



Institute of Actuaries of Australia

**Future longevity research
& product development
in the
Australian retirement market**

Prepared by the LIWMPC Longevity Research Group

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Future research and product development in the Australian retirement market

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Abstract

This paper reviews longevity around the world both in terms of products and the pricing and valuation bases used to manage them as they stand at 2009. The current status of the Australian market is discussed with a view to provoking a wide-ranging discussion about the requirements for a well managed retirement market in Australia.

Keywords: Longevity, Life tables, Retirement

1. Introduction

In 1965, André-François Raffray, a lawyer in the southern French city of Arles, made a deal with a ninety-year-old local woman. In a contract relatively common in France, he agreed to pay her an income for the rest of her life in exchange for inheriting her house upon her death.

Unfortunately for M. Raffray, the woman was Mme. Jeanne Calment, who went on to be the longest-lived person in the world at 122 years. She outlived the luckless M. Raffray, who paid more than the value of the house before pre-deceasing her.

“In life, one sometimes makes bad deals”, said Mme. Calment of M. Raffray.

In 2008 the Life Insurance and Wealth Management Practice Committee (LIWMPC) of the Institute of Actuaries of Australia developed a research program to provide a foundation for development of the Life Insurance and Wealth Management industries in Australia and New Zealand.

This paper is the first in a program of research work. It addresses one of the main issues facing this industry in current times. This issue has become important with the advent of baby-boomers reaching retirement, the global financial crisis and the need for retirees to provide and protect their lifestyle through a potentially long retirement period.

In writing this paper we have endeavoured to draw together all the relevant components for a discussion surrounding the issue of managing longevity. We have put forward an argument for planning further action so that tools will be available to allow these risks to be well managed.

The action itself has not yet been decided upon, as it is felt by the group that direction should come from the industry at this time to determine the best way forward.

To this end, the paper draws no conclusions other than aiming to encourage discussion.

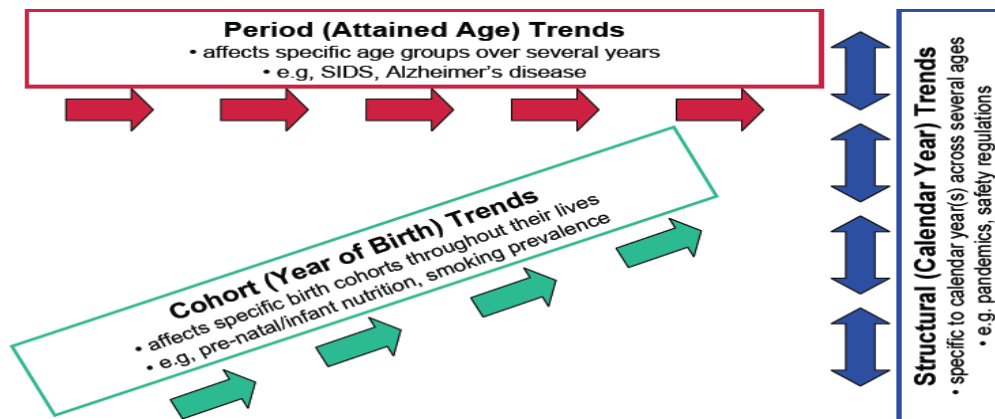
2. Longevity Experience – Global Studies

Given the issues with availability of credible data in Australia there will always need to place a reliance in part on the greater body of overseas experience for any analysis. The purpose of this section is to highlight an example of such an overseas study, and some related observations on drivers of historical mortality improvements.

2.1 International Data

An excellent starting point for an overview of international experience is the Princeton Report on “Patterns of Mortality Improvement over Age and Time in Developed Countries”. This report estimated surfaces of mortality improvement over age and time for 18 developed countries for the period from 1950 to the latest year available

The following diagram illustrates how to interpret these mortality improvement surfaces or “heat maps”. The colours represent the degree of longevity improvement, with the deep red being areas of greatest mortality improvement and the areas of deep blue being the areas of greatest longevity deterioration. Period (or attained age) trends affect specific age groups over several years. An example of such a trend would be Alzheimer’s disease that affects a certain age group. Cohort (or year of birth) trends affect specific birth cohorts throughout their lives. An example of such a trend would be the reduction in smoking prevalence. Finally, there are structural changes (or calendar) trends. These are specific to calendar years across several ages. Examples of structural changes are changes in safety regulations and the introduction of new diseases. Maps are based on population data.



Source: Patterns of Mortality Improvement over Age and Time in Developed Countries

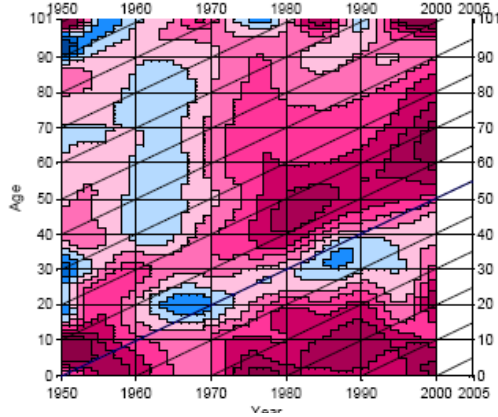
The key conclusion was that mortality did not decline uniformly across the countries but instead the patterns of mortality improvement can be classified into period, cohort and structural trends. The source for the following graphs is “Patterns of Mortality Improvement over Age and Time in Developed Countries”.

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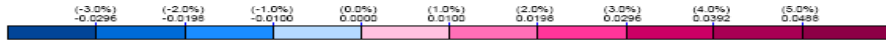
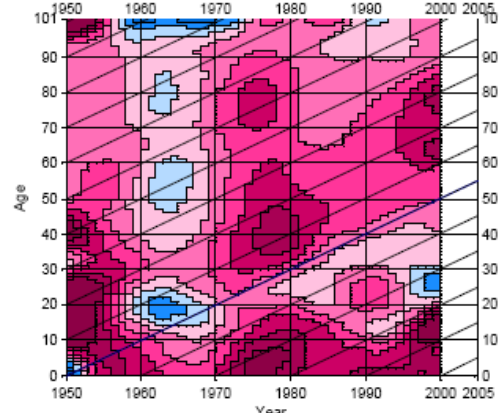
Australia

The Australian mortality improvement surface shows a number of clear trends. There is a clear structural trend in the 1960's for all ages but particularly around age 20. One potential explanation of this is the mass production of the motor car and the increased incidence of fatal motor vehicle accidents. Another clear trend is a cohort trend for those born around 1935. Finally, there is structural trend for males but not for females in the late 1980's particularly for ages around 30. A potential explanation for this trend would be the introduction of AIDS.

Australia, Males



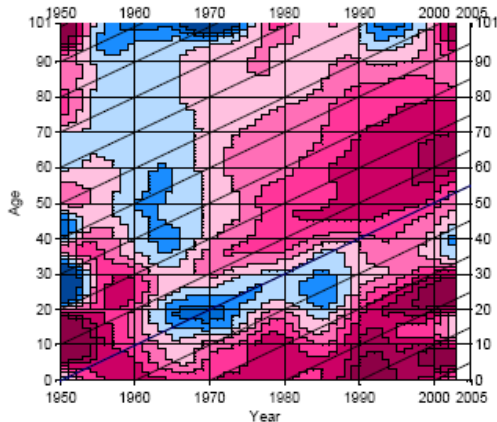
Australia, Females



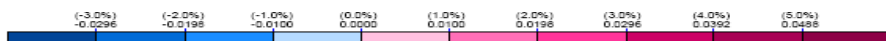
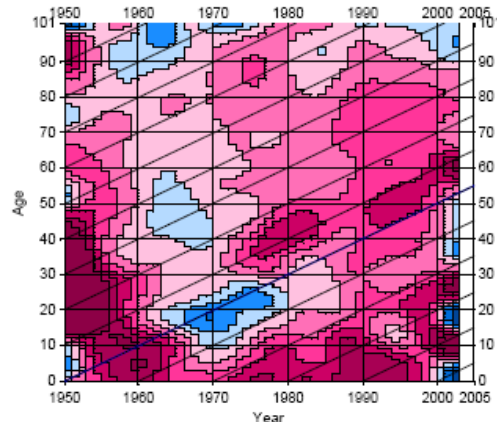
New Zealand

Not unsurprisingly, the New Zealand mortality improvement surface looks very similar to the Australian experience.

New Zealand, Males



New Zealand, Females

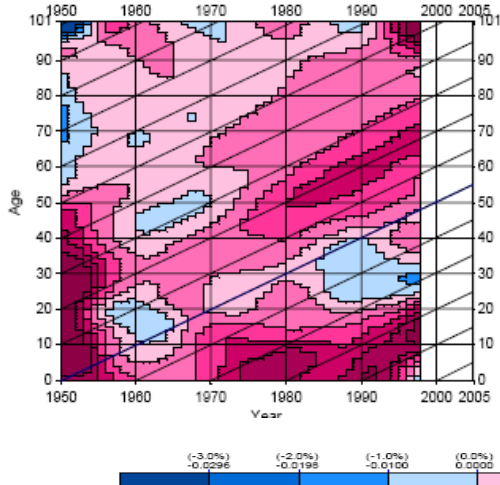


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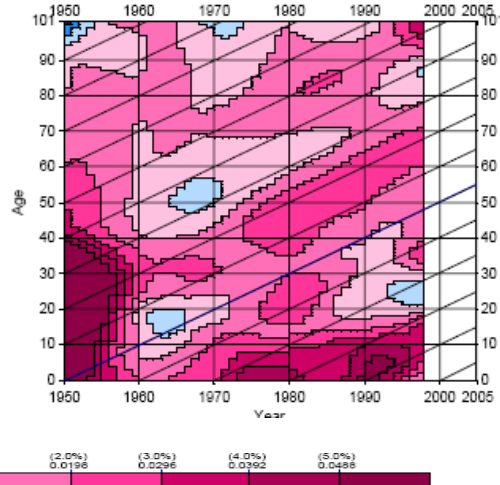
United Kingdom

The United Kingdom mortality improvement surface also looks similar to the Australian and New Zealand experience. The cohort effect where men and women born in the period 1925-45 have experienced more rapid reduction in mortality rates than generations born either before, or after this period has been well documented in the UK by the Actuarial profession. In particular, by far the greatest improvement in mortality is for the 1930-34 birth years. However, it is worth noting that there are differences between Australia and the UK and this would have implications for the relevance of UK data for Australia.

England & Wales, Males



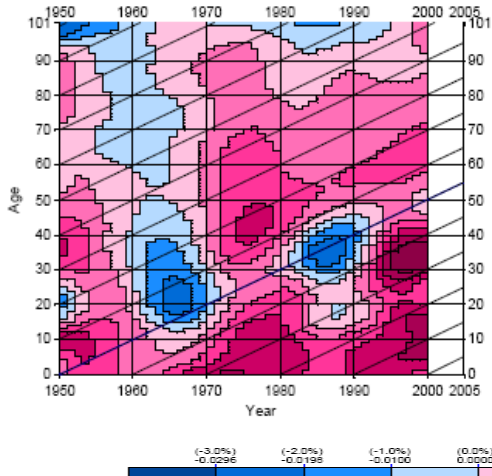
England & Wales, Females



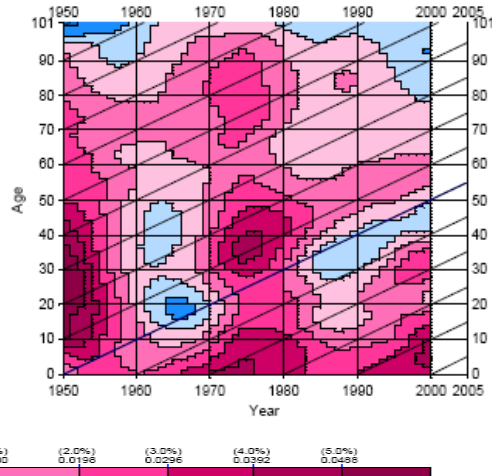
United States

The United States mortality improvement surface has similar age-specific patterns and timings of changes to Australia but it is worth noting that the overall average level of mortality improvement for the two companies are different.

United States, Males



United States, Females

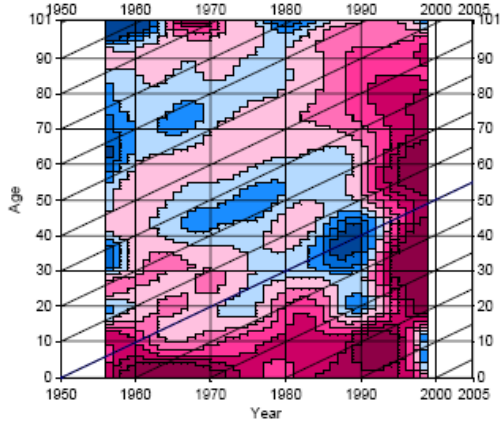


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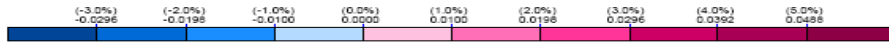
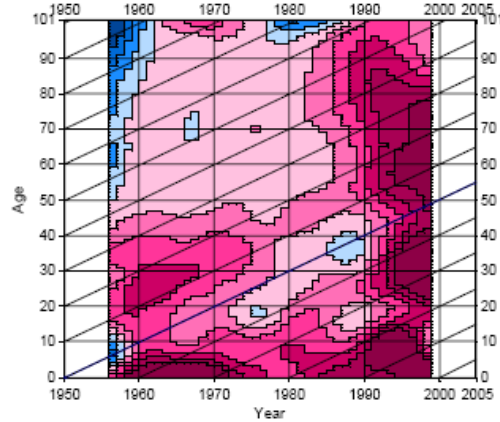
East Germany

The East German mortality improvement surface is dramatically different from those shown previously. There is a very clear structural trend of dramatic mortality improvements following the fall of the Berlin Wall and the reunification of Germany.

Germany (East), Males



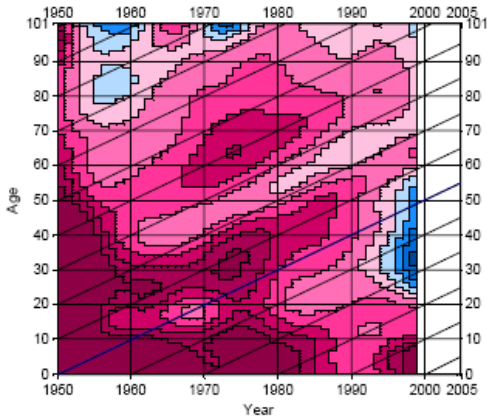
Germany (East), Females



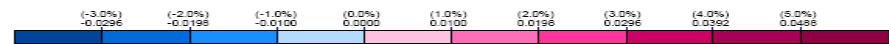
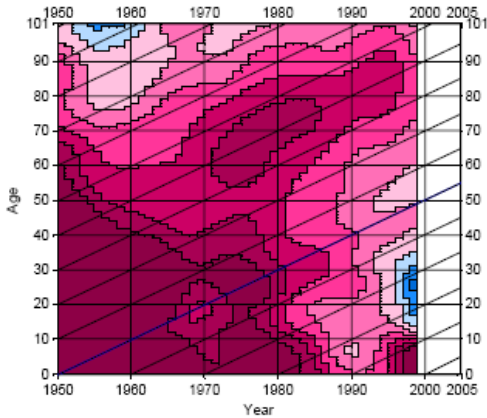
Japan

The Japanese mortality improvement surfaces are also materially different. The overall rate of mortality improvement has been significantly higher than Australia.

Japan, Males



Japan, Females



2.2 Key Drivers of Mortality Improvement

When interpreting these mortality improvement surfaces it is important to understand the key drivers behind the observed trends to determine the extent to which these trends will persist into the future.

Leading Causes of Death

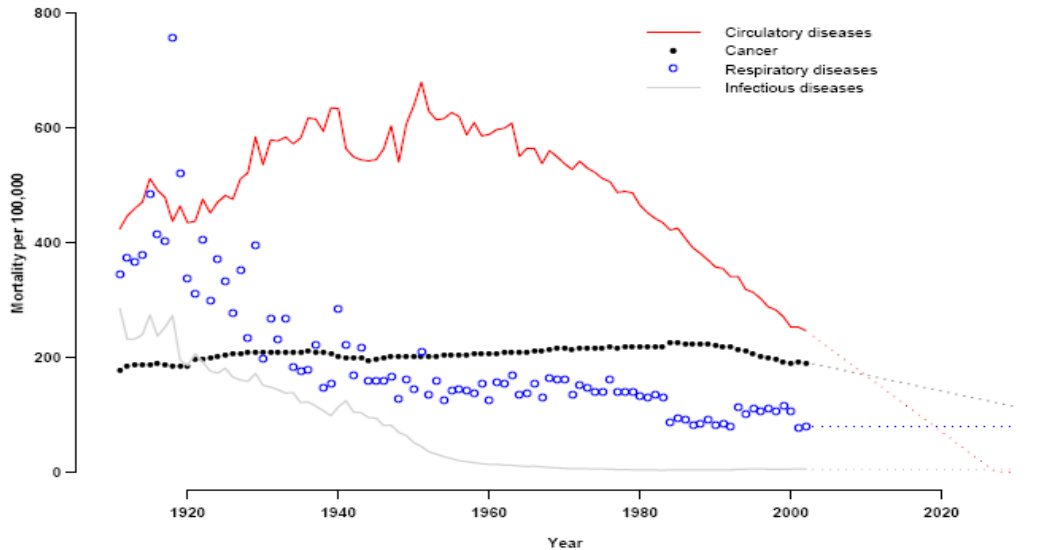
The following table shows the leading causes of death in the US in 1900 and 2005. There has clearly been a significant change in the leading causes of death over the period.

Leading Causes of Death

<u>1900</u>	<u>2005</u>
1) Pneumonia and Influenza	1) Heart Disease
2) Tuberculosis	2) Cancer
3) Diarrhea, Enteritis, and Ulceration of the Intestines	3) Cerebrovascular Disease
4) Heart Disease	4) Chronic Lower Respiratory Diseases
5) Cerebrovascular Disease	5) Accidents
6) Nephritis	6) Diabetes
7) Accidents	7) Alzheimer's Disease
8) Cancer	8) Pneumonia and Influenza

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Clearly historical mortality improvement has resulted from significant improvements in treatment of killer diseases. These killer diseases have changed over time and this can be clearly seen in the following chart based on UK experience. The key point here is that simply extrapolating past mortality improvements ignores the fact that the leading causes of death change over time.



Age-standardised mortality rates for selected broad disease groups, 1911-2003, England & Wales

Source: National Statistics (UK government)

Smoking Prevalence

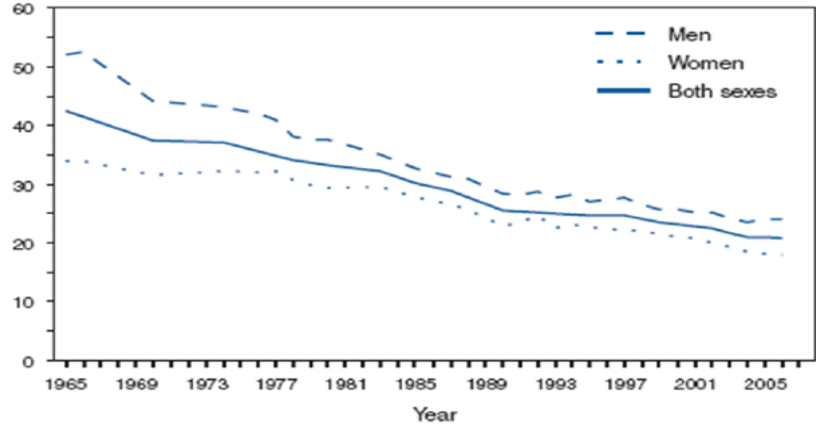
The United States Centre for Disease Control estimates that 1 in every 5 deaths in the US is due to smoking related causes. Primary causes include lung and related cancers, heart disease and respiratory diseases. Changes in smoker prevalence have created cohort effects among smoking related causes of death and contributed to some of the observable improvement in heart disease mortality.

Changes to smoker prevalence is therefore one of the key drivers of mortality improvements. Furthermore, relative changes of smoker prevalence over time vary from country to country and can contribute to the explanation of why mortality improvement surfaces vary from country to country

The following chart shows the changes in smoker prevalence for the US since 1965.

Cigarette Smoking Prevalence

Prevalence of current smoking among adults aged 18 years and over:
United States, 1965-2006



Changes to smoker prevalence is therefore one of the key drivers of mortality improvements. Furthermore, relative changes of smoker prevalence over time vary from country to country and can contribute to the explanation of why mortality improvement surfaces vary from country to country. As an example, take a country that has experienced a significant falls in smoker prevalence historically potentially contributing to historically high mortality improvements. This reduction in smoker prevalence is not sustainable as you can only permanently quit smoking once. The contribution to the historic mortality improvement factors is therefore also not sustainable. The converse is also true and highlights one of the issues with simply extrapolating historic mortality improvement surfaces by country.

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3. Longevity Experience – Australian starting point

There are five sources of readily available mortality data covering advanced ages that might be considered a suitable starting point for pricing or valuation of longevity products in the Australian market. These are identified in the table below together with arguments for and against their use.

Table	Description	For	Against
IM80/ IF80	UK immediate annuity tables determined from insured life data.	<ul style="list-style-type: none"> Used as basis for Australian reporting requirements Sufficient data for graduated table and improvement data to be produced 	<ul style="list-style-type: none"> Data and improvement assumptions very old UK products different to Australian Products sold at that time very different to now Known that population longevity and improvements have changed
IML00/ IFL00	UK immediate annuity tables determined from insured life data	<ul style="list-style-type: none"> Smoker/non-smoker split – necessary for use Different tables available for various cohorts within the study 	<ul style="list-style-type: none"> Data out of date Lack of future projections reduced usability Little data being submitted Insufficient data has led to assumptions being made (e.g. no select rates) that affect usefulness Product and market in which it is sold is different to Australia Australian population mortality is different to UK Low data levels mean unlikely to repeat study
2008 (SAPS S1)	UK self-administered pension scheme mortality	<ul style="list-style-type: none"> Standardised definitions of over 50 different mortality projection bases 	<ul style="list-style-type: none"> Difficult to match to Australian market
IA95-97	Insured life tables for death cover contracts	<ul style="list-style-type: none"> Experience is Australian 	<ul style="list-style-type: none"> Based on different contract type Annuity basis has insufficient data for production Data is too old No improvement or projections for annuitants
Mercer studies	Two studies (02-05 and 05-07) on four public sector pension schemes. Compares	<ul style="list-style-type: none"> Australian data Potential to include wider data from database 	<ul style="list-style-type: none"> Study members likely to have different experience to the general population Inclusion of wider scheme data would result in

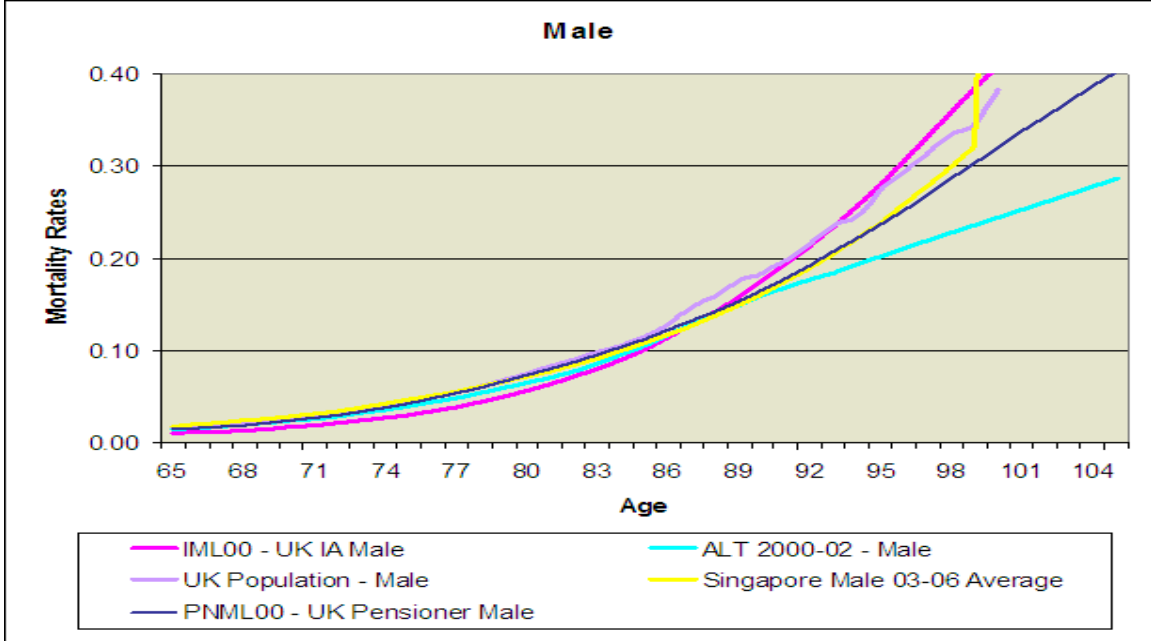
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	<p>pensioner mortality to ALT 00-02 and improvements to ALT25</p>		<p>reduced homogeneity of data</p> <ul style="list-style-type: none"> • Studies found that pension size inversely influences mortality, so results may not be able to be applied to other sections of the retired population. • This influence also requires this skewness to be taken into account when using these tables • Each scheme has a different commutation policy, which may also affect mortality experience • There is little available data for spouses and anyone aged 95 and over.
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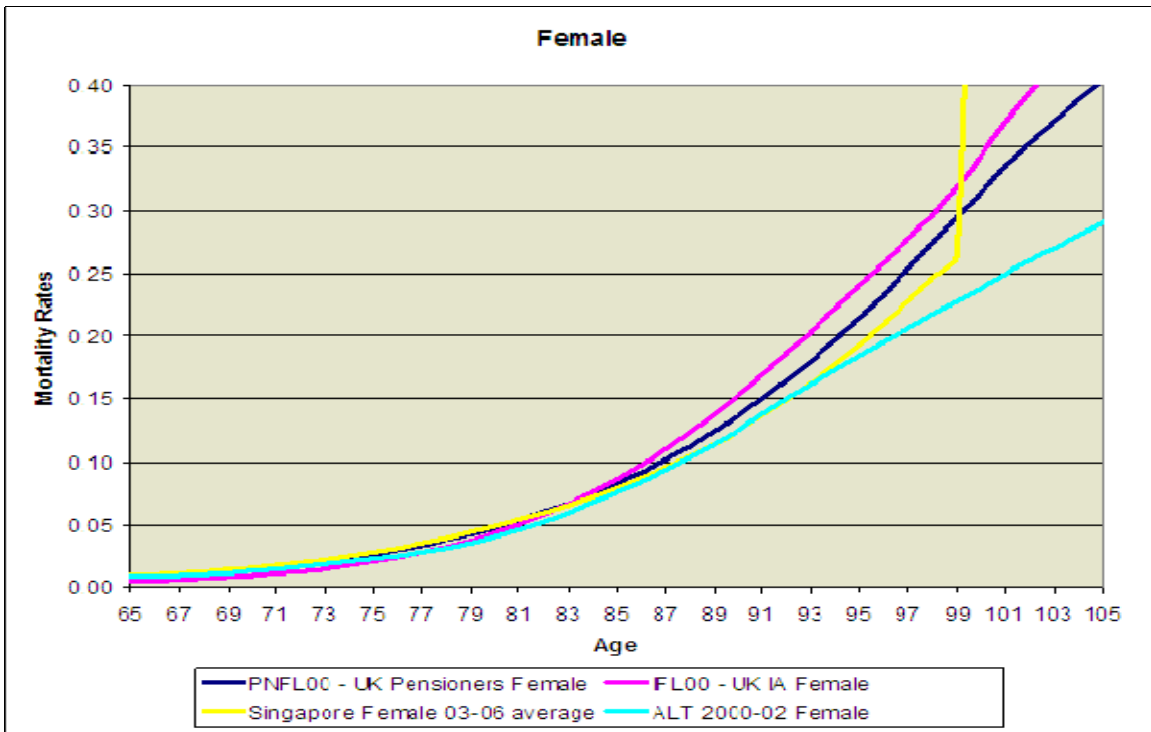
The conclusion is that none of these tables are really suitable for use in the Australian market. A small difference in anticipated longevity can make a huge difference to the liability of the company.

3.1 Comparison of international mortality experience

The graph below is interesting in that the UK pensioners and annuitants cross over at older ages.

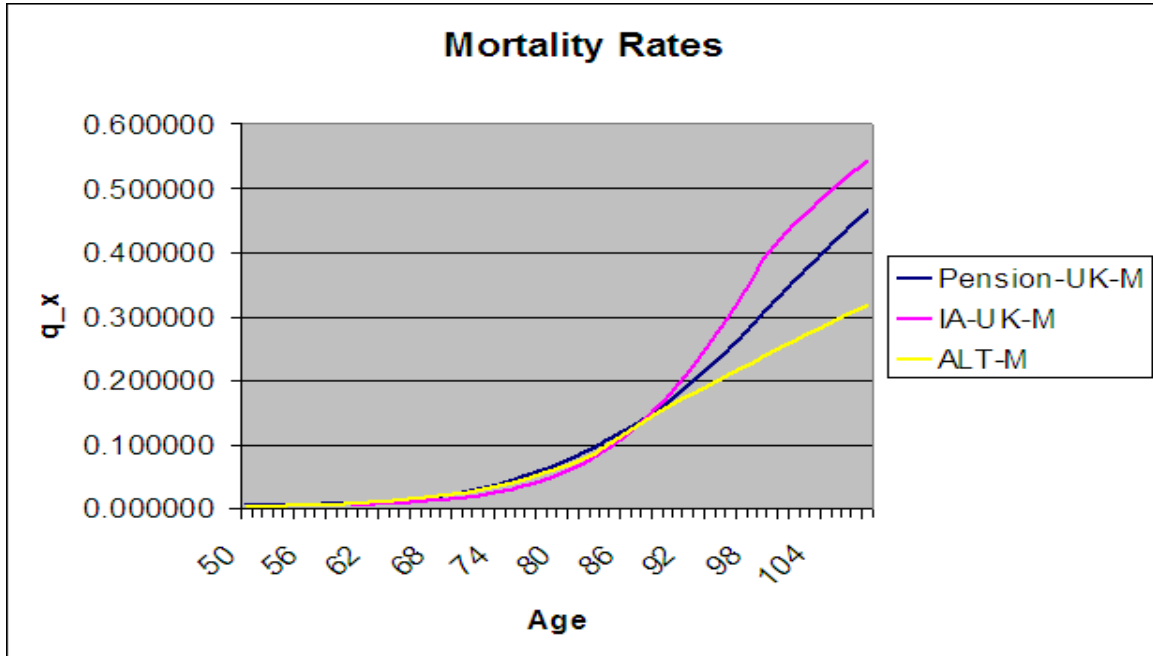


A similar graph for females;



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The cross-over is counter intuitive in some ways, but may be mere random volatility or else could be due to different levels of heterogeneity in the two groups (i.e. broadly the healthier pensioners have outlived the less healthy ones, and the “less healthy”/“healthy” ratio is higher in the pensioners groups than the annuitants).



4. The Australian retirement market

4.1 Market Size and Growth

In early 2008 total Australia superannuation assets stood at \$1.2 trillion, but since then losses have been significant (for example, the research house Dexx&R reported in February 2009 that \$250 billion had been lost from the retail and wholesale superannuation market over the 2008 calendar year).

The growth of the Australian superannuation marketplace places it in the top 5 in the world in terms of total assets. It ranks higher than the United Kingdom, and is the leading country by superannuation assets across Asia.

The post retirement superannuation sector is the strongest sector in terms of assets growth, are forecast to grow by close to 23% p.a. until 2012. This highlights the strong generational shift of Australians into retirement and the considerable expansion of wealth in the sector.

4.2 Existing Retirement Income Products Overview

The product range offered in the Australian retirement income market has generally been fairly limited. For a long time, lifetime annuities were the only product available for retirees. However, with favourable tax treatment and room for sharing upside investment return, allocated pensions have quickly grown to dominate the retirement income market since the 1990s. Recently, some signs of product innovation are emerging.

4.3 Allocated Pensions

The tax treatment has been favourable for this line of products. Allocated Pension Products allows a flexible drawdown (age based minimum drawdown applies) and selection of investment options for retirees and their advisors. It allows retirees to share the investment upside and more closely manage their retirement funds. The weakness of this product is that all investment and longevity risks are born with the retirees.

4.4 Lifetime and Term Annuities

Annuities provide a fixed income stream for the life of the retiree. Although both investment risk and longevity risk are absorbed by the product issuer, these are not popular in Australia for a range of reasons.

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Among these are:

- the perception of high cost;
- the desire of retirees to have control of their hard-earned savings for bequest motivations;
- a lack of awareness of the need for lifetime income levels above and beyond that provided by the pension;
- a lack of understanding of the basic structure, features and benefits of such products;
- the removal of the asset test exemption in 2007; and
- for many superannuitants, a savings balance of below \$100,000 simply does not translate into an annuity income stream of any apparent value to them.

It is also arguable that, due to recent events on world markets, genuine concerns could be held regarding the long-term stability and fidelity of annuity providers – the risk of institutional failure is now relatively apparent in the mind of the consumer.

A limitation on behalf of providers to support this product is that there are considerable capital charges associated with annuities, and the general lack of long-dated assets with appropriate risk and duration characteristics.

4.5 Product Innovations

Recent years have seen signs of active product innovation from retirement income providers. For example, AXA's North Personal Pension is a version of a variable annuity that also provides investment guarantees under two banners. One, where the value of original investments are guaranteed over 5 or 7 years and the second, where the value of original investments and market growth on those investments are guaranteed for terms of 10, 15 or 20 years (with growth 'locked in' annually). Similar variable annuity products have been actively sold in North America.

Another example is Asteron's recently launched ALIS product (Asteron Longevity Income Stream) which allows self insurance of individual longevity risk via a member pooling scheme, with limited options around the investment risk available. In order to reduce income volatility in respect of the pooled longevity risk, each fund requires a minimum member size. As the media release relating to the launch of the ALIS product stated, there is a major income gap for many Australians who are retiring and are likely to outlive their retirement savings, and closing this gap "requires real innovation from the financial services industry". It should be noted that the ALIS product was designed to complement existing retirement strategies (such as allocated pensions), not replace them.

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The main features of these products can be seen in the table below:

Type of product	Access to Fund	Investment Option	Longevity Risk	Residual Capital Value	Simplicity
Allocated Pensions	Flexible with minimum withdrawal % required	plenty of choice of funds and managers	not covered – the risk resides with the individual	passes to estate	easy to understand
Annuities	income defined on the date of purchase	investment risk borne by product issuer	longevity risk borne by issuer	N/A	easy to understand
North Product	defined as a fixed % of guaranteed account balance	choice of asset class and manager	not guaranteed	passes to estate	complex
ALIS	income defined by actuarial discretion	limited choice of investment options	individual longevity risk guaranteed, group longevity risk remains	decreased balance of capital value by age	complex

4.6 Size of the issue

The scope and size of the future superannuation market and associated needs of retirees is enormous by comparison with the current state of affairs. Deloitte research suggests a quadrupling of Superannuation savings by 2021 to \$4.36 trillion. ABS estimates suggest that the over 65's will consist of 37% of the population by 2031, at which point in time there will be 3 people of working age (15-64) for every person above 65 – in contrast to a 8:1 ratio in 1970 and a 5:1 ratio currently.

Health, aged care and Age pension spending is expected to increase from 7.1% of GDP in 2006/07 to 13.7% of GDP in 2046/47.

4.7 Current Shortfalls and problems

In terms of problems, perhaps the key issue is to do with perceptions and awareness. Firstly, how to shift consumer and market perception from the mindset of accumulating as big a balance as

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possible, then to being able to produce an income stream that is at a level to allow a reasonable existence over the long term.

This is exacerbated by people underestimating how long they are likely to live, and a lack of available tools to understand both investment and longevity risks as well as what constitutes a “reasonable” level of income.

The latter issue has no consensus with a plethora of studies giving different perspectives and expectations on the issue – for example, Gallagher (2009) refers to the target replacement rates suggested by the Institute of Actuaries of Australia of 70-80%. This compares to Senator Sherry and Wayne Swan suggesting 65%.

We can then contrast this with ASFA/Westpac income amounts at various levels of ‘comfort’, which are based on a ‘Fixed Amount of Retirement Income’ approach. Additionally these often do not account for the fact that there are different phases of retirement, each with differing lifestyle and working options, and associated net cashflow/costs.

It is arguable that the intersection of longevity, investment and income level risk, coupled with inadequate appreciation, knowledge and awareness of these risks, describes the current and pending state of play in the Australian retirement market. This is despite the majority of Australians having the visibility of account balances growing over time and a number of public statements and campaigns to educate consumers in these matters.

In addition to this, for those products on offer, policyholders are generally exposed to investment and longevity risk (which they do not understand) even if they do understand what constitutes a reasonable level of income. And, as per recent events, investment risk in particular has the potential to severely curtail any reasonable sustainability of income into even the short/medium term, let alone the longer term.

Some commentators rate the existing pension system as only marginally adequate to compensate or provide protection against inflation, investment and longevity risks or to provide smooth income over the longer term, even in conjunction with existing product offerings.

In terms of the specific prevalence and features of allocated pensions, Nance (2009) highlighted that risks still reside with retirees such that, for example, 50% of males now aged 60 will live to 86 but only 50% of those surviving will have any assets remaining at that time. Further, 20% will live to 92, but only 25% of those survivors will have any assets remaining.

Rawlinson and Cater (2008) carry out similar analyses but with varying asset allocations and derive complementary results – for example, for the 50% of males still alive at age 86, between 54% and 64% will have assets remaining (for 30% and 50% allocations in growth assets respectively).

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Additional risks that can impact retirement income levels to a significant degree include things that are simply always going to be part of life. This includes:

- the cost of living increasing more than anticipated;
- unexpected health and family assistance or emergency costs;
- shocks to the housing market and/or natural disasters;
- tax and pension changes;
- more subtle pressures such as increased levels and expectations of living standards into the future;
- as well as widespread fund and systemic failures.

4.8 Suggested Ways ahead/coping mechanisms?

Matterson (2007) suggests four main features that could form part of product solutions to the existing shortcomings within the Australian market. These features should aim to fill the void that currently exists, if they can:

- protect the downside;
- combine capital protection, upside participation and income generation;
- facilitate a shift into more aggressive asset allocations; and
- allow adoption of guarantees into existing product offerings such as allocated pensions

It is noted that variable annuities with various forms of guarantees or riders have proven to be very successful in the North American Market. The major product variations include Guaranteed Minimum Income Benefit (GMIB), Guaranteed Minimum Accumulation Benefit (GMAB), Guaranteed Minimum Death Benefit (GMDB), GMWM and Guaranteed Lifetime Withdrawal Benefit (GLWB). The major product features include capital and investment earning guarantees, as well as longevity risk guarantees.

Recently, there also have been similar products launched in Australia but so far, the guarantee is relatively limited with little investment choice, a single fixed maturity date, and initial capital invested only being guaranteed at the maturity date only.

The provision of a broader range of Government securities may be essential in assisting the emergence of product-based solutions to longer term risks (namely inflation and longevity).

Wider strategies to assist the management of investment and particularly longevity risks are well known and have been discussed and presented at various forums. For example, Wickham and Starkey (2008) summaries these as:

- downsizing the family house (though beware the impact on pension eligibility);
- utilizing reverse mortgages though these are not without a range of risks themselves;

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- working part time;
- simply drawing down less from retirement savings and as such adjust to a lower standard of living; and
- living with extended family or shared facilities.

Given that the key issue is to do with perceptions and awareness, then perhaps a key path ahead is to focus on education and the advice process. In this, Rawlinson and Cater (2009) offer the following implications for the advice process:

- Better enunciation of the nature/extent of longevity risk;
- Important to assess investment risk by reference to an individual's attitude to the dispersion of fund depletion outcomes;
- More effectively weighing up the merits of new forms of investment guarantees emerging with allocated pensions;
- Seeking ways of presenting complex information in a simple but useful way; and
- Better management by AFS licensees of the risks associated with the retirement income advice process.

4.9 Capital Market Transfer Longevity Risks

The need for a trading asset and liability market in longevity (mortality)-linked products is becoming recognised as a major requirement for successful hedging and management of longevity risks worldwide. The need for such a market is apparent when considering that the growth of longevity risk will not be met via:

- existing capital markets which do not provide natural hedging for longevity; or
- existing insurance and reinsurance markets which lack the capacity and liquidity

The risk worldwide is significant and financial innovation has yet to fill the need for this emerging and growing risk. As such the development in the near future of a range of products, securitisations and derivatives is expected, among them:

- Longevity bonds (the first attempted issue was in November 2004 by the European Investment Bank);
- Mortality Bonds;
- Life Securitisation in the form of "Blocks of Business", "Regulatory Reserving", "Life Settlement", "Annuity Book" and "Reverse Mortgage"
- Mortality and Survivor (Longevity) Swaps;
- Mortality and Survivor (Longevity) Forwards; and
- Mortality and Survivor (Longevity) Futures and Options.

The conditions now seem ripe for the emergence of such a market, given that some trades have now been done and that the size of longevity exposure is significant by any economic measure.

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With the paucity of existing market and insurance-based solutions (with cost and capacity the chief limitations), opportunities await those who can develop attractive proposals and products that will meet the needs of those exposed to significant longevity risk.

Various conditions will have to eventuate for the successful establishment and maintenance of an active market. The main ones appear to be the need for:

- (a) appropriate and accepted mortality indices;
- (b) transparent forecasting models;
- (c) standardised instruments to transfer longevity risk, versus the means and expertise to construct tailored or customised hedging tools.

In Australia, the development of a sophisticated capital market for longevity risks could prove to be instrumental for the development of a vibrant range of retirement income products.

5. Other retirement markets

Many other developed nations are trying to manage the issue of an ever-increasing proportion of the population living to greater and greater ages. In the interests of learning lessons from others we have summarised the main approaches and products being used elsewhere.

5.1 Pensions

Defined benefit pensions funds are still big business in the United States - \$US1, 243 billion at the end of 2007. Their funding levels have reduced significantly since the market started to falter.

Defined benefit pensions have been in decline in the UK for a number of years following the various issues relating to their sale and funding. In the 2008 research by the UK Pensions Regulators the sample indicates that only 31% of those sampled were members of open schemes, a steadily declining figure (in 2006 the figure was 41%).

The schemes as a whole have moved from a position of a funded position of 109.7% of liabilities at 30 March 2007 to a funding position of 99.4% as at 31 March 2008. This was mainly to do with a fall in asset values as a result of financial market movements – it is unlikely to have improved in the intervening period.

At the end of March 2008 it was estimated that the total scheme coverage was 12.4 million members with £833.2 billion of liabilities.

There is an interesting quote that comes from this research in relation to some sensitivity analysis that has been undertaken and this is:

“An increase in longevity such that experienced mortality is now equivalent to that of an individual two years younger would increase schemes’ liabilities by around five per cent, or £38.0 billion.”

As a result of the issues with pensions in the UK there has been a movement toward defined contribution pension schemes. There is a degree of sufferance due to scale for these schemes – 75% have fewer than 5 members. There are 83, 125 (and growing) schemes at June 2007, 116 of these have more than 10,000 members. Of these 83,125 schemes, 2,249 (including 101 of those with more than 10,000 members) are ‘hybrid’ schemes. A hybrid scheme has a section with defined contribution benefits and one or more other sections providing benefits under a different arrangement. The defined contribution section had £160 billion in assets at June 2007.

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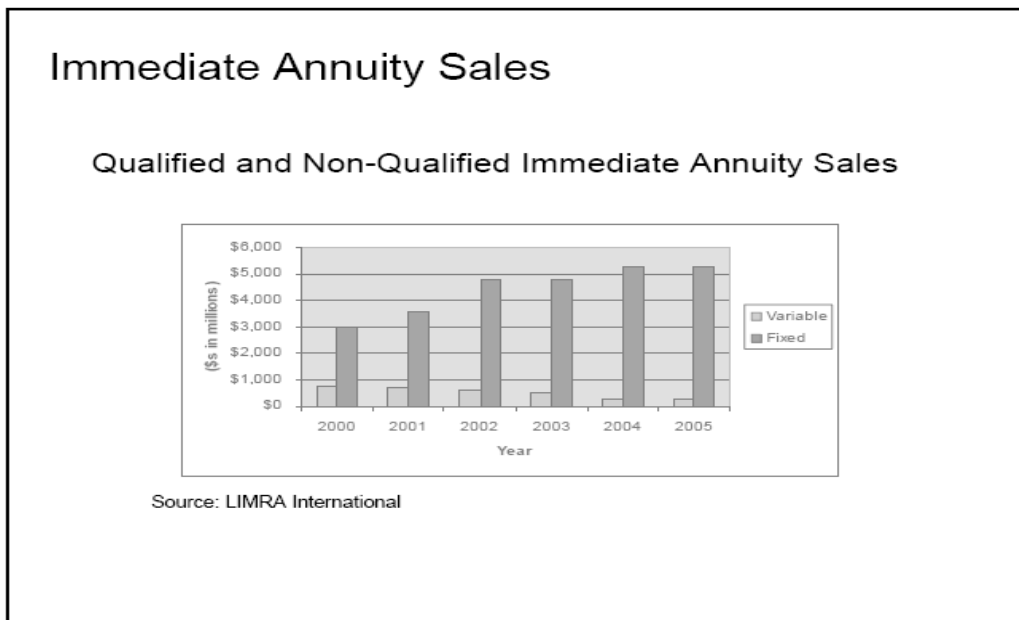
5.2 Annuities

In the USA immediate annuities are viewed as having a number of drawbacks. They are seen as an inflexible and irreversible decision including a high commission. Their value is underestimated by a populace that also undervalues its longevity risk.

The market has responded by adjusting the existing immediate annuity concept to allow greater flexibility for the insured. There are a number of product features that have appeared in this space in the American market. These are:

- Changes to the income payment – either reducing or increasing the payment in times of need, there are restrictions, for example, only after the third policy anniversary.
- Withdrawal benefits – Partial withdrawals are allowed. Again there are various restrictions on this, such as a small number allowed per year, must occur prior to the expectation of life at the commencement of the policy, limited to a percentage of policy value.
- Value remaining paid out on death – may be limited to the life expectancy at inception.
- Variable immediate annuities with income floors (more on variable annuities later).
- Variable to Fixed Conversion Features
- Integration of Long Term Care Benefits
- Longevity Insurance
- Income Bridge
- Flexible Start, Stop, and Restart
- Partial Annuitisation
- Cash Value
- Death Benefit
- Limited Accelerated Benefit-Nursing Care
- Options: Inflation, Index or Interest Credits
- Mortality Credits for Sub Standard (lives)

The effect on sales in the American market can be seen in the graph reproduced below.



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In the UK market there have been a number of product features introduced to make these products more attractive, such as:

- Guaranteed term annuity
- Value protected annuity
- Escalating annuity
- Investment-linked annuity
- With profits annuity
- Unit-linked annuity
- Impaired life annuity
- Enhanced annuities

There has been a steady increase in the conversion of pensions to annuities over time. The majority of these are now converted.

Sales of annuities are still increasing with more than £11 billion sold in 2007.

5.3 Allocated pensions

These are effectively the same as unit-linked annuities and investment-linked annuities in other countries. The term allocated pension is widely used here, but not in the main overseas markets.

These are viewed as a variation on annuities and thus are effectively included above.

5.4 Reverse mortgages

In the 1970's and 1980's reverse mortgage products first started to appear in the US. Growth was slow to begin with due to a number of barriers, such as complexity of product, various state and federal legislation issues, the risk of default if a holder became ill and could not maintain their home.

Government policy changed in 1989 and consequently the market improved. Long-term care insurance is widely sold in the US and much research has been undertaken on the use of reverse mortgages to fund the purchase of long-term care insurance.

Sales are measured as the number of reverse mortgage loans issued. The real growth in the market commenced in 2004 with just under 40,000 loans being issued. The figure for FY 2008 (end September) was 112,200.

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There is considerable interest in this product in the Indian market. The first product was introduced to the Indian market in 2006. It is estimated that by 2016 there will be about 28 million people eligible to take a reverse mortgage loan and that by the end of 2010 the market will be close to USD 500 billion.

In the UK lifetime mortgages make up 0.54% of all balances owing at the end of June 2008. This equates to £3,598 million on issue. To the end of June 2008 reverse mortgages (lifetime mortgages or equity release mortgages) were a growing proportion of a growing mortgage market.

5.5 Variable annuities

A variable annuity is essentially a unit –linked investment product with a number of options that allow flexibility or guarantee various benefits. The benefits are generally referred to as GMXB's and the main ones are:

- GMDB: Guaranteed Minimum Death Benefit
- GMAB: Guaranteed Minimum Accumulation Benefit
- GMWB: Guaranteed Minimum Withdrawal Benefit
- Lifetime GMWB: Lifetime version of GMWB
- GMIB: Guaranteed Minimum Income Benefit

In the UK sales grew strongly from 1985 to 2000 but have tapered off since then. At the end of 2007 the UK market was close to £10 billion per annum. It is forecast to be double this size by 2012.

The Japanese market has been quick to take an interest in variable annuities post financial deregulation in 1998 – 2001. The first products were sold in 2000, however the market reached ¥4,230.2 billion in September 2004. The success of these products in the Japanese market is attributed to the effect of the baby boom on demographics and the lack of alternative investments with reasonable returns after a prolonged bear market.

In the United States total assets in variable annuities were almost \$1.4 trillion at the end of the first quarter of 2008. It seems that the advantages of variable annuities outweigh the major perceived disadvantages, fees and high tax rates on returns. However, sales have been trending downwards since mid 2008 with an 18.1% decrease in the third quarter over the previous comparative year's sales.

5.6 Mortality bonds

Mortality bonds are issued on portfolios much the same as any other reinsurance contracts. These products are used to hedge the risk of actual mortality deviating to a given degree from a set

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expected mortality. They are predominantly used to hedge pandemic risk on portfolios covering risk of death or longevity risk on annuity portfolios.

In the US the first mortality bonds were issued in 2005. At June 2008 there was a total of \$ US 1,660 million of risk principal on issue.

The bonds on issue in the US market can be seen in the table below:

Issuer	Sponsor	Risk Principal (US\$ MM) ⁽¹⁾	Inception	Expected Maturity	Term (Years)	Rating (S&P)	Spread (in bps) ⁽²⁾	Expected Loss (in bps)	Wrapper
Un-wrapped Tranches									
Osiris B2	AXA	64	9-Nov-06	15-Jan-10	3.18	A-	120	7.3	
Osiris C	AXA	150	9-Nov-06	15-Jan-10	3.18	BBB	285	17.8	
Osiris D	AXA	100	9-Nov-06	15-Jan-10	3.18	BB+	500	37.4	
Tartan Class B	Scottish Re	80	4-May-06	7-Jan-09	2.68	BB+	300	18.0	
Vita II Class B	Swiss Re	62	13-Apr-05	1-Jan-10	4.72	A	90	0.7	
Vita II Class C	Swiss Re	200	13-Apr-05	1-Jan-10	4.72	A-	140	4.0	
Vita II Class D	Swiss Re	100	13-Apr-05	1-Jan-10	4.72	BBB	190	14.0	
Vita III Class A-VII	Swiss Re	129	11-Jan-07	1-Jan-12	4.97	AA-	80	3.1	
Vita III Class B-I	Swiss Re	90	27-Dec-06	1-Jan-11	4.01	A	110	3.9	
Vita III Class B-II	Swiss Re	50	27-Dec-06	1-Jan-12	5.01	A	112	3.7	
Vita III Class B-III	Swiss Re	39	27-Dec-06	1-Jan-11	4.01	A	110	3.9	
Nathan Re	Munich Re	100	19-Feb-08	15-Jan-13	4.91	BBB+	135	4.7	
Wrapped Tranches									
Osiris B1	AXA	128	9-Nov-06	15-Jan-10	3.18	AAA	20	7.3	CIFG wrapped
Tartan Class A	Scottish Re	75	4-May-06	7-Jan-09	2.68	AAA	19	5.0	FGIC wrapped
Vita III Class A-IV	Swiss Re	100	11-Jan-07	1-Jan-11	3.97	AAA	21	3.2	MBIA wrapped
Vita III Class A-V	Swiss Re	100	11-Jan-07	1-Jan-12	4.97	AAA	20	3.1	FSA wrapped
Vita III Class A-VI	Swiss Re	71	11-Jan-07	1-Jan-11	3.97	AAA	21	3.2	CIFG wrapped
Vita III Class B-V	Swiss Re	50	11-Jan-07	1-Jan-12	4.97	AAA	21	3.7	FSA wrapped
Vita III Class B-VI	Swiss Re	71	11-Jan-07	1-Jan-11	3.97	AAA	22	3.9	CIFG wrapped
Total Outstanding				1,660	-->as of 06/08/2008				

Notes

(1) Transactions issued in non-USD are converted as of the prevailing exchange rate on their respective inception date
(2) Spread over benchmark rate (typically three month US LIBOR or, for Euro-denominated transactions, Euribor)

Source: Guy Carpenter & Company, LLC

In the UK market Swiss Re issued a mortality bond in 2003. Investors were able to invest in this bond and the aim was to cover the risk of a pandemic. This bond had a four-year term. More recently the BNP Paribas/PartnerRe/EIB (BPPE) long-term longevity bond has been issued. It is structured as a zero coupon, 25-year amortising bond. The return depends on the number of deaths in a particular cohort of the UK male population.

5.7 Mortality swaps (Survivor swaps)

A mortality swap is where fixed mortality (or longevity) is swapped for a floating mortality table in the same way that currency and interest rate swaps work. Rumour has it that a mortality swap has occurred recently in the Australian market.

JP Morgan has been developing indices in a number of countries to allow longevity securities to be benchmarked and priced. These now cover a number of markets including the US, UK, Germany and the Netherlands. At 2008 there appear to be two UK trades that have occurred.

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The situation is similar in the US with some individual contracts in existence but little published information on the depth of the market as a whole.

5.8 Annuity futures

These are products that are being discussed in overseas markets. They are now possible due to the implementation of the indices mentioned above, but there is little public evidence available of actual transactions.

6. Need for a segmented retirees table

The main risk posed by the guarantees in these products is being able to manage the longevity risk associated with them. While companies may purchase bonds, futures and swaps to reduce their exposure to this risk, the counterparty still has to manage the risk.

In most of the other markets where these products are sold there have been issues around managing these risks as the information on the segment of the market taking these products was not able to be separated from the population data as a whole.

In both the US and the UK the population experience has been segmented into relevant groups and life tables and adjustment factors developed to allow a better fit of pricing assumptions to match the insured population.

In Australia we have three possible data sources; the IAAust annuity data, Population tables and the Mercers data. As we have seen, there are difficulties in applying all three of these, particularly if new products are developed where the target market differs from the cohort making up these existing studies, which is likely.

The alternatives are:

6.1 Using information from overseas studies

We could take the information gained from overseas studies and try to adjust these to fit the make up of the relevant target group. Any such adjustment is going to be very difficult to do and would be a rough approximation.

It is, however, a starting point. If a sufficient volume of product were then sold and experience studies were performed a relevant life table and improvement factors could be built up over time. The issue with this is that through this time companies have been pricing single premium products before the experience is built up, so this could be a costly way to do it in practice.

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6.2 Fitting based on existing Australian data

We could use the existing annuity, Mercers and population tables and fit a series of interim graduations to apply to different groups perceived to be between the data available. To do this the data would need to be available at close to the same dates, would need to be as up to date as possible and a series would be required to obtain improvement rates. This would be difficult to achieve.

The resulting tables might be a good guess, but even being a small way out on these types of tables can have a large impact on future profitability, even if they are, technically, best estimates.

The other issue is, how do you determine the characteristics of the groups that you are splitting the data into if there is no information available to do this?

6.3 Developing an Australian retired persons experience study

This would be great data to have. To get it we would need all companies that provide retirement products to submit data to a central source in a specified format by a given deadline. The deaths would have to be recorded accurately – which is problematic as a death with some products is simply a different type of withdrawal and records of deaths may not be as accurately kept compared with the practice of life insurance companies.

We are all aware of the issues and cost involved in experience studies with life insurers who really need the data. There is little impetus for non-life companies to provide this information, as they would perceive little use for themselves from the results.

6.4 Developing a stratified life table

The Australian Life Tables are developed by the Government Actuary from census data with an identifier code that allows deaths to be matched to in force data. Given the in force data is derived from census information there is the possibility of being able to pick up other census fields that could be used as a proxy for socio-economic indicators.

The data could then be used to determine either life tables, or A/E rates compared to the relative population tables. If back data could be obtained the study could be repeated over a number of census periods so that improvement data could be built up.

Before anyone starts talking to the Government Actuary about this, no one from our team has discussed this idea with anyone yet.

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The other issue with this is the determination of socio-economic proxies to be used to split the tables. There could be a considerable amount of work in running through data split along a number of possible proxies to see how definitive the results actually are before final indicators are decided upon.

7. Conclusion/discussion

What we would like to do at this point in the session is to have an open discussion to determine the views of the membership and plan a way forward.

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