermediate Projection Matrix"*.

Examples in the case of a Premium Rate projection would be the interest earned and the fund accumulation. See Appendix D.2.

The third stage is to determine other items which require a more complicated calculation, and include them as additional columns. Often it is still possible to use the existing projection mechanism and element values for those calculations.

This gives what can be termed the *"Expanded Projection Matrix"*.

An example in the case of a Premium Rate projection would be the statutory reserve. See Appendix D.3.

9 Sample Policy

Individual Policy Benefits

A fundamental element of the computer system being illustrated is that where possible it uses the individual policy benefits - the actual business on the books of the life office.

Single Policy Benefit v. an Office's Block of Business

For clarity, I have used only one sample policy with a single benefit throughout the model. In practice, the actual integrated life actuarial system would process all or a user requested subset selection of policies, one benefit at a time. Some degree of efficiency in use of intermediate factor values would be achieved through appropriate sorting of those policies so that factors used would not have to be recalculated for every benefit.

"Policy Parameters"

In Part I Section 4.1 Product Development (Premium Rates), we introduced the concept of *Elements of the Calculation*. The first of these was "Policy Parameters" which we regard as "fixed" for each set of calculations.

To summarise, the policy is a traditional ten year endowment assurance, with uniform reversionary bonuses, including interim and terminal bonuses, for a male, non smoker, aged 40 at entry. The sum insured is $100,000, and the rate of bonus is 3% p.a. compound.

The specific selection of "Policy Parameters" I have used to illustrate the integrated computer system are shown in Appendix B.

"Appendix B.1 Fixed Policy Parameters" identifies the most basic and most fixed policy parameters.

"Appendix B.2 Policy Parameters varying by Duration" identifies all other policy parameters, which are normally calculated from the basic "fixed" set. To keep the concepts clear, I have avoided any complicated parameter patterns by duration, although the program calculating Appendix B.2, could cater for irregular patterns just as easily as the simple pattern.

10 Sample Assumptions

We have seen in Part I, Sections 3 and 4, that the life office actuary requires a computer system that will cater for a range of business function calculations from Premium rates, through statutory and realistic reserves, to comparison with actual experience, and the projection of several of these items to give a range of model office scenarios.

In all such cases the mechanism used is to carry out projections of the cash flow amounts, the probabilities associated with their payment and the discounting of the expected payment to a point in time.

Each of the elements of this projection calculation requires certain assumptions to be made. The type of assumptions made are common across all the business functions, but the level of each type of assumption almost always varies.

"Assumption" Parameters

The second of the *Elements of the Calculation* introduced in Part I Section 4.1 was "Assumption Parameters" which can be regarded as "variable" for each set of calculations.

Premium Basis

The specific selection of "Assumption parameters" I have used to illustrate the premium rate calculation is shown in Appendix C.1 Premium Basis.

Statutory and Realistic Reserve Bases

With only the level of assumptions affecting the basic projection mechanism, we can calculate the basic projection matrix elements using the same VALUE Formula. Hence the same computer program can calculate these elements for the Statutory Reserve and for Realistic Reserves. With the Institute heading for extensive use of the Margin on Services valuation method, it is necessary to calculate reserves at a point in time on both the last and current valuations' sets of assumptions.

The specific selection of "Assumption parameters" illustrate these reserves bases are shown in Appendices C.2 to C.4 inclusive:

Appendix C.2 Statutory reserve basis
Appendix C.3 Current Realistic reserve basis
Appendix C.4 Last Realistic reserve basis

Actual Experience

Historically in the financial management of a life office, the actuary carried out an Analysis of Surplus. When studying for the Life Offices exam, some of us

struggled through the theory wondering why an actuary went to such trouble when the valuation basis was very conservative and hence the surplus constituents - interest, mortality etc - were out of touch with the office's "real" experience. That comparison of actual experience with statutory valuation basis results can now be expanded to comparison with any of the other assumption bases, including the other three in this model - premium, last realistic and current realistic. This gives an excellent insight into how profitable or otherwise a life office is and where exactly it is making that profit. I have thus included a set of assumptions to illustrate briefly how the model could be used for such profitability measurement and analysis.

Appendix C.5 Anticipated Actual Basis

11 Policy Parameters Excluded

In order to keep the model from getting too complex, and hence distract the reader from the principles being pursued, it was decided to specifically exclude certain items which have to be taken account of in practice. Some such items are listed here, to give an indication of difficulties to be faced and complexities to be programmed in a practical extension of the proposed system:

- Frequency of payment of premium other than yearly, including the associated frequency loadings;
- Policy and benefit fees;
- Non traditional products - Immediate Annuities, Disability Income
- Reinsurance - could use the same mechanism as for the gross, but with its own set of assumptions, and in the opposite direction (opposite sign).
- Effect of historic alterations
- Consumer price indexation of benefits

The development of an integrated computer system will need to pay full and very careful attention to such details.

12 Detailed Calculations of the Proposed Integrated Computer System

The starting point is the simple "VALUE" formula, developed in Section 8.2:

VALUE = AB x AR x PS x PD x DF

i.e. = Amount of Benefit x Assumption Rate x Probability of Survival x Probability of Decrement x Discount Factor

The practical use of this formula will now be shown for all the life office actuary's business functions, by identifying EACH element of the formula by item name and actual figure. Premium rate calculation will be treated in full as a practical example, while subsequent functions will have their differences to the premium rate treatment discussed. It is hoped that this will be sufficient to enable people to judge the merits or otherwise of the method, and enable those wishing to do so, to carry the practical application of the method to their own office.

12.1 Product Development (Premium Rates)

Business requirement

To calculate a set of premium rates for a new product.

Only one generalised core projection program is needed. Each function can use less than the full list of column items within the matrix, according to the specific requirement at hand.

Calculation of Basic Projection Matrix

We first calculate those items which are independent of each others own calculation.
With the increasing memory capabilities of PCs and workstations, the technique of "populating the table" (Appendix D.1) for these "independent" values of the projection, is becoming increasingly practical.

The starting point is a single sample policy, which is assumed to be issued at time t=0. From there on, the projection is on an "average" or "expected" basis. I.e. this single sample policy is treated as a large population of such policies.

Appendix D.1 gives all the figures for the basic projection matrix.

To illustrate the VALUE Formula at work, I shall explain the detailed calculation of just 3 elements of the projection mechanism - Premium, per unit premium Expense and Death benefit. The balance are explained in Appendix E.1

The date in the VALUE Formula definitions which is applicable for premium rate calculations, is at time t, where t varies from commencement at the beginning of year 1, to maturity at the end of the year 10.

t the "t"th policy year
t = 1

PREM Premiums received (assumed payable at start of policy year)

Amount of Benefit	Gross Annual Premium (cf Appendix B.2)
Assumption Rate	Full premium is payable
Probability of Survival	Certain to survive to start of projection!
Probability of Decrement	Certain to be paid
Discount Factor	For this simple Premium Rate calculation, there is no discounting.

i.e.

```
PREM
  =   AB       *    AR     *      PS     *     PD     *    DF
  =   PREMIUM        1             1            1           1
  =   12064.00
```

EXPADMIN Ongoing Administration Expenses incurred (assumed incurred at start of policy year)

and

EXPTERM Termination Expenses incurred (assumed incurred at end of policy year)

Expenses incurred can be many and varied, and each life office will have its own set based on its own administration structure and its basis of measurement of expenses and their analysis with respect to policy parameters.

Each of these should form an element in the cash flow projection, as each has its own set of VALUE Formula definitions and each can have its own time of incidence - eg beginning, middle , end of year. They affect the later calculation of interest (INT) accruing and hence FUND accumulation values at the end of each year, in the intermediate projection matrix.

I have kept just two EXPENSE columns in the projection, but have calculated these as the sum of 3 and 2 expense elements respectively for EXPADMIN and

EXPTERM, in order to illustrate the operation of the *Amount of Benefit* (AB) and the *Assumption Rate* (AR) definitions of the VALUE Formula.

The *Amount of Benefit* (AB) for all expenses, is the item on which the Expense is calculated.

If it is a dollar amount expense, ie event based, AB = 1.
If it is a per unit Sum Insured expense, AB = Sum Insured.
If it is a per unit Premium expense, AB = Premium.

The *Assumption Rate* (AR) for all expenses, is the expense rate or dollar amount itself.

A detailed example of the calculation will make this clearer.

Say t=2 (2nd Year)

EXPADMIN (2) PER UNIT PREMIUM EXPENSE (ADMIN)
(Assumed to occur at start of year)

Amount of Benefit	Gross Annual Premium (from Appendix B.2)
Assumption Rate	The per unit prem admin expense rate at the start of year 2. (from Appendix C.1)
Probability of Survival	Probability of surviving to start of year 2
Probability of Decrement	One - in force.
Discount Factor	For this simple Premium Rate calculation, there is no discounting.

EXPADMIN (2) PER UNIT PREMIUM EXPENSE (ADMIN)

=	AB	*	AR	*	PS	*	PD	*	DF
=	PREMIUM		PREM P.U EXP		1Px		1		1
=	12064.00		.05		.848521				
=	511.83								

DEATH (Death assumed to occur at end of year)

Amount of Benefit	Death benefit (from Appendix B.2)
Assumption Rate	One - full amount payable
Probability of Survival	Probability of surviving to start of year 2
Probability of Decrement	Only payable on death in year 2.
Discount Factor	For this simple Premium Rate calculation, there is no discounting.

```
DEATH

 =  AB          *     AR         *      PS        *     PD      * DF
 =  DEATH BEN         1                 1Px             Qx        1
 =  100000                             .848521         .0019
 =  161.22
```

Calculation of Intermediate Projection Matrix

Another program can then take these values and calculate the dependent items. In this case this will be the interest earned over each year (INT) and the fund at the beginning (FUND0) and the end (FUND1) of the year. This separation of tasks makes the system easier to amend and maintain.

Interest and Fund Accumulation Calculations

For t=1

FUND0 = 0 as no monies have yet been received or paid out.

The Premium Rate calculation projection, must now calculate the interest accruing (INT). A full year's interest is earned on the fund at the beginning of the year plus/minus income and outgo items which are received or paid at the beginning of the year.

```
INT      =  I * (FUND0[1] + PREM[1]   - EXPADMIN[1] - COMM[1])
           .07* (    0     + 12064.00 -   6152.00    - 8444.80)
           .07* ( -2532.80)
           -177.30
```

FUND at end of year (FUND1)

The simple addition to and subtraction from the fund at the beginning of the year of all income and outgo items including interest as just calculated.

```
FUND1 =   (FUND0[1] + PREM[1] + INT[1] - (EXPADMIN[1] +
          EXPTERM[1] + COMM[1] + DEATH[1] + DEATHBON[1] +
          SURR[1] + SURRBON[1] + MAT[1] + MATBON[1]))
      =   (  0      + 12064.00 - 177.30 - ( 6152.00    +
            8.24     + 8444.80 + 174.00    +     5.22      +
           0       +    0          +    0   +    0     ))
      =   (11886.70 - 14784.26)
      =    -2897.56
```

This is continued for the rest of the term, giving the INT and FUND1 (and FUND0) columns as shown in Appendix D.2

Successive Estimation of the Initial Premium

The programs calculating the basic and intermediate projection matrix are repeated with successive estimation of the initial premium, to get the premium which gives Fund at end of term = 0.00.

In our example a premium of 12064.00 satisfies this goal, and this has been used in the projection illustrations.

Expanded Projection Matrix Calculation

In general, for prudence and to satisfy the Life Act solvency requirements, a Life Office will hold stronger reserves than the accumulated premiums less claims and expenses shown in the above projection. The actuary in determining the cash flow projection will wish to calculate this Statutory Reserve at each point in the projection. The extent to which this exceeds the accumulation at a point in time, can be treated as a transfer into the fund, to be released in later years when the thus enlarged fund exceeds the then Statutory Reserves required.

Application to Integrated Computer System

The calculation of the Statutory Reserve will use the same projection mechanism as for the basic premium rate calculation, (in computer terms the same program or subroutine). Some additions are required but these are best kept separate from the projection mechanism. Their incorporation as an integrated part of our projection model is dealt with briefly in Section 12.5 - Valuation.

For this premium rate extension calculation, we can simply incorporate a number of further columns to those already in Appendix D.2. Computers are excellent for handling a large physical number of data elements, so there is no reason to reduce the number of elements being calculated. While one program may calculate all 20 or more columns, only those specific columns directly relevant to the investigation may be shown to the screen or printed. However the actuary likes to see everything that's calculated, as this allows instant comparison of actual figures and their trends or "shape".

The interested reader can refer to Carr and others "The Practice of Life Insurance in Australia" chapter 13 for a discussion and an example of the further calculations this requires. The approach needed is as follows:

We replace columns FUND at the beginning (FUND0) and end (FUND1) of the year by Statutory Reserve at the beginning (RESSTAT0) and end (RESSTAT1) of

the year, and interest on the fund based accumulation (INT) by interest on the reserve based accumulation (INTRES).

We calculate the new Fund accumulation at the end of each year (FUNDRES).

We must hold an amount equal to the Statutory Reserve at the end of the year. The transfer into the fund can be calculated as the difference between the fund and the reserve: the actuarial convention is to treat the shortfall as a negative item - new business strain, so the calculation is FUNDRES less RESSTAT1.

Finally the present value at commencement, of the Transfers, indicates the profitability of the product. The rate of interest which gives a Present Value of zero is known as the yield on transfers. In our example where the PREMIUM was calculated to give a Fund balance of zero at the end of the contract, the yield on transfer has to equal the rate of interest used in the accumulation (7%).

The actuary can now vary any one or more of the assumptions in the projection, including the premium itself, before rerunning the projection program (ad infinitum if necessary!), and examining the calculated transfers and their present values at a range of "Profit/Risk Discount Rates".

12.2 Model Office Projections

Business requirement

To calculate estimates of Liabilities and Assets, and construct the resultant Revenue and Profit and Loss Accounts and Balance Sheets, for periods and at points in time between now and a date in n years time.

Application to Integrated Computer System

12.2.1 Liabilities: Revenue Account and Balance Sheet Projections

Here we expand the single "expected" product in the Premium Rate calculation to encompass:

- a range of different sample policies,
- incorporate volumes of new business, and
- projection dates and periods.

Different types and characteristics of policies, with new business volumes at later durations, simply require many different sample policies, with associated volume factors for each, to be run through the projection mechanism of our computer

system. The start and end points of each such projection depends on the dates and periods for which the total model office projection is required.

Adding the individual results gives the totals for each revenue account item at each duration, with a line of the "summed" projection effectively being a Revenue Account. The liabilities side of the Balance sheet can be read from the Statutory (or other) Reserve and the Fund Accumulation columns of the "summed" projection.

VALUE Formula Definitions

Amount of Benefit and Assumption Rate

Cash flows are identical to the single case used in the premium rate calculation above on an individual policy basis.

Probability of Survival and Probability of Decrement

Identical to the single case used in the premium rate calculation above on an individual policy basis.

For new business starting at durations later than time 0, the probability of survival factors used would cover the duration from the future start date.

Discount Factor

Identical to the single case used in the premium rate calculation above on an individual policy basis; (i.e. no discounting to the start date of the policy.)

Profit Discounting to the Current Date.

To determine the present value of all future profits, only one change is required from the "Premium Rates Extension" calculation above.

The "Profit Discount Factor", used in the Calculation of the Present Value of Transfers (PVTRANS), simply requires discount factors used to be for the duration to the current date and not to the future start date, for new business commencing at future durations.

Care must be taken to keep Future New Business separate from In Force business to avoid "profit" distortions due to the use of a Statutory valuation basis which results in higher post first year transfers not offset by the past new business strain.

Model Office v. Individual Benefits

When modelling In Force business in practice, companies determine model points - a summary of its business formed by grouping and averaging this business by the premium rating characteristics. The main reason for this in the past has been to reduce the enormous volume of repetitive calculations.

With an integrated computer system, the company's existing business could be used directly, replacing the policy parameters of Appendix B. The exact mechanism for the replacement depends on the way in which the data is stored in the administration system, but once it is set up, the feeding through of the information *will increase the accuracy of the projections of in force business and free the actuary from having to make the model points.*

It should be remembered that the more complex part of the projection is the calculation of future reserve levels and that this will already be available on a individual policy benefit basis as part of the valuation system. (See section 12.5.)

12.2.2 Asset Projections to match Liability Projections

Similar projection techniques would be used, with the income/outgo corresponding items essentially being investment income - covering dividends, rent, interest and realised capital gains, tax, and the fund accumulation/reserve value corresponding items being investment values.

Assumptions on the asset side would include periodical (in the simple case - annual) growth and decline of the expected income and asset value for each type of asset - fixed interest, equity, property etc. and subdivision therein, an initial investment portfolio based on business in force, and a strategy (set of rules) for investment of monies arising from future new business.

The detail of these calculations would require additional separate programming, but the assets results are best stored in the same time and item matrix format, so that liabilities item totals at time t can be directly compared to asset item sums at time t; eg Interest (INT) on the liability side to Total Investment Income on the assets side.

12.3 Policy Issue/New Business and ongoing Administration; Partial payouts, Alterations and Special Quotations; Terminations ie Full surrender, Paid up, Maturity and Death Claims.

12.3.1 Rates and Factors

In Section 4.3, we stated the actuary's main responsibility within the Administration System as the set up of all the rates and factors required for all administration calculations.

In an integrated system, the same facility for setting, maintaining, storing and accessing these rates and factors, would be used for the administration system calculations as for the premium rate calculation and model office projections. "Actual" or "projected" parameters could be selected as required.

The transfer of the rates used as assumptions in the product development routine into the administration system, would then be a fait accompli.

12.3.2 Termination Value Calculation.

These calculations must use the individual policy information stored on the administration system.

Already we have seen in the premium rate calculation (Section 12.1) where termination values are used as the *Amount of Benefit* (AB) items in the SURRender, DEATH, and MATurity element calculations (and their BONus counterparts). For traditional products the calculation of the amount of Surrender Value may be quite simple and independent of other items in the projection, as in the demonstrated example. For more complex products, it may be dependent on other elements in the projection calculations.

The principle to be followed is the same as for the inclusion of the Statutory Valuation in the Premium Rate determination in Section 12.1; ie the same projection mechanism can be used, but the first run through is to calculate the Surrender Values themselves, and only then is the full accumulation projection carried out. Previous columns of figures in the projection matrix can be simply overridden by the new values, or in some instances where the intermediate values might be of some interest in themselves, further columns can be added to the matrix, and examined at the actuary's leisure.

12.4 Statistics

The main focus of actuarial computing within the Statistics area is the calculation of experience rates of decrement. This requires identification and counting of the numbers, sums insured, disability income p.a. and premiums, for lives

(i) at the beginning and end of each interval of the period being investigated (the In Force),

(ii) going off the books due to the particular decrement being investigated (the movements).

Actual amounts paid or due to be paid by way of claim are also collected.

This identification is primarily a data reading exercise, where the data resides on the administration system in the form of policy and movement records respectively. It is therefore not directly related to the integrated actuarial computer system being developed in this paper, and hence will not be pursued further here.

Both management statistics and experience investigations, should be converted into a form matching that used for the premium basis calculation - ie converted to a Basis Assumptions format, eg actual mortality ratios in the form of rate per unit death benefit, actual commission including production volume bonus of commission, and used for analysis of past periods (see Section 12.6 below), and projections into the future on an "actual basis". Appendix D.5 would be established in this way.

12.5 Valuation

Business Requirement

To calculate the liabilities the company has to policyholders in respect of all of their policies.

I have calculated Reserves on a modified Net Premium basis, the modification being a Zillmer expense equal to 3.5% of the Sum Insured. The full valuation basis assumptions are shown in Appendix C.2.

12.5.1 Net Premium Calculation

The first item to be calculated is the Net Premium. This can be achieved using the same basic projection mechanism as used for premium rate calculation in Section 12.1, in the following manner:

The Net Premium equals
(the Present Value of future DEATH benefits plus the present value of the future MATurity benefit)
divided by
(the present value of one payable in advance each year from now to the end of the term)
all taken at the date of issue of the policy.

Using the simple computer system projection mechanism we can choose to do either of two things:

(i) ignore the benefit columns other than DEATH or MATurity; or

(ii) we can choose to include them, in the knowledge that the assumptions picked up will include zero for the *Amount of Bonus Benefit* (AB), or the *Assumption Rate* (AR) for expenses and commission will be picked up as zero, or the actual decrement rate itself will be zero, e.g. for withdrawals (see Appendix C.2).

For a live policy valuation, the policy data would simply be picked up from the valuation extract file taken earlier from the administration system.

To calculate all relevant items within the projection, the Zillmer Expense item has been set in the assumptions where the Administration Expense Per Unit Sum Insured would normally be set.

In addition, for the first run through of the system's basic projection mechanism, the Premium is set to 1, to enable us to derive the total present value at commencement per $ premium; ie the annuity function value. No INTerest or FUND calculations are required.

Value Formula Definition

Amount of Benefit and Assumption Rate

Cash flows are identical to the single case used in the premium rate calculation above on an individual policy basis.

Probability of Survival and Probability of Decrement

Identical to the single case used in the premium rate calculation above on an individual policy basis.

Discount Factor

This is the only VALUE formula difference to the single case used in the premium rate calculation above on an individual policy basis. We want to discount to the start date of the policy, so we introduce a v^t factor.

The results of this first iteration are shown in Appendix D.3. The totals for each column are shown and the Net Premium is calculated.

Details of the calculation using the value formula definition are shown in Appendix E.2.

12.5.2 Prospective Reserve at time t

The general prospective valuation reserve is calculated as:

Present Value (Benefits) + Present Value (Eexpenses) - Present Value (Premiums)

The first two items have just been calculated and the last can be calculated in an identical manner by setting *Amount of Benefit* (AB) in the VALUE formula for PREMium equal to the Valuation Premium. In the case of the Statutory Net Premium Valuation, this will be set equal to the NET PREMIUM just calculated.

For realistic Gross Premium valuations such as those with Bases set out in Appendices C.3 and C.4, *Amount of Benefit* (AB) in the VALUE formula for PREMium will be set to the Gross Premium actually payable.

We now need to enter the projection mechanism at the Valuation date, or more usually in practice, depending on how you wish to calculate reserves at non integral number of years in force, both at the policy anniversary prior to the valuation date, and that following. In the case where projections are carried out both before and after the anniversary date, most of the elements of the VALUE Formula will be identical, and the Discount Factor(DF) will differ by one year.

The main working variation between valuation methods and bases, will be in the determination of the *Amount of Benefit* (AB), and to a lesser extent the *Assumption Rate* (AR). In a live valuation, these will be deduced from the policy data, and may require other assumptions as to, for example, interim and terminal rates of bonus for parts of years. Keeping such matters restricted to the AB and AR calculations, avoids the detailed Valuation calculation programming itself from getting too confusing.

The other VALUE formula factor which will be different from the Premium rate calculation and the Net premium calculation, is the timing of the Discount Factor. This will be to the beginning of that particular projection - ie to the policy anniversary before or after the Valuation date.

Appendix D.4 shows the basic projection "matrix" required for the Reserve calculation at commencement. By totalling each column (shown in Appendix D.4 at the bottom of each column) we have the present value at the beginning of the first year of each benefit, expense and premium item.

The Valuation Reserve is then simply calculated as the total of the Benefit and Expense columns less the total of the Premium column.

12.5.3 Reserves for Future New Business

When a policy is not actually on the books, the above mechanism can of course still be used. Instead of starting the calculation of the projection mechanism at the integer durations each side of the actual duration in force at the valuation date, the calculations need to be started at duration zero, and repeated to the end of the term. While this gives rise to a lot of individual projection matrices, the power of the computer lies here. It can easily sum the columns for each projection, and then within each projection add those totals for the benefit and expense columns and subtract the total for the premium column.

12.5.4 Future Reserves for Existing Business

Similarly it is possible to determine future reserves on business already in force by continuing with the projection mechanism from the second anniversary after the valuation date to the maturity or expiry of the policy.

The estimation of the policy items governing the cash flows - the *Amount of Benefit* - is external to the VALUE Formula itself. In practice with a model office projection into the future these values will have a duration or time dependent reference point, and can normally be thus slotted directly into the main VALUE Formula within the Projection Mechanism.

Relationships of VALUE Formula Factors between Applications.

En route through the different actuarial applications, it can be seen that relationships often exist between each of the AR, PS, PD and DF factors, from one projection mechanism to another. E.g. the Net Premium Calculation and the Reserve Calculation. This can be used to ensure relatively efficient calculations, where hardware calculation power is either a restriction or gives rise to cost savings. However as stated earlier, this will become less and less of a restriction as time passes, as cost per unit of computer processing capability continues to decrease.

12.6 Profitability Measurement and Analysis

Business requirement

To measure and analyse the profit currently being earned, and likely to be earned in the future, by the company.

Estimating Current Profits and Projecting Future Profits

Section 4.6 of Part I explored the practical computing background to profitability measurement and analysis. Following this through in any level of detail to the proposed integrated computer system would require a full paper in itself. I have

therefore confined discussion in this section to the basic principles of the proposed system.

In general terms, the sensitivity of future profits can be examined by using the same VALUE Formula based projection mechanism, to project current or future business, using a set of "anticipated actual" or "experience" assumptions such as those forming Appendix C.5. The comparison of the resulting expanded projection matrix element values to the corresponding element values of the same projection on the office's realistic valuation basis, would be a useful tool in assessing current and future profitability.

12.7 Agency Support - Quotations

Business requirement

To enable agents (including the life office itself) to provide illustrations of future values of proposed new policy benefits, and the cost thereof.

As stated in Part I Section 4.9, an agency quotation or illustration projection is in fact a single case of the final product development premium rate projection.

Hence the existing projection mechanism detailed for Premium Rate Calculation in section 12.1, can be used as is. The projection would be carried out twice or three times, with the interest rate (or its equivalent) being set to the guaranteed rate of return, if applicable and then to the company's low and high illustration rates. Expense and commission costs, and mortality and morbidity charges, would be set at the levels to be actually charged to the policyholder as part of the future administration. Furthermore the exact mechanism and timing for calculating such charges - the *Amount of Benefit* (AB) and the *Assumption Rate* (AR) in the VALUE Formula would be a separate program called by the integrated computer system, so that the quotation is totally consistent with both the premium rate calculation and the actual administration of the policy. All these functions would call the same program.

The projection items being communicated to the policyholder may include the surrender value at the end of selected years *t;* ie *Amount of Benefit* (AB) element of SURR), the Fund accumulation at the end of selected years (FUND1) and the cost of the death benefit (DEATH).

13 Conclusion to Part II

As the rapid pace of development of computer capability, power and speed continues with little increase in hardware cost, the life office actuary's detailed business function requirements and wishes can increasingly by met.

For cost efficiencies in developing and maintaining the computer systems which will deliver these functions, a single integrated system is the ideal to strive for.

The strong interrelationship of life office actuarial work and the calculation intensive nature of much of the work, suggest such an integrated system for the life office actuary could be cost effective, consistent, simple in concept, flexible, and enhance productivity.

The integrated computer system described in Part II could provide the basis for such a system.

References

(i) Direct references from paper

Ashurst, R.G. and Day, G.H. (1979) The Emerging Benefits of Computer Techniques or the Computer Techniques of Emerging Benefits. J.S.S. 23 pp 25 - 42.

Carr P.S. and Vinson (1987) Solvency Standards for Life Insurance Companies. Institute of Actuaries of Australia.

Carr P.S. and others (1989) The Practice of Life Insurance in Australia. Institute of Actuaries of Australia.

Carr P.S. and others (1989) Solvency Principles. Institute of Actuaries of Australia.

Forfar (1989) Using APL for Financial Applications J.I.A. 116

Goford, J. (1985) The Control Cycle: Financial Control of a Life Assurance Company. J.S.S. 28 pp 99 - 114.

Harsant, J (1989) The Construction of Computer Systems and the use of Fourth Generation Languages. Staple Inn Actuarial Society.

Lewin, C.G., Evans J.V., Goodare, R.E. and Packer L.R (1989) Calculating Devices and actuarial Work. J.I.A. 28 pp 215 - 287.

Life Insurance Committee (1989) Realistic Reporting of earnings of Life Insurance Companies. Institute of Actuaries of Australia.

Miles & Gubbay (1987) Realistic Financial Reporting. T.I.A.A. 1987 pp

Pollard A.H. (1981) The Actuary in the 1980s. T.I.A.A. pp 572 - 573.

(ii) Further Reading

Anderson, J.C.H. (1959) Gross Premium Calculations and Profit Measurement for Non-Participating Insurance. T.S.A. 11 pp 357-394.

Bunch, T.S. (1988) The Valuation of With-Profits Business and the Estate. J.S.S. 31 pp 59 - 88.

Jenkins, T.C. and Wilson, A.J. (1975) A Study (using Projection Mathematics) of a change in the Minimum Valuation Basis. T.I.A.A.N.Z.

Lane G.C., & Ward G.C. (1961) The emergence of Surplus of a Life Office under Varying Conditions of Expansion. T.I.A.A.N.Z.

Lee, R.E. (1985) A Prophet of Profits. J.S.S. 28 pp 1 - 42.

Stephens, N. (1981) Computer Techniques for Developing Premium Rates. Institute of actuaries Student Society 17 Feb 1981.

Wise, A.J. and Annable, M.J. (1989) The current State of Asset/Liability Modelling in the U.K. 1st AFIR Colloquium

Appendix A

IBM's SAA - Systems Application Architecture

Background

IBM offers systems based on several different hardware platforms and operating systems. These systems span a nearly thousand-fold capacity range, and support the information processing needs of people in very different environments.

To make movement between these systems easier, to facilitate multi-system use, and to bring the breadth of IBM's product line to bear on customer needs in all environments, IBM has introduced Systems Application Architecture (SAA). The results are intended to be:

- *applications that can be ported with little effort*
- *applications that can span systems*
- *user access to these applications that is simpler and more uniform*
- *programming skills that have broader applicability.*

What it covers

SAA is a collection of selected software interfaces, conventions, and protocols that are being published. SAA will be the framework for developing consistent, integrated applications across the future offerings of the major IBM computing environments.

The interfaces, conventions and protocols of SAA are designed to provide an enhanced level of consistency and connectivity in the following areas:

- *programming interface - the languages and services that application developers use in building their software*
- *user access - the design and use of screen panels and user interaction techniques*
- *communications support - the connectivity of systems and programs*
- *applications - the software built and supplied by IBM and other vendors.*

Advantages

SAA facilitates an increased level of consistency and connectivity across the participating systems. As a result, the development and use of applications should be less expensive and more timely, and optimum use can be made of an enterprise's resources.

Consistency

Consistency provides several advantages. Users who need access to data on one system today and another system tomorrow can benefit. The programs they run will be similar, and the actions they perform while running those programs will be more uniform. Panels, keyboards, procedures - their appearance and behaviour will often be the same. With less relearning, users have faster and easier access to data, and business efficiency increases.

Consistency means portability, and building applications for multi-system solutions becomes faster and easier. The source for a program built on one system can be taken to another system and implemented more smoothly. Effort expended in creating a general data processing solution is therefore lessened, along with the development time.

Connectivity

Connectivity allows programmers to crate applications that span systems - running partly in one environment and partly in another. Distributing an application in this manner permits its various functions to be processed where most desirable. This allows maximum leverage of existing capabilities, utilising the unique strengths of an enterprise's various systems.

A particular advantageous arrangement is the use of an intelligent workstation with a host. The host system gives powerful processing and fast access to large databases. The intelligent workstation (in the form of a PC) offers attractive graphics and convenient menus and conversations for a user. Using SAA's connectivity features, an application can be split so that its logic and data access run efficiently on the host, while its human interaction takes place on the user-friendly PC.

Furthermore, because these interfaces also have the consistency provided by SAA, application parts can be moved more easily to other systems should the enterprise structure expand or change.

Disadvantages

Several aspect of SAA are still in the early development stage.

(reproduced in part from IBM's document GC26-4341-2, Systems Application Architecture)

Appendix B.1 Fixed parameters

Age @ Entry	Sex	Smoker	Term	Sum Insured	Annual Premium
40	M	N	10	100000	$12064.00

Appendix B.2 Parameters Varying by Duration

Dur t	Gross Premium	Basic Death Benefit	Cash Surr Value	Maturity Value	Accrued Revers. Bonus	Bonus Death Benefit	Bonus Cash Surr Value	Bonus Maturity Value	Dur t
1	12064.00	100000	0	0	3000.00	3000.00	0.00	0.00	1
2	12064.00	100000	10000	0	6090.00	6090.00	609.00	0.00	2
3	12064.00	100000	20000	0	9272.70	9272.70	1854.54	0.00	3
4	12064.00	100000	30000	0	12550.88	12550.88	3765.26	0.00	4
5	12064.00	100000	40000	0	15927.41	15927.41	6370.96	0.00	5
6	12064.00	100000	50000	0	19405.23	19405.23	9702.61	0.00	6
7	12064.00	100000	60000	0	22987.39	22987.39	13792.43	0.00	7
8	12064.00	100000	70000	0	26677.01	26677.01	18673.91	0.00	8
9	12064.00	100000	80000	0	30477.32	30477.32	24381.85	0.00	9
10	12064.00	100000	0	100000	34391.64	34391.64	0.00	34391.64	10

Appendix C.1 Assumption Parameters by Duration for Premium Basis

Dur t	%0 Mort- ality	% With- rawal	% Int	% Inf exp	% Rev bon	$ Death exp	$ termin- ation exp	$ admin per policy exp	S I per mille admin exp	prem per cent admin exp	prem per cent comm- ission	Dur t
1	1.74	15.0	7.0	5.0	3.0	210.00	52.50	20.00	1.0	50.0	70.0	1
2	1.90	7.5	7.0	5.0	3.0	220.50	55.13	21.00	1.0	5.0	2.5	2
3	2.09	7.5	7.0	5.0	3.0	231.53	57.88	22.05	1.0	5.0	2.5	3
4	2.30	7.5	7.0	5.0	3.0	243.10	60.78	23.15	1.0	5.0	2.5	4
5	2.54	7.5	7.0	5.0	3.0	255.26	63.81	24.31	1.0	5.0	2.5	5
6	2.82	7.5	7.0	5.0	3.0	268.02	67.00	25.53	1.0	5.0	2.5	6
7	3.14	7.5	7.0	5.0	3.0	281.42	70.36	26.80	1.0	5.0	2.5	7
8	3.50	7.5	7.0	5.0	3.0	295.49	73.87	28.14	1.0	5.0	2.5	8
9	3.91	7.5	7.0	5.0	3.0	310.27	77.57	29.55	1.0	5.0	2.5	9
10	4.37	100.0	7.0	5.0	3.0	325.78	81.44	31.03	1.0	5.0	2.5	10

Appendix C.2 Assumption Parameters by Duration for Statutory Basis

Dur t	%0 Mort-ality	% With-rawal	% Int	% Inf exp	% Rev bon	$ Death exp	$ termin-ation exp	$ admin per policy exp	S I per mille admin exp	prem per cent admin exp	prem per cent comm-ission	Dur t
1	1.88	0.0	3.5	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	1
2	2.08	0.0	3.5	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	2
3	2.31	0.0	3.5	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	3
4	2.59	0.0	3.5	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	4
5	2.92	0.0	3.5	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	5
6	3.30	0.0	3.5	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	6
7	3.72	0.0	3.5	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	7
8	4.20	0.0	3.5	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	8
9	4.74	0.0	3.5	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	9
10	5.34	100.0	3.5	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	10

Appendix C.3 Assumption Parameters by Duration for Current Realistic Basis

Dur t	%0 Mort- ality	% With- rawal	% Int	% Inf exp	% Rev bon	$ Death exp	$ termin- ation exp	$ admin per policy exp	S I per mille admin exp	prem per cent admin exp	prem per cent comm- ission	Dur t
1	1.64	20.0	8.0	5.0	3.0	157.50	31.50	10.00	0.5	40.0	70.0	1
2	1.80	9.5	8.0	5.0	3.0	165.38	33.08	10.50	0.5	4.0	2.5	2
3	1.99	9.5	8.0	5.0	3.0	173.64	34.73	11.03	0.5	4.0	2.5	3
4	2.20	9.5	8.0	5.0	3.0	182.33	36.47	11.58	0.5	4.0	2.5	4
5	2.44	9.5	8.0	5.0	3.0	191.44	38.29	12.16	0.5	4.0	2.5	5
6	2.72	9.5	8.0	5.0	3.0	201.01	40.20	12.76	0.5	4.0	2.5	6
7	3.04	9.5	8.0	5.0	3.0	211.07	42.21	13.40	0.5	4.0	2.5	7
8	3.40	9.5	8.0	5.0	3.0	221.62	44.32	14.07	0.5	4.0	2.5	8
9	3.81	9.5	8.0	5.0	3.0	232.70	46.54	14.77	0.5	4.0	2.5	9
10	4.27	100.0	8.0	5.0	3.0	244.33	48.87	15.51	0.5	4.0	2.5	10

Appendix C.4 Assumption Parameters by Duration for Last Realistic Basis

Dur t	%0 Mort- ality	% With- rawal	% Int	% Inf exp	% Rev bon	$ Death exp	$ termin- ation exp	$ admin per policy exp	S I per mille admin exp	prem per cent admin exp	prem per cent comm- ission	Dur t
1	1.69	17.5	7.5	5.0	3.0	183.75	42.00	15.00	0.8	45.0	70.0	1
2	1.85	8.5	7.5	5.0	3.0	192.94	44.10	15.75	0.8	4.5	2.5	2
3	2.04	8.5	7.5	5.0	3.0	202.58	46.31	16.54	0.8	4.5	2.5	3
4	2.25	8.5	7.5	5.0	3.0	212.71	48.62	17.36	0.8	4.5	2.5	4
5	2.49	8.5	7.5	5.0	3.0	223.35	51.05	18.23	0.8	4.5	2.5	5
6	2.77	8.5	7.5	5.0	3.0	234.52	53.60	19.14	0.8	4.5	2.5	6
7	3.09	8.5	7.5	5.0	3.0	246.24	56.28	20.10	0.8	4.5	2.5	7
8	3.45	8.5	7.5	5.0	3.0	258.55	59.10	21.11	0.8	4.5	2.5	8
9	3.86	8.5	7.5	5.0	3.0	271.48	62.05	22.16	0.8	4.5	2.5	9
10	4.32	100.0	7.5	5.0	3.0	285.06	65.16	23.27	0.8	4.5	2.5	10

Appendix C.5 Assumption Parameters by Duration for Anticipated Actual Basis

Dur t	%0 Mort-ality	% With-rawal	% Int	% Inf exp	% Rev bon	$ Death exp	$ termin-ation exp	$ admin per policy exp	S I per mille admin exp	prem per cent admin exp	prem per cent comm-ission	Dur t
1	1.59	22.0	8.5	5.0	3.0	131.25	21.00	5.00	0.4	35.0	70.0	1
2	1.75	10.0	8.5	5.0	3.0	137.81	22.05	5.25	0.4	3.5	2.5	2
3	1.94	10.0	8.5	5.0	3.0	144.70	23.15	5.51	0.4	3.5	2.5	3
4	2.15	10.0	8.5	5.0	3.0	151.94	24.31	5.79	0.4	3.5	2.5	4
5	2.39	10.0	8.5	5.0	3.0	159.54	25.53	6.08	0.4	3.5	2.5	5
6	2.67	10.0	8.5	5.0	3.0	167.51	26.80	6.38	0.4	3.5	2.5	6
7	2.99	10.0	8.5	5.0	3.0	175.89	28.14	6.70	0.4	3.5	2.5	7
8	3.35	10.0	8.5	5.0	3.0	184.68	29.55	7.04	0.4	3.5	2.5	8
9	3.76	10.0	8.5	5.0	3.0	193.92	31.03	7.39	0.4	3.5	2.5	9
10	4.22	100.0	8.5	5.0	3.0	203.61	32.58	7.76	0.4	3.5	2.5	10

Appendix D.1

Basic Projection Mechanism

Premium Rates Calculation - First Iteration

t	FUND0	PREM	EXPADMIN	EXPTERM	COMM	DEATH	DEATHBON	SURR	SURRBON	MAT	MATBON	INT	FUND1	t
1	0.00	12064.00	6152.00	8.24	8444.80	174.00	5.22	0.00	0.00	0.00	0.00	0.00	0.00	1
2	0.00	10236.56	614.50	3.86	255.91	161.22	9.82	636.39	38.76	0.00	0.00	0.00	0.00	2
3	0.00	9450.82	568.15	3.78	236.27	163.73	15.18	1175.09	108.96	0.00	0.00	0.00	0.00	3
4	0.00	8723.74	525.24	3.70	218.09	166.32	20.87	1627.02	204.21	0.00	0.00	0.00	0.00	4
5	0.00	8050.90	485.50	3.63	201.27	169.51	27.00	2002.05	318.87	0.00	0.00	0.00	0.00	5
6	0.00	7428.17	448.70	3.56	185.70	173.64	33.69	2308.99	448.06	0.00	0.00	0.00	0.00	6
7	0.00	6851.68	414.60	3.50	171.29	178.33	40.99	2555.75	587.50	0.00	0.00	0.00	0.00	7
8	0.00	6317.90	383.00	3.44	157.95	183.29	48.90	2749.42	733.46	0.00	0.00	0.00	0.00	8
9	0.00	5823.61	353.72	3.39	145.59	188.75	57.52	2896.36	882.73	0.00	0.00	0.00	0.00	9
10	0.00	5365.77	326.57	36.86	134.14	194.37	66.85	0.00	0.00	44283.19	15229.72	0.00	0.00	10

Appendix D.2

Intermediate Projection Matrix

Premium Rates Calculation showing INTerest and FUND accumulations

t	FUND0	PREM	EXPADMIN	EXPTERM	COMM	DEATH	DEATHBON	SURR	SURRBON	MAT	MATBON	INT	FUND1	t
1	0.00	12064.00	6152.00	8.24	8444.80	174.00	5.22	0.00	0.00	0.00	0.00	-177.30	-2897.56	1
2	-2897.56	10236.56	614.50	3.86	255.91	161.22	9.82	636.39	38.76	0.00	0.00	452.80	6071.34	2
3	6071.34	9450.82	568.15	3.78	236.27	163.73	15.18	1175.09	108.96	0.00	0.00	1030.24	14281.24	3
4	14281.24	8723.74	525.24	3.70	218.09	166.32	20.87	1627.02	204.21	0.00	0.00	1558.32	21797.84	4
5	21797.84	8050.90	485.50	3.63	201.27	169.51	27.00	2002.05	318.87	0.00	0.00	2041.34	28682.25	5
6	28682.25	7428.17	448.70	3.56	185.70	173.64	33.69	2308.99	448.06	0.00	0.00	2483.32	34991.40	6
7	34991.40	6851.68	414.60	3.50	171.29	178.33	40.99	2555.75	587.50	0.00	0.00	2888.00	40779.11	7
8	40779.11	6317.90	383.00	3.44	157.95	183.29	48.90	2749.42	733.46	0.00	0.00	3258.92	46096.47	8
9	46096.47	5823.61	353.72	3.39	145.59	188.75	57.52	2896.36	882.73	0.00	0.00	3599.45	50991.47	9
10	50991.47	5365.77	326.57	36.86	134.14	194.37	66.85	0.00	0.00	44283.19	15229.72	3912.76	-1.69	10

Appendix D.3

Basic Projection Mechanism

Statutory Valuation Net Premium Calculation

t	PREM	EXPADMIN	DEATH	MAT	t
1	1.0000	3500.00	181.64	0.00	1
2	0.9644	0.00	193.81	0.00	2
3	0.9298	0.00	207.52	0.00	3
4	0.8963	0.00	224.29	0.00	4
5	0.8637	0.00	243.69	0.00	5
6	0.8321	0.00	265.31	0.00	6
7	0.8013	0.00	288.01	0.00	7
8	0.7713	0.00	313.00	0.00	8
9	0.7421	0.00	339.87	0.00	9
10	0.7136	0.00	368.19	68580.95	10
Tot 8.5147		3500.00	2625.32	68580.95	@ start of year 1

Net Premium is

(3500.00 + 2625.32 + 68580.95) / 8.5147

= 74706.27 / 8.5147

= 8773.80

Appendix D.4

Intermediate Projection Mechanism

Statutory Valuation Reserve at Start of Year 1 - Second Iteration

t	PREM	EXPADMIN	DEATH	MAT	t
1	8773.79	3500.00	181.64	0.00	1
2	8461.15	0.00	193.81	0.00	2
3	8158.02	0.00	207.52	0.00	3
4	7863.94	0.00	224.29	0.00	4
5	7578.33	0.00	243.69	0.00	5
6	7300.68	0.00	265.31	0.00	6
7	7030.52	0.00	288.01	0.00	7
8	6767.50	0.00	313.00	0.00	8
9	6511.19	0.00	339.87	0.00	9
10	6261.18	0.00	368.19	68580.95	10
Tot	74706.19	3500.00	2625.32	68580.95	

Reserve at start of year 1 is

(3500.00 + 2625.32 + 68580.95) - 74706.19

= 74706.27 - 74706.19

= 0.08

(after rounding errors we have zero as we would expect)

Appendix E.1

Product Development (Premium Rates) Detailed Calculations

Calculation of Basic Projection Matrix

To illustrate the VALUE Formula at work, I shall explain the detailed calculation of each of the items in the projection, for the first 2 years.

The date in the VALUE Formula definitions applicable for premium rate calculations, is at time t, where t varies from commencement at the beginning of year 1, to maturity at the end of the year 10.

t the "t"th policy year
t = 1

PREM — Premiums received
(Assumed payable at start of policy year)

Amount of Benefit — Gross Annual Premium (cf Appendix B.2)
Assumption Rate — Full premium is payable

Probability of Survival — Certain to survive to start of projection!
Probability of Decrement — Certain to be paid

Discount Factor — For this simple Premium Rate calculation, there is no discounting.

i.e.

```
PREM
 = AB      *      AR      *      PS      *      PD      *      DF
 = PREMIUM        1              1              1              1
 = 12064.00
```

EXPADMIN — Ongoing Administration Expenses incurred
(Assumed incurred at start of policy year)

and

EXPTERM — Termination Expenses incurred
(Assumed incurred at end of policy year)

Expenses incurred can be many and varied, and each life office will have its own set based on its own administration structure and its basis of measurement of expenses and their analysis with respect to policy parameters.

Each of these should form an element in the cash flow projection, as each has its own set of VALUE Formula definitions and each can have its own time of incidence - eg beginning, middle , end of year. They affect the later calculation of interest (INT) accruing and hence FUND accumulation values at the end of each year, in the intermediate projection matrix.

I have kept just two EXPENSE columns in the projection, but have calculated these as the sum of 3 and 2 expense elements respectively for EXPADMIN and EXPTERM, in order to illustrate the operation of the *Amount of Benefit* (AB) and the *Assumption Rate* (AR) definitions of the VALUE Formula.

The *Amount of Benefit* (AB) for all expenses, is the item on which the Expense is calculated.

If it is a dollar amount expense, ie event based, AB = 1.
If it is a per unit Sum Insured expense, AB = Sum Insured.
If it is a per unit Premium expense, AB = Premium.

The *Assumption Rate* (AR) for all expenses, is the expense rate or dollar amount itself.

A detailed example of the calculation will make this clearer.

EXPADMIN

EXPADMIN (1) DOLLAR EXPENSES PER POLICY (ADMIN)
(Assumed incurred at start of year)

Amount of Benefit	One for event based (ie policy in force)
Assumption Rate	The per policy admin expense amount inflated to the start of year 1. (from Appendix C.1)
Probability of Survival	Certain to survive to start of projection year 1.
Probability of Decrement	One - in force.
Discount Factor	For this simple Premium Rate calculation, there is no discounting.

i.e.
EXPADMIN (1) DOLLAR EXPENSES PER POLICY (ADMIN)

```
=  AB        *      AR         *        PS       *        PD      * DF
=  1        PER POL $ AMT EXP           1                 1         1
=                   20
=  20
```

EXPADMIN (2) PER UNIT PREMIUM EXPENSE (ADMIN)
(Assumed to occur at start of year)

Amount of Benefit	Gross Annual Premium (from Appendix B.2)
Assumption Rate	The per unit prem admin expense rate at the start of year 1. (from Appendix C.1)
Probability of Survival	Certain to survive to start of projection year 1.
Probability of Decrement	One - in force.
Discount Factor	For this simple Premium Rate calculation, there is no discounting.

i.e.
EXPADMIN (2) PER UNIT PREMIUM EXPENSE (ADMIN)

```
=   AB        *    AR           *      PS      *      PD     * DF
=   PREMIUM      PREM P.U EXP          1              1        1
=   12064.00        .5
=   6032.00
```

EXPADMIN (3) PER MIL% PREM EXPENSE (ADMIN)
(Assumed to occur at start of year)

Amount of Benefit	Basic Death Benefit (from Appendix B.2)
Assumption Rate	The per unit sum insured admin expense rate at the start of year 1. (from Appendix C.1)
Probability of Survival	Certain to survive to start of projection year 1.
Probability of Decrement	One - in force.
Discount Factor	For this simple Premium Rate calculation, there is no discounting.

i.e.
EXPADMIN (3) PER MIL% PREM EXPENSE (ADMIN)

```
=   AB        *    AR           *      PS      *      PD     * DF
=  DTH BEN      SUM INS P/U EXP        1              1        1
=  100000          .001
 = 100.00
```

```
Adding EXPADMIN =  20  +  6032  +  100
                =  6152.00
```

EXPTERM

EXPTERM (1) DOLLAR EXPENSE ON DEATH
(Death assumed to occur at end of year)

Amount of Benefit — One for event based.
Assumption Rate — The death expense amount inflated to the end of year 1. (from Appendix C.1)

Probability of Survival — Certain to survive to start of projection year 1.
Probability of Decrement — Only payable on death in year 1.

Discount Factor — For this simple Premium Rate calculation, there is no discounting.

i.e.

EXPTERM (1) DOLLAR EXPENSE ON DEATH

```
 =   AB      *      AR       *       PS      *     PD     * DF
 =    1      DEATH $ AMT EXP          1           Qx        1
 =                 210                          .00174
 =  0.37
```

EXPTERM (2) DOLLAR EXPENSE ON NON DEATH TERMINATION (Lapse/Surrender/Maturity assumed to occur at end of year)

Amount of Benefit — One for event based.
Assumption Rate — The termination expense amount inflated to the end of year 1. (from Appendix C.1)

Probability of Survival — Certain to survive to start of projection year 1.
Probability of Decrement — Only payable on lapse in year 1.

Discount Factor — For this simple Premium Rate calculation, there is no discounting.

i.e.

EXPTERM (2) DOLLAR EXPENSE ON NON DEATH TERMINATION

```
 =   AB      *      AR       *       PS      *      PD     * DF
 =    1      TERM  $ AMT EXP          1           Wx        1
 =                 52.50                        .15
 =  7.88

Adding EXPTERM =  0.37  +  7.88
               =  8.25
```

COMM COMMISSION
(Assumed to occur at start of year, with payment of premium)

Amount of Benefit Gross Annual Premium (from Appendix B.2)
Assumption Rate The per unit premium commission rate at the start of year 1. (from Appendix C.1)

Probability of Survival Certain to survive to start of projection year 1.
Probability of Decrement One - in force.

Discount Factor For this simple Premium Rate calculation, there is no discounting.

i.e.
COMM COMMISSION

=	AB	*	AR	*	PS	*	PD	*	DF
=	PREMIUM		PREM P.U COMM		1		1		1
=	12064.00		.7						
=	8444.80								

DEATH (Death assumed to occur at end of year)

Amount of Benefit Death benefit (from Appendix B.2)
Assumption Rate One - full amount payable

Probability of Survival Certain to survive to start of projection year 1.
Probability of Decrement Only payable on death in year 1.

Discount Factor For this simple Premium Rate calculation, there is no discounting.

i.e.
DEATH

=	AB	*	AR	*	PS	*	PD	*	DF
=	DEATH BEN				1		Qx		1
=	100000						.00174		
=	174.00								

DEATHBON BONUS PAYMENT ON DEATH
(Death assumed to occur at end of year and bonus assumed to accrue at that time)

Amount of Benefit Bonus Death benefit (from Appendix B.2)

All other VALUE factors are identical to those for DEATH.
ie
DEATHBON

=	AB	*	AR	*	PS	*	PD	*	DF
=	BON DEATH BEN		1		1		Qx		1
=	3000						.00174		
=	5.22								

SURR SURRENDER
(Surrender assumed to occur at end of year)

Amount of Benefit Cash Surrender Value (from Appendix B.2)
Assumption Rate One - full amount payable

Probability of Survival Certain to survive to start of projection year 1.
Probability of Decrement Only payable on withdrawal in year 1.

Discount Factor For this simple Premium Rate calculation, there is no discounting.

i.e.
SURR SURRENDER

=	AB	*	AR	*	PS	*	PD	*	DF
=	CSV		1		1		Wx		1
=	0						.15		
=	0								

SURRBON BONUS PAYMENT ON SURRENDER
(Surrender assumed to occur at end of year and bonus assumed to accrue at that date)

Amount of Benefit Bonus Cash Surr Value (from Appendix B.2)

All other VALUE factors are identical to those for SURR.
ie
SURRBON

=	AB	*	AR	*	PS	*	PD	*	DF
=	BON CSV		1		1		Wx		1
=	0						.15		
=	0								

MAT MATURITY
(Maturity assumed to occur at end of year)

Amount of Benefit Maturity Value (from Appendix B.2)
Assumption Rate One - full amount payable

Probability of Survival Certain to survive to start of projection year 1.
Probability of Decrement Only payable on withdrawal in year 1.

Discount Factor For this simple Premium Rate calculation, there is no discounting.

i.e.
MAT MATURITY

=	AB	*	AR	*	PS	*	PD	* DF
=	MAT		1		1		Wx	1
=	0						.15	
=	0							

MATBON BONUS PAYMENT ON MATURITY
(Maturity assumed to occur at end of year and bonus assumed to accrue at that date)

Amount of Benefit Bonus Maturity Value (from Appendix B.2)

All other VALUE factors are identical to those for MAT.
ie
MATBON

=	AB	*	AR	*	PS	*	PD	* DF
=	BON MAT		1		1		Wx	1
=	0						.15	
=	0							

Using the same principles for assigning values to the VALUE factors for the second year (t=2), we get the following equations and answers. I have omitted the repetition of the factor names and explanations as they are identical to those for t= 1, but the actual figures taken from the policy and assumption parameter tables A.2 and B.1 are for a year later.

t=2 (2nd Year)

PREM Premiums received
(Assumed payable at start of policy year)

```
PREM
 =   AB        *      AR        *        PS        *     PD      * DF
 =   PREMIUM          1                  1Px               1        1
 =   12064.00                         0.848521
 =   10236.56
```

Note PS = 1Px is survival allowing for both Mortality and Lapse Decrement.

EXPADMIN Ongoing Administration Expenses incurred
(Assumed incurred at start of policy year)

EXPADMIN (1) DOLLAR EXPENSES PER POLICY (ADMIN)
(Assumed incurred at start of year)

```
 =   AB        *      AR        *        PS        *     PD      *  DF
 =    1       PER POL $ AMT EXP          1Px               1         1
 =                    21                .848521
 =   17.82
```

EXPADMIN (2) PER UNIT PREMIUM EXPENSE (ADMIN)

```
 =   AB        *      AR        *        PS        *     PD      * DF
 =   PREMIUM        PREM P.U EXP          1Px               1        1
 =   12064.00          .05               .848521
 =   511.83
```

EXPADMIN (3) PER MIL% PREM EXPENSE (ADMIN)

```
 =   AB        *      AR        *        PS        *     PD      * DF
 =   DTH BEN      SUM INS P/U EXP         1Px               1        1
 =   100000           .001               .848521
 =   84.85
```

Adding EXPADMIN = 17.82 + 511.83 + 84.85
= 614.50

```
EXPTERM

EXPTERM (1)   DOLLAR EXPENSE ON DEATH

 =   AB       *       AR        *        PS      *     PD     * DF
 =    1       DEATH $ AMT EXP           1Px           Qx        1
 =                    220.50          .848521       .0019
 =   0.36

EXPTERM (2)   DOLLAR EXPENSE ON NON DEATH TERMINATION

 =   AB       *       AR        *        PS      *     PD     * DF
 =    1       TERM  $ AMT EXP           1Px           Wx        1
 =                    55.13           .848521       .075
 =  3.50

Adding EXPTERM =  0.36  +  3.50
               =  3.86


COMM          COMMISSION

 =   AB       *       AR        *        PS      *     PD     * DF
 =   PREMIUM      PREM P.U COMM           1Px           1        1
 =   12064.00       .025           .848521
 =   255.91


DEATH

 =   AB       *       AR        *        PS      *     PD     * DF
 =   DEATH BEN        1             1Px           Qx        1
 =   100000                       .848521       .0019
 =   161.22

DEATHBON

 =   AB       *       AR        *        PS      *     PD     * DF
 =   BON DEATH BEN    1             1Px           Qx        1
 =   6090                         .848521       .0019
 =   9.82


SURR          SURRENDER

 =   AB       *       AR        *        PS      *     PD     * DF
 =   CSV               1             1Px           Wx        1
 =   10000                        .848521       .075
 =   636.39
```

```
SURRBON
 =    AB        *       AR        *        PS       *     PD     * DF
 =    BON CSV           1                  1Px              Wx        1
 =    609.00                             .848521          .075
 =    38.76

MAT              MATURITY

 =    AB        *       AR        *        PS       *     PD     * DF
 =    MAT               1                  1Px              Wx        1
 =    0                                  .848521          .075
 =    0

MATBON
 =    AB        *       AR        *        PS       *     PD     * DF
 =    BON MAT           1                  1Px              Wx        1
 =    0                                  .848521          .075
 =    0
```

Appendix E.2

Statutory Reserve Net Premium Detailed Calculations

Calculations at Date of Issue

First run through of projections.

t = 1

PREM Premiums received
(Assumed payable at start of policy year)

Amount of Benefit One - per unit premium
Assumption Rate Full premium is payable

Probability of Survival Certain to survive to start of projection!
Probability of Decrement Certain to be paid

Discount Factor Payment is made at start of year one, so discounting is for 0 years.

i.e.

PREM								
= AB	*	AR	*	PS	*	PD	*	DF
= PREMIUM		1		0Px		1		V**0
= 1				1				1
= 1								

EXPADMIN (3) PER MIL% PREM EXPENSE (ADMIN)
(Assumed to occur at start of year)

Amount of Benefit Basic Death Benefit (from Appendix B.2)
Assumption Rate The per unit sum insured admin expense rate at the start of year 1 (the Zillmer rate)

Probability of Survival Certain to survive to start of projection year 1.
Probability of Decrement One - in force.

Discount Factor Payment is made at start of year one, so discounting is for 0 years.

i.e.

EXPADMIN (3)	PER MIL% PREM EXPENSE (ADMIN)							
= AB	*	AR	*	PS	*	PD	*	DF

```
=  DTH BEN     SUM INS P/U EXP          1            1        1
=  100000          .035
=  3500
```

DEATH (Death assumed to occur at end of year)

Amount of Benefit Death benefit (from Appendix B.2)
Assumption Rate One - full amount payable

Probability of Survival Certain to survive to start of projection year 1.
Probability of Decrement Only payable on death in year 1.

Discount Factor One full year's discounting at the Valn rate of interest.

i.e.
DEATH

```
=  AB        *       AR        *        PS       *     PD      *  DF
=  DEATH BEN                            1             Qx        V**1
=  100000                                          .00188    .96618
=  181.64
```

MAT MATURITY
(Maturity assumed to occur at end of year)

Amount of Benefit Maturity Value (from Appendix B.2)
Assumption Rate One - full amount payable

Probability of Survival Certain to survive to start of projection year 1.
Probability of Decrement Only payable on withdrawal in year 1.

Discount Factor For this simple Premium Rate calculation, there is no discounting.

(Maturity decrement [change Premium Rate calc] is at end of year, but does not act over full year as for surrender. Hence PS must cover period up to the actual maturity date.)

i.e.
MAT MATURITY

```
=   AB        *       AR        *        PS       *     PD      *  DF
=   MAT                1                   1             Wx        V**1
=   0                                    .99812          .0     .96618
=   0
etc for years 1 to 9

In year 10 we have
MAT           MATURITY
```

```
=   AB       *     AR       *      PS      *    PD     *  DF
=   MAT            1              10Px          Wx      V**10
=   100000                        .96740        1      .70892
=   70499.25
```

If we add the columns we get

PREM	EXPADMIN	DEATH	MAT
8.51471	3500	2625.32	68580.95

```
NET PREMIUM = (3500 + 2625.32 + 68580.95) / 8.51471
            = 74706.27 / 8.5147
            = 8773.79
```

SYDNEY

MR. S. McGING (Author): In writing the paper I was trying to achieve two aims. The first was to save readers some of the heartache of what I went through when I first worked on computer systems - becoming familiar with the basics of the computing environment and its associated terminology for both personal and mainframe computer systems. The second was to relate these fundamentals to the business that we are in - that of the life office actuary in a life insurance company.

Part I of the paper first describes the computing environment background and then describes the various types of computer applications to which the life actuary attends.

One practical use of Part I of the paper might be to introduce new actuarial students to actuarial computing concepts and ideas. The paper may also be quite useful as a reference document.

Part II is a proposal for a particular computer model developed to illustrate the practical implementation of the ideas and principles described in Part I. The basis for that model are practical observations that I have made, coupled with my interpretation of the direction of computing as it affects the actuarial world at this time.

Computers and their use can be a very controversial subject. I hope that people in reading this paper and in the discussion that will follow this evening will be quite free with their views. People can have very different views on a lot of aspects discussed in the paper. As I said in the paper, I am not a computer expert. I am just taking the role of putting things down on paper and getting people to react to them. So I encourage you to do that tonight.

MR. M. GARDNER: As those of you who know me know, this is a subject close to my heart. I very much wish to thank Mr. McGing on his lucid paper. This morning I rang David Begg to say that I wished to speak and then he drafted me as Opening Speaker.

I found very little in the paper I could quarrel with so I will speak from my own experiences in this field and perhaps just question in a small way some of the emphasis Sean has placed on certain matters.

I intend to speak on two matters, the vision we are aiming for and the DP needs expressed in Section 6.3.

The last five years has seen the PC come of age. No longer do the DP managers in our industry pour scorn on this plaything. This paper addresses one of the major unsung problems of the DP industry - the lack of experts with both experience in Mainframes and PCs. The next five years will be highlighted by the incredible growth in the communication between all computers. All the ingredients are falling into place, IBMs System Application Architecture (SAA), the operating systems such as OS/2 extended, the structured query language SQL pronounced SEQUEL by the initiated I am told, the data bases, the application programs, and the networking hardware.

My first quibble with Sean was his title of Part II - an Integrated Life Actuarial Computer System. I think that he just stepped away from calling it the Life Office Financial Management Information System on which General Managers can base their hard decisions. He mentioned the other ingredients, the accounting information and the statistics. I believe this Financial Management System is the holy grail that Chief Actuaries and General Managers are searching for and this paper should provide them with some good indicators in their search.

I think that most of us feel some level of discomfort when looking at the current state of Australian Life Offices and when we try to imagine the future course of all the individual Offices. I believe most of us would attach a much larger probability of ruin than at the start of any recent decade.

Sean started his search for the Holy Grail by looking at how to predict the future position of the office from a new business model. Given that it is now a rare office that does not have some rudimentary projection system, I decided to pursue the holy grail instead from the very recent past. I believe that it is very hard to model the future if you do not know where you have been or where you are. Admittedly if you do not know where you are going, it may be hard to say where you are today. The great weakness of many actuarial systems today is in the Realistic Reserve Area and in particular in the Analysis of the Sources of Profit and Losses. If we cure that problem then we obtain some decent assumptions as to our current experience and some hard numbers.

Hard in several senses, for discussions with management often revolve around the issuing of only marginally profitable premium rates. How many offices know the financial bottom line effects of the current high surrender rates? How many offices live inside their expense margins? Thus it is important at the individual product level to bring out the current credible "realistic" assumptions and then we can start to model the future. A management system must be able to manage the present and solve today's problems or there will be no tomorrow.

Out of this realistic valuation system on every individual policy will flow the program modules and arrays of factors needed for the projection system. The model projection package that I think both Sean and I envisage must be able to cope with varying scenarios of asset and interest cycles, varying new business, varying inflation, franked dividends, taxes, etc. I also feel that it should not only be able to generate the Statutory Profit from Solvency Reserves based around adverse deviation margins, but also the "realistic profit" and the source of those profits split up into profits on Surplus, planned profit margins, and varianced to the realistic assumptions. For example the bottom line effects of a change in surrender rates should be shown.

Like Sean, I now believe that this is achievable in the foreseeable future provided we treat the computers with respect and do not expect miraculous speeds.

Having shared my vision with you, I would now like to go through Section 6.3 and relate it to Sean's picture of the computer scene now and in the near future which Sean has expressed admirably.

In Sections 6.3.1 and 6.3.2, I agree whole-heartedly that it is best to write a lot of sub-program modules that can be accessed by any actuarial system as it not only saves time, it also stops errors arising from small differences in programming and interpretations.

I would restate Section 6.3.3 slightly differently. Any system and its associated programs should be designed to be maintainable for the next 20 years with appropriate documentation for the user, another designer and another programmer.

Unlike Sean, I believe that speed will always be a problem and it is not sufficient to expect the computers to finally get fast enough that one can adopt elegant and simple formulae. So any section of a program which is used thousands of times in a run must be designed for maximum speed and then be documented. I have numerous examples where a small added inelegance caused the program to speed up considerably.

One example was an Agency Support Policy Illustration program that was taking up to 5 minutes to produce answers. This was reduced to 20 seconds by introducing more actuarial formulae, splitting the central formulae up so that when zero constants or arrays were present they were avoided.

Sections 6.3.4 to 6.3.7 I agree with, but it made me a little puzzled given some of Sean's earlier remarks. Screens are always the way to go.

I know of only one computer language that covers PCs, workstations, minis and mainframes and that is the old and trustworthy COBOL. I am told that 70% of all programs in the world are written in COBOL. I was surprised when I read Sean's references to APL and C but then later he mentioned Micro Focus COBOL which relieved my mind.

APL is a marvellous language for actuarial programs but it is not popular with DP managers, suffers from several dialects and I believe that it is not available on many machines. As Sean says, it must be very carefully documented otherwise it is double-dutch and most people prefer to rewrite an APL program from scratch rather than adjust another person's program.

COBOL is often knocked in actuarial circles so I would like to spend a few minutes on it as there have been advances made on it. An English Company called Micro Focus has specialised in COBOL and now dominate the field of COBOL compilers with Microsoft and IBM actually rebadging their product. Now companies like Sun Microsystems and IBM with their new RISC chips go to Micro Focus and ask for a COBOL compiler rather than try and do it themselves.

The reason is the PC version is accompanied by a magnificent set of tools which they call Workbench COBOL. With Workbench you can animate a program so that you can step through the program line by line showing each element of each calculation. If a program is falling over, you can run it to that point, examine the line at that point then patch in extra lines of logic or change a data field and restart it at any point in the program. This means you can review how a program works or debug a program in no time at all. Other features include counting how often each line of code is used in a real life run, painting a screen, adding panels to a screen, and having overlapping screens. You can now develop on a PC the CICS screens for the IBM mainframe. Better still in the latest version you can now access Presentation Manager under OS/2 so you can use the mouse and do all sorts of fancy screen routines.

With common code covering all computers then you can deal with any size of office. In a big office with the magic letters SQL and OS/2, it is becoming very feasible to input the parameters on your friendly PC, upload them to the mainframe, run the heavy calculations and large sorts on it, then download the answers to your friendly PC where they can be played with, reviewed and printed off using a variety of tools.

Section 6.3.8 mentions real live data and my earlier points about speed apply here. If the computer code is quick and the computer is large enough then one can use all the policies as one's model or with only the very similar policies aggregated. I believe making a model is an art and it needs some skill and flair which is best avoided if possible as it is not fool-proof.

In Section 4.6 on Post Movement Valuation, Sean implies that an analysis of movements is beyond his dream. In my holy grail it is central to it. This is where the dreams of the actuary in regard to his assumptions meet with hard reality of daylight.

Some of the Revenue Account figures are essential to the Analysis of Profit. Expenses need to be split by product and occasionally these are available on the mainframe or the PC. Similarly interest earnings, capital gains and asset values may be available. Both of these could be captured for our ideal system.

I noted Sean's comments in Section 4.1 that the third party software from overseas is a possibility. The software has been developed and is being developed here and one of my dreams is that we in Australia will be able to export to the UK and USA rather than import. At least I know the Prime Minister would agree with my dream.

I really enjoyed your paper Sean and I think that it is very timely with so many important developments on both the computer and actuarial fronts taking place at this moment in time.

MR. B. WELLAND: Firstly, may I thank the author for a very valuable paper. Part I is a useful reference document with respect to current hardware and software alternatives. Unfortunately, in the nature of information technology advances, it will become outdated over time.

I would like to support Mr. Gardner's comments about APL. This language has been used extensively in my office. We do suffer from the problems resulting from exercise of considerable individuality and ingenuity by very talented amateur programmers, who are tardy about proper documentation. More recently we have also suffered from a great shortage of people who could be called competent in the language, so maintenance is a real problem.

I will confine my comments to Part I of the paper, which attracts me because it rekindles nostalgic memories of the early days of computers in this country. There are several key words in the paper. The first that took my eye was 'accuracy'. In combination with the author's reference to the bygone days of electronic calculators, I was reminded of the mid-1950s when my office used to perform its valuation calculations on an electronic calculator. Accuracy was not a strong point, so the process was rerun until two identical answers were obtained. So long as this answer was within the bounds of gross error checks, it was then accepted as the valuation liability.

The next label that took my eye was 'user-friendly'. That also takes me back a long way, in fact back to 1958 and the first commercial computer in Australia, the IBM 650. Its programming language was called SOAP, rather slippery, and certainly not user-friendly. Even less friendly was the input output control mechanism. The punch card input and the punch card and printer

outputs were controlled by means of plug board wiring. Completed plug boards resembled nothing more than a mass of mutli-coloured spaghetti, and the chances of some wiring becoming disconnected were very real.

The third word that took my eye was 'security', which reminded me that in those early days it was the accepted practice to identify program errors during production runs, alter the program immediately, and continue with the run. Testing and documentation were rudimentary, and controls such as back-up files, anti-fraud security, off-site duplication were not even heard of.

The early DP systems with which I was associated concentrated on creation and maintenance of valuation files for the purposes of experience investigations and statutory statistical reporting, including the valuation process itself. At a somewhat later stage policyholder files were developed for administration and premium billing. Two separate files were thus maintained for the one group of policies resulting in all of the problems referred to in the paper.

Although both files were theoretically updated from the same source they were maintained separately for many years, largely because the criteria governing their creation and maintenance were quite different. The administrative file required, as a very high priority, fast up-date of details such as policyowner name and address, amount and due date of premium, loan information, etc. There was little concern about such esoteric matters as valuation constants, underwriting codes, and rider benefit details.

On the contrary, the valuation file needed these details to be up-dated, and up-dated correctly. Investigations and statutory reports had to be produced. Certifications were required under the Life Insurance Act. Wide ranging edits were devised to assist in correct updating. If a policy change failed the edit checks, it was rejected for examination and re-submission. The delay involved in this process was the major reason why integration of two files was not acceptable.

In more recent times, aided by increased DP capability, some compromises have allowed marriage into a single file, with considerable reduction in costs of file maintenance.

Nowadays we take for granted the existence of computer files for statistical and policyowner billing purposes - indeed it is hard to imagine how we could operate without such DP assistance. Current attention is being directed to more meaningful management information and to development of client files rather than policy files, so as to improve client service.

Another area where considerable focus has been applied is agency support. Given the increasing complexity of our products, our more financially aware clientele and the requirements for greater disclosure, this was an inevitable path to follow. At least in this manner we have more chance of ensuring compliance with regulatory and prudential requirements in the sales process.

To conclude, I would like to return to my theme of key words. This time I refer to one I did not find in the paper - 'co-operation'. By 1962 the larger Australian offices had outgrown the IBM 650 and were ready to move on to the mighty IBM 1410 computer, complete with magnetic tapes and a rudimentary disc drive. Programs were written but testing had to be carried out in the USA. In a spirit of co-operation which would be rare in today's environment, representatives from different offices worked together on this task, each largely working on their own office's programs, but always ready to help the other as needed.

If I could digress for a moment, I am concerned at a recent lack of cooperation between offices in a rather different area. My comment relates to a proposal by the NSW Government to replace Financial Institutions Duty (FID) by a new Financial Assets Duty (perhaps aptly labelled FAD). This new duty, if copied by the other states as is proposed, has the potential in time to approach federal income tax in financial importance to the life industry. The NSW State Government issued a discussion paper in May outlining the proposed changes. A major feature was application of the new levy to all financial institutions including banks, life offices and superannuation funds. Thus superannuation funds invested in life offices would be levied twice, with no offset to be allowed. The intended tax base is total Australian assets, so the normal regimentation of the ballot box to keep rates under control would have little effect.

The discussion paper called for submissions by the 31 August. My office has made a submission and also prepared a draft for LIFA. My information is that up till last week there had been no other submissions made to any of the governments concerned. I would like to take this opportunity to urge you to investigate these proposals as a matter of urgency. It may already be too late.

I apologise for that digression, Mr. President, but I would like to close by again thanking the author for a most interesting paper.

MR. M. SCHNEIDER: I would like to thank the author for his excellent paper on actuarial computing. I feel that this paper will serve as a most useful reference document.

I have split my comments on the paper into the same two sections as the author, namely the comments on actuarial computing in general and then on the integration of actuarial systems.

On computers in general, I think that it is important to remember when considering the power of various computers that it is the elapsed time taken to complete a task on the computer that is important. Thus a mainframe that is, say, 100 times more powerful than a PC may in fact take twice as long to complete a task if there are 200 people using it. So one of the advantages of mainframes listed in Section 2.4.1, namely sheer processing power, may only be true in theory, or at least after 5 o'clock in the afternoon.

Many of the other advantages listed for mainframes in Section 2.4.1 such as security of data, huge data storage capabilities and ease of communication are now readily available from PC network file servers and these are now serious contenders to replace mainframes in small to medium sized life offices. In fact one American life office recently replaced its mainframe with a high end PC network and file servers and reduced its DP costs from $45 a policy to $6 per policy. So the advantages are quite startling.

The advantages of SAA as listed in Appendix A will certainly revolutionise data processing for many organisations. Unfortunately SAA is somewhat further away than IBM would like us to believe.

On the PC side, OS/2 is the IBM strategic product to facilitate SAA and OS/2 runs on most 80286 or higher PCs. Therefore unless IBM throw a curve ball or do something unexpected, we will not have to rush out and buy IBM OS/2 and sell all our PCs to get the benefit of SAA.

I would like to stress the author's comments in Sections 2.5.8.2, 2.5.8.3.2 and 2.5.8.3.3 and also those of the prior speakers that documentation standards and testing are vital ingredients for actuarial systems. Often insufficient resources and time are allocated to these tasks. The programming of the actuarial formulae themselves often take less than one quarter of the time in any actuarial system with the balance being required for programming of input and output, testing, documentation and standards. These are often glossed over when time is allocated for a job. In fact many of these tasks should, perhaps, not be done within the actuarial department at all. However I understand the problems with lack of resources from the DP side.

Turning to Part 2 of the paper I feel that the author's concept of an actuarial engine driving many of the actuarial systems is a very good one. The author has presented a single basic formula which he states can be used at the heart of all actuarial computer programs (Section 8.2). This actuarial equivalent of the long sought-after "unified theory of gravity" is most useful.

The author's concept of an integrated actuarial computer system is certainly very appealing, simple and straightforward in theory. Where the complexity lies for me is in the input and output to and from this core system. For example it would be necessary to maintain and administer hundreds of parameter files containing the parameters for each product, the various bases associated with the calculation of reserves, surrender values, realistic models, etc. Perhaps the author could expand on whether the parameters listed in Appendix B2 would be computer generated. For example, what would be involved in a model office if the user wishes to perform sensitivity tests on, say, reversionary bonus rates? How difficult would this be to do?

The other potential area of complexity for me is the handling of the results of the calculations when they return to, say, the surrender calculation program or the statutory reserve routine. Would these systems then have to be more complex to pick out the appropriate numbers required from the years of numbers produced by the core system?

A further problem is that several systems may require monthly calculations. An example of this would be a profit testing system which in the early years of the policy may need monthly calculations in order to allow for skewed lapses or commission claw-back. If the core system is set up to function monthly for doing profit projections and you will need several passes through this core system to allow for the calculation of surrender values, statutory reserves, termination values, etc, this would require an enormous amount of processing power, especially if the system is functioning on an individual policy basis. I therefore agree with the earlier speakers that it will probably be necessary to set up model points with the underlying in force business, at least for several years, until computers are far more powerful. This is especially true if one is going to be running sensitivity tests on the data. A user does not want to have to wait overnight for these runs.

I would like to pose an alternative integrated approach to actuarial systems. In fact it may not be an alternative but perhaps my misunderstanding of some of the items proposed in the paper. Instead of having a projection matrix as the engine would it not be possible to have many different engines such as a whole of life surrender value calculation engine, or a term assurance statutory reserve calculation routine? These could still be available to all systems that require these values such as valuation and projection systems but would not depend on just using the projection approach. Any method could be used to calculate them.

This approach would be supported by the new emerging technology called object oriented programming languages, such as C++ which facilitate this type of approach. Once again I would like to compliment the author on his paper. I have certainly got a lot out of it and I hope that many of his ideas are carried forward and implemented in due course.

MR. D. KERR: I would like to add my congratulations to the author for a very voluminous paper. I would like to comment on that later. I think the larger a paper gets, the more things you can leave out.

The author has given us a history of hardware development and I think this resulted in three fundamental changes to the way systems are developed. First of all we have gone from model points and groups to first principles and individual policies and it has made systems a lot simpler to understand and build.

Secondly programs are now updated and tested with immediate turnaround, a few seconds. Whereas in my early days it used to be one or two days turnaround. With a one day turnaround you spent a lot of time making sure you got your corrections right before you put things into it. These days with immediate turnaround you can just try and see if it gets the right result or not. If it does not you try it again.

Thirdly the growth of information centres has meant a loss of life office experience in those computer areas. The computer professionals these days are computer professionals they are not life insurance people.

There are four areas I would have like to have seen broadened in the paper. The formula in Section 8.2 is rather simplistic. There are two other areas which make this formula a lot more complex in practice. One is paying frontend loaded commission to agents which makes computer systems very complex and the other is security. When we give quote systems to agents, you want to make sure they cannot change the interest rates to something they would appreciate, 25% or 30%. It might give the right answer for the agent but not for the office.

In the asset liability matching area I would like to see a lot of work on the cost of guarantees and the desired reserve levels. It is something we are still to see.

The author has not quite given the solution to the biggest problem with computer areas, the priority queue. If you have got a one year priority queue how do you get rid of that.

One comment on Section 4.4.3 on experience investigation. Just a plea to make sure that the computer system for the future automatically generates output for the Institute's Mortality and Morbidity Investigation.

I would like to comment on a couple of issues raised by previous speakers. There was a comment that the elapsed time was more important than processing time. I have two disagreements with this. First of all if you are paying by processing time then processing time is more important than the elapsed time.

Secondly if a mainframe takes 10 minutes for a job but you cannot get it running for three days and a PC takes 8 hours but you can run it overnight then I do not care if it takes 8 hours. You set it going when you leave for home and it is all nice and finished in the morning.

Finally I believe that the complexity of management information systems and product design increases to absorb any spare capacity.

MR. S. McGING (Author): Thank you for your interesting comments.

In replying, I will dwell only one those areas where I have something positive to offer, or where there is some disagreement with an aspect of the paper. Otherwise the standard established for writing 100 pages would be continued beyond what any of us would like!

Mike Gardner referred to SQL. SQL is a particularly useful recent development. We are getting to a situation where the tools available in the market place and the mechanics that are established by way of standards etc. are becoming increasingly important to our actuarial computer systems. SQL is a prime example. It is always much easier to do things when a standard that has general acceptance and does a particular job reasonably well, has already been established even if different from the way that you would approach designing the system or the methodology from scratch.

Mike discussed the question of speed and the requirement for more elegance in programming solutions. The basic thrust of the paper is that over time the increase in power and capabilities of hardware relative to price are going to continue and the extent to which one requires elegant solutions will decrease enormously. But there is always scope for defining solutions more elegantly.

The analysis of movements is beyond my dreams for this paper. It is very important that the capabilities of computers are used to try and get some realistic answers on movements and their analysis. Over the last few years I have found that most life offices have practical problems in getting the relevant data. The paper reflects on those practical limitations rather than the dream.

One speaker mentioned that it would be lovely to have systems that are self documenting. That is coming. There are tools which generate a certain amount of documentation. For example utilities which you can put onto your PC that enable you to

search for the file that you named six months ago but whose name you cannot now remember. One advantage of such utilities is that they are very cheap because it is not just actuarial users that get value from them. So you might pay $100,000 for a small actuarial system whereas you pay $1,000 for a superb database package. Such is life.

In writing this paper I had to be very careful about a number of things. One was not to get into too much complexity as that would discourage readers. Another was to try and keep the paper down to a reasonable size. Both were difficult tasks. On projection of assets, the question of the deterministic approach as opposed to a stochastic approach is a very valid one. I see that the increase in capabilities of machines will enable greater use of the stochastic approach. I know for instance that there is at least one system in use that does a stochastic estimation for investment income and asset value modelling.

Barry Welland talked about co-operation in developing systems. The situation in our industry is extremely competitive. Computer systems can provide the edge for one company over another and not just in life insurance companies. Look at the Coles Myers of this world and see the enormous investment that they have made in new technology. Look at the banks and the extent to which they invest huge sums of money in computer systems. They are afraid that if they do not invest, they will get left behind.

Mark Schneider asked me to make a number of comments. The first was whether one should have computer generated input parameters or not. The answer is yes and no! When you start to develop a system you would normally enter parameters as part of your development process, and from there on you tend just to change these. If you buy third party software you will get some parameters already in the system. There are lots of mechanisms by which you can change their values including writing simple programs. A typical example would be where you want to test sensitivities using for example, plus or minus 1% on the interest rate, rather than telling the system that 10% is changed to 11% or 9%.

Marks's second query was how to handle the results of the intermediate calculations. It depends on the purpose for which they are required. The integrated system that I proposed has to be taken as relatively simple because it is trying to get across concepts and a basic mechanism. There will be complications when you come to either a particular office or a range of different business functions. The paper shows that there is already an enormous amount of common ground between such functions which if conquered enables you to spend more time on the other areas.

Thirdly, the frequency of calculations. For at least the first year, and preferably the first two years or more you want monthly calculations. In the ideal situation you should have monthly calculations to the end of the longest policy term. Third party tools to combine those monthly values by quarter or year already exist. An example is Javelin Plus, which is another of those valuable $1,000 pieces of software.

Fourthly, modelling versus individual policy calculations. In practice, at one end of the spectrum you have a model office where everything is modelled and there is only a limited number of model points, while at the other end you have each and every individual benefit including movements. Over the next few years you will see the projection starting point - the data that you are using, move gradually towards individual policy data. It may never reach each individual benefit; you may not want it to reach that extreme for the reasons that were discussed earlier by Mike Gardner and others, but it is definitely going to move in that direction. There are facilities by which you can combine your individual policy data to give you very large numbers of model points.

The alternative system of "many engines" that Mark mentioned would I believe be quite different to my solution. So it is an alternative rather than something that will actually fit into what I proposed.

One speaker talked about stochastic variation. As I said earlier, this is particularly important on the asset projection side. My paper did not go into the detail the speaker discussed with respect to global items such as tax but his points are quite valid. Perhaps someone would like to take those and write a further paper.

Finally David Kerr had a few words on the priority queue. This becomes an emotive subject when you work with a life insurance office. One cannot understand why it is going to take 6 months to provide a solution which on the face of it, requires just a few hours work. I am still not sure why it takes 6 months, but I believe the change of emphasis from Data Processing and Information Technology departments to User departments based on the use of cheaper hardware and more user friendly software, will result in users organising their own results more quickly themselves. In the long term a Data Processing department is not going to survive if it takes 6 months when somebody else can get results in a relatively short period of time. The secret is to have the skills in your own actuarial department or at least someone else on whom you can call, to enable you to do such things more quickly and more efficiently.

Again, thank you very much for your comments.

MELBOURNE

MR. S. McGING (Author): The life office actuary's computing environment and business tasks. This is a very specialist subject and there is a lot of information in the paper. Some of you may not have had the opportunity to read through it all. I will give a brief overview of the paper starting with some of my intentions in putting it together.

The first aim was to describe the computing environment that the life office actuary faces. By life office actuary I include anybody associated with that individual including all actuarial department members.

In the paper I firstly describe the general computing environment. What is a PC? What is a Mainframe? A lot of us come across the terminology used. It is probably fair to say a lot of us, including myself some years ago, are a little embarrassed by perhaps not knowing:-

(i) as much as we think we should
(ii) as much as we would like to know, or
(iii) as much as we think other people think we know.

But this is just human nature - well represented among actuaries - so we have nothing to be worried about. I wanted to extend from the general computing environment to the actuarial tasks themselves, trying to make the transition as painless as possible. The idea was to introduce terms gradually so that readers were not discouraged from continuing.

I did this firstly with hardware which ranges from mainframe through mini and workstation down to PC. Then I looked at the environment itself - the structures within which we operate. The mainframe computer department is a very different animal to the PC environment where each of us like to work on our own in comfort; where nobody can see what we do, where we can play to our heart's content and where we get very good productivity at the same time.

Next the software. The languages that we use. Tools of the trade. The various operating systems. The computer industry tends to be one where people have strong opinions on particular languages, particular methodologies and particular uses. I would like to see people rise to the bait in some of those sections, as it is only by discussion that we get a real flavour for what is accepted and what is totally unacceptable.

Finally in Part I, I came to drawing those strands together to illustrate the normal business tasks of the life office actuary. I went through each of those in turn starting with the profit testing scenario, taking it through model office, valuation and administration systems to quotations for agents.

Part 2 of the paper went a step further. The first 5 pages are general and easily read. It includes "The Wish List". This lists what we would like to have in a computer system. We want to keep duplication to an absolute minimum. We want consistency among our programs and the way in which they are used. We want something simple or at least we should want something simple. We want something flexible. We want it to be friendly. We want to use live data where possible. There will be limitations but these are the goals that we aim for. Finally we do not want to have to worry about different hardware platforms. If you have a program for a particular task why should you have to be concerned that it is not going to run on a mainframe or is it only going to run on a PC?

I included predictions as to how I saw current developments in the market place on the computing side giving rise to changes in the computing environment for actuaries. The main points are that we are heading towards a workstation environment rather than mainframes. The benefits will include much better communication between hardware platforms, enabling us to use our programs across the full range of hardware. Thus we are coming to a real integrated world rather than the disjointed environment we have had for some time.

In the rest of Part 2, I developed a prototype for an integrated life actuarial system. There was not much point talking about the glorious aims on the wish list without actually demonstrating that, yes, these aims are now becoming attainable. It is only recent computing development which enables us to move on and actually develop such a system. The basic idea is a projection matrix with which most of us would be reasonably familiar. The matrix was developed in relatively simple steps to ultimately give a full integrated life actuarial system.

Finally, I examined each of the individual life office tasks which were described in the first part of the paper and applied those to the integrated system that I had developed. To make sure that this actually worked I developed a computer model in parallel with writing the paper. The appendices at the back are output from that model.

MR. R. FRIEDMAN: Firstly my compliments to Sean on a very useful and interesting reference paper.

In Section 2.2 Sean refers to the computer as a tool, and that it is a great advantage for users. In this case the user is the actuary who has obtained direct access to computing power. In Section 2.5.1 Sean makes a reference to the DP department usually not being familiar with life insurance business and that

this unfamiliarity leads to misinterpretations and misunderstanding of user requirements. I believe that the actuary's ability to use the computer as a tool avoids much of this difficulty. Once the actuary can get "hands on" use of the computer the possibility of the "tail wagging the dog" situation can be avoided.

In Sections 2.4.1 and 2.5.2 Sean makes some reference to the advantages of mainframe systems as opposed to PC systems. Specifically he refers to security of data under a mainframe environment. He makes reference to the fact that in a PC environment organised structure is not forced upon the developer of the system. This I find interesting because some things that do happen in a PC environment are that documentation tends to be slack and security of data tends to be overlooked quite often. I am sure there are many PC users who at some stage have lost a spreadsheet. If there was a backup copy much difficulty would have been saved. Things like this have to be looked at fairly carefully in a PC environment.

In Section 2.5.3.1 the author talks about spreadsheets and gives certain views on the shortcomings of the spreadsheet. I agree with him on this. However, I do believe that with some degree of inventiveness spreadsheets can be quite powerful for certain applications.

In Section 2.5.3.3 Sean suggests that, as a general rule, the creation of a data base away from the main repository of data should be actively discouraged. I strongly agree with this. In fact, I would suggest that this should be a "golden rule" rather than a general rule. Often this is the cause of differences in management reporting and information; one set of management data emanates from the marketing department and a totally different set emanates from the actuarial department. Sean does refer to these problems on statistics in Section 3. A further difficulty which can arise from time to time is that different departments have different definitions for what is ostensibly the same management information item.

Also in Section 3 Sean suggests that product development always ends up being a nine months task even if people would prefer it to take less time. I have no doubt that this is often the case. With appropriate planning and communication between all the parties involved this process need not take as long in many cases. I believe that on occasions either the actuaries or the marketing people go a long way down the product development track before they start talking to one another. The inevitable result is that, a long way down the track, there may be a lot of work to be undone when they do eventually start getting together. This can involve a great deal of lost time.

Getting back to the system that Sean is talking about, there is a very strong advantage to having profit testing and modelling facilities available that provide the opportunity for the marketing manager and the actuary to sit down together and work out what the trade-offs are between the marketing needs and financial viability. I have had the opportunity of working simultaneously with both marketing people and the actuaries on product development using facilities of this type and I have found it to be very effective.

I am not sure what Sean is thinking of when he talks about the reserving process. I think of the reserving process as happening continuously. I believe it is vital for any projection system to do the calculations on a monthly basis rather than an annual basis. Also to assume that events occur on average mid way through the policy year or the financial year is not good enough in many instances.

In Section 4 Sean lists various items of income and outgo in the projection. The increase in reserves in each time interval is not listed. I am not sure where this is taken into account in Sean's process.

In Section 4.1 there is a reference to a premium formula. I do question the necessity of this, though I think that what Sean is doing is using the premium formula as a means to getting a first estimate of what the premium might be. Most modern savings products do not have a premium rate and the need for premium rate formulae for these products does not exist. The profit testing process itself provides the answers to the pricing questions.

Lastly in Section 7 Sean sees less modelling in the future and more use of actual data. I agree.

MR. F.M. McINERNEY: I found this a very timely paper. Mainly because the company I work for is considering introducing a new computer system. In my opinion this is one of the most dangerous things it could do.

The major managerial problem facing actuaries at the moment is how to deal with computers. For a life office actuary computer costs usually are the cause of most expense overruns. Either the computer system does not do what it should do, in which case extra staff are needed to correct the errors, or it costs too much money.

Personal Computers have changed the way in which routine work is carried out in an Actuarial Department. I do not believe that actuaries have learnt how to deal with this adequately on a managerial basis. These problems are managerial rather than actuarial.

Turning to the mainframe. Usually the first computer system was developed for the purpose of doing the valuation. It contained a record of all the policies for valuation and was a flat file. The structure of the programmes and files had been designed by the actuary and allowed the actuary to perform the valuation easily.

Other areas within the life company, policy administrators, started using this file as their main source of policy data. They found the systems designed by the actuary frustrating as they never really knew the exact situation with an individual policy. They always had to refer to other sources to get the full picture. A policy may have been surrendered but the policy file would only be updated monthly.

About 10 years ago a number of companies decided to change their computer system and introduce data bases. These systems were designed for the administrators. The actuary stood on the sidelines and was informed by the computer people that the data base would be able to provide him with all the information he had previously required. Unfortunately, when data bases were introduced it soon became apparent to the actuary that all the information he had previously was not available. One major problem was that extract files used for valuations never balanced. This was caused by the administrators always wanting to have an exact picture of the policy on line. If this involved going back and changing records in the past this was done. So if you ask for a valuation extract at a particular data your extract will differ depending on the physical date that the extract is taken. It is interesting to hear one speaker's comments that he is changing, I presume, from a data base system to a flat file system.

The other aspect of this development to data bases was that in fact the actuary lost control of his valuation files. I have seen situations where the valuation consists of a programme run by the computer department who then give you the answers on a piece of paper. All you receive is a figure. What the computer programmes actually do is unknown and it is very difficult for the actuary to extract that information. I am not sure how widespread this problem is. I would be interested to hear other people's comments.

Looking forward, the main challenge I see for the life actuary is to recapture the valuation process. That is what I will be pushing for greatly in our new computer development. To bring back under actuarial control all the valuation formulae, the parameters and basically the valuation data.

Turning to another part of the paper, hidden away I found a number of little gems. In Section 2.5.4.7 Sean makes a comment that when a new computer system is envisaged the most important aspect is that the design is correct. That is an important fundamental statement. So many computer systems are developed without any clear idea of what the computer system is supposed to do. To launch into a project without a design is ridiculous.

It must be remembered that all of this is so new. Ten years ago one would not have had these problems. With a major computer system you have to define in advance every single thing that can happen to a policy. In the history of life insurance that has not been necessary, because slight adjustments could always be made to manual records.

A simple example is the looming year 2000 which, I am told by some of my DP people, is going to crash quite a number of systems. If you have got a manual record system, you can adjust your cards quite easily and without any major trauma, to allow a date for the year 2000. In a lot of computer systems it is really going to require a new system.

Regarding the other points I picked up from the paper. I was interested in Sean's comments on documentation. No one seems to document anything very well. I often wonder when you come across a situation like that whether it is because people are trying to do an impossible task. One gets a situation where if you ask a computer programmer to document what a computer system does, he will state what he thinks it should do or what he would like it to do, rather than what it actually does. I feel the only solution to documenting computer programmes is to get readable programmes rather than try and force people to document what the programme does.

MR. A. BROWN: I wish to rise to Sean's bait and be emotional.

I march to the beat of a different drum. I will try to analyse why this is so. I think it is because I started off as a mathematician, then as a computer programmer who became acquainted first with a life office, and then with the actuarial profession. I have radical views, like holding systems analysts in very low esteem.

The financial decision making end of the computer industry is particularly grubby. One of the reasons people get emotional about computers is that there is a lot of money involved.

I dismiss the whole of that part of the paper on IBMs Systems Application Architecture. SAA is merely a promotional device by the computer salesman to try and lock in his share of the market. What does the customer get for all this architecture? - more costs. It is very dangerous for the computer user that it is the hardware manufacturer that is attempting to define the software standards for the industry.

Let's get emotional about Section 2 on hardware. There is no mention of any Australian hardware (or software either for that matter) in the past or the future. Do you have an Australian made in your office, or even in your home? I do. Do you intend to have one in the future? Or is it implicit in your planning that Australia will remain a colony of America or Japan, with continual balance of payments problems due to its excessive computer imports?

Turning to Part II of the paper, a key idea is the VALUE formula developed in Section 8.2. An earlier reference to this idea would be Bennett, Berry, Brown, Farrington and Key, JIA, Vol 101 Part 111, December 1974. The most noteworthy aspect of this design is that because of its simplicity it can be implemented on a microcomputer. I carried out, with a small team of programmers, a full scale implementation of such a system in a superannuation context in 1982, on a microcomputer limited to 128k of memory. Noteworthy also was that the implementation was in PL/1, despite the comments in Section 2.5.7.1.8. In fact I carried out development for more than 15 years in this language, and enjoyed its suitability for insurance problems.

The advocates of IBMs SAA would do well to review IBMs literature on PL/1 from the period of its launch in 1964 through to the mid 70s. My comment here on SAA is "Beauty is in the eye of the beholder".

I disagree with Sean on the usefulness of the VALUE formula. There are many contexts where the simplicity of design leads to unacceptable running costs, and even unacceptable maintenance costs. Sean mentions commutation formulae. I have found it useful for some purposes to concentrate on an even higher level platform than that. Annuity and assurance functions are well known to actuarial science. We have been able to show, in an implementation of the 1975 notation proposals of this Institute, that it is possible to construct a small package of just these two functions which has both power and efficiency I look forward to the day when some bright actuarial student embodies this design on a chip. I am sure it can be done, as the storage requirements are quite small.

My list of current problems on computer systems facing a life office seems to be different from that of Sean.

(a) Pricing of capital guarantees and other investment risks - that is certainly topical.

(b) Credit rate management - design of feedback systems in the engineering tradition.

(c) Simulation of capital raising by a life office - one that is in the national interest!

Each of these projects can be tackled on a personal computer. My major problem as far as main-frame computers are concerned is one involving cost containment. In my view main-frames will become less and less dominant in actuarial work, as they become recognised as the bottle-necks that they are in office systems.

There are other things that I see computers doing at the moment, although I am not directly working on them.

(a) Using computers for the production of policy documents.

(b) Using computers to interpret the benefit schedules attached to superannuation trust deeds. Our resident programmer tells me that the language for this task now includes over 750 phrases. I learnt in my school days of the design of Basic English which needed only 1000 words. I think the superannuation mess is getting more complicated than that very quickly.

There is a mention early in the paper of a lack of Australian references. I have written a bit on occasions. One very irreverent note was in the Correspondence to JIA, September 1983, which opened up with the beautiful words "Yes, Mr Hey, there is a Santa Claus." This contains the references to another four papers relating to Australian work.

The one thing I thought was missing from Sean's wish list was for low cost and high efficiency of the total computer system. This I would love to have.

MR. D. FRENCH: Sean, first of all I would like to congratulate you on your paper. I did actually read all of it and enjoyed it. I will always remember Show Day 1990 as the day I did not go to the Show but sat and read your paper.

I think Part I will go down in history as a useful reference manual. Somebody has finally taken the time to write out all the hardware choices and all the software choices available to the Actuary. I was really encouraged that somebody has written or recognised that C is an actuarial language. My experience overseas is that people are beginning to use C. Five years ago there was a lot of resistance from actuaries in using C, because everyone was on the APL bandwagon. That is slowly changing as people realise that there are a lot of benefits using C as actuarial software. I was also encouraged in your paper, Sean, that you started to talk about asset modelling. I think asset modelling is extremely important. I would like to point one thing out, though. When you discussed asset modelling you mentioned determining an investment strategy. Asset modelling goes a little bit further than that. Besides modelling behaviour of your assets and of course your investment strategy you want to also think about your crediting strategy. That is, how to manage the rate you are going to credit to the policyholder. You also need to think about the interactions between assets and liabilities.

You mentioned in your paper using a mainframe for modelling. Many of you might know that I am not a proponent of modelling with mainframe systems. I have three reasons for that. The first is the cost. I think if the CEO ever sat down and figures out how much it costs the actuarial department to do its embedded value calculations, its appraisal value calculations, or its revenue accounts, he would pull the plug. It is just too costly. Number two is that it is too bulky. It is too hard to get things in and out of the system and you have to deal with the DP Department. They are always unco-operative, therefore, it is extremely time consuming. The third reason is that actuaries who build models on mainframes seem to have the need to use 30,000 model points to determine their embedded value calculations. They say they need a lot of model points because it's more accurate. You really do not need that many model points to determine embedded values or appraisal values. I would also argue that you do not even need 30,000 model points to do your revenue account projections, even if you wanted to monitor actual to expected experience on a monthly basis.

One of Sean's predictions in his paper is a move to policy by policy modelling. I guess I am going in the other direction and say I do not agree with that prediction. I think the first company who goes down the road to model on a policy basis, will soon determine it is too costly and time consuming. I think all the complications, and Sean you mentioned some of them in your paper, are just going to make the task impossible.

At a certain point, it does not even become modelling any more if you are going to project on a policy by policy basis. For instance now we know next calendar year, if we are doing an appraisal value, that a few hundred people are going to lapse. When we are on a policy by policy basis, actuaries, being who they are, are going to start arguing who actually lapses, is it John Smith or is it John Brown. This is just going to waste time and is just not needed. I am going to predict where I think modelling is going. It is not policy by policy. I think the next step for modelling is going to be stochastic asset/liability modelling. What I mean by that, is modelling assets and liabilities under randomly generated economic scenarios taking into account the specific performance of assets, the investment strategy of a life office, the crediting strategy of a life office and the interactions between assets and liabilities. Interactions between assets and liabilities would affect, for instance, new business issued, lapse rates, policy loans, partial withdrawals and flexible premium patterns. I also predict that these systems will not be on mainframes, but on PCs.

Those are my brief comments. Again Sean, thanks for your contribution.

MR. R. McLEOD: I would also like to thank Sean for the thought provoking paper. My approach is to take a slightly different line to most people and point out the sins of systems I have seen over the past few years.

The first sin is that we have often ignored the relationships between different pieces of data. This causes us to set up files that cannot talk to each other because the information on one file is not correlated to relevant information held on another file. The easiest example is how we have always set up files on a one client per policy basis. Only recently have systems recognised that one client may have many policies so sending out six renewal notices, six lapse notices etc. is a little odd and expensive.

The second sin is that we collect, particularly at underwriting time, substantial data and then do not incorporate it. For years we asked people their smoking habits, but when non-smoking policies arrived we did not have the statistical data to draw upon - we had discarded it. Similarly we ask about occupations now and on Disability Income and Group Life substantial occupational loadings apply. However, for ordinary life cover I suspect many systems do not note occupation. Folklore suggests occupations also affect lapses, as well as mortality. We cannot, through lack of data, prove or disprove this or establish mortality differentials.

Turning to Section 2 of Sean's paper, he sets out a series of business functions we require and an integrated system that covers these functions. This is a top down approach to systems design.

An alternative approach is what has been called data modelling. This is a bottom up approach in that you initially spend a considerable portion of time analysing the various pieces of data you require on your system and the relationships between the data (ie. one policy per client, one client per policy, etc.).

Having designed your structured data model, consideration is then given to what programs are needed to access this data and proponents of this approach suggest that having a solid data structure enables you to build your system more easily, eliminating duplication of codes or functions. They also suggest that because of the solid data structure your systems are easier to amend and should last longer. If those assertions are true then considerable cost savings are possible.

The major disadvantages I see are those of controlling the data analysts. The work is a little esoteric compared to mainstream programming. Consequently, it is relatively easy to see it being done in a slapdash manner, or alternatively to find someone making a career out of designing the perfect data model.

Overall, I am of the belief that this approach offers the best hope for the development of future systems and that by applying top down system designs we run the risk of repeating our past problems.

MR. S. McGING (Author): Thank you for what was quite a varied response. Most of the comments were broadly in agreement with what I had written. Differences were on questions of emphasis rather than content. Alan Brown was a fairly vivid exception to that rule, and certainly livened up the discussion.

In replying to individual speakers I shall concentrate on particular points where perhaps there was some disagreement or a question being asked of me.

One speaker asked about the timing of cash flows. I believe he was working towards having monthly data as opposed to yearly. In my model, I was trying to keep things reasonably simple. Consequently I did not specifically state the data should be monthly rather than yearly. It is my very strong belief that you must have monthly data or you lose some of the accuracy. The thrust of the current computing environment is such that with the emerging increase in power and reduction in cost, use of monthly data is becoming more and more practical.

The window problem that this speaker raised and Ron Friedman explained to us was solved by Ron himself towards the end of his comments. The reserve process must be continuous. If we have monthly data and monthly time intervals, then the reserves would normally be calculated at the end of each month. Taking that to the extreme, calculating the reserves immediately on payment of the premium is just the next step. It is simply a further stage in the generalisation of the model.

Frank McInerney referred to a lot of managerial problems in writing systems. Managing the process is vital. It comes down to control of people and resources while understanding what is going on. The trouble is if you do not understand what is going on, a project can be completely overboard and in a real mess before you can stop it happening or initiate damage control. Having a mainframe computer system development go wrong is a very costly business. You have got to watch it all the way.

He also talked of promises to the actuary not being fulfilled when databases came out first. A lot of us have found this and not just in databases - rather almost anything to do with new technology. Let us look at the communication process. You know exactly what you want from a system. You are depending on another department within your organisation, but they do not

necessarily understand the system. There can be a communication problem in the first instance. Then there can be a persuasion problem in firstly trying to communicate your needs, and secondly trying to translate those needs into cost benefits. I do not have any particular solution except that if actuaries better understand the systems environment, two way communication with systems personnal is much easier. You could perhaps know (a little better) how their minds operate.

The correct design of a system is fundamental. It is impossible to get everything right at the beginning. Human nature is such that there are going to be errors or omissions. Secondly, whether it is legislation, new products or techniques, things do change over time. We need to incorporate flexibility in design rather than trying to get everything right at the start, because in practice it is just not possible.

I now turn to documentation and readable programs. There are tools available whereby documentation gets away from the actual program code. One speaker talked in terms of the SAS type language. These code generators and data base interrogators, as I refer to them in the paper, are extremely useful tools. They eliminate the pure code writing, and are relatively cheap compared with actuarial resources. The productivity savings are enormous. I believe more and more specialist software including actuarial software will use these facilities to get the end results that we want.

Alan Brown had many different views on a wide range of matters. Basically we just accept different views. One point I would like to make is that there are very real business risks associated with daring to be very different from everybody else. It is all very well to say that IBM have SAA as a front for their hardware selling. But the truth is it's a real business world out there and IBMs direction becomes a de facto business standard. You have to live with it.

Incorporation of pricing of capital guarantees, simulation of capital raising etc. in the paper would have been a very interesting exercise. But the agenda for the current paper was full!

One speaker referred to the actuarial department "owning" the data. There is a lot to be said for that concept. Many of the problems that arise for the actuary in the long run are caused by lack of understanding by the computer systems department of the data, eg. problems can arise when changes are made to the database without adequate consultation. On the other hand we as actuaries should know that such reviews are going on within the company. We must get involved early in the process, provide our views and help shape a better long term solution. You have got to be seen to have an interest and to a certain extent, have some understanding of the style of business of data processing professionals.

Doug French talked about "C". Theoretically some languages are no more suitable for actuarial use than other languages. PL1 is a good example of a useful language for actuarial purposes. Because other languages such as COBOL on the mainframe and C on the PC have become the de facto industry standards, there is less concern about whether or not they are good "Actuarial" languages.

Doug also talked about modelling and the stochastic variation in the asset and liability side. The stochastic variation is I think an important element of projections on the asset side. The interaction of liabilities is also important and there are programs which have been developed worldwide to cope with this. They are particularly useful for capital guaranteed investment account products. Again the potential of the hardware is such that stochastic modelling is becoming more viable in a practical sense.

Rob McLeod talked about the sins of systems - data files not being integrated and data that is asked for at commencement not actually being used later. It is important to go through the discipline of "do you really need this field" with the users. There is a danger in putting too much data into a system. The overhead of maintaining a very big system is very large costs. In the long run, it comes down to designing the system properly at the beginning.

Rob referred to a "bottom up" approach for designing of systems. His description sounded like a form of structured systems analysis which I believe is a very sound methodology. I see that as complimentary to the basic integrated actuarial system developed in the paper. Structured system design requires you to know what you want from the system. It thus imposes a very necessary discipline as well as a frame work for system design.

Thanks to all of you for your comments and your encouragement.

By P. Carroll, BA, FIAA

TABLE OF CONTENTS

1. INTRODUCTION

Objective

The purpose of this paper is to examine the patterns of morbidity in the Australian population, as far as it is possible to do so from the material available, to assist in the underwriting and design of disability insurance products and, in particular, to discover if there is any actuarial basis for "unisex" premium rates in the pricing of these products.

Sources

The sources used are listed in the bibliography to this paper.

The ABS has conducted a number of surveys of various aspects of morbidity in the Australian population in recent years, including the following

- *1977-78 Australian Health Survey*
- *1981 Survey of Handicapped Persons*
- *1983 Australian Health Survey*
- *1988 Survey of Disabled and Aged Persons.*

Only preliminary results of the 1988 Survey are yet available. A 1989 Australian Health Survey has been conducted by the ABS but, as yet, no information is available from it.

The AIH was formed in 1987 to gather and analyse statistics on health matters and, in particular, to collate material from the various State government agencies which collect health related statistics. It has published numerous studies, the most comprehensive and apt the present purpose being

- *Australia's Health: The First Biennial Report of the AIH, 1988.*

Method

From the data available, rates of morbidity have been calculated, separately for males and females, standardising wherever possible for age, income or other relevant factors. In some cases the appropriate exposed-to-risk figures have not been published but were supplied by the ABS.

From the standardised female and male rates, ratios have been calculated, collated and examined, to identify empirically the extent and nature of differences in morbidity between females and males in the population. These ratios provide a simple and effective measure of the relationship between female and male morbidity: where the ratio is greater than 1, female morbidity is higher than male morbidity; where the ratio is less than 1, it is lower. A selection of the ratios examined is contained in this paper, together with comments. An asterisk is shown wherever a zero denominator has occurred in the calculation of the ratios.

2. BACKGROUND

The conventional wisdom

The 1989 Report of the Disability Committee of the Institute of Actuaries of Australia, given in October 1989, said

> "Females continue to experience a much heavier incidence of morbidity than males. Termination rates, however, appear to be very similar for females and males. This is consistent with previous Australian and overseas experience."

This conclusion was based upon the experience of contributing life offices in Australia, for the period 1982 to 1987, and related to persons in occupation Class "A" only. The Committee reported that there was insufficient exposure in other occupation classes to allow publication of age-specific female rates.

Reinsurers in Australia report similar general conclusions, namely that female experience, when it is available, shows heavier morbidity than males but, in many cases, female experience is too sparse to allow significant conclusions.

That there is a difference in morbidity experience between insured females and males reflects a long recognised experience in insurance markets elsewhere. For example, in May 1975, the Insurance Department of New York State, the pace-setting regulatory body in the US, examined the experience of 26 leading companies licensed to write disability income coverage in New York State. The stated purposes of the study were

- "to determine if sex is a factor in the cost of disability income insurance"
- "if sex is a factor, to determine to what extent this one characteristic affects the cost of disability income insurance as between otherwise similar risks."

The study concluded

> "Sex is a major factor affecting the cost of disability income insurance. For accident and sickness benefits, female claim costs are consistently higher than male claim costs up to age 60 ... For accident only benefits, female claim costs are generally less than male claim costs below age 30 and show ratios which increase with advancing age."

This conclusion from the New York study is typical of a general one, frequently reported and widely believed, that women experience more "sickness" while men experience more "accidents". This is the conventional wisdom.

The countervailing view

There is, however, a countervailing view on the relative incidence of sickness between women and men. For example, the Statistics Unit of the Equal Opportunities Commission in the United Kingdom studied data from the Department of Health and Social Security (DHSS) claims and from annual household surveys of morbidity in the UK, relating to a ten year period to 1981. It reported,

> "we have strong reservations whether the apparently higher sickness rate for women, in the DHSS statistics for sickness and invalidity benefits claims, currently reflects the relative sickness absence of women in employment. In particular, we are unclear how the DHSS figures could be used as a reasonable basis for permanent health insurance. The DHSS statistics are derived from an administration system which may have yielded a biased sample of women at greater risk of sickness or invalidity. We have analysed in detail the General Household Survey results for sickness absence from work in 1975-76, which we believe are typical of the period 1971-81. The level of sickness absence from work has remained constant, at around 5% of working men and women being absent in any one week. The similarity between men and women's sickness absence overall is partly explained by the high proportion of women who work part-time. Part-time women workers have lower rates of absence than full-timers. We estimate that full-time women employees had an overall ten days of sickness absence a year compared with nine days for men. This difference is substantially smaller than that suggested by the DHSS figures."

Surveys in Australia give some credence to the countervailing position, for example preliminary results from the 1988 Survey of Disability and Aged Persons in Australia show that the estimated number of disabled females (1.248 million) was less than the estimated number of disabled males (1.296 million), despite the higher average age of the female population. This issue is examined in greater detail in Section 4 of this paper.

The question

The question therefore remains: what explains the apparently worse claims experience of females who have disability income insurance in Australia?

There are a number of possible factors which may render women generally more likely to claim, specifically

- physiological differences between men and women which create different susceptibilities to disabling diseases and conditions, for example chromosomal and hormonal differences
- experiences unique to women, for example menstruation, pregnancy and childbirth
- economic and social differences between men and women, for example income levels, family roles and occupations.

It is a purpose of this paper to review the evidence available from general population studies in Australia and to identify, as far as possible, the nature of the morbidity differences between women and men in Australia.

3. OVERALL PATTERN OF MORBIDITY

The ABS Health Surveys analyse "health related actions" by age and sex. The table below summarises the ratios of the female to male rates for various categories of behaviour, as reported in the 1983 Australian Health Survey. The rates are calculated using the total populations of women and men in each age group.

HEALTH RELATED ACTIONS

Ratio of Female to Male Rates

	Age Group:							*Total*
Action	*<5*	*5-14*	*15-24*	*25-44*	*45-64*	*>65*	*Total*	*15-64*
Take medication:								
Prescribed	0.89	0.97	2.81	2.26	1.25	1.10	1.57	1.87
Non-prescribed	0.99	1.07	1.28	1.21	1.36	1.27	1.21	1.27
Total	0.95	1.03	1.72	1.54	1.31	1.15	1.36	1.50
Consultations:								
Doctor	0.97	1.10	1.65	2.68	1.20	1.01	1.32	1.49
Dentist	0.64	1.12	1.40	1.40	1.05	0.76	1.16	1.29
Other	0.97	1.06	1.40	1.44	1.34	1.18	1.27	1.40
Total	0.95	1.10	1.53	1.57	1.20	1.02	1.28	1.43
Reduced activity:								
Hospital	0.73	0.75	2.36	2.17	0.81	0.74	1.25	1.48
Bed	1.04	1.18	1.91	1.33	1.27	1.14	1.33	1.44
Other	1.30	0.98	1.16	1.14	1.24	1.21	1.15	1.17
Total	1.14	1.08	1.50	1.27	1.21	1.11	1.24	1.30
Days Off:								
School		1.07	1.75				1.11	1.75
Work*			1.29	0.64	0.45		0.69	0.69
Total		1.07	1.42	0.64	0.45		0.85	0.79

* *nb: Rates based on total population, not workforce.*

From this data, it is evident that women are considerably more likely to take health related actions than are men of the same age. At adult ages, the only significant exception applies to days off work, where the figures are not meaningful because of the lower proportions of working women in the population.

It is also evident that the greatest differences between female and male rates occur between ages 15 to 65 years - the very ages when disability insurance cover is most likely to be sought.

These differences are discussed in greater detail below.

Medications

Women overall are 36% more likely to use medications than are men of comparable age: women of working age are 50% more likely to use medications.

The table below shows the ratio of female to male rates of medication use, analysed by type of medication, according to the figures reported in the ABS survey of 1983.

MEDICATION USAGE, BY TYPE OF MEDICATION

Ratios of Rates Female to Male Rates

	Age Group:						
Type of medication:	*<5*	*5-14*	*15-24*	*25-44*	*45-64*	*>65*	*Total*
Birth control pills	*	*	*	*	*	*	*
Tranquillisers	0.67	0.86	1.69	2.14	1.57	1.47	1.69
Heart, blood, fluid tablets				2.41	1.44	1.31	1.65
Sleeping pills	1.16	0.00	2.54	1.62	1.47	1.41	1.65
Vitamins, minerals	0.90	0.95	1.51	1.57	1.44	1.30	1.65
Pain relievers	0.96	1.22	1.64	1.45	1.52	1.47	1.45
Allergy tablets	0.72	0.91	1.17	1.74	1.90	0.99	1.35
Laxatives, stomach medicines	0.81	0.76	1.60	1.30	1.20	1.07	1.23
Other	0.71	0.90	1.37	1.25	1.08	0.90	1.09
Cough and cold remedies	1.05	1.06	1.26	1.05	1.10	0.87	1.06
Skin creams	0.91	1.17	1.02	0.96	1.00	0.91	1.00

At ages above 15 years, women are greater users of virtually all forms of medication and are *substantially* heavier users of tranquillisers, heart, blood and fluid tablets, sleeping pills, vitamins and minerals and pain relievers.

Consultations

Women overall are 28% more likely to consult health professionals than are men of comparable age: women of working age are 43% more likely to do so.

About two thirds of all reported consultations are with doctors. The table below shows the ratios of female to male numbers of doctor consultations, by reason for consultation, as reported in the ABS Survey of 1983.

DOCTOR CONSULTATIONS, BY REASONS

Ratios of Female to Male Numbers

Reason for consultation	*Ratio*
Genito-urinary system	4.33
Nerves, tension, depression	1.98
Hypertension	1.92
Mental disorders	1.70
Arthritis	1.64
Circulatory system	1.45
Symptoms and ill-defined conditions	1.35
Nervous system and sense organs	1.30
Endocrine, nutritional, metabolic	1.30
Acute nasopharyngitis	1.29
Skin and subcutaneous tissue	1.20
Other eye diseases	1.12
Respiratory system	1.12
Influenza	1.10
Digestive system	1.08
Musculo-skeletal system	1.06
Bronchitis, emphysema	0.90
Heart disease	0.88
Other specified conditions	0.86
Back trouble	0.75
Injuries	0.60
Total illness	1.21
Pregnancy supervision	*
Check-up	1.44
Immunisation	1.30
Total not ill	2.72
Total ill and not ill	1.33

From these figures, it is evident that women consult doctors more than men do for illness conditions related to genito-urinary conditions, nerves, tension, depression, hypertension, mental disorders and arthritis. They are also more likely to consult doctors for reasons other than illness, such as check-ups and immunisations. On the other hand, men are more likely to consult doctors for conditions such as injuries, back problems, heart disease, bronchitis and emphysema.

If doctor consultations for reasons related to the genito-urinary system and for reasons other than illness are excluded, the overall ratio of female to male doctor consultations falls from 1.32 to 1.14.

For consultations with other health professionals, such as chemists, chiropractors, opticians and optometrists, nurses, acupuncturists, naturopaths, herbalists and podiatrists, women have substantially higher rates than men. The only significant category where men have higher rates is with physiotherapists.

Reduced activity

It is also evident that women experience more "reduced activity" for health reasons than do men. For all women, the rates exceed those for men by 24%: for women of working age, the excess is 30%.

The table below shows the ratios of female to male rates of reduced activity, for persons over two years of age, analysed by duration of incidents.

REDUCED ACTIVITY, BY DURATION

Ratios of Female to Male Rates

	Duration of Incident				
Nature of reduced activity	*1 day*	*2-3 days*	*4-7 days*	*>7 days**	*Total*
In hospital	1.47	1.17	1.55	0.83	1.23
In bed (not hospital)	1.39	1.30	1.39	0.95	1.33
Other	0.89	1.21	1.13	1.22	1.15
Total	1.20	1.21	1.25	1.16	1.20

* *Includes all cases where incident lasted for the entire 14 days of the 1983 Survey.*

It is evident that women generally have higher rates for incidents of from two to seven days in duration, while men have higher rates of hospitalisation and bed confinement for periods lasting more than seven days.

Data available on hospitalisations from the various States have been analysed in some detail by the AIH, which reported as follows in 1988

> "More hospital episodes involve females than males. In 1983, females accounted for 57% of all episodes of care compared with 43% for males. The age-standardised admission rates for Queensland acute hospitals and South Australian public hospitals (the only two States for which 1983 data has been published by age, sex and diagnosis) were 185 per thousand males and 222 per thousand females. When normal delivery and complications of pregnancy and childbirth and genito-urinary cases are excluded, the age-standardised admission rates become 176 per thousand males and 151 per thousand females."

From AIH data, it is also evident that the patterns of hospital experience of women differ very much from those of men, even though strict comparisons are bedevilled by data problems in a number of States, particularly by the absence of private hospital data from Victoria. Evidence of this is shown on the next page.

The table below lists, in order of significance, all causes of *public* hospital admissions in the mid-1980's where the sex-specific admission rates exceeded 2 per thousand population.

*PUBLIC HOSPITAL ADMISSIONS 1984-85**

Cause	*Rate per 1,000*
Females	
Normal child birth	10.8
Kidney dialysis	6.7
Abdominal/pelvic symptoms	4.5
Asthma	3.4
Menstrual disorders	3.2
Fetal/placental problems	2.9
Contraceptive management	2.8
Early or threatened labour	2.8
Trauma in delivery	2.8
Spontaneous abortion	2.8
Hypertension in pregnancy	2.1
Males	
Kidney dialysis	6.5
Asthma	3.8
Acute myocardial infarction	2.5
Abdominal/pelvic symptoms	2.5
Chronic ischaemic heart diseases	2.5
Respiratory/chest symptoms	2.3
General symptoms	2.1
Inguinal hernia	2.0

** 1984 in some States, 1985 in others*

It is clear that childbirth and related matters are major elements in female hospital experience.

Days off

In comparing days off work, the figures must be adjusted to reflect the fact that smaller proportions of women in each age population group are exposed to risk than are men, because of lower levels of employment participation among women. It is pertinent also to consider reasons. The table below shows the ratios of the female to male rates of absence from work, based on *total numbers employed*, for selected reasons.

ABSENCE FROM WORK, BY REASON

*Ratio of Female to Male Rates**

Reason for absence from work	*Ratio female to male rates*
Otis media (earache)	3.26
Acute nasopharyngitis	1.87
Stomach disorders	1.26
Diarrhoea, enteritis	1.23
Virus	1.21
Influenza	1.05
Musculo-skeletal	0.83
Respiratory diseases	0.72
Back trouble	0.63
Injuries	0.62
Total	1.17

* *Rates based on total employed population*

From this data, it is evident that women are more likely to be absent from work for earache and colds and, to a lesser extent, stomach disorders and infections, while men are more likely to be affected by injuries, back trouble, respiratory diseases and musculo-skeletal problems.

In summary, it is clear from the material available from the ABS and AIH that, overall, female morbidity is heavier than male morbidity.

4. MORE SERIOUS CONDITIONS

In this Section, the patterns of more serious forms of morbidity, in particular chronic conditions (illness conditions persisting for more than six months), handicaps, disablements and cancer, are examined.

Chronic conditions

The patterns of chronic conditions in the population were surveyed by the ABS in 1977-78. The ratios of the female and male rates, calculated from the 1977-78 Survey for all chronic conditions and for those relating to conditions with "activity limitations", are summarised in the table below.

CHRONIC CONDITIONS, BY AGE

Ratios of Female to Male Rates

Age group	*All conditions*	*Conditions with activity limitations*
< 5	0.98	0.71
5 - 14	0.81	0.63
15 - 24	1.11	1.30
25 - 44	1.23	0.95
45 - 64	1.09	0.70
> 65	1.03	1.38
Totals	1.11	0.89

While, at adult ages, women have higher rates of chronic conditions overall, men are more prone to conditions with "activity limitations". For adults of working age, an activity limitation is defined by the ABS as a restriction or inability in carrying out housework, attending school or work, shopping or engaging in sport.

The table below summarises the ratios of female to male rates by types of condition.

CHRONIC CONDITIONS, BY CAUSE

Ratio of Female to Male Rates

Type of condition	
Complications at birth	*
Diseases of the blood	4.36
Genito-urinary	1.97
Absence of organs	1.60
Circulatory	1.52
Musculo-skeletal	1.36
Skin	1.31
Congenital	1.19
Nervous & sense organs	1.12
Ill-defined	0.99
Respiratory	0.97
Endocrine, nutritional & metabolic	0.94
Mental	0.92
Infective & parasitic	0.91
Neoplasms	0.77
Digestive	0.75
Accidents, violence	0.71
Absence of limbs	0.21
Total	1.17

Women are more likely to experience chronic conditions relating to diseases of the blood, genito-urinary, circulatory and musculo-skeletal systems and of the skin and absence of organs. Men are more likely to experience chronic conditions arising from conditions such as absence of limbs, accidents and violence, digestive disorders and cancer.

If chronic illnesses are classified into those which can cause death, as defined by the AIH (neoplasms, heart, cerebrovascular, hypertension and respiratory diseases), and milder conditions, then an even sharper pattern is evident. Whereas more women overall (49%) report chronic illnesses than do men (39%), more men report these potentially fatal chronic conditions (13%) than do women (10%).

Handicaps and disablement

According to ABS figures, a significant proportion of the Australian population suffers some kind of handicap or disability. From preliminary figures from the 1988 Survey, the ABS estimated that

- 2.1 million persons, or 13.0% of the population, suffered a disabling handicap that caused a restriction in performing daily activity
- a further 0.4 million persons, or 2.6% of the population, suffered a disability that caused inability to perform an activity in a normal manner, but not classified as a "handicap".

These proportions were different from those revealed in the earlier 1981 Survey, in which the proportions reported were 8.6% (disabling handicaps) and 4.6% (other disabilities) respectively. The ABS attributed about half the changes to shifts in the composition of the population and about half to changes in the proportions found to be disabled. General community awareness of disablement had probably been increased, and any stigma attached to it reduced, by public campaigns associated with International Year of the Disabled in 1981.

The following table summarises the ratios of the female to male rates of handicap and disability, as defined by the ABS, by age.

HANDICAPS AND DISABLEMENT, BY AGE

Ratio Female to Male Rates

Age	*Handicapped*	*Disabled not handicapped*	*Total*
< 5	0.67	*	0.67
5 - 14	0.70	0.97	0.74
15 - 29	0.90	0.83	0.88
30 - 44	0.97	0.71	0.91
45 - 59	0.93	0.65	0.88
60 - 64	0.65	0.57	0.64
65 - 69	0.81	0.62	0.76
70 - 74	0.95	0.72	0.90
> 75	1.15	0.53	1.07

It is evident that women report *lower* levels of handicap and disablement at all ages below 75 years.

The table below shows the ratios of the female to male numbers of persons reporting any form of disablement, by cause. These ratios do not allow for age differences but, nevertheless, indicate the different patterns of disabling conditions.

DISABLEMENT, BY CAUSE

Ratio of Female to Male Numbers

Condition	*Ratio*
Musculo-skeletal	1.29
Sight	1.21
Mental	1.03
Nervous	0.96
Circulatory	0.91
Other	0.91
Respiratory	0.70
Hearing	0.65
Total	0.96

Musculo-skeletal diseases, especially arthritis, are more prevalent among women, and account for about 30% of all disablements. Mental diseases account for about 15% of disablements and are about equally prevalent in women and men. Other significant causes of disablement, such as hearing loss, circulatory and respiratory diseases, are more prevalent among men.

Cancer

Cancer is significant as the second most common cause of death and the only major cause of death for which mortality and morbidity rates are increasing. It is also a disease for which comprehensive statistics are available. Since 1982, almost all cancers occurring in Australia have been recorded in State and Territory based cancer registries and comprehensive national data has been collated by the AIH.

The AIH estimates that one third of all males and one quarter of all females will develop cancer by age 75 and that one in five males and one in nine females will die from cancer by that age.

Based on analysis of age-standardised rates, the 1988 AIH Report said:

> "Cancer occurs more frequently in males than females (38% excess) and is even more likely to kill males than females (62% excess). Males tend to develop forms of cancer which are more often fatal, especially lung cancer."

In summary, it is evident that men are more susceptible to the more serious chronic conditions, disabling diseases (except for arthritis) and serious cancers. This contrasts with the generally higher morbidity reported for women.

5. ECONOMIC AND SOCIAL INFLUENCES

It is feasible that, at least in part, differences in morbidity experienced between the sexes are explained by differences in the economic and social circumstances of men and women. Consideration is given to this below.

Income

The table below shows the ratio of female to male rates, for the various health-related actions reported in the 1983 Survey, classified by income level. For this purpose, persons can be classified according to their individual incomes and also according to the income of the family unit to which they belong. The figures shown relate to individual incomes, but the totals are shown for both individual incomes and family incomes for comparison. Only persons over fifteen years of age have been included in this analysis.

HEALTH RELATED ACTIONS, BY INCOME

Ratios of Female to Male Rates

	Income Levels (Annual):						
Action	*<$2,001*	*$2,001-$4,000*	*$4,001-$8,000*	*$8,001-$12,000*	*$12,001-$15,000*	*$15,001-$20,000*	*>$20,000*
Medication:							
Prescribed	1.96	1.37	1.29	2.13	2.35	2.18	2.05
Non-prescribed	1.24	1.44	1.34	1.42	1.32	1.34	1.26
Total	1.32	1.27	1.19	1.43	1.44	1.41	1.33
Consultations:							
Doctor	2.04	1.22	12.11	1.47	1.66	1.40	1.35
Dentist	1.39	1.52	1.19	1.52	1.83	1.61	1.79
Other	1.15	1.27	1.51	1.19	1.88	1.51	1.65
Total	1.66	1.24	1.19	1.38	1.70	1.45	1.44
Reduced activity:							
Hospital	1.97	0.88	0.85	0.44	0.65	0.68	0.00
Bed	1.44	1.18	0.98	1.69	1.76	1.57	1.18
Other	1.36	1.12	1.07	1.15	1.29	1.40	1.17
Total	1.29	1.14	0.99	1.28	1.42	1.35	1.12
Days off:							
Work		1.33	1.64	1.54	1.34	1.11	1.00
Total (individual incomes)	1.29	1.25	1.18	1.36	1.38	1.36	1.25
Total (family incomes)	1.26	1.38	1.17	1.30	1.28	1.27	1.19

At the time of this survey in June 1983, average male earnings were about $18,000 per year.

It is evident that the higher morbidity experienced by women generally occurred at all income levels. The differences are reduced slightly, however, between women and men with above average levels of income.

It is also possible to analyse chronic conditions by sex and income level, from the data reported in the ABS Survey of 1977-78. The table below summarises the ratio of female to male rates for overall chronic conditions, classified by income level, taken from this Survey.

CHRONIC CONDITIONS, BY INCOME

Ratio of Female to Male Rates

Gross personal income (annual)	*Ratio*
Less than $1,000	1.68
$1,000 to $5,000	1.03
$5,000 to $10,000	1.10
Over $10,000	1.22
Total	1.15

At the time of this survey, average male earnings were about $10,000 a year.

From this data, it is evident that, except for those with very low incomes, the differences between men and women are increased at higher income levels.

The ABS survey of 1977-78 classified illness conditions into three broad groups - acute, chronic and emotional. According to data from this Survey, men with higher incomes reported lower levels of all three kinds of illnesses. Women with higher incomes reported similarly lower levels of acute and emotional illnesses, but not so with chronic conditions. In commenting on this outcome, the AIH said

> "The weak relationship between income and health problems among women could be because personal income is a poor measure of a woman's socio-economic status, since household income for a significant proportion of women (particularly those at home) will be largely determined by the husband's income."

Marital status

It is evident, from the available data, that the incidence of all forms of illness varies with marital status in a broadly similar manner for both women and men. In particular, separated, widowed and divorced women and men report more health problems than do married women and men of the same ages.

In the variations in morbidity by marital status, the most significant difference between women and men relates to emotional health problems. According to data from the 1977-78 Survey, married people report fewer problems than their single counterparts, but the reduction in incidence of emotional problems is substantially less for married women than it is for married men.

Occupation

From ABS Survey data, it is also evident that reported illnesses vary considerably from one occupation to another, and that these variations differ between women and men.

The table below shows the ratios of the overall rates of reported illnesses for women to those of men, in the three broad categories used in the 1977-78 Survey. The rates used have been age-standardised.

REPORTED CONDITIONS, BY OCCUPATION TYPES

Ratio of Female to Male Rates

Occupation	*Chronic*	*Acute*	*Emotional*
Administrative	1.39	1.38	1.42
Retail	1.36	1.10	1.02
Transport/Communications	1.24	1.34	1.01
Professional	1.24	1.27	1.03
Service	1.10	1.13	1.05
Clerical	1.07	1.23	1.60
Farming/Fishing	1.05	1.45	1.23
Trade	0.99	1.10	1.50

I have difficulty interpreting these results in a meaningful way. It appears from this data that women in "administrative" occupations have substantially worse reported health experience than do men, across all three categories of conditions. On the other hand, women in "service" occupations appear to experience very similar health to men in those industries, across all three categories of conditions. The other occupational categories appear to fall into three overlapping groups, in particular

- those where women experience substantially more chronic conditions than do men, namely retail, transport and communications, and professional occupations
- those where women experienced substantially more acute conditions than do men, namely transport and communications, professional, clerical and farming and fishing occupations
- those where women experience substantially more emotional conditions than do men, namely clerical, farming and fishing and trade occupations.

In summary, it is apparent that the relationship between health and income, marital status and occupation is complex. An adverse social situation and a low income may cause health problems and, on the other hand, health problems may limit social opportunities and income. Various physical and emotional problems may have causal links with one another. It is evident that health varies with economic and social factors but it is very difficult to identify clear patterns and causal relationships.

6. CONCLUSIONS

Summary

From looking at the whole of the available data, some general features are evident.

- Women are considerably more likely than are men to suffer a range of minor ailments and non life-threatening health problems and to use medications and seek assistance from health professionals. Women report more emotional conditions, nerves, tension, depression and mental disorders. On the other hand, men are more likely to report serious physical disabilities and injuries and life-threatening conditions such as heart disease, cancer and respiratory disease. Men report more chronic conditions generally and more serious chronic conditions too. It is also evident, after eliminating the effects of childbirth, that men spend more time in hospital and are more likely to be handicapped or disabled

- The differences in experiences between women and men and, in particular, the exposure of women to childbirth and associated health conditions, does account for the different morbidity at least in part, particularly for minor ailments and short term hospitalisations. The fact that the differences between women and men tend to be greater at ages 15 to 45 years than at other ages is prima facie evidence of this. Factors related to childbirth are nevertheless insufficient to account for the very broad spectrum of differences apparent across a whole range of morbidity. They certainly cannot account for the heavier incidence of more serious conditions among men.

- In some respects, it is appears that there are morbidity differences between women and men which may be physiologically based, other than those related to childbirth. For example, women appear to suffer more from some diseases of the circulatory system (varicose veins) and of the musculo-skeletal system (arthritis) than do men. On the other hand, men suffer more diseases of the heart and respiratory system. The pattern of cancer differs very markedly between the sexes too. It is difficult to say, however, the extent to which such differences are due to behaviour (eg diet, habits and exercise) rather than physiology.

- While there are variations in morbidity according to income, marital status and occupation, these are not sufficiently large or pervasive through the whole range of health matters to account for the size and scope of the differences in morbidity apparent between the sexes.

In summary, there appear to be large differences between the sexes in population morbidity which cannot be accounted for by exposure to childbirth or to differences in income, marital status or occupation. *The major difference is that women generally suffer more minor ailments and non-fatal illnesses and men generally suffer more chronic, disabling and potentially fatal conditions.*

Possible explanations

The question remains, therefore, why women who insure against disability suffer higher claim rates than men who do so. It is evident that the underlying general morbidity differences between women and men, in the population as a whole, are insufficient to explain claims rates of the order of 50% more for women. This suggests there are *behaviourial factors in the insurance process itself* which affect the relative claims rates of women and men.

There is a strong view in some medical circles that a high proportion of disease is behaviourally based. Two expressions of this view are given below.

> "Disease is both self-created and self-cured. Illness is the physical and psychological result of unresolved needs, not a malfunction of a machine caused by unknown or external factors. A notion in our society that is widely held and aggressively defended is that people, through no fault of their own, will from time to time become unwell, may have accidents and may require surgery. Getting ill or staying well is regarded as a matter of chance, misfortune or luck. So deeply rooted in our belief system is the concept of disease as both inevitable and out of our own control that, in treating disease, we usually look at the very last point of expression of the disease - the symptoms. Beneath the symptoms, those irritating and unacceptable aches and pains, is a vast network of inter-related causes and factors contributing to the disease."
>
> *John Harrison: "Love your Disease, It's Keeping you Healthy" Angus & Robertson, 1984*

"When cosmopolitan medical civilisation colonises any traditional culture, it transforms the experience of pain. The same nervous stimulation that I shall call 'pain sensation' will result in a distinct experience, depending not only on personality but also on culture. This experience, as distinct from the painful sensation, implies a uniquely human performance called suffering. Medical civilisation, however, tends to turn pain into a technical matter and thereby deprives suffering of its inherent personal meaning. People unlearn the acceptance of suffering as an inevitable part of their conscious coping with reality and learn to interpret every ache as an indicator of their need for padding and pampering. Traditional cultures confront pain, impairment and death by interpreting them as challenges soliciting a response from the individual under stress; medical civilisation turns them into demands made by individuals on the economy, into problems that can be managed or produced out of existence."

Ivan Illich: "Limits to Medicine"
Pelican Books, 1976

It is useful to distinguish two hypotheses based on behaviourial explanations.

1. *At the time when insurance is purchased, a form of selection may occur which more severely affects average claim rates among women than it does among men.*

   In its most extreme form, there may be an element of *fraud* by those who propose for insurance knowing they intend to claim. Apart from fraud, strong self-selection may occur whereby *high risk* individuals are over-represented among those who effect the insurance.

   If the proportions, from those eligible to do so, of women who effect disability insurance are considerably lower than the corresponding proportions of men, the effects of fraud or strong self selection are likely to be more evident in the smaller pool of female risks than in the larger pool of male risks.

   If this first hypothesis is correct, then a case for unisex rates can be made. In effect, unisex rates would assist in spreading the costs of fraud and self selection by women and men evenly over the total pool of female and male risks.

2. *After insurance has been effected, a form of selection may occur which more severely affects average claim rates among women than it does among men.*

   In effect, having insurance coverage may affect the responses of people to potentially disabling events, such as accidents, illness, economic stress, work and family pressures. Some may more readily become disabled if they are insured, for reasons which may or may not be conscious. It is feasible that a mix of cultural, social and attitudinal factors affects women more significantly in this respect. In a word, it may be more socially acceptable for women not to work.

   If this second hypothesis is correct, it is difficult to make a case for unisex rates on actuarial grounds.

These two hypotheses can be tested only by examining the experience of insured populations, a matter appropriate for the Morbidity Committee of the Institute.

7. ACKNOWLEDGMENT

The assembling of all the data of this paper has been a very substantial task. I acknowledge gratefully the assistance of my colleagues at Trowbridge Consulting and in particular my secretaries, Jenny Adams and Janet Pether, who patiently typed all the tables, and Blair Nicholls who assisted me in assembling the data.

BIBLIOGRAPHY

Australian Bureau of Statistics, *Australian Health Survey, 1977-78: Accidents*, Catalogue No 4313.0

Australian Bureau of Statistics, *Australian Health Survey, 1977-78: Chronic Conditions*, Catalogue No 4314.0

Australian Bureau of Statistics, *Australian Health Survey, 1983: Health Related Actions Taken by Australians*, Catalogue No: 4358.0

Australian Bureau of Statistics, *Australian Health Survey, 1983: Illness Conditions Experienced*, Catalogue No: 4356.0

Australian Bureau of Statistics, *Australian Health Survey, 1983: Preliminary*, (Catalogue No: 4348.0)

Australian Bureau of Statistics, *Disabled and Aged Pensions: Preliminary Results, Australia 1988* (Catalogue No 4118.0)

Australian Institute of Health, *Australia's Health*, Australian Government Publishing Service, Canberra, 1988

Illich, I, *Limits to Medicine*, Pelican Books, 1976

Institute of Actuaries of Australia, *1989 Convention Cairns Australia: Report of the Disability Committee*, 1989

Harrison, Dr J, *Love Your Disease, It's Keeping you Healthy*, Angus & Robertson 1984

Statistics Unit, Equal Opportunities Commission, United Kingdom *Sex Differences in Sickness Absence from Work: Evidence from the General Household Survey and Other Sources*, August 1983

SYDNEY

MR. D. KERR: I would like to thank Peter for producing such a timely paper so soon after the Human Rights and Equal Opportunity Commission report on insurance and sex discrimination was tabled in Federal Parliament. I believe a couple of the later speakers are going to concentrate on this issue. Peter has raised the issue for the need for the insurance industry to be in a position to be able to defend its sex differential premium rates in the face of publicly available population statistics. For the actuarial profession it also raises issues, especially the need for insured lives statistics and secondly to be able to justify any differences between population and insured lives experience.

I would like to comment on some of the aspects of the paper and return to the key issue of insured lives statistics. Section 2 repeats the conventional wisdom that men experience more accidents while women experience more sickness. In the case of insured white collar lives the Australian experience is that women have heavier claims for both accidents and sickness.

This is partly explained by the low number of workplace accidents in this occupation group but it is still somewhat surprising.

Section 2 also raises the issue of pregnancy as being a possible factor in higher claim rates for females. In 1982-87 Australian experience, only 1% of female claims were the result of pregnancy related causes. Heavier female experience was therefore not due to pregnancy.

In Section 3 the author states that when pregnancy and genito-urinary cases are excluded then males have a higher hospital admission rate than females.

When considering the impact on disability insurance it is reasonable to exclude normal pregnancy as this produces very few insurance claims. It is not reasonable to exclude genito-urinary cases. The admission rates excluding normal pregnancy then become 185 per 1000 for males and 211 per 1000 for females, or 14% higher for the females.

In Section 4 there is a comment that men report a higher rate of potentially fatal chronic diseases than do women. It may be thought that disability insurance claims would be more affected by chronic diseases than say for doctor consultations. However it is possible that those lives that are susceptible to chronic diseases may be excluded by the underwriting process.

This may remove the population bias towards males.

In Section 5 the author investigates the impact of income levels on occupation and morbidity and the results do not appear to be particularly significant. In the case of insured lives the incidence rates heavily depend on occupation. Therefore probably salary, with white collar lives enjoying much lower incidence rates than blue collar lives.

In the case of female to male experience it would appear that for insured lives the extra females claims experience is highest for white collar occupations and lowest for blue collar.

The author has put forward two hypotheses in Section 6 for the higher incidence rates for female insured lives. The first is that the selection occurs when the policy is taken out. Now this is of course true, the selection being undertaken by the life office. The whole purpose of underwriting, risk classification and claims control is to ensure that we remove the effects of fraud and self selection by high risk groups.

I therefore do not support this hypothesis as being the reason for sex differential morbidity rates.

The author's second hypothesis is that the differences between males and females occurs after the policy is taken out as a result of females higher propensity to be disabled and therefore claim.

This would appear to be correct. The reason may be partly explained by the differences between population and insured lives experience.

This brings me to the second part of my address, the issue of the need for insured lives statistics and secondly to be able to justify the differences between population and insured lives experience.

This Institute does carry out investigations into insured lives morbidity. It also has proposed investigation into insured lives mortality. The insured lives investigation is suffering from a lack of commitment by the contributing offices.

At the end of last month only one office had provided their contribution and this office was an overseas owned company. I do not think that reflects very well on the Australian industry. If companies do not contribute to the Institute investigations there is a risk that as an industry we will not be able to justify sex discriminatory premium rates.

There are no investigations being carried out on lump sum disablement experience or on annuities at this stage although proposed mortality investigations tend to include annuity business.

The Morbidity investigation presented to the Cairns Convention covers the period 1982 to 1987. The crude rate of claim for all occupation age groups is really pretty similar. 29.4 per thousand for males and 30 per thousand lives for females. However this is mainly explained by the high proportion of blue collar lives amongst the males. When we break the experience down by age and occupation a different result appears. We get much higher rates for females compared to males.

The four graphs shown are for the four different occupation classes. In the top left hand corner is Class A where the female rates appear to be running about double the males rates. Class B in the top right hand corner experience is very similar. Class C at the bottom left hand corner is again very similar except for the older age groups. Class D is only based on 28 claims and therefore is unreliable.

Now this would imply that female white collar lives should be charged around 200% of equivalent male premium rates and the blue collar lives could be charged similar rates to the males. This is of course completely opposite of current industry practice.

One of the reasons for the extra female claims is that they are due to mental and genito-urinary causes.

The female mental claims are significant for all four occupation classes as is the genito-urinary causes. It is quite obvious that the proportion of accidents increases as you move from white collar to blue collar.

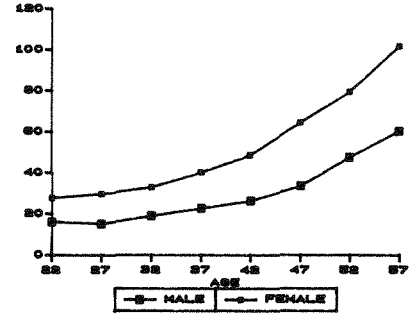
Finally I would like to turn to the issue of the difference between population and insured lives experience. There is likely to be a difference for a number of reasons. Firstly initial underwriting tends to remove proponents with pre-existing conditions. There is the possibility that the underwriting may involve reverse selection with male lives being more strictly underwritten than female lives. The definition of disability is different for life insurance, and in particular insurance generally excludes accidents due to work related or transport related incidents. These are covered by Workcover or Transcover and are therefore excluded from insured lives experience due to offset conditions. The exclusion of these accidents is likely to worsen the relative position of female insured lives.

Thirdly the lives covered under insurance policies are younger on average than the general population. 43% of male lives and 53% of female lives are aged between 20 and 35. This bias towards younger insured lives may offset the high rate of chronic conditions and handicaps in the general population, as these generally occur later in life.

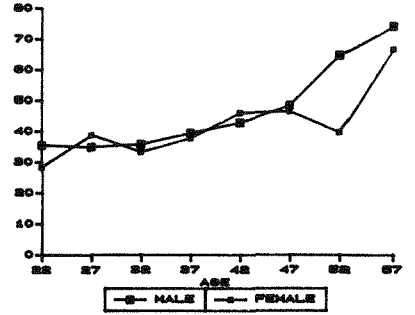
Insured lives population is different in character to the general population. Insured lives tend to be self employed, probably have above average income, be healthy at entry and be aware of the need to protect their income. It is difficult to estimate the impact, if any, on sex differential incident rates from these factors.

In conclusion it would appear that females experience heavier morbidity based on the general population and insured lives.

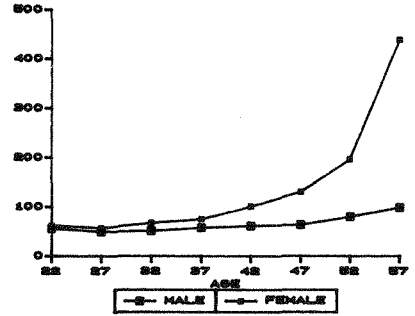
AUSTRALIA DISABILITY INCIDENCE RATES 1982-87
CLASS A 2 WEEK DEFERMENT



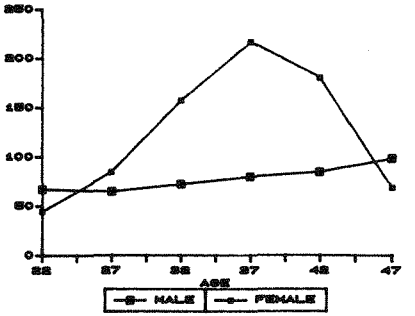
AUSTRALIA DISABILITY INCIDENCE RATES 1982-87
CLASS B 2 WEEK DEFERMENT



AUSTRALIA DISABILITY INCIDENCE RATES 1982-87
CLASS C 2 WEEK DEFERMENT



AUSTRALIA DISABILITY INCIDENCE RATES 1982-87
CLASS D 2 WEEK DEFERMENT



MR. B. WELLAND: First of all I offer my thanks to the author for presenting some most interesting statistics bearing on health aspects in the Australian population. My concern, shared with the previous speaker, relates to the relevance of these statistics to disability income insurance.

I would like to cast your mind back to the 1985 case of Pinder v the Friends Provident. Ms. Pinder was a female dentist who brought an action against the Friends Provident in the Westminster County Court, London, because she was offered sex-distinct permanent health insurance rates. In the court hearing, one of the major pieces of evidence was a long written submission by the eminent Professor Bernard Benjamin. He discussed the nature of appropriate and inappropriate data for this purpose. He also discussed the nature of disability as covered by permanent health insurance and the nature of the selection process. He concluded very strongly that population sickness rates were totally unsuitable. More particularly he referred to the General Household Survey, a British survey which I believe covered rather similar health aspects to the Australian Bureau of Statistics data analysed in this paper. As well as relating to the total population rather than insured lives, he criticised the Survey because of sampling errors based on subjective and unsubstantiated answers to insufficiently detailed questions. The judgement of the court was in favour of Friends Provident, and in his summary the judge agreed that the GHS statistics were totally unsuitable.

An example which highlights my concern regarding the relevance of the data being presented occurs under the heading "Doctor Consultations, by Reasons" in Section 3, where the final ratio of female to male medical consultations of 1.33 compares very closely with the corresponding total of 1.32 in the age-specific table "Health Related Actions" in Section 3. However the total under the first heading includes pregnancy supervision so that may well be a major reason for the high ratios in the Health Related Actions table in the important child-bearing ages. A very similar argument may be applied to the inclusion of birth control pills in the medication entries in the Health Related Actions table. These actions are certainly not relevant to disability insurance, and so should be excluded from any data designed to illustrate disability income differentials.

In Section 3 the author has made that adjustment but has also excluded genito-urinary system consultations. I agree with the previous speaker that this is not a valid approach. It is not in dispute that disorders of this kind are much more common for females but that is just as relevant to disability insurance rating as the higher level of heart conditions in males. AMPs disability income experience discloses 13% of total female claims are genito-urinary related, compared with a negligible percentage for males.

Section 3 also deals with absences from work. There are a number of problems with this array, not the least with respect to its relevance to disability income is the nature of many of the reasons, e.g. earache, common cold, stomach disorders.

I wish to move now to the conclusions in the paper where I note that support is given to the reality of differences in morbidity by sex although explanations for those differences are hard to establish. The author gives two possible explanations based on behavioural differences. I have some difficulty with his logic in the final two paragraphs in Section 6.1. As I understand it, he is suggesting that lower proportions of females propose for disability income insurance but that a larger proportion of those who do propose may be exercising strong anti-selection. That proposition may or may not be valid, but I still have difficulty with his corollary in the next paragraph that excess claims resulting from this higher level of anti-selection should be spread over both male and female lives. I do relate much more closely to his second hypothesis in Section 6.2 that there may be differences in social acceptance of disability for females.

AMP statistics continue to display excess morbidity for females varying quite considerably by age, qualifying period and occupation group. In our experience, the highest female to male ratios occur in the professional occupations. A ratio of about 2.0 applies for all professional occupations with even higher ratios, approaching 3.0, for female accountants and medical practitioners. In line with other investigations, our statistics also show that claim durations are about 10% lower for females.

I would like to take this opportunity to urge you to give further thought to the way we give effect to sex differentials in disability insurance. I recommend that we should abandon the conventional wisdom of +50% or +60%, and make more direct allowance in accordance with the world-wide statistics which are now increasingly showing us that a single percentage increase is a very broad brush indeed. Statistics point to differentials considerably greater than +50% for some ages and occupations, but considerably lower elsewhere. For some groupings there may be no differential at all.

I take the same view with regard to the widespread practice of a 3 or 5 years differential for female mortality. Sufficient data is now available to allow us to be more professional in that area.

The last aspect I wish to comment on is with regard to the recently released Human Rights and Equal Opportunity Commission's report on Insurance and Sex Discrimination. This report was in response to the Attorney General's 1984 request to examine the validity of the insurance and superannuation

exemptions in the Sex Discrimination Act. The Institute, through its Risk Classification Committee, made a detailed submission in December 1984 following a sessional meeting where all members were given the opportunity to express their views. The Committee has since maintained contact and offered help to the Commission in their examination of various aspects of this subject. The Report on the Superannuation Exemption was issued in 1986 and a Bill was presented to Parliament last year. That Bill lapsed in the Senate prior to the last federal election and has recently been reintroduced. The only change in the reintroduction was deletion of a provision which allowed future changes by regulation. I believe that is a most welcome variation.

The recent report on Insurance aspects puts forward two principles. Firstly, changes should not cost women more money, and secondly, changes should not result in withdrawal of products from the market. With those principles firmly in mind, the long and very detailed report canvasses the opinions and options that are available fully, and in the main, very fairly. For example, it accepts that it is impractical at this time to have valid Australian insured lives statistics for disablement insurance, and particularly for annuities.

The recommendations of the report were to retain an exemption for insurance with deletion of the phrase "or any other relevant factors", and with allowance for further exemption in particular cases with the agreement of the HREOC. The Report also recommended greater accountability and better communication by offices in the form of disclosure of the existence of sex differentiated rates at point of sale, and an obligation to supply supporting statistics to policyholders on request. A disputes mechanism linked to LIFA's Complaints Review Committee, specifically requiring input from IAA, is also envisaged.

The Risk Classification Committee of the Institute met recently and made a recommendation to today's Council meeting. The recommendation was for general acceptance of the document, subject to a few specific points requiring further consideration. In the first place, removal of the "other relevant factors" part of the exemption clause was seen to be acceptable in the case of sex discrimination, but a strong recommendation was made to retain that clause in the case of other types of differentiation which might be subject to legislation, since in those other cases it would be available. The second point made to Council was that the body responsible for granting of any exemption should not be the HREOC but rather the ISC, our lead regulator. The third point was that the

envisaged disputes resolution process should not be made retrospective to existing business. In making those recommendations we came to the view that it was not the intention of the Report to allow the disputes resolution process to override the Appointed Actuary's certification of premium rates under Section 78, since the involvement of the ISC and the Institute were required before any decision could be made in respect of such disputes.

In conclusion, I would like to thank the author again for a most interesting and most timely paper.

MR. R.A. BUCHANAN: I would like to address three aspects of this paper:

(i) the choice of measure for comparing male and female mortality;

(ii) some discussion of the workers' compensation experience; and

(iii) whether the arguments for unisex rating are sound.

Choice of Measure

In analysing morbidity, we have three dimensions: incidence, severity and duration. Perhaps because the available population data points this way, Mr. Carroll has concentrated largely on comparisons based on incidence, with some discussion of severity and very limited discussion of duration. This is unfortunate, because the cost and, hence, the premium rates appropriate for disability insurance are very strongly dependent on duration.

My understanding is that the difference between the incidence rates shown in insured morbidity studies is partly offset by differences between claim durations between males and females.

As an example of the difficulty in drawing conclusions from rates of incidence alone, consider the cancer statistics quoted in Section 4. By age 75, one third of all males and one quarter of all females are estimated to have developed cancer, while by the same age one in five males and one in nine females have died from cancer. Clearly, male cancer morbidity is substantially heavier than female.

If we consider the impact on disability insurance, however, the relevant statistic is the proportion of lives who would be on benefit. If we subtract the deaths from those who develop cancer, it turns out that there are two male survivors out of 15 and five female survivors out of 36. Assuming that the quoted ratios are exact, the female/male ratio of those surviving disabled is 25 to 24, a slightly higher cost for females than males, despite the much higher male incidence rates.

Workers' Compensation

Workers' compensation is a form of disability insurance with a much larger volume of claim data than the life office product. Unfortunately, the exposure information collected is generally in the form of wages, which incorporate a sex bias, and is generally not split by sex. This makes it difficult to make sex-based analyses of the incidence of claims. It is clear, however, that the average duration of claims is substantially longer for females than for males. This, by virtue of the exclusion of compensation cases from insured disability, may contribute to lower claim durations in that product.

There is anecdotal evidence that this difference is strongly linked to occupation and social status. Women tend to have lower paid and less interesting jobs than men and very often are expected to act as homemaker as well. These circumstances are not conducive to a rapid return to work. Unfortunately, I am not aware of any study comparing duration of disability for males and females in the same occupation and with similar social status.

Unisex Rating

In his conclusion, Mr. Carroll suggests two reasons why the insured morbidity experience for males and females differs substantially more than the population incidence rates compared in the paper. These are selection by the insured at the time of issue and when an event occurs which may give rise to a claim. I would suggest two other hypotheses.

3. At the time when insurance is underwritten, the rating classes select out homogeneous groups of insureds and thereby remove distortions resulting from differences in the composition of the male and female populations.

4. As suggested earlier in this discussion, differences in duration on benefit can give rise to substantial cost differences which are not reflected in incidence rates.

Both of these hypotheses, if true, suggest that it would be valid to distinguish between male and female rates.

I would expect that all four hypotheses are valid and contribute to the differences between the observed insured morbidity rates.

In relation to Mr. Carroll's first hypothesis, I do not think it is necessary to hypothesise fraud. Individual disability insurance is purchased by those who see a need for it. Given the structure of our society, this tends to be men who, in most cases, are still seen as the principal breadwinner and a

minority of women who, for one of a variety of reasons, are in this principal breadwinner role. While society is changing to reduce this imbalance, these attitudes are still very strong. It is entirely reasonable, given this asymmetry, to expect differences in rates of claim incidence and claim duration, even if the objective morbidity experience of males and females were identical.

There is also the question of who is responsible to redress any inequity. In my opinion, it is pointless to try to change the symptoms while ignoring their causes. If the differences between male and female insured morbidity result from inequities in our social structure, then we should target those inequities. If we try to pretend that the morbidity differences do not exist, we will reduce the pressure for societal changes and make it less likely that the fundamental problem will be cured.

MRS C. PRIME: We are told that the objective in writing this paper is to examine patterns of morbidity in the Australian population from available material, and particularly to look at actuarial bases for unisex disability products. The available data, apart from the statistics prepared by the Institute's own Disability Committee is largely publications of the Australian Bureau of Statistics. I do not read this paper as implying any disagreement with the Institute's own disability statistics. ABS is virtually the only other organisation that analyses statistics of this type. ABS can also be quite useful in supplying intermediate data that never finds its way into publications.

ABS statistics are population statistics. Even more than with mortality, the lives which find their way into disability insurance show morbidity which differs from the population. There are many more variations in rating factors, and different underwriting by different companies for what appears to be the same rating factor. Sometimes the rating factors are described similarly but in fact they are applied quite differently making inter-company comparisons very difficult.

Many more factors affect health than survival. With such expensive insurance, a cost effective product is developed by choosing cover in many different ways. The result of this is sometimes unsatisfactory. For instance Total and Permanent Disability Lump Sum cover (TPD) is a cheap product. Something much better is needed but the client may not be prepared to pay for it.

A well known Department of Labour and Industry study of a few years ago, looked at workforce time lost from sickness for men and women and concluded that there was no difference. The occupational mix had been ignored. The larger proportion of blue collar men in the workforce was making male morbidity look worse than it should have. The population had not been stratified at all by occupation.

The recent report of the Human Rights and Equal Opportunity Commission on 'Insurance and The Sex Discrimination Act 1984', (1990) recommends that the insurance exemption in the Sex Discrimination Act should remain with more onus on insurers to justify and publish what they do. This does not seem unsatisfactory. In the Report, the Commission acknowledges that, for insurance to be viable, the statistical process must be allowed to work. Also acknowledged is that there are many factors suitable for rating groups and several reasons for their choice, and that the underlying cause of observed differences for various groups is not directly relevant.

The Report acknowledges the unsuitability of population statistics for disability insurance, that male/female differences in mortality do exist, and that the overlap theory cannot be used to negate the use of statistics.

However the Report is proposing changes to the Act. It recommends that the insurance industry should justify discriminatory practice. This does not amount to a requirement for graduated male/female Australian insured life morbidity tables. It does not mean that overseas data, although it cannot be used, will be harder to justify. Australian insured data for disability income insurance does exist. The big gap is for TPD. Much of this business is written in employee groups however, and it is possible there is not so much discrimination in this area.

The figures in this paper are a most interesting point of comparison. But as the author acknowledges, they do not solve the question of why women who insure against disability suffer higher claim rates. Also the situation is changing with time, with types of cover offered and with company practice, particularly marketing practice. It is very very difficult to collect a homogeneous group starting with a few lives when it is not feasible to aggregate safely over a number of years.

The Human Rights Commission is aware that the research they wish to see carried out is a very big project. I believe they are looking to the Institute of Actuaries of Australia to do it. Consequently, I believe they will be pleased to be told about this meeting and this paper. They will be pleased that the research is starting so soon after the publication of their own report.

MR. J. SLACK: One speaker talked about a survey he had done on the group salary continuance market. I wish to put on record what the individual disability market is currently doing with regard to gender loadings.

I looked at 16 contracts and, based on last year's new business, that accounts for over 90% of the market. My findings were:

- all have loadings for blue collar females
- 9/16 have gender based rates for the top white collar group (of the 9 at least 2 have changed from using unisex rates to gender based rates in the last 6 months).

I also looked at the type of loadings used for females - that is whether the market applies a flat percentage extra to the male rates or whether they use ratings based on age. I found that 8 out of the 16 use a flat percentage and the other 8 use loadings which vary by age.

Why would percentage loadings be used? I think that it is for fairly pragmatic reasons. Given the variety of premium rates needed for different occupations, benefit periods, qualifying periods, optional claims escalation, smoker/non smoker rates, and optional AIDS loadings, rate book pages can be potentially fairly voluminous unless short cuts are made.

No doubt some companies feel that females only make up about 10% of the market and a doubling of the number of rate book pages for specific female rates cannot be justified.

MR. P. CARROLL (Author): Thank you very much for your kind remarks. This paper was, for me, a journey of discovery. I found the topic fascinating and, every time I saw a new table of statistics, I found something in it that surprised me. For me the work has settled the general question of whether our rating practices are supported by population statistics. It is true that, in the general population, women experience more health related incidents, as the Bureau of Statistics calls them, but there is nothing in female population experience to support disability claims rates of the order of 50-100% above those of men.

Most studies in the insurance industry are bedevilled by lack of data for females. When you start breaking the experience down by age, duration, occupation and so on, the cells do become very small. It is also a problem that many insurance contracts exclude things that are relevant to females and, therefore, much information about female experience is not recorded. Despite that, the broad picture is clear in almost every market where there are disability income products. Female rates of claim are high and they tend to be highest amongst females who live in families which include members with high income levels or white collar occupations.

So, why is the insurance experiencing these higher claims rates for women? I think it is obvious that some kind of selection is going on which I surmise is exacerbated because, in insurance, disability is defined in occupational terms as well as being based on illness.

The paper suggests two hypotheses which differ from each other simply in the timing of the selection. The first is that there is a group of high risk proposers who slip through the underwriting net at the time contracts are taken out. If this accounts for the difference of claims rates, then a case can be made for unisex premiums. The argument is that the costs incurred through underwriting failures should be spread evenly among everybody.

The second hypothesis is that the selection occurs later in the insurance process, after the proposal has been accepted. It is based on the notion that there is a behavioural element, affecting the propensity to become disabled, which differs between men and women. This behavioural element may be affected by the presence of the insurance contract itself also in a way that differs between the sexes.

If I was forced to guess, I would support the second hypothesis. I think, if the family income is high so that it can afford to lose an income and if it experiences events that may be considered disabling, social pressures can more readily allow women in the family to become "disabled". If this is the explanation, I see no actuarial argument in unisex rates so long as we have the existing social structures and pressures affecting women. There may, however, be marketing or political reasons.

Barry Welland asked how information regarding the non-prescribed medications and bed confinement other than in hospitals was measured. They are all self-reported in the ABS Studies.

On the question of differences of hospitalisation, the broad picture is that men and women have roughly the same rates, if you exclude childbirth. The differences certainly do not justify loadings of the order of 50-100% by women.

Bob Buchanan suggested that it would be useful to have more information regarding incidence, severity and duration of health related events and I agree. I have no idea where to get this data. Perhaps Bob does. He proposed a number of additional hypotheses and I would not argue with him that there are possibly more than the two I suggested.

What does it all mean? I think there are three areas to be considered.

The first is in product design. It is the income products that seem to have the greatest sex differences in claim rates. The old fashioned disability products, with tables of maims, and TPD products have much more equal claims rates. If the law compels unisex rating or if we believe that it is desirable for marketing reasons, products should be designed with more lump sum benefits and fewer income benefits.

The second area is in the pricing of products. If we offer unisex premiums to professional and white collar occupational groups and not among other socio-economic groups, then we are flying in the face of the evidence.

Thirdly, there are issues of relevance to claims management. If there are social and behavioural factors encouraging greater claims among women, perhaps our claims management ought to concentrate more on these issues than on the medical context in which claims are occurring.

Thank you all very much. I enjoyed writing the paper and hearing the discussion and I thank you for the kind reception you have given it.

There was no discussion available from the Melbourne meeting.

COURT DECISIONS

DUTY OF A LIFE AGENT

BELL V AUSTRALIAN EAGLE INSURANCE CO. LTD & ORS

- (1989) 6 ANZ INSURANCE CASES 60983 -

FEDERAL COURT OF AUSTRALIA

The agent completed the proposal form and although the insured advised the agent he had suffered rheumatic fever as a child, the information was not included in the proposal form. The insured died within three years of the issue of the policy from a condition that came from the rheumatic fever. The Company denied the claim. The estate of the insured sued the Company upon the policy and the Company counter claimed on the agent.

Burchett J.

HELD

(1) The proposal was completed by the agent acting within his authority so the Company was denied from relying on the failure to disclose the rheumatic fever. It was therefore obliged to pay the claim.

(2) The Company succeeded in the counter claim against the agent because he was under a duty to fill out the proposal form correctly and he had failed in that duty.

SUICIDE

CLARK AND ORS V NZI LIFE LIMITED - (1984) 6.

ANZ INSURANCE CASES 60988 - SUPREME COURT OF QUEENSLAND

The insured took out a life policy in August 1985 and died in October 1985. The policy contained a suicide clause voiding the policy if death was within 13 months of commencement. The cause of death was by a bullet fired from a rifle by the insured. The point at issue was whether the death was as a result of suicide or whether it was the result of an accident. There were no witnesses to the death. Evidence given suggested the insured must have been crouched over the rifle at the time of death, the rifle had the safety catch off, it only contained one bullet and he had a blood alcohol level of 0.10.

Thomas J.

HELD

(1) On the evidence an accidental discharge of the rifle was unlikely.

(2) The issue would be decided on the balance of probabilities.

(3) The decision was death by suicide.

SECTION 26(a)

EQUITABLE LIFE ANMD GENERAL INSURANCE CO. LTD V

FEDERAL COMMISSION OF TAXATION

90 ATC 4438 - FULL FEDERAL COURT OF AUSTRALIA

This was an appeal from the decision at 89 ATC 4972.

Davies and Gummow J.J.

HELD (by a majority)

(1) The taxpayer was not a trader in shares and the profits realised in closing down the business were capital profits.

PINCUS J. (dissenting)

HELD

(1) When the taxpayer closed down its business it did not go into liquidation and in fact continued to hold some assets.

(2) The profits realised were therefore taxable as they were no different from what would have occurred had the taxpayer continued in business.

ADMINISTRATIVE APPEALS TRIBUNAL DECISIONS

SECTION 82 AAC

90 ATC 180

The taxpayer company had established a superannuation fund. The members of the fund were divided into three groups - principal employees, named employees and unnamed employees.

Contributions were made to the fund in respect of the three groups of members. When a member left the scheme amounts standing to the credit of the member were generally forfeited to continuing members of the fund. The nature of employment of the unnamed employees was such that there was an expectation they would never receive any benefits from the scheme. The principal employees and named employees were made aware of the existence of the scheme but the unnamed employees were never advised of the scheme and were all unaware it existed. The Commissioner disallowed a deduction of contribution made to this fund.

HELD

(1) The expectations that a member was unlikely to receive benefits from the fund does not render the contribution non deductible.

(2) But to be deductible a contribution must be made for the purpose of providing benefits to members and these benefits must be fully secured.

(3) None of the benefits for the unnamed employees were fully secured and so were not deductible.

(4) Contributions made on behalf of the principal employees and named employees are fully secured and were decuctible.

SECTION 116G

90 ATC 310

A friendly society established a number of funds to administer the various services it provided for members. One of these services was insurance. The society was not taxed on its income from the non insurance services but was taxed on its income from insurance services. The society established a fund to provide for its taxation liability and this fund earned investment income. The Commissioner assessed the income from this fund for tax.

HELD

(1) The tax liability is imposed on the insurance business not on the fund.

(2) Insurance business includes the investment of the fund and also the payment of tax.

(3) The income in question was therefore taxable.

SECTION 27H

90 ATC 631

The taxpayer received a lump sum on retirement which he rolled over into a variable annuity. The purchase price of the annuity was $50,000 and the annuity payment over five years was $10,000 p.a. plus interest. The Commissioner taxed the interest as assessable income, whereas the taxpayer contended it fell within the provisions of Section 27H and should be taxed as a concessional amount.

HELD

(1) The fact the contract stated it was an annuity did not make it an annuity.

(2) The transaction was in reality a term deposit with capital and income benefits.

(3) It was therefore correct to tax the income benefit as interest on the capital.

STATUTES

New South Wales

No. 90 - Motor Accidents (amendment) Act 1990 making minor amendments to the 1988 Act

No. 97 - Credit (amendment) Act 1990 revising the definition of consumer credit insurance

Victoria

No. 65 - State Insurance Office (amendment) Act 1990 authorising the conversion of the State Insurance Office to a public company

AUSTRALIAN PUBLICATIONS 1990

The ISC clears up RBL confusion with a question and answer paper - M. Gilbert (AII Journal Vol. 13 No. 2 - June 1990)

A Contemporary Actuarial View
- R.R. Lester (AII Journal Vol. 13 No. 3 - August 1990)

Circulars 273 and 274 and their impact on Capital Guaranteed Superannuation Business - T. Rudge (Superfunds No. 127 - June 1990)

Superannuation, What Next
- R. Stevens (Superfunds No. 129 - September 1990)

THE INSTITUTE OF ACTUARIES OF AUSTRALIA

AIDS REPORT NO.5

UPDATED PROJECTIONS - AUSTRALIAN POPULATION

February 1990

1. In 1988 The Institute of Actuaries of Australia published some projections of AIDS and its effect on the overall level of population mortality. Subsequently data have become available both here in Australia and overseas which indicate that initial estimates of the long term impact of AIDS may have been too high.

   Although some downward revision is justified, it is important to note reports such as that from the United States "AIDS Forecasting - Undercount of Cases and Lack of Key Data Weaken Existing Estimates"(1) which "...estimates that the net effect of these problems may be that only about two-thirds of all cases of AIDS and other fatal HIV-related illnesses were captured in the data underlying existing national forecasts". Recently there have been reports in Australia which indicate that existing statistics on AIDS cases and deaths may be understated by at least 10%. Adjusted figures which have now begun to show in the official figures still exclude unreported cases.

2. The model devised by Professor David Wilkie has again been used with the various parameters derived from Australian data. You are referred to AIDS Report No.2 for detailed comment on the model.

   Because of the subjective nature of the underlying assumptions in the data, it is appropriate to have three projections which have been termed low, medium and high. These projections will provide actuaries with a range of potential outcomes. Each actuary will need to understand the ramifications of each projection to decide which one is appropriate in a particular situation.

3. The model continues to be based on a single sex model relating to males only. The latest official statistics confirm that females, at this stage, represent a very small proportion (3%) of the number of AIDS cases. There have been studies both here and overseas which indicate there has been behavioural change by those who belong to those "transmission categories" that have experienced significant levels of AIDS cases but partially offset by minimal change in lower risk categories. Each of the projections shown in this Report allow for behavioural change. It must be stressed that any period chosen to reflect behavioural change is very subjective, relying as much on anecdotal evidence as any scientific evidence.

The behavioural change periods used during which the initial intensity reduced linearly to half its original level were:

Projection	Period of Change
Low and Medium	1 January 1984 to 1 January 1989
High	1 July 1985 to 1 July 1990

The initial intensity of the additional AIDS mortality reduced over the same periods. Such a reduction would represent an allowance for the effect of Zidovudine (AZT) on persons with AIDS.

4. The basic parameters of all three projections are:

Initial Population	-	Mid 1983 Australian Bureau of Statistics (ABS) estimates
Initial at Risk Population	-	Males aged 21 to 50: . 2½% for Low projection . 5% for Medium and High projections
Transfer from At Risk to Clear	-	Intensity 0.1 from the beginning of the period of behavioural change
Mortality	-	Australian Life Tables 1980-82
New Entrants at Risk	-	ABS projections of males at age 15: . 1% for Low projection . 2% for Medium and High projections
Transfer from At Risk to HIV+	-	Initial intensity of 0.7 for ages 25 to 35 reducing to zero at age 15 and 70
Transfer from HIV+ to Sick with AIDS	-	Intensity varies by duration according to a Weibull distribution $G(t) = 1 - \exp\{-.004t^{2.35}\}$
Mortality of Sick	-	Normal mortality plus an initial intensity of 0.7

5. The results of the projections are set out in Appendices 1 to 3. As already mentioned, any of the results should be treated with some caution. However, it is interesting to note the cumulative actual number of deaths compared with the projections. The actual deaths are derived from the 26 January 1990 Australian HIV Surveillance Report of the National Centre in HIV Epidemiology and Clinical Research.

Table 1

Year (Mid-year)	Actual Cumulative Deaths	Projection - Cumulative Deaths Low	Medium	High
1983	1	0	0	0
1984	8	11	11	11
1985	50	48	48	48
1986	130	125	126	127
1987	323	263	268	275
1988	501	478	508	539
1989	749	793	892	985

Under-reporting and late reporting are likely to mean that the actual number for 1989 is likely to be closer to the projections than the above table indicates.

Doctors and statisticians have attempted to estimate the number of HIV positive persons in Australia. The estimates being quoted for the middle of 1989 were generally in the range 15,000 to 50,000. The range emerging from the Institute projections at the same time is 18,000 to 31,000.

6. The projections indicate that the number of new HIV positive cases in any one year has reached its peak or will in the not too distant future. Any significant spread of HIV infection outside the homosexual/bisexual cohort will, however, nullify any reduction in the number of new HIV+ cases in the homosexual/bisexual cohort.

Appendices 4 to 6 set out the increase to insured lives mortality resulting from AIDS. These appendices are based on the assumption that insured lives will experience the same increase in mortality as in the population generally. Underwriting practices should have the effect of reducing the increase in mortality for insured lives. However, the impact will vary between insurers depending on such factors as HIV testing levels, the accuracy of any declaration and personal statements, and the client profile of the insurer. The reports of the Society of Actuaries Task Force on the financial implications of AIDS for insurers in the United States[2][3] should be useful to all actuaries. The letter[4] from the U.K. Government Actuary to the Appointed Actuary is also useful background.

The graphs attached as Appendices 7 to 9, which compare the percentage increase in mortality on the original "Basis M" (IAA AIDS Report No.3) and the new bases, illustrate the effect of the changed parameters. For these graphs and the tables of extra mortality the last complete year in the 30 year projections has been shown and not the quinquennial year.

7. The references that follow also include papers not already mentioned which provide additional background material.

References

(1) "AIDS Forecasting - Undercount of Cases and Lack of Key Data Weaken Existing Estimates" U.S. General Accounting Office, June 1989

(2) "The Financial Implications of AIDS for Life Insurance Companies in the United States" Society of Actuaries, July 1989

(3) "The Financial Implications of AIDS on Individual Disability Insurance in the United States" Society of Actuaries, December 1989

(4) "Reserves for HIV and AIDS" Letter from UK Government Actuary, December 1989

(5) A. Carr "Behaviour change in Australia in response to the threat of HIV infection: a survey of current knowledge" Dept of Community Services and Health, February 1988

(6) R.W. Connell et al "Social aspects of the prevention of AIDS : study A" Macquarie University, June 1988

(7) B. Donovan "Social and behavioural components of clinical studies" 3rd National Conference on AIDS, August 1988

(8) P.J. Solomon & S.R. Wilson "The Back Projection Method for Estimation of the Incidence of HIV Infection" C.S.T.R.-012-89

(9) "Acquired Immune Deficiency Syndrome in England and Wales to End 1993 Projections Using Data to End September 1989" UK Public Health Laboratory Service, January 1990.

Appendix 1

IAA AIDS REPORT NO.5

"Low" Projection

Year (mid-year)	HIV+ Cases		Cumulative AIDS Cases	Cumulative AIDS Deaths
	New	Cumulative		
1983	0	1784	0	0
1984	1368	3152	43	11
1985	2102	5254	125	48
1986	2854	8108	273	125
1987	3401	11509	523	263
1988	3533	15042	917	478
1989	3296	18338	1501	793
1990	3249	21587	2313	1226
1991	3095	24682	3380	1782
1992	2800	27482	4715	2467
1993	2426	29908	6319	3375
1994	2030	31938	8171	4528
1995	1653	33591	10238	5922
1996	1319	34910	12469	7541
1997	1037	35947	14809	9360
1998	807	36754	17195	11342
1999	626	37380	19562	13441
2000	488	37868	21855	15609
2001	387	38255	24024	17796
2002	316	38571	26031	19953
2003	268	38839	27849	22037
2004	237	39076	29465	24011
2005	217	39293	30873	25846
2006	205	39498	32082	27524
2007	197	39695	33106	29035
2008	192	39887	38962	30375
2009	188	40075	34671	31548
2010	185	40260	35256	32565
2011	183	40443	35739	33437
2012	182	40625	36139	34181

Appendix 2

IAA AIDS REPORT NO.5

"Medium" Projection

Year (mid-year)	HIV+ Cases		Cumulative AIDS Cases	Cumulative AIDS Deaths
	New	Cumulative		
1983	0	1784	0	0
1984	1394	3178	43	11
1985	2200	5378	126	48
1986	3122	8500	275	126
1987	3964	12464	531	268
1988	4480	16922	942	508
1989	4538	21460	1566	892
1990	4901	26361	2458	1470
1991	5127	31488	3666	2293
1992	5073	36561	5231	3408
1993	4764	41325	7181	4857
1994	4271	45596	9524	6669
1995	3683	49279	12248	8856
1996	3078	52357	15314	11411
1997	2509	54866	18669	14308
1998	2006	56872	22235	17497
1999	1580	58452	25928	20916
2000	1234	59686	29658	24487
2001	963	60649	33336	28127
2002	757	61406	36880	31751
2003	608	62014	40222	35281
2004	504	62518	43309	38647
2005	434	62952	46106	41792
2006	388	63340	48591	44674
2007	358	63698	50764	47269
2008	339	64037	52636	49567
2009	326	64363	54227	51570
2010	318	64681	55564	53293
2011	312	64993	56680	54758
2012	308	65301	57610	55994

Appendix 3

IAA AIDS REPORT NO.5

"High" Projection

Year (mid-year)	HIV+ Cases		Cumulative AIDS Cases	Cumulative AIDS Deaths
	New	Cumulative		
1983	0	1784	0	0
1984	1419	3203	43	11
1985	2559	5762	126	48
1986	4202	9964	280	127
1987	5921	15885	556	275
1988	7287	23172	1028	539
1989	7769	30941	1789	985
1990	7212	38153	2939	1695
1991	6580	44733	4566	2757
1992	6207	50940	6732	4253
1993	5572	56512	8469	5246
1994	4800	61312	12772	8773
1995	4005	65317	16601	11841
1996	3259	68576	20880	15422
1997	2602	71178	25503	19456
1998	2047	73225	30347	23854
1999	1594	74819	35277	28506
2000	1235	76054	40161	33290
2001	959	77013	44880	38083
2002	754	77767	49334	42768
2003	607	78374	53446	47244
2004	504	78878	57161	51426
2005	435	79313	60457	55257
2006	389	79702	63327	58698
2007	359	80061	65787	61736
2008	338	80399	67865	64374
2009	325	80724	69600	66632
2010	316	81040	71035	68541
2011	310	81350	72216	70138
2012	306	81656	73185	71464

Appendix 4

IAA AIDS Report No. 5

AUSTRALIAN INSURED LIVES EXTRA MORTALITY FROM AIDS PER 100,000
LOW BASIS

ATTAINED AGE	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2011
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	3	2	2	1	0	0	0	0	0	0	0	0	0	0
30	13	14	15	15	13	11	9	7	4	1	1	1	1	1
35	17	22	28	35	42	48	50	49	46	36	30	24	2	2
40	16	22	28	37	48	58	67	75	78	80	79	76	33	6
45	12	17	23	31	42	53	63	72	79	84	86	86	60	19
50	7	10	14	20	27	36	46	57	66	73	78	80	59	25
55	4	6	8	11	15	20	27	34	42	49	56	62	55	20
60	2	2	3	4	5	10	13	17	21	26	31	37	48	20
65	1	1	2	2	3	3	4	6	8	10	13	16	32	21
70	0	0	1	1	1	1	2	2	3	3	4	4	13	19
75	0	0	0	0	0	0	0	1	1	1	1	2	3	9
80	0	0	0	0	0	0	0	0	0	0	0	0	1	1

PERCENTAGE INCREASE IN MORTALITY DUE TO AIDS
(using 70% IA 1964-70 ulimate mortality per 100,000)
LOW BASIS

ATTAINED AGE	BASE MORTALITY	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2011
20	134	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	75	4%	3%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	72	18%	19%	21%	21%	18%	15%	12%	10%	6%	1%	1%	1%	1%	1%
35	86	20%	26%	33%	41%	49%	56%	58%	57%	53%	42%	35%	28%	2%	2%
40	122	13%	18%	23%	30%	39%	48%	55%	62%	64%	66%	65%	62%	27%	5%
45	197	6%	9%	12%	16%	21%	27%	32%	36%	40%	43%	44%	44%	30%	10%
50	342	2%	3%	4%	6%	8%	11%	13%	17%	19%	21%	23%	23%	17%	7%
55	599	1%	1%	1%	2%	3%	3%	5%	6%	7%	8%	9%	10%	9%	3%
60	1034	0%	0%	0%	0%	0%	1%	1%	2%	2%	3%	3%	4%	5%	2%
65	1744	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	2%	1%
70	2867	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
75	4593	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
80	7155	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

AUSTRALIAN INSURED LIVES EXTRA MORTALITY FROM AIDS PER 100,000
MEDIUM BASIS

ATTAINED AGE	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2011
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	4	3	3	2	0	0	0	0	0	0	0	0	0	0
30	17	21	23	23	19	16	13	9	5	1	1	1	1	1
35	24	35	47	59	70	78	81	80	73	58	48	38	3	3
40	23	33	47	62	79	97	114	128	136	140	140	134	58	10
45	16	24	36	50	66	85	103	120	134	145	151	153	110	36
50	9	14	21	29	40	54	70	87	104	119	130	136	106	44
55	5	8	11	15	20	27	36	46	58	71	85	97	98	34
60	2	3	4	6	8	12	16	20	26	33	41	49	79	35
65	1	2	2	3	3	4	5	7	9	12	14	19	44	36
70	0	1	1	1	1	2	2	2	3	3	4	4	14	27
75	0	0	0	0	0	0	0	1	1	1	1	2	3	9
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PERCENTAGE INCREASE IN MORTALITY DUE TO AIDS
(using base of 70% IA 1964-70 ultimate mortality per 100,000)
MEDIUM BASIS

ATTAINED AGE	BASE MORTALITY	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2011
20	134	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	75	5%	4%	4%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	72	24%	29%	32%	32%	26%	22%	18%	12%	7%	1%	1%	1%	1%	1%
35	86	28%	41%	55%	69%	81%	91%	94%	93%	85%	67%	56%	44%	3%	3%
40	122	19%	27%	39%	51%	65%	80%	94%	105%	112%	115%	115%	110%	48%	8%
45	197	8%	12%	18%	25%	33%	43%	52%	61%	68%	73%	76%	78%	56%	18%
50	342	3%	4%	6%	8%	12%	16%	20%	25%	30%	35%	38%	40%	31%	13%
55	599	1%	1%	2%	3%	3%	5%	6%	8%	10%	12%	14%	16%	16%	6%
60	1034	0%	0%	0%	1%	1%	1%	2%	2%	3%	3%	4%	5%	8%	3%
65	1744	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	3%	2%
70	2867	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
75	4593	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
80	7155	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

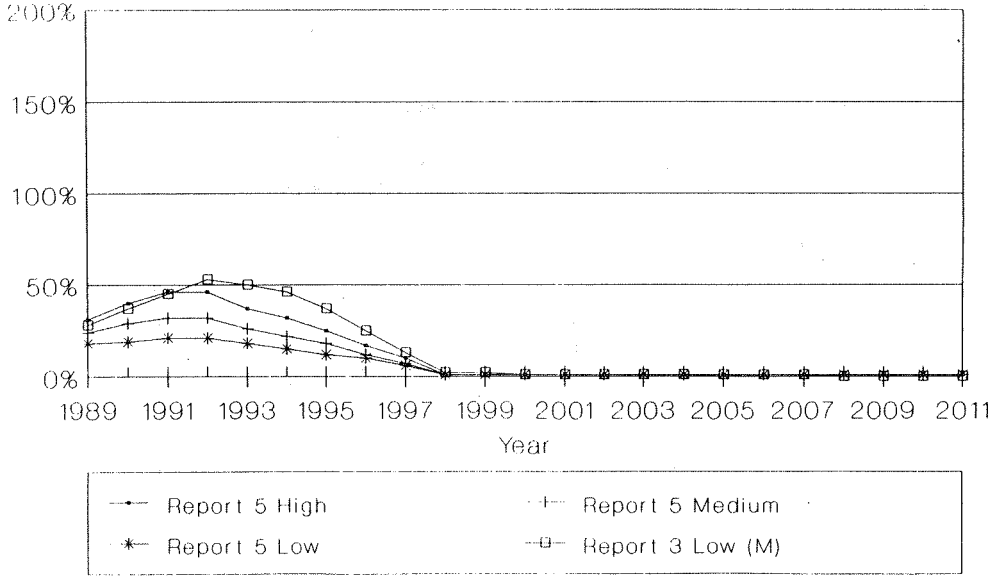
AUSTRALIAN INSURED LIVES EXTRA MORTALITY FROM AIDS PER 100,000
HIGH BASIS

ATTAINED AGE	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2011
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	4	4	3	2	0	0	0	0	0	0	0	0	0	0
30	22	29	33	33	27	23	18	12	7	1	1	1	1	1
35	30	46	65	82	99	112	118	115	106	82	67	51	4	3
40	28	44	64	87	111	136	159	177	185	189	186	177	72	10
45	19	31	47	68	92	119	144	166	183	195	199	198	129	41
50	11	17	26	39	55	74	97	122	144	162	174	179	122	46
55	6	9	13	19	27	37	49	65	82	99	116	131	115	34
60	2	3	5	7	10	15	21	27	35	45	56	68	98	35
65	1	2	2	3	4	5	6	8	11	15	20	25	58	40
70	0	1	1	1	1	2	2	3	3	4	5	6	19	33
75	0	0	0	0	0	0	0	1	1	1	2	2	4	12
80	0	0	0	0	0	0	0	0	0	0	0	0	0	1

PERCENTAGE INCREASE IN MORTALITY DUE TO AIDS
(using base of 70% IA 1964-70 ultimate mortality per 100,000)
HIGH BASIS

ARRAINED AGE	BASE MORTALITY	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2011
20	134	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	75	5%	5%	4%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	72	31%	40%	46%	46%	37%	32%	25%	17%	10%	1%	1%	1%	1%	1%
35	86	35%	53%	75%	95%	115%	130%	137%	134%	123%	95%	78%	59%	5%	3%
40	122	23%	36%	53%	71%	91%	112%	131%	145%	152%	155%	153%	145%	59%	8%
45	197	10%	16%	24%	34%	47%	60%	73%	84%	93%	99%	101%	100%	65%	21%
50	342	3%	5%	8%	11%	16%	22%	28%	36%	42%	47%	51%	52%	36%	13%
55	599	1%	2%	2%	3%	5%	6%	8%	11%	14%	17%	19%	22%	19%	6%
60	1034	0%	0%	0%	1%	1%	1%	2%	3%	3%	4%	5%	7%	9%	3%
65	1744	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	3%	2%
70	2867	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
75	4593	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
80	7155	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

PERCENTAGE INCREASE IN MORTALITY DUE TO AIDS Attained Age 30



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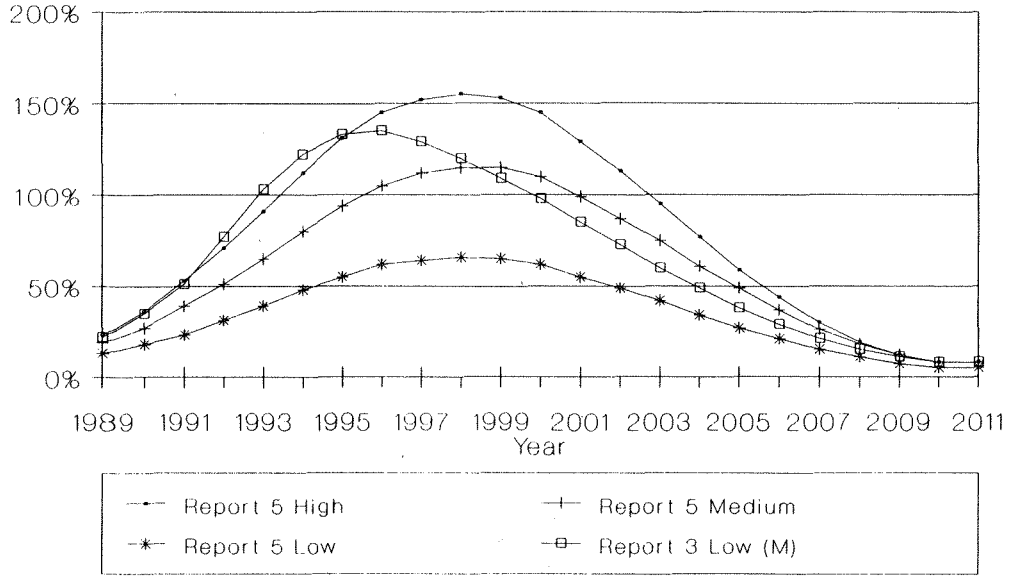
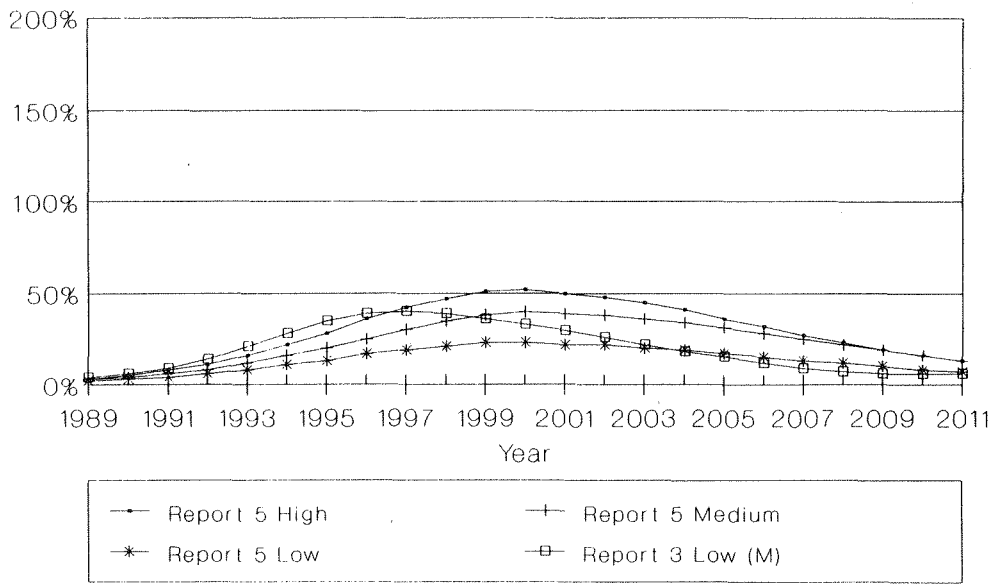
•using 70% IA 1964-70 ultimate mortality

PERCENTAGE INCREASE IN MORTALITY DUE TO AIDS Attained Age 40



IAA AIDS Report No. 5
•using 70% IA 1964-70 ultimate mortality

PERCENTAGE INCREASE IN MORTALITY DUE TO AIDS Attained Age 50



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•using 70% IA 1964-70 ultimate mortality

THE INSTITUTE OF ACTUARIES OF AUSTRALIA

The Hon. P J Keating M P
Treasurer
Canberra Ministerial Office
House of Representatives
Canberra ACT 2600

21 December, 1990

My dear Treasurer

Review of the Life Insurance Act

I understand that a full review of the Life Insurance Act is being carried out. In this regard, we were invited by the Deputy Commissioner, Life Insurance, to provide suitable comment. Our comment is enclosed.

You will notice that The Institute suggests a number of areas where professional actuarial advice and reporting is desirable. We also advocate reporting in the Companies' Code format.

These matters require standards. It is suggested that the development and approval of actuarial standards under the auspices of The Institute corresponds with the procedures involved with development and approval of 'approved accounting standards' under Section 266 of the Companies' Code.

I wish to emphasise the Institute's readiness to develop such standards. We would welcome discussion of this subject and of appropriate timetables.

Yours sincerely

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REVIEW OF LIFE INSURANCE ACT

SUBMISSION TO THE TREASURER BY THE INSTITUTE OF ACTUARIES

C O N T E N T S

Section

Attachments

1. INTRODUCTION

1.1 As part of the process of reviewing the Life Insurance Act, the Deputy Commissioner, Life Insurance (DCLI) has asked for a submission from the Institute of Actuaries of Australia (the Institute).

1.2 The actuarial profession, by nature of its training and experience, feels that it can make a worthwhile contribution to the review of the Life Insurance Act (the Act). The Institute therefore welcomes the opportunity to make this submission. The Institute would also welcome the opportunity to peruse a draft of the Bill for the revised Act and to make constructive comment where considered appropriate.

1.3 Actuaries occupy many senior positions in the life insurance industry: such positions range from purely technical to chief executive. Nevertheless, this submission is intended to cover only those aspects of the Act of relevance to actuaries as professionals. Those matters of more general concern will be covered in submissions from other bodies.

1.4 The practicability of implementing any suggestions has been borne in mind in preparing this submission.

1.5 The life insurance industry has changed dramatically in the forty five years since the Act was first introduced. The techniques available to the actuarial profession have also changed markedly in that time. We thus submit that a major restructuring of the Act is necessary: it is not sufficient to tamper with a few details.

1.6 The Institute recognises that the simultaneous implementation of all the recommendations in this submission may cause practical difficulties. The Institute therefore recommends that the new Act should incorporate the full range of recommendations, but make provision for implementation over a period.

1.7 The Institute also recognises that companies have issued policies and may have framed other documentation, including Articles of Association, in accordance with the terms of the existing Act. Such policies and documentation should not be retrospectively affected by the changes introduced into the new legislation. It will therefore be necessary to include "grandfathering provisions" in a number of areas, some of which are indicated throughout this submission.

2. SUMMARY OF RECOMMENDATIONS

2.1 The Institute submission covers 16 topics. A list of all recommendations is given in Attachment 1. A very brief summary of the recommendations is as follows:

(a) Structure of the Act - the Institute recommends major changes to the structure of the Life Insurance Act. The Act itself should deal only with matters of principle with detail being contained in ISC Circulars and Professional Standards. See Section 4.

(b) Role of the actuary - the Institute supports the continuation of the Appointed Actuary concept and proposes additional responsibilities. See Section 5.

(c) Definitions - the Institute makes various technical recommendations. See Section 6.

(d) Discretionary Policies - the Institute recommends a definition of a discretionary policy which includes a participating policy (as currently defined) and any other policy where benefits are at the discretion of the company. See Section 7.

(e) Premium Rating - the Institute proposes that no policy be issued unless the Appointed Actuary has approved all terms and conditions of that policy. See Section 8.

(f) Surrender Values - the Institute is opposed to minimum surrender values within the legislation because of the detriment this can cause continuing policyholders. However, should such minimums be imposed, possible scales are recommended. See Section 9.

(g) Statutory Funds - the Institute supports retention of the Statutory Fund concept and makes recommendations intended to clarify the role of Statutory Funds. See Section 10.

(h)	Assets	- the Institute is opposed to control of investment policy but proposes that the Appointed Actuary should make adjustment to the valuation of liabilities in respect of assets whose value is not appropriate for purposes of capital adequacy. See Section 11.
(i)	Valuation of Liabilities	- the Institute recommends a realistic basis for valuation of liabilities with additional reserves for capital adequacy. See Section 12.
(j)	Reporting of Earnings	- the Institute recommends that earnings be reported on a realistic basis which is consistent with the treatment of capital adequacy. See Section 13.
(k)	Capital Adequacy	- the Institute recommends major changes to allow reporting of capital adequacy on a modern basis. See Section 14.
(l)	Allocation of Profit	- the Institute recommends allocation of profit at each year end and proposes rules for this process in the interests of equity. See Section 15.
(m)	Distribution of Profit	- the Institute recommends major changes in the interests of equity. See Section 16.
(n)	Annual Reporting	- the Institute recommends significant changes to make reporting similar to the Companies Code. See Section 17.
(o)	Statistics	- the Institute recommends that collection of statistics be dealt with by ISC Circular. See Section 18.
(p)	Disclosure	- the Institute recommends greater disclosure of policy terms and conditions at the point of sale and subsequently. See Section 19.

2.2 The recommendations on disclosure underpin many of the rest of our recommendations. The Institute believes in "freedom with publicity" within reasonable limits. The disclosure recommendations are critical to the integrity of the remainder. Adequate disclosure of policy benefits, terms and conditions at point of sale and financial benefits year by year considerably reduces the need for cumbersome devices to protect policyholders. The Institute believes that this approach is more in the interests of consumers than, for example, a high level of minimum guarantees and rigid constraints.

2.3 The Institute is recommending significant changes to the basis of reporting the financial performance of life insurance companies. We believe that major changes are essential in this area and that the recommendations we have made will give policyholders, both prospective and existing, shareholders and the Commissioner a much clearer picture of the financial position than the current basis. We also believe that our proposals will help solve the problem of maintaining equity between policyholders and shareholders.

3. PURPOSE OF THE LIFE INSURANCE ACT

3.1 All legislation enacted by Parliament is intended to achieve a purpose. When introduced to Parliament, the Treasurer's Second Reading Speech indicated that the present Act's purpose was "to regulate life insurance business conducted in Australia, and to protect the interest of persons who have effected life insurance policies".

3.2 Since 1945, the prevailing concerns of the community and Parliament have altered. In particular, the community now expects positive consumer protection. This mood is evidenced in legislation such as the Trade Practices Act, various State Fair Trading Acts and the Insurance Contracts Act. In addition, the operating environment, products and business practices of the life insurance industry have seen major change.

3.3 The Institute believes that the purpose of any revision of the Act should reflect community concerns. Specifically, the Institute believes the purpose of the Act should be to regulate the conduct of life insurance business for the protection of policyholders and shareholders by:

(a) imposing minimum standards for demonstrating adequacy of capital, such standards to take account of the nature of the liabilities and the nature of the assets supporting those liabilities;

(b) encouraging prudential management of life insurance business by requiring actuarial and audit control where appropriate;

(c) requiring relevant disclosure of product and financial information to consumers prior to life insurance contracts being entered into, and to policyholders during the term of their policies;

(d) providing a framework for maintaining equity among policyholders, and between policyholders and shareholders of a life insurance operation;

(e) clarifying the ownership of, and entitlement to benefit from, Statutory Funds; and

(f) requiring relevant disclosure of the operating results of the business to the owners.

3.4 The recommendations in this submission have been framed with regard to the purposes noted above.

3.5 This submission presupposes that the revised Act will deal exclusively with life insurance business and will perpetuate the current regime of separate regulation of life insurance business. The Institute believes that this is appropriate because:

(a) the long term guarantees often associated with life insurance policies are particular to life insurance business and require specialist techniques for analysis, monitoring and control;

(b) the beneficiaries of these guarantees require a higher standard of prudential support than consumers of other goods and services; and

(c) the nature of life insurance contracts can be sufficiently specialised and, for the consumer, complex as to warrant business specific consumer protection.

3.6 The Institute does, however, recognise that certain classes of life insurance contracts are similar to other "investments" consumers can make. The recommendations made in this submission also have regard to these similarities and the standards of control and disclosure currently imposed on these investments.

4. STRUCTURE OF THE LIFE INSURANCE ACT

Recommendations

4.1 The Act is 45 years old and over the years conditions, products and practices have changed significantly. The process of change is likely to continue in the future. The revised Act must therefore be able to deal with a changing environment. We regard it as essential that the Act should deal only with matters of principle. The matters of principle of concern to the Institute form the main body of this submission.

4.2 Matters of detail should be covered by means of:

(a) Professional Standards issued by the Institute, and

(b) ISC Circulars.

These both should have the explicit backing of the Act. ISC Circulars and Professional Standards can be more readily amended to deal with changes than can Statutory Regulations.

4.3 To date the ISC has sought assistance, comment or advice from the Institute prior to issue of ISC Circulars which are of relevance to actuaries. This has, from time to time, taken the form of a select committee including actuaries. The Institute recommends that this consultation process with the actuarial profession be carried forward after the enactment of the revised Act. This assumes even greater relevance in the event that the DCLI, at a future date, is not an actuary.

4.4 The principles should be laid down by Parliament and would be expected to stand the test of time. They should create the framework for the detailed rules and, in doing so, would create limits for public servants. Change to the principles would require the approval of Parliament. The detailed rules in the ISC Circulars and Professional Standards can be revised regularly to deal with new products, the changing environment and changing community attitudes - but always within the limits of the principles in the Act.

4.5 The Institute has produced several Professional Standards to be used by actuaries in carrying out their professional responsibilities. It is accepted that the Institute's recommendations rely on a considerable extension of these Professional Standards and the Institute is willing and prepared to undertake any necessary work to set the standards and enforce them.

5. THE ROLE OF THE ACTUARY

Present Position

5.1 The Act has always recognised the importance of professional actuarial advice in the financial management of a life insurance company by requiring

(a) actuarial approval for premium rates;

(b) regular actuarial reports on the financial condition; and

(c) actuarial approval for the distribution of surplus.

5.2 In the original form of the Act these actuarial tasks could have been carried out by different actuaries. Recent legislation introduced the concept of the Appointed Actuary who is solely responsible for all these tasks.

Recommendations

5.3 The Institute supports the Appointed Actuary concept and recommends that this be carried over to the revised Act. We also propose that the definition of Appointed Actuary should be extended to include Accredited Members of the Institute of Actuaries of Australia.

5.4 The current Act (S42, S42AA, S42A and S42B) requires a company to apportion receipts, payments and tax in an equitable manner, eg. between Australian and overseas business. The Institute supports retention of this requirement and recommends that such apportionments be approved by the Appointed Actuary as well as being certified by the Auditors.

5.5 A satisfactory unit pricing process is essential for the proper financial management of investment-linked contracts. Valuation and premium rating both rely on the integrity of this process. The Institute recommends that the Appointed Actuary be required to approve the unit pricing process on a regular basis.

5.6 There are various instances in this submission which recommend that the approval of the Appointed Actuary be required. These are summarised below showing the appropriate paragraph number. In many cases the Appointed Actuary is currently required, in terms of Professional Standards, to shoulder similar responsibilities. The Institute considers that these responsibilities should be embodied in the new legal structure.

(a) Apportionments - any apportionment of receipts, payments and tax between Statutory Funds (or Revenue Accounts) must be approved by the Appointed Actuary [5.4]

(b) Unit Pricing Process - the Appointed Actuary must approve the unit pricing process on a regular basis [5.5]

(c) Premium Rating - no policy may be issued unless the Appointed Actuary has approved all terms and conditions [8.4 and 8.5]

(d) Premium Rating - all product terms and conditions must be reviewed regularly by the Appointed Actuary [8.8]

(e) Other Business - in preparing the Financial Condition Report, the Appointed Actuary should consider the effect other business may have on the life insurance business [10.9]

(f) Statutory Funds - reinsurance between Statutory Funds is permitted subject to the approval of the Appointed Actuary [10.14]

(g) Statutory Funds - the establishment of a new Statutory Fund by separation from an existing Statutory Fund or a merger of existing Statutory Funds must be approved by the Appointed Actuary [10.17]

(h) Statutory Funds - any transfer from or between Statutory Funds must be approved by the Appointed Actuary [10.18]

(i) Assets - the Appointed Actuary is required to adjust the value of the liabilities in respect of asset values which are inappropriate for the purposes of capital adequacy [11.6]

(j) Valuation of Liabilities - the Appointed Actuary is required to produce a valuation of liabilities to demonstrate capital adequacy and to establish realistic earnings [12.5]

(k) Capital Adequacy - the Appointed Actuary is required to approve a Capital Adequacy Statement [14.6]

(l) Allocation of Profit - allocation of the Operating Profit must be approved by the Appointed Actuary [15.9]

(m) Distribution of Profit - any distribution to policyholders or shareholders or any transfers must be approved by the Appointed Actuary [16.5]

(n) Statement by the Appointed Actuary - the Appointed Actuary is required to produce a statement describing the valuation of liabilities [17.7]

(o) Financial Condition Report - the requirement is retained but should be framed in such a way that the Commissioner is able to produce the Report as evidence if a formal complaint is brought by the ISC against the Appointed Actuary [17.10]

(p) Traditional policy benefit illustrations - the bonus rate to be used should be approved by the Appointed Actuary [Attachment 7, 3.2(d)]

5.7 The current Act makes no provision for an Acting Appointed Actuary. The Institute recommends that the revised Act make provision for an Acting Appointed Actuary in the absence of the Appointed Actuary.

6. DEFINITIONS

6.1 Significant Definitions

The current Act contains many definitions in S4(1). As part of the revision of the Act this section will need to be amended. Apart from policies which share in profits, which are discussed in Section 7, the Institute wishes to make specific proposals about a number of matters:

(a) **Life Policy**

Modern life insurance contracts frequently consist of a number of components, for example death benefit, disability rider, savings component etc. The definition of life policy should recognise that a life policy can be made up of several components often exhibiting wide differences. Further the legislative framework should not focus on policies as a whole but rather on the components which comprise any policy.

(b) **Continuous Disability Insurance**

The current Act definition applies only to benefits which are incorporated in a life insurance policy. This leaves it unclear as to whether stand-alone disability policies are covered by the Act. The Institute believes that disability policies which are guaranteed renewable for more than one year's duration cover complex risks which require the prudential controls and actuarial supervision provided by the Act.

The Institute recommends that the definition should be changed to include all disability policies with guaranteed renewability of more than one year's duration either on a stand-alone basis or coupled with other types of life insurance. It is recognised that a small number of general insurance companies registered under the Insurance Act transact such business and it is suggested that they could continue to do so under "grandfathering provisions."

(c) **Investment-Linked Business**

Elsewhere in this submission (10.12) is a recommendation that it be a requirement that this type of business be in a separate Statutory Fund. For this to be effective a definition will be necessary. The definition should recognise that an investment-linked component is one under which the primary benefits are defined as being based on the value from time to time of a specified pool of assets or a suitably defined index, whether by means of division into units or otherwise.

(d) **Investment Account Business**

The Act will need to refer to this type of business. We suggest that a definition based on the description given in ISC Circular 273 be adopted.

(e) **Annuity Business**

The Institute feels that the need for prudential control of this class of business is self-evident and that it should be covered by the Act. There will thus be a need for a definition. The definition should recognise that an annuity is a policy under which the policyholder, in exchange for a single premium or a series of premiums, receives a stream of payments for a term which either depends on the duration of human life or lives or is for a specified term.

(f) **Deeming Provisions**

We support the continuation of the concept of "deeming provisions". The provisions currently in S4(4) should be rewritten to reflect the revised scope of the Act and the business classifications within it.

Classes of Business

6.2 At present S4(3) divides business into three classes - Ordinary, Superannuation and Industrial. The reasons for this seem to be historical and no longer appropriate. In particular, Industrial business is no longer written by any company and all such business in force has been deemed to be Ordinary business by the Commissioner but continuing to be subject to S101. In these circumstances the Institute recommends that all references to Industrial business should be removed from the Act and Part V of the Act should be repealed and provision made for S101 provisions to be grandfathered.

6.3 The division of other business into Ordinary and Superannuation was perhaps based on the fact that Ordinary business was subject to tax and Superannuation business was exempt. This is no longer the case: both are subject to tax, albeit in different ways and at different tax rates. In addition, for tax purposes there are three different categories of Superannuation business. Finally, another category of business - Immediate Annuity Business - is exempt from tax. For tax purposes, these categories of business are now fully defined in the Income Tax Assessment Act. Tax law changes so rapidly that it seems unlikely that these categories will remain unchanged for long. Accordingly, the Institute believes that there is no longer any reason relating to the purpose of the Act to separate business into classes and

recommends that S4(3) be repealed. (See Section 18). If the Commissioner sees a need to retain the class concept the definitions of Superannuation and, if applicable, Annuity Business should be identical to those used for tax purposes.

7. DISCRETIONARY POLICIES

Present Position

7.1 A "participating policy" is defined in the Act as "a policy by the terms of which the owner of the policy is entitled to a share in surpluses or profits which may be distributed by the company".

7.2 The Act makes extensive provision for the protection of policyholders' rights - particularly in relation to the distribution of profits to participating policyholders. Of particular relevance is the S50 requirement that distribution of profits be approved by the Appointed Actuary.

7.3 At the time that the Act was written, life insurance policies provided clearly either:

(a) guaranteed benefits in money terms ie. non-participating business, or

(b) guaranteed benefits at a lower level than those in (a), together with bonuses representing a share of the profits of the company ie. participating business.

Thus, the essence of a participating policy is that it has a lower level of guaranteed benefit in return for which it shares in the profits of the company.

7.4 Since that time there have been a variety of policies issued which are not clearly in either category (a) or (b). For example:

(a) investment-linked policies where the benefits are directly linked to the value of a defined pool of assets or a defined index;

(b) group life policies where a profit is declared based on the mortality experience of the total of a class of group life policies;

(c) investment account policies where the benefits are expressed as a deposit investment receiving regular interest credits; the rate of interest being linked in non-discretionary terms to the investment earnings in a defined pool, with investment earnings smoothed over a period of years in a defined manner; or

(d) investment account policies similar to (c) but where the interest credits are determined on a basis which permits some discretion in the linkage with the investment earnings or in the way earnings are smoothed.

7.5 ISC Circular 273 to Life Insurance Companies dated 21 June 1989 provides guidelines with regard to the determination of crediting rates under non-participating and participating investment account policies.

7.6 Companies have taken different approaches in the determination of whether a policy is participating or non-participating.

Recommendations

7.7 The Institute recommends that the Act defines a new type of "discretionary policy" where the payment or crediting of any contractual benefit or component of a benefit is at the discretion of the company, such definition to include a participating policy. Any other policy is defined as a non-discretionary policy. The object of this is to protect discretionary policyholders by ensuring that they will not be treated unfairly in relation to the exercising of discretion by the company. The existing concept of sharing in profit is adopted for that purpose.

7.8 The above definition has the following features:

(a) all participating policies are discretionary;

(b) where the contractual benefits under a component are directly determined from a formula stipulated in advance (such as a group life policy sharing in mortality profits in a defined pool) or from the investment results of a sub-fund on the basis of calculation and valuation methods stipulated in advance, or the performance of an index (such as an investment-linked or index-linked policy) the policy is not discretionary;

(c) where the company has the opportunity to exercise discretion as to the amount of contractual benefit payable after the experience has been recorded, this is tantamount to allocation of profit, so that the policy is a discretionary policy, to be protected by the Act in relation to sharing in profits;

(d) a policy shall not be regarded as a discretionary policy solely because it provides non contractual surrender values determined on a discretionary basis; and

(e) an investment account or investment-linked policy shall not be regarded as a discretionary policy solely because there is a right under the policy for the company, on giving reasonable notice, to alter the expense or mortality charges for all policies in that class.

7.9 The Institute undertakes to include in its Professional Standards the necessary sections guiding the Appointed Actuary in:

(a) the determination of whether or not a policy is a discretionary policy, and

(b) the fair treatment of discretionary policies in terms of the sharing in the allocation of profits and the exercise of discretions described in the policy document. See Section 15.

8. PREMIUM RATING

Present Position

8.1 The current Act states that no policy can be issued unless the rate of premium is approved by the Appointed Actuary as suitable. In giving approval the Appointed Actuary must have particular regard to the maximum commission payable.

8.2 A feature of the Act is that no definition of "suitable" is given. It should also be noted that, for investment account and investment-linked policies which have been developed since the Act was introduced, approval of premiums has come to mean the approval of the charges to be made for expenses and any guarantees together with the premiums for any associated life cover.

8.3 The Institute has issued Professional Standards which give comprehensive guidance to the Appointed Actuary about the considerations to be observed in determining premium rates.

Recommendations

8.4 The financial stability of a life insurance company depends on the levels of premiums and charges, which must be relevant to the other terms and conditions of the contract. The Institute therefore recommends that, rather than refer only to premiums and commissions, the new Act should prescribe that no policy component may be issued unless the Appointed Actuary has approved in writing all terms and conditions of and relating to that component.

8.5 Commission is a factor relating to a policy component which has a major impact on the level of premiums and charges. We therefore recommend that the specific reference to the Appointed Actuary having regard to the commission payable should be maintained in the revised Act.

8.6 The Institute also recommends that the Act should include a definition of commission. The definition should be consistent for all purposes, eg. for premium rating, for reporting in the Revenue Account (see Attachment 2[a]) and for any disclosure purposes set down in this or a related Act or in ISC Circulars. The definition should be along the lines of "any benefit paid or granted in money or in kind to any agent, broker or employee for selling or servicing business."

8.7 It is further recommended that the Act should make the prescription for the Appointed Actuary to approve all terms and conditions of the policy only in general terms. The Institute's Professional Standards will address the details of the approval process and will specify the production of a report. The Commissioner should have the right to see the report.

8.8 It is envisaged that the Professional Standards will require the Appointed Actuary to review all product terms and conditions on a regular basis and, if appropriate, to withdraw approval. The Act should recognise those Professional Standards.

9. SURRENDER VALUES

Present Position

9.1 The current Act provides for minimum surrender values for whole of life, endowment and pure endowment policies, coupled with a discretion to the Commissioner to suspend or vary a life insurance company's obligation to pay those values if to do so would endanger its financial stability. The surrender value basis prescribed is a prospective one using out of date parameters.

9.2 Statutory minimum surrender values for investment account policies have recently been imposed by way of guidelines in ISC Circular 273 and include a similar dispensation at the Commissioner's discretion. The basis is a retrospective one which should cause no problems to a company for regular premium policies but could be difficult for single premium policies in an adverse investment environment.

9.3 Currently no minimum surrender value scales exist for investment-linked policies.

9.4 The Institute, while acknowledging that there are strong social arguments for the protection of policyholders by prescribing minimum surrender values, is concerned about the number of guarantees which are being included in both investment account and investment-linked policies. Guarantees of minimum surrender values could, in certain circumstances, prejudice the interests of continuing policyholders. The ability to obtain dispensation from the Commissioner is likely to be time consuming and hence may be ineffective.

Recommendations

9.5 The Institute's recommendation is that there should be no prescribed minimum surrender values. To support this, the Institute is also recommending better disclosure of the surrender benefits provided under the policy's terms (see Attachment 7). Grandfathering provisions should ensure that for policy components issued before the Act is revised, surrender values will be not less than those based on the existing statutory minimum basis (where that basis applied to the policy component).

9.6 Should Parliament wish the Act to retain a minimum surrender basis, our recommendations are given in Attachment 3.

10. STATUTORY FUNDS

Present Position

10.1 The current Act requirement for the establishment of Statutory Funds to segregate the assets and liabilities relating to all or a defined part of a company's life insurance business, serves three main purposes:

(a) to assist in the equitable management of the business;

(b) to regulate transfer of surplus to shareholders or between funds; and

(c) to protect policyholders' entitlements in the event of a winding up or amalgamation of funds.

10.2 The current Act allows a company to establish separate Statutory Funds as a right in respect of any part of its Superannuation business or any part of its overseas business. Subject to the approval of the Commissioner, a company may establish a Statutory Fund in respect of part of a class of business. The current Act also allows a company to conduct other business separate to its life insurance business and external to its Statutory Funds.

10.3 The Commissioner has required separate Statutory Funds for investment-linked business. As we understand it, this requirement stems from concern to protect the position of investment-linked business relative to other business in the same Statutory Fund should a company be wound up as a result of a fall in asset values. The argument is that, following a fall in asset values, investment-linked policyholders will already have suffered a reduction in benefits. If on winding up, the assets attributable to them are to be pooled with those of other policies in the same Statutory Fund, they may suffer a further unjustified reduction in benefit. We support this argument.

10.4 In practice some companies have established separate Statutory Funds for overseas business. Some companies have established separate Statutory Funds for Superannuation business for reasons of tax effectiveness or optimising investment policy.

10.5 At the present time hybrid policies are marketed which include various combinations of investment-linked components, investment account components, guaranteed benefits on certain eventualities (death, maturity etc.) and charges in respect of the policy and its components. It can be the case that it is appropriate to secure these various policy components against more than one Statutory Fund. Two different methods have been adopted for dealing with such hybrid policies:

(a) policies are issued secured on one Statutory Fund and any components or guarantees inappropriate to that Statutory Fund are then reinsured with another, and

(b) the policy document specifies the various benefits and components and on which Statutory Fund each is secured.

Doubts have been expressed whether reinsurance between Statutory Funds is legally possible and whether one policy can be secured on more than one Statutory Fund.

10.6 The current Act refers to action necessary in splitting a Statutory Fund by separation but makes no provision for the amalgamation of Statutory Funds within a company.

Recommendations

10.7 The concept of the Statutory Fund has been an effective part of life insurance regulation since the present Act was introduced. Although life insurance business can be regulated without the introduction of Statutory Funds, we recommend that the concept be retained.

10.8 The revised Act should directly address the issue of whether separate Statutory Funds should be required in particular circumstances and whether a company should be allowed to establish Statutory Funds at its discretion or whether the legislative framework should forbid such discretion or allow the Commissioner control over the exercise of such discretion. Our specific recommendations are given in 10.10 to 10.16.

10.9 The Institute recommends that a company be permitted to conduct business other than life insurance business external to the company's Statutory Funds. We recognise that the well being of the life insurance business depends, in some part, on the well being of the company as a whole. We therefore believe that the

Appointed Actuary's Financial Condition Report (see 17.10) should deal not only with the life insurance business but should also consider the effect other business the company conducts may have on the life insurance business.

10.10 We see no good reason why discretionary business should be isolated in a separate Statutory Fund. However, if discretionary and non-discretionary business are in the same Statutory Fund, it is necessary to ensure that the interests of discretionary policyholders are fully protected. We believe that this is best done by identifying that part of the Statutory Fund which relates to discretionary policyholders. Further, once this identification has been made, we see no objection to discretionary policyholders' retained earnings being used to finance new business in any other Statutory Fund as long as they maintain their identity and those policyholders gain an equitable share of the profits arising in the new Fund (see Section 15).

10.11 The Institute recommends that overseas business should be held in separate Statutory Funds. This will minimise the difficulties faced by the Commissioner in supervising overseas business. Indeed, it is our view that the Act should be concerned primarily with the protection of Australian policyholders: establishment of separate Statutory Funds for overseas business assists in this.

10.12 The Institute supports the argument in favour of segregating investment-linked components of a policy in their own Statutory Fund or Funds and recommends that the Act require such business to be in a separate Statutory Fund.

10.13 The recommendations in 10.11 and 10.12 requiring separate Statutory Funds for certain segments of business should not be rigidly imposed especially where the segments constitute only a small part of a company's life insurance business. The Institute recommends that the Commissioner be given discretion to waive such requirements where so requested by a company.

10.14 Elsewhere (see 6.1[a]) the Institute recommends that the legislative framework be concerned with the components of a policy separately rather than jointly. This recommendation and the need to give effect to the segregation of investment-linked components for hybrid policies require that the Act confirm that a policy being secured against more than one Statutory Fund is acceptable. The Institute also recommends that reinsurance between the Statutory Funds of a company should be permitted subject to the terms of reinsurance being approved by the Appointed Actuary. The Act should confirm such reinsurance is acceptable.

10.15 The Institute further recommends that the segregation of investment-linked components in their own Statutory Fund should be supported by a prohibition on that fund retaining any guarantees of investment performance or return. Any such guarantees under hybrid policies can be reinsured out or directly secured on other Statutory Funds.

10.16 We believe that a company should have the right to establish, from new, a Statutory Fund for any defined part of its life insurance business without requiring the approval of the Commissioner.

10.17 The establishment of a new Statutory Fund by separation, or an amalgamation of Statutory Funds, is a matter of judgement. The Institute recommends that a company establishing a new fund or amalgamating two or more funds within the same company, should require approval of the Appointed Actuary. The Institute will produce Professional Standards to guide the Appointed Actuary in this.

10.18 Transfers between Statutory Funds or out of a Statutory Fund involve judgement. The Appointed Actuary should be required to approve any such transfers. Capital adequacy must be demonstrated before such transfers can occur.

10.19 We believe that the Act should make it clear that a Statutory Fund can be wound up independently of other Statutory Funds a company may have established. Similarly it must be clear that a policy's components are secured only against the Statutory Fund or Funds specified in the policy, and then only to the extent specified, and are supported by any guarantees given by the company itself from resources outside the Statutory Funds.

10.20 Some companies have adopted a system of hypothecation of assets within a Statutory Fund to improve the management of particular blocks of business. This may be done either by creation of individual sub-funds or by unitisation of all investments within the fund and particular blocks of business holding particular mixes of unit. We believe that such hypothecation is reasonable as a means of determination of benefits and management of capital adequacy. It should be permitted subject to disclosure at the point of sale and subsequently and the overriding principle that in the event of a winding-up, all the assets of the Statutory Fund are available to support all the liabilities.

10.21 At times it is appropriate for Statutory Funds to hold assets which, by their nature, come only in relatively large parcels. If an asset can only be wholly owned by one Statutory Fund then smaller Funds may be hindered from holding such assets. The Institute recommends that joint ownership of an asset by

different Statutory Funds of a company be permitted, providing the interests of each fund are fully specified and documented. In general each fund should rank parri-passu. Joint ownership will avoid more complex structures to achieve the same purpose.

10.22 The Institute believes that the circumstances surrounding any winding-up or judicial management of a Statutory Fund or the transfer of Statutory Funds from one company to another will be too individual to permit the creation of a defined framework. Consequently we recommend that the existing Act requirement for such events to be subject to the Court should be retained.

11. ASSETS

Present Position

11.1 The current Act (S39), places certain restrictions on the investments of Statutory Funds. In broad terms these are that, except with the approval of the Commissioner: -

(a) the fund can not be invested in a related company (other than a subsidiary), and

(b) no more than 5% of a fund can be in trust schemes, e.g. unit trusts.

11.2 The restriction on investment in trust schemes is understood to be causing considerable practical difficulties at present and some companies have sought the Commissioner's approval to exceed the 5% limit. The restriction on investment in related companies could easily be circumvented by investing in a subsidiary which in turn invests in a related company. In summary, the current rules appear to prevent certain forms of sensible investment but do not prevent undesirable activity.

11.3 The current Act is silent on the question of the valuation of assets other than intangible assets (S49[5]) and merely requires that signed copies of the audited accounts and balance sheet be supplied to the Commissioner.

Recommendations

11.4 It is the Institute's view that the current rules on investments need to be completely revised. The current restrictions on trust investments can preclude a company from taking sound investment opportunities and should be eliminated. As a general principle, the Institute recommends that a life insurance company should have complete freedom to invest the assets of a Statutory Fund, subject only to: -

(a) any restrictions which may be included in the company's Articles of Association;

(b) policy conditions; and

(c) a prohibition on investments in, loans to and deposits with related companies (other than wholly-owned subsidiaries) or controlling shareholders without the express approval of the Commissioner, except where the related company or controlling shareholder is a Bank.

The prohibition in (c) is required to ensure that at all times the funds of the company remain under the control of the directors. There should be appropriate "look-through" provisions to prevent the intent of the prohibition being avoided by channelling the investment or loan or deposit through a subsidiary to other related companies.

11.5 For the purposes of determining Operating Profit (see 13.5), the Institute recommends that assets should be valued on a market value basis.

11.6 It is essential when considering the capital adequacy of a Statutory Fund to pay careful attention to the value placed upon the assets. The Institute's existing Professional Standards require the Appointed Actuary to make an adjustment to the value of the liabilities if it is believed that the value of the assets as stated in the balance sheet is not appropriate for the purposes of assessment of capital adequacy. We recommend that this principle be incorporated in the revised Act and that the detail of such adjustments be made in accordance with Professional Standards issued by the Institute and made as an adjustment to the liability valuation.

11.7 Particular care will be necessary in placing a value on such items as -

(a) deferred tax benefits;

(b) investment in controlled or related companies; and

(c) non-traded assets.

11.8 The Institute's Professional Standards for adjusting the liabilities in respect of the value of assets will, because of the capital adequacy purpose of the valuation, provide for a zero value to be assigned to certain asset types. The Professional Standards will be regularly updated to reflect changes in investment practice.

11.9 Assets which may be assigned a zero value for capital adequacy purposes could include -

(a) unsecured loans to directors, employees and intermediaries;

(b) unpaid premiums which are not secured by the valuation of liabilities;

(c) computer software except to the extent that it has a known resale value;

(d) office fittings; and

(e) intangible assets.

11.10 The company should be required to publish details of any adjustment made to the value of liabilities to reflect an asset value adjustment made by the Appointed Actuary for the purpose of assessing capital adequacy. The company should also be required to publish details, in the notes to the balance sheet, at individual asset level, of all assets exceeding, say, 1% of a Statutory Fund.

12. VALUATION OF LIABILITIES

Present Position

12.1 The current Act requires that a life insurance company shall, every five years at least, cause its Appointed Actuary to make an investigation into its financial condition and to produce a written report thereon. ISC Circular 154 currently requires an annual report.

12.2 Part of the financial condition investigation is a valuation of liabilities on a "proper" basis. There is a requirement that the value of liabilities in aggregate is not less than the value calculated on a prescribed minimum basis. This basis is prescribed in the Act for whole of life, endowment insurance and pure endowment business and in ISC Circular 273 for investment account business.

Recommendations

12.3 It is the Institute's view that the Act must be updated to recognise recent work done on assessment of capital adequacy. We believe that the revised Act should recognise that the nature of life insurance contracts is changing rapidly. Prescribing minimum valuation bases for specific types of business will soon become out-of-date. The Act should, therefore, be concerned only with principles and leave detailed regulation to Professional Standards established by the Institute (see 12.14).

12.4 Elsewhere, (see 17.10) we recommend retention of the requirement that a Financial Condition Report be produced. The Financial Condition Report should be produced annually and it should be available to the Commissioner by right but not be a public document.

12.5 It should continue to be a requirement of the Financial Condition Report that a valuation of liabilities be performed by the Appointed Actuary for the purposes of establishing realistic earnings and demonstrating capital adequacy. The approach recommended identifies two reserves in respect of policies, ie:

(a) Policy Reserve, and

(b) Statutory Reserve.

12.6 The Policy Reserve can be defined as the reserve required for policies calculated on a basis using assumptions which reflect the Appointed Actuary's best estimate of the expected outcome of all contingencies affecting the policies, including reasonable benefits to discretionary policies, and allowing for planned margins. It should be noted that the Policy Reserve may be negative or less than the current surrender value under certain circumstances and excludes any provision for non-contractual benefits since the previous distribution.

12.7 The Statutory Reserve includes margins for adverse deviations, asset liability mismatching, asset default risk etc. A company would be required to hold assets at least equal in value to the Statutory Reserve.

12.8 The difference between the Statutory Reserve and Policy Reserve can be labelled the Capital Adequacy Reserve. Each Statutory Fund would then comprise the following:

(a)	Policy Reserve	}
		} The sum equals Statutory Reserve
(b)	Capital Adequacy Reserve	}
		}

(c) Other Reserves

See also Section 15.

Policy Reserve

12.9 The Professional Standards will require that in carrying out the valuation of liabilities to determine the Policy Reserve, the Appointed Actuary should make assumptions about the future cost of the risks accepted and services provided by each type of component, taking account of expected investment earnings and discontinuance rates and relevant interrelationships. These assumptions should be the most realistic that can be made using judgement, experience and professional training and should allow for reasonable benefits to discretionary policyholders. In addition, allowance should be made for planned margins.

12.10 The method of valuation should ensure that:

(a) the Policy Reserve requires no initial finance: this is provided in the form of a Capital Adequacy Reserve;

(b) the provision of the initial finance is a capital item and is not recognised as a loss; similarly the repayment of the initial finance is not recognised as profit;

(c) future profits are not capitalised but future losses are; and

(d) profit or loss will be recognised at the sale of a contract only to the extent that the capitalised value of the allowance for acquisition costs in the premium payable differs from the acquisition costs actually incurred.

The consequence of (a) to (d) is described in 13.4.

Statutory Reserve

12.11 The Statutory Reserve should be calculated using the same method as followed in calculating the Policy Reserve but:

(a) recalculating the liabilities using assumptions which include margins for adverse deviations;

(b) calculating the additional reserves required for the pricing risk, asset default risk and mismatching risk. This calculation would be carried out for each type of policy component using parameters depending on the characteristics of the liabilities and the assets supporting them; and

(c) including the additional reserves for adjustments in respect of asset values as required in 11.6.

12.12 On writing new business, the requirement to establish a Statutory Reserve may cause a strain. This strain may be financed by a transfer from shareholders' funds - either capital or retained earnings - or from discretionary policyholders' retained earnings. This finance can be from within the Statutory Fund or by transfer from outside. Where discretionary policyholders' retained earnings are transferred to support business in another Statutory Fund, they must be identified and gain an equitable share of future profits. It is suggested that discretionary policyholders' retained earnings transferred from another Statutory Fund be denoted Discretionary Policyholders' Capital.

12.13 The Capital Adequacy Reserve and the Other Reserves in a Statutory Fund are thus supported by:

(a) Discretionary Policyholders' Retained Earnings (DPRE);

(b) Discretionary Policyholders' Capital (DPC) - identified by original Statutory Fund;

(c) Shareholders' Funds - which are identified as Shareholders' Working Capital (SWC); and

(d) Shareholders' Retained Earnings (SRE).

These items are dealt with more fully in Section 15. See also the proposed Balance Sheet - Attachment 2(b).

Legislative Framework

12.14 The Institute recommends that the Act should require the Appointed Actuary to carry out a valuation of the liabilities to determine the Policy Reserve, as defined in 12.6, and the Statutory Reserve, as defined in 12.7. Reference should be made to the fact that the Institute will produce detailed Professional Standards specifying methods and bases to be used for particular types of business.

12.15 The Institute undertakes to develop detailed Professional Standards for the calculation of Policy Reserves and Statutory Reserves. Features to be incorporated in the Professional Standards are set out in Attachment 4.

12.16 In general, the Appointed Actuary would be required to follow the Professional Standards. However, different methods or assumptions could be followed, if supported by detailed scenario testing, but the departure would have to be reported and may need to be justified to the Commissioner and the Institute.

13. REPORTING OF EARNINGS

Present Position

13.1 Financial reports prepared in accordance with the current Act have two purposes:

(a) to demonstrate the solvency of the company, and

(b) to demonstrate that the distribution of surplus complies with the requirements of the Act.

Details of these reports are published in the First and Second Schedules. The Financial Condition Report (see 12.1) gives further information to the company but is not published.

13.2 The reports are not designed to demonstrate the profit made by a company and they do not do so. Published financial reports are potentially misleading to an uninformed reader. Taken at face value they appear to show that most life insurance business makes large losses in the year of sale and profits in subsequent years. This is not a realistic view.

Recommendations

13.3 The Institute recommends that the financial reports of a life insurance company be prepared along similar lines to those required by the Companies Code. It has been recommended that assets be valued on a market value basis (see 11.5). This, together with the recommendations in Section 12 above on valuation of liabilities, give a framework under which realistic profit can be calculated and reported.

13.4 In addition to the requirements noted in 12.10 the Policy Reserve calculation principles should establish a progression of reserves over the life of a policy such that:

(a) planned profit will be recognised each period in relation to the planned margins for risks, services and the interest on the finance provided;

(b) experience profit will be recognised each period in relation to the difference between the actual experience and the assumptions for the period made at the previous valuation; and

(c) profit should not include the repayment of capital previously committed to support a fund.

13.5 The profit emerging each year is the growth in the fund less the increase in Policy Reserves. This is the Operating Profit of a Statutory Fund.

13.6 It is recommended that calculation of Operating Profit will be carried out for each Statutory Fund and details shown in the Revenue Account. See Attachment 2(a). In summary, Operating Profit is -

(a) Operating Income less

(b) Operating Expenditure less

(c) increase in Policy Reserves plus

(d) any interim distribution of profit

14. CAPITAL ADEQUACY

Present Position

14.1 Under the current Act capital adequacy is demonstrated by the use of conservative bases for valuing liabilities . These bases are specified in the Act for conventional business and by ISC Circular 273 for investment account business.

14.2 The current Act requires that a company have a minimum paid-up share capital of $2m before it is registered. This presumably is intended to provide an additional reserve. In addition to providing an additional reserve, the requirement for a minimum paid-up share capital can be regarded as some evidence of the bona fides of the owner of the company. It is noted that the Act does not give the Commissioner any power of approval of the change in ownership of a company, eg. to establish that the new owner is fit and proper to operate a life insurance company.

14.3 The operation of a life insurance company is such that assessment of capital adequacy is not an easy exercise. For a typical cohort of life insurance policies, reserves are built up in the early stages, when premiums and investment earnings exceed claims and expenses; these then run off in the later stages as claims increase. At any point in time the adequacy or otherwise of these reserves built up to meet policy liabilities depends on the future experience in investment performance, expenses, claims and withdrawals. None of these factors can be known with certainty. Accordingly, the statement that a Statutory Fund has adequate capital must be a statement of probability.

14.4 The following points should be borne in mind.

(a) No level of reserves will protect a Statutory Fund against the consequences of poor decisions.

(b) A critical determinant of capital adequacy is product design. Clearly a life insurance company issuing single premium investment account policy components offering full guarantees at any time is more at risk than one issuing policies with limited guarantees and the same charges.

(c) A life insurance company may expect to generate large profits in the future and yet currently not have adequate capital on a statutory basis. This fact is not necessarily a cause for panic. Under sound management the life insurance company could trade out of its difficulties.

14.5 There are many ways of determining capital requirements. Within the Australian actuarial profession, strong support has been expressed for an approach which adds margins for various contingencies to the Policy Reserve for liabilities as described in 12.11.

Recommendations

14.6 The Institute recommends that companies be required to report on capital adequacy using the Capital Adequacy Statement set out in Attachment 2(e). This Capital Adequacy Statement should be approved by the Appointed Actuary.

14.7 Provided that overseas business is kept in separate Statutory Funds, these capital adequacy requirements should, at the discretion of the Commissioner, not apply to business outside Australia in countries with acceptable regulations.

14.8 The ability of a company to meet its obligations to policyholders depends in part on the integrity and financial stability of its owners. The Institute therefore recommends that the revised Act should require the Commissioner's approval of a new owner.

15. ALLOCATION OF PROFIT

Present Position

15.1 Allocation of surplus is dealt with in accordance with the company's Articles of Association. The current Act is silent on the subject of allocation but does specify requirements for the distribution of surplus. See Section 16.

15.2 The current Act does not provide for surplus arising from Australian participating business to be separately identified. This can lead to difficulty and argument.

Recommendations

15.3 The Institute believes that the use of the concept "surplus" for the purpose of allocation and distribution of profit is not helpful. We have earlier recommended the adoption of realistic reporting, defined the concept of "Operating Profit" (see 13.5) and introduced the concept of discretionary policies (see Section 7).

15.4 The Institute believes that it is necessary to identify the entitlements of discretionary policyholders and shareholders in each Statutory Fund. In order to do this it is essential that Operating Profit be allocated fully between shareholders and discretionary policyholders at each year end. The allocation process establishes ownership of Operating Profit.

15.5 Clearly, some part of the profit arising in a Statutory Fund must be allocated to those providing the capital supporting the Statutory Fund. Capital is provided by way of the four items listed in 12.13. DPRE is a source of capital internal to the Fund. DPC, SWC and SRE are provided from sources external to the Fund.

15.6 Rules for sharing of profits between discretionary policyholders and shareholders will normally be set out in the company's Articles of Association and/or policy documents. For the protection of discretionary policyholders it is necessary to have some restrictions in the Act. There are three cases to be considered.

(a) When a Statutory Fund secures only non-discretionary business, any Operating Profit may be allocated entirely to the external capital providers. The allocation between different groups of external capital providers should be determined in relation to capital commitment in that Fund.

(b) When a Statutory Fund secures only discretionary business equity between the policyholders and external capital providers needs to be considered when Operating Profit is being allocated. A suggested approach is given in 15.7.

(c) Where a Statutory Fund secures both non-discretionary and discretionary business, a company which desires to allocate profits from the two sources separately may elect to establish separate revenue accounts. To avoid manipulation, eg. avoidance of loss in poor years, any such election should only be reversed with the approval of the Commissioner. In this case Operating Profit from the non-discretionary business will be allocated in accordance with (a) and from discretionary business in accordance with (b). If separate revenue accounts are not maintained, profits will be allocated as if the fund secured only discretionary business.

15.7 When Operating Profit is being allocated between discretionary policyholders and external capital providers, there is no method by which equity can be guaranteed. However the Institute believes that a two stage approach as follows can both provide reasonable equity and retain incentive for shareholders to subscribe capital to the Statutory Fund, an action which is in the best interest of the fund's policyholders.

(a) Stage one involves calculating an amount equal to the fund earning rate applied to the Other Reserves (adjusted for any transfers into or out of the fund since the last valuation and the timing of those transfers). This amount is then normally allocated between the providers of capital to the Other Reserves. The allocation should be in proportion to the capital provided after adjusting for transfers made and the timing of those transfers.

(b) Stage two involves allocating the remainder of the Operating Profit (after (a)) between discretionary policyholders and other providers of capital. Discretionary policyholders should be allocated no less than 80% of this amount with the residual being normally allocated in proportion to the external capital provided (again adjusted for transfers).

Some points to note about this process are:

(c) The adjustment for transfers when allocating profit between capital providers is necessary to help ensure that the size or timing of transfers cannot be used to manipulate the share of profits of the various capital providers.

(d) SWC is a capital item which should retain its identity. Accordingly Operating Profit determined under (a) and (b) above in respect of SWC becomes a part of SRE.

(e) DPC is a capital item. However, in order to protect the interests of discretionary policyholders who provide capital to another Statutory Fund we believe it is appropriate that profit determined under (a) and (b) above in respect of DPC be added back into DPC and hence treated for distribution purposes as a capital item.

15.8 Fund earning rates and Operating Profit can, of course, be negative. After allocation, therefore, one or more of DPRE, SRE and DPC could be negative. This is acceptable for capital adequacy provided that the Statutory Fund contains sufficient capital in total.

15.9 The Institute recommends that allocation of Operating Profit be subject to approval by the Appointed Actuary and that the Allocation of Operating Profit Statement be published in the form set out in Attachment 2(c).

15.10 The Institute will produce Professional Standards to guide the Appointed Actuary in dealing with the allocation of profit.

16. DISTRIBUTION OF PROFIT

Present Position

16.1 Distribution of surplus is dealt with in accordance with the company's Articles of Association. However, this is subject to overriding Act provisions - S50 of the Act. The current Act does not require surplus to be distributed but if surplus is distributed, Australian participating business must receive at least 80% of that part of distributed surplus arising from this business. Distribution of surplus must be approved by the Appointed Actuary.

16.2 No distinction is made between the rules for transfers out of a Statutory Fund to shareholders and those to another Statutory Fund to support its business.

Recommendations

16.3 The recommendations in Section 15 establish ownership of Operating Profit and allocate it, for each Statutory Fund, between Discretionary Policyholders' Retained Earnings (DPRE), Discretionary Policyholders' Capital from another fund (DPC) and

Shareholders' Retained Earnings (SRE). Distribution of profit is, therefore, a transfer from DPRE to discretionary policyholders and from SRE to the Profit and Loss Account. Transfers of SWC between Statutory Funds or to shareholders' funds are capital transfers. Transfers of DPC between Statutory Funds or repatriations of DPC to DPRE in the source Statutory Fund are capital transfers. Transfers from DPRE to DPC in another Statutory Fund are capital transfers.

16.4 The Institute believes that once ownership of Operating Profit is established there should be minimal constraint on distribution or transfer. The requirements which we see as necessary are:

(a) no distribution or transfer may be made which would cause a Statutory Fund to have inadequate capital;

(b) to protect discretionary policyholders from undue deferment of distributions we recommend that any transfer from SRE to the Profit and Loss Account or to another Statutory Fund should be limited to the same proportion of SRE that distributions to discretionary policyholders bear to DPRE; and

(c) if either SRE or DPRE are negative any distribution or transfer must be approved by the Commissioner.

Capital transfers are unrestricted providing (a) is met.

16.5 Any distribution or transfer must be approved by the Appointed Actuary.

16.6 The Institute will produce Professional Standards to guide Appointed Actuaries in dealing with the distribution of Operating Profit.

16.7 The recommendations in Sections 15 and 16 constitute a major change from the current law on allocation and distribution of profit. The Institute believes that significant changes are necessary in view of difficulties experienced in interpreting and operating the current Act S50.

16.8 Attachment 5 sets out the Institute's recommendations on transitional procedures to move from the current position to that proposed.

17. ANNUAL REPORTING

Current Position

17.1 The purpose of reporting is to inform interested parties on the financial health of the life insurance company. These parties include:

(a) Shareholders,

(b) Policyholders,

(c) the Commissioner, and

(d) Future Consumers (possibly represented by financial analysts)

17.2 Each of these parties has different requirements but it is the Institute's opinion that it is possible for one set of reports to satisfy them all. The requirements of each of the parties are:

(a) Shareholders

- what is the profit for the current period?
- what is the prospect for future profits?
- how much dividend is payable?
- what capital is involved?
- what are the likely future capital requirements?

(b) Policyholders (Present and Future)

- how secure are policy benefits?
- what are the prospects for interest and bonus rate declarations?
- what share of profits is allocated to policyholders?

(c) the Commissioner

- how secure are the policy benefits?
- how secure will benefits be if the company continues to write new business?
- how fair is the allocation of profit between shareholders and different groups of policyholders?

17.3 Current reporting requirements are designed to meet only one objective ie. to satisfy the Commissioners' need for knowledge on the security of current policy benefits.

17.4 A Professional Standard exists to guide Appointed Actuaries preparing Financial Condition Reports but currently the Commissioner has no redress against an Appointed Actuary whose report does not meet the Standard.

Recommendations

17.5 It is recommended that reports should be based on a format similar to that required under the Companies Code. The Institute is of the view that there should be consistent financial reporting requirements for all types of financial institutions.

17.6 To comply with recommendations made earlier the Institute recommends that the following be published:

(a) Revenue Account for each Statutory Fund, in the form set out in Attachment 2(a),

(b) Balance Sheet, consolidated, in the form set out in Attachment 2(b),

(c) Allocation of Operating Profit Statement for each Statutory Fund, in the form set out in Attachment 2(c),

(d) Profit and Loss Account, consolidated, in the form set out in Attachment 2(d),

(e) Capital Adequacy Statement for each Statutory Fund, in the form set out in Attachment 2(e), and

(f) Statement by the Appointed Actuary as described in Section 17.7.

The reports (a) to (e) replace the current First Schedule and should be reviewed by the Accounting Profession prior to adoption. The Act should permit the Commissioner to vary the forms from time to time by ISC Circular thus allowing the reporting format to keep pace with future developments.

17.7 The Institute recommends that a Statement by the Appointed Actuary be included in published documents for the benefit of all interested parties. The information to be included in this statement would be the subject of Professional Standards. Attachment 6 provides an indication of the content of this statement.

17.8 In the case of a company that has established separate Statutory Funds for overseas business, the Institute recommends that the annual reports may be so arranged so that only the actuarial statement relating to the Statutory Fund(s) in the countries concerned need be published there.

17.9 The Institute recommends that the requirements for returns under the current Second and Third Schedules be deleted. The Statement by the Appointed Actuary would be expected to satisfy the purposes of these Schedules.

17.10 The Institute also recommends that the requirement for the Appointed Actuary to produce a Financial Condition Report be retained, but that such reports be required yearly. Furthermore, the Commissioner should be able to produce such reports as evidence in a disciplinary procedure if a complaint arises regarding adherence to Professional Standards. The privacy of the report should be preserved if it is produced as evidence.

18. STATISTICS

18.1 The Institute regards the collection of statistics on the life insurance industry by the Commissioner as being outside its professional sphere of interest. It is recognised that the Commissioner and the industry have a valid need for statistics relating to various types of business. The statistics required are likely to change frequently. Accordingly, the Institute recommends that the Act be changed to empower the Commissioner to require companies to provide such accounting and statistical information relating to different types of business as considered appropriate. The Act should also authorise the Commissioner to obtain statistics from companies and pass them to the Institute of Actuaries to enable it to prepare standard statistical tables for use by actuaries in valuing liabilities, premium rating and determining discrimination practices in the pricing and underwriting process. The detailed statistics required could then be specified in ISC Circulars without the difficulty of changing the Act itself.

19. DISCLOSURE

Present Position

19.1 There appears to be a general wish by the community for consumer protection in the financial services sector, particularly by disclosure at the point of sale. New investors in unit trusts and companies receive considerable protection through regulations of the Companies Code and from the NCSC. Indeed most forms of investment require prospectuses to be individually approved by the NCSC which requires very full and detailed disclosure of the terms and conditions attached to the investment and considerable information about the recent financial results of the company or trust. After sale, investors must be provided with detailed information on a timely basis about emerging financial results.

19.2 It seems reasonable that institutions competing with unit trusts should be treated similarly. In this light the position of the life insurance industry looks anomalous. Purchases of single premium life insurance bonds or deferred annuities are very similar to unit trusts. Purchases of regular premium savings contracts are also in the nature of investments; indeed buyers of such contracts are likely to be less sophisticated than buyers of single premium contracts and to need even more protection.

19.3 The current Act provides some protection: S77 gives the Commissioner the right to object to proposal forms or policy documents if they are considered likely to mislead. ISC Circulars have been issued with guidance about disclosure standards for investment-linked and investment account policies covering promotional material, policy documents and regular

statements of investment results to policyholders. These requirements are different from NCSC standards for similar investments.

19.4 The Institute supports the concept of investors in the various types of financial institutions receiving broadly similar protection and the various institutions being subject to broadly similar rules about disclosure. The Institute is of the view that each type of financial institution should be regulated by only one Government Department. Where a particular industry, such as the life insurance industry, is governed by a specific Act and principally regulated by one Government Department, that Department should be responsible for regulating all aspects of that industry - (the lead-regulator concept).

Recommendations

19.5 The Institute believes that life insurance consumers should receive protection by means of disclosure of relevant information at the point of sale, at policy issue and at regular (at least yearly) intervals during the life of policies which have savings or investment components.

19.6 The Institute believes that the NCSC regulations relating to prospectuses for unit trusts and other prescribed interests have gone too far. As a result prospectuses:

(a) are so complex that it is likely that most investors do not read them or, if they do, do not understand them; and

(b) cause the promoting companies unreasonable cost and delay.

They therefore do not provide the consumer protection intended and are not cost effective.

19.7 The Institute recommends that the Act be expanded to contain a section requiring the Commissioner to specify, in ISC Circulars, the information to be disclosed prior to the completion of any proposal, how such information shall be disclosed and the manner in which such information shall be acknowledged by the proposer as having been disclosed. To assist the Commissioner, the Institute makes recommendations on the matters to which such ISC Circulars should make reference at the present time. These recommendations are given in Attachment 7.

19.8 The Institute recommends that the disclosure information referred to in 19.7 also be provided to the policyholder in conjunction with the issue of the policy.

19.9 The Institute recommends that the Act be expanded to require the Commissioner to specify, in ISC Circulars, the basis on which a company can provide illustrations of future benefits and the minimum information to be provided with such illustrations.

The Institute has already made recommendations to the Commissioner as to the basis it considers appropriate at present. These are also given in Attachment 7. A summary of the key points in respect of individual policies is:

(a) standardised bases for the gross investment return should apply to all companies based on the then current 10 year Commonwealth Bond rate;

(b) both death and surrender benefits at specific durations must be shown; and

(c) an inflation adjusted illustration must also be provided, the adjustment being standardised for all companies.

19.10 The Institute is happy with the concept of the 14 day "free look" period required by the Insurance Contracts Act. However, in the case of investment-linked policies, the full refund of the premium paid provides an unreasonable financial option against the company in the event of a fall in the value of the investment units. The Institute recommends that the amount refunded be modified to the amount that would have been required to purchase the units from the company on the business day after return of the policy together with any additional initial charge levied with a maximum refund of the amount of the premium originally paid.

19.11 The Institute believes that, providing new purchases can only be made if the disclosure statement accompanying a proposal has been received, there need be no further control of "interest arouser" brochures whose purpose is to alert possible buyers to the existence of products and invite them to make a proposal. However such brochures should not be inconsistent with the disclosure statement. The Trade Practices Act provides protection against misleading statements in such documents.

19.12 The Institute recommends that the Act should be expanded to specify that regular statements should be issued at least yearly to all holders of policies with investment or savings components. The minimum content of such statements should be specified in ISC Circulars. To assist the Commissioner the Institute makes recommendations on the matters to which such ISC Circulars should make reference at the present time. These recommendations are given in Attachment 7.

20. CONCLUSION

20.1 The Institute recognises that the changes recommended represent a significant revision of the Act but feels that major changes are needed. This may well cause transitional problems. The Institute is ready to help the ISC to manage these difficulties and to assist in the preparation of the revised Act and supporting ISC Guidelines.

20.2 The Institute is ready to develop all necessary Professional Standards and to enforce them through its professional conduct procedures.

20.3 The Institute is grateful for having been consulted regarding the proposed revision of the Life Insurance Act.

ATTACHMENT 1

LIST OF RECOMMENDATIONS

1. **Structure of the Life Insurance Act**

   (a) The Act should deal only with matters of principle (4.1).

   (b) Matters of detail should be covered by means of ISC Circulars and Professional Standards (4.2).

   (c) The process of consultation with the actuarial profession should continue (4.3).

2. **The Role of the Actuary**

   (a) The Appointed Actuary concept should be retained. Accredited Members of the Institute of Actuaries of Australia should be permitted to become Appointed Actuaries (5.3).

   (b) The requirement to apportion receipts, payments and tax in an equitable manner should be retained and should be approved by the Appointed Actuary as well as being certified by the Auditor (5.4).

   (c) The Appointed Actuary should approve the unit pricing process (5.5).

   (d) A full list of the responsibilities of Appointed Actuaries proposed for the Act is shown (5.6).

   (e) Provision should be made for an Acting Appointed Actuary in the absence of the Appointed Actuary (5.7).

3. **Definitions**

   (a) The definition of life policy should recognise that a life policy can consist of several components (6.1[a]).

   (b) The definition of continuous disability insurance should be extended to include all disability policies with guaranteed renewability of more than one year's duration (6.1[b]).

   (c) A definition of investment-linked business is required (6.1[c]).

   (d) A definition of investment account business is required (6.1[d]).

   (e) A more comprehensive definition of annuity business is required (6.1[e]).

ATTACHMENT 1 continued

(f) Deeming provisions should continue (6.1[f]).

(g) All references to industrial business should be removed from the Act (6.2).

(h) The separation of business into classes should not continue (6.3).

4. **Discretionary Policies**

(a) The concept of a discretionary policy should be introduced (7.7).

5. **Premium Rating**

(a) No policy should be issued unless the Appointed Actuary has approved in writing all terms and conditions of and relating to that policy (8.4).

(b) When approving policy terms and conditions, the Appointed Actuary should have regard to commission (8.5).

(c) The Act should include a definition of commission (8.6).

6. **Surrender Values**

(a) There should be no prescribed minimum surrender values (9.5).

(b) Should prescribed minimum surrender values be imposed, recommendations are made (7.6).

7. **Statutory Funds**

(a) The concept of the Statutory Fund should be retained (10.7).

(b) The revised Act should address the issues of freedom to establish Statutory Funds (10.8).

(c) A company should be permitted to conduct business other than life insurance business external to its Statutory Funds (10.9).

(d) In preparing the Financial Condition Report the Appointed Actuary should consider the effect of external business (10.9).

(e) If discretionary and non-discretionary business are in the same Statutory Fund, that part of the Statutory Fund relating to discretionary business may be identified (10.10).

ATTACHMENT 1 continued

(f) Discretionary Policyholders' Retained Earnings (DPRE) can be transferred to support other Statutory Funds but must retain their identity in the new fund (10.10).

(g) Overseas business should be kept in separate Statutory Funds (10.11).

(h) A company should be required to establish one or more Statutory Funds for its investment-linked business (10.12).

(i) The requirements in (g) and (h) could be waived at the discretion of the Commissioner (10.13).

(j) Where a policy consists of a number of components normally covered by separate Statutory Funds, this may be done either directly or by the policy being written in one Statutory Fund only and appropriate components reinsured (10.14).

(k) The terms of reinsurance between Statutory Funds must be approved by the Appointed Actuary (10.14).

(l) Statutory Funds supporting investment-linked business should be prohibited from retaining guarantees of investment performance or return (10.15).

(m) A company should have the right to establish a Statutory Fund for any part of its business (10.16).

(n) The approval of the Appointed Actuary is required for the establishment by separation or the amalgamation of Statutory Funds (10.17).

(o) Any transfer between Statutory Funds or between a Statutory Fund and the Shareholders' Fund must be approved by the Appointed Actuary and capital adequacy must be demonstrated before such transfers can occur (10.18).

(p) The Act should make it clear that a Statutory Fund can be wound up independently of other Statutory Funds (10.19).

(q) Hypothecation of assets within a Statutory Fund should be permitted subject to disclosure (10.20).

(r) Joint ownership of an asset by different Statutory Funds should be permitted provided the interests of each fund are fully specified and documented (10.21).

(s) The winding-up or judicial management of a Statutory Fund or the transfer of Statutory Funds from one company to another should continue to be subject to the Court (10.22).

ATTACHMENT 1 continued

8. **Assets**

(a) A life insurance company should have complete freedom to invest the assets of a Statutory Fund subject only to policy conditions, and the Articles of Association, except for investments in loans to or deposits with related companies (other than wholly-owned subsidiaries or Banks) (11.4).

(b) For the purposes of determining Operating Profit, assets should be valued on a market value basis (11.5).

(c) The Act should require the Appointed Actuary to adjust the value of the liabilities if it is believed that the value of assets as stated in the balance sheet is not appropriate for assessing capital adequacy (11.6).

(d) The details of the basis of valuing assets and any adjustments to the value of liabilities made for the purpose of assessing capital adequacy should be published (11.10).

(e) Details of all assets exceeding 1% of a Statutory Fund should be published at an individual level (11.10).

9. **Valuation of Liabilities**

(a) The Appointed Actuary should be required to produce a valuation of the liabilities for the Financial Condition Report to establish realistic earnings and demonstrate capital adequacy. This will be done by requiring a valuation of liabilities on two bases to determine the Policy Reserve and Statutory Reserve (12.5).

(b) The valuation of liabilities should comply with Professional Standards (12.14).

10. **Reporting of Earnings**

(a) The financial reports of a life insurance company should be prepared along similar lines to those required by the Companies Code (13.3).

(b) Operating Profit should be calculated for each Statutory Fund and details shown in a revised Revenue Account (13.6).

11. **Capital Adequacy**

(a) Companies should be required to report annually on capital adequacy using a Capital Adequacy Statement (14.6).

(b) The Commissioner should have the discretion to rule that Australian capital adequacy requirements do not apply to overseas business (14.7).

ATTACHMENT 1 continued

(c) The Commissioner should have the power to approve new owners of a company (14.8).

12. **Allocation of Profit**

(a) Profit must be allocated at each year end (15.4).

(b) When a Statutory Fund secures only non-discretionary business, Operating Profit may be allocated entirely to the external capital providers (15.6[a]).

(c) When a Statutory Fund secures both non-discretionary and discretionary business, profit from the two sources may be allocated separately provided separate revenue accounts are established (15.6[b]).

(d) Profit from discretionary business should be allocated by a two stage process. The first stage allocates an amount equal to the current year fund earning rate to the Other Reserves. The second stage allocates the balance of the profit with a restriction that at least 80% of the balance must be allocated to discretionary policyholders (15.7).

(e) Capital commitment should be the sharing basis for allocating profit between capital providers (15.7).

(f) Allocation of Operating Profit should be subject to approval by the Appointed Actuary (15.9).

(g) The Allocation of Operating Profit Statement should be produced (15.9).

13. **Distribution of Profit**

(a) No distribution or transfer should be made which would cause a Statutory Fund to have inadequate capital (16.4).

(b) Any transfer from SRE to P&L or another Statutory Fund should be limited to the same proportion of SRE that distribution to discretionary policyholders bears to DRE (16.4).

(c) If SRE or DPRE is negative, any distribution is subject to approval by the Commissioner (16.4).

(d) Any distribution or transfer must be approved by the Appointed Actuary (16.5).

(e) Transitional procedures for moving from the current position on profit distribution to that recommended are proposed (16.8).

ATTACHMENT 1 continued

14. **Annual Reporting**

(a) Financial reporting should be consistent with that for other financial institutions (17.5).

(b) The following should be published (17.6):

- Revenue Account
- Allocation of Operating Profit Statement
- Capital Adequacy Statement
- Profit and Loss Account
- Balance Sheet
- Statement by the Appointed Actuary

These should replace the current First Schedule, Second Schedule and Third Schedule (17.6 and 17.9).

(c) The actuarial statement published in a country need only relate to that country (17.8).

(d) The Appointed Actuary should be required to produce a Financial Condition Report yearly (17.10).

15. **Statistics**

(a) The Act should empower the Commissioner to require companies to provide such information as is considered appropriate (18.1).

16. **Disclosure**

(a) The Act should empower the Commissioner to specify in ISC Circulars the information to be disclosed prior to completion of a proposal (19.7).

(b) The Act should empower the Commissioner to specify in ISC Circulars the basis on which a company can provide illustrations of future benefits (19.8).

(c) For investment-linked policies, the premium refunded under the 14 day "free look" period should be adjusted to allow for unit price movements (19.9).

(d) The Act should empower the Commissioner to specify in ISC Circulars the information to be disclosed to holders of policies with investment or savings components on a yearly basis (19.12).

ATTACHMENT 2(a)

XYZ Pty Ltd
REVENUE ACCOUNT
Year Ended 31 December 19X2

	Statutory Fund No. 1	Statutory Fund No. 2
OPERATING INCOME		
Premium Income		
Single Premiums		
First Year Premiums		
Other Premiums		
Total Premiums		
Investment Income		
Interest Dividends & Rents		
Realised Profits less Losses on Sale of Assets		
Unrealised Gains Less Losses		
Total Investment Income		
TOTAL OPERATING INCOME	396	17
OPERATING EXPENDITURE		
Claims Paid (subdivided according to cause)		
Commissions on Acquisition		
Commissions on Servicing		
Total Commissions		
Other Expenses including Provisions		
- In Respect of Single Premium Business on		
Acquisition		
Maintenance		
- In Respect of Annual Premium Business on		
Acquisition		
Maintenance		
Investment Expenses		
Total Other Expenses including Provisions		
Income Tax & Other Taxes		
TOTAL OPERATING EXPENDITURE	184	8
NET INCREASE IN FUND BEFORE TRANSFERS	212	9
INCREASE IN POLICY RESERVE ON SAME BASIS AS PREVIOUS YEAR	180	11
VALUE OF CHANGE IN BASIS FOR POLICY RESERVE	4	-
OPERATING PROFIT	28	(2)
BALANCE OF FUND BROUGHT FORWARD	827	34
NET INCREASE IN FUND BEFORE TRANSFER	212	9
TRANSFER (TO)FROM PROFIT AND LOSS ACCOUNT	(3)	-
TRANSFER (TO)FROM OTHER STATUTORY FUNDS	(6)	6
BALANCE OF FUND CARRIED FORWARD	1030	49

ATTACHMENT 2(b)

XYZ Pty Ltd
BALANCE SHEET
Year Ended 31 December 19X2

Investments
Cash
Promissory Notes
Money on Deposit
Total Short Term Investments
Government Securities
Semi Government Securities
Debentures
Secured & Unsecured Notes
Loans on Mortgages
Loans on Policies
Loans on Bills of Sale
Other Secured Loans
Unsecured Loans
Bonds
Outstanding Premiums
Accrued Interest
Total Fixed Interest Investments
Ordinary Shares
Preference Shares
Property & Mortgage Trusts
Futures
Freehold Property
Life Interests & Reversions
Total Equity Investments
Total Investments
Other Assets
Office Furniture, Motor Vehicles
Loans to Controlled Companies
Total Other Assets
TOTAL ASSETS

Less Current Liabilities
Claims Admitted or Intimated but not yet Paid
Sundry Creditors
Provision for Income Tax
Provision for Annual Leave
Provision for Long Service Leave
TOTAL CURRENT LIABILITIES

PROVISION FOR DEFERRED INCOME TAX

NET ASSETS 1084

ATTACHMENT 2(b) continued

FUNDS

SHARE CAPITAL			1
SHARE PREMIUM RESERVE			3
PROFIT AND LOSS ACCOUNT BALANCE			1
STATUTORY FUND NO. 1			
- Policy Reserve		892	
- Capital Adequacy Reserve		128	
supported by			
- Shareholders' Working Capital	21		
- Discretionary Policyholders' Retained Earnings	94		
- Shareholders' Retained Earnings	13		
- Other Reserves		10	
supported by			
- Discretionary Policyholders Retained Earnings	2		
- Shareholders' Retained Earnings	8		
STATUTORY FUND NO. 1 BALANCE			1030
STATUTORY FUND NO. 2			
- Policy Reserve		40	
- Capital Adequacy Reserve		9	
supported by			
- Shareholders' Retained Earnings	2		
- No. 1 Fund Discretionary Policyholders' Capital	7		
- Other Reserves		-	
supported by			
- Shareholders' Retained Earnings	(3)		
- No. 1 Fund Discretionary Policyholders' Capital	3		
STATUTORY FUND NO. 2 BALANCE			49
TOTAL FUNDS			1084

ATTACHMENT 2(c)

XYZ Pty Ltd
ALLOCATION OF OPERATING PROFIT STATEMENT
Year Ended 31 December 19X2

	Statutory Fund No. 1	Statutory Fund No. 2
Operating Profit from Revenue Account	28	(2)
Add interim distributions to Discretionary Policies becoming claims or surrendered	1	-
TOTAL OPERATING PROFIT	29	(2)
Allocated to		
- Discretionary Policyholders' Retained Earnings	23	-
- Shareholders' Retained Earnings	6	(1)
- Discretionary Policyholders' Capital - No. 1 Fund	-	(1)
DISCRETIONARY POLICYHOLDERS' RETAINED EARNINGS		
- brought forward	95	-
- from Operating Profit	23	
- distributed to Discretionary Policyholders	(16)	-
- transfer from(to) Statutory Fund No. 2	(6)	
- carried forward undistributed	96	-
Supporting		
- Capital Adequacy Reserve	94	-
- Other Reserves	2	-
SHAREHOLDERS' RETAINED EARNINGS		
- brought forward	18	-
- from Operating Profit	6	(1)
- transfer to Profit and Loss Account	(3)	-
- transfer from(to) Statutory Fund No. 2	-	-
- transfer from(to) Statutory Fund No. 1	-	-
- carried forward undistributed	21	(1)
Supporting		
- Capital Adequacy Reserve	13	2
- Other Reserves	8	(3)

DISCRETIONARY POLICYHOLDERS' CAPITAL	
- brought forward	5
- from Operating Profit	(1)
- transfer from(to) Statutory Fund No. 1	6
- carried forward	10

ATTACHMENT 2(c) continued

	Statutory Fund No. 1	Statutory Fund No. 2
Supporting		
- Capital Adequacy Reserve		7
- Other Reserves		3
SHAREHOLDERS' WORKING CAPITAL		
- brought forward	21	
- transfer from(to) Profit and Loss Account	-	
- carried forward	21	
Supporting		
- Capital Adequacy Reserve	21	
- Other Reserves	-	

ATTACHMENT 2(d)

XYZ Pty Ltd
Shareholders' Fund
PROFIT AND LOSS ACCOUNT
Year Ended 31 December 19X2

PROFIT AND LOSS ACCOUNT	
Profit and Loss Account balance brought forward	1
Transfer from (to) Share Premium Reserve	0
Transfer from (to) Statutory Fund No. 1	3
Transfer from (to) Statutory Fund No. 2	-
Dividends	(3)
Profit and Loss Account balance carried forward	1

SHARE PREMIUM RESERVE	
Share Premium Reserve brought forward	3
Transfer from (to) Profit & Loss Account	0
Share Premium Reserve carried forward	3

ATTACHMENT 2(e)

XYZ Pty Ltd
CAPITAL ADEQUACY STATEMENT
Year Ended 31 December 19X2

	Statutory Fund No. 1	Statutory Fund No. 2
Policy Reserve at end of period	877	40
Distribution of Profit to Discretionary Policyholders	16	-
less interim distributions to Discretionary Policies becoming claims or surrendered	(1)	-
TOTAL POLICY RESERVE	892	40
Capital Adequacy Reserve at beginning of period	123	5
Increase (Decrease) in Capital Adequacy Reserves required	5	4
Represented by		
- transfer from(to) Shareholders' Working Capital	-	-
- increase (decrease) in Discretionary Policyholders' Retained Earnings	2	-
- increase (decrease) in No. 1 Fund Discretionary Policyholders' Capital	-	4
- increase (decrease) in Shareholders' Retained Earnings	3	-
TOTAL CAPITAL ADEQUACY RESERVE	128	9
TOTAL STATUTORY RESERVE	1020	49
Other Reserves at beginning of period	10	-
Increase (decrease)	-	-
Supported by		
- transfer from(to) Shareholders' Working Capital	-	
- increase (decrease) in Discretionary Policyholders' Retained Earnings	-	-
- increase (decrease) in No. 1 Fund Discretionary Policyholders' Capital	-	-
- increase (decrease) in Shareholders' Retained Earnings	-	-
TOTAL OTHER RESERVES	10	
BALANCE OF FUND at end of period	1030	49

ATTACHMENT 3

SURRENDER VALUE BASIS - RECOMMENDATIONS

1. General Principles

In the event Parliament regards it as necessary for minimum surrender values to be prescribed, the following features should apply:

(a) the scales should be set out in ISC Circulars rather than in the Act;

(b) the requirement for minimum values should apply to Australian policies only;

(c) paid-up values should be derived from surrender values rather than vice versa as currently applies;

(d) different scales should be prescribed to recognise the impact of tax on investment earnings and expenses;

(e) the process for dispensation in the event of the financial stability of the Statutory Fund being endangered should be capable of speedy implementation; and

(f) transitional arrangements may be necessary, particularly if the new scale were to specify lower minimum values than the current one.

2. Capital Guaranteed Business

2.1 The Institute's preferred basis for individual capital guaranteed business is for a retrospective basis to apply in the early years of a policy, with allowance for acquisition and other expenses and the cost of any life cover. For later years a prospective basis should be used for whole of life, endowment insurances and pure endowments, while for investment account business the basis should be a minimum proportion of the Account Balance with recognition of any future guarantees.

2.2 For the retrospective basis referred to in 2.1, the Institute considers the approach adopted in ISC Circular 273 to be adequate for investment account, whole of life, endowment insurance and pure endowment business. It would be appropriate to refine the ISC Circular 273 basis to use a gross interest rate of 7% pa at the present time with adjustments for the basic tax rates and to change this from time to time.

ATTACHMENT 3 continued

2.3 For the prospective basis referred to in 2.1, the following approach is recommended for whole of life, endowment insurance and pure endowment business:

(a) the surrender value be taken as a proportion of the Policy Reserve (as defined in 12.6 of the Submission); and

(b) the proportion of the Policy Reserve referred to in (a) is 85% until ten years prior to -

(i) the maturity date of the policy,

(ii) the attainment of age 85 of the life insured for whole of life business,

and the proportion then increases by 1% pa to a maximum of 95%.

2.4 The minimum surrender value is the greater of the surrender value calculated on the retrospective and prospective bases described in 2.2 and 2.3.

3. Investment-Linked Business

If Parliament wishes to extend minimum surrender scales to encompass investment-linked business the Institute recommends that the approach adopted be similar to that for investment account business but with the value of units allocated being used in substitution for the accumulation of account amounts at a defined interest rate. Where the underlying investments are illiquid, provision should be made for a deferral of the payment of the surrender value.

4. Other Matters

4.1 Where a statutory minimum surrender basis applied to policy components issued before the revision of the Act, grandfathering provisions should ensure that the minimum surrender values are not less than those based on the existing minimum basis.

4.2 We reiterate that we are opposed to minimum surrender scales being set by Parliament. Guarantees inhibit investment freedom and thus reduce returns. Accordingly the Institute feels that protection of policyholders is better served by disclosure at the point of sale than by minimum surrender scales.

ATTACHMENT 4

VALUATION OF LIABILITIES - PROFESSIONAL STANDARDS

Features to be incorporated in the Professional Standards for valuing liabilities are given below:

(a) Benefits, premiums and expenses should be valued to the end of the benefit period, not to an earlier renewal date.

(b) The use of discontinuance assumptions would be required.

(c) In no event should the Statutory Reserve, on a component by component basis, be negative or less than the current cash surrender value (even if not guaranteed). Note that the Policy Reserve could be less than the current surrender value and may be negative with the Capital Adequacy Reserve making up any amount required to reverse a negative Policy Reserve or to build up the Statutory Reserve to the current surrender value.

(d) The discontinuance, mortality and morbidity assumptions may be based upon the recent experience of the company provided this is relevant and credible: otherwise industry or other relevant experience must be used. The minimum margins for adverse deviation would be specified.

(e) In selecting expense assumptions, the Appointed Actuary may assume (unless inappropriate) that the company will continue to write new business in the future, but the assumed levels of new business must be realistic. Provision should be made for future inflation, and this provision should be consistent with assumed future interest rates, and any indexation of benefits and premiums. The expense assumptions must provide for maintenance expenses in future years consistent with those currently being incurred.

(f) For non-discretionary business, a specified (maximum) long term interest rate to be adopted for the investment of future premiums and the reinvestment of investment income will be given. For discretionary business the Appointed Actuary will need to consider the relationship between earnings and profit distribution.

(g) In calculating the reserves for discretionary business, provision must be made for future distributions of profit, except the current one, and the assumed rates must be consistent with other assumptions. (Distributions at the current valuation are not included in the Policy Reserve at the valuation.)

ATTACHMENT 4 continued

(h) The Statutory Reserve for any policy must be sufficient to ensure that, on the basis adopted, there will be no need for future external finance. There will be no need to establish a mismatching reserve for future premiums.

(i) The Appointed Actuary should include a special reserve to reflect the difference between the value for the assets held in the Balance Sheet and that adopted for the assessment of capital adequacy.

(j) The methods to be used to allow for the pricing risk, asset default risk and mismatching risk will be specified.

ATTACHMENT 5

ALLOCATION OF PROFIT - TRANSITIONAL PROCEDURES

1. General Principles

1.1 Some companies may wish to split accounts between discretionary and non-discretionary business: this need not be compulsory under the Act and there should be a variety of positions which could be adopted to suit different companies' needs.

1.2 The revised Act should provide for apportioning Statutory Fund balances between shareholders and discretionary policyholders at a prescribed date or at some time in the future at the election of the company. Some of the possibilities for apportionments are:

(a) approved apportionments already in place

(b) for a company with little non-discretionary business all Operating Profits could be regarded as discretionary

Any such election should only be reversed with the approval of the Commissioner.

1.3 If neither of the options above is suitable the company would split the excess of the Statutory Fund balance over the Policy Reserves as set out below:

2. Non-Mutual Companies

2.1 The capital transferred into the Statutory Fund by the shareholders over the years should be identified as such. This is identified as Shareholders' Working Capital.

2.2 Amounts transferred from another Statutory Fund would be identified as that Statutory Fund's Discretionary Policyholders' Capital.

2.3 Undistributed Operating Profit which can be identified as having arisen from non-discretionary business should be identified as Shareholders' Retained Earnings.

2.4 The remainder of the excess of the balance of the Statutory Funds over Policy Reserves at the election date, after allowance for 2.1, 2.2 and 2.3 would be deemed to be discretionary business profit and should be apportioned between policyholders and external capital providers according to the allocation rules in the company's Articles, but subject to any overriding provisions in the revised Act. The policyholders' component would become the Statutory Fund's Discretionary Policyholders' Retained Earnings. The external capital providers' component would be added to Shareholders' Retained Earnings and to Discretionary Policyholders' Capital.

ATTACHMENT 5 continued

Note that this remainder may be negative.

2.5 Shareholders' Working Capital and any other Statutory Fund's Discretionary Policyholders' Capital would not be subject to any distribution restrictions, although they could only be transferred to Shareholder Funds or other Statutory Funds to the extent they are not required to support the Statutory Reserves (see Submission section 16.4).

3. Mutual Companies

3.1 Transfers of a capital nature into a Statutory Fund (eg. from another Statutory Fund) should be identified as the transferring fund's Discretionary Policyholders' Capital.

3.2 The remainder of the excess of the balance of the Statutory Fund over Policy Reserves in each Statutory Fund at the election date would be deemed to be discretionary business profit and should be apportioned between that Statutory Fund's DPRE and the other Statutory Fund's DPC according to the sharing rules in the revised Act.

ATTACHMENT 6

STATEMENT BY THE APPOINTED ACTUARY

The methods, bases, and results of the valuation of the Policy Reserve and of the Capital Adequacy Reserve are to be fully described and published in a statement by the Appointed Actuary to be attached to the annual reports of the company. The statement should show:

(a) the general principles of the methods adopted in determining the valuation of the Policy Reserve for each of the various types of policies;

(b) the elements of the bases used in the determination of the Policy Reserve. The elements include:

(i) the tables of mortality and morbidity;
(ii) the rates of discontinuance;
(iii) the rates of interest;
(iv) the rate of growth in unit prices;
(v) the rates of bonus taken into account;
(vi) the levels of renewal expenses;
(vii) the rate of inflation; and
(viii) the values available on early discontinuance of the policy.

(c) the general principles adopted in the allocation of profit between the providers of capital to the Statutory Fund and the discretionary policyholders;

(d) the general principles adopted in the distribution of profit to the discretionary policyholders;

(e) the elements of the bases used in the determination of the Capital Adequacy Reserve. The elements include:

(i) the margins for adverse mortality and morbidity;
(ii) the margins for adverse changes in rates of discontinuance;
(iii) the margins for adverse changes in the levels of renewal expenses;
(iv) the margins for adverse changes in rates of interest;
(v) the allowance for the mismatching of assets and liabilities;
(vi) the allowance for the asset default risk;
(vii) details of any adjustments in respect of the asset values held in the Balance Sheet for the purposes of the Capital Adequacy Reserve;
(viii) the allowance for the pricing risk.

ATTACHMENT 6 continued

(f) a summary of the valuation results for each type of policy to show, by Statutory Fund:

Number of policies
Sum Insured or Account Balance
Bonus attaching
Office yearly premium
Policy Reserve
Capital Adequacy Reserve
Statutory Reserve

In addition, the statement should include certificates to the effect that:

(g) the Appointed Actuary has examined the data upon which the valuation was conducted and is satisfied as to its accuracy;

(h) the Appointed Actuary has performed all the duties required under the Act and has conformed with all relevant ISC Circulars and Professional Standards.

Should it not be possible for the Appointed Actuary to give unqualified certificates, qualified certificates with appropriate reporting of the matters qualified should be given.

ATTACHMENT 7

DISCLOSURE RECOMMENDATIONS

1. Background

This Attachment gives the Institute's recommendations on point of sale disclosure, benefit illustrations and regular statements which it believes to be appropriate at the present time.

2. Point of Sale Disclosure

2.1 The Institute has recommended that ISC Circulars should specify the information to be disclosed prior to the completion of any proposal, how such information shall be disclosed and the manner in which such information shall be acknowledged by the proposer as having been disclosed.

2.2 The Institute recommends that the ISC Circulars at the present time should contain reference to the following matters in respect of individual policies:

(a) a proposal form can only be supplied attached to a disclosure statement which satisfies the principles specified in the Act;

(b) disclosure statements need not be individually approved by the Commissioner but the Commissioner should monitor them for compliance and should have the power to require them to be changed if they are found to break the rules;

(c) all disclosure statements should clearly describe in simple language the terms and conditions of the policy, including:

(i) the benefits provided by the policy on the happening of relevant events including those on surrender;

(ii) in the case of investment-linked policies, the possible volatility of the benefits payable;

(iii) the charges to be levied during the life of the policy together with any right which the company has to change them;

(iv) the nature of any guarantees (including those relating to capital) and any limitations, and the name of the provider of each guarantee;

(v) the Statutory Fund or Funds in which the components will be secured;

ATTACHMENT 7 continued

(vi) whether the policy component is discretionary or non-discretionary describing the nature of the discretions involved;

(vii) an offer to provide on request a copy of the policy document; and

(viii) an offer to provide on request a copy of the most recent accounts of the company including names of the Directors and Appointed Actuary;

(d) A broad description of the rights and privileges accruing on becoming a member of a mutual office; and

(e) All disclosure statements for policies with investment or savings type components should, in addition, clearly describe in simple language:

(i) the broad principles of the company's investment objectives for the relevant Statutory Fund or sub-fund together with any right which the company has to change it. Note: the objective of this requirement is to be informative, not to create restrictions;

(ii) the current proportion of the Statutory Fund or sub-fund investments in broad asset categories;

(iii) the company's broad philosophy and principles in relation to bonus or interest rate declarations, as the case may be;

(iv) the general basis on which tax is currently levied on the company and the buyer with a statement that these are subject to change by the Government;

(v) the earnings history for the past few years (say 5) of the relevant Statutory Fund or sub-fund;

(vi) the history for the past few years (say 5) of bonus or interest rate declaration for the product; and

(vii) in the case of superannuation business the legal restrictions which currently apply (in brief and broad terms) with a statement that these are subject to change by the Government.

(f) Disclosure statement information is also provided in conjunction with the issue of the policy.

ATTACHMENT 7 continued

2.3 Where an individual's benefits are defined under a master policy but that individual is paying the whole of the premium applicable to the benefits of that individual, the Institute believes that the standard of disclosure required should be similar to that recommended in 2.2 above.

2.4 Where an individual's benefits are defined under a master policy and the premium is partly or wholly paid by the policyholder or another party, the Institute believes that a lesser standard of disclosure is required. This is in recognition of the greater sophistication of such policyholders and the more open competitive environment they generally operate in. The Institute makes no recommendations in respect of such policies at this time.

3. Benefit Illustrations

3.1 The Institute has previously recommended that ISC Circulars should specify the basis on which a company can provide illustrations of future benefits and the minimum information to be provided with such illustrations. This is reiterated below.

3.2 The Institute recommends that the ISC Circulars at the present time should specify that if a company provides benefit illustrations in disclosure statements or to potential buyers in individual cases, these shall be on standardised bases as follows.

(a) Benefit illustrations should show two values, both of which are calculated using specified interest rates:

(i) CB x (1-t) + 3% and
(ii) 80% of the above,

where CB is the average 10 year Commonwealth Bond rate over the past 3 years and t is the basic tax rate applicable to the fund.

(b) Actual projections should be carried out using the specific allocation of bonus or investment return method appropriate to the policy component, having regard to expense and/or policy charges, both implicit and explicit.

(c) In the case of traditional participating policies the Appointed Actuary should approve the bonus rates considered most likely to be declared if these earnings rates are experienced in the future.

ATTACHMENT 7 continued

(d) Illustrative amounts payable on death and surrender at duration 2 years, 5 years and 10 years should be shown as a minimum. If the surrender value basis can be changed, a statement to that effect should be made.

(e) In addition, a rate of inflation should be specified as 2/3 of CB and inflation reduced amounts for at least the longest duration should be shown with an explanation which notes that the value of projected benefits in terms of their real value for spending purposes will be reduced by the effects of future inflation. Adjusted figures to correspond with current monetary values should be shown, along with the inflation rate assumed in arriving at that value.

4. Regular Statements

4.1 Currently we propose that regular policyholder statements should show:

(a) current death and surrender values;

(b) new and total bonus in the case of traditional participating policies;

(c) in the case of investment-linked and investment account policies a brief "statement of account" showing the value at beginning and end of the period and the contributing elements to the change;

(d) a statement that company accounts relevant to the policy will be supplied on request;

(e) a reminder about the investment objectives of the appropriate Statutory Fund or sub-fund; and

(f) the current asset allocation proportions in broad categories.

MANAGING VOLATILITY IN SUPERANNUATION FUNDING

by Dermot Balson BSc, FIAA

1. Synopsis

This paper looks at superannuation funding as a risk management process, introducing a simple twist to accrued benefit funding that allows integration of investment volatility and a variety of explicit company/Trustee objectives in funding management. Simulation and graphic presentation are used extensively in the initial design of the funding program.

The objective is to provide Trustees and companies both with more effective and meaningful management information, and with simple but highly flexible financial control systems. However, while one possibility is discussed in detail in this paper, it is not put forward as the ultimate method, but to show that the objective is feasible.

1.1 Introduction

Some years ago I began to wonder why we go to such lengths to value benefits 30-40 years into the future precisely, using imprecise assumptions. In researching for this paper, I was interested to see that many actuaries have echoed this in the past, but projection funding still seems to be prominent.

There may be good reasons for this, including

(1) projection methods do stabilise contribution rates - often a key requirement of the sponsoring company
(2) the methods produce exact answers which many clients prefer to the complexities of the real world situation
(3) use of consistent assumptions over time facilitates surplus analysis; explanations to clients; and setting up of standard formulae, eg for transfers, actuarial reserves, etc
(4) the methods have an aura of great expertise, complexity and professional judgement, while in fact allowing a high degree of standardisation, which particularly aids computer processing

In preparation for a tilt at this well-worn windmill, it is appropriate to start with what we are trying to achieve.

2. THE ACTUARY'S ROLE

If there were no actuaries, I believe defined benefit funds could survive, if managed with common sense. Without expert risk management advice, they would be likely to take a security-oriented, short term view.

2.1 What can actuaries do ?

What can the actuary bring to superannuation funding ?

I would characterise our main contribution as *financial risk management*. By *identifying*, *quantifying* and *managing* risk, actuaries allow companies and Trustees to take *controlled risks* - and a longer term view - which should benefit all concerned. Simple examples are the greater use of equities to improve long term returns (requiring control of resulting short term volatility), stabilised contribution rates which assist company budgeting (requiring management of short term imbalances), and self-insurance.

2.2 Funding Criteria

In a recent paper, Bone [1] set out the following funding criteria

Liquidity (of cash flow to meet benefits)
Security (of accrued benefits)
Stability (of contribution rate)
Durability (to cope with change)
Equitable accounting (for accountants)
Excess funding (minimising thereof)

While it is difficult to argue with any of these on its own, they need to be balanced against each other, and I am concerned that we not decide for our clients where that balance should be. But do needs vary between clients ? To what extent should we accommodate such differences ?

3. CLIENT NEEDS

Our clients' needs may be unarticulated, confused and conflicting. Today they are likely to include :

3.1 Company Needs

Companies are having to run more tightly than ever, and whatever their view on ownership of surplus, they are increasingly conscious of the potential waste in sloppily managed superannuation funds.

Many companies, therefore, need an *active management program* with continuous evaluation and decisive action to control imbalances.

Further, companies need to understand the effect of *increasing investment volatility* on their future costs, and the potential risks inherent in their benefit designs - not least from Government regulations ! For example, one of my clients had to suddenly pour in a large contribution to meet the solvency test required by the Companies' Act, because the resulting qualification in its accounts would have damaged market and employee confidence.

3.2 Trustee Needs

Both solvency and the level of current funding are clear concerns, in targeting the Trust toward its long term objectives.

A need which Trustees easily overlook is *risk management*. This applies not only to the above aspects, but also to insurance and particularly to investment management. What are the possible implications of choosing aggressive and volatile managers ? Are there considerations beyond pure performance potential, and how can they be measured ? To what extent can the Trustees afford to take a long term view, allowing short term funding to fluctuate ? How definite is the surplus identified by actuarial valuations, and what limits should be put on its use ?

3.3 Member Needs

Members may have little involvement with benefit design, costing or funding. Nevertheless, they may have views on aspects such as the ownership and uses of asset surpluses, investment approach (effect on leaving service benefits) and equity between members (as in inter-fund transfers, credit for previous benefits, etc).

4. ACCOMMODATING VARYING NEEDS

4.1 The actuarial approach

I propose that actuarial consulting should allow the client to make its *own informed decisions*, through the marriage of the consultant's specialised analytical skills/knowledge and the client's needs .

This is particularly important for Trustees, who cannot delegate decisions or responsibility. It is not sufficient for them to take advice unthinkingly. They must attempt to take their decisions in the full knowledge - and understanding - of the implications. Any mistakes are theirs.

This is something Roger Corley recognised in his (UK) Presidential Address in 1988. He said "*If the people who have to make the decisions have not seen the full extent of the options which they can consider and there is then a later enquiry, this could conceivably lead to a challenge over the nature of actuarial advice. .... I believe this can be avoided if we take care to set out for the clients or employers whom we advise the full range of available options and their consequences and then to make sure that our own views, however widely we know them to be shared, are properly seen as opinions*".

To me, this means the report style I have seen often - and written myself -

* based on a single set of assumptions & presented with high precision and few qualifications
* a surplus figure calculated as the projected future assets minus future benefits, again with little or no indication of variability
* surplus discussed as though it were a definite figure
* contribution rates calculated with apparent precision
* no analysis of the effect of the chosen investment approach on future results, eg the effect of volatility

is not only inadequate, but may be seen as unprofessional. Even as an actuary, I would have difficulty with many reports - the projected results of a single set of simplistic assumptions, boiled down to present values, are very hard to interpret meaningfully. Continued acceptance of these standards seems to me to be out of step with the changes occurring in related actuarial fields such as life office work and general insurance, where the importance of volatility testing is recognised.

4.2 Is volatility testing really needed ?

I would accept that volatility testing was not necessary if the results of our projections were not significantly affected by real-life volatility. However, one has only to carry out valuations on varying investment assumptions to see that they do have a significant effect, ie the choice of real return matters.

In the real world, not only is there no such animal as a long term real return, but even if there was and we got it right, steady real return assumptions ignore the interactive effect of short term volatility in both asset values and cashflows, which create further instability and inaccuracies in our calculations.

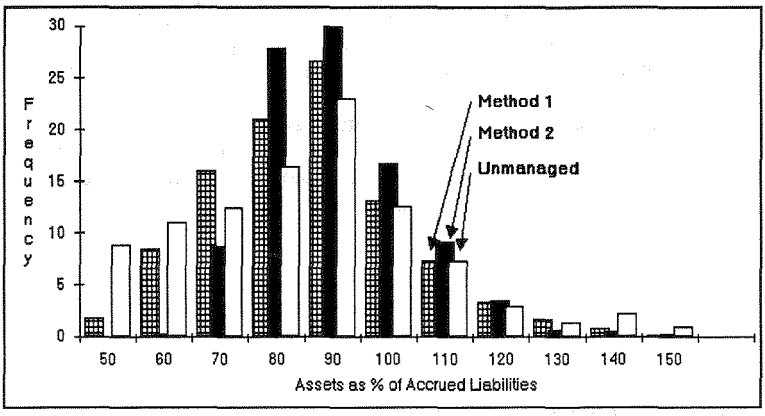
This is important if we then recognise that for many funds, the long term is not 20 or 30 years, but 5 years. By this, I mean that while some funds can afford to take a very long view and carry large temporary deficits or surpluses, others cannot afford the luxury (eg through cost constraints, PR perceptions). *This suggests we need to analyse and manage the relevant volatility for each client according to its needs. Volatility is subjective to the client, not something that can be generalised.*

Against this, it may be argued that projection funding is not supposed to be accurate, but to stabilise contribution rates while broadly trending in the right direction. *However, I believe the prime funding objective is cost-efficient solvency* - that is, securing the benefits prudently with proper allowances for the unknown, while at the same time minimising the cost to the employer.

4.3 The priority - managing extremes, not smoothing contribution rate

Perhaps this reflects a different priority - not stable contributions, but a stable funding position. Our main valuation clients are the Trustees, who must be less concerned with contribution stability than with the health of the fund, particularly in the near future, which may be all that we can predict with any credibility.

To illustrate, the picture below shows a sample distribution of the accrued funding index (assuming annual measurement), calculated as asset value divided by (undiscounted) accrued benefits. The scatter of the results reflects the combined effect of asset and liability volatility, muted by actuarial management.



The unshaded bars show the results without actuarial management, ie static contribution rate, while the other two bars show the results of different active management methods, ie managed contribution rate.

I submit that the shape of this distribution is crucial to successful funding management, as the major risk for Trustees is at the funding extremes. How should it look ?

The Trustees will want to see the *left hand side* of the graph managed down to acceptable frequency levels. The level of vested benefits; investment volatility; and availability of additional employer support might all be factors in deciding the exact shape.

On the *right hand*, surplus side, the Trustees would be likely to be more conservative, ie the graph would slope more gradually than the left, while attempting to moderate the incidence of excessive surplus. This might lead to management away from the natural unmanaged (fixed contribution) distribution to an asymmetrical distribution as shown above for Method 2.

The left hand bar (Method 1) has a similar shape, but seems to allow the funding level to get too low too often (in my view). The actuary would then have to suspend the normal approach and take manual control to restore the situation. This has in fact often happened in the real life method which this bar simulates - aggregate funding.

You may guess that the more suitable bar (Method 2) comes from the method in this paper. You will also want far more than a picture to convince you it works !

Before agreeing to any shape at all, however, I suggest you would want to ask a number of questions, including

* benefit design and level of vested benefits
* possible investment approaches and likely pattern of returns
* possible funding management approaches and control of surplus/deficits
* distribution of contributions required to achieve different shapes
* volatility of benefit growth and benefit outgo

If we can integrate the answers to these questions with the Trustee and company objectives and constraints to reach a combination suitable to both, we can (in theory) build a distribution model together with an associated contribution model to show the overall effect of the many interacting factors. Of course, we cannot do this accurately - but can we do it effectively ? I hope to show it is possible.

5. RANGING

This method, which I will call ranging for obvious reasons, is a simple but powerful variant of accrued benefit funding. It involves a five step process as follows :

1. Set a reasonable working contribution rate (using a projection method perhaps) - the precise level is not critical, as it can only be a broad estimate.

2. Set an easily measured and relatively stable funding target, eg 90% of (undiscounted) accrued retirement benefits.

3. Set a series of funding ranges on each side of the target, each with a simple asset management rule.

4. Calculate the asset and liability levels at least annually, and adjust contributions based on the funding range into which the asset level falls.

5. Review the entire process at least every three years, together with the client.

These steps are not trivial and raise a number of questions that need to be answered. First, however, an example may clarify the concept.

5.1 Illustrative ranges

The ranges below illustrate the ranging concept. Essentially, they prescribe rules for varying the contribution level depending on the asset index. This is assumed to take place annually.

Assets as % accrued benefits	Action
Under 75%	Make up shortfall to 75% within 12 months
75% to 82.5%	Lift contribution by 1/3 shortfall to 82.5%
82.5% to 90%	Lift contribution by 1/7 shortfall to 90%
90%	Target level
90% to 100%	No action
100% to 120%	Drop contribution by 1/5 excess over 100%
Over 120%	Full excess over 120% available immediately

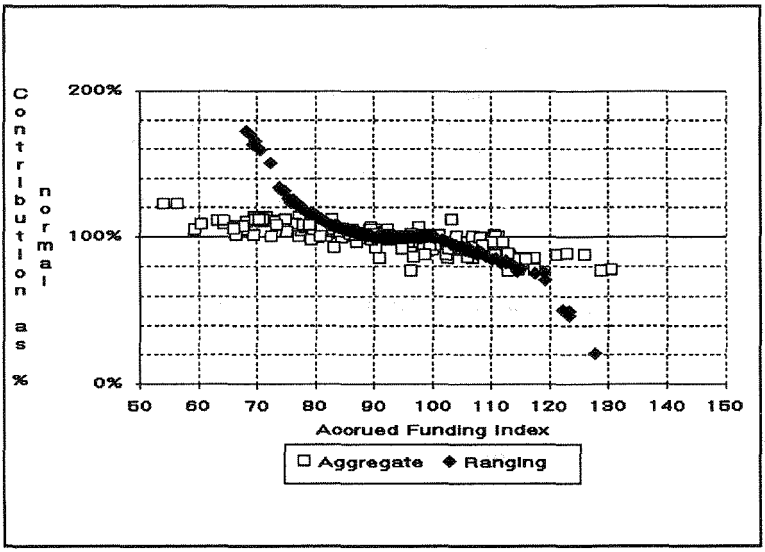
Specimen asset level	Action
95%	No action - maintain long term contribution rate
83%	Increase normal contribution by 1/7 of shortfall to 90%, ie 1% of assets
70%	Increase by full shortfall to 75% (ie 5%), plus 1/3 of shortfall in next band from 75% to 82.5% (ie 2.5%), and 1/7 of range 82.5% to 90%, or 8.57% of assets in total
115%	1/5 of excess over 100% is available, ie 3% of assets
140%	Total excess over 120%, plus 1/5 of difference between 100% and 120%, is available, ie 24%

5.2 Effect on contribution rates

The ranges above may appear a little disjointed - how do they affect contribution rates in practice ? The graph below shows the simulated effect on contribution rate of the above scales, and of aggregate funding, assuming that the normal contributions are 1/7 of total asset value.

Please note that the contribution rate shown is for the year *following* the measurement of the funding index, ie a funding index of 80 and contribution level of 120% means that if in any year the funding index is 80%,the contribution rate for the following year will be 120% of normal levels.

Note also that the aggregate funding distribution is more ragged than ranging, because the contribution level is only adjusted every three years, ie it will react to the current funding level only one in every three cases.



What I call the "activity level" picture shows that basic aggregate funding has a relatively flat (passive contribution) line, while ranging has a flat centre, becoming more active at the extremes. I find this picture very useful in demonstrating the balance between contribution and funding stability.

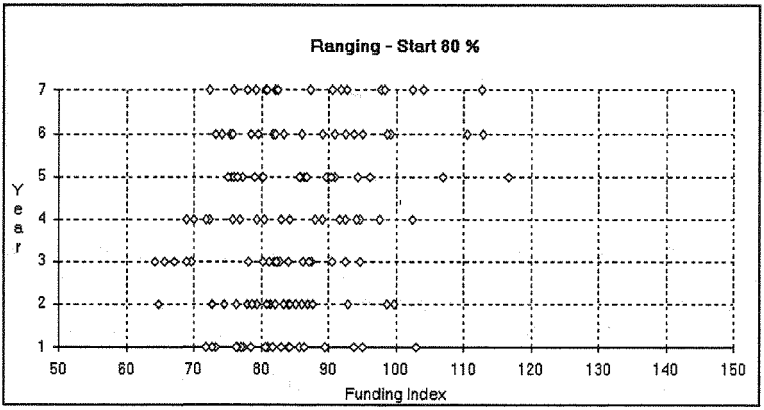
It is also valuable in easily demonstrating other financial control measures, eg moving the index target to the right creates an asset reserve and would lessen the risk of contribution blowout, while raising the contribution floor also creates a reserve (of a different shape). If the employer sets contribution limits, and the Trustee sets funding limits, we can represent these as a target box on our picture within which we have to try to stay, and develop an overall approach (allowing for the investment approach) that we hope will achieve this.

It would be useful to show investment volatility, at the risk of overcrowding the picture, and I have done this simply by drawing tickmarks on the horizontal 100% contribution line, to show the maximum expected variation (to an approximate probability level) in one year. This gives some idea of the effect of the underlying investment approach.

5.3 Effect on financial position

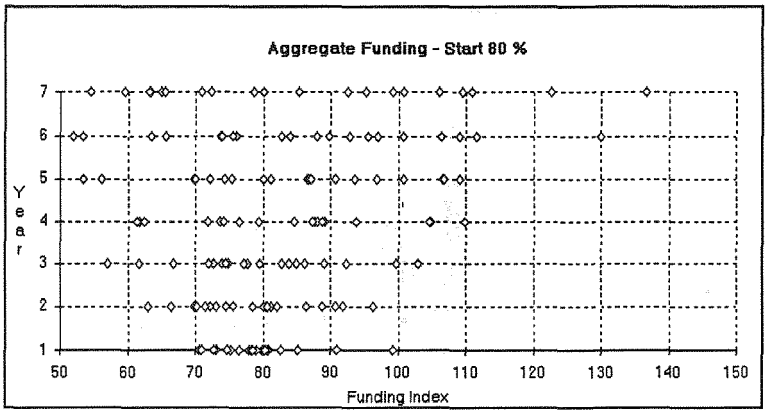
Having said that the picture above is setting contributions for the next year, how well does the approach work ? Suppose we start with a funding index of 80 in our example, and apply the ranges and our investment model for a few years. If there was no management, we would expect the results to gradually fan out, uniformly on each side of 80. Active management should "herd" the results toward the middle and away from the left.

The scattergrams below show the results of 20 simulations, year by year for 7 years (the first year is at the bottom of the graph, the seventh at the top). Each point represents a single result.



Knowing that ranging was pretty severe at the extremes, I expected a well behaved migration to the centre. However, there are some diehard rebels remaining on the left.

I was only partly comforted to see that aggregate funding (below) did much worse, as its passive contribution approach would suggest.



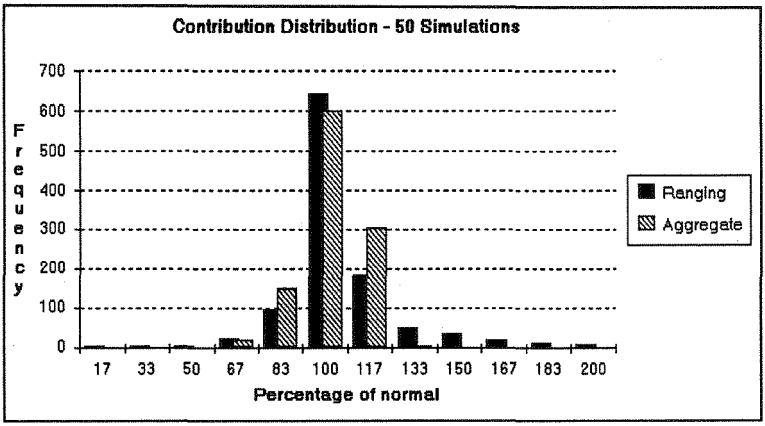
I think that my investment distribution (Appendix I) may be partly at fault, in being more volatile than even the real world. Further, my model assumes the actuarial approach has no safety margins for conservatism, whereas many (if not most) actuaries do value conservatively, the margins in their assumptions (leading in aggregate funding both to higher contributions and higher funding targets) providing a buffer that dampens volatility. Certainly, if I thought the above results were likely, I would be exploring such reserving options and also whether the investment volatility could be reduced.

In any event, however realistic the actual results above are, I suggest such pictures are very useful in showing the dynamics of our systems at work.

5.4 Simulated long term results

You have already seen a funding distribution graph comparing ranging (using the ranges above), aggregate funding and an unmanaged fund. This is based on 50 simulations, each of 20 years, and a diversified investment mix. Details of the simulation basis and investment patterns are given in Appendix I. Note that this simulation allows for investment volatility around a known mean, which understates the real world position.

The corresponding graph showing the contribution pattern is given below.



The ranging results show wider dispersion than those for aggregate funding. This is to be expected, given their different management styles. However, if it is felt that ranging is too scattered, ie contribution stability has been unnecessarily traded for funding stability, two key points must be made :

(1) there are times - far more frequently for aggregate funding - where the funding index is very poor, and the actuary would have to step in and take decisive action. If these results were added to the picture, I believe they might show that in fact ranging's extremes might be comparable, or even less pronounced than those of aggregate funding, which can tend to leave things until they are very bad, requiring extreme action.

(2) ranging's parameters are far more flexible than those of aggregate funding, because they do not pretend to be estimates of any particular factor such as investment return. They can therefore be varied to a far greater degree, and, being designed specifically to affect the bottom line - the funding position - have a more direct effect on that position than, say, a change to the investment return assumption in aggregate funding. Therefore, a client can choose ranges to suit a wide variety of objectives, from extreme contribution stability to extreme funding stability - far beyond the range of conventional funding, in my experience.

5.5 Developing ranges in practice

How might the ranges above have been developed ?

Imagine a fund which offers a flat percentage of final average salary per year of membership. The leaving benefit, which applies up until age 55, starts with a return of member contributions with interest, which with added vesting, rises to around 80% of the accrued retirement benefit over a ten year period.

Currently, vested benefits average 70% of accrued (undiscounted) retirement benefits, and this percentage has been relatively stable.

The fund is invested with several similar diversified fund managers with a wide spread of assets.

The company

* acts as Trustee, and is anxious to manage the fund efficiently by minimising surplus, but is also concerned not to be seen as ignoring its duties as Trustee.
* wishes to declare steady interest rates on member contributions each year. (A reserve over minimum vested benefits of 5-10% is agreed as desirable to achieve this by cushioning asset volatility).
* is able to make additional contributions if required, but would like to stabilise costs and receive some warning if the situation begins to deteriorate. It would prefer gradually increasing contributions rather than a sudden request for a large injection of funds.

1 Initially, a *working contribution rate* is established, taking into account the investment approach as discussed earlier. This could be done by any one of many projection methods.

2 The next step is to set a *funding target*. Conventional methods might suggest a figure around 80-90% of undiscounted accrued retirement benefits, given an expected 1-1.5% real return - lower, if recent investment history repeats itself. However, there is a downside constraint of absolute (let us say to a "plausible" level) solvency. Given the volatile investment outlook, it is clear a safe margin will be needed, hence the choice of 90%.

3 The *downside ranges* can be set in a number of ways. The rationale for those above is to progressively lift the contribution rate as the funding index falls, cushioning the impact on cost and providing early warning that the position is weakening. The first range requires a gradual payback of 1/7, rising to 1/3 in the next range as the danger zone approaches. The final range requires immediate payback, because at this point, the fund is no longer covering its desired reserve margin over solvency levels (70% plus 5-10% reserve, ie 74-77%).

4 The *upside ranges* have been set wider mainly because there is no solvency constraint to cramp them, but also for reasons of conservatism.

5.6 Other options

The ranges above can be redesigned in a number of ways - there can be one or ten ranges; they can be based on different benchmarks (eg actuarial reserves); the action formula can be in any form desired - the key objective is to marry statistical credibility with Trustee and company objectives and constraints, to come up with a program that is as self-reliant as possible.

5.7 Look before you leap - the use of simulation

While I do not believe simulation can *predict* very accurately, I find it very useful in showing the *shape* of uncertainty, ie in quantifying possible risk, and also in benchtesting management methods.

Importantly, simulation may show that contribution volatility is inevitable in some cases, eg where aggressive investment management and high vesting requirements are combined. I would rather identify contribution volatility at the testing stage of benefit design, than have it rear up later in real life, when it is too late for the client to moderate the risk factors ! I suggest, too, that actuaries need to get out on the simulation skidpan every now and then - I doubt that many of us could reasonably quantify the effect of likely volatility to clients, if asked.

I would not suggest simulation of every client - for many smaller clients, the results of generalised work would probably be sufficient. The much higher volatility of small member groups would tend to swamp funding subtleties,

so that general robustness of the management approach would become the dominating factor.

5.8 Comparing ranging with conventional methods

To simulate basic *aggregate funding* is relatively simple and requires only one, symmetrical range - set the target asset level at the point where the deficit stops and surplus begins, and divide all deviations from that point by the value of 1% contributions factor. Ranging can be used in this form to adjust the aggregate funding contribution level between valuations without the need for full projections, and reset as part of the three yearly valuation, ie it can be used simply as an enhancement of aggregate funding. However, in my view, this would be a waste of the power of ranging.

As the predictive power of aggregate funding (ie the accuracy of the projection results) is eroded by increasingly volatile investment and business markets, I see its value as producing relatively stable contributions and identifying broad cost trends. When other methods can do this far more simply (eg ranging above), I question the point of setting "realistic" assumptions and carrying out complex projections of entire fund memberships, when the central assumption - investment return - is likely to create such variations. Worse, aggregate funding is designed as a projection system rather than as a funding management system, ie almost all the control variables are related to projection assumptions, so that it is not easy to vary the pace and style of funding, as demonstrated for ranging above.

Obviously, as an accrued benefit variant, ranging has little difficulty fitting in with that approach. However, I believe it goes much further in offering a way round the basic problem that pure accrued benefit funding produces volatile contribution rates. By graduating the accrued benefit management to suit the financial position, the need to smooth asset values and perhaps do short range projections to achieve some contribution stability can be avoided. Further, accrued benefit funding (as I have seen it) makes no allowance for investment style or volatility - surely a key ingredient for a short range funding approach.

5.9 Ranging and Credibility

Ranging's qualitative, statistically oriented "credibility" approach to surplus has, I believe, an important advantage. Rather than stating that everything over the target asset level is surplus, and allowing it to be used up immediately (eg by improving benefits), ranging graduates surplus distribution in relation to its credibility, slowing down as the centre is approached.

6.0 Does ranging meet its objectives ?

6.1 Understanding of and control by the client

Trustees and companies can become deeply involved in setting the ranges, as they depend on factors such as the attitude to surplus distribution, and the ability of the company to make additional payments. The concepts are simple for financially literate people.

The approach forces consideration by the employer and Trustees of how the bad and good times will be managed, and can allow for a variety of objectives and constraints. I suspect that many clients have little idea of just how variable their contribution rates really might be, because there has been no way of demonstrating this simply.

I submit that these points are crucial to intelligent risk management by Trustees - how can they possibly manage effectively if they have never considered the probability of unbalanced funding conditions, or how they will react to them ? Equally, how can a company sensibly commit itself to significant defined benefit promises without a clear idea of its likely cost levels in different financial situations ?

Where, on the other hand, the Trustees leave it entirely to the actuary, I believe it is possible to simply apply general principles derived from similar clients to put forward a suitable program; to explain the basic concepts; and, importantly, what will happen in different financial circumstances. I do not therefore think ranging is beyond the smaller client - in fact, if it and aggregate funding were both invented today, I imagine the latter would be regarded as far more onerous !

6.2 Actuarial objectives

Ranging focuses on several of the funding criteria listed earlier - security (of accrued benefits); stability (of contributions); durability (of approach); excess funding (control of) - without placing specific emphasis on each. That emphasis is for the client to decide - not the actuary.

I therefore submit that ranging allows clients to make their *own, well-informed decisions* on funding. Not only can they explicitly build in their own objectives and requirements, but they can see the result translated to funding and contribution patterns before committing themselves.

Reiterating, I believe that the main challenge in funding management lies not in simply stabilising contributions, which can easily be done at the expense of funding stability, but rather avoiding funding extremes while remaining within the practical constraints of perpetual solvency, company cost limits, etc., as laid down not by us, but by our clients.

Funding methods can then be viewed as quantitative techniques which supplement our judgement and enhance understanding of the process we are managing. This has close parallels with the increasing use of quantitative techniques by investment managers. In a sense, they are expert systems, and the more expert they can be without becoming incomprehensible, the more effective they will be. I am not however suggesting we should follow the results blindly, whatever method we use !

7. ASSET MANAGEMENT

7.1 Valuing assets

You will question how this approach tackles the difficult question of asset valuation. The use of raw market values leads to very erratic asset values, but too much smoothing can be very subjective.

There seems to be no single answer, so it is important that ranging can cater for a variety of approaches. The ranges themselves should be tailored to the residual volatility following the actuary's valuation of assets. Widening the ranges absorbs volatility, allowing the greater use of market value, while on the other hand, heavy smoothing of asset values would reduce volatility, allowing narrower ranges to be used. However, the further the asset value is from market value, the less the effectiveness of ranging as a solvency tool.

However, as there may be other reasons for differential treatment of assets for short term solvency and longer term funding (eg where the assets include employer shares which might be written down for solvency purposes but not for long term funding) it may be more practical to have a second set of solvency ranges based on a conservative market value of assets. The Trustee could then apply both sets of ranges - ie one for solvency and one for the medium/long term - and act on the most conservative answer.

The approach can thus adjust itself very flexibly to a number of asset valuation methods, with a backup solvency test if necessary.

*I therefore believe ranging offers an enhancement on conventional methods, by **complementing** the asset valuation approach.*

8. THE ACTUARY AND THE INVESTMENT APPROACH

While it would seem essential to integrate investment and financial management, in reality, they are often virtually divorced. For example, I would expect most actuaries would agree that capital secure and growth oriented investments should produce significantly different average returns over time, eg 2-5% per annum. However, it is common for actuaries to use the same real return in all their valuations, irrespective of the investment approach. I have also yet to see a valuation that explicitly measures the effect of likely volatility in returns, outside of Ian Laughlin's [2] simulation proposals.

Equally, the investment approach is often selected with little consideration of the risk tolerance of the fund. I have often heard it said that defined benefit funds can carry more investment risk than defined contribution funds because they can take a longer view, but this is certainly not universal and will vary between funds. How do we test investment risk tolerance ?

I suggest that ideally, the funding and investment approaches should be arrived at together, rather than separately. This might be done by first establishing the objectives of the company and Trustees - funding standards, cost constraints, investment limits and goals, etc - and designing an integrated approach to achieve these objectives. I have gone some way to exploring this, as outlined below.

9. BUILDING THE INVESTMENT APPROACH

Generally, increased investment growth is associated with greater volatility, which creates funding risk. This volatility can be reduced through

* reserves (which absorb falls in asset value)
* financial support from the company (within given limits)
* time (the longer the period of measurement, the lower the scatter)

These options are emphasised in discussion of the company and Trustee objectives set out below. It may not be possible to meet all these objectives, but they form a framework within which available investment options can be analysed.

9.1 Short Term Objectives

9.1.1 Solvency : The assets should at all times cover vested benefits (or with probability X). This is not only important for the Trustee, but the company may wish to avoid the possibility of having its company accounts qualified.

9.1.2 Returns : Where the leaving benefits are accumulation-based, the Trustee and/or company may wish to secure a certain level of return with reasonable certainty on part or all the assets. Given a suitable margin between the vested benefits and actual asset level, this may not constrain the overall investment approach.

9.2 Cost constraints

What cost level can the company afford ? If a deficiency develops, how quickly and how deeply can the company dig ? The Trustee's confidence in the financial support of the employer sponsor is important in deciding the level of affordable risk in the short and long term. For example, strong employer support may act as a shadow reserve, reducing the need for actual reserves.

9.3 Reserve levels

How high a reserve cushion will the Trustee and company support ? The higher the reserve, the greater the risk that can be afforded. This is particularly valuable in allowing the use of long term strategies that risk short term volatility.

9.4 Benefit profile

What is the likely distribution of benefit payments in future years ? What is the likelihood of large, unexpected payments (eg mass retrenchments or chief executive retirements) ?

9.5 Asset profile

What is the current asset level relative to liabilities, and what special features do the assets have (eg shares held in the company sponsor) ? What are the objectives and preferences of the Trustee ?

9.6 Funding Management

What is the funding approach to be used ? Specifically, how will it react in strong and weak funding situations ?

9.7 Investment Analysis

Given a suitable investment model - something of a holy grail - various alternative models can be developed through simulation.

Such an investment model needs to reasonably simulate the future variability of different investment options over varying time periods, and, if possible, give some indication of the associated performance differential. This is no mean task, as the stockmarket has been shown (in unpublished work by John Evans) to produce skewed, serially dependent results that are not normally distributed. The interaction between different classes of investment is also complex.

One can of course use the past, as some have done, but will it replicate ? What time-period should we use, and has the investment environment been similar enough to the present, over that period ? Should the effect of major events such as the 1987 crash be moderated or accentuated ?

I cannot answer these questions nor provide a suitable model, but I believe we need as a profession to try to do so, given that investment uncertainty impacts on most of the work actuaries do.

If there were such a model, we could test the volatility limits of particular funds, allowing for the factors above. For example, the investment target might require growth assets in excess of 60% of the total. However, the short term solvency targets might then demand a high reserve (or shadow reserve - ie employer cost commitment) level, and active solvency management (ie frequent checks and decisive action).

I believe such work helps us as risk management professionals to truly understand the complex interaction between different risk factors, particularly that of investment volatility, which I believe we may have trivialised in the past even though it is the major contributor to surplus and deficit. The results are not predictive of result, but of shape. They will not tell us when or how big the financial storms will be, but should broadly predict the overall seaworthiness of a fund, integrating the effect of benefit design, investment approach, employer support and funding management.

10. FUNDING MANAGEMENT, CHAOS AND DYNAMIC SYSTEMS

Chaos theory is proving to underlie many real-life dynamic systems. Whether or not superannuation funding or any of its components, eg investment growth contain chaotic elements, there are interesting lessons to be learned from chaos research.

Ian Stewart, writer of a book[3] on the mathematics of chaos theory -

"*When the dynamics of a system goes chaotic, there's a trade-off between the precision to which we know its current state, and the period of time over which we can say what - in detail - it will do. And the precision of events has to be almost impossibly good to make even medium-term predictions.*

On the other hand, we can still make very accurate predictions - not of the exact long-term behaviour, but of its general qualitative nature. We can impose quantitative limits on it; and we can determine its statistical features."

This is where I believe intelligent computer modelling can help us both understand and manage the complex funding process, just as it has been invaluable in deriving the shape of many other dynamic systems. For example, fractal mapping techniques are being applied to EEG brainscans to develop measures - visual or numerical - of good health, to supplement natural health predictors such as blood pressure. These techniques - and those of adaptive control - may well be of great value in analysing some dynamic actuarial processes too.

I would like to leave the last word to the old master, Frank Redington [4] :

"*When I first saw that graph of F*, I had had twenty years of experience of valuation problems. But that was merely knowledge: this graph was different: this was understanding. I still feel the same: that my understanding came with that graph and has not greatly advanced in the thirty years since then.*"

* The plus-minus-plus life office flow of funds curve

11. MANAGING VOLATILITY AT THE BENEFIT DESIGN STAGE

11.1 Mapping the cost shape

At the benefit design stage, actuarial costs are usually estimated using long term forward projections, which are collapsed into present value figures.

The irony is that the final cost figure is probably the *least* important of all. An experienced actuary can set it in his head, knowing that the inherent volatility of costs and the choice of actuarial approaches make a wide range of results acceptable.

If the projection results were used to identify cost flows, shape or patterns, they might be of greater use. The richness of the information in a simple new entrant projection is quite surprising.

We can, for example, use the year by year figures in the projection to create cost pictures which have the advantages of being :

1. *Highly explicit (see below)*
2. *Pictorial (a picture IS worth a thousand words)*
3. *Time-sensitive*
4. *Capable of showing the effect of investment volatility & estimation errors*
5. *Relatively independent of actuarial approach*

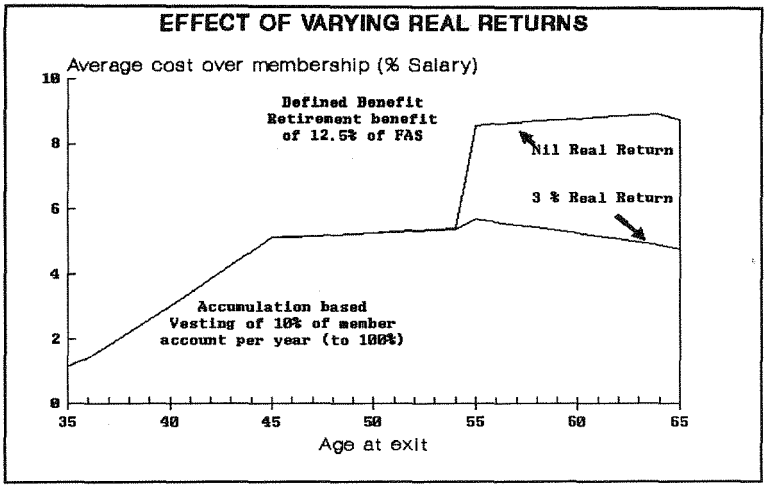
11.2 Cost Pictures

Suppose we calculate for a given new entrant, the total cost to the company should he/she leave after 1 year, 2 years, 3 years.... up to normal retirement, calculated as an *average percentage of salary over the whole of each period of membership.*

We thus ignore decrements altogether at this point. The cost we arrive at for each year is the "what-if" cost of meeting the member's benefit in that year, plus his/her full accumulated share of fund expenses (admin & insurance costs) over past membership.The total is averaged over that membership. (Appendix II illustrates the cost calculation.)

This requires assumptions as to investment and salary growth, and the insurance cost of mortality and morbidity, but *no membership movement decrements*, leaving the results highly explicit.

They could then be graphed as shown below (note that two investment assumptions are shown to illustrate the effect of investment variability).



Apart from being highly *explicit*, the cost picture is also relatively unassociated with any actuarial approach, since at this stage it does not ask *how* the overall cost should be estimated nor funded.

Further, it can readily be seen where the main costs arise, and which member decrements are likely to have most effect on costs.

In fact, the graph illustrated shows how a generous accumulation leaving benefit puts a floor under retirement benefit costs in a way that clients should be able to follow.

11.3 Use of the cost picture

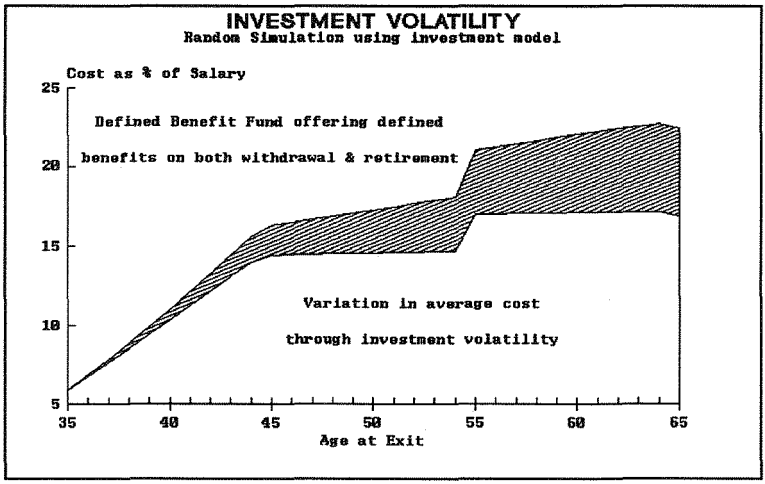
The basic picture can be used in several ways :

1. *To analyse a particular benefit structure as above*
2. *To examine vesting progression and the marriage of withdrawal and retirement benefits*
3. *To compare alternative benefit structures pictorially, eg when discussing vesting improvements*

4. To show investment volatility

The last of these is less obvious, but important. Even if we could pin down the long term real return, year to year volatility will create significant cost differences over time, depending on the investment approach and world markets.

The picture can show it through a simple model of randomised investment returns. Appendix III describes how this might be done, through running a number of projections based on randomly selected annual returns to arrive at a range of possible costs at each duration, as illustrated below.

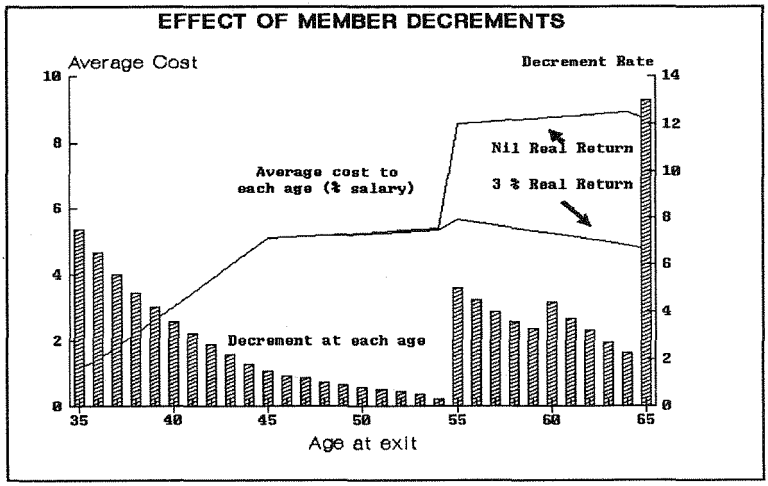


Note the objective is not to predict cost, but to show its overall shape and volatility. Trends and patterns are more important than decimal places. The use of different investment models to demonstrate the effect of alternative investment approaches is also conceivable.

11.4 Membership decrements

The cost pictures give a strong hint of the major source of cost, and the most significant decrements. For example, a very flat cost curve will be relatively insensitive to decrement levels, whereas a sharply rising cost curve will be sensitive to the timing of decrements.

To assist in this, the exit pattern can be superimposed on the cost graph, as shown below. This gives the client a visual idea of the source of cost, and a better feel for the meaning of the overall figure. The reason for insensitivity to retirement rates, for example, could simply be a very flat cost over the retirement age range.



12. SUMMARY AND CONCLUSIONS

The aim of this paper has been to explore ways of identifying, measuring, communicating and controlling the different risks involved in superannuation funding, and to put forward concrete suggestions.

As always, there are sure to be several ways of achieving these objectives, and, as stated initially, the ideas above are intended as a demonstration of what can be achieved, rather than as the "ultimate" method. I have tried to walk the fine line between undue enthusiasm for new ideas, and unfair criticism of existing methods.

I hope to have shown at least that practical funding management can build in a number of real-life factors, including investment volatility and a variety of company/Trustee objectives; be part of an integrated development of investment approach; and above all, communicate clearly to, and genuinely involve, the true owners of the funding risks - the company and Trustees.

This paper is really for them.

REFERENCES

(1) SM Bone, "Funding for superannuation plans under volatile financial conditions", T.I.A.A.,1989, p4

(2) I Laughlin, "Use of simulations in the actuarial management of superannuation funds", T.I.A.A., 1987

(3) I Stewart, "Does God play dice ? The mathematics of chaos", 1989, p286

(4) F Redington, "Prescience & Nescience", The collected papers, Essays and Speeches of Frank Redington, p518

APPENDIX I
SIMULATION OF FUNDING MANAGEMENT

This is a simple simulation designed to show the "shape" given to funding by different methods. The investment distribution was intended to illustrate the returns expected from a well-diversified market-linked manager, adjusted to give a real return in the range normally used by actuaries. However, I do not claim it is anything more than illustrative.

As stated in the text, this simulation merely tests volatility around a fixed mean, exactly as predicted by the actuary. The results would be wobblier still if the fixed mean were replaced by real world uncertainty.

Assets and cashflow

The starting position is 1,000, with mid-year contributions of 150 and benefits uniformly distributed between 115 and 185 (ie average membership is stable but benefits are a little wobbly). The starting position is taken to be the target asset level, of 90% undiscounted accrued benefits. Both aggregate funding and ranging are centred on this target.

Investment performance

This is assumed distributed as follows :

Return range % p.a.	Cum.Frequency
(15)-(10)	1
(10)-(5)	5
(5)- 0	15
0 - 5	31
5 - 10	51
10 - 15	71
15 - 20	83
20 - 25	90
25 - 30	94
30 - 35	98
35 - 40	100

Random numbers are applied to the table (interpolating linearly) to derive annual returns. This gives an average return of about 10.5%, which I reduced across the board by 1% to give a more common actuarial assumption of 9.5%.

Liability growth

This is assumed at 9.5% also, reflecting a steady state position. This means that if investment growth equalled actuarial expectations, and benefits were stable, the contributions and asset growth would match benefit payments and liability growth. As stated above, therefore, the model is testing only for volatility around a known mean - not for variability in the mean itself.

Funding management - unmanaged

The contribution rate is fixed at 150 per year. This is shown as a control (or passive benchmark) to illustrate the value of actuarial management.

Funding management - aggregate funding

The contribution rate starts at 150, and is recalculated every three years as

normal rate - (asset level - target benefits) / value of 1% contributions

where assets reflect cumulative investment growth and target benefits reflect cumulative cashflow (ie the starting assets plus net cashflow thereafter). The value of 1% contributions is taken as 11, as a reasonable choice.

Funding management - ranging

The ranges shown in the paper are applied annually, with a minimum of nil contribution and a maximum of 3 times normal contribution.

Scaling of frequency graphs

The Y axis shows numerical incidence of the range given by the X axis. As an example, where the X axis is scaled 0,50,100,150,.., a reading of 25 for the 50 bar means there were 25 results in the range centred on 50, ie 37.5-62.5.

APPENDIX II
BUILDING THE COST PICTURE

Suppose we have the following cost elements, derived from a new entrant projection with no decrements at all.

The cost of deaths/disablements is provided for through insurance premiums, as is the case with most funds in real life. (Calculations I have done suggest that there is no significant difference between doing this and using decrements - significance being measured relative to factors such the effect of investment variation).

The figures below are expressed in real, ie current year, dollars.

Age	*Expenses in year (1)*	*Benefit Payable (2)*	*Value 1% Contrib. (3)*
35	*100*	*1000*	*200*
36	*110*	*2500*	*200*
37	*120*	*5000*	*200*

(1) Insurances & admin costs
(2) Benefit payable halfway through year
(3) Value of 1% contribution for current year of age

Thus, the average cost to the company of a member leaving during the year of age 37, expressed as an average cost over the entire membership, would be :

(benefit + accumulated costs) / (accumulated contributions)

= (5000+100+110+120/2) / (200+200+200/2) = 10.54 %

APPENDIX III
ADJUSTING THE COST PICTURE FOR INVESTMENT VOLATILITY

Suppose we run a large number of new entrant projections, using randomised annual investment returns (or randomised real returns taking salary volatility into account as well).

We can use these to calculate the standard deviation of the asset buildup (value of 1% of contributions) at each age, and thereby to get some idea of the possible effect on costs of investment volatility, as follows. (It is assumed for this example that all benefits are defined, ie none are affected by investment volatility).

The figures below are expressed in real, ie current year, dollars.

	-- Value of 1% Contributions --			*Total*
Age	*Average (1)*	*Cumulative (2)*	*Deviation (3)*	*Costs (4)*
35	*200*	*100*	*5*	*1100*
36	*200*	*300*	*20*	*2700*
37	*200*	*500*	*40*	*5500*

(1) Average value over all simulations
(2) Cumulative average to mid-year
(3) Standard deviation of cumulative value
(4) Total of benefit payable mid-year and cumulative costs

The alternate costs to be graphed for age 37 are therefore

$$\frac{5500}{(500+40)} \quad \text{and} \quad \frac{5500}{(500-40)}$$

ie 10.2 % and 12.0 %

PORTFOLIO CONTROL : RISK AND PERFORMANCE

Presented by David A. Begg, BSc., FFA, FIAA

"Would you tell me please, which way I ought to go from here?"
"That depends a good deal on where you want to get to," said the Cat.
"I don't much care where - " said Alice.
"Then it doesn't matter which way you go," said the Cat.
*" - so long as I get **somewhere**," Alice added as an explanation.*
"Oh, you're sure to do that," said the Cat, "if you only walk long enough."

(Lewis Carroll, Alice in Wonderland)

INTRODUCTION

This paper considers the nature of the control processes necessary for the successful active management of an investment portfolio against a target passive performance benchmark.

The shortcomings of the traditional efficient frontier analysis in a benchmark environment are identified and the concept of the "Swing" Portfolio is introduced as a means of quantifying the expected return differential and the risks inherent in actively varying the portfolio asset mix away from the benchmark mix.

The particular requirements of both short and medium term Tactical asset allocation analyses are discussed and a methodology for assessing the potential impact of competitive factors is also developed.

The difficulties of comparative performance measurement are addressed and a new basis is suggested for assessing the value added by active investment management.

1. THE IMPORTANCE OF INVESTMENT OBJECTIVES

1.1 If he is to be in a position to perform his role in a meaningful and accountable manner it is essential that an investment manager has a clear set of agreed investment objectives.

1.2 These objectives may be expressed more formally in some instances than in others and may reflect a greater or lesser focus on a whole range of potential influences and outcomes. Nevertheless, they should exist and should be agreed in advance with the client. Can the manager's performance really be assessed without some specified measure of what he is expected to achieve ?

1.3 Generally, the process of setting a fund's investment objectives will focus upon questions of risk and will have regard to such factors as the nature and pattern of the liabilities which the fund supports and the degree of security which is deemed to be appropriate. The trade-off between additional return and acceptable risk will be a central element of this process, whatever definition(s) of "risk" might be adopted in a particular case. Superannuation funds, life insurance funds, general insurance funds, etc. all conform to this general pattern - formally expressed or not.

1.4 It is not the purpose of this paper to examine how these investment objectives should be determined. It will be sufficient for the current purposes to postulate that, for any set of investment objectives, out of a range of possible "static" portfolios there exists one portfolio which will best meet those objectives over the period to the time horizon, given the expected future experience of all relevant factors. This portfolio is taken to be the "benchmark portfolio" against which the performance of the investment manager will be measured.

1.5 In this context, a "static" portfolio is defined as a portfolio which is rebalanced regularly so as to restore the proportions invested in each asset class to the selected asset mix - note that this will shift assets away from the best performing asset classes to those that have underperformed over the period.

1.6 Is the concept of a benchmark portfolio a reasonable one ? It has been argued, for example, that the vagaries of investment markets are such that the future levels of investment returns on the various asset classes cannot be predicted with any certainty and that, consequently, the benchmark portfolio concept is fatally flawed.

1.7 It must be acknowledged that, in the main, the investment manager has no control over the level of returns he will achieve on each asset class - this will be determined by general market conditions. Past experience has shown, however, that, in the absence of extreme market movements such as occurred in October, 1987, it is possible to make a reasonable assessment of the relative riskiness - as measured by the volatility of return - of different portfolio asset mixes.

1.8 Given the overall importance of risk definition and control, it is this prospect of making a reasonable assessment of the benchmark portfolio's relative risk profile that justifies the investment manager's use of the benchmark concept, despite the uncertainty surrounding the absolute levels of future investment returns.

1.9 To illustrate the above points, Table 1 contains details of three different benchmark portfolios which have been selected as being reasonably representative of what might be termed "low", "medium" and "high" risk portfolios.

Table 1.

	Percentage in each Asset Class		
	Low	Medium	High
Australian Shares	25	40	50
Australian Bonds	25	15	5
Australian Cash	10	5	0
Australian Direct Property	25	15	10
International Shares	15	25	35

1.10 Figure 1 shows the annualised returns which would have been achieved on these three portfolios over rolling three-year periods from December, 1979 to December, 1989 based on the assumption that the asset class returns earned in each quarterly period matched those of published indices (eg. Australian All Ordinaries Accumulation Index for Australian shares).

1.11 Figure 2 shows the annualised volatility of quarterly returns for the three portfolios over the same rolling three-year periods. The stability of the relative riskiness of the three portfolios over the period is apparent.

1.12 Figure 3 shows a scatter diagram in conventional risk/return format for the rolling three-year periods up to September, 1987. The diagram clearly illustrates the quite distinct experience of the three portfolios over those periods. Post-1987 results show a similar marked delineation between the results for the three portfolios but have been excluded solely to avoid producing an unnecessarily complex picture. Overall results for the total period from December, 1979 to September, 1987 have also been indicated for each portfolio and show that a modest increase in portfolio return was achievable at each level of increased risk.

1.13 The establishment of a clearly defined benchmark portfolio imposes its own discipline upon the actions of the investment manager. In doing so, it ensures that the manager is alert to the dangers of allowing the asset allocations in his portfolio to drift in response to market sentiment. Without it, portfolio drift could well reach a point where the portfolio's degree of risk exceeds the client's level of tolerance without that level ever having been established. In that event, if things go well the investment manager may be applauded, but .....

1.14 It has been assumed in the following sections that a satisfactory benchmark portfolio has been established in discussions between the investment manager and his client.

Figure 1

PORTFOLIO RETURNS

For rolling 36 months periods ending on date shown

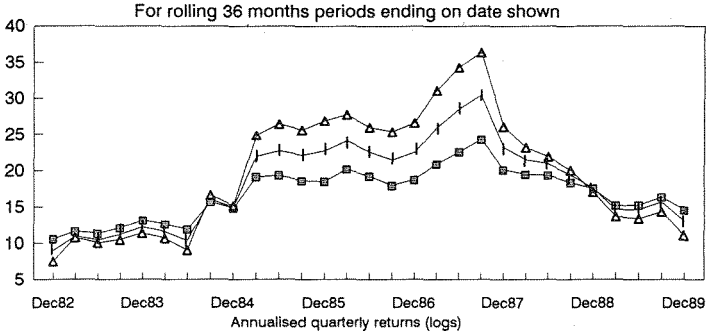


Figure 2

PORTFOLIO VOLATILITY

For rolling 36 months periods ending on date shown

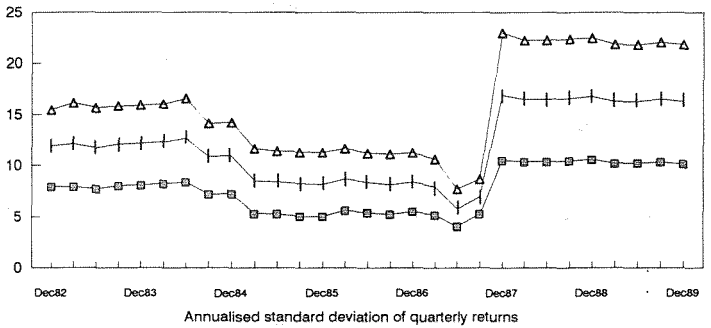
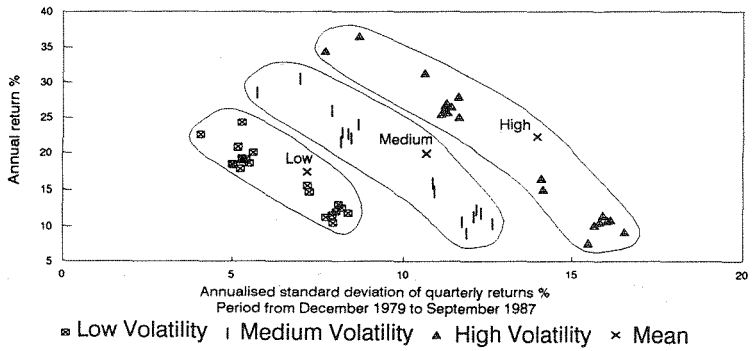


Figure 3

PORTFOLIO PERFORMANCE

RETURN AND VOLATILITY



2. PERFORMANCE OBJECTIVE

2.1 Once established, the benchmark portfolio becomes the fund manager's overall **strategic performance objective.**

2.2 Within the various investment sectors, each **sector manager** will have an objective to outperform a selected sector target.

For example :-

Table 2. Sector performance targets.

Investment Sector	Benchmark Mix %	Sector Performance Target
Australian Shares	40	All Ordinaries Accumulation Index
Australian Bonds	15	CBBI Index (all series, all mats.)
Australian Cash	5	DBSM Bank Bill Index
Australian Direct Property	15	AMP Property Unit *
International Shares	25	MSCI ($A) World Accumulation Index
International Bonds	0	Salomon World Bond Index ($A)

* this might be replaced by the BOMA property index, once that index has been established.

2.3 The **fund manager's** success as an active manager will be measured by the performance of the total fund relative to a static portfolio (rebalanced periodically) which is invested in accordance with the benchmark asset mix.

2.4 Outperformance, therefore, may arise through :-

* **outperformance** within the investment sectors - ie. by outperforming the individual sector target(s) ; and/or

* **adding value** through asset allocation - ie. by being overweight (within the permitted tolerances) in the better-performing sector(s).

2.5 The selection of the benchmark portfolio will be a major influence on the level of a portfolio's performance[1] but this paper concentrates on that portion of the return (perhaps 10%-30% of the total) which the manager might expect to be generated by his active management of the portfolio.

2.6 **The strategic performance objective sets the minimum level of acceptable performance for the fund manager.**

3. ACTIVE ASSET ALLOCATION

3.1 Provided the performance in each investment sector is up to target, a fund manager can attain his strategic performance objective by adopting a completely passive approach towards asset allocation, rebalancing his portfolio from time to time in line with the benchmark assumptions - ie. by maintaining a static portfolio.

3.2 **Deviations in asset allocation away from the benchmark mix must be justified by an expectation of earning additional return.**

3.3 At any time, a portfolio's asset allocation may be considered in two parts, as in Table 3 :-

Table 3. Current mix vs benchmark portfolio.

Investment Sector	Current Mix %	Benchmark Mix %	Difference Mix %
Australian Shares	35	40	-5
Australian Bonds	10	15	-5
Australian Cash	12	5	7
Australian Direct Property	10	15	-5
International Shares	30	25	5
International Bonds	3	0	3
Total	100	100	0

3.4 **Any performance differential from asset allocation will arise from the differences in the individual sector allocations.**

4. THE ACTIVE OR SWING PORTFOLIO

4.1 Control of a portfolio's tactical asset allocation becomes the management of the differences between individual sector allocations. The Difference Mix shown in Table 3. above can be considered as a subsidiary portfolio having the following properties :-

* **the portfolio has zero aggregate value.**
* **individual sector holdings may be positive or negative.**
* **the combination of this portfolio and the benchmark portfolio at any time comprises the current holdings.**

4.2 This subsidiary portfolio is subsequently referred to as the **swing portfolio.**

4.3 Management of the tactical asset allocation process is simply the management of the swing portfolio.

4.4 Because of the additive nature of the swing portfolio and the benchmark portfolio, any out-performance (under-performance) in return from the total portfolio will be the return generated by the swing portfolio.

4.5 Focus on the swing portfolio emphasises the fundamental requirement that the manager should identify the expected relative performance of the individual asset classes and should then allocate the swing portfolio accordingly.

4.6 **In essence, in a benchmark environment active asset allocation for any portfolio is solely a question of the allocation of its swing portfolio.**

5. BROAD STRATEGY RANGES

5.1 The specification of broad strategy ranges for individual investment sectors is a common feature in setting a portfolio's investment objectives. How does the presence of such constraints on asset allocation affect the operations of the swing portfolio ?

5.2 Table 4 below, sets out a possible set of investment objectives for a medium risk superannuation portfolio :-

Table 4. Portfolio constraints.

Investment Sector	Benchmark Mix %	Minimum %	Maximum %	Current Mix %
Australian Shares	40	25	55	35
Australian Bonds	15	10	25	10
Australian Cash	5	2	20	12
Australian Direct Property	15	10	20	10
International Shares	25	10	35	30
International Bonds	0	0	15	3

5.3 The constraints on the total portfolio in Table 4 readily transform into specifications for the swing portfolio, as shown in Table 5 :-

Table 5. Constraints on the swing portfolio.

Investment Sector	Benchmark Mix %	Minimum %	Maximum %	Current Mix %
Australian Shares	0	-15	15	-5
Australian Bonds	0	- 5	10	-5
Australian Cash	0	- 3	15	7
Australian Direct Property	0	- 5	5	-5
International Shares	0	-15	10	5
International Bonds	0	0	15	3

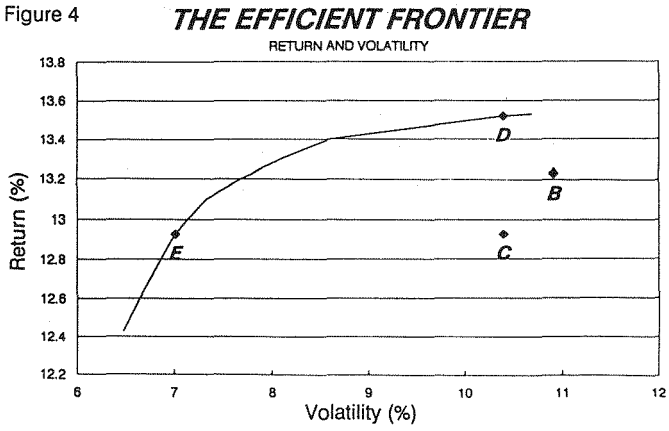
5.4 Thus, it is apparent that the presence of broad strategy ranges for the portfolio's asset allocation is simply reflected in corresponding constraints on the allocation of the swing portfolio.

6. QUESTIONS OF RISK

6.1 Any deviation from the benchmark mix gives rise to risk - in this case the risk of under-performance against the benchmark portfolio. How can that risk be assessed and controlled ?

6.2 First, consider the total portfolio position. The most common method of risk assessment adopted is that which examines the portfolio's expected risk and return parameters relative to the "efficient frontier", ie. relative to the set of possible portfolios which, given the investment manager's best estimates of the future returns and volatilities for each asset class, will maximise the expected return at each level of risk - with risk, for this purpose, being defined as the expected standard deviation of the portfolio's return.

Figure 4



6.3 Figure 4 shows the position of the current portfolio (C) and the benchmark portfolio (B) relative to the efficient frontier derived from the investment manager's current assumptions as to expected return, volatility and correlations for the permitted asset classes.

6.4 It is important to recognise that the benchmark portfolio may not always be optimal when considered against the investment manager's current tactical expectations. This is not surprising, given that the benchmark portfolio will have been established on the basis of a different set of assumptions, and it should not be a cause for concern, given the longer-term horizon for the benchmark portfolio. Attention now should focus on the relationship between the current portfolio C and the benchmark portfolio B.

6.5 Consider the position of the current portfolio C shown in Figure 4. In risk/return terms this portfolio has both a lower expected return and a lower level of risk than the benchmark portfolio B. It would be possible to achieve a higher expected return than that on portfolio C, without any increase in risk, by moving to the portfolio D - which lies on the efficient frontier and is clearly seen to be superior to the benchmark portfolio B. Portfolio D is the optimal portfolio at that level of risk.

6.6 Alternatively, it would be possible to reduce the level of risk below that of portfolio C, without diminishing the expected return, by moving to portfolio E - which also lies on the efficient frontier. Portfolio E is clearly seen to be superior to portfolio C.

6.7 The asset mixes of the efficient portfolios D and E are quite different from the benchmark portfolio B. These differences will give rise to a risk that they will under-perform the benchmark portfolio. Risk in this framework is quite different in concept from a measure of volatility of total return and it is possible that portfolios D and E may not be optimal when risk is assessed on this new basis.

6.8 **A portfolio on the efficient frontier may not be optimal when measured against a benchmark portfolio. A different measure of risk is required.**

7. TRACKING ERROR

7.1 When the performance of a portfolio is to be measured against the strategic performance objective derived from a passive benchmark portfolio, the question of the risk/return trade-off must be considered in a relative sense against the benchmark portfolio.

7.2 The expected return of the swing portfolio is the measure of the expected return differential between the current and the benchmark portfolios. A similar measure of the relative risk of the current and the benchmark portfolios is required.

7.3 When the possible distribution of future returns on the two portfolios about their respective expected mean values is considered, it will be apparent that the difference between the returns on the two portfolios from time to time will fluctuate - perhaps quite widely. A measure of the dispersion which may be expected in that return differential is known as the "**tracking error**" - technically, it is the standard deviation of the expected return differential.

7.4 Algebraically, the expected return on the benchmark portfolio B can be expressed as :-

$$Exp(R_b) = \sum {}_bw_i * r_i \quad ; \text{ where}$$

$${}_bw_i = \text{the weight of asset class } i \text{ in portfolio B ;}$$
$$r_i = \text{the expected return on asset class } i \text{ ; and}$$
$$\sum {}_bw_i = 1$$

and the return differential between the current portfolio C and the benchmark portfolio B is given by :-

$$Exp(R_c) - Exp(R_b) = \sum {}_cw_i * r_i - \sum {}_bw_i * r_i \quad ;$$

$$= \sum ({}_cw_i - {}_bw_i) * r_i \quad ; \text{ where}$$

$${}_cw_i = \text{the weight of asset class } i \text{ in portfolio C ; and}$$
$$\sum {}_cw_i = 1$$

but

$${}_sw_i = ({}_cw_i - {}_bw_i) = \text{the weight of asset class } i \text{ in the swing portfolio ;}$$

where $\sum {}_sw_i = 0$

and hence

$$Exp(R_c) - Exp(R_b) = \sum {}_sw_i * r_i = Exp(R_s)$$

ie. the expected return differential is equal to the return generated by a portfolio with asset weights equal to $({}_cw_i - {}_bw_i)$, ie. by the swing portfolio.

7.5 The standard deviation of the expected return differential - ie. the standard deviation of the expected return on the swing portfolio, is termed the expected tracking error of the current portfolio C relative to the benchmark portfolio B. The tracking variance, or the square of the tracking error, is given by :-

$$Var(R_s) = Var(\sum {}_sw_i * r_i) ;$$

$$= \sum_i \sum_j {}_sw_i * {}_sw_j * Cov_{ij} \quad ; \text{ where}$$

where Cov_{ij} = the covariance between the returns on asset classes i and j ; and
$Var(R_S)$ = the square of the expected tracking error.

7.6 As a measure of the volatility of the difference in expected returns, tracking error provides the required measure of relative risk of a portfolio against the benchmark portfolio. Being a function of the differences in portfolio weights and the covariances of the asset classes, that relative risk is influenced by the anticipated correlations between the asset returns.

7.7 Expressing tracking error numerically, if two portfolios have a tracking error of 1% and if their returns are normally distributed, then the actual return differential will be normally distributed and can be expected to lie within +/- 1% of the expected difference on approximately two-thirds of the occasions. Assessment of the relative risk of a portfolio thus becomes an assessment of the level of tracking error which is acceptable.

7.8 **By definition, the standard deviation of return on the swing portfolio is equal to the tracking error of the current portfolio. The swing portfolio thus provides simple measures of both the expected return and the risk of the current portfolio relative to the benchmark portfolio.**

7.9 It should also be noted that control of a portfolio's risk through its tracking error relative to the benchmark portfolio addresses both the sources of risk and their interactions. The composition of the swing portfolio from time to time is not, of itself, a good indicator of the size of the "bets" being taken on the asset allocation dimension - there are, for example, clearly very significant differences between the riskiness of a shift from cash to shares and an equal shift from Australian bonds to hedged overseas bonds. Similarly, the size of the permitted shifts, as in Table 5, cannot be regarded as a good indicator of how aggressively the investment manager will change the asset mix - some additional information is required.

7.10 Figure 5 below shows, in relative risk/return terms, the position which was illustrated in Figure 4 above, ie. it shows the position of the associated swing portfolios, according to the assumptions which have been made as to expected return, volatility and correlations of the permitted asset classes.

7.11 In Figure 5 the benchmark portfolio B now appears at the origin, showing no incremental return and no tracking error, as expected, ie. portfolio B is the riskless position in relative terms.

7.12 The current portfolio C can now be compared in relative terms with the benchmark portfolio and with the efficient portfolios D and E from Figure 4. In Figure 4, ie. in absolute risk/return space, a shift from portfolio B to portfolio C might, perhaps, be justified on the grounds that some expected return was being given up in exchange for a reduction in overall risk. Looking at Figure 5, ie. in relative risk/return space, it is apparent that such a move cannot be justified, since the reduction in expected return is accompanied by an increase in risk. Table 6 provides a numerical illustration of Figures 4 and 5.

Figure 5

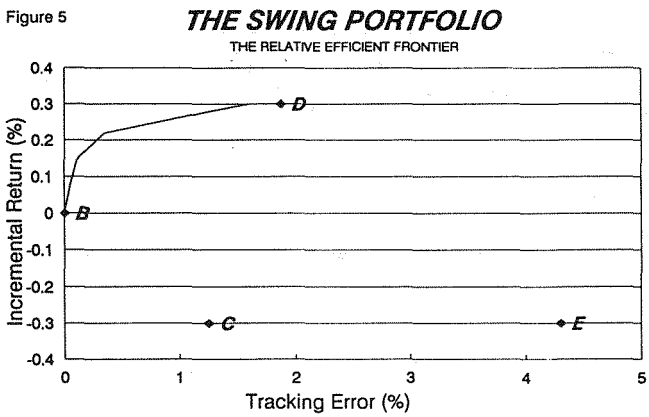


Table 6. Portfolio details

	Absolute (Fig.4)		Relative (Fig.5)	
Portfolio	Return %	Risk %	Return %	Risk %
B	13.2	10.9	0.0	0.0
C	12.9	10.4	-0.3	1.3
D	13.5	10.4	0.3	1.9
E	12.9	7.0	-0.3	4.3

7.13 It can be seen that a shift from portfolio C to portfolio E produces no incremental return but increases the tracking error. In a relative sense, therefore, a shift to portfolio E cannot be supported - despite the apparent attractiveness of such a shift illustrated in Figure 4.

7.14 A shift from portfolio C to portfolio D produces positive incremental return but also increases the tracking error. In this particular case, it seems clear that the shift would be acceptable in virtually all cases but, for the general case, some additional measure, a measure of risk tolerance - or risk/return trade-off, is required before an assessment can be made of the acceptability of a shift to portfolio D.

7.15 It should be noted that although both portfolio D and portfolio E were on the efficient frontier illustrated in Figure 4, portfolio E is clearly not optimal on the relative basis shown in Figure 5 but portfolio D is nearly so.

7.16 At each level of tracking error there will be one portfolio mix which will maximise the expected incremental return and can thus be regarded as the optimal relative portfolio. The line in Figure 5 is a line joining the optimal portfolios at each level of tracking error - **ie. in relative risk/return terms this is the efficient frontier.**

7.17 The efficient frontier for the swing portfolio describes the optimal asset allocation mixes at the various levels of tolerance for tracking error, ie. all that is necessary at each review of strategy is for the investment manager to optimise the swing portfolio in the light of his current return, volatility and correlation assumptions for the asset classes.

8. INVESTMENT SECTOR RISK

8.1 To this point the analysis of portfolio risk has concentrated upon the question of adding value and risk through asset allocation between the permitted asset sectors.

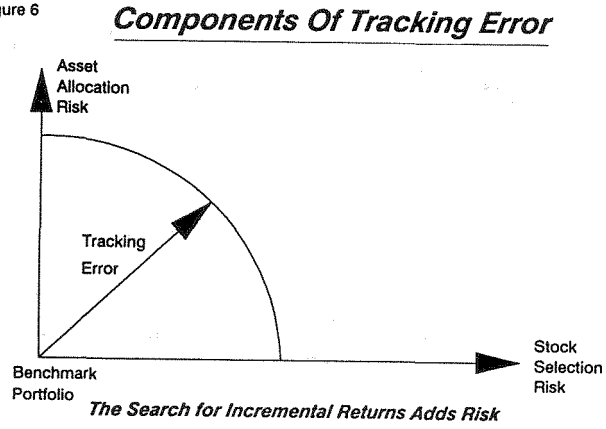
8.2 In Section 2.4 above reference was made to the other potential avenue for superior performance - by out-performing the individual sector targets which make up the benchmark.

8.3 Just as deviations from the benchmark asset mix are the source of any performance differential from asset allocation and give rise to risk, or tracking error, so deviations away from the sector targets within each asset class are also potential sources of added risk and return.

8.4 The only way to avoid sector risk completely is to "buy the index". As soon as the investment manager selects a different composition for his sector portfolio - presumably because he expects to achieve superior performance by under-weighting some stocks and over-weighting others, he incurs risk relative to his benchmark, ie. sector risk can be an important component of overall tracking error. Control of this sector risk is just as important as is control of asset allocation risk.

8.5 Figure 6 provides an illustration of the two dimensions of tracking error in a portfolio.

Figure 6



8.6 An investment manager who adopts a static asset allocation policy will have tracking error emerging solely from his stock selection policy. A manager who indexes his sector investments to his targets will limit his tracking error to that emerging from his asset allocation strategy. Most managers will be somewhere in the middle - but both dimensions must be controlled.

8.7 Although the investment manager is free to agree with his client what the performance target for each asset sector should be, it is desirable that the chosen target should be based upon a readily available published index which the manager would be able to replicate, if he wished to do so.

8.8 If we assume that the expected return on the active sector portfolio can be represented by the CAPM Market model, we have :-

$$r_i = a_i + b_i * r_{it} + e_i \quad ; \text{ where}$$

a_i = the expected non-market return for the sector i portfolio
ie. its alpha - which is a constant
b_i = the beta of the sector i portfolio relative to its target
r_{it} = the market-related return on the sector i target portfolio
e_i = the residual non-market component of the sector i portfolio return - with an expected mean value of zero

and we can calculate the square of the tracking error of the active sector i portfolio relative to its target from :-

$$Var(r_i - r_{it}) = (1 - b_i)^2 * Var(r_{it}) + Var(e_i) \quad ;$$

where it is seen to be a function of :-

* the beta of the active portfolio relative to its target
* the variance of the target portfolio
* the residual variance of the active portfolio

8.9 As an indication of the possible impact of stock selection on a portfolio's tracking error, the following figures on the Australian equity market have been derived from current IPORCH software supplied by BARRA International :-

Target Index - Australian All Ordinaries Share Index

Actual Portfolio	Portfolio Beta	Residual Risk	Tracking Error
20 Leaders	1.10	4.8 %	5.4 %
50 Leaders	1.05	2.6 %	2.8 %

ie. a tracking error of the order of 5.4% can be expected if the investment manager should seek to match the return on his target All Ordinaries benchmark by investing in a capitalisation-weighted portfolio which is based on the shares comprising the 20 Leaders Index.

8.10 Provided it is possible to specify each active sector portfolio relative to its target index in the manner described in Section 8.8 above, it then becomes a relatively straightforward calculation to determine the overall tracking error of the portfolio relative to the benchmark portfolio.

8.11 When analysed in this manner it becomes clear that, having established the benchmark portfolio, neither asset allocation nor stock selection will necessarily dominate the excess returns generated by the investment manager. Instead, the source of any excess returns will be very much a function of the manager's style and skill with respect to both dimensions.

9. RETURN RELATIVITIES

9.1 In general terms, for any given set of volatility and correlation assumptions there exists a set of sector returns which will make a particular swing portfolio optimal at a given level of risk tolerance. Given this property, it is quite a simple process to determine what return relativities between the various asset classes would be required to justify the current, or any other, portfolio mix.

9.2 Quadratic optimisers can be very sensitive to modest changes in the assumptions made as to future returns for the asset classes and they can make no allowance for the fact that the investment manager may be forced to provide one figure to represent what he might regard as a range of equally likely outcomes for an asset class. Analysis of the return relativities implied by a particular asset mix can assist the manager to gauge the sensitivity of the allocation process whilst retaining control over the basic allocation of the swing portfolio.

9.3 Returning to the current portfolio C, Table 7 shows the level of returns implied for each asset class, on the basis of the assumptions made with regard to expected volatilities, correlations and risk tolerance, for portfolio C to lie on the relative efficient frontier, as illustrated in Figure 5. These returns may be compared with those originally assumed :-

Table 7. Implied asset class returns

	Implied Return % Tolerance level 1	Tolerance level 2	Assumed Return %	Swing Portfolio Mix
Australian Shares	-8.2	1.8	13.5	-5
Australian Bonds	3.4	6.5	12.0	-5
Australian Cash *	8.5	8.5	8.5	7
Australian Direct Property	6.3	7.6	14.0	-5
International Shares	12.8	10.2	14.0	5
International Bonds	13.7	10.6	13.0	3
Implied incremental return	1.6	0.6		
Expected tracking error	1.3	1.3		

* the return on Cash has been fixed in each case so as to highlight the return differences between the other classes.

9.4 As will be apparent from the example in Table 7, a comparison between the implied returns and the investment manager's expected returns for each asset class will quickly indicate whether significant changes need to be made to the swing portfolio. Table 7 clearly indicates, for example, that the manager's relative expectations for Australian shares are not supported by his under-weight position - which implies a very poor outlook for share returns.

9.5 The implied returns are clearly sensitive to the assumed level of risk tolerance. Nominating a risk tolerance level is equivalent to specifying the required slope of the relative efficient frontier for a given level of tracking error. Table 7 indicates the underlying return/risk trade-offs implied at each of the two selected levels of risk tolerance. Level 2 can be seen to be a more aggressive strategy - ie. less incremental return is required per unit of risk.

10. TRANSACTIONS COSTS

10.1 The impact of transactions costs can be an important factor in the overall asset allocation process. In extreme cases it may be that the anticipated benefits of a change in asset mix will be swallowed up by the costs of implementing the change.

10.2 The optimisation process can incorporate an allowance for the transactions costs involved in shifting from the current swing portfolio, thus ensuring that the impact of costs is brought into consideration.

11. SHORT TERM TACTICAL ALLOCATION

11.1 The analysis of the swing portfolio has been made above in terms of a medium-term re-allocation of assets for the current portfolio but it is not necessary to limit the use of the model in that way.

11.2 The prime requirement of any re-allocation considerations is an analysis of the relative expected returns from the various asset classes and some assessment of the risk/return trade-offs involved. These are the same whether we are considering an occasional medium-term or a more frequent short-term tactical review. It may be, of course, that different factors and time frames are considered at the various reviews but the fundamental questions are the same.

11.3 With a shorter time horizon for the tactical review it is necessary to consider the desirability of shifting from the current portfolio to a new (possibly short-term) position based upon an assessment of expected short-term returns. In such an analysis the short-term opportunity for incremental return is the driving force but the potential impact of risk must not be ignored. There are, therefore, two main considerations :-

* the position relative to the current portfolio - is the move justified ?
* the position relative to the benchmark portfolio - is the move within overall acceptable limits ?

11.4 In this mode, an analysis of the swing portfolio relative to the current portfolio - ie. an examination of the best shifts away from the current mix, could be a useful addition to the standard comparison with the benchmark portfolio. Given the presence of transactions costs, for example, it may be that this alternative analysis better represents the practical options which are available to the investment manager.

11.5 It may be that a proposed tactical shift away from the current portfolio could be justified but that the portfolio would then fall outside some pre-determined limits on, for example, the tracking error (relative to the benchmark portfolio) based upon a longer perspective. This is an essential feature of the control process inherent in the use of a benchmark allocation as a means towards a fund's achievement of its investment objectives.

12. PERFORMANCE MEASUREMENT

12.1 It will be important to ensure that a complete performance attribution analysis, incorporating the impact of transactions costs, is performed on a regular basis to assess the value added by the asset allocation and stock selection processes and, hopefully, through that analysis to feed back the results to enhance the manager's application of those processes.

12.2 It is likely that it will become necessary for investment managers to provide their clients with the results of both sector and asset allocation performance in order to satisfy their demands for justification of fees charged for active, as compared with passive, management of each element.

12.3 Much of the performance analysis work currently published is forced to rely upon inadequate information from investment managers and, consequently, the results are open to debate and, often, attack - quite justifiably in many cases. It would be a major step forward if managers could be persuaded to release details of their performance benchmarks, their asset allocations (including the impact of derivatives) and their sector performances on a regular basis in order that more meaningful methods of performance measurement could be introduced. In this ideal world it would be possible, for example, to examine whether a manager's performance could reasonably be attributed to skill rather than to luck !

12.4 Regrettably, the most commonly adopted method for comparing the performance of different investment managers is still the historical return/volatility scattergram of the type illustrated in Figure 3. It seems probable that a majority of industry professionals would accept that, viewed *ex ante*, such an analysis can be an appropriate tool for assessing the absolute levels of risk for different portfolio structures, although there is a general desire for some better measure of risk to be developed[2,3,4].

12.5 When viewed *ex post*, however, a return/volatility chart is nothing more than an historical record of performance. The return dimension is, quite obviously, meaningful in absolute terms but the volatility dimension gives no indication of the risks taken by the investment manager to achieve the portfolio return and does not address the question of his performance benchmark - ie. it gives no indication of the portfolio's exposure to potential tracking error over the period of analysis.

12.6 It is quite feasible, for example, through a fortunate combination of circumstances, that the portfolio with the highest tracking error could be shown on a return/ volatility chart as the portfolio with the lowest "risk". Additionally, of course, a manager could outperform his benchmark portfolio but still show up comparatively poorly because his benchmark portfolio was weighted towards the poorer performing asset classes.

12.7 Table 8 shows the performance of three different portfolios over the three-year period to December, 1989. Each portfolio had an identical performance benchmark.

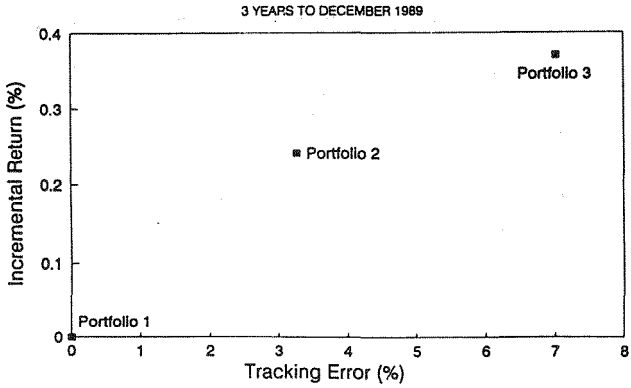
Table 8. Hypothetical portfolio performance - 3 years to December, 1989

Portfolio	Annualised Return %	Standard Deviation %
1	13.03	16.27
2	13.27	15.97
3	13.40	15.82

12.8 As can be seen from Table 8, the results achieved by the three managers over the period were very similar, but the manager of Portfolio 3 achieved the highest return with the lowest volatility.

12.9 When the performance of each manager relative to the benchmark portfolio is examined, however, a rather different picture emerges. Figure 7 illustrates the results :-

Figure 7 ***HYPOTHETICAL TRACKING PERFORMANCE***



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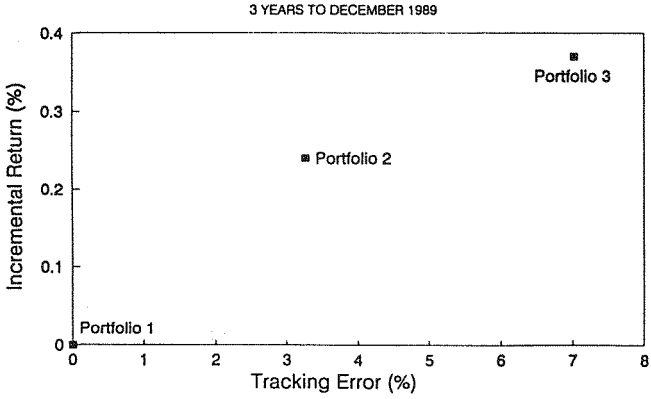


* Portfolio 1 is clearly seen to be a riskless portfolio which attained its performance objective - eg. it was managed passively by a manager who adopted a static asset allocation policy and who invested each sector in its target index ?

* Portfolio 2 produced a marginal increase in return at the expense of a modest tracking error - eg. it was managed conservatively by an active manager who took only modest "bets" away from the benchmark portfolio ?

* Portfolio 3 produced the highest increase in return but is clearly seen to have had significant relative risk exposure - it was managed aggressively by an active manager who was willing to take significant sector and stock risks in his search for added value ?

12.10 On a measure of incremental return per unit of tracking variance (a modified Sharpe ratio ?) Portfolio 2 is clearly superior to Portfolio 3 (all other things being equal). On this framework, Portfolio 3 might be selected by those clients with a high tolerance for risk and seeking maximum return.

12.11 The results in Tables 8 and Figure 7 are, of course, based upon hypothetical simulations of periodic portfolio returns. They are included to provide a numerical (and graphic) illustration of the importance of tracking error relative to the benchmark portfolio in any analysis of investment performance.

12.12 The hypothetical example in Tables 8 and Figure 7 was purposely kept simple to assist the illustration - in particular, a common benchmark was assumed to apply in each case. Is a common benchmark a necessary feature of meaningful comparative performance analysis ?

12.13 Calculations made using published historical returns for a range of investment managers suggest that, in broad terms, reasonably consistent comparative results can be obtained by measuring manager performance against different benchmarks provided that the benchmarks adopted have a similar overall risk profile to the portfolios measured. "Medium risk" portfolios, for example, seem to show a lower tracking error against a "medium risk" benchmark than either "low risk" or "high risk" portfolios. This is encouraging and suggests that measurement of groups of managers against common benchmarks could be a step forward.

12.14 The ideal situation, of course, would see the performance of each portfolio measured against its own benchmark. In such an environment it would be quite reasonable to illustrate the performance of different managers on a relative risk/return scattergram and to assess the value added through the use of a measure such as that suggested in Section 12.10 above.

12.15 As an added refinement, the calculation of the tracking error experienced for each portfolio could be based upon the below-target variance[2,3], thus responding to the justifiable complaint that differences arising out of superior investment performance should not be included in an assessment of a portfolio's riskiness. Attention should be focussed on the risk of under-performance.

12.16 If managers will not provide the information on benchmarks and performance which will be required to undertake such studies, they should not complain if performance analysts base their results upon less precise estimates in their search for a meaningful tool for the assessment of an investment manager's value added.

12.17 On the other hand, it will be desirable that some common standard be adopted by the various parties involved in performance analysis in order to avoid adding to the already heavy demands which are placed on investment managers for the provision of performance details.

13. MONITORING THE BENCHMARK

13.1 Although the discussion on the benchmark portfolio has treated it as a fixed asset allocation, it must be recognised that, in practice, it may be necessary to modify the benchmark from time to time in response to such factors as :-

* changes in the objectives of the fund - influenced by changes in the underlying liability structure, for example.

* changes in the investment manager's long term expectations for asset class returns etc.

* changes in the client's level of risk tolerance - due to changes in funding levels, perhaps.

* dissatisfaction with the existing benchmark - perhaps as a consequence of poor relative performance.

13.2 The "performance" of the benchmark should thus be the subject of regular appraisal but, until it is changed, it must remain as the investment manager's strategic performance objective - the minimum acceptable level of performance.

13.3 To the extent that the selection of the benchmark portfolio was influenced by the investment manager's expectations as to the experience of the various asset classes, the performance of the benchmark could be considered as an important component of the investment manager's own performance. It is unlikely, however, that any meaningful analysis of this aspect could be contemplated other than over the longer term and changes such as those mentioned in Section 13.1 above could further complicate the analysis.

13.4 The regular appraisal of the benchmark will also provide a check on one other aspect of relative performance measurement - the possible use of a "soft option" benchmark. It would be possible for an investment manager to establish a low risk portfolio as the benchmark but consistently to invest in, say, a medium risk portfolio with the expectation that he will achieve a higher return and so outperform his benchmark. To be meaningful, the benchmark portfolio should represent the investment manager's "default" and long-term average position.

14. IMPACT OF TAXATION

14.1 The analysis to this point has ignored a very important influence on investment performance - the potential impact of income and capital gains taxes.

14.2 In the ultimate, it is after tax returns that are important to the client and different managers may adopt different strategies in response to the particular tax position of their funds.

14.3 Because there are no published after-tax performance benchmarks it is difficult even to assess the returns achieved in individual asset sectors with a target benchmark in a totally meaningful manner but it would be inappropriate for the investment manager simply to compare, for example, his after-tax returns on his Australian share portfolio with movements in the All Ordinaries Accumulation Index.

14.4 Similarly, difficulties already exist in measuring total portfolio performance because of the different methods adopted by managers in reserving for un-realised capital gains.

14.5 There does not appear to be an easy solution but the absence of a totally defensible solution should not bring the process to a halt. The investment manager will still be required to explain his results to his clients and the impact of tax must be identified at some stage.

14.6 Although unacceptable to the purist, a reasonable solution might be to consider the impact of tax on each portfolio as a completely separate item of investment performance. On this basis, the performance of the portfolio relative to its benchmark would first be assessed on a before-tax basis and then the overall tax impact calculated. The initial determination of the benchmark portfolio and tactical changes to the swing portfolio would, however, be made on the basis of the expected after-tax returns on each asset class.

15. OTHER CONSIDERATIONS

15.1 Consideration of the basic questions of asset allocation in a benchmark environment have been considered above in a "pure" sense wherein :-

* the benchmark portfolio has been established.
* asset re-allocations and sector composition are considered relative to the benchmark portfolio.
* the total risk/return position of the overall re-allocated portfolio is only of secondary importance.

In this environment the objectives of the asset allocation process can be achieved through consideration of the swing portfolio.

15.2 In practice, however, it is likely that other considerations may enter into the process. An investment manager (the investment manager of a life insurance company, for example) might wish to set up a number of benchmark portfolios in order to meet the requirements of various investment products. The benchmark portfolios will, in the main, be governed by product needs but it is likely that competitive considerations could also influence the process.

15.3 There could be a requirement from the manager of a pooled fund, for example, to control (within limits) the extent of the expected tracking error of his current portfolio relative to a major competing fund. This can be achieved in a manner similar to that described above for tactical re-allocations, ie. :-

* consider the incremental return and tracking error relative to the benchmark portfolio (which is still assumed to be the dominant requirement) ; and

* consider the incremental return (which may be negative) and tracking error relative to the competing fund.

15.4 If it is assumed that the portfolio returns will be symmetrically distributed, the anticipated probability of underperforming the competing fund by more than x% can be calculated and an assessment made of the acceptability, or otherwise, of the position. Ultimately, of course, it may be necessary for the manager to choose between the maintenance of his control "rules" and his wish to limit an emerging divergence from competing funds.

15.5 In an environment where the concept of strategic performance objectives for funds gains acceptance and understanding among clients, the divergence from competing funds will not be a major issue - the issue instead will be one of re-appraisal of the strategic performance objective.

15.6 Much current research is being directed towards the development of optimisation methods which can encompass both the asset and the liability side of the balance sheet, rather than focus purely on assets. A recent paper by Sharpe and Tint is an excellent example of this work[5]. The risk control methods described in this paper will be equally applicable to an asset/liability scenario.

16. ACKNOWLEDGEMENTS

16.1 This paper is the distillation of much discussion and debate and the assimilation of the research of other authors over a considerable period of time. Whilst retaining responsibility for the comments made in the paper, the author wishes to acknowledge the important contributions that have been made to that process by many professional and business colleagues, particularly Mr W.R. Gorman.

17. CONCLUSIONS

17.1 The major conclusions of this paper can be summarised as follows :-

* the investment manager's objectives should be specified in the form of a static benchmark portfolio.

* the investment manager's performance should be measured as a risk-adjusted incremental return relative to the benchmark portfolio.

* tracking error relative to the benchmark portfolio is an appropriate measure of portfolio risk.

* control over portfolio risk should be achieved by optimising the swing portfolio.

* comparative analysis of investment manager performance should be made on a relative rather than an absolute risk/return basis.

* current performance analysis is unsatisfactory and meaningful comparative analysis will be virtually impossible unless investment managers are prepared to release the necessary data.

BIBLIOGRAPHY

1. Determinants of Portfolio Performance - Brinson G.P., Hood L.R., and Beebower G.L., Financial Analysts Journal , July-August 1986.

2. Mean-Risk Analysis with Risk Associated with Below-Target Returns - Fishburn P.C., The American Economic Review, March 1977

3. Risk and Relevance - Sortino F.A., Pension Research Institute, School of Business, San Francisco State University

4. The Measurement of Investment Performance - Knox D. and Prowse R., Institute of Actuaries of Australia, 1989.

5. Liabilities - A new approach - Sharpe W.F. and Tint L.G., The Journal of Portfolio Management, Winter 1990.

Figure 4

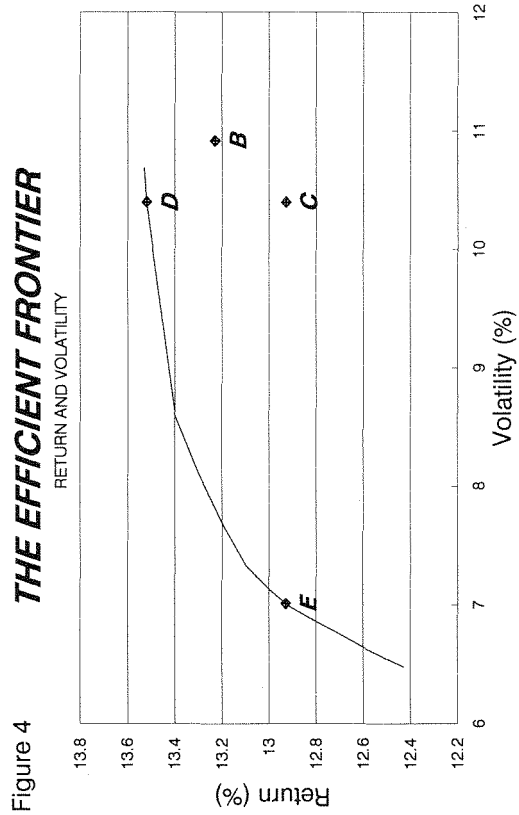

THE EFFICIENT FRONTIER
RETURN AND VOLATILITY
Return (%)
13.8
13.6
13.4
13.2
13
12.8
12.6
12.4
12.2
6
7
8
9
10
11
12
Volatility (%)
D
B
C
E

Figure 5

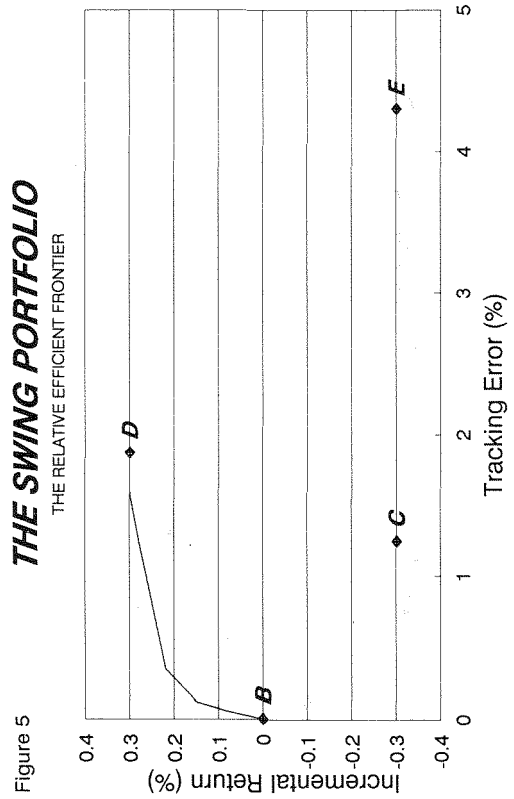
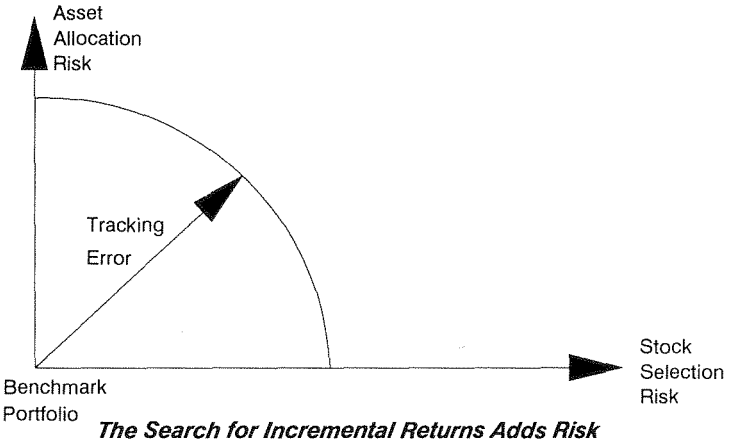

THE SWING PORTFOLIO
THE RELATIVE EFFICIENT FRONTIER
Incremental Return (%)
Tracking Error (%)
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
0
1
2
3
4
5
D
B
C
E

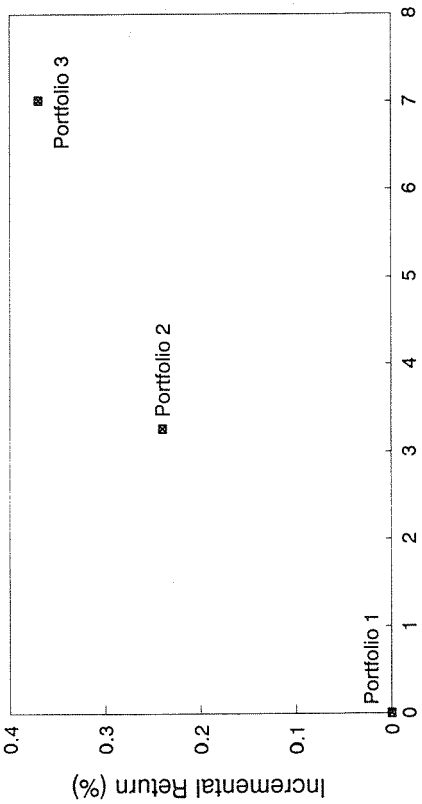
Figure 6

Components Of Tracking Error



The Search for Incremental Returns Adds Risk

Figure 7 ***HYPOTHETICAL TRACKING PERFORMANCE***



UTILITY, BENCHMARKS AND INVESTMENT OBJECTIVES

by RA Lipman FIA, FIAA

1. Introduction

1.1 This paper has three main themes:-

1. Utility is used to represent an investors tastes or preferences. These preferences reflect a combination of the nature of the liabilities and the personal risk tolerance of the investor. This theory leads to utility maximisation as the guiding principle in choosing between investments.

2. The appropriate incorporation of benchmarks is suggested in order to make this theory correspond more closely to investor behaviour.

3. The potential of utility for graphic presentation is used to aid communication and promote intuitive understanding.

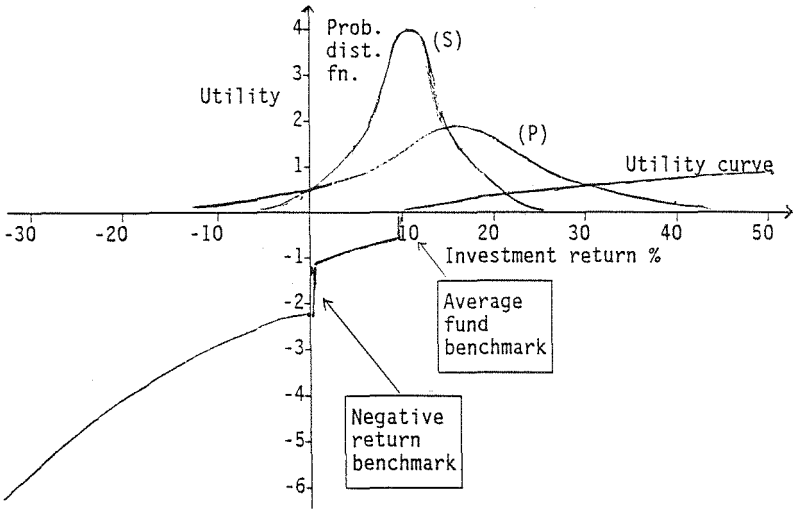


Figure 1 Shows utility curve for a particular accumulation plan together with investment distributions of "secure" (S) and "performance" (P) orientated investments

1.2 The second part of this paper deals with their practical application and includes suggestions regarding:

1. A standardisation convention for the utility function.

2. A new risk measure.

3. A practical methodology.

1.3 This paper focuses on the foundations of making investment decisions under uncertainty. For this purpose it is assumed that the future probability distributions of the outcomes of the various investment alternatives are known; this enables one to concentrate on the considerations involved in choosing between these alternatives. In all cases the rates used are the instantaneous rate (the force of issue).

1.4 These issues are dealt with under the following headings:-

Theoretical Aspects

. Utility

. Shape of the utility function and benchmarks

. Historical review of investment objectives

Practical Aspects

. Standardisation convention

. Utility curve and investment distribution assumptions

. A practical methodology

. Accumulation plan illustration

. Other uses

Conclusion

2. Utility

2.1 Utility was devised over 200 years ago to meet the shortcomings of the expected value concept which were exposed by the classic problem known as the "St. Petersburg Paradox". This paradox was first formulated by Nikolaus Bernoulli (while in St. Petersburg).

> "Peter tosses a coin and continues to do so until it should land "heads" when it comes to ground. He agrees to give Paul one ducat if he gets "heads" on the very first throw, two ducats if he gets it on the second, four if on the third, eight if on the fourth, and so on, so that with each additional throw the number of ducats he must pay is doubled. Suppose we seek to determine the value of Paul's expectation."

The value of Paul's expectation can be calculated as follows:

Toss on which "Heads" first appears	Sequence	Prob.	Prize	Contribution to expected value
1	H	1/2	1	1/2
2	TH	1/4	2	1/2
3	TTH	1/8	4	1/2
4	TTTH	1/16	8	1/2
:	:	:	:	:
:	:	:	:	:

The total expected value is the series $\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$ ..... which is infinite. On the basis of expected values one ought to be prepared to pay an infinite amount to play the game which in return only gives one a 50% chance of ending up with $1 and a 90% chance of ending up with less than $10. The expected value concept leads to intuitively unacceptable results.

This paradox does not just depend on a play on infinity as intuitively unacceptable results also arise if a finite number of tosses is specified.

2.2 The 18th century mathematicians, Daniel Bernoulli and Gabriel Cramer, independently sought to resolve this paradox by replacing the concept of expected value by expected utility. Bernoulli argued that individuals are concerned with utility rather than money values and that utility decreases as money value increases. Expected utility is a generalisation of the expected value concept in that expected value is the special case of expected utility when the weighting for all financial outcomes is the same.

They each proposed different forms for the utility function i.e.

Bernoulli $U(x) = b.\log(x/a)$
Cramer $U(x) = \sqrt{x}$

These functions gives values for the St. Petersburg Paradox of $2 and $2.914 respectively:-

2.3 Applying this approach to the investment environment, leads to the fundamental statement:-

> The primary investment objective is to maximise expected utility.

The expected utility of a particular investment or portfolio of investments can be expressed mathematically as:-

$$E\{U(r)\} = \int U(r).p(r).dr$$

where $U(r)$ = utility derived from an investment return of r.
$p(r)$ = probability density function of the investment return r.

If the functions are not continuous, the definition becomes

$$E\{U(r)\} = \Sigma\ U(r).P(r)$$

where $P(r)$ = probability of investment return r

2.4 The calculation of the expected value of an investment is illustrated.

EXPECTED UTILITY CALCULATION

Investment Return %	Assumed Probability (1)	Assumed Utility (2)	Expected Utility (1) x (2)
-20	0.2	-5	-1.0
0	0.2	-1	-0.2
10	0.2	0	0.0
20	0.2	0.5	0.1
40	0.2	1	0.2
Total	1.0		-0.9

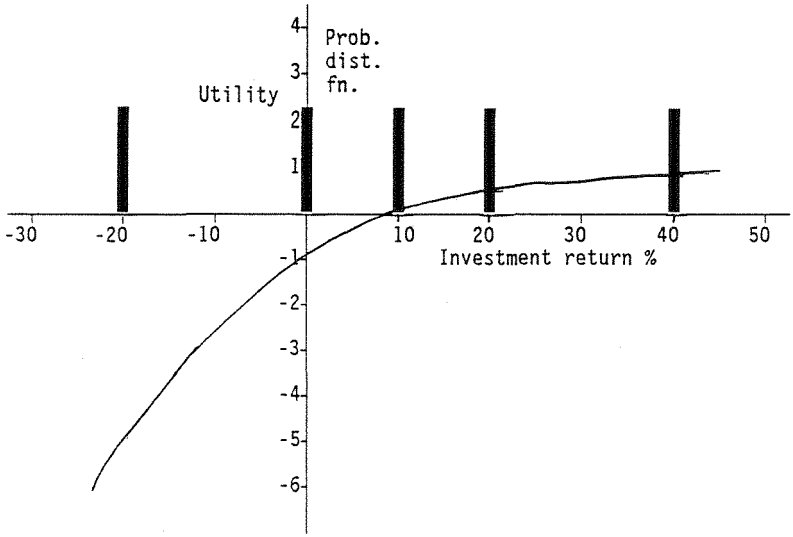


Figure 2 - Illustration of expected utility calculation.

2.5 This illustration used the utility function of a hypothetical risk averse investor. We can categorise the basic types of investors as follows:

1. Risk averse - concave utility function
2. Risk indifferent - linear utility function
3. Risk lover - convex utility function

These different types are illustrated in figure 3.

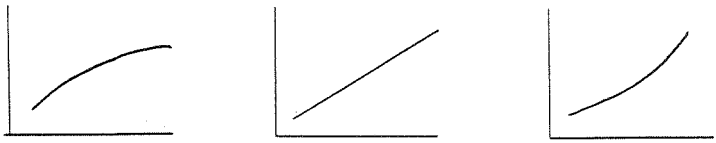


Figure 3 - Illustration of 3 basic types of investor.

2.6 Utility is used to represent an investors tastes or preferences. These preferences reflect a combination of the nature of the liabilities and the personal risk tolerance of the investor. As such the weighting used in the formula (and thus the expected utility of an investment as well) is personal to each investor. For example, in the case of an employer sponsored accumulation plan for employees, there are a multitude of interested parties e.g.

each of the members
employer
trustees
each of the investment managers
each of the consultants

who will tend to attach different weights to each of the possible investment returns and thus may rank the investment options differently.

2.7 Some relevant considerations relating to utility are:

1. The origin or scale for the utility function are arbitrary. One can for example use a scale of 1 to 10 or one which is negative where satisfactory performance is not attained and positive where it is attained.

2. Utility can also be used at a number of different levels. For example in the investment environment it can be used for rating individual investments, groups of investments or portfolios or the pooled funds offered by professional investment managers.

3. The units in which utility is expressed do not necessarily have to be nominal money returns. It can also, for example be expressed in real returns or related to the increase in average weekly earnings as is appropriate having regard to the nature of the liabilities.

4. The utility function of an investor can change over time e.g. immediately before and after a stock market crash.

5. The utility function can be multivariate e.g. apart from return have a variable related to socially desirable ends.

2.8 A fundamental question has not been addressed. How realistic is it to represent investor preference by a utility function and rank investments according to their expected utility? Expected utility was given axiomatic justification by the work of von Neumann and Morgenstern. They demonstrated that provided certain axioms are accepted, then it rigorously follows that the investor will make his decisions according to the expected utility rule.

3. The Shape of the Utility Function and Benchmarks

3.1 Intuitively, it appears reasonable to assume that utility increases as the investment return increases i.e. more is better. (Mathematically $U'(x) > o$)

3.2 It has also been suggested that the economic law of decreasing marginal utility applies i.e. for each additional equal increment of investment return, the associated additional utility decreases. (Mathematically $U''(x) < o$). While accepting that this operates as a general tendency, one of the main suggestions of this paper is that this "law" does not operate near benchmarks (this concept is dealt with later in this section).

3.3 A number of functions have been suggested to represent utility e.g.

1.	Exponential	$-\exp\{-ax\}$, $a>0$
2.	Fractional	x^a , $0<a<1$
3.	Quadratic	$x - ax^2$, $a>0$, $x< 1/(2a)$

All these functions have the properties suggested above.

3.4 Insight into the appropriateness of possible utility functions and the role of investment distribution statistics can be obtained by considering the contribution which they make in the expected utility calculation. As suggested in Levy and Sarnat, consider a general utility function $U(r)$ where r denotes the annual return. We know nothing about U except that we assume that its derivatives exist. Expanding U in a Taylor series about $E\{r\} = \mu$ we get

$$U(r) = U(\mu) + U'(\mu).\frac{(r-\mu)}{1!} + U''(\mu).\frac{(r-\mu)^2}{2!} + \cdots\cdots$$

Now taking the expected utility and noting that

$E(r-\mu)=0$, $E(r-\mu)^2 = \sigma^2$, and in general $E(r-\mu)^n = \mu_n$ we get

$$EU\{r\} = U(\mu) + \frac{U''(\mu)\sigma^2}{2!} + \frac{U'''(\mu)\,\mu_3}{3!} + \cdots\cdots$$

This alternative expression for expected utility reveals some interesting features:

1. Knowing the investment distribution is equivalent to knowing all the moments and visa versa. Expected utility depends upon all the moments.

2. The importance of a particular moment depends upon both its magnitude and its weighting or coefficient.

3. Expected utility is in general a linear function of variance (not standard deviation).

4. The closer the utility function is to linear (or the less risk averse) the less important the higher moments. For the more risk averse investor the higher moments assume greater significance.

   A practical implication of this is that while the popular mean-variance criterion may be adequate for risk tolerant investors such as trustees of typical defined benefit funds more risk sensitive investors may need to have regard to higher movements e.g. require positive skewness.

Benchmarks

3.5 One of the main arguments of this paper is that diminishing marginal utility may not necessarily operate over the entire domain but that there may be one or more benchmarks which are personal to the investor and near which diminishing marginal utility does not hold. Investment literature abounds with comparisons with market indices, inflation, other funds results, increase in average earnings, etc. Investment objectives which fail to take account of these benchmarks are ignoring an important aspect of the "investment reality"; benchmarks are intuitively adopted by many investors and form an important part of their decision process.

The benchmarks important to a particular investor can be represented in his utility function by appropriate "steps" or "jumps". The precise modifications required maybe more complex but at this stage of development it is suggested that simple steps or jumps are adequate.

3.6 Financial loss or negative return is one such benchmark. For many investors the increase in utility from an increment in return from -0.1% to 0% is greater than an increment in return from 0.1% to 0.2%. Diminishing marginal utility does not hold in the region immediately below this benchmark.

3.7 The nature of the particular investor's liabilities may impart crucial importance to certain benchmarks e.g. failure to achieve a specific return may result in a catastrophe to the investor such as insolvency or the forced sale of the family home.

3.8 A common benchmark is the return achieved by the "average" investor; what constitutes the average will vary from investor to investor according to the particular group that the investor associates himself with.

3.9 For psychological reasons, jumps in the utility of the investment return may occur such as at each integer and especially at multiples of 5 and 10.

3.10 Benchmarks tend to be personal to individual investors. When the aggregate behaviour of a group of diverse investors is examined, the impact of benchmarks will tend to be obscured because of differing time horizons and benchmarks.

4. Historical Review of Investment Objectives

4.1 The theory of utility incorporating benchmarks is one of considerable generality. A major feature of this theory is the way in which it lends itself to graphic presentation. These features will now be illustrated by considering the main statements of investment objectives which have occurred in actuarial literature.

4.2 The classic statement on investment objectives is Bailey's paper which was presented to the Institute of Actuaries in London in 1862. "Bailey's Canons" of investment are:-

"1. That the first consideration should invariably be the security of capital.

2. That the highest practicable rate of interest be obtained, but this principle should always be subordinate to the previous one; the security of the capital.

3. That a small proportion of the total funds (the amount varying according to the circumstances of each individual case), should be held in readily convertible securities for the payment of current claims, and for such loan transactions as may be considered desirable.

4. That the remaining and much larger proportion may safely be invested in securities that are not readily convertible; and that it is desirable, according to the second principle, that it should be so invested, because such securities, being unsuited for private individuals and trustee, command a higher rate of interest in consequence.

5. That, as far as practical, the capital should be employed to aid the life insurance business."

This theory corresponded closely with institutional investment practice prior to the Second World War. Their investments tended to be exclusively in fixed interest apart from some owner-occupied property. This approach was facilitated by accounting practice which included investments in the accounts at their original cost.

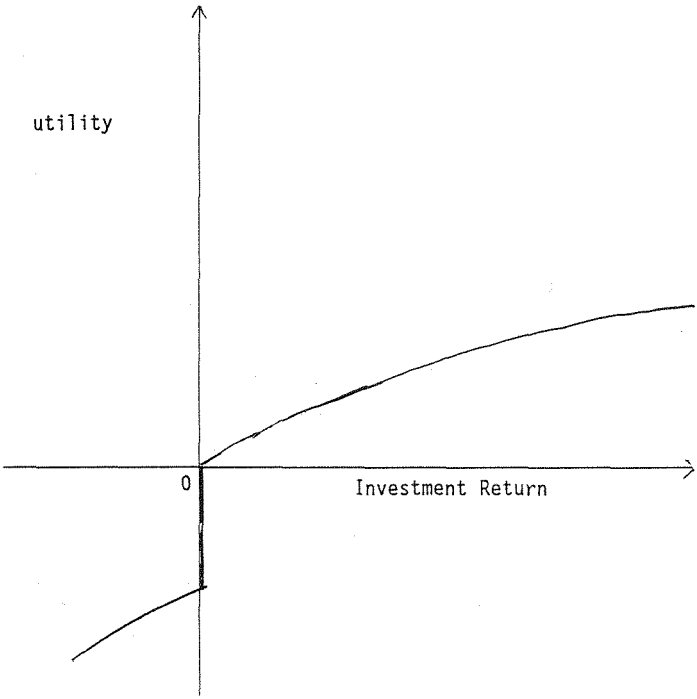


Figure 4 - Utility curve illustrating Bailey's "security of capital" and "highest practicable rate of interest"

4.3 In 1948 Pegler was still able to state that Bailey's Canons remained enthroned as the basic orthodox doctrine and the foundation on which actuarial students should be instructed. Pegler, however, criticised them, especially their emphasis on security of capital. He proposed their replacement by the following four principles:-

1. It should be the aim of life office investment policy to invest its funds to earn the maximum expected yield thereon.

2. Investments should be spread over the widest possible range in order to secure the advantages of favourable, and minimise the disadvantages of unfavourable, political and economic trends.

3. Within the limits of the Second Principle, offices should vary their investment portfolios and select new investments in accordance with their view of probable future trends.

4. Offices should endeavour to orientate their investment policy to socially and economically desirable ends.

There is no distinction between capital and income; the focus is on total yield. The concept "expected yield" takes into account the risk of payments failing to materialise. He introduced the notion of a risk coefficient which would be equal to or less than one according to the security of the investment and which would be applied to the "apparent yield" in the calculation of the expected yield.

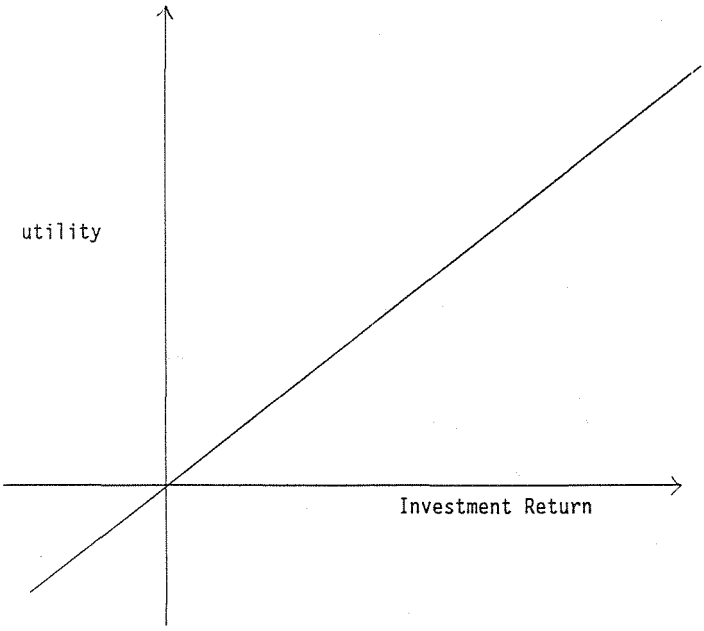


Figure 5 - Utility curve which ranks investments according to Peglers "maximum expected yield"

If we assume that the utility function is a linear function of the investment return i.e. $U(r) = ar + b$ then the expected utility of any investment is

$$E\{U(r)\} = \int (ar + b).p(r).dr$$

$$= a\int r.p(r).dr + b\int p(r).dr$$

$$= a.E(r) + b$$

The constants a and b relate to origin and scale and thus this utility function ranks investments according to E{r} or their expected value or yield. This is just another way of expressing Pegler's first principle which aims at achieving the maximum expected yield.

4.4 Pegler's concept of expected yield ranks equally a risk free investment with a guaranteed return and a highly risky investment with an equal expected return. Clarke pointed out in 1954 that higher risks were normally associated with higher investment returns and further that the nature of the liabilities should be taken into account. He incorporated these considerations into his statement of the investment objective:-

> "to maximise the expected yield with the minimum of error, having regard to the nature and incidence of the liabilities."

This statement explicitly recognises the conflict between return and risk. Regarding the pay-off for risk taking, Clarke stated "The investor will base his assessment of the adequacy of this margin upon past experience, his views as to future trends and his knowledge of the terms on which other similar investments currently stand in the market."

4.5 In 1968 Hemstead presented a paper which amongst other things focused on the relationship between return and risk. After discussing various definitions of risk, he suggested "The sum of the probabilities associated with various levels of financial loss is the 'chance of loss' which, it is suggested provides a satisfactory absolute measure of the 'degree of risk'.

4.6 In the discussion of Hemsteads' paper K.J. Goodare commented at page 58

> "...'utility function' which suitably expressed the fact that the more money there was, the less important was acquiring, or losing a marginal pound. That was an old idea in economics but strangely seemed to have been disregarded by actuaries. The principle was simple. A suitable utility function in the form of a system of weights which gave increasing weight to losses and less weight to gains had to be selected and multiplied by each of the probability distributions under consideration, and the product with the greatest expected utility found.... the concept of the maximum expected utility expressed more

accurately what was really wanted...."

He went on to say, however, that the mathematics seemed intractable.

4.7 In America, the seminal work on what is called "Modern Portfolio Theory" was produced by Markowitz in 1952. His original work includes the following important statements:-

1. "The process of selecting a portfolio may be divided into two stages. The first stage starts with observation and experience and ends with beliefs about the future performances of available securities. The second stage starts with the relevant belief about future performances and ends with the choice of portfolio."

2. "The E-V rule states that the investor would (or should) want to select one of these portfolios .....i.e. those with minimum V for given E or more and maximum E for given V or less". (E denotes expected value; V = variance).

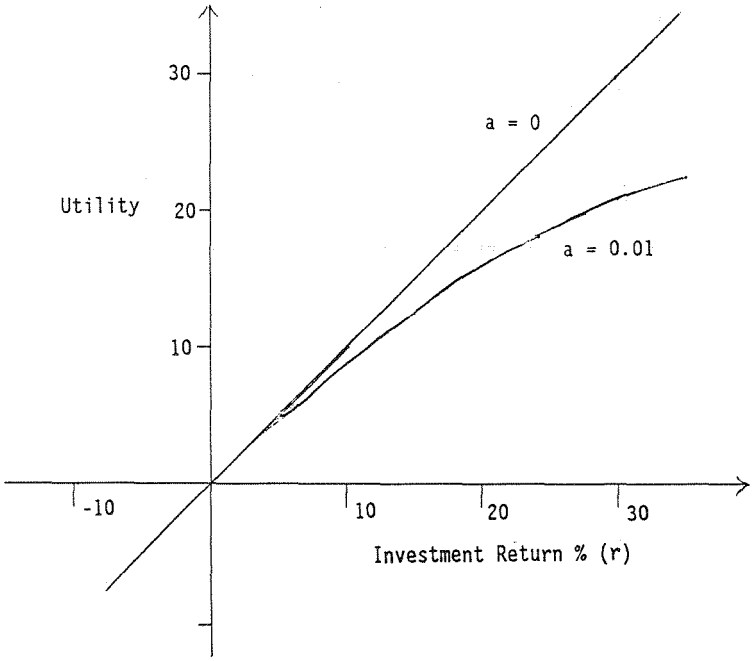


Figure 6 - Utility curve $r - ar^2$ which ranks investments according to expected value and variance.

3. An investment rule or theory should serve "both as a hypothesis to explain well-established investment behaviour and as a maxim to guide ones own action."

4. "It is necessary to avoid investing in securities with high covariances among themselves. We should have diversity across industries....."

5. "Perhaps - for a great variety of investing institutions which consider yield to be a good thing; risk, a bad thing; gambling to the avoided - E,V efficiency is reasonable as a working hypothesis and a working maxim."

Based on these foundations and extended to incorporate utility an extensive body of literature and technology has been built up. The most widely used approach is to assume that the utility function is quadratic: This is both simple to understand and apply.

4.8 Recent work has tended to focus on the definition and measurement of investment risk. Clarkson, for example, proposed that

> "Investment risk is a function both of the probability of the return being below a certain threshold and also of the severity of the financial consequences arising from these values of return."

He thus uses a utility type weighting for returns below the threshold. This definition of risk can be expressed as that portion of the expected utility which relates to investment returns below a certain threshold (or benchmark to use the terminology of this paper).

PRACTICAL ASPECTS

5. Standardisation Convention

5.1 Utility functions preserve their rankings under positive linear transformations i.e. the origin and scale are arbitrary. This gives the freedom to choose an origin and scale which aid communication and promote intuitive understanding.

The following convention is suggested:-

a) Origin - Make the utility function zero for an average or mediocre result i.e. one that gives to the trustees neither pain nor pleasure, neither satisfaction or dissatisfaction. Positive utility is then associated with pleasure or satisfaction. Negative utility is associated with pain or dissatisfaction. Let M represent the average result. This suggests a utility function proportional to C(x) - C(M): where C(x) is the "crude" utility function.

b) Scale - Make the utility function equal one for an extreme positive return say P. This is arbitrarily chosen to represent the extreme of positive returns from the range of returns reasonably likely to occur. This promotes ready rating of other aspects of utility in terms of a multiple or fraction of this nominated extreme positive return.

The standardised utility function now becomes:-

$$U(X) = \frac{C(X) - C(M)}{C(P) - C(M)}$$

where C(X) is the crude utility function.

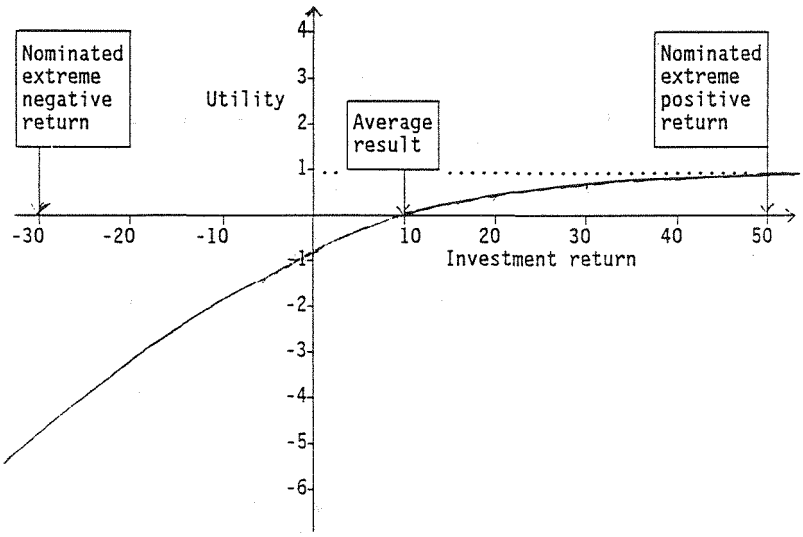


Figure 7 Arbitrary utility curve using suggested graphic presentation convention

5.2 Corresponding to the extreme positive return we also nominate an extreme negative return (say N). We can now define a simple measure of risk.

$$\text{Risk ratio} = \frac{-\text{Utility (Extreme negative return)}}{\text{Utility (Extreme positive return)}}$$

$$= -\text{Utility (Extreme negative return)}$$

$$= [C(M) - C(N)]/[C(P) - C(M)]$$

As we have scaled the utility function to make the utility of the extreme positive return unity.

This risk ratio is a quantitatively precise definition of a concept already in everyday use e.g. "the penalties for failure are greater than the rewards for success."

6. Utility Function and Investment Distribution Assumptions

6.1 Utility Function Assumption

As a working basis we now assume that (ignoring for the time being the impact of benchmarks) the utility function is exponential. In particular that the crude function is -exp{-ax}. The reasons for choosing this particular function are as follows:

1. It satisfies the "more is better" principle.
2. It satisfies the principle of "decreasing marginal utility".
3. It involves only a single constant i.e. "a".
4. As will become apparent, it has analytic advantages.

6.2 As stated this function depends on a single constant. We can promote intuitive understanding by relating this constant to the "risk ratio" as follows:-

$$\text{Risk ratio} = \frac{C(M) - C(N)}{C(P) - C(M)}$$

$$= \frac{-\exp(-aM) + \exp(-aN)}{-\exp(-aP) + \exp(-aM)}$$

Taking the nominated extremes as 2 standard deviations from M.

$$= \frac{-\exp(-aM) + \exp(-aM + 2a\sigma)}{-\exp(-aM-2a\sigma) + \exp(-aM)}$$

$$= \frac{\exp(2a\sigma) - 1}{1 - \exp(-2a\sigma)}$$

$$= \exp(2a\sigma)$$

$$a = \frac{\ln R}{2\sigma}$$

This is independent of M. Taking σ =0.2 (roughly corresponding to the standard deviation on equities) reduces to:

$$a = 2.5 \ln R.$$

where R is the risk ratio.

6.3 A table of values of a according to integral risk ratios is set out below:

Risk Ratio	a
1	0
2	1.7
3	2.7
4	3.5
5	4.0
6	4.5
7	4.9
8	5.2
9	5.5
10	5.8
15	6.8
20	7.5

6.4 We make the further assumption that the instantaneous rates of investment returns are normally distributed. The reasons are as follows:

1. There is some evidence that this is a reasonable approximation at least for the more volatile asset classes such as equities and the errors involved in applying it to more stable asset classes such as treasury notes are not of great significance in the context of their use in this paper.

2. It is a well-known distribution.

3. As will be demonstrated, in association with an exponential utility function, it can be manipulated to provide easy determination of expected utility.

6.5 Expected Utility

Using these assumptions in the definition of expected utility produces (ignoring standardisation).

$$E(U) = \int (-\exp(-ax)) \left(\frac{1}{\sqrt{2\pi}\sigma} \exp\left(-\tfrac{1}{2} \left(\frac{x - \mu}{\sigma}\right)^2\right) \right) dx$$

Considering the power of the exponential and recompleting the square, this simplifies to

$$= \quad -\exp\{-a(\mu - \frac{a.\sigma^2}{2})\}$$

Standardising this function in accordance with section 5.

$$E(U) = \frac{-\exp\{-a(\mu - a\sigma^2/2)\} + \exp\{-am\}}{-\exp\{-aP\} + \exp\{-am\}}$$

6.6 This formula can be used to determine the conditions under which one investment is preferred to another.

$$EU_A\{x\} > EU_B\{x\}$$

This simplifies to

$$A < \frac{2(\mu_A - \mu_B)}{\sigma_A^2 - \sigma_B^2} \qquad \sigma_A > \sigma_B$$

.7 We can get some idea of "a" by comparing the expected utility which emerges based on statistics derived from the historical performance of the major asset classes in the United States. (Chosen because the largest market over the period considered).

Asset class	Geometric Mean	Standard Deviation
Equities	9.1%	21.9%
Long terms Government Bonds	3.0%	5.7%
Treasury bills	3.0%	5.1%

Source: R. Ibbotson and R. Sinquefield stocks, Bonds, Bills and Inflation

Taking $\mu_a = 9\%$ $\sigma_a = 20\%$
$\mu_b = 3\%$ $\sigma_b = 5\%$

Then we must have:

$$a < \frac{2\,(0.09 - 0.03)}{0.2^2 - 0.05^2}$$

$$\text{i.e.} \quad a < 3.2$$

We can use this to broadly categorise investors.

Category	"a"	Risk ratio
Risk indifferent	0	1
Risk averse		
- performance orientated	< 3.2	<3.5
- security orientated	> 3.2	>3.5

6.8 Benchmarks

For convenience and simplicity assume that benchmarks can be incorporated into the expected utility calculation as follows:

$$E(U) = \int (U(x) - B).p(x)dx + \int U(x).p(x).dx$$

where U(x) is the normal utility function ignoring the benchmark

$$= \int U(x)p(x).dx - B \int p(x).dx$$

$$E(U) = E(U(x)) - B.F(b)$$

where F(b) is the probability of obtaining a return not exceeding b. This is readily obtainable from statistical tables.

7. A PRACTICAL METHODOLOGY

7.1 Markowitz divided the portfolio selection process into two phases. The framework developed in this paper suggests a three phase process as follows:

1. Form beliefs about the shape of the future utility function of the particular investor (liability-side).

2. Form beliefs about the future probability distributions of and interrelationship between the various investment options (asset-side).

3. Choose the portfolio with the maximum expected utility (asset/liability optimisation).

This extension explains the increased attention now being given to the liabilities.

7.2 The formation of beliefs about the utility function of a particular investor can be approached by addressing the following questions having regard both to the nature of the liabilities and risk tolerance of the particular investor.

1. What benchmarks are relevant?

2. What is a mediocre result; one which gives rise to neither satisfaction nor dissatisfaction?

The answer to the two questions enables a "qualitative curve" to be drawn.

3. How important are they relative to the utility of the nominated extreme positive return?

4. What is the risk ratio?

8. Accumulation Plan Example

8.1 To illustrate the practical application of what has been suggested consider an employer sponsored accumulation plan (defined contribution) under which the trustees are required to allocate the investment return of the fund annually.

8.2 The "liability" specifications are:

1. An average fund result of 10% is considered to cause neither satisfaction or dissatisfaction.

2. The following benchmarks are considered important:

   a) avoiding a negative return - utility "step" 1.

   b) achieving the average fund result - utility "step" 0.5

3. The trustees are security orientated with a total (i.e. including benchmark utility "steps") risk ratio of 6.

8.3 The constant "a" can be determined as follows:

Total risk ratio		6
Less: benchmark utility steps		
Average fund	0.5	
Negative return	1.0	1.5
Non-benchmark risk ratio		4.5

From the table in 6.3, a = 3.8

8.4 The "asset" specifications are:

1. Normal distribution

2. Investment options S (Security) and P (Performance)

$$\mu s = 0.11 \quad \sigma_s = 0.06$$
$$\mu p = 0.15 \quad \sigma_p = 0.12$$

No mixes of investments are permitted.

8.5 The expected utility of each of these option can be calculated using the formulae developed in 6.5 and 6.8 as follows:

$$E\{U_s\} = 0.02 - 0.03 - 0.22 = -0.23$$
$$E\{U_p\} = 0.11 - 0.11 - 0.17 = -0.17$$

8.6 As no mixes are permitted the asset liability optimisation phase simply consists of choosing the option with the greatest expected utility i.e. option P. Figure 1 provides a graphic presentation of the utility curve and the investment distribution.

8.7 As an alternative to ranking the investment options by expected utility is to express them as what is termed "the certainty equivalent return". This is obtained by determining the certain or risk free rate of return which has the same utility. This method does not work when the utility falls within a benchmark step.

9. Other Uses

9.1 The theory which has been developed is of considerable generality and provides a framework for categorising.

1. Investor types

Refer overleaf. Most of these features are obvious consequences of the expected utility formula in Section 3.4 (at least for the exponential utility function).

2. Risk definitions

The three phase portfolio selection process suggested in Section 7.1 with its clear separation of utility curve, investment distribution and asset/liability optimisations suggests a corresponding categorisation of risk definitions.

Liability-driven

These relate solely to the utility function for example the "risk ratio" suggested in this paper. These measures are personal to each investor.

Asset-driven

These relate solely to the investment distributions e.g. the various moments such as the standard deviation or variance. These measures are the same for all investors.

Asset/liability driven

These depend both on the utility function and the investment distributions e.g.

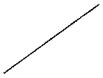
1. The probability of failure to achieve a particular benchmark e.g. positive return, the risk-free return and the average fund.

2. The expected utility of the zone of dissatisfaction(e.g. Clarkson).

3. Certainty equivalent return.

These measures are personal to each particular investor.

INVESTOR CATEGORISATION SCHEME

Category	Mathematical Definition (1)	Utility Curve	Example of Investor	Importance of investment distribution moments		Eligible Investment Distribution
				Variance	Skewness	
Risk averse						
Strong	$U'' < 0$ $U''' > 0$		Defined Contribution fund	Minimise	Maximise positive	
Weak	$U'' < 0$ $U''' = 0$		Defined benefit fund	Minimise	Not	
Risk Indifferent	$U'' = 0$			Not	Not	
Risk Lover	$U'' > 0$ $U''' < 0$		Gambler	Maximise	Maximise negative	

Note (1): In addition to $U' > 0$

11. Conclusion

11.1 The theory of utility has been applied specifically to the investment environment. In order to make this theory correspond more closely with investor behaviour the concept of benchmarks has been incorporated. The power of this theory has been demonstrated e.g its ability to incorporate other theories as a special cases and its potential for graphic presentation.

11.2 In recent years, the attention being given to the nature of the investors liabilities and their risk sensitivity has been increasing; the current focus on risk measures is symptomatic of this. The theories developed in this paper provide a means of quantifying these liability aspects. Quantification has been the precursor to success in other fields e.g. physics.

The advantages of these theories become more apparent when one contrasts the progress achieved against the current inability of the typical investor to articulate clearly the rules that guide his behaviour.

REFERENCES

BAILEY, A.H. (1862). On the Principles on which the Funds of Life Assurance Societies should be Invested. Journal of the Institute of Actuaries. Vo. 10, pp 142 - 147.

BOWERS, C.J. AND LESTER, R.R. (1980). Modern Investment Technology. TIAA, 1980, pp 334 - 418.

BOWERS, N.L. ET AT. Risk Theory. A publication by the Society of Actuaries, U.S.A. 1986 pp 2 - 20.

CLARKE, H.G. (1954). A Broad Analysis of the Problems of the Investment of Life Funds. Journal of the Institute of Actuaries. Vol 80, pp 335.

CLARKSON, R.S. (1989). The Measurement of Investment risk. Journal of the Institute of Actuaries. Vol 116. pp 127 - 178.

HEMSTEAD, J.R. (1968). One-year Returns and the Degree of Risk. Journal of the Institute of Actuaries. Vol 95, pp 19 - 77.

LEVY, H AND SARNAT, M (1984) Portfolio and Investment Selection: Theory and Practice. pp 104

MARKOWITZ, H.M. (1952) Portfolio Selection. The Journal of Finance, VII pp 77 - 91

PEGLER, J.B.H. (1948). The Actuarial Principles of Investment. Journal of the Institute of Actuaries. Vol 74 pp. 179 - 194.

VON NEUMANN, J AND MORGENSTERN, O. (1944). Theory of Games and Economic Behaviour.

BEHAVIOUR OF VARIOUS FUNDING METHODS UNDER CHANGING CONDITIONS

Presented by deLancey Worthington, BA, FIAA

1 INTRODUCTION

The purpose of this paper is to examine the behaviour of various funding methods using objective formulae to compare liquidity, stability, security and durability. Forty computer simulations of a defined benefit plan over 25 years were undertaken to obtain "experience" for examination. Details of the superannuation fund, and the assumptions underlying the model are contained in sections 15, 16 and 17.

2 DEFINITIONS

The following terms are used with the specific meanings outlined below:

2.1 Accrued Benefits Index (ABI)

The ratio of the market value of fund assets to the total accrued retirement benefits. Accrued retirement benefits are calculated as current final average salary (previous 3 years) times the accrued retirement multiple (15% for each year and complete month).

2.2 Vested Benefits Index (VBI)

The ratio of the market value of fund assets to the total leaving service benefits (resignation or early retirement if over age 55).

3 FUNDING METHODS EXAMINED

3.1 Entry Age Normal Funding Method A (EAN-A)

The normal cost each year is the new entrant rate based on the age and salary profile of new members. The surplus or deficit arising from using this normal cost is spread over the salary weighted future term to normal retirement date. If surplus is sufficient to provide a contribution holiday for 5 years then this option is taken.

3.2 Entry Age Normal Funding Method B (EAN-B)

This method is the same as EAN-A except that no contribution holidays are taken unless the assets and future member contributions are sufficient to meet the expected cost of all future benefits for existing members.

3.3 Attained Age Normal Funding Method (AAN)

If assets exceed the value of accrued liabilities aggregate funding is used. Otherwise, aggregate funding is used for future service benefits and the deficit in respect of past service benefits is spread over the salary weighted average future term to normal retirement date.

3.4 Aggregate Funding Method (AGG)

The contribution rate is set as a level rate to meet the expected cost of prospective benefits for existing members.

3.5 Projected Unit Credit Funding Method (PUC)

The normal cost is the cost of prospective benefits accruing in the coming year. This is adjusted for any difference between the assets and value of accrued liabilities spread over the average future term in the fund with allowance for decrements.

3.6 FAS87 (FAS87)

Although FAS87 is an accounting standard, for the purposes of this paper I have assumed that it is possible to use this as a funding method. The method is identical to PUC except that the discount rate is set each year based on the net yield on long term Government Bonds. Unlike most of the other funding methods FAS87 is calculated every year, rather than used every 3 years. Negative contribution rates are taken as zero.

3.7 Target Funding Method 1 (TARGET1)

There are various methods of target funding but the first method that I have used is to aim for the assets to equal 100% of accrued retirement benefits in 3 years' time making no allowance for decrements, investment earnings or increases in salary. This is, therefore, a very simplistic funding method with the emphasis on security of benefits.

3.8 Target Funding Method 2 (TARGET2)

This method is more complex than TARGET1. The contribution rate is the higher of:

(i) A long-term contribution rate determined using EAN-A but using an assumed investment return reflecting the expected return on the actual assets. This rate is set every three years.

(ii) A contribution rate calculated each year being
(VB-AMV) / S / ·85 + AR - MCR

where
- VB is vested benefits at the calculation date
- AMV is adjusted market value at the calculation date. The adjustment is to allow for the "worst" situation to occur with the market value of assets, and therefore depends on the current investment policy.
- S is the total salaries for members of the fund.
- AR is the retirement benefit accrual rate.
- MCR is the member contribution rate.

This method was selected to concentrate on protecting the security of assets and to limit the contributions when the fund is "adequately" funded.

4 METHOD

In order to compare each of the funding methods I have used measures of average liquidity, stability, security and durability. And for liquidity, stability and security I have also calculated measures of the worst situation.

4.1 Liquidity

The ability to meet benefit payments without the need to sell assets.

For the purposes of liquidity I have assumed the fund is self invested and that all investment income is reinvested and therefore not available for paying benefits. If the fund is in a pool the investment manager is usually able to make large benefit payments from the cash inflow from other investors in the pool without the need for realising assets. In each year of the projection I have calculated benefit payments less member contributions, less company contributions. There may be a shortfall which must be met from assets. The shortfall each year is divided by the amount of assets in the particular year and then the ratios for each projected year are averaged. The result can be considered to be an indicator of the average proportion of the fund that needs to be invested in liquid assets.

The worst ratio was also recorded. This result could be considered to be the minimum proportion of the fund in liquid assets, in the situation that generated the worst result.

4.2 Stability

A funding method is considered to have stability if the contributions from year to year are either at the same rate each year, or at a similar rate rather than fluctuating significantly from year to year.

The stability of the contribution rate is assessed by two measures. The first measure is the average absolute change in the contribution rate compared to 3 years ago. Absolute means the absolute value of the change has been taken. The other measure is the largest absolute change in contributions over a 3 year period.

4.3 Security

The ability to meet benefit obligations as they arise and in particular the value of assets compared to accrued liabilities.

I have used four measures of security, two based on the Accrued Benefits Index and two based on the Vested Benefits Index. These measures are the average index and the worst value of the index achieved in any year of the projections.

4.4 Durability

The ability to absorb a change in economic or demographic conditions.

To measure the durability of each funding method I have looked at the effect on the contribution rate and the accrued benefits index of 2 different disruptions of the fund. Firstly, the value of assets is assumed to fall by 30%, and secondly, the fund becomes closed to new members. These measures are only documented for one investment portfolio. This portfolio has been selected so the impact of the disruptions is not swamped by investment profits. This could occur because the underlying financial assumptions are based on a period of historically high real investment returns.

4.5 Alternative Benefits

In looking at alternative benefit designs I wanted to consider designs that were very similar to the ones that I had used for the majority of the results. I therefore took a very simple approach of altering the interest rate that was credited to members' accumulations.

The standard design had been a five year average of the fund's investment returns, reduced by 1% as an allowance for expenses. My first alternative was to use the investment return in the current year reduced by 1%. My second alternative was to credit the salary inflation rate to the member's accumulations. Each of these designs had roughly the same expected costs under the funding methods used. The first alternative was chosen under the expectation that vested benefits would show behaviour much closer to the variations in the assets. The second alternative was chosen so that all benefits achievable from the fund would be based on salary and not related in any way to the performance of the fund. The same asset portfolio has been used to compare the relative behaviour of each of the funding methods.

The measure I have used for both the current return and salary increase alternatives is the change in the average accrued benefits index and for the current return alternative I have also measured the change in the worst vested benefits index across the range of portfolios in Group A.

5 COMPUTER MODEL

An asset liability model was developed to examine the behaviour of the fund under the varying conditions. The model has the following features:

(1) It stochastically generates rates of inflationary salary increases, the yield on long-term government bonds, and the annual return on various asset classes. The method of generating these returns is detailed in section 20.

(2) It projects assets, cash flows, solvency ratios and valuation results for each year.

(3) It breaks the process into 3 steps:

a) determination of valuation factors on various bases;
b) preparation of a summary of features using standard assumptions; and
c) calculation of the results using stochastic assumptions to adjust the results determined using standard assumptions.

(4) It has the ability to have an experience basis different to the valuation basis relating to decrements, new entrant distribution and financial assumptions. Except for FAS87 and TARGET2 the same funding method is used each 3 years with constant financial assumptions of 9% investment return and 7% inflationary salary increases. FAS87 and TARGET2 are calculated each year. The FAS87 investment return/discount rate is based on the generated long-term bond yield. TARGET2 uses the expected return on the portfolio for its investment return assumption. Promotional salary increases are also included, reducing the effective gap to about 1% on average. For the purposes of comparisons I have assumed that the decrements experienced match the decrements expected on the valuation basis.

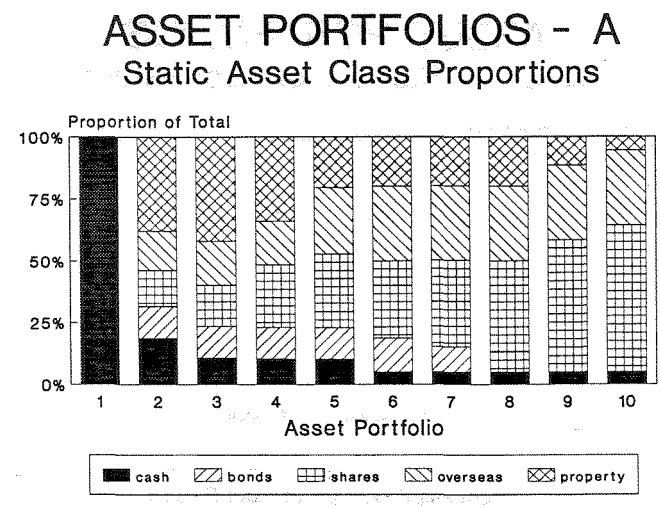
6 ALTERNATIVE ASSET PORTFOLIOS

Two groups of ten different investment portfolios have been utilised comprising of a mixture of cash, bonds, shares, overseas investments and direct property. I will call these Group A and Group B and the results from these portfolio groups will be similarly labelled. The proportions in each asset class were determined by an optimiser using the average real rates of return, standard deviation of real returns, correlation of real returns and constraints on the proportions in each asset type. Varying constraints were introduced to produce a range of portfolios similar to those that may have been used by an investment manager in recent years. Changes in asset values have been assumed to be log normally distributed. The proportions generated by the optimiser are shown in graphs 1A and 1B.

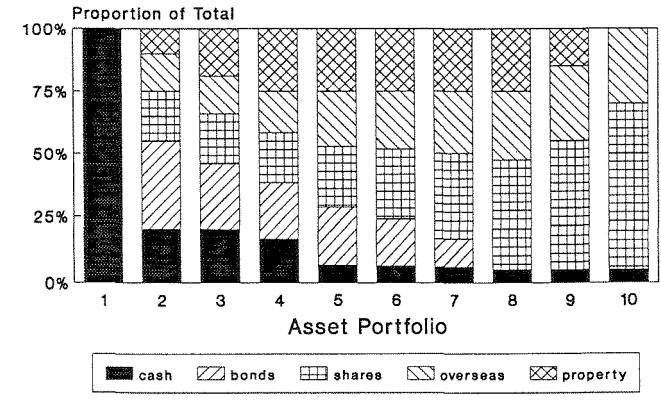
The assumptions underlying Group A have been determined from the experience during the 1980's. Real returns have been taken as the excess over increases in AWE. Group B assumptions have been artificially created by suppressing the Group A figures to give a less optimistic expectation. The Group A portfolios have expected annual real rates of returns ranging from 2% for portfolio 1 which is 100% cash, increasing to 6.8% for portfolio 10 which has a large proportion of the fund in equity assets. Group B has lower expectations ranging from an annual real return of 0.6% for portfolio 1 to 3.8% for portfolio 10. The expected return and standard deviation of return of each asset mix are plotted in graph 2 to show the frontier resulting from the optimisations. The lumpiness in the frontier is caused by changes in the constraints.

A fund is assumed to maintain a fixed investment portfolio (the model does allow this to be altered each year but if used would introduce a further dimension to the results).

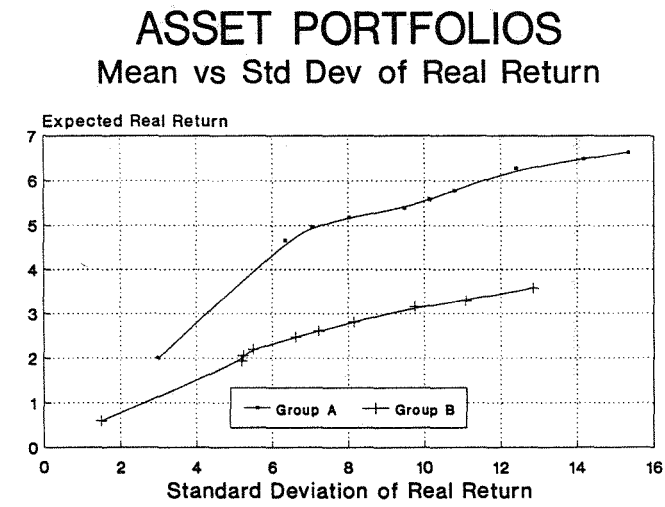
To demonstrate the effects over time of the investment portfolio on the funded position I have graphed the quartiles of the accrued benefits index generated by portfolios 1 and 7 of Group A, using aggregate funding. This is illustrated in graphs 3 and 4. The more volatile investment mix produces an ever expanding funnel of likely outcomes. The more stable investment mix produces a stable distribution after only a few years.



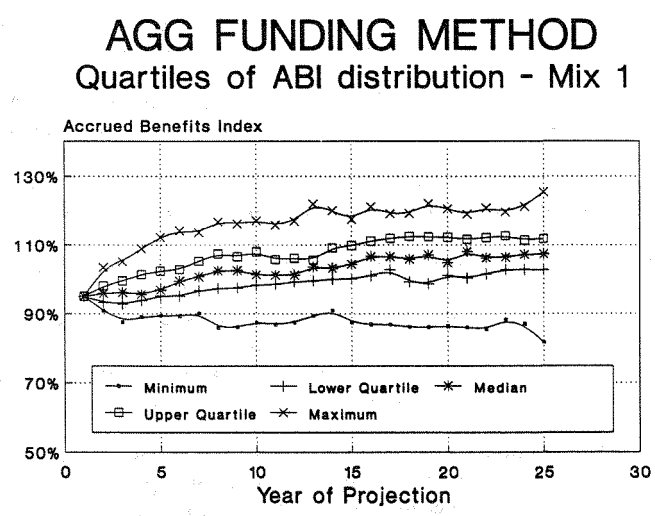
Graph 1A



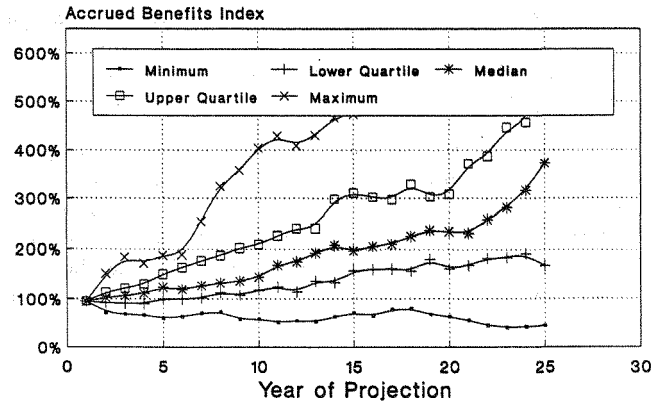
Graph 1B


ASSET PORTFOLIOS
Mean vs Std Dev of Real Return
Expected Real Return
7
6
5
4
3
2
1
0
0
2
4
6
8
10
12
14
16
Group A
Group B
Standard Deviation of Real Return

Graph 2



Graph 3



Graph 4

7 CONTRIBUTION RATES GENERATED BY EACH FUNDING METHOD

The contribution rates generated by the eight funding methods for various levels of accrued benefits are shown graphically in graphs 5 to 12. Graph 13 also shows the contribution rates generated by TARGET2 relative to its target of the vested benefits. Portfolios 1, 2, 7 and 10 of Group A have been used to demonstrate the effect of investments on the contribution rate.

Each method demonstrates a contribution rate which decreases as the funding level increases. Each method shows results scattered around a central axis. If the results had been measured only at the review date then all of the results would have been on the axis, as shown by FAS87 and TARGET2. For those funding methods which review the contribution rate every three years, the experience between review dates has caused the dispersion of contribution rates. This behaviour of neatly sitting along a straight line, rather than being more dispersed is because the membership population used is stationary in its age, salary and service profile.

7.1 **EAN-A** (Graph 5) can cause the contribution rate to be inappropriate for the financial position of the fund when it is poorly funded. The normal cost for this method is 8.8% of salaries. Once there is sufficient surplus to reduce contributions below 6.5% then no contributions are required.

7.2 **EAN-B** (Graph 6) The normal cost for this method is 8.8% of salaries. The behaviour of this funding method is similar to EAN-A but with contributions still required when the ABI is 170%. This can result in contributions being paid to the fund when the ABI is 230% due to movements in asset values between actuarial reviews. Surplus or deficiencies are spread over the average period to normal retirement of existing members and allows for future contributions in respect of future new members.

7.3 **AAN** (Graph 7) The normal cost for this method is about 9.0% of salaries. The behaviour of this method is bimodal. When there is surplus in the fund the contribution rate is determined using aggregate funding. When there is a deficit, on the value of accrued liabilities, however, the behaviour is similar to EAN-A. This can be seen in a change in the slope of the central axis when the contribution rate is 9.0%.

7.4 **AGG** (Graph 8) Compared with EAN-A and EAN-B the gradient of the line is steeper with zero contributions being calculated at a lower ABI level than EAN-B. The line is steeper because the "surplus" or "deficit" is spread over a shorter period, being roughly the salary weighted annuity for the period that each current member will remain in the fund, allowing for decrements.

7.5 **PUC** (Graph 9) The normal cost for this method is 9.0% of salaries. Any surplus or deficiency over the value of accrued liabilities is spread over the weighted average period that the existing members will be in the fund. The slope and point at which no contributions are required is very similar to AGG.

7.6 **FAS87** (Graph 10) This method is the same as PUC except the actuarial assumptions may be changed. The multiple lines appearing on the graph are for different groups of assumptions. The slope of the line does not change as the assumed investment return is altered, rather the line moves to a lower contribution level. A different normal cost applies for each group of assumptions.

7.7 **TARGET1** (Graph 11) The normal cost for this method, when it is at its target, is a contribution rate of 10% of salaries. This is the cost of benefits accruing in one year, net of member contributions. The slope of the line is much steeper than the previous method as the surplus/deficiency is amortised over 3 years.

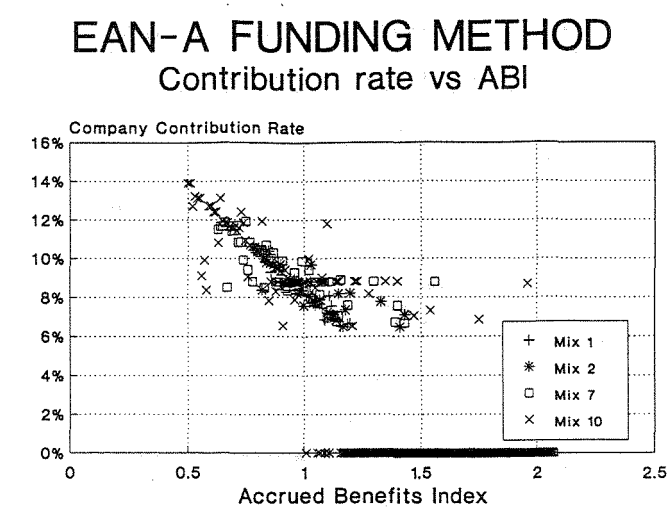
7.8 **TARGET2** (Graphs 12 and 13) Different contribution curves, with different slopes occur depending on the asset mix. For a fully cash portfolio the likelihood of falling into insolvency is very small, therefore the contribution rate is not high and is fairly level over a wide range of funding levels. For more volatile investment portfolios a greater margin against potential falls is established, leading to quite high funding levels being necessary to avoid insolvency.

7.9 General Comments on Contribution Rates

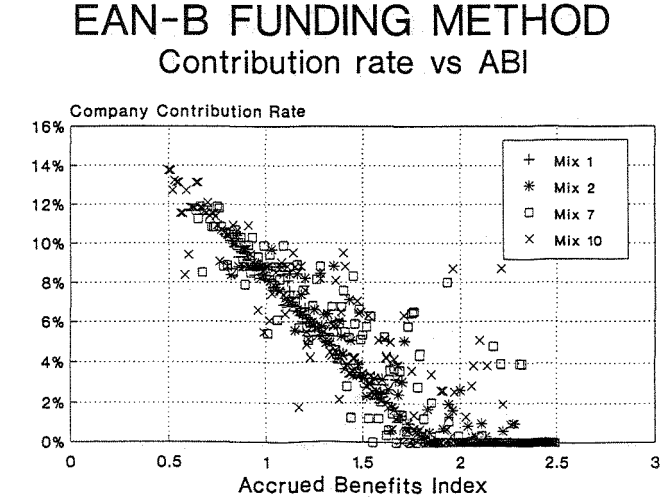
Because of the nature of the formulae used to determine contribution rates most of the funding methods produce rates which are a linear, or near linear, function of the accrued benefits index. The important features of each method, which influence its behaviour, are the point at which contributions are zero and the slope of the line. The lower the ABI level at which the funding method cuts the contribution flow, the less likely is the fund to generate surpluses. The steeper the slope of the line, the more responsive is the contribution rate to a change in the financial position of the fund.

Taking EAN-B to have a slope of 1.0 then the funding methods have the following relative responsiveness to changes:

EAN-A	1.0
EAN-B	1.0
AAN	1.8 and 1.0
AGG	1.8
PUC	1.8
FAS87	1.8
TARGET1	7.0
TARGET2	9.2

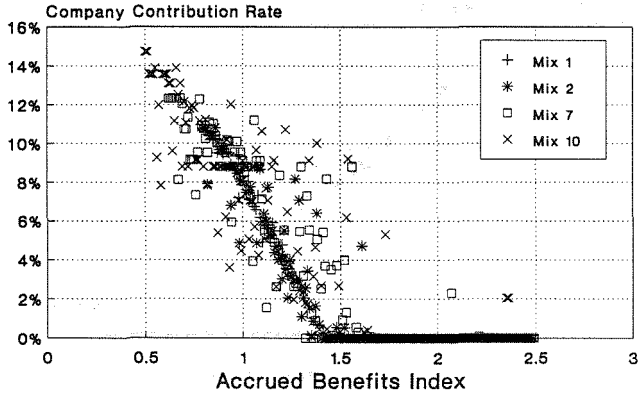


Graph 5



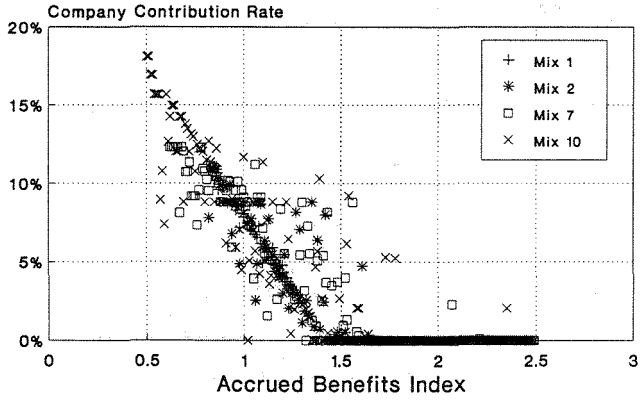
Graph 6

AAN FUNDING METHOD
Contribution rate vs ABI



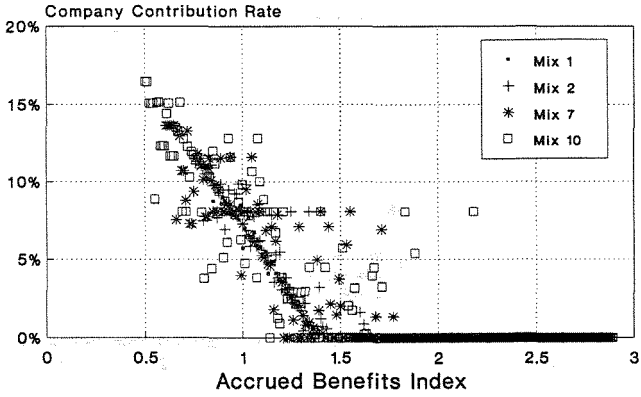
Graph 7

AGG FUNDING METHOD
Contribution rate vs ABI



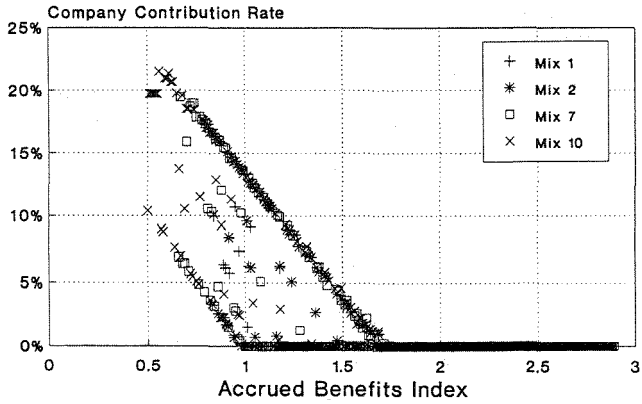
Graph 8

PUC FUNDING METHOD
Contribution rate vs ABI



Graph 9

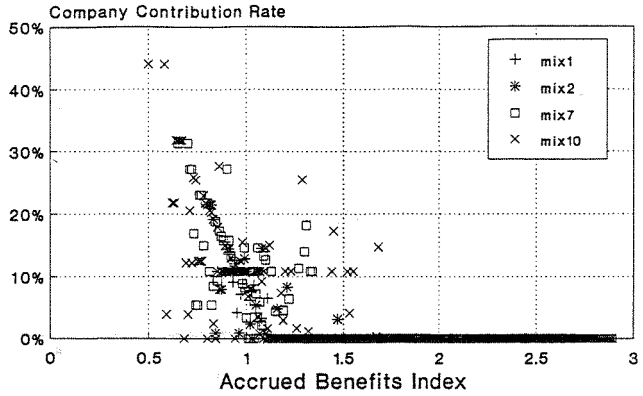
FAS87 FUNDING METHOD
Contribution Rate vs ABI



Graph 10

TARGET1 FUNDING METHOD

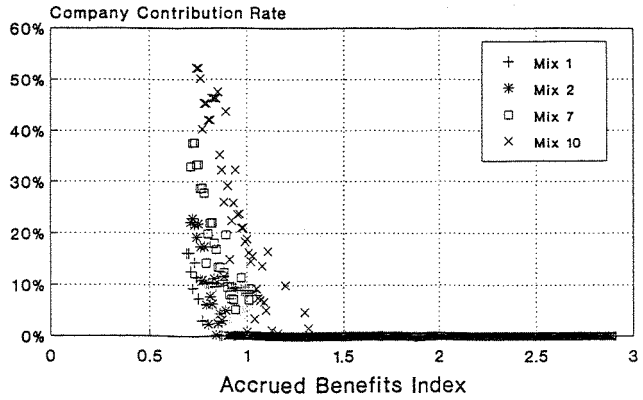
Contribution Rate vs ABI



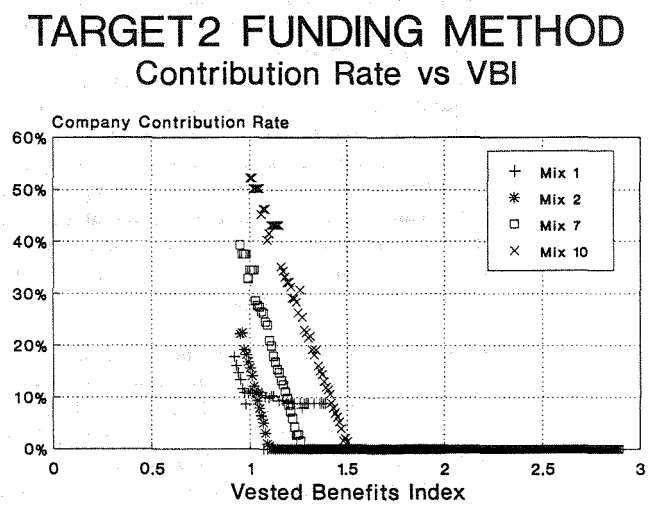
Graph 11

TARGET2 FUNDING METHOD

Contribution Rate vs ABI



Graph 12


TARGET2 FUNDING METHOD
Contribution Rate vs VBI
Company Contribution Rate
60%
50%
40%
30%
20%
10%
0%
0
0.5
1
1.5
2
2.5
3
Vested Benefits Index
Mix 1
Mix 2
Mix 7
Mix 10

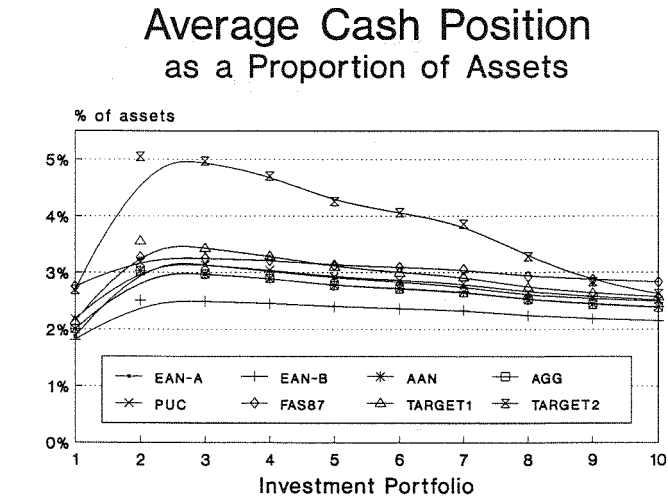
Graph 13

8 RESULTS OF LIQUIDITY TESTS

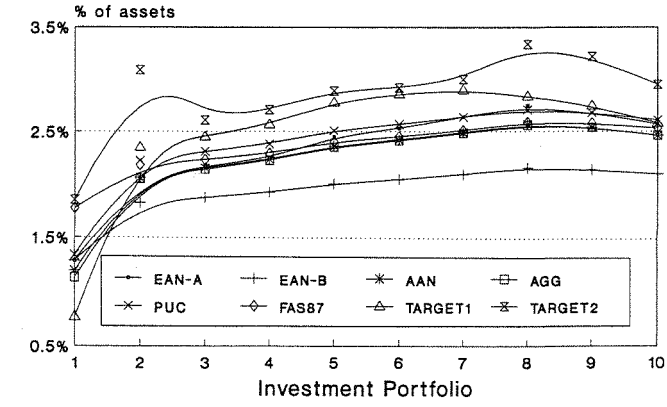
8.1 Graphs 14A and 14B show the average cash required as a proportion of assets for each of the funding methods over the 10 different asset mixes in Group A and Group B. As the expected return on assets increases there is a consequent reduction in the level of contributions required as calculated by the funding method. This results in a reduction in the fund's cash flow available to meet benefit payments. TARGET2 demonstrates a lower level of liquidity (ie. a higher need for cash) than any of the other funding methods. EAN-B, on the other hand, with contributions payable at a higher rate than the other methods, is more able to pay benefits out of cash flow. The traditional funding methods all show similar behaviour. All methods require some level of liquid assets.

8.2 Graph 15A and 15B show the worst situation, which arises when contribution rates are low. The results are effectively in reverse order of the contribution rates at high levels of ABI. EAN-B is the most liquid with a liquid assets requirement of about 4% of assets. TARGET1 is the worst with a requirement of 8% of assets. This suggests that particularly during periods of healthy asset values (high ABI, low or nil contributions) it is necessary to maintain a reasonable cash level in the fund.

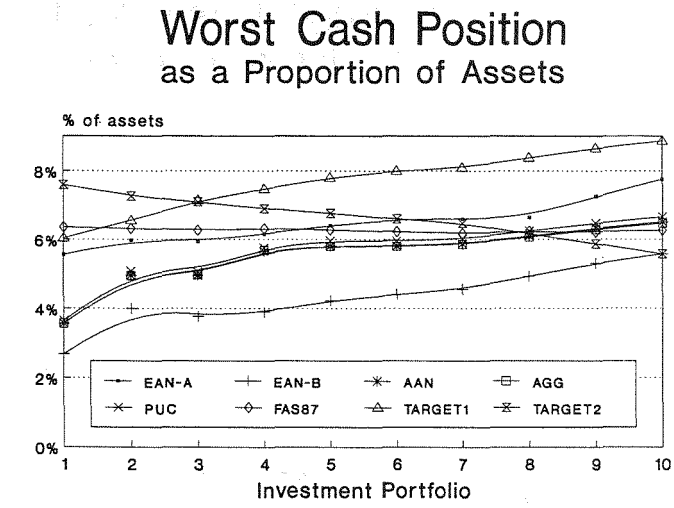
The results shown by Group A and Group B are similar with the relativities of the various funding methods being maintained.



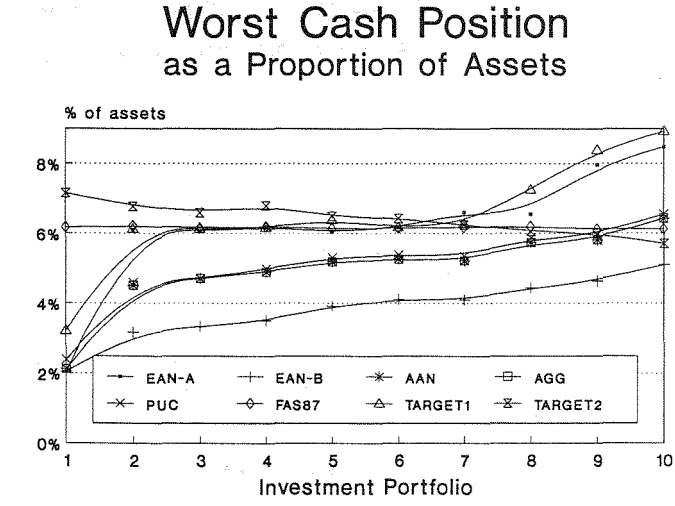
Graph 14A



Graph 14B



Graph 15A



Graph 15B

9 RESULTS OF STABILITY TESTS

9.1 Average Contribution Change

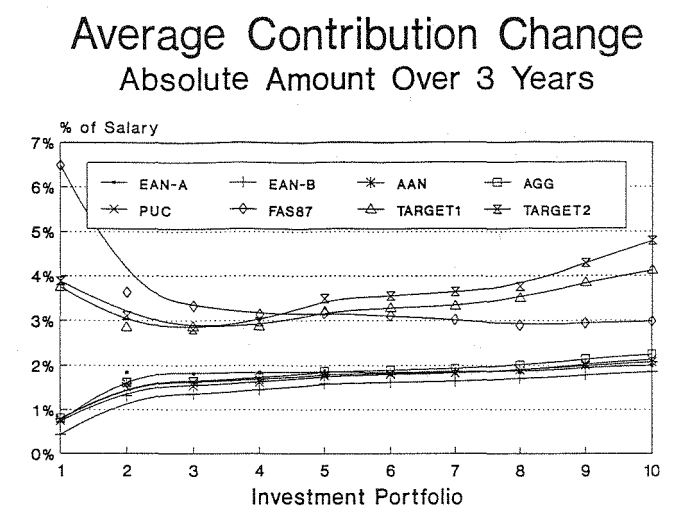
Graph 16A and 16B sets out the average change in contributions over 3 years for various asset mixes. The results show 2 main groups, the first being the traditional funding methods and the second being FAS87 and the Target methods.

The first group of funding methods produce very similar results of about a 2% of salary change every 3 years. FAS87 and the target funding methods produce about two to three times the level of average variation in the contribution rate. This reflects the nature of the funding methods. The first group is long-term and tries to even costs from year to year whereas FAS87 and target funding have a shorter time horizon, and vary their outlook frequently.

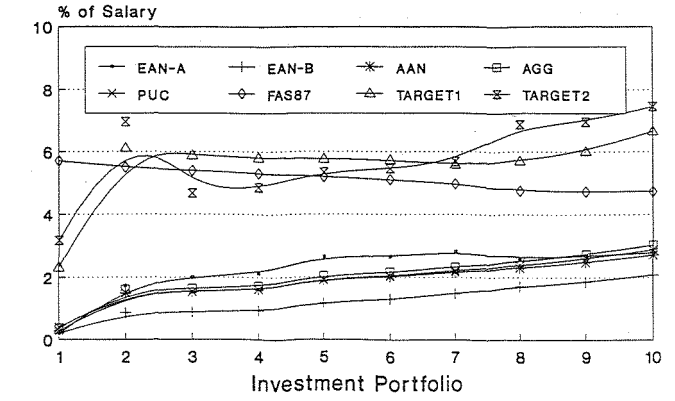
There is a general trend of increasing variability of contributions as the volatility of assets increases.

9.2 Largest Change in Company Contributions

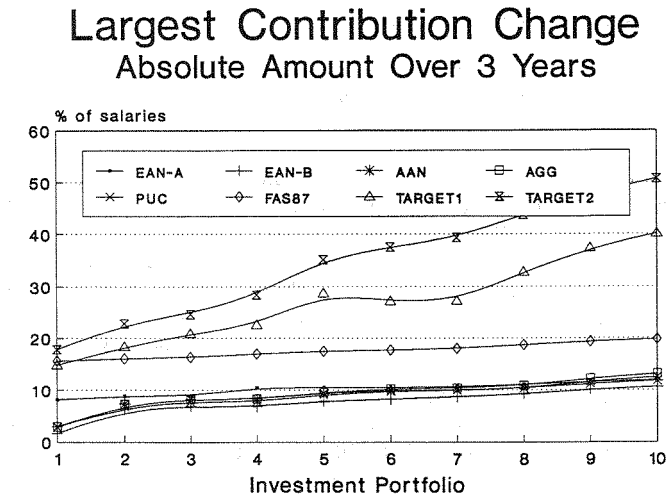
There is similarity in the results for the largest change in company contributions, as shown in Graph 17A and 17B, with the average change in Graphs 16A and 16B. All the funding methods show at least a gradual trend of increasing fluctuations in contributions as we progress to portfolios with greater equity content, and hence more variability of asset values. EAN-A produces a higher absolute change than the other traditional funding methods. This is because there is a large jump in and out of the contribution holiday. Again FAS87 and target funding are much higher than other methods. The increased variability in contributions as the expected return on asset increases is due to the much larger swings in asset value that occur as the expected returns increase.



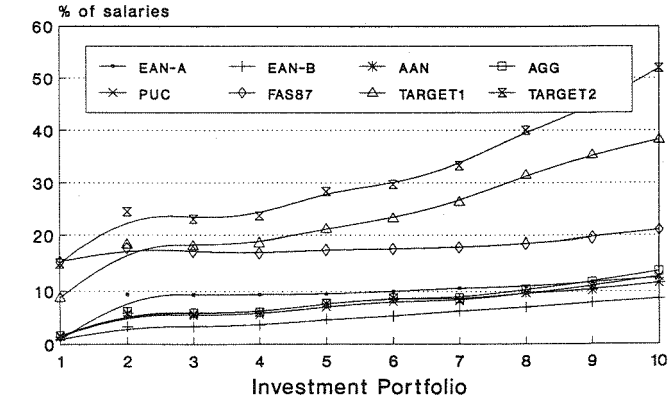
Graph 16A



Graph 16B



Graph 17A



Graph 17B

10 RESULTS OF SECURITY OF BENEFITS

10.1 Average ABI and Average VBI

Graph 18A and 18B shows the average accrued benefits index demonstrated by each of the funding methods and graph 19A and 19B shows the average vested benefits index.

All the methods result in increasing average security (as measured by ABI and VBI) as the expected return on assets increases. The also (except for TARGET2) retain their relatively to each other. The highest security is shown by EAN-B. Except for portfolios 9 and 10 the lowest security is shown by TARGET2. The average vested benefits index is flatter than the average accrued benefits index. This is because the average fund earning rate is credited to members accounts linking the vested benefits to the increasing return on assets. For the portfolios with very high proportions of equity assets, the VBI is actually lower than the ABI. This means that the very high crediting rates generated by those portfolios have resulted in resignation benefits for long serving employees being in excess of their accrued retirement benefits. The group of traditional funding methods again shows very similar behaviour.

TARGET2 anticipates large swings in asset values for the portfolios with large equity contents, causing large contributions to be paid. This forces the average funded position to improve relative to the other methods.

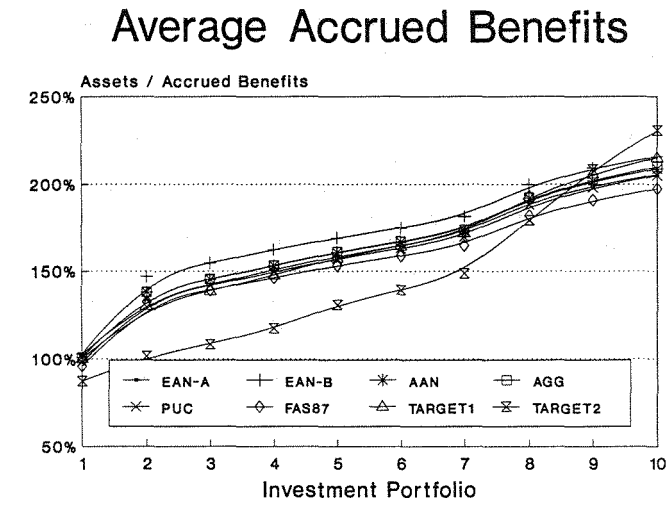
Group B produces lower security as investment returns are lower, producing less surplus. This brings TARGET2 and the other methods closer together.

The ranking of the funding methods from lowest average security to highest average security is:

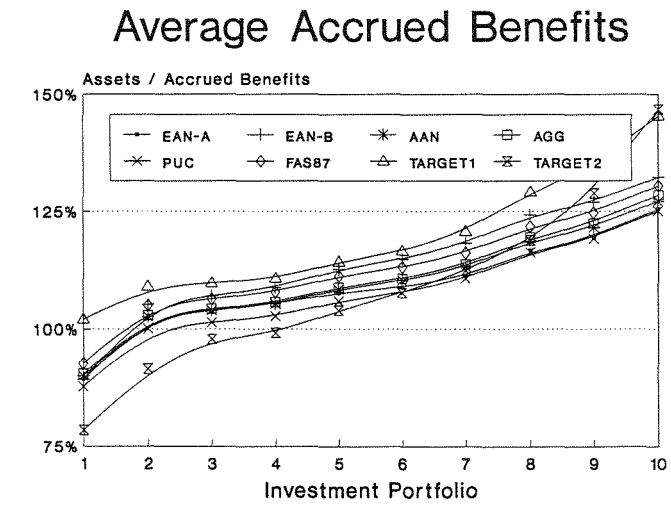
TARGET2, PUC, EAN-A, AAN, AGG, FAS87, EAN-B, TARGET1.

10.2 Worst ABI and VBI

The trade-off between the increase in average return on the portfolio and the variability of the return can be seen by the minimum ABI and VBI achieved for each asset mix. These are shown in graphs 20A and 20B and graphs 21A and 21B respectively. In both sets of graphs the minimum gets worse, for each funding method except TARGET2, as the volatility of the assets increases. TARGET2 is steady across the investment portfolios as it anticipates the volatility of the assets. For the most of the investment portfolios the VBI can fall well below 100% for any of the funding methods except TARGET2. If the funds found themselves in this position then there would be the need for a large contribution from the Company to restore the solvency of the fund. The contribution rate would then behave similarly to TARGET2 when the VBI is low. Other than TARGET2 the funding methods behave similarly. The traditional methods produce almost identical results. TARGET1's behaviour has the same shape for Group A and Group B but produces much better results for Group B.

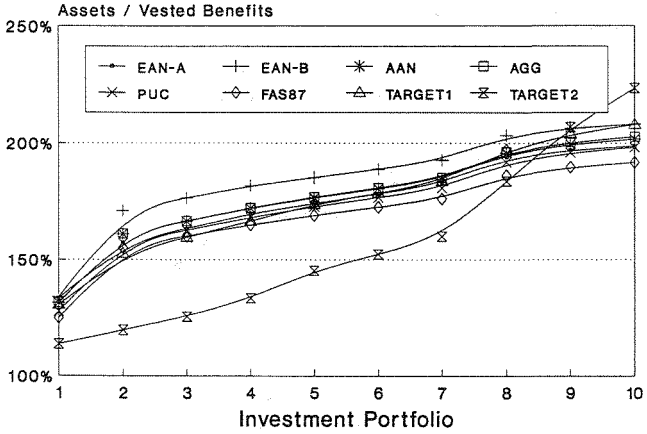


Graph 18A



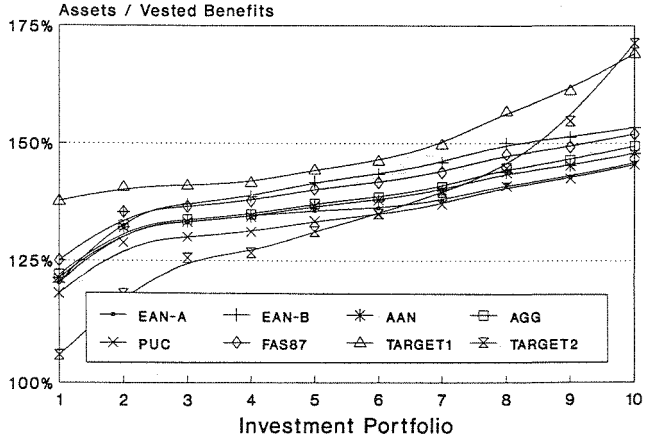
Graph 18B

Average Vested Benefits Index



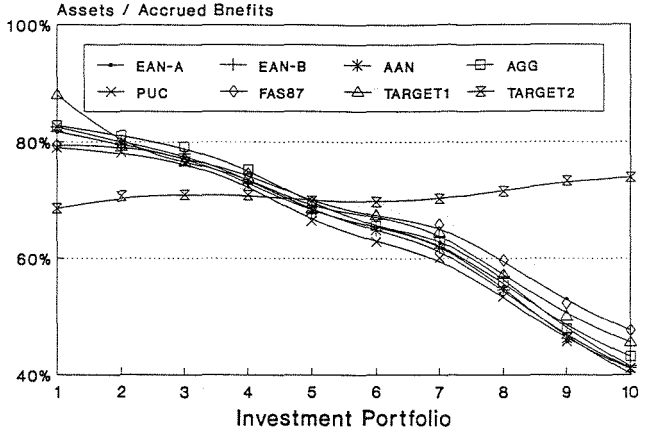
Graph 19A

Average Vested Benefits Index



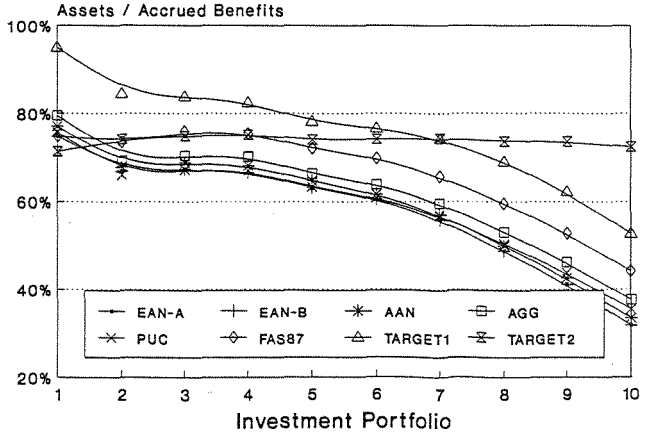
Graph 19B

Worst Accrued Benefits Index

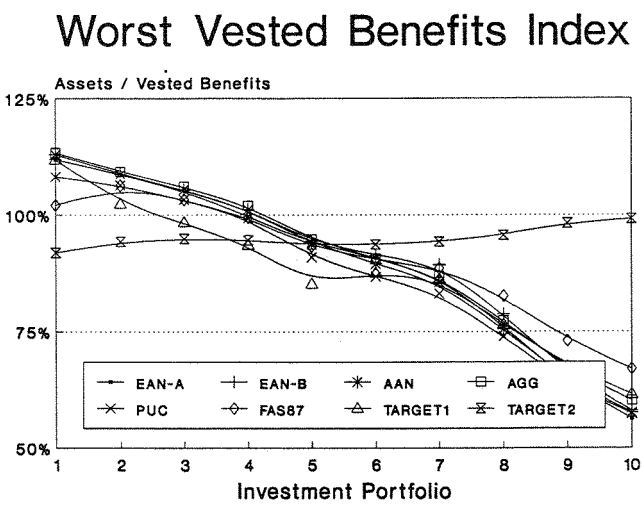


Graph 20A

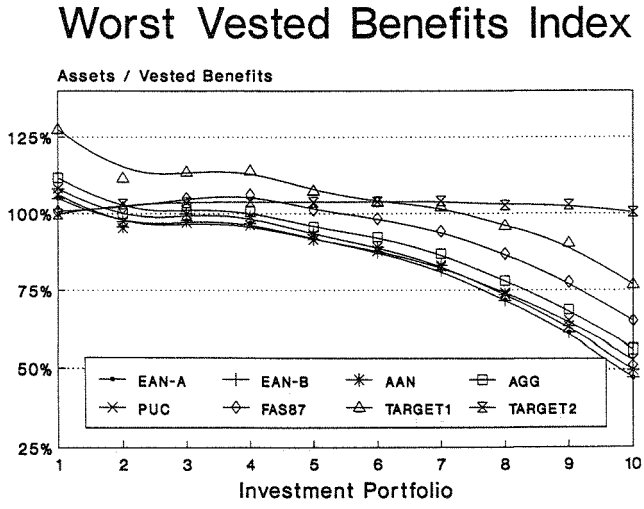
Worst Accrued Benefits Index



Graph 20B



Graph 21A



Graph 21B

11 RESULTS OF DURABILITY TEST

11.1 30% Fall in Asset Values

In the first year of projection the generated investment return was reduced by 30% to give the result that the asset values would fall 30% below what would otherwise have been the case. The reaction of each of the funding methods was then measured by looking at the contribution rates which arose as a result of the 30% fall in asset values. These differences were averaged across forty different simulations. Similarly, the VBI and ABI generated by each of the funding methods as a result of the 30% fall in asset values has been averaged.

11.1.1 Effect on Contributions

The effect of the fall on the contribution rates for each of the funding methods is shown in graph 22. At the time the disruption in asset values occurred, each of the traditional funding methods was sitting close to their average long term "target" for the accrued benefits index. The behaviour shown for the contribution rates for the traditional group of funding methods is to spread the deficit over the future working lives of the then current members and at each successive valuation to respread the remaining deficit and therefore to gradually allow for the impact of the fall. FAS87 and TARGET2 reacted most violently to the fall in asset values and set a high contribution rate which was expected to recover their target position quickly. This was achieved, as their contribution rates stabilised in only a few years.

11.1.2 Effect on Security of Benefits

The average ABI and VBI illustrated in graphs 23 and 24 adjusted quite smoothly to the 30% fall in asset values. It can be seen that TARGET2 returned to its long term position the year after it took full recognition of the fall in asset values. TARGET1 also moved quickly to achieve a long-term stable position after 7 years. The other funding methods are much more gradual in their approach to the long term position. They are still improving relative to TARGET1 after 25 years.

The funding methods appear to take one of two stances, either they spread the effect over a long period and gradually return to their long term position, or as is the case for target funding, they react violently to the change and attempt to recover their long term position quickly. The latter approach is more satisfactory for the security of benefits.

11.2 Closure of the Fund to New Members

In the first year of the projection, the flow of new members to the fund was ceased. Each of the funding methods continued to use it previous assumptions regarding new members, particularly in spreading any surplus or deficiency.

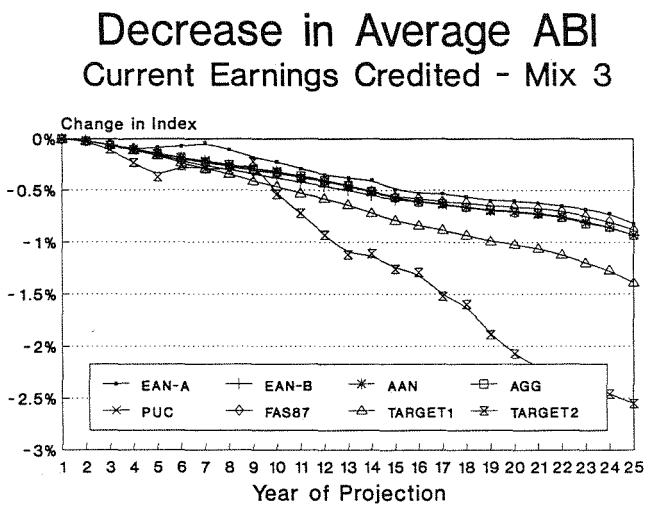
11.2.1 Effect on Contributions

The impact on the contribution rates are shown in graph 25, expressed as a multiple of the rate for the fund if it had remained open to new members.

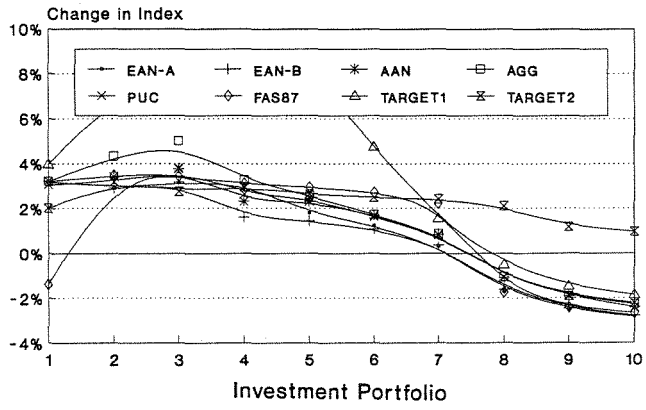
The change in contribution rate for each of the methods is similar except for TARGET2. The traditional group of funding methods show quite similar behaviour, with the contribution rate gradually decreasing over time relative to the rate payable for an open fund, under the influence of high investment returns and a declining membership. The highest relative contribution rate is demonstrated by TARGET2, which is responding to the ageing of the membership population and increase in vested benefits. Both the target funding methods ignore exits from the fund in the coming 3 years and therefore set a target which is above the eventual outcome. This results in unnecessarily high contributions which are dampened on the upwards side by the surplus that they generate.

11.2.2 Effect on Security of Benefits

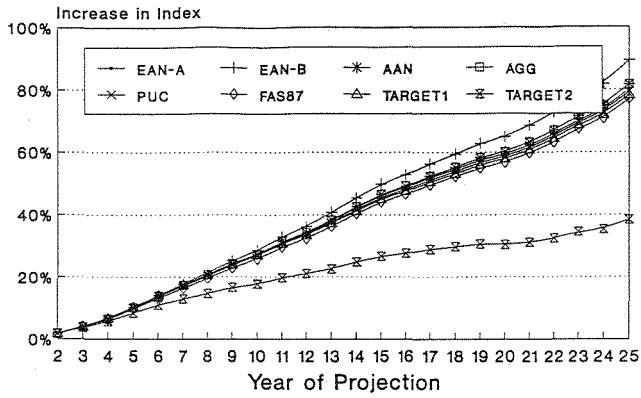
The progression of the ABI and VBI shown on graphs 26 and 27 is quite similar for all the funding methods. There is a large increase in the ABI and VBI over the period after the closure of the fund to new members. This demonstrates the inability of the funding methods to reduce surplus once it reaches the critical level at an ABI of about 1.5 when the funding methods reduce to zero contributions. All the funding methods are very close together because the contribution rates, although different, are quite small. The distortion in the VBI at 25 years is caused by the lumpiness of cash flows for the few remaining members.



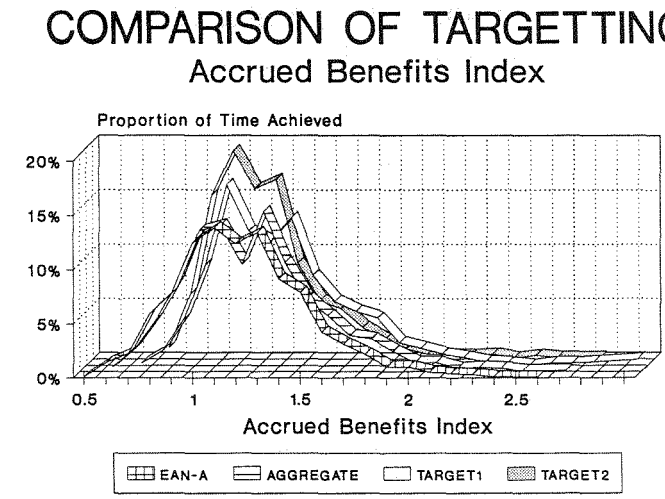
Graph 28



Graph 29


Increase in Average ABI
Salary Related Benefits - Mix 3
Increase in Index
100%
80%
60%
40%
20%
0%
EAN-A
EAN-B
AAN
AGG
PUC
FAS87
TARGET1
TARGET2
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Year of Projection

Graph 30


COMPARISON OF TARGETTING
Accrued Benefits Index
Proportion of Time Achieved
20%
15%
10%
5%
0%
0.5
1
1.5
2
2.5
Accrued Benefits Index
EAN-A
AGGREGATE
TARGET1
TARGET2

Graph 31

12 RESULTS OF TESTS OF ALTERNATIVE BENEFIT DESIGNS

12.1 Crediting Current Earnings

Using the earnings in the latest year rather than a 5 year average, had very little impact on the results. The vested benefits on average, increased marginally, causing the VBI and ABI to decline. The ABI declined as slightly higher benefits are paid, reducing the assets. This was most pronounced, but still only slight, for TARGET2 which bases its funding on the actual vested benefits. This is shown in graph 28. I believe the decline is the result of the stochastic returns produced by the simulations. An increase is also possible.

The worst VBI as shown in graph 29, is improved for most investment mixes. This is because the accumulation vested benefits follow the changes in assets more closely.

12.2 Crediting Salary Increases

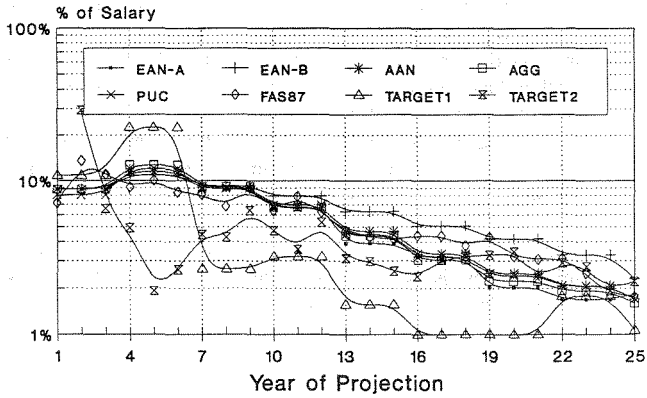
The rate of interest actually credited to members is on average lower than crediting one based on the investment return because of the high return expected for Mix 3. As a result of the lower amount of resignation benefit being paid to actual exits the surplus generated in the fund is a little higher than would otherwise be the case. These two effects result in much higher coverage of vested benefits. This is demonstrated by the average accrued benefits index in graph 29.

TARGET2 which bases its funding on the developing vested benefits takes better account of the developing surplus.

13 EFFECTIVENESS OF TARGET FUNDING METHODS

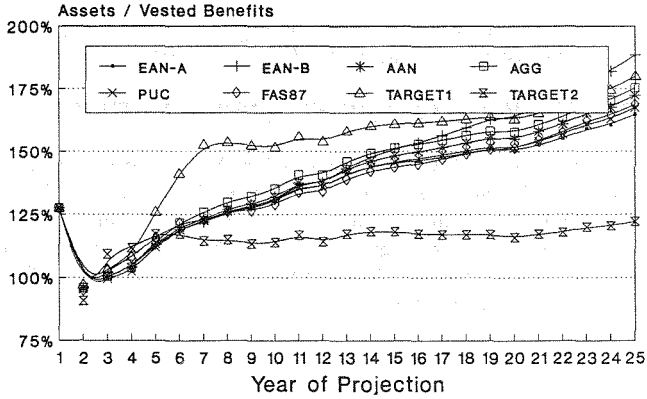
The accrued benefits index generated in the second to twenty fifth year of forty simulations are compared for EAN-A, AGG, TARGET1 and TARGET2 based on portfolio 7 of Group B. A frequency distribution for each method is shown in graph 31. EAN-A and AGG produce a significant number of outcomes which would result in insolvency. TARGET2 is more centralised than the other methods.

Average Contribution Rate
after Crash - Mix 3



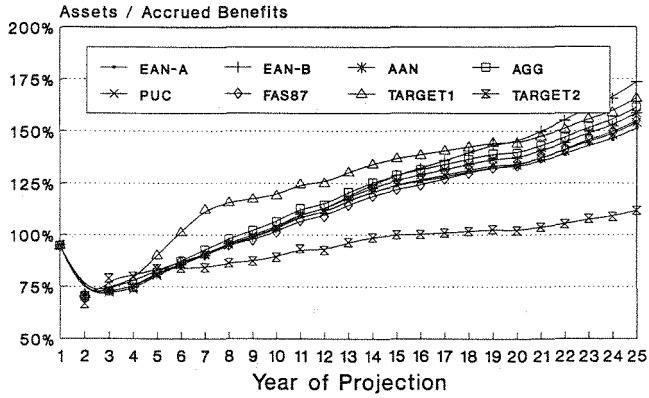
Graph 22

Average Vested Benefits
after Crash - Mix 3



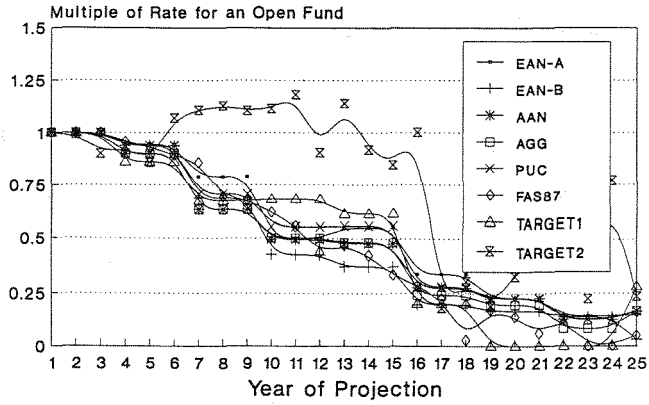
Graph 23

Average Accrued Benefits
after Crash - Mix 3



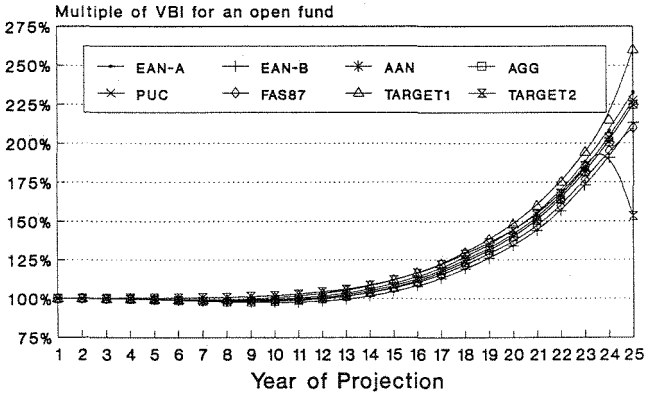
Graph 24

Average Contribution Rate
after Closure to New Entrants - Mix 3



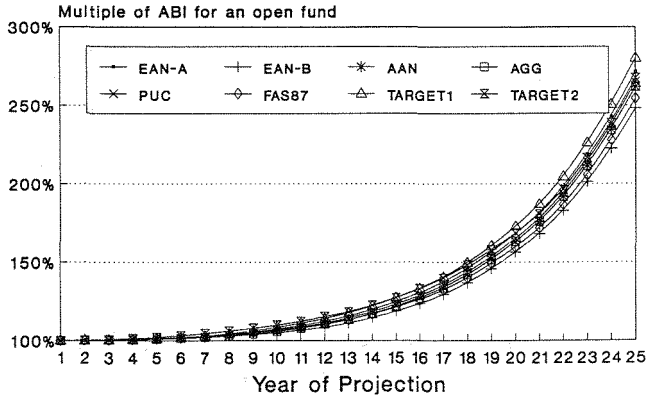
Graph 25

Average Vested Benefits
after Closure to New Entrants - Mix 3



Graph 26

Average Accrued Benefits
after Closure to New Entrants - Mix 3



Graph 27

14 CONCLUSION

14.1 The funding methods used by the majority of actuaries in Australia at the current time which include entry age normal, attained age normal, aggregate and PUC produce very similar results under most conditions. In handling surpluses and deficiencies they tend to take a long term approach which smooths the contribution rates but causes the vested benefits index and the accrued benefits index to fluctuate. FAS87, being calculated each year, and target funding tend to respond more quickly to changes and therefore result in greater fluctuations in the contribution rate. This is offset by a lesser degree of variation in the vested benefits and accrued benefits indices. If contribution holidays are introduced into the entry age normal method, then the behaviour moves between that of the traditional, long term methods and the short term target methods.

14.2 All the funding methods cannot handle large surpluses, which can be self sustaining. Funding methods which recognise surpluses more quickly, such as TARGET1 and TARGET2 result in lower surpluses being generated. The contribution rates, however, are much more volatile.

14.3 The Target funding methods also automatically steer the funding away from insolvency, at the cost of high contribution rates and high volatility of contribution rates. The traditional methods can lead to solvency difficulties if there is an investment collapse.

14.4 The responsiveness of the various methods can be seen in slope of the graph of the contribution rate against the ABI. The methods that review the contribution rate only once every three years can result in inappropriate contributions being paid, particularly if a large proportion of volatile investments is held. In these circumstances the funding position should be at least broadly examined each year, to determine whether the current investment policy and contribution rate remain suitable.

14.5 It may be suggested that our actuarial assumptions are at fault when the large current surpluses held by many funds are considered. Using assumptions closer to actual experience would have given much lower contribution rates and correspondingly produced lower surpluses. The effect of varying the assumptions can be seen in Graph 10, with the lowest rates being calculated on a 5% real return.

14.6 The TARGET2 funding method, however, demonstrates that solvency considerations quickly override the fall in contribution rate. This is because the fall in asset values possible with an aggressive investment mix can very quickly threaten the coverage of vested benefits if the fund is not well funded before the fall. This also suggests that trustees should be made more aware of the possible outcomes given the fund's current funded status and investment policy.

14.7 The contribution rates required by TARGET2 (as shown in Graph 13) suggest either the Company needs to provide a guarantee to contribute to protect the fund's solvency at all times or the trustees should reduce the volatility of the fund's assets. TARGET2 could be used to set the investment policy if the company were, for example, to set a maximum contribution rate of 15% of salaries. The most risky portfolio suitable could be determined by the contribution line on Graph 13 closest to the intersect of the current ABI and the maximum company contribution rate. A set of alternative contribution rates/investment portfolios could be prepared at each three yearly review, and used between actuarial reviews to stabilise the fund.

14.8 Perhaps more work needs to be done on dynamically linking portfolio selection and actuarial funding of benefits.

15 FUND DESIGN

Normal Retirement Age	65
Early Retirement Age	55
Benefit Scale	15%
Final Average Salary	Previous 3 years
Death and Disablement	Prospective normal retirement benefit.
Member Contributions	5% of salary
Resignation Benefit	Return of member contributions with interest plus vesting after 5 years of 10% p.a. Maximum of 100% after 15 years.

16 LIABILITY ASSUMPTIONS

16.1 **Long-term Investment Return**	9% p.a.
16.2 **Inflationary Salary Increases**	7% p.a.
16.3 **New Members**	Fixed proportions at ages 18, 23, 28, 33, 38, 43 and 48.

Age at Entry	Salary	Proportion of Total Entrants
18	5,899	8.70%
23	12,688	23.91%
28	18,744	23.91%
33	23,466	15.22%
38	27,155	15.22%
43	29,940	6.52%
48	32,059	6.52%

16.4 Decrements

Standard rates as would be used for most valuations on death, disablement, retirement and resignation.

Number of exits per 10,000 members.

Age	Death	TPD	Resignation	Retire
20	99	4	18,200	0
25	85	6	15,000	0
30	75	9	12,500	0
35	105	18	7,500	0
40	149	38	5,000	0
45	260	87	2,500	0
50	455	202	0	0
55	790	471	0	12,000
56	790	471	0	6,000
57	985	660	0	6,000
58	1,100	682	0	6,000
59	1,228	927	0	6,000
60	1,372	1,098	0	20,000
61	1,524	1,292	0	15,000
62	1,693	1,521	0	12,000
63	1,880	1,790	0	10,000
64	2,089	2,108	0	10,000

16.5 Promotional Increases

Age related averaging 1% p.a. for stationary population.

Promotional Scale

Age	Index
20	10,000
25	17,585
30	23,595
35	28,084
40	31,973
45	34,562
50	36,878
55	37,801
60	38,645
65	38,733

16.6 Initial Membership

Stationary population achieved by new members and actuarial assumptions.

Age Range	Number Members	Average Salary	Average Accumulation	Average Membership
15-19	3.24	6,657	301	0.95
20-24	13.10	12,713	1,012	1.95
25-29	23.11	17,908	2,473	3.26
30-34	29.68	26,348	7,640	6.58
40-44	32.59	29,277	11,608	8.77
45-49	35.73	31,532	17,113	11.76
50-54	38.63	33,051	24,140	15.41
55-59	30.76	33,816	33,511	20.23
60-64	16.10	34,315	43,402	25.01

17 ASSET ASSUMPTIONS

17.1 Correlation Coefficients Derived from 1980's Experience

	AWE	Cash	Bonds	Shares	Overseas	Property	Bond Rate
AWE	1.0	-0.5	-0.7	-0.3	-0.3	-0.2	-0.9
Cash		1.0	0.25	0.2	0.0	0.0	0.9
Bonds			1.0	0.45	0.0	0.2	0.85
Shares				1.0	0.5	0.0	0.6
Overseas					1.0	0.0	0.0
Property						1.0	0.0
Bond Rate							1.0

17.2 Expected Mean and Standard Deviation of Real Returns

	Group A		Group B	
	Mean	Std Dev	Mean	Std Dev
Cash	2.0	3.0	0.6	1.5
Bonds	3.0	6.0	0.9	4.0
Shares	7.5	22.0	4.0	18.0
Overseas	6.0	18.0	3.0	15.0
Property	5.0	10.0	2.4	8.0
Bond Rate	2.0	4.0	0.75	3.5

AWE increases are assumed to average 7% p.a. with a standard deviation of 2.5% and an auto correlation with the previous years increase of 70%.

INVESTMENT AND FINANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION ONE 3 MARKS

Describe briefly the following terms

(i) Intermediation
(ii) Securitisation

and give a current example of each process in the Australian market.

[3 marks]

QUESTION TWO 3 MARKS

Describe briefly, within the context of modern portfolio theory, the concept of "risk tolerance" and its relevance to the management of:

a balanced investment portfolio for a superannuation plan?

a pooled discretionary superannuation fund managed by a life insurance company?

[3 marks]

QUESTION THREE 4 MARKS

Describe briefly the major factors which have an impact on the price at which a money market or fixed interest security will sell in the secondary market.

A discussion of general economic factors is not required.

[4 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION FOUR 5 MARKS

What is meant by each of the terms "Immunisation" and "Matching"?

What are the main points for and against the adoption of each of these strategies?

[5 marks]

QUESTION FIVE 7 MARKS

(a) Discuss briefly the factors you would consider in making an assessment of the liquidity risk of an investment in each of the following types of un-listed trusts:

(i) a cash-management trust
(ii) a share imputation trust
(iii) a property trust

[5 marks]

(b) To what extent would your comments in response to (a) differ if the trusts in (ii) and (iii) were listed on the Australian Stock Exchange?

[2 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION SIX 8 MARKS

On the assumption that the future returns on individual shares can be expressed in terms of a simple single factor model:

(a) state the general form of the equation of return, defining the terms used;

[2 marks]

(b) discuss briefly the likely effect of diversification on:

(i) the factor-related risk; and
(ii) the security-specific risk

within a share portfolio. You should illustrate your answer algebraically.

[6 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION SEVEN 9 MARKS

(a) Describe briefly the concept of the Security Market Line, as developed in the Capital Asset Pricing Model. You should illustrate your answer graphically and define any terms used.

[5 marks]

(b) What use might the manager of a share portfolio make of the concept of a Security Market Line?

[2 marks]

(c) Discuss briefly the implications of the Efficient Market Hypothesis

(i) in its weak form; and
(ii) in its strong form,

for your answer in (b).

[2 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION EIGHT 10 MARKS

(a) Describe briefly the main features of the following types of derivative securities:

(i) Share Price Index futures contracts
(ii) Options on Share Price Index futures contracts
(iii) Swaps
(iv) Forward Rate Agreements

[6 marks]

(b) How might the manager of a share portfolio use derivative securities to hedge, either fully or partially, his physical share exposure against an expected fall in the market? You should describe two methods, using a different derivative type for each method.

[2 marks]

(c) What effect will the hedging methods you have described in (b) have on the portfolio if the market:

(i) rises?
(ii) falls?

[2 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION NINE 10 MARKS

The ordinary shares of a major industrial company will shortly be quoted "ex-dividend". The amount of the dividend will be 20 cents per share and it will be franked to 75%. The latest recorded sale price for the shares was $5.00.

(a) Assuming a corporate income tax rate of 39%, no tax on capital gains (or tax relief on losses) and an otherwise stable sharemarket, how would you expect the price of the shares to vary if the buyers and sellers of the shares comprised:

(i) **only** superannuation funds taxed at 15% on investment income.
(ii) **only** individual investors with a marginal tax rate of 47%.
(iii) **only** tax-free investors.

[7 marks]

(b) What, if any, profitable trading opportunities might exist for each class of investor in (a) to deal in the shares in a market comprising a mix of the three different classes of investor?

(You should assume, for this purpose, that there will be no legal impediment to any proposed dealing in the shares)

[3 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION TEN 20 MARKS

You have been appointed as the consulting actuary to a large accumulation-based superannuation plan. The investment of the assets of the plan has been delegated to an external fund manager under a management agreement.

The Trustees wish to undertake a major review of the plan and you have been asked to assist in this process by preparing a report on the subject of investment risk.

(a) List the different parties who are involved in the plan.

[3 marks]

(b) Comment briefly on the main aspects of investment risk from the viewpoint of each of the parties in (a).

[14 marks]

(c) What would be the main differences in your report for a defined-benefit plan?

[3 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION ELEVEN 20 MARKS

The investment manager of a medium-sized discretionary pooled fund has expressed concern at the continuing mediocre showing of the fund in the regular monthly published "league tables" of risk and return, and has requested you to investigate the past performance of the fund with the aim of identifying:

* possible reasons for the observed competitive position;
* those areas where the manager is adding value; and
* those areas where the manager is not adding value.

Outline

(a) the broad areas for investigation;

[8 marks]

(b) what information you would require to perform the task; and

[6 marks]

(c) the main steps in your analysis.

[6 marks]

(You should ignore any possible income tax or capital gains tax effects)

END

THE INSTITUTE OF ACTUARIES OF AUSTRALIA

INVESTMENT AND FINANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION ONE 15 MARKS

Describe the features of each of the following financial contracts, highlighting the main differences that make each contract unique:

(i) a forward rate agreement;
(ii) a futures contract on 90 Day Bank Accepted Bills;
(iii) a put option on a Ten Year Treasury Bond Futures contract;
(iv) an interest rate swap;
(v) an interest rate cap agreement.

[15 marks]

QUESTION TWO 25 MARKS

Consideration is being given to the development and financing of an aluminium smelter in an overseas lesser developed country.

(a) Outline major risks that would be involved in such a project and the techniques that could be used to minimise or manage these risks.

[15 marks]

(b) A major Australian life insurance company is assessing a proposal to participate in the equity financing of the smelter. Discuss how the life company should evaluate the returns and risks of an equity investment in such a project.

[6 marks]

(c) Discuss how a major Australian bank should assess the returns and risks of a non-recourse loan to the project developers.

[4 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION THREE 15 MARKS

An investor owns a floating rate security issued by a major Australian corporate which matures in six years time on 15 October 1996 and which pays semi-annual floating interest coupons equal to the six month Bank Accepted Bill rate plus 2% p.a. The floating rate security does not trade actively. Assume that on 15 October 1990 the 10.5% October 1996 Commonwealth Treasury Bond can be purchased in the market at a 14.5% (semi- annual) yield to maturity. Assume also that interest rate swaps for a six year term with semi-annual interest payments on 15 April and 15 October are quoted on 15 October 1990 at a fixed rate of 15.5% p.a. against a floating rate of the six month Bank Accepted Bill rate.

(a) Discuss the considerations involved in determining a value for the floating rate security, mentioning the return and risk factors that would need to be taken into account in a valuation of the security.

[7 marks]

(b) Assume that the investor enters into an interest rate swap on 15 October 1990 (for the same face value as the floating rate security), under which it pays the floating rate and receives the fixed rate.

(i) Determine the combined value of the floating rate security cash flows along with the interest rate swap cash flows using a valuation interest rate of the Treasury Bond rate plus 2% p.a.

[6 marks]

(ii) Outline the possible factors that would account for any similarity or difference between the value determined in (b) (i) and the market value of the floating rate security.

[2 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION FOUR 20 MARKS

A gold bullion dealer is considering introducing a five year 100 ounce gold repurchase contract to support its bullion sales. Under this contract the dealer will guarantee to repurchase gold at the original purchase price at the end of five years if the market price of gold at that time is less than the original purchase price. If the market price of gold is above the original purchase price then, under the repurchase contract, the dealer will have the right to buy 40% of the gold at the original price together with 60% at the current market price. Each repurchase contract will be for 100 ounces of gold. Under the contract the dealer would meet all storage and insurance costs for the purchased gold. All prices and payments are in US dollars.

As an example, if an investor purchases gold at $US340 an ounce ($US34,000 for one 100 ounce contract) and the price rose to $US500 then the dealer would buy 40 ounces at $US340 and 60 ounces at $US500. If the price fell below $US340 an ounce then the dealer would buy the full 100 ounces at $US340 an ounce.

Assume that the current gold price is $US340 an ounce and five year at-the-money 100 ounce gold call options are available in the market for a premium of $US24,500. Five year AAA-rated zero coupon bonds trade at 13.5% p.a. and storage and insurance costs for gold amount to $US160 p.a. per 100 ounce contract payable annually in advance.

(a) Based on this information, determine whether you consider the terms of the repurchase contract to be fair to the purchaser.

[12 marks]

(b) Assuming that the bullion dealer issues a substantial volume of these repurchase contracts, outline any alternative strategies that the dealer might use to ensure that it will be able to meet its obligations under the repurchase contracts and discuss their advantages and disadvantages.

[8 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION FIVE 25 MARKS

(a) Outline and discuss the main features of asset backed securities.

[9 marks]

(b) A life insurance company is considering a proposal to securitise the loadings in the premiums of its annual premium non-participating life insurance business. These loadings represent the difference between the actual gross premium receipts and the net premiums included in the published actuarial valuation. The life company maintains separate audited accounts for this business.

Under the proposal the life insurance company would sell an entitlement to the future premium loadings on this class of business to a major merchant bank for an agreed up-front payment. The merchant bank would then sell entitlements to these cash flows to investors in the form of LIFE certificates (Life Insurance Favourable Experience Certificates).

Outline and discuss the major issues and the factors that would need to be taken into account in the securitisation of these loadings from the point of view of both the life insurance company and the merchant bank.

[16 marks]

END

INVESTMENT AND FINANCE — 1990 EXAMINATIONS
SPECIALIST LEVEL — PAPER TWO

QUESTION ONE — 15 MARKS

A superannuation fund has long term salary related liabilities in the form of future lump sum and pension benefits to active members, as well as fixed pension payments to retired members.

(a) Outline the interest rate risk management principles and techniques which would be relevant for this fund.

[5 marks]

(b) Describe how the fund managers can use the futures and options markets in the fund's interest rate risk management.

[10 marks]

QUESTION TWO — 15 MARKS

(a) Outline the circumstances under which diversification of an investment portfolio can reduce risk.

[2 marks]

(b) Outline the effect of diversification on the value of option contracts by discussing the difference between the value of a portfolio of options and the value of an option on a portfolio.

[3 marks]

(c) Use the following data to determine the expected return and standard deviation of the portfolio of shares and bonds with the minimum possible standard deviation of return:

	Shares	Bonds
Mean return % p.a.	24	14
Standard Deviation % p.a.	26	9

Correlation coefficient between share and bond returns 0.30

[10 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION THREE 21 MARKS

(a) Outline the advantages and disadvantages of each of the following methods for the valuation of a controlling interest in a publicly listed company.

(i) Capitalisation of future maintainable earnings.
(ii) Net realisable asset values.
(iii) Discounted cash flow.

[12 marks]

(b) State, with reasons, which method or combination of methods you would recommend as most appropriate for determining the fair market value of an equity interest in each of the following companies:

Company A A diversified holding company that has grown rapidly as a result of takeovers in recent years. Goodwill is a significant component of the company's balance sheet.

Company B An exploration and mining company whose main asset is proven mineral reserves. The company has U.S. dollar sales agreements for a significant part of these reserves and very little debt in its balance sheet.

Company C A manufacturing company with significant amounts of capital equipment financed mainly by debt. Depreciation charges on this equipment and interest deductions on its debt have resulted in significant tax losses in the last few years. The company is currently considering raising equity finance to retire some of the debt.

[9 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS
SPECIALIST LEVEL PAPER TWO

QUESTION FOUR 25 MARKS

(a) Define the Macaulay duration, modified duration, and convexity of a financial instrument.

[6 marks]

(b) Outline how modified duration measures the interest rate risk of a fixed interest bond.

[2 marks]

(c) Show that the percentage price volatility with respect to an infinitesimal interest rate change of the value of an option on a bond is given by the expression

$$\frac{B}{V(B)} \times \frac{\partial V(B)}{\partial B} \times D$$

where B is the value of the underlying bond,
V(B) is the value of the option as a function of B,
D is the modified duration of the underlying bond,
$\partial V(B)/\partial B$ is the partial differential of the option value with respect to the underlying bond value.

[4 marks]

(d) A 3 month at-the-money call option on a ten year Treasury bond has a value equal to 3.5% of the bond value. The hedge ratio for the option using the Black-Scholes formula is 0.7 and the duration of the underlying bond is 5.7 years. Ten year Treasury bond market yields are currently 14% p.a.

(i) Using this information and the formula in (c) determine the modified duration of the 3 month at-the-money call option on the ten year bond. Interpret your answer.

[5 marks]

(ii) A merchant bank holds $100 million face value of 14% p.a. semi-annual coupon five year to maturity, NSW Treasury corporation bonds. Market rates for these five year bonds are currently 15% p.a. (semi-annual). Stating any assumptions that you make, determine the approximate value of 3 month at- the-money call options on ten year bonds that would need to be sold in order to hedge this inventory against an instantaneous 1% increase in interest rates.

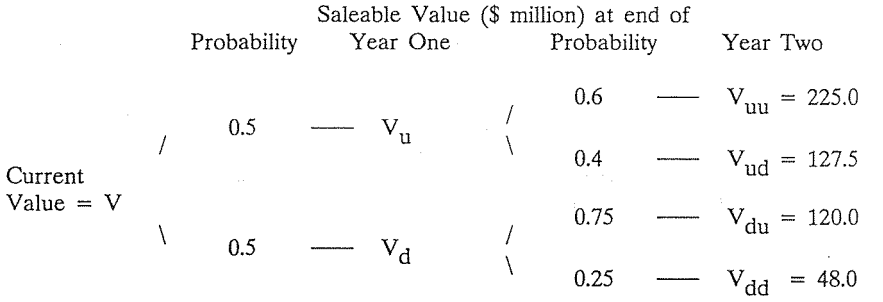
[8 marks]

INVESTMENT AND FINANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION FIVE 24 MARKS

A company is evaluating an opportunity to make an equity investment of $105 million in an ore processing plant. The future saleable value of the plant will depend on whether business and economic conditions are favourable or adverse. The following tree diagram gives the assessed future saleable values of the plant at the end of two years along with the probability attached to each possible value change over each of the two years.



The plant will not generate any income over these two years nor require any further investment other than the $105 million made at the start. The expected rate of return on the plant, based on market returns on an equity investment in an equivalent plant, is 20% p.a.. The company can borrow at 10% p.a. and it will always be able to repay any borrowings even under adverse conditions.

(a) Determine whether the company should invest in the plant today by evaluating the net present expected value of the equity investment in the ore processing plant.

[6 marks]

QUESTION FIVE CONTINUES ON NEXT PAGE

INVESTMENT AND FINANCE — 1990 EXAMINATIONS
SPECIALIST LEVEL — PAPER TWO

QUESTION FIVE (CONTINUED) — 24 MARKS

(b) The company is considering purchasing an option which will give it the right, but not the obligation, to buy traded shares in an identical ore processing plant during the next two years. The option gives the company the right to purchase a parcel of 15 million shares either at the end of one year at a cost of $115.5 million or at the end of two years for a cost of $127.5 million.

Use the portfolio replication concepts of option pricing theory to determine the price that the company should pay for this option. In order to do this assume that the shares in the plant are traded in the market and that the future share price movements have been assessed as follows;

	End Year One	End Year Two
		S_{uu} = $15.00
	S_u = $10.33	
S = $6.67		S_{ud} = $ 8.50
		S_{du} = $ 8.00
	S_d = $ 5.67	
		S_{dd} = $ 3.20

Explain as clearly as possible all steps in your answer.

[18 marks]

END

LIFE INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION ONE 3 MARKS

Describe two methods of profit sharing used for participating group life insurance business in Australia.

[3 marks]

QUESTION TWO 4 MARKS

List four criteria for a satisfactory method of distribution of surplus and give a brief description of each criterion.

[4 marks]

QUESTION THREE 4 MARKS

Given the following information from the I.S.C., describe the influences in the market for immediate annuities which have led to the significant increase.

Single Premium Annuities Issued ($ millions)

Year ended 31/12	Ord-inary	Super-annuation	Total
1979	0.4	2.4	2.8
1980	1.5	1.1	2.6
1981	1.6	5.2	6.8
1982	2.2	2.2	4.4
1983	2.3	4.3	6.6
1984	16.8	6.4	23.2
1985	7.7	148.9	206.6
1986	147.4	915.6	1,063.0
1987	312.6	1,613.0	1,925.6
1988	217.7	2,996.8	3,214.5

[4 marks]

LIFE INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION FOUR 6 MARKS

Describe briefly the three components of the estate.

[6 marks]

QUESTION FIVE 6 MARKS

Describe how differences in the taxation treatment of ordinary and superannuation business may effect individual term insurance premium rates.

[6 marks]

QUESTION SIX 7 MARKS

(a) Premium rating is one of the purposes of analysing the expenses of a life office. Briefly outline three other purposes.

[3 marks]

(b) List the expense rates which you would present as the result of an expense analysis for premium rating.

[4 marks]

LIFE INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION SEVEN 9 MARKS

Prior to 1970 an Australian life office issued participating whole life policies with premiums payable throughout life. The latest declared reversionary bonus rates for these policies were $35 per $1,000 sum insured plus $55 per $1,000 of existing bonuses. A terminal bonus of 20% of existing reversionary bonuses is currently paid on claims. For these policies describe, with reasons, the bases you would consider appropriate for

(a) the surrender of reversionary bonuses, and

(b) the conversion to a paid up policy.

[9 marks]

QUESTION EIGHT 10 MARKS

Introducing the bill for life insurance legislation in 1945, the Commonwealth Treasurer indicated a purpose of the bill was the protection of the interests of persons who effected life insurance.

(a) Indicate how the statutory responsibilities of the appointed actuary support this objective.

[5 marks]

(b) Describe four other areas, aside from the responsibilities of the appointed actuary, where the Life Insurance Act contributes to the protection of policyholders.

[5 marks]

LIFE INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION NINE 10 MARKS

You work for an office which has only ever issued with profit endowment assurances. The Appointed Actuary has asked you to test and report on the validity of the data used and the accuracy of the results produced by a valuation of the liabilities on the Life Insurance Act minimum basis.

Describe the tests you would apply to the data and the valuation results.

[10 marks]

QUESTION TEN 10 MARKS

Discuss the advantages and disadvantagaes of distributing term insurance through tied agents, brokers and direct marketing from the point of view of the life office.

[10 marks]

QUESTION ELEVEN 11 MARKS

An Australian life office proposes to commence writing disability income insurance for as wide a market as possible.

(a) Discuss the issues involved in defining disability for the purpose of benefit payments under these contracts.

[5 marks]

(b) List the factors which may be expected to influence morbidity experience. Indicate briefly the impact of each factor.

[6 marks]

LIFE INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION TWELVE 20 MARKS

You have recently been involved in the development of a new series of ordinary annual premium investment account policies. Projection techniques were used in the development of these contracts.

(a) State the transfer formula that would have been used in these projections.

[3 marks]

(b) Describe an acceptable pattern of transfers.

[3 marks]

(c) Define the "yield on transfers" and state its applications.

[4 marks]

(d) Discuss with reasons the criteria that would be used to test the profitability of these new contracts.

[5 marks]

(e) Describe the investigation that would be undertaken to ensure the suitability of the charges for these contracts.

[5 marks]

END

LIFE INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION ONE 10 MARKS

Describe how you would expect each of the following to impact on the design, pricing and financing of the given product in the Australian life insurance market:

(a) The introduction of tax deductibility for the office acquisition expenses on single premium ordinary insurance bonds.

(b) The replacement of the free look cancellation provisions with increased disclosure requirements including the disclosure of surrender values at durations from one to ten years on investment linked annual premium business.

[10 marks]

QUESTION TWO 10 MARKS

Describe the particular features of the "margin on services" method of valuation of liabilities which distinguishes it from other methods.

[10 marks]

QUESTION THREE 12 MARKS

(a) Discuss critically the underwriting measures taken by Australian life offices to reduce their exposure to AIDS related claims.

[7 marks]

(b) Discuss the way in which offices might modify their marketing and product design in response to the AIDS epidemic.

[5 marks]

LIFE INSURANCE 1990 EXAMINATIONS
SPECIALIST LEVEL PAPER ONE

QUESTION FOUR 20 MARKS

(a) Which factors should an actuary take into consideration when determining a suitable solvency valuation basis. To what extent is the current minimum valuation basis specified in the Life Insurance Act suitable for a solvency valuation?

[12 marks]

(b) A life office values the following classes of term insurance by reserving one year's gross premium.

(i) term insurance with a level sum insured and a level premium.

(ii) term insurance with a level sum insured and with premiums payable on a yearly renewable basis according to the attained age of the life insured.

(iii) term insurance with a decreasing sum insured and with level annual premiums ceasing five years before the expiry of the policy.

Discuss the suitability of this basis for a solvency valuation of liabilities and describe how you would test to ensure that the reserves were adequate.

[8 marks]

LIFE INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION FIVE 23 MARKS

A small Australian life office is considering the introduction of a series of non-cancellable disability income contracts.

The office has no previous experience in this area and has asked you as a consulting actuary to advise on both a suitable premium basis for these contracts and on the underwriting issues involved.

(a) Describe briefly the sources of morbidity data that might be appropriate for use in setting a premium basis.

[5 marks]

(b) Discuss the factors which you would expect to effect the rates of morbidity experience of these products.

[7 marks]

(c) Discuss the special situations for underwriting consideration that the office is likely to encounter if it enters this market.

[6 marks]

(d) Discuss the reinsurance bases the office might consider for this business.

[5 marks]

LIFE INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION SIX 25 MARKS

ABC Insurances Ltd. is a listed company which has conducted a life insurance operation for several decades. The most recent decade has been marked by significant changes in the following order.

(a) An on market takeover leading to control of the company passing to a diversified investment group with no other insurance interests.

(b) A subsequent takeover by the parent of a retail chain along with an announcement that ABC's existing term and disability income products would be "marketed over the counter alongside a variety of goods and clothing within a week".

(c) Significant business growth for the office stemming from the expanded distribution systems.

(d) A "management review" initiated by the new parent which leads to marked increases in profit and dividends.

(e) An announced sale to a large foreign life office with existing subsidiary life operations of a similar size in Australia. It is proposed to merge the two operations.

From the point of view of the Insurance and Superannuation Commission, outline the concerns which would be raised in respect of this office at each juncture, the usefulness of reported information and the actions available to address concerns.

[25 marks]

END

LIFE INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION ONE 11 MARKS

The appointed Actuary has asked an actuarial student to prepare a table of premium rates, durations one to ten, for level sum insured level annual premium term insurance policies on the following assumptions:

(a) Expenses

(i) initial commission of 5% of an annual premium for each year of the term

(ii) renewal commission of 2.5% of each premium

(iii) issue costs of $200 per policy

(iv) renewal costs of $75 per policy

(b) Interest of 8% per annum

(c) Mortality of A67/70 ult

(d) An average sum insured of $200,000 for all ages and terms.

QUESTION ONE CONTINUES ON NEXT PAGE

LIFE INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION ONE (CONTINUED) 11 MARKS

The student has produced the following results and come to you for help.

	Term									
Age	1	2	3	4	5	6	7	8	9	10
25	21.88	16.58	14.78	13.88	13.34	13.00	12.79	12.67	12.61	12.61
26	21.65	16.39	14.62	13.74	13.25	12.95	12.77	12.69	12.68	12.72
27	21.49	16.26	14.53	13.69	13.23	12.97	12.85	12.81	12.84	12.93
28	21.40	16.21	14.51	13.72	13.31	13.09	13.01	13.02	13.11	13.26
29	21.39	16.24	14.59	13.85	13.48	13.32	13.29	13.35	13.50	13.70
30	21.47	16.36	14.77	14.07	13.76	13.65	13.68	13.80	14.01	14.28
31	21.64	16.59	15.05	14.41	14.15	14.11	14.20	14.39	14.66	15.00
32	21.93	16.93	15.44	14.87	14.67	14.70	14.86	15.12	15.47	15.89
33	22.32	17.39	15.97	15.46	15.34	15.43	15.67	16.01	16.44	16.94
34	22.85	17.98	16.63	16.20	16.15	16.33	16.65	17.08	17.60	18.20
35	23.51	18.72	17.45	17.10	17.14	17.81	18.34	18.34	18.96	19.66

You have verified the student's premium formula and verified the accuracy of his calculations.

What gives rise to the results and why are they not suitable for use in practice?

Give three different methods you would suggest to the student to resolve the problems.

[11 marks]

LIFE INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION TWO 20 MARKS

A small Australian life office is wholly owned by a large European based financial institution.

The Australian life office expects its individual personal superannuation business to increase significantly in the near future. Its major product in this area is an annual premium non-participating contract that may be written as either a market linked or investment account product.

Before the parent company will commit the additional capital required to finance the expected growth tit has asked for a review of the product and its charging structure in light of current conditions.

(a) Discuss a method you would consider appropriate for determining the crediting rate for investment account policies.

[4 marks]

(b) Discuss the criteria that might be used by the parent company when deciding whether to commit new capital to this product. In your answer illustrate how the expected mix of investment account and market linked business might effect their decision.

[10 marks]

(c) Describe the approach you would adopt to estimate the amount of additional capital the office might require to fund its anticipated growth in new business. Also, outline how the office might finance part of this anticipated growth without recourse to new capital.

[6 marks]

LIFE INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION THREE 20 MARKS

The Managing Director of a large U.K. life office is considering a joint venture operation in Australia. As a consultant to the office, you have been requested to comment on several aspects of the proposal. One section of your report compares the distribution methods employed in the Australian market. In particular, you are required to cover the distribution systems of the large mutual offices and by bank owned life insurers.

Prepare the section of your report discussing this issue. Your report should use personal superannuation business as a particular product example.

[20 marks]

QUESTION FOUR 24 MARKS

You are about to review the profitability of new ordinary whole life business written by your office. In this review you will use projection techniques.

(a) Describe the constituent parts of the cash flows used in these projections and the assumptions required to generate them.

[5 marks]

(b) Discuss, with reasons, the profit criteria you would consider appropriate to this review.

[7 marks]

(c) Discuss, with reasons, the sensitivity tests you would perform during this review.

[5 marks]

(d) Describe how you might use the results of these projections to illustrate the expected emergence of profits under these products.

[7 marks]

LIFE INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION FIVE 25 MARKS

You are actuary to a large mutual life office which carries out a net premium valuation each year.

(a) Show, using formulae and symbols as necessary, how you would analyse the emerging surplus into the contributions arising from

(i) interest,
(ii) expenses,
(iii) mortality,
(iv) new business, and
(v) surrenders.

[17 marks]

(b) The most recent year's analysis shows a large interest surplus, an expense strain and a large surrender surplus. Draft your reply to a new director who suggests, after studying the analysis, that you should increase both expense loadings and surrender values.

[8 marks]

END

GENERAL INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION ONE 5 MARKS

(i) What is meant by the term "Utmost Good Faith"?

[2 marks]

(ii) Briefly describe three situations which may mean that a proposer had breached his duty of good faith.

[3 marks]

QUESTION TWO 5 MARKS

Name two statistical distributions commonly used to represent claim size distributions in general insurance.

Compare the characteristics relevant to goodness of fit of the two distributions and comment on their ease of use in practice.

[5 marks]

QUESTION THREE 8 MARKS

(i) List the elements which define the premium for a typical incurred loss retrospective rating policy for workers' compensation?

[4 marks]

(ii) List the possible sources of profit or loss for an insurer under such a policy.

[4 marks]

GENERAL INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION FOUR 8 MARKS

(i) Explain the difference between facultative and treaty reinsurance arrangements.

[3 marks]

(ii) Compare the effect on a direct insurer's accounts of surplus treaties and excess of loss treaties for commercial fire business.

[5 marks]

QUESTION FIVE 10 MARKS

An insurer with a large motor Third Party Property Damage insurance portfolio currently has a rating structure which does **not** incorporate any form of No Claim Bonus. The company is considering introducing a no claim bonus system the same as exists for its comprehensive motor portfolio (i.e. six levels of NIL, 20%, 30%, 40%, 50% and 60% with a claim leading to a "step back" of two levels of NCB). The claim frequency in the portfolio averages four claims per 100 policies per annum.

(i) Stating any assumptions, derive the numerical transition matrix that describes the probabilities of moving from no claim bonus level i to level j.

[4 marks]

(ii) Discuss the advantages and disadvantages of the proposal.

[6 marks]

GENERAL INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION SIX 15 MARKS

You are the consulting actuary to a medium size insurer which has a comprehensive motor portfolio of 100,000 policies spread over three states. This portfolio is supported by a reasonably sophisticated computer system developed by the company to handle

- policy administration
- claims handling
- accounting functions.

The company now wishes to develop a management information system using the information stored in the main computer system in order to more actively manage and control the marketing, pricing and underwriting of its motor insurance.

The underwriting manager has approached you for your advice on the types of reports that should be produced by this management information system.

Draft your reply.

(Note: Detailed specification of data to be included is NOT required.)

[15 marks]

GENERAL INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION SEVEN 14 MARKS

You are responsible for pricing in an insurance company which sells mainly through brokers. Currently, the company sells a Home Contents policy which provides cover as defined by the standard cover applying under the Insurance Contracts Act. (*Note: Under the Insurance Contracts Act, the standard cover for Contents Insurance specifies indemnity cover only.*)

Following approaches from a number of brokers, the company is now considering upgrading its Home Contents policy to:

- allow for full replacement value on all items irrespective of age, and to provide full coverage against any form of accidental breakage, and

- extend the cover to provide cover for personal property lost or damaged whilst travelling anywhere in Australia.

(i) Describe the investigations you would undertake in order to determine the change in risk premium that would arise from the changes being considered.

[8 marks]

(ii) Briefly discuss the other matters the company should consider in deciding whether to introduce the changes suggested.

[6 marks]

GENERAL INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION EIGHT 15 MARKS

The following information has been compiled for a company's comprehensive motor portfolio as at 31 December 1989.

Cumulative claims lodged

Accident Year	Lodged year 1986	1987	1988	1989
1986	1,050	1,155	1,160	1,160
1987		1,210	1,340	1,346
1988			1,405	1,535
1989				1,600

Cumulative claims paid ($'000s)

Accident Year	Payment year 1986	1987	1988	1989	Case estimates outstanding at 31/12/89
1986	1,985	2,120	2,280	2,320	-
1987		2,500	2,705	2,830	75
1988			2,920	3,100	430
1989				3,450	660

Using the chain ladder approach, derive estimates of the number of, and the liability for, IBNR claims as at 31 December 1989. Clearly show all steps in your calculations and state any assumptions that you make.

[15 marks]

GENERAL INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION NINE 20 MARKS

ABC Pty. Ltd. is the Australian general insurance subsidiary of a large UK based insurance conglomerate. ABC's business is heavily concentrated (80%) in personal lines with commercial lines (predominantly small business insurance) making up the remainder.

ABC's reinsurance protections comprise excess-of-loss treaties to cover it against catastrophic losses. For the 1990 year, the retention under these covers was $4.5 million per event. During 1990, ABC experienced two catastrophe losses where the gross loss exceeded the company's net retention.

The following information has been extracted from the last four annual reports of Company ABC.

Table 1 Underwriting Statement (figures in $m)

	Year ended 30 June			
	1987	1988	1989	1990
Gross premiums received	125.0	138.0	150.0	163.0
Reinsurance premiums ceded	5.0	4.9	4.7	7.2
Premium income for year	120.0	133.1	145.3	155.8
Increase in unearned premiums	5.8	7.0	3.8	5.6
Earned premium income	114.2	126.1	141.5	150.2
Gross claims paid	80.0	86.0	95.0	122.0
Reinsurance recoveries due	0.0	0.0	0.0	(11.0)
Increase in net claims outstanding	10.3	11.6	11.1	16.4
Net incurred claims	90.3	97.6	106.1	127.4
Commission paid	15.0	18.6	21.0	24.5
Management expenses	21.3	22.2	25.1	29.3
Underwriting surplus	(12.4)	(12.3)	(10.7)	(30.9)

QUESTION NINE CONTINUED ON NEXT PAGE

GENERAL INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION NINE (CONTINUED) 20 MARKS

Table 2 Profit and Loss Account (figures in $m)

	Year ended 30 June			
	1987	1988	1989	1990
Underwriting surplus	(12.4)	(12.3)	(10.7)	(30.9)
Investment income	16.7	18.6	19.6	21.3
Profit before tax	4.3	6.3	9.0	(9.7)
Provision for tax	1.0	1.7	2.7	(4.8)
Profit after tax	3.3	4.5	6.3	(4.9)
Realised capital gains	5.0	(1.6)	0.5	(0.3)
Unrealised capital gains	3.2	(10.0)	1.0	(0.5)
Dividends paid	(1.5)	(1.5)	(2.0)	-
Total increase in net worth	10.4	(8.6)	5.8	(5.7)

Table 3 Balance Sheet (figures in $m)

	Year ended 30 June			
	1987	1988	1989	1990
Liabilities				
Shareholders' funds	39.0	40.4	45.2	40.0
Provision for unearned premiums	53.8	60.7	64.5	70.1
Provision for o/s claims	45.0	56.6	67.7	84.1
Other liabilities	10.0	11.0	11.8	13.1
Total	147.8	168.7	189.2	207.3
Assets (Book Value)				
Premiums outstanding	5.0	7.0	12.0	17.0
Fixed assets	2.0	2.3	2.4	2.7
Property	8.8	9.5	10.6	11.1
Shares	30.0	34.9	44.2	49.5
Fixed interest securities	102.0	115.0	120.0	127.0
Total	147.8	168.7	189.2	207.3
Excess of market value of assets over book value	15.0	5.0	6.0	5.5
Net worth (market value)	54.0	45.4	51.2	45.5

QUESTION NINE CONTINUED ON NEXT PAGE

GENERAL INSURANCE 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION NINE (CONTINUED) 20 MARKS

(i) Define and calculate for each of the four years the following ratios:

- loss ratio
- expense ratio
- underwriting ratio
- solvency margin

[8 marks]

(ii) Comment on the company's financial results over the last four years.

[10 marks]

(iii) What are the implications for the company if it were to grow rapidly in the next 12 months?

[2 marks]

END

GENERAL INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION ONE 10 MARKS

(i) Describe in detail a suitable method for estimating the liability for IBNR claims in a householders' insurance portfolio.

[5 marks]

(ii) Discuss the advantages and disadvantages of methods which utilise case estimates for estimating outstanding claims for liability insurance.

[5 marks]

QUESTION TWO 8 MARKS

(i) List the elements which define the premium for a typical incurred loss retrospective rating policy for workers' compensation.

[4 marks]

(ii) List the possible sources of profit or loss for an insurer under such a policy.

[4 marks]

GENERAL INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION THREE 8 MARKS

(i) Explain the difference between facultative and treaty reinsurance arrangements.

[3 marks]

(ii) Compare the effect on a direct insurer's accounts of surplus treaties and excess of loss treaties for commercial fire business.

[5 marks]

QUESTION FOUR 10 MARKS

An insurer with a large motor Third Party Property Damage insurance portfolio currently has a rating structure which does **NOT** incorporate any form of No Claim Bonus. The company is considering introducing a no claim bonus system the same as exists for its comprehensive motor portfolio (i.e. six levels of NIL, 20%, 30%, 40%, 50% and 60% with a claim leading to a "step back" of two levels of NCB). The claim frequency in the portfolio averages four claims per 100 policies per annum.

(i) Stating any assumptions, derive the numerical transition matrix that describes the probabilities of moving from no claim bonus level i to level j.

[4 marks]

(ii) Discuss the advantages and disadvantages of the proposal.

[6 marks]

GENERAL INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION FIVE 15 MARKS

You are the consulting actuary to a medium sized insurer which has a comprehensive motor portfolio of 100,000 policies spread over three states. This portfolio is supported by a reasonably sophisticated computer system developed by the company to handle

- policy administration
- claims handling
- accounting functions.

The company now wishes to develop a management information system using the information stored in the main computer system in order to more actively manage and control the marketing, pricing and underwriting of its motor insurance.

The underwriting manager has approached you for your advice on the types of reports that should be produced by this management information system.

Draft your reply.

(Note: Detailed specification of data to be included is NOT required.)

[15 marks]

GENERAL INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION SIX 19 MARKS

You are responsible for pricing in an insurance company which sells mainly through brokers. Currently, the company sells a Home Contents policy which provides cover as defined by the standard cover applying under the Insurance Contracts Act. (*Note: Under the Insurance Contracts Act, the standard cover for Contents Insurance specifies indemnity cover only.*)

Following approaches from a number of brokers, the company is now considering upgrading its Home Contents policy to:

- allow for full replacement value on all items irrespective of age, and to provide full coverage against any form of accidental breakage, and

- extend the cover to provide cover for personal property lost or damaged whilst travelling anywhere in Australia.

(i) Describe the investigations you would undertake in order to determine the change in risk premium that would arise from the changes being considered.

[8 marks]

(ii) Discuss the other matters the company should consider in deciding whether to introduce the changes suggested.

[11 marks]

GENERAL INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION SEVEN (CONTINUED) 30 MARKS

Table 2 Profit and Loss Account (figures in $m)

	Year ended 30 June			
	1987	1988	1989	1990
Underwriting surplus	(12.4)	(12.3)	(10.7)	(30.9)
Investment income	16.7	18.6	19.6	21.3
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Dividends paid	(1.5)	(1.5)	(2.0)	-
Total increase in net worth	10.4	(8.6)	5.8	(5.7)

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Premiums outstanding	5.0	7.0	12.0	17.0
Fixed assets	2.0	2.3	2.4	2.7
Property	8.8	9.5	10.6	11.1
Shares	30.0	34.9	44.2	49.5
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Excess of market value of assets over book value	15.0	5.0	6.0	5.5
Net worth (market value)	54.0	45.4	51.2	45.5

QUESTION SEVEN CONTINUED ON NEXT PAGE

GENERAL INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION SEVEN 30 MARKS

ABC Pty. Ltd. is the Australian general insurance subsidiary of a large UK based insurance conglomerate. ABC's business is heavily concentrated (80%) in personal lines with commercial lines (predominantly small business insurance) making up the remainder.

ABC's reinsurance protections comprise excess-of-loss treaties to cover it against catastrophic losses. For the 1990 year, the retention under these covers was $4.5 million per event. During 1990, ABC experienced two catastrophe losses where the gross loss exceeded the company's net retention.

The following information has been extracted from the last four annual reports of Company ABC.

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Underwriting surplus	(12.4)	(12.3)	(10.7)	(30.9)

QUESTION SEVEN CONTINUED ON NEXT PAGE

GENERAL INSURANCE 1990 EXAMINATIONS
SPECIALIST LEVEL PAPER ONE

QUESTION SEVEN (CONTINUED) 30 MARKS

(i) Define and calculate for each of the four years the following ratios:

- loss ratio
- expense ratio
- underwriting ratio
- solvency margin.

[8 marks]

(ii) You act as the consulting actuary to Company ABC. Draft your reply to the following request which has just been received from the General Manager of Company ABC.

"Dear Actuary,

Re: Financial Performance of Company ABC

We are currently in the process of preparing our financial plans for Company ABC for the next few years.

Would you please comment on our financial results over the last four years and advise me of any aspects of our performance which you believe are important for us to take into account in our planning.

[12 marks]

I am also interested in your views on the suitability of the mix of investments the company currently holds.

[4 marks]

QUESTION SEVEN CONTINUED ON NEXT PAGE

GENERAL INSURANCE 1990 EXAMINATIONS
SPECIALIST LEVEL PAPER ONE

QUESTION SEVEN (CONTINUED) 30 MARKS

"In reviewing the figures, you should be aware that we expect our current book of business to grow at around the same rate as has been evident in the last couple of years. However, we also expect to expand our operations to move into the CTP insurance business during the current financial year, taking on an additional $50 million of premium income. I would welcome any comments you have on the financial implications that this may have for us.

[4 marks]

Yours faithfully,

General Manager
Company ABC

1 August 1990"

[2 marks for overall structure of answer]

[22 marks total for part (ii)]

END

GENERAL INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION ONE 10 MARKS

(i) Why does an insurance company need to analyse expenses by class and function?

[3 marks]

(ii) Company XYZ is a general insurer specialising in personal lines, with an extensive range of products covering the insurance needs of individuals. It sells and services its products through its own network of branches.

Describe a suitable method for analysis of staff-related expenses for Company XYZ.

[7 marks]

GENERAL INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION TWO 10 MARKS

Company ABC is a small specialist general insurer, providing commercial insurance protection to second hand car dealers. This protection provides

- fire and additional perils and consequential loss protection on the dealer's premises and on the vehicles held by the dealer
- collision and Third Party Property Damage covers on vehicles whilst they are on public streets
- glass breakage, burglary, fidelity guarantee and public liability risks.

Last year Company ABC's premium income was $5 million and its solvency margin is currently 30%.

(i) List the possible sources of large loss for which ABC may need to consider obtaining reinsurance protection.

[5 marks]

(ii) Describe a reinsurance program which would be suitable for the insurer.

[5 marks]

QUESTION THREE 15 MARKS

Discuss the factors which should be considered by a major industrial company when deciding whether or not to self insure comprehensive motor vehicle risks.

[15 marks]

GENERAL INSURANCE 1990 EXAMINATIONS
SPECIALIST LEVEL PAPER TWO

QUESTION FOUR 12 marks

(i) Under principles of sound rating, the premium rates should incorporate a profit loading which will give shareholders a reasonable return on the capital required to support the risks underwritten.

Defining all symbols and stating any assumptions made, develop an expression which relates the profit loading needed in the premium rates to the amount of capital employed and the rate of return required on that capital.

[7 marks]

(ii) Discuss circumstances in which an insurer may not wish to incorporate the profit loading derived under principles of sound rating.

[5 marks]

GENERAL INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION FIVE 28 MARKS

The following information relates to the personal accident insurance portfolio of an insurer.

	Year to 31/12/87	Year to 31/12/88	Year to 31/12/89	9 mths to 30/9/90
No. of policies written	16,379	16,184	17,691	14,515
Gross written premium ($000)	1,582	1,720	1,684	1,218
No. of claims reported	1,211	1,265	1,507	1,282
Incurred cost of claims ($000)	483	691	907	878

(i) Estimate the gross loss ratio for each of the four periods, stating any assumptions you make.

[8 marks]

(ii) Comment on any trends and the possible causes thereof.

[7 marks]

(iii) The insurer's target gross loss ratio for the class is 50%. Estimate the rate increase required from 1 January 1991 to achieve this target on business written in 1991.

[7 marks]

(iv) Discuss the alternative courses of action which would be open to the company if the marketing manager advised that significant business would be lost following a rate increase equal to that determined in (iii).

[6 marks]

GENERAL INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION SIX 25 MARKS

The chain ladder method has been applied to quarterly run-off data for a health insurance portfolio using two approaches, resulting in the following chain ladder factors being calculated:

Approach 1: Using payments only

Cumulative claim payments ($'000)

Accident Quarter	Development Quarter 1	2	3	4
1	514	815	973	991
2	485	788	928	
3	612	796		
4	396			

Chain ladder factors

Accident Quarter	1	Development Quarter 2	3	4
1		1.59	1.19	1.02
2		1.62	1.18	
3		1.30		
4				
Average		1.50	1.19	1.02

QUESTION SIX CONTINUED ON NEXT PAGE

GENERAL INSURANCE 1990 EXAMINATIONS
SPECIALIST LEVEL PAPER TWO

QUESTION SIX (CONTINUED) 25 MARKS

Approach 2: Using cumulative claims incurred (i.e. claims paid plus estimated outstanding on notified claims)

Cumulative claims incurred ($'000)

Accident Quarter	Development Quarter 1	2	3	4
1	963	981	994	1,130
2	996	969	965	
3	1,041	1,112		
4	915			

Chain ladder factors

Accident Quarter	Development Quarter 1	2	3	4
1		1.02	1.01	1.14
2		0.97	1.00	
3		1.07		
4				
Average		1.02	1.01	1.14

QUESTION SIX CONTINUED ON NEXT PAGE

GENERAL INSURANCE 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION SIX (CONTINUED) 25 MARKS

(i) Using the average chain ladder factors set out above, derive the estimated undiscounted liability for outstanding claims that would arise using the two different approaches. In doing your calculations, you should note that:

- virtually all claims are lodged within six months of the date of the accident
- by the end of the fourth development quarter, the estimates placed on claims still outstanding have proven to be very accurate, and
- past claims settlement experience shows that approximately 5% of payments are made later than the fourth development quarter.

[10 marks]

(ii) Comment on the results of your calculations.

State, with reasons, the figure you would give as your central estimate of the undiscounted liability for outstanding claims.

[10 marks]

(iii) Discuss the issues this insurer should consider in deciding what provision for outstanding claims it should put in its balance sheet.

[5 marks]

END

SUPERANNUATION 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION ONE 10 MARKS

(a) Describe the main features of:

- Capital guarantee funds
- Capital stable funds
- Market linked funds (also called managed growth funds or investment linked funds)

[5 marks]

(b) List two advantages and two disadvantages of each form of investment in part (a).

[5 marks]

QUESTION TWO 10 MARKS

Set out the advantages of defined benefit funds and the advantages of defined contribution funds. In the light of the list of your points, discuss the statement:

"The trend in the recent past in Australia, and the inevitable trend in the foreseeable future, is for Australian executive superannuation funds to be defined benefit, and for all non-executive superannuation funds to be defined contributions".

[10 marks]

SUPERANNUATION 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION THREE 6 MARKS

What are the relative advantages and disadvantages of the commutation and projection methods for calculating the value of benefits and contributions in respect of an Australian superannuation plan?

Give one example for each method of a situation in which you believe each method would be more appropriate, with reasons to justify your choice.

[6 marks]

QUESTION FOUR 10 MARKS

A Trustee for a defined benefit plan with 500 members has asked some questions concerning the insurance requirements of the plan. His questions are:

> "If the actuary's costing of the plan includes full allowance for the death and disability benefits under the plan, why is any insurance required?"
>
> "I have heard that some insurers give refunds when experience is favourable. How do such arrangements work, and does it result in lower costs to the plan?"

Draft a letter to the Trustees in response to these questions.

[10 marks]

SUPERANNUATION 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION FIVE 13 MARKS

The chief executive of an Australian company is considering early retirement and then working part-time. He is a member of his company's complying superannuation plan and thinks his superannuation benefit will be in excess of the government's reasonable benefit limits. He wants to know what his options are in dealing with this problem. He has given you the following information:

Date of birth: 1 December 1931

Date joined company: 1 May 1953

Date joined fund: 1 July 1953

Early retirement benefit: a lump sum of 7 times FAS(3) or the pension equivalent

Early Retirement age: 59 years

Final average superannuation salary FAS(3) at age 59: $100,000

Taxable salary for the year ending 30 June

1991	$86,000 estimated
1990	$75,000
1989	$67,000
1988	$62,000

Salary thresholds for reasonable benefit limits are $39,970 and $74,220.

He has had no other superannuation arrangements. There are $10,000 of undeducted contributions.

QUESTION FIVE CONTINUES ON NEXT PAGE

SUPERANNUATION 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION FIVE (CONTINUED) 13 MARKS

(i) Compare his early retirement benefit with the reasonable benefit limits as at 1 December 1990, stating any approximations used.

[3 marks]

(ii) Outline the alternative ways in which he could receive his early retirement benefit, setting out the method of taxation and the reasonable benefit limits implications of the alternatives.

(Detailed tax calculations are not required).

[7 marks]

(iii) State the criteria set down by the Insurance and Superannuation Commissioner for an annuity to be a qualifying annuity. What are the consequences of purchasing an annuity that does not meet these criteria?

[3 marks]

SUPERANNUATION 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION SIX 10 MARKS

You are the actuary to the complying superannuation plan described in Appendix A. The plan assets are managed as a separate portfolio by a merchant bank. You conducted the previous actuarial investigation of the plan as at 1 July 1987.

(i) List the membership data and other information you would require from the Trustees in order to conduct the actuarial investigation of the plan due as at 1 July 1990.

[5 marks]

(ii) Prior to the valuation calculations this data and information will be edited and analysed. Set out the section headings of your valuation report that deal with these aspects and describe the general contents of each section.

[5 marks]

SUPERANNUATION 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION SEVEN 15 MARKS

A complying superannuation plan provides lump sum benefits defined in terms of final average salary. The assets of the plan have recently been changed from a balanced fund to a managed equity fund (i.e. with a significantly higher portfolio weighting in shares). After discussion with the company and the Trustees, the actuary has changed the economic assumptions in the actuarial valuation basis as follows:

	Former	New
future net investment returns	10% pa	11% pa
future salary inflation	8% pa	8% pa

The actuarial funding method currently used is entry age normal funding and under this method and on the current assumptions the plan is neither in surplus or deficiency.

(a) What are the implications of the above changes in the investment strategy and valuation basis for the funding of the plan?

[10 marks]

(b) It has also been decided to change the funding method from entry age normal to projected unit credit funding. What will this change mean for the funding of the plan?

[5 marks]

SUPERANNUATION 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION EIGHT 10 MARKS

The management of an Australian services company employing 50 people, both blue and white collar workers, decides to install a defined contribution plan.

(a) The Trustees of the plan have requested that the rate of investment return be smoothed when calculating the rate to be credited to members each year.

What restrictions are placed on the calculation of the crediting rate by the Occupational Superannuation Standards Act (OSSA) and Regulations.

[5 marks]

(b) The Trustees are aware that surpluses may arise from benefits foregone by members who resign.

Suggest alternatives for dealing with this surplus.

[5 marks]

QUESTION NINE 5 MARKS

State the OSSA requirements for trustees of superannuation funds established on or after 16 December 1985 (i.e. regulations 13, 14 and 15).

[5 marks]

SUPERANNUATION 1990 EXAMINATIONS

ORDINARY LEVEL

QUESTION TEN 10 MARKS

The Trustees of a non-contributory, complying, defined contribution superannuation fund make the following statement to you: "With the recent taxes on superannuation investment income and contributions, members would be better off if we paid them additional salary in lieu of contributions to the fund, and the members invested in property (with associated borrowings), fixed interest securities or shares".
Draft a letter of reply to the Trustees on this statement.

[10 marks]

SUPERANNUATION 1990 EXAMINATIONS

ORDINARY LEVEL

APPENDIX A

A superannuation plan with about 500 members provides the following benefits:

On Retirement, Death and TPD Between Ages 60 and 65

A multiple of Final Average Salary, calculated as 5% for each Year of Membership, PLUS the amount (or amounts) derived from the following table:

Member contribution rate during a Period of Membership	Additional multiple arising from that Period of Membership
0%	Zero
1%	2½% multiplied by Period of Membership
2%	5% multiplied by Period of Membership
3%	7½% multiplied by Period of Membership
4%	10% multiplied by Period of Membership
5%	12½% multiplied by Period of Membership

Member contributions are based on Plan Salary and may only be varied at the plan's annual review date. Plan Salary during a year is the salary applicable at the previous review date.

Years of Membership are calculated in years and complete months from the date the member joined the plan to the date of actual retirement.

Periods of Membership are calculated in years and complete months from the date contributions commence at the designated rate to the date contributions at that rate cease.

Final Average Salary is the average of the salaries applying at the review dates in the three years preceding actual retirement.

APPENDIX A CONTINUES ON NEXT PAGE

SUPERANNUATION 1990 EXAMINATIONS

ORDINARY LEVEL

APPENDIX A (CONTINUED)

On Retirement Between Ages 55 and 60

A lump sum benefit calculated as above but discounted by 2% per annum for the period, calculated in years and complete months, between the date of actual retirement and the member's 60th birthday.

On Death and Total Permanent Disablement

A lump sum benefit equal to the amount which would have been paid on retirement at age 60 had the member continued in service on the Plan Salary applicable at the date of death or disablement, and further assuming that the member would have contributed at the rate of 5% of salary from the next review date until his 60th birthday.

On Resignation Prior to Age 55

A basic benefit equal to a return of the member's contributions accumulated with interest at the "fund earning rate", **PLUS**

an additional amount equal to 10% of the basic benefit for each complete year of membership in excess of 5, with a maximum of 100% of the basic benefit.

END

SUPERANNUATION 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION ONE 20 MARKS

(a) Describe the main features of:

- Capital guarantee funds
- Capital stable funds
- Market linked funds (also called managed growth funds or investment linked funds)

[5 marks]

(b) List two advantages and two disadvantages of each form of investment.

[5 marks]

(c) Four of the clients of a firm of consulting actuaries have the following characteristics:

(i) a defined benefit fund with a significant surplus, and the Trustees wish to minimise future company contributions payable;

(ii) a defined benefit fund with a significant surplus, and the Trustees wish to preserve the dollar level of surplus for the next three years from 1 July 1990;

(iii) a closed defined benefits fund with a small surplus;

(iv) a company sponsored defined contribution fund, where some members of the fund are also members of a trade union that sponsors an industry fund. The sponsoring company prefers its employees to belong to the company fund, rather than the industry fund.

Giving brief reasons - what investment vehicle would you recommend to each of the Trustees? In each case, and again giving brief reasons, what method would you recommend for determining the rate of interest to be credited to members' contributions?

[10 marks]

SUPERANNUATION 1990 EXAMINATIONS
SPECIALIST LEVEL PAPER ONE

QUESTION TWO 20 MARKS

(a) Discuss the following statement:

"The trend in the recent past in Australia, and the inevitable trend in the foreseeable future, is for Australian executive superannuation funds to be defined benefit, and for all non-executive superannuation funds to be defined contributions".

[8 marks]

(b) You are the actuary to the defined benefit superannuation fund that covers all 2,000 employees of a subsidiary of an American company that acts as a selling agent for all the parent's products, and as a manufacturer for one line. The international Human Resources Vice President has just read a summary of the fund design of the Australian plan, and has asked the following questions:

(i) I have read in your newspapers about productivity superannuation; what does this mean, and how did it become established in Australia?

(ii) Why are the benefits in the Company's superannuation fund payable as lump sums rather than pensions? Are not pensions a preferable form of benefit?

(iii) I see that the trust deed defines 'salary' (for the purposes of superannuation) very broadly. How should salary be defined in practice?

(iv) As you are aware, the retirement benefit is based on a 15% multiple, and the resignation benefit is a return of the members' own contributions (which are 5% of salary) plus interest, multiplied by a multiple:

Years of Service (t)	Multiple
less than 10	1
10 or more	(1 + .025t)

I am told that this is uncompetitive in Australia today. Please advise an alternative design, giving main implications (other than the cost).

Set out your answers to the above questions **in point form.**

[12 marks]

SUPERANNUATION 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION THREE 20 MARKS

A Trustee for a defined benefit plan has asked some questions concerning the insurance requirements of the plan. His questions are:

(i) If the actuary's costing of the plan includes full allowance for the death and disability benefits under the plan, why is any insurance required?

[5 marks]

(ii) If insurance must be obtained, how much is necessary?

[4 marks]

(iii) I have heard that some insurers give refunds when experience is favourable. How do such arrangements work, and does it result in lower costs to the plan?

[5 marks]

(iv) There has been much talk in the media about large potential payments by plans in respect of AIDS claims. Will the plan's insurance protect it against such claims?

[3 marks]

(v) Will the insurers always pay a claim, particularly for total permanent disablement, whenever the Trustees decide to pay a benefit?

[3 marks]

Draft a letter to the Trustees in response to these questions.

SUPERANNUATION 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION FOUR 13 MARKS

The chief executive of an Australian company is considering early retirement and then working part-time. He is a member of his company's complying superannuation plan and thinks his superannuation benefit will be in excess of the government's reasonable benefit limits. He wants to know what his options are in dealing with this problem. He has given you the following information:

Date of birth:	1 December 1931
Date joined company:	1 May 1953
Date joined fund:	1 July 1953
Early retirement benefit:	a lump sum of 7 times FAS(3) or the pension equivalent
Early Retirement age:	59 years
Final average superannuation salary FAS(3) at age 59:	$100,000

Taxable salary for the year ending 30 June

1991	$86,000 estimated
1990	$75,000
1989	$67,000
1988	$62,000

Salary thresholds for reasonable benefit limits are $39,970 and $74,220.

He has had no other superannuation arrangements. There are $10,000 of undeducted contributions.

(i) Compare his early retirement benefit with the reasonable benefit limits as at 1 December 1990, stating any approximations used.

[3 marks]

(ii) Outline the alternative ways in which he could receive his early retirement benefit, setting out the method of taxation and the reasonable benefit limits implications of the alternatives.

(Detailed tax calculations are not required). [7 marks]

(iii) State the criteria set down by the Insurance and Superannuation Commissioner for an annuity to be a qualifying annuity. What are the consequences of purchasing an annuity that does not meet these criteria?

[3 marks]

SUPERANNUATION 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

QUESTION FIVE 12 MARKS

You are the actuary to the complying superannuation plan described in Appendix A. The plan assets are managed as a separate portfolio by a merchant bank. You conducted the previous actuarial investigation of the plan as at 1 July 1987.

(i) List the membership data and other information you would require from the Trustees in order to conduct the actuarial investigation of the plan due as at 1 July 1990.

[5 marks]

(ii) Prior to the valuation calculations this data and information will be edited and analysed. Set out the section headings of your valuation report that deal with these aspects and describe the general contents of each section.

[5 marks]

(iii) List the items which must be included, under OSSA regulations, in an extract of your valuation report to be provided to fund members.

[2 marks]

SUPERANNUATION 1990 EXAMINATIONS
SPECIALIST LEVEL PAPER ONE

QUESTION SIX 15 MARKS

A complying superannuation plan provides lump sum benefits defined in terms of final average salary. The assets of the plan have recently been changed from a balanced fund to a managed equity fund (ie. with a significantly higher portfolio weighting in shares). After discussion with the company and the Trustees, the actuary has changed the economic assumptions in the actuarial valuation basis as follows:

	Former	New
future net investment returns	10% pa	11% pa
future salary inflation	8% pa	8% pa

The actuarial funding method currently used is entry age normal funding and under this method and on the current assumptions the plan is neither in surplus or deficiency.

(i) What are the implications of the above changes in the investment strategy and valuation basis for the funding of the plan?

[9 marks]

(ii) It has also been decided to change the funding method from entry age normal to projected unit credit funding. What will this change mean for the funding of the plan? For the purposes of the USA Financial Accounting Standard 87, what additional economic assumption will need to be included in the actuarial valuation basis and why?

[6 marks]

SUPERANNUATION 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

APPENDIX A

A superannuation plan with about 500 members provides the following benefits:

On Retirement, Death and TPD Between Ages 60 and 65

A multiple of Final Average Salary, calculated as 5% for each Year of Membership, PLUS the amount (or amounts) derived from the following table:

Member contribution rate during a Period of Membership	Additional multiple arising from that Period of Membership
0%	Zero
1%	2½% multiplied by Period of Membership
2%	5% multiplied by Period of Membership
3%	7½% multiplied by Period of Membership
4%	10% multiplied by Period of Membership
5%	12½% multiplied by Period of Membership

Member contributions are based on Plan Salary and may only be varied at the plan's annual review date. Plan Salary during a year is the salary applicable at the previous review date.

Years of Membership are calculated in years and complete months from the date the member joined the plan to the date of actual retirement.

Periods of Membership are calculated in years and complete months from the date contributions commence at the designated rate to the date contributions at that rate cease.

Final Average Salary is the average of the salaries applying at the review dates in the three years preceding actual retirement.

APPENDIX A CONTINUES ON NEXT PAGE

SUPERANNUATION 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER ONE

APPENDIX A (CONTINUED)

On Retirement Between Ages 55 and 60

A lump sum benefit calculated as above but discounted by 2% per annum for the period, calculated in years and complete months, between the date of actual retirement and the member's 60th birthday.

On Death and Total Permanent Disablement

A lump sum benefit equal to the amount which would have been paid on retirement at age 60 had the member continued in service on the Plan Salary applicable at the date of death or disablement, and further assuming that the member would have contributed at the rate of 5% of salary from the next review date until his 60th birthday.

On Resignation Prior to Age 55

A basic benefit equal to a return of the member's contributions accumulated with interest at the "fund earning rate", **PLUS**

an additional amount equal to 10% of the basic benefit for each complete year of membership in excess of 5, with a maximum of 100% of the basic benefit.

END

SUPERANNUATION **1990 EXAMINATIONS**

SPECIALIST LEVEL **PAPER TWO**

QUESTION ONE — 20 MARKS

(a) Prior to the calculation of tax, the draft financial statements of a complying superannuation fund were prepared as follows:

	$'000		$'000
Assets as at 1/7/89 (book value) (market value $10,535,000)	10,158	Insurance premium	95
		Pension Payments	105
Company contributions	2,705		
		Lump sum benefits	
Member contributions (non deductible)	1,352	Retirement	179
		Death and disability	82
Insurance rebate	9	Withdrawals	207
Investment income		Expenses of administration	150
Fixed interest securities	638		
Dividends (Australian equities)	315	Professional fees	35
Realised capital gains (fixed interest securities)[1]	95	Tax in respect of 88/89	450
Realised capital gains (equities)[2]	327		
		Assets as at 30/6/90 (Market value $14,723,000)	14,296
	15,599		15,599

Notes: (1) Fixed interest securities purchased 1/9/86 $755,000
Fixed interest securities value at 1/7/88 $875,000
Fixed interest securities sold 1/1/90 $850,000

(2) Equity purchased 1/1/85 $1,000,000
Equity value at 1/7/88 $1,050,000
Equity sold 1/4/90 $1,327,000

QUESTION ONE (a) CONTINUES ON NEXT PAGE

SUPERANNUATION 1990 EXAMINATIONS
SPECIALIST LEVEL PAPER TWO

QUESTION ONE (a) (CONTINUED) 20 MARKS

You have been supplied with the following additional information:

1. For capital gains purposes, CPI increases at 8% per annum.

2. Value of pensions at 1/7/89 $1,013,000
   Value of pensions at 30/6/90 $985,000

3. Company tax rate is 39%

4. For actuarial purposes, assets have been valued at market value.

5. 75% of the future service death and disability benefits are insured.

6. Dividends are 80% franked.

Calculate the tax payable by the fund for the year ended 30 June 1990 (ignoring any reserve for unrealised gains).

[15 marks]

(b) State the OSSA requirements for trustees of superannuation funds established on or after 16 December 1985, (i.e. regulations 13, 14 and 15).

[5 marks]

SUPERANNUATION 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION TWO 20 MARKS

You are the actuary to a superannuation fund and have just completed the initial work on the valuation covering the two years to 30 June 1990. Aggregate funding has been used. All benefits are salary related. To assist in the analysis of surplus you have obtained particular values from the computer (projection) programs.

The following summarises the information:

		$'000
Assets as at 1 July 1988		5,317
Contributions (net of tax)	- employees in force at 1/7/88	1,895
	- new entrants	117
Benefits	- employees in force at 1/7/88	
	. deaths	403
	. withdrawals	377
	. retirements	492
	- new entrants	38
Investment return (net of tax)		1,311
Assets as at 30 June 1990 (net of provisions for tax payments)		7,330
*** *** *** *** *** *** *** ***		
Net liability as at 1 July 1988		5,085
Net liability as at 30 June 1990		
	- members in force at 1 July 1988	6,036
	- new entrants	96
Rate of investment return assumed in the valuation		8% p.a.
Rate of salary increase assumed in the valuation		7% p.a.
Actual rate of salary increase (employees in force at 1/7/88)		5% p.a.

QUESTION TWO CONTINUES ON NEXT PAGE

SUPERANNUATION 1990 EXAMINATIONS
SPECIALIST LEVEL PAPER TWO

QUESTION TWO (CONTINUED) 20 MARKS

For members who were in force as at 1 July 1988 the following were calculated from the 1 July 1988 valuation data:

*	Expected strain on deaths	$370,000
	Expected surplus on withdrawals	$375,000
*	Contributions expected to be payable (net of tax)	$1,777,000

In respect of actual exits the following were calculated:

Net liability of deaths at date of death	$115,000
Net liability of withdrawals at date of withdrawal	$861,000

(a) Explain how the two items marked with an * would be calculated (formulae not necessary).

[2 marks]

(b) On the data available, analyse the surplus as at 30 June 1990.

[18 marks]

SUPERANNUATION **1990 EXAMINATIONS**

SPECIALIST LEVEL **PAPER TWO**

QUESTION THREE — 20 MARKS

The employer in respect of a defined benefit lump sum plan is part of a multinational conglomerate with subsidiaries in several overseas countries.

It has been agreed that, where an employee transfers from one company within the group to another, a full transfer value will be exchanged between the respective plans.

(a) Explain the different potential financial effects of:

(i) using a prospective benefit (i.e. total service reserve) method; and
(ii) using an accrued benefit (i.e. past service reserve) method

for calculating a transfer value to be paid out of the plan.

[5 marks]

(b) Would you make any adjustment to the calculated transfer value if the plan was in surplus or deficit at the time? Give reasons.

[3 marks]

(c) What adjustments, if any, would you make to the assumptions ordinarily used in the regular actuarial valuation of the plan when determining the assumptions to use for calculating transfer values? Give reasons.

[4 marks]

(d) The Trustees of the plan are unsure how to treat transfers into the plan from other plans within the group. Draft a brief note to the Trustees suggesting suitable alternative treatments, noting particularly the alternative benefits which might be provided on

- Normal or Early Retirement
- Death and Total Permanent Disablement
- Resignation, including the allowance for vesting of benefits.

Ignore the effects of tax.

[8 marks]

SUPERANNUATION **1990 EXAMINATIONS**

SPECIALIST LEVEL **PAPER TWO**

QUESTION FOUR 15 MARKS

You are the actuary to a complying superannuation plan which provides lump sum benefits based on final salary and to which members are not required to contribute. The assets are invested directly in a portfolio by the trustees. Your report on the actuarial investigation of the plan as at 1 July 1990 reveals, among other things,

vested benefits index $= \frac{\text{market value of assets}}{\text{vested benefits}}$

$= \frac{\$60.0\text{m}}{\$19.6\text{m}} = 306\%$

accrued retirement benefit index $= \frac{\text{actuarial value of assets}}{\text{accrued retirement benefits discounted at } 1\frac{1}{2}\% \text{ pa to normal retirement date}}$

$= \frac{\$59.2\text{m}}{\$30.0\text{m}} = 197\%$

from the actuarial valuation balance sheet

	$m
total benefit liabilities	73.0
less actuarial value of assets	59.2
	13.8

which represents a gross aggregate company contribution rate of 6% pa of members' salaries.

the new entrant contribution rate for a typical new entrant is 12.5% of salary.

Based on his understanding of your report, the company finance director has suggested that $40.4m of surplus assets could be repaid to the company immediately.

Payment of surplus to the company is permitted under the trust deed of the plan. The Trustees have asked for your advice on the financial and other consequences for the plan of this suggestion. They have also asked for your advice, with reasons, on the level of surplus that might be repaid to the company. Draft your reply.

SUPERANNUATION 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

QUESTION FIVE 25 MARKS

(a) Suggest a funding method by which contributions to the plan described in Appendix A might be determined to ensure an orderly funding of the benefits. Give reasons for your answer and note any difficulties with, or consequences of, your proposed approach.

[4 marks]

(b) Carefully defining all symbols used, develop suitable projection formulae which may be used to value the benefits under the plan in Appendix A, as at an annual review date, in respect of both past and future membership.

[21 marks]

SUPERANNUATION 1990 EXAMINATIONS
SPECIALIST LEVEL PAPER TWO

APPENDIX A (Note that this is identical to the plan design in the first paper)

A superannuation plan with about 500 members provides the following benefits:

On Retirement, Death and TPD Between Ages 60 and 65

A multiple of Final Average Salary, calculated as 5% for each Year of Membership, PLUS the amount (or amounts) derived from the following table:

Member contribution rate during a Period of Membership	**Additional multiple arising from that Period of Membership**
0%	Zero
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APPENDIX A CONTINUES ON NEXT PAGE

SUPERANNUATION 1990 EXAMINATIONS

SPECIALIST LEVEL PAPER TWO

APPENDIX A (CONTINUED)

On Retirement Between Ages 55 and 60

A lump sum benefit calculated as above but discounted by 2% per annum for the period, calculated in years and complete months, between the date of actual retirement and the member's 60th birthday.

On Death and Total Permanent Disablement

A lump sum benefit equal to the amount which would have been paid on retirement at age 60 had the member continued in service on the Plan Salary applicable at the date of death or disablement, and further assuming that the member would have contributed at the rate of 5% of salary from the next review date until his 60th birthday.

On Resignation Prior to Age 55

A basic benefit equal to a return of the member's contributions accumulated with interest at the "fund earning rate", **PLUS**

an additional amount equal to 10% of the basic benefit for each complete year of membership in excess of 5, with a maximum of 100% of the basic benefit.

END