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Contents

2007 VOLUME 13
issue 2

Feature Articles

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2007 VOLUME 13
issue 2

Mean reversion in investment markets: the implications for investors and regulators

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This paper is particularly concerned with mean reversion in investment markets and its implications for investment market regulation. It is now well established that equity markets reflect a varying risk premium. It also seems that they and other investment markets are not necessarily always efficient and can sometimes move to extreme levels. Investors who rely on fundamental analysis of individual assets and asset classes can profit from such movements. Uninformed investors, on the other hand, can not only lose money by inadequate diversification and excessive trading, but also by being panicked into buying overpriced or selling underpriced assets.

This leads on to a consideration of other errors, identified by recent research, to which uninformed investors may be prone. Most important would appear to be the failure of superannuation members to adapt their investment strategy over their lifetimes.

It is suggested that official and industry regulators should take behavioural finance insights into account in enforcing disclosure, and by encouraging a more thorough approach to the monitoring of investment performance. The pressure on uninformed and nervous investors to panic might be reduced by the publication of a consensus portfolio to act as a benchmark.

Keywords: *Superannuation; choice; mean reversion; behavioural finance*

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Introduction

This paper attempts to outline what is known about mean reversion in investment markets, and to explore the implications for the regulation of defined contribution superannuation funds in Australia. Australian superannuation fund members now have, in the main, choice of both fund and investment mix. As members of accumulation funds, their retirement income depends significantly on how they exercise their investment choices.

While there is a plethora of advice available on investment choice, there is limited agreement - even between experts - on many basic facts. There are, however, a few clear principles that bear repetition and expansion: diversification, expense management, fundamental analysis and – in the light of the mean reversion discussed at length in this paper – avoiding panic. These principles are not unknown, and are captured in some popular books such Bernstein (2002), but they are not universally accepted and still need explanation and defence.

In section one this paper quickly summarises the debate between efficient market theory and behavioural finance. Section two is a more detailed consideration of research into mean reversion, the results of which support a time varying equity risk premium and non-linear reversion to a mean range rather than a point. Together they make the case for fundamental analysis, which is discussed in section three as part of a rehearsal of investment theory. The section also discusses recent theoretical and market developments that take members' age into account. These developments are found to fall short in their consideration of housing, expenses over the life-span and mean reversion. Section four considers regulation and recommends some changes.

In reviewing the literature, an attempt has been made to focus on more influential papers, but the field is too broad to have confidence that everything has been covered. Writing ten years ago, Campbell *et al* (1997) mention the impossibility of covering

all the papers that had then investigated the efficiency of markets, let alone the other subjects covered in this paper.

1 How investment markets work

A full discussion of investment market functioning must include the theories of market efficiency and behavioural finance, with perhaps a mention of econo-physics and evolutionary finance as interesting alternative approaches. Such discussion can, however, be made difficult by dogmatic arguments. Arnott (2004), in a Financial Analysts Journal editorial, makes the point that: 'much of our industry works on dogma. And much of that dogma is based on sound economic theory. But theory is only theory: it tells us what should happen, not necessarily what does happen.'

1.1 Market efficiency

Belief in market efficiency is one piece of dogma that may be a source of poor advice.

1.1.1 Markets are not perfectly efficient

It is clear that even the large US share market is not perfectly efficient. This is recognised by the wiser proponents of the theory, such as Ball (1995), who merely asserts that it is a reasonable *a priori* assumption that deep and liquid markets with low barriers to entry should be efficient. He mentions a number of anomalies that have not been explained. Of particular interest are:

- Shorter term under-reaction to news that rewards momentum strategies.
- Subsequent price over-reactions and then longer term corrections that reward contrarian investment strategies.
- The weak correlation of observed betas - and the stronger correlation of smaller capitalization, lower market to book ratios, and higher dividend yields - with higher returns on individual shares.

- Various seasonal patterns of hourly, daily, monthly and quarterly prices. He does not mention the even longer four year cycle, which Nickles (2004) shows to coincide with US presidential elections since the early fifties.

1.1.2 The impossibility of perfect efficiency

Occasional inefficiencies in markets are partly explained in a widely referenced article by Grossman and Stiglitz (1980) who prove the impossibility of completely efficient markets. There must be enough inefficiency in market prices to make it worthwhile for traders and arbitrageurs to operate. Anomalies in relative value occur if there are insufficient numbers of active investors. The profit these investors make keeps them in business, but there is no assurance that they will be uniformly successful.

One implication is that anomalies are not likely to persist for long. They will emerge, become subject to exploitation by traders and arbitrageurs and then may disappear only to reappear some time later. Another implication is that at least some people must believe that it is possible to make trading or arbitrage profits for markets to be efficient. As a dogma, the efficiency of markets is self-defeating. The more it is believed, the more money will be lost.

In spite of this, market efficiency is widely taught in university courses and used as a useful, if not always challenged, assumption on which to base models for asset prices. Welch (2000) asked a sample of over 100 finance and economics professors whether they believed in the efficiency of markets or not. Over 90% believed that equity markets were efficient and followed random walks in the short run. Fewer than half thought that markets showed negative auto-correlation over a three to five year horizon and that the value of the equity risk premium changed over time. Most appeared unworried by the anomalies mentioned above.

1.1.3 But one cannot beat the market

A lack of efficiency means that it is possible to profit if there is an element of luck (arising from the absence of traders and arbitrageurs) to supplement good judgement. Whether the investment performance of managers persists over time has been intensively researched. Carhart's (1997) findings remain largely unchallenged. There is, at best, weak evidence of persistent superior performance arising from funds that seem able to quickly capture new evidence in the market, or better interpret current information. There is however much stronger evidence of persistent underperformance. Part of the underperformance can be explained by excessive trading; the rest must come from the purchase or sale of investments at uneconomic prices. One possibility is that managers are trading at an uneconomic price for some personal benefit at the expense of the members. Another is that they have failed to consider the fundamental value of the assets that they are trading.

There is also evidence that recognisable groups of individuals perform significantly worse than average. Barber and Odean (2000 and 2001), for instance, describe a group of individual investors that lose by trading too often: they buy shares that subsequently do worse than average and sell shares that do better, and also waste significant amounts on brokerage. The problem is more acute for males and the unmarried.

1.2 Behavioural finance and bounded rationality

If markets were efficient, they would have to be dominated by rational investors (or sellers of assets). Behavioural finance is based on the view that investors are not only ignorant about the future but not entirely rational in their processing of relevant information, or at least as Simon (1983) puts it, they use bounded rationality.

1.2.1 Credulity

Daniel *et al* (2002) provide a detailed review of behavioural theories of pricing. They suggest that investor credulity lies at the root of the anomalies in efficient markets. They further explain credulity mainly in terms of 'limited attention' and over-optimism, both widely attested in the psychological literature and every day experience. In more recent work on over-optimism, however, Hoelzl and Rustichini (2005) find that it is limited to tasks that are perceived as relatively easy. People can become excessively pessimistic when faced with more difficult tasks.

The limited attention and processing power of investors is used by Daniel *et al* to explain the under-reaction of share prices to news, the persistence of arbitrage opportunities in markets with fewer participants and the greater returns from smaller capitalization stocks with a limited following of analysts. It can also explain herd behaviour if investors place too much weight on information that comes from other market participants, and not enough on their other sources of information.

Over-optimism could explain some of the excesses of price momentum before it reverts, and may explain some of the relative failure of growth and high market to book strategies. Companies in these categories may well perform better than others, but relative underperformance arises because they do not do as well as expected, perhaps by management and analysts. Daniel *et al* also report on research that suggests that investors are more credulous about intangible information than accounting data. It may be that these anomalies are also better explained by limited attention than over-optimism.

Cooper *et al* (2004) confirm overreaction theories of short-run momentum and long-run reversal. They also find that momentum profits depend on the state of the market and that up-market momentum reverses in the long-run, which is consistent with over-optimism.

1.2.2 Under-reaction

Under-reaction to announcements and subsequent momentum over a period of months represents perhaps the most potent evidence of inefficiency in markets: prices do not reflect all publicly available information. Ball (1995) argues that the over-reaction is smaller than might be expected: markets are almost efficient. Other attempts have been made to explain the anomaly. Lewellen (2002), for instance, suggests that is can be explained by the correlation structure of markets, but the response by Chen and Hong (2002) shows that his arguments are not valid.

Over-optimism may have a role in this under-reaction. Schwartz and Steil (2002) report that investment managers often appear to think that their competitive advantage lies more in their alternative interpretations of the same information, rather than quickly absorbing new information. Anecdotally, this view arises from the mistaken belief that the market is always efficient in processing information. It may lead managers to neglect the importance of quickly processing new information.

1.2.3 Defences of rationality

In the face of the behavioural critique, there have been a number of attempts to explain the anomalies and defend investor rationality, but none appear - at this point - to be entirely successful. Brav and Heaton (2002) suggest that rather than see market anomalies as irrational, they could be explained in terms of the rational Bayesian adaptation of new information into *a priori* knowledge. Aloysius (2005) uses similar arguments to distinguish stochastic from model risks and to suggest that 'ambiguity aversion' explains the equity risk premium puzzle. Ball (1995) suggests that the alternative behavioural theories are too disparate and the patterns too transient to provide an alternative. In one sense he appears to be right: behavioural explanations do find patterns in the statistical noise in sequences of prices, but they do not seem sufficiently predictable to exploit.

1.2.4 Relevance of irrationality

That brings the discussion to the relevance of behavioural finance to investment practice.

It does not justify communal or government setting of prices. Daniel *et al* (2002) note that the proponents of the efficient market theory make their arguments as a defence against government intervention. Daniel *et al* make the point that this is a brittle and unnecessary defence line. If market participants can be irrational, so can government officials. Government intervention in the mechanism of price formation is not justified by market irrationality.

The irrationality of some market participants represents both a threat and an opportunity to rational investors. Irrational noise interferes with the pricing mechanism, and means that rational investors – if forced to liquidate assets at an unfavourable time – will lose money. This applies even more strongly to rational investment managers who may lose mandates to less rational competitors when prices are out of line with fundamental value. To the extent that rational investors and investment managers are able to buy when assets are irrationally cheap and sell when they are irrationally dear, there are profits to be made.

One of the major and avoidable risks to uninformed superannuation members is that they will credulously accept the recommendation of over-optimistic managers and irrational analysts and advisors, and sell cheap and buy dear.

1.3 Other theories

Hens and Schenk-Hoppé (2005) describe the theory of evolutionary finance, which considers the evolution of markets and the adaptation and survival of investment strategies in a manner analogous to the adaptation and survival of biological species. Empirical observation includes the strategies of investors, and not just the pricing patterns that make up the stuff of

technical research and underlie the theories of efficient markets and behavioural finance. Econo-physics, as for instance described in Ball (2004), similarly describe the functions of markets rather than prices.

Both do offer useful insights into the working of markets and the formation of prices.

2 Mean reversion

While the insights of the efficient market hypothesis and behavioural finance are frequently incorporated into investment advice, the same does not seem to be true of what is known about mean reversion.

This section therefore looks in some detail at the results of academic research into whether prices are a random walk or can be expected to revert in some way to some mean or fundamental value. Formula 1 states this more rigorously for Δx_t the change in price to time t.

$$\Delta x_t = \mu_0 + \mu_1 t + (\alpha - 1)x_{t-1} + \sum_{j=2}^{p} \beta_j \Delta x_{t-j+1} + \varepsilon_t \qquad (1)$$

A trend stationary series of price changes would have non-zero values for μ_0 and μ_1; while a covariance stationary series would have non-zero values for some of the β_j's. A value of α that differs from one means that the series is not stationary at all, and is mean reverting if $\alpha < 1$. Mean reversion thus means that the expected change in the price depends on the current price and can be expected to revert in some way to a longer term mean value.

It is concluded below that there is significant theoretical and empirical evidence of non-linear mean reversion from market extremes. The reversion is not likely to be to a point, but to some level within a range. Discussion begins with currency markets as they provide the necessary background to discuss mean reversion in other markets.

2.1 Currency markets

Identical commodities should sell at identical prices in different markets – after allowing for costs of transport. Rogoff (1996), in a valuable literature review, outlines a puzzle that – in the short run at least - they do not. In that paper, he suggests that while economists all believe that purchasing power parity (PPP) should hold in some form or other, it had taken some 400 years of research to find persuasive data to demonstrate that prices do tend to revert to the expected mean. The pace of reversion, which he set at 15% pa, is however sufficiently slow to represent a puzzle – even if 'one confines attention to relatively homogenous classes of highly traded goods'.

There are obvious explanations. In the first place there are frictions: not just transport and other trading costs, but tariffs and other barriers to trade. There is also the likelihood that traders and arbitrageurs may not be able, or find it worthwhile, to respond to price differentials until they become relatively large. The idea can be expressed as a 'band of inaction' around PPP, with mean reversion applying outside this band.

There are a variety of models that have been tried to fit this pattern. In one of the more elegant Taylor *et al* (2001), confirmed and adapted by Paya *et al* (2003), use an exponential smooth transition auto-regression (ESTAR) model. A one period simplified model of their approach is given by formula 2:

$$y_t = \mu + [1 - e^{-\alpha(y_{t-1}-\mu)^2}][(y_{t-1} - \mu)] + \varepsilon_t \qquad (2)$$

where μ represents a productivity adjusted purchasing power parity and ε_t represents an error term. The exponential weight is limited to the range [0,1] to prevent it from blowing out. Their formula also allowed for a variety of lags over longer periods; the resultant fit for a range of European currencies and the US dollar over 22 years to May 2001 suggests faster mean reversion than reported by Rogoff, especially for the larger shocks away from PPP. For a 10% shock, half lives (representing the time taken to

move half way to a long term equilibrium) vary from 13 to 41 months; for a 40% shock the half lives vary from 1 to 17 months. The authors explain the differences in the parameters of the formula for different countries by differences in the ease of arbitrage. This, in turn, depends on geography and institutional structures (which would be taken to include culture).

Amongst this literature, Taylor (2001) provides a useful analysis of two pitfalls in measuring mean reversion. The first is the problem of time averaging. He finds, for instance, that measuring currency rates or returns at monthly intervals will overstate the half life by some 50% if the true half-life is greater than a month, and by more if it is less. The second issue is that of non-linearity, which leads to increasing errors as the band of inaction widens. He uses what he calls the simplest, non-linear model where the reversion is linear outside the band of inaction. This 'threshold autoregression' (TAR) requires estimates of the thresholds as well as of the parameters of the reversion.

There is another independent strand of research into mean reversion and PPP sparked off by O'Connell (1998) who argued that the long term linear mean reversion was 'overvalued' because of cross-sectional dependence or collinearity. High inflation had simultaneously affected most of the countries in the samples and thus created spurious relationships. This strand ignores what would appear to be the superiority of the non-linear tests, but the non-linear researchers, in turn, appear to ignore these other influences that should be considered in the modelling process.

After referring to the non-linear developments, Taylor and Taylor (2004) say that 'the idea of long-run PPP now enjoys perhaps its strongest support in more than thirty years, a distinct reversion in economic thought.' It certainly appears that recent research has resolved the puzzle of PPP. Small deviations from PPP present little in the way of profitable arbitrage opportunities, and can remain for some time. Large deviations from the productivity weighted PPP do, however, produce a speedy and measurable mean reversion.

2.2 Interest rates

Unlike PPP for currencies, there is no natural theoretical level to which interest rates can be expected to revert. There are however good theoretical reasons to expect the real rate of interest to be within a band of some -2% to perhaps 10%. Below real rates of -2%, there will be opportunities for arbitrage as is it possible to hold cash if there is no inflation or non-perishable goods if there is. If real interest rates were 10% in a developed economy (where the balance sheets of the banks exceed GDP and there are numerous other loans and rental on property to pay), total real interest and rent payments could account for 20% of GDP. If half the people in a country are lenders and renters and the other half rentiers (who receive interest and rent), the borrowers will be paying an average of 40% of their gross incomes in interest and rent. While perhaps not impossible, it is difficult to envisage such a situation being sustainable.

In the vast literature on interest rate modelling (most of which covers nominal interest rates), two strands can be examined briefly. One, such as Mankiw and Miron (1986) finds that there is insufficient evidence to reject the hypothesis of a random walk. On the other hand, many interest rate models, such as Vasicek (1977) and Cox, Ingersol and Ross (1985) assumed linear reversion to a mean. These models did not initially fit observed data well, but have been developed to fit more closely.

Some subsequent work appears to have shown that the relationship is not linear. Jones (2003) shows that attempts to measure the parameters precisely are largely dependent on the hypothesis being tested. He provides an interesting illustration of how results can differ widely depending on alternative Bayesian prior distributions. The problem arises from the paucity of data at extremes. One can believe that each extreme event is likely to be unique in its causes and the way in which markets return to normality. If so, it provides no evidence of future mean reversion.

Kapetanios *et al* (2003) apply an ESTAR model to interest rates in the major OECD economies with success. Nominal interest rates too, therefore, appear to be mean reverting as they approach extreme values. There is less research on the real interest rate as determined by deducting inflationary expectations from nominal rates, but Lai (2004) finds evidence of mean reversion in the US.

2.2.1 Term structure

Seo (2003) finds a non-linear mean reversion in the term structure of interest rates using a TAR approach. He ascribes these plausibly to transaction costs, which prevent investors from realizing arbitrage opportunities. His adjustment coefficients which describe the mean reversion are regime-dependent (ie. the parameters of the model switch between different regimes (or states of the world) in a random fashion. Regime shifting models often fit the data well because of their fatter tails and ability to reflect clumps of increased volatility). This makes the model even more complex.

Chan and Cheung (2005) produce a TAR model of Australian long and short term interest rates with three regimes based on thresholds of the difference between the two rates. The model may well be over-parameterized, but has mean reverting properties.

2.2.2 Credit risks

Jarrow and Turnbull (2000) bring together default and market risks to model credit risks. They refer to the need, arising from banking regulation, to capture the risks of default, downgrade and spread. The first two are clearly related and are clearly cyclical. Collin-Dufresne and Goldstein (2001) confirm that firms adjust their leverage over time to find an optimal level with the result that credit spreads are mean reverting. Prigent *et al* (2001) find evidence of non-linear mean reversion of the indices, as does

Bhanot (2005), who confirms that survival bias does not change this result.

Some idea of the consensus view can be obtained by considering pro-cyclicality. This is the problem that backward looking, risk-based regulatory capital will rise after defaults and spreads increase, and then be too high for the improvement to come. Allen and Saunders (2004) survey the literature and say that they see a consensus on the basic idea of addressing pro-cyclicality, but little agreement on model and policy specifics.

2.2.3 Inflation

As with real interest rates, there is no obvious long term level for inflation and inflationary expectations, except perhaps the targets set from time to time by central banks. Given that explicit inflation targeting is relatively recent, there is not enough data to confidently test this possibility. There are reasons for believing that the inflation rate cannot fall much below zero – real interest rates would rise too high, and the redistribution between different groups of people become untenable. Inflation rates can however explode, as has been experienced too frequently.

As with the other time series investigated, there are many independent strands of research on inflation. Much of the earlier economic work does not consider mean reversion at all, and where it does, only considers linear characterizations, which from the earlier discussion, are unlikely to be satisfactory. The few reported attempts that have tried non-linear models have been more successful. Baillie *et al* (1996) analyse monthly inflation for 10 different countries, and find strong evidence of long memory with mean reverting behaviour for all countries except Japan. Arghyrou *et al* (2005) try a variety of linear and non-linear models on UK inflation rates over the last third of the previous century. That they have attempted a number of models suggests that there is data snooping (so finding spurious relationships), and the large number of parameters that they use suggests some over-

parameterization. In spite of this, their rejection of the null hypothesis of a random walk for inflation appears plausible.

2.3 Equity markets

This brings us to the interesting question of whether there is a band of inaction for equity markets. As with PPP, there are a number of ways of modelling the 'true' value of a share, with prices deviating from this value to the extent that the assumptions in the particular model do not hold.

One can make the assumption that all markets are competitive and free of trading or arbitrage opportunities. If the markets for every company's products and its assets and liabilities were perfectly efficient, the mean value of a share would be the book value of the net tangible and intangible assets (adjusted appropriately for inflation). If the price were higher, an arbitrageur could raise capital for a new company of the same sort, buy the same assets and then sell the shares for a premium. If the price were lower, then the companies would not invest in replacement assets and would pay their entire cash flows back to their shareholders until the productive capacity in the market was sufficiently reduced.

One can relax the assumption that the underlying markets are efficient, and consider the position if only the investment markets are efficient, and can produce an unbiased estimate of companies' earnings. Under these circumstances, every company would generate earnings at a risk premium to the risk free interest rate of suitable duration. If one makes the additional assumptions that there is a stable correlation structure for all shares and sufficient market participants who can invest or borrow at the risk free rate, then the margin required by investors over the risk free rate can be determined. If one can also ignore the impact of depreciation and the possible need for investment to maintain the earning power of the assets, a fairly accurate estimate of the value of the company can be obtained by discounting the earnings at a risk-adjusted rate.

If alternatively, we assume that retained earnings are used to increase dividends in real terms at some predictable rate, the fair value of shares can be determined by the dividend yield. One obvious problem is that optimal dividend policy changes with the tax regime, which provides a major obstacle to the assumption that the long term payout ratio has been constant.

2.3.1 Empirical relationships

There is clear evidence of mean reversion in price to earnings ratios and market to book ratios (Tobin's q) as described, for instance, in Harney and Tower (2003). They used a value for the market to book ratio that adjusted for inflation. Cavaglia and Moroz (2002) find that industry share price indices tend to converge to long term dividend yield, interest rates and earnings levels. Cutler *et al* (1991) find significant reversions to the dividend yield in Australia, Canada, the UK and some US periods, but not in the other countries they model. Thomson (1992) finds significant mean reversion of dividend yields in South Africa.

There is also evidence that share prices in different countries and sectors revert to their average relative to the global market. Balvers *et al* (2000) find reversion from 18 countries to a portfolio representing the average value for the 18 countries when testing annual data. Stotz (2004) finds evidence of mean reversion in 50 large European shares using a combination of profits and book values as explanatory variables.

Futures contracts are relatively easily priced using the spot price of the underlying asset and assumptions about interest rates and dividends, or storage costs. Even in this market, however, there are costs to arbitrage, and Monoyios and Sarno (2002) find an ESTAR mean reversion to the theoretical price that produces a superior fit to a linear mean reversion to underlying stock prices.

There is research, such as Narayan and Smyth (2005), that rejects mean reversion, but this might be accused of being naïve in

that the authors only look for reversion to an absolute value, and test on daily data which may well hide longer term reversion.

The conclusion is that there appears to be mean reversion from the extreme of equity market values based on earnings yield, dividend yields and market to book ratios.

2.3.2 Bubbles

The corollary of mean reversion in the extremes is that prices occasionally reach extremes. Such extremes would be irrational bubbles if the expected return on risky assets fell below the risk free rate, although they would only ensure the presence of arbitrage profits if there were a way of ensuring that no money is lost.

Bubbles can be explained by herd behaviour as for instance in Hirshleifer (2001) and Hirshleifer and Teoh (2003). Herd behaviour may arise from irrational psychological biases that involve placing excessive reliance on the opinions of others, or from rational incentives not to take a contrarian view. Kim and Nofsinger (2005) provide evidence of the latter applying to institutional investors. The theory of rational bubbles is famously illustrated by Keynes, who described investment as a beauty contest where the prize goes to the person who best guesses the preference of the majority. Kurz (1994) provides a more rigorous demonstration that investors may develop different rational models that all fit the historical data, and that acting on these differences may lead to bubble type volatility.

Allen and Gale (2000) look for other explanations and suggest that the bubbles in Japan and in Scandinavian countries during the eighties and nineties arose from excessively generous credit that exposed the banks to moral hazard by investment opportunists. If this were true it would be the banks rather than the investors who were irrational, unless the value of government support exceeded their credit losses, in which case government officials supplied the irrationality. On the other hand, the rupture of other bubbles may

reflect deeper causes as suggested by Kindleberger (1988) for the crash of 1929.

There are other reasons why share prices may be at a level unjustifiable in terms of their intrinsic value. Some arise because some investors will not sell shares that they know to be over-priced. Owners who are involved in the management, or who have family and other ties to a company, may chose not to sell over-priced shares, while other investors will not sell for tax reasons. Passive investors may also be limited, by prior decision, to buy and hold shares in their index. Woolley and Bird (2003) criticise passive investors for buying shares that were clearly overpriced during the 2000 tech bubble. They cite evidence that share prices rise if they are included in a share index favoured by passive investors as evidence of market inefficiency. They do not raise the problem that this effect is aggravated by share price indices that are based on capitalization rather than tradability, although this problem has been addressed in the last few years by free float indices.

Restraints on short selling can also explain bubbles. Short selling is particularly risky, as a 'bear squeeze' can require a purchase at inflated prices when it comes to delivery. Perhaps the most colourful of these in recent years was the manipulation of the silver price in the late eighties. The Bunker Hunt brothers were the most famous participants in a consortium that drove the silver price up 650% in one year as short sellers attempted to cover themselves. The gold price bubble of the same years may well have been an irrational parallel. Williams (1995) describes aspects of the legal case against the Hunt brothers and their collaborators; Abolafia and Kilduff (1988) discuss the regulatory manipulation that broke the bear squeeze by limiting the number of contracts that an individual could hold.

Gilchrist *et al* (2005) develop a model of bubbles, assuming restraints on short sales and the incentive of companies to issue more shares when prices are high, and to invest the money in expanding their operations. They investigate the 2000 tech bubble, and find that companies behaved as might be expected from their model. They did not find excessive and wasteful investments took place because companies restricted their share offerings in order to maintain the price. Woolley and Bird (2003), however, suggest that European communication companies did make wasteful investments; a large part was overpaying governments for licences.

While bubbles can be inflated by overoptimism, panics are also not impossible if there are times when rational investors are unable to buy or where portfolio insurance or regulatory capital requirements require sales even though markets are already depressed. The extent of the 1987 share market crash can be explained by programmed selling. Barker (1999) mentions other incidents of the forced sale of equities, and purchases of fixed interest stocks, as a result of capital requirements.

Bubbles and panics can therefore occur in investment markets.

2.3.3 Comparative performance

If markets do mean revert, such relationships should be exploitable. Malkiel (2004) looks at the success of technical and fundamental models to predict returns. He uses dividend yields, price earnings ratios and a model based on interest rates and Tobin's q, and finds evidence of out-performance.

These results are not disproved by findings, such as by Becker *et al* (1999) that mutual fund managers on the whole are unable to benefit from market timing. The average investor must do as well as the market, and these findings merely show that the mutual fund managers in the study are no different from the average investor.

The performance test for mean reversion would be to see whether those investors (and raisers of capital) that attempt to read market levels do better than those that do not. The performance of asset allocation hedge funds could provide such a test. Capocci and Hubner (2004) confirm that earlier analyses appear to have overstated the success of hedge funds, but they do find that one quarter of US hedge funds managers appear to be successful in finding arbitrage opportunities. Amongst these are funds with a market timing strategy. Do *et al* (2005), in contrast, find no evidence of over-performance in Australian hedge fund managers. In summary therefore, the formal evidence that there are opportunities for identifiable groups of investors to exploit market timing is weak.

There is however strong evidence that companies raise more money when the market is high – as found by Gilchrist *et al* (2005). This produces something of a puzzle in that they appear to have more knowledge about the level of the market than institutional investors. The fact that institutional investors face incentives to herd does not mean that they do not have an incentive to attempt to outperform by small – and measurable – margins.

Outside of the academic research, there is perhaps no puzzle: everyone knows that fundamental investors such as Warren Buffett outperform the market. The problem is that their services are not generally available to all at a fixed price or they are not easy to identify. Berkshire Hathaway, for instance, is a closed fund and the share price partly depends on the demand for Mr Buffett's skills. There has apparently been no academic attempt to measure whether Buffett's success has been due to chance or not, which perhaps creates a puzzle in itself.

The question therefore appears to remain open until someone finds a way of identifying successful managers.

2.3.4 Property

Most of the research in this area has been on US listed property trusts (ie. REITs), which would be expected to display some equity type characteristics. Stevenson (2002) is the most cited article, and finds that statistics from some markets reject the hypothesis of stationarity. He concludes that mean reversion is slow. He does not however refer to the paper of Okunev and Wilson (1997), which finds significant results for an exponential reversion.

2.4 Consequences?

In the survey mentioned in 1.1.2 above, Welch (2000) documented the relatively low level of belief amongst academics in a varying equity risk premium. This contrasts somewhat with the view of Campbell *et al* (1997, 286): 'It used to be thought that expected asset returns were approximately constant and that movements in prices could be attributed to news about future cash payments to investors. Today the importance of time-variation in expected returns is widely recognized, and this has broad implications for both academics and professionals…' As their text book is regarded as something of a classic by some, the slowness in the spread of this view about fluctuating risk premiums is disconcerting, but does illustrate the difficulty of developing an informed consensus of views.

It appears that market extremes are relatively short-lived. If investors do not panic by buying at extremely high or selling at extremely low prices, the impact may be relatively small. If there are no fundamental grounds why the extremes should not reverse, then they may be able to benefit from the extremes by buying inexpensively or selling overpriced assets. For the reasons mentioned in 2.3.2 it is normally unwise to participate in short selling.

3 Theory of investment

This section recapitulates, in the light of these facts about investment markets, the basic principles of investment. Fundamental analysis and diversification are both widely accepted, although not as frequently practised.

3.1 Fundamental analysis

Fundamental analysis attempts to determine the underlying value of an asset by reference to company specific accounting and economic data, and consideration of the future. It can be contrasted with technical analysis that considers only previous price movements, and perhaps turnover, and is purely historical.

Perhaps the most important result of the research on market efficiency, behavioural finance and mean reversion is that fundamental analysis can be shown to identify opportunities for extra profits during those times when the market is inefficient, or subject to behavioural biases.

This appears to be confirmed by Abarbanell and Bushee (1998) whose model includes a variety of firm specific accounting data (such as accounts receivable, margins, labour force productivity etc). Their results do not prove that fundamental analysis will always pay for itself in superior returns; such proof is not possible although the arguments of Grossman and Stiglitz (1980) mentioned in 1.1.2 suggest that it ought to be close. Given its relatively low cost for relatively large fund managers, however, there would be a strong argument for all superannuation funds that can access such managers to adopt it.

Technical analysis may well identify specific shares or bonds or sectors of the investment markets that are anomalously priced, but it is always wise to consider whether there may not be good reasons for the anomalies, when viewed prospectively.

3.2 Diversification and utility theory

Analysis of prospective investment returns should give not only the expected value, but the range of possibilities, which leads to considering how to make the trade off between some measure of risk and return.

The rational approach to this trade-off is to develop some curve of utility of various levels of wealth and weight these by the probabilities of occurrence. This involves a host of brave assumptions on both the utility of levels of wealth and the probabilities of future returns as is pointed out, for instance, by Georgescu-Roegen (1954). The irrationality that underlies much of behavioural finance lies in the fact that people do not have consistent utility functions and are often unreasonable in determining future probabilities. (From a totally different perspective, Allen and McGoun (2000) suggest that investors derive a variety of pleasures from participating in what can be a social as well as an intellectual experience. They refer to the 'Motley Fool Investment Guide', but an examination of the daily press would tend to confirm their observations.)

Thomson (2003), however, defends subjective utility theory as a normative method of guiding investment decisions. Whatever other gains there are from investing, there appears to be no better rational approach to choosing between investments with different expected risk and return.

Whatever rational method is used to determine the asset allocation, if it considers risk at all, it is likely to result in the diversification of the portfolio. If returns on different assets are not perfectly correlated, a diversified portfolio can produce considerable reductions in risk for relatively little loss of return provided returns on the different assets do not differ markedly.

3.3 Life cycle applications

Recent years have seen a number of applications of utility theory to personal investment decisions. Campbell *et al* (2003), Chen *et al* (2006) and Purcal and Chan (2006) are examples. They take into account not only personal utility and some of the characteristics of the investment markets mentioned above, but also allow for consumption over the financial lifecycle and diversification benefits and risks that arise from wage income. McCarthy (2004) surveys much of the literature and refers to Cocco (2005) and others who incorporate housing in the portfolio choice.

In spite of their complexity, these models are recognised by their authors as relatively crude approximations to reality. They do, however, confirm various intuitions and throw light on some otherwise unanswerable questions. Mean reversion in returns over the medium period means a greater allocation should be made to riskier assets, as does the greater implicit investment in human capital that young people have as a result of their greater future wages. A varying equity risk premium means a varying allocation to risky assets.

Four particular criticisms of these models can be made. They frequently use too high an equity risk premium and under-emphasise its uncertainty; their characterisation of the utility function appears unrealistic and they ignore the insights offered by the growth optimal portfolio (explained below); they do not appear to consider the particular situation of retired superannuation fund members, and they confuse mean reversion and autocorrelation.

3.3.1 The size of the equity risk premium

There are considerable differences in opinion as to the size of the equity risk premium. Mehra and Prescott (2003) report on two decades of debate on their earlier observation that the premium appeared too high to be explained solely by risk aversion. Not the

least of the problems is that of measurement as McCarthy (2004) points out. The historical returns must be estimated between two points in time so that even small changes in choice of period lead to considerable differences in estimates. In Welch (2000) academic economists estimated the arithmetic average long term risk premium as 7% on average. This reduced to 5.5% when the 1998 survey was repeated in 2000 – as reported in Welch (2001). One of the reasons may have been that Welch's original paper reported that the respondents believed that the consensus view within the economics profession was as high as 8%, and that this had 'anchored' their views at a higher level. On the more pessimistic side, Wilkie (1995) suggests that, in average conditions, the risk premium may be in the range from 3% to 4% per annum. His calculations make allowance for the re-rating of shares, which has been responsible for much of the out-performance of recent years. This lower estimate is supported by others such as Dimson *et al* (2004).

The difference between these two estimates of the expected risk premium is significant, as can be seen by Table 1. While the underlying model is simplistic, it indicates the variability of investment returns and the overlap illustrates the difficulty of distinguishing between different assumptions. Under plausible assumptions, a difference in return of 2% per annum, over a working career of 40 years, increases the expected outcome by 50%. The chance of a negative return would be reduced by about 75%.

Table 1: Accumulation phase – lump sum

Percentiles	2% return	4% return
1%	22	27
5%	25	34
25%	39	54
50%	57	77
75%	84	127
95%	156	243
99%	207	306
Mean	68	100

Shown is the accumulated value of 1 per annum after 40 years, assuming a lognormal return with standard deviation of 15% - 250 simulations.

Regardless of the shape of the utility function, it is clear that the allocation to equities will depend very much on the investor's view of future equity returns. That the experts differ so dramatically on the mean, but that the variability is not quite as disputed, would tend to support Aloysius (2005) that ambiguity aversion tends to discourage equity investment. For retirement planning purposes, it would seem appropriate to use a lower rather than higher estimate of the equity risk premium.

Over-optimism in these models is aggravated by a failure to take expenses into account. A typical Australian superannuation fund will charge its members administrative expenses of at least 0.5% per annum for equity investment. Tax may reduce the return by another 0.5%. On the other hand, the individual's personal cost of borrowing will be at least 1.5% over the risk free rate. Even if the superannuation fund is able to gear up more cheaply, the net risk premium to be used to estimate the optimum level of gearing within the fund should probably not be more than 1.5% - if the equity risk premium is 3% or lower.

3.3.2 The growth optimal portfolio

Luenberger (1997) describes the growth or log optimal strategy, which determines the proportion of capital to be invested in each asset by using subjective probabilities of the returns and a logarithmic utility function. He makes a persuasive argument for the use of the logarithmic rather than another utility function for this purpose. The utility function used in most of the papers that have contributed to the debate on the equity risk premium have used a constant relative risk aversion of the form:

$$U(W) = (W^{(1-\gamma)} - 1)/(1-\gamma) \qquad (3)$$

where W represents wealth and γ the coefficient of risk aversion, which is taken to be in the range (1,10]. A coefficient of risk aversion close to 1 approaches logarithmic utility. Cocco(2005) uses 5 as being plausible, but this is not intuitive as it implies that every 20% increase in wealth is worth less than half of the

previous 20%. It is suggested that this apparent risk aversion is more likely to reflect rational discontinuities caused by the possibility of forced lifestyle changes in the short run as suggested in Asher (1999). Shrikhande (1997) demonstrates that a kink in the utility function of this type can serve to explain the equity risk premium puzzle in the same way as a higher co-efficient of risk aversion.

Younger fund members must necessarily expect their consumption patterns to change in the long run – for lifecycle if not wealth induced reasons. If investment returns do not meet expectations, they are likely to be able to work for slightly longer to make up the shortfall. In such circumstances, any kinks in the utility to be applied to investments ought to disappear. Very risk averse utility is therefore not an appropriate normative basis for investment decision making over the long term.

Luenberger briefly derives the growth optimal portfolio of assets that maximises the logarithmic utility over a single period – given the expected distribution of investment returns from different assets (or - more practically - asset classes). It can be shown that, in the long run, this portfolio dominates all other strategies in the sense that the expected median return is always higher. It is more likely to be optimal the longer the time period for investment. For the youngest members of superannuation funds, with a long term time horizon, it would appear that the growth optimal portfolio is the one that they should choose.

3.3.3 Older superannuation fund members

Superannuation members face increasingly reduced investment opportunity sets as they age. A reducing life expectancy is often punctuated by two particularly important life decisions.

The first is the purchase of a house. This decision may not have been made for investment reasons (ownership gives benefits not obtainable from renting – some tax related), but the presence

of the house and significant debt in the family's portfolio is likely to require a different optimal allocation of assets. On a relatively conservative view of the equity risk premium and investment expenses, the best advice may be to repay the home loan as quickly as possible. To the extent that contributions to superannuation are compulsory, a growth optimal portfolio that takes into account correlations with interest rate movements will be more appropriate. This is consistent with the model of Cocco (2005), who does however not allow for the greater utility that may arise from owning rather than renting.

The second major decision relates to retirement. McCarthy (2004) makes the point that the models do not adequately take retirement fund, social security and tax considerations into account. Of interest in this section are retirement fund members who will want to rely on their retirement benefits from the fund. Such members have two main decision phases: the first no longer to invest in human capital (future career development), the second to finally leave the workforce. Once out of the workforce and drawing down superannuation savings, members' investment choices should be much more conservative.

Table 2, using a volatility one third of that used in Table 1, shows the percentile distribution of the residual value of an annuity forty years after it is first drawn. Post retirement benefits at older ages are obviously much more sensitive to volatility and to differences in return. An investment policy even more conservative than that which would produce the standard deviation of 5% used in the chart appears to be indicated. The growth optimal portfolio would appear inappropriate because of the kinks discussed above.

Table 2: Decumulation phase – residue

Percentiles	2% return	4% return
1%	2	23
5%	6	38
25%	15	58
50%	23	76
75%	37	91
95%	55	158
99%	78	204
Mean	27	81

Shown is the residue after an annuity of 1 is drawn from an original amount of 40 for 40 years, assuming a lognormal return with standard deviation of 5% - 250 simulations.

This significant change to a more conservative investment portfolio in retirement suggests that the current practice of revising asset allocations in retirement (the lifestyle portfolios that reduce exposure to investment risks as people age) may well be appropriate. These are described in Bodie and Treussard (2006), who suggest that they may still recommend too high a proportionate investment in risky assets for those with high coefficients of risk aversion (or kinks in their utility functions).

If there are kinks in people's utility curve that derive from lumpy lifestyle decisions, then it is not correct to use a universal utility curve for all people. It is important to understand each family's circumstances as the level of risk aversion will depend on how close they are to having to make significant changes for financial reasons.

3.3.4 Exploiting mean reversion and time varying risk premiums

Mean reversion of prices in the extremes is not the same as negative autocorrelation, which looks at changes in the previous period, rather than the level of the market as evident from formula 1. There is also no stable cut-off between short term momentum and long term correction both of which are observed. Ahmed *et al* (2002) for instance, show that a momentum strategy –

based on the winning style of the previous year - would have been profitable in the US in the 15 years from 1982.

The models described above take different approaches to mean reversion. Campbell *et al* (2003) allow for auto-correlations and reversion to the dividend yield, Purcal and Chan (2006) allow only for autocorrelation, while Chen *et al* (2006) make no allowance at all. It would seem appropriate to use a more comprehensive model that considers all the factors mentioned in 2.3.1 that have been found to govern mean reversion.

3.4 Expenses and taxes

The need to keep control of expenses and tax does not always seem to receive the emphasis it deserves. Asher (2004) calculates the total impact of expenses that are frequently held to be unnecessary but which can be explained by the ordinary member's need for some financial advice.

The costs of trading to individuals are mentioned in 1.1.3 above. The costs to institutions are discussed in Schwartz and Steil (2002). They report on an international survey which shows that soft commissions (undisclosed payments often in kind) are widely prevalent and reduce the effectiveness and increase the cost of trading. Glass and Wagner (1998) identify four elements to the cost of trading:

- Broker commissions, which are a little higher for soft dollar trades and significantly higher for more difficult trades, and the bid offer spread.
- The market impact, measured by the difference in the price from when the order is placed to when the trade is completed.
- Timing losses that arise from the time the portfolio manager chooses to trade to the time the order is placed.

- Opportunity costs arise when an order is not completed, which can be measured by the product of the change in price and the stocks not traded.

Only brokerage is always a cost; the others may turn out profitable at times. As a measure of the impact of these costs, Glass and Wagner's exhibit 2 is worth repeating (in Table 3), as it shows that it is possible to significantly reduce the cost of trading. The table also makes their point that the costs must be considered as a whole, as savings of one element is likely to increase costs in another: directed trades (where investment managers are required to use a particular broker) may be cheaper but seem to take longer to implement.

Table 3: Costs of Trading

	Directed trades	Non-directed trades
Commissions	-12 basis points	-15 basis points
Market impact	-13 basis points	-24 basis points
Delay costs	-87 basis points	-44 basis points
Total execution costs	-112 basis points	-83 basis points

Exhibit 2 from Glass and Wagner (Plexusgroup)

It is noticeable, and a significant omission, that brokerage costs are not invariably reported in superannuation fund accounts. It also appears that most managers do not measure total trading costs.

Dammon *et al* (2001) discuss how appropriate management of capital gains tax particularly can affect optimal asset allocations and returns. While the rate of tax is relatively low in Australia, capital gains tax on a portfolio that turns over once each year can be as high as 0.75% per annum of the value of the portfolio.

4 Regulatory response

While much has been said about the role of government, this section accepts the limits of Adam Smith: '...the sovereign has only these duties to attend to; three duties of great importance, indeed, but plain and intelligible to common understanding:

- first, the duty of protecting the society from the violence and invasion of other independent societies;
- secondly the duty of protecting, as far as possible, every member of society from the injustice and oppression of every other member of it, or the duty of establishing an exact administration of justice;
- and thirdly, the duty of erecting and maintaining certain public works and certain public institutions which it can never be in the interest of any individual, or small number of individuals, to erect and maintain; because the profit could never repay the expense to any individual or small number of individuals, though it may frequently do much more than repay it to a great society.'(Smith, 1930 edition, 180)

In this context, the role of regulators would seem to be to help protect superannuation members from exploitation and to create the conditions for efficient investment markets that would not arise spontaneously.

This section mentions some recommendations from behavioural finance, outlines the Australian regulatory structure and then makes a few modest recommendations.

4.1 Suggestions from behavioural finance

Three sets of suggestions emerge from the behavioural finance literature; each of which could be taken up by the regulators and required of trustees as suggested later in this section.

4.1.1 Disclosure

As mentioned in 1.2.4 above, Daniel *et al* (2002) are not advocates of government direction of the market, but have some suggestions on:

'Minimally coercive and relatively low cost measures to help investors make better choices and make the market more efficient. These involve regulation of disclosure by firms and by information intermediaries, financial reporting regulations, investment education, and perhaps some efforts to standardise…advertising.

'More controversially, a case can be made for regulations to protect foolish investors by restricting their freedom of action or the freedom of those that may prey upon them. Limits on how securities are marketed and laws against market manipulation through rumour spreading may fall into this category.

'There is little cost to requiring companies to provide a standard warning, analogous to cigarette warning labels, to workers of the risks of plunging retirement money in their own company's stock. Regulating the way in which retirement investment options are presented to individuals (ie. the status quo choice, and how choices are categorized) may have low cost yet may greatly affect lifetime outcomes.'

In the light of the observed persistent under-performance of some funds, Blake and Timmerman (2004) conclude that past performance information should be made available to members so that they are able to avoid these under-performing funds.

4.1.2 Option menus

Mitchell and Utkus (2004) take up the question of choices noting that many portfolios tend to be undiversified, that people tend to end with the default investment option particularly if a large number of alternative choices are made, and that they tend

to interpret the choices offered as including an element of recommendation. For example, if more equity options are offered, people will put a larger proportion of their assets into equity.

They suggest that the default option should automatically guide investors into optimal investment behaviour. This suggests some type of lifestyle investment pattern as discussed in 3.3.3 above. Such a pattern would need to be invested in optimal portfolios that progressively sell risky assets and buy indexed-linked bonds of appropriate duration as people age, noting the comments that older people are likely to be much more risk averse.

In order to prevent a plethora of options confusing and misleading average investors, they suggest that alternative options should be limited and placed on an alternative investment menu.

4.1.3 Self-monitoring

Behavioural research confirms the human penchant to forget or reinterpret past errors. Biais *et al* (2005) report on experiments that show that self-monitoring of performance provides something of an antidote to overconfidence. One might be more emphatic: if there is any science or management in investment, monitoring the success and failure of decisions is essential.

4.2 Australian regulations

Official responsibility for the regulation of Australian superannuation funds is shared by the Australian Securities and Investment Commission (ASIC), which is responsible for market conduct of the industry, and the Australian Prudential Regulation Authority (APRA), which is responsible for the regulation of the trustees.

ASIC's policy statements govern the content of disclosure; Policy Statement 168 requires disclosure to facilitate the comparison on fees and historical performance.

APRA's Superannuation Circular II.D.1 'Managing Investments and Investment Choice' requires trustees to develop diversified investment strategies that place neither the fund nor the member exercising the choice at excessive risk. It also discusses the implementation of the strategies and, of particular interest to this paper, the reporting of investment performance.

There are also a number of industry, professional and educational bodies with their own principles of investment and standards for the provision of advice. They should also be seen as part of the regulatory system, and the recommendations below apply also to them.

4.3 Recommendations

The following ideas for the development of these regulations may be considered.

4.3.1 Disclosure

The recommendations from behavioural finance recorded in sections 4.1.1 and 4.1.2 should be incorporated as part of good practice.

In addition, it would not be out of place to require superannuation funds to report on the exact assets held by their various options. Australia is apparently almost unique in not requiring mutual funds to report on their asset holdings (as reported to the author by Bloomberg management).

4.3.2 Monitoring performance

In monitoring investment performance, trustees ought to consider the success of each element of the investment decision: asset allocation, stock selection and dealing. Such monitoring should include performance attribution of the form used by Daniel *et al* (1997) that measures the relative contribution of asset allocation and stock selection. It would be even more useful if

investment managers were to document the reasons for their particular decisions. This would help to prevent the hindsight bias described in the behavioural literature.

The success of stock selection can be further analysed by the approach set out in Day *et al* (1994), which measures the profitability, over recent quarters, of particular decisions to buy and sell. It provides an important short term measure of investment ability and efficiency, especially relevant in view of the tendency reported in 1.2.2 for managers to underestimate the possibility of inefficiencies in information flow. The mis-pricing that may arise is likely to be relatively short, so the wisdom of a particular transaction should soon be apparent. It would, in some respects, be surprising if an investment manager saw opportunities more than a few weeks before the market price responded.

Given that excessive dealing and high dealing costs have been identified as a significant contribution to under-performance, it is also important to monitor the dealing costs identified by Glass and Wagner (1998) and listed in 3.4 above.

Such reporting should also include the impact of tax on net investment returns.

In the interests of transparency, the results of these analyses ought to be made available to members and potential members – perhaps after a suitable delay to protect the intellectual capital of the investment managers. Given the limited interest and ability of members to absorb large quantities of data, such performance reports should be summarized before they are distributed, with fuller reports available on request or on websites.

This more thorough reporting can be contrasted with the performance reports currently given to members. These are normally given for a variety of periods often from 3 months to 5 years which make little or no allowance for different styles. The shorter periods are entirely useless and inappropriately focus attention on a set of random numbers. The longer terms are of

greater value but often do not make appropriate allowance for tax.

APRA's investment circular will hopefully encourage trustees to develop a more thorough approach to performance measurement. It should perhaps be made more specific.

4.3.3 Poor performers

The publication of past performance league tables is appropriate, as suggested by Blake and Timmerman (2004), so that investors can avoid under-performing funds. While the worst funds are often included in a table, editorial invariably focuses on winners rather than losers. The reason is presumably that losers are also advertisers. The losers may not be driven out by competition if they operate through a marketing channel that does not require comparisons to be made.

It would appear that it should fall to the regulator (APRA in this instance) to identify poor performers and ensure that the shortfall is not due to dishonesty or gross incompetence.

It may also be appropriate for the regulator (ASIC in this case) to actively discourage the use of the more risky interest bearing assets that are particularly active in property financing. They are particularly inappropriate for superannuation funds given that they commonly offer limited diversification and the returns are skewed downwards: a maximum interest rate and a possible 100% loss. Advertisements ought, at very least, to disclose a measure of the risk being taken. (Something along the lines of: 'The underlying properties have to fall in value by 5% to affect the value of your investment, and by 10% to reduce it to zero'.)

4.3.4 Risk appetite

Superannuation fund members are normally given the choice between a range of risk and reward tradeoffs. More recent developments are for products to be related to age.

The existing products also do not appear to take the research findings set out above into account:

- They do not appear to offer a growth optimal portfolio for younger investors. This might well incorporate some implicit gearing to the extent permitted by law.
- The difference between homeowners and non-homeowners does not appear to be recognised.
- Most of the portfolios have predetermined asset allocations, giving the investment managers limited opportunity to respond to extreme market events.

It is not clear that these issues should be resolved by regulatory intervention. It would appear to be mainly an issue of ongoing research and education, of which this paper is an element.

4.3.5 Benchmark portfolio to discourage panic

One of the functions of prudential regulators is to avoid banking crises. Preventing extremes in investment markets is generally seen as beyond their capabilities. There may however be some parallels between the role of government in banking crises and in investment market extremes. People at least need to be reassured.

The damage done by a bank run is obvious. Superannuation fund members – who 'panicked' and bought foreign technology shares at the peak of the last bubble may have lost half their lifesavings. Though they may not make news, their losses may be considerable.

As discussed by Abolafia and Kilduff (1988), regulators do have a direct interest in the effect of price bubbles on lenders that have contributed to the bubble. They will also respond at various stages of a panic. Are earlier interventions possible? To ask the regulator to warn of excesses is unrealistic. The benefits are putative, the risk to reputation far too high.

It is possible, however, that there would be some merit in developing a model growth optimal portfolio that reflected the consensus of economists, asset consultants and investment managers. The portfolio could be published by the regulator or an industry body and be justified as a 'public work' in Adam Smith's terms. The consensus could be based on a survey that did not lead to the identification of the individual participants, so preserving any competitive advantage. The published results would be of the anticipated returns and correlation matrices of the major asset classes and of the resultant model growth optimal portfolio. (There should be constraints on short sales and borrowing as neither are legally permitted. Luenberger shows that the mathematical result for the growth optimal portfolio can normally be shifted away from the most risky assets with a minimal loss of expected return, but this a technical detail.) The model portfolio would include a measure of dispersion in both the expected returns and model portfolio. Such a publication would have a number of advantages:

- It would be resolutely prospective, so providing a constant reminder that historical returns are not estimates of the future. It ought also to encourage more fundamental analysis as it is necessary to estimate future returns.
- It would also provide a constant reminder for the desirability of diversification even where expected returns differ significantly.
- Behavioural research suggests that it would encourage people's views and actions towards conformity. This is the desired response for uninformed investors. Even in the case of the academics reported in Welch (2001), it led to

more reasonable estimates of the future. It may aggravate the pressures of informed professional investors, but might also provide an environment where shorter term deviations from the herd would be easier to explain.

- Because it would have to be published with the necessary health warnings, it would remind older investors of their need to reduce risk.

5 Conclusion

Extracting a consensus view of the current state of investment theory is made difficult by dogmatically held views and a vast output of often unrelated research.

While markets may be more efficient than we could expect, it is clear that there are momentum and bubble effects that are better explained by the bounded rationality of investors. These anomalies in efficient market theory are well explained by behavioural finance, but exploiting the resulting noise requires fundamental analysis of the merits of each investment. Fundamental analysis can yield profits from both asset allocation and stock selection during those times when markets are inefficient. The benefits of active asset allocation when markets are mispriced do not appear to be emphasised sufficiently.

In protecting uninformed superannuation investors with investment choice, regulators need to ensure that they are given information in a way that encourages sensible behaviours. A particular gap in the current framework would appear to be a thorough monitoring of performance. Poor performers particularly ought to be identified. It is also suggested that the development and publication of a consensus portfolio would encourage all the desirable elements of a sensible investment strategy: fundamental analysis, adequate diversification and a greater sense of comfort with the choices made.

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Report (without tables) on the Disability Income Experience Investigation for the Years 1998-01

*Life Risk Insurance Committee**

This paper has been prepared for issue to, and discussion by, Members of the Institute of Actuaries of Australia (Institute). The Institute Council wishes it to be understood that opinions put forward herein are not necessarily those of the Institute and the Council is not responsible for those opinions.

A copy of the full report (with tables) can be purchased directly from the Institute.

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1 Executive Summary

1.1 Scope of the report

This report, covering the calendar years 1998 to 2001, has been a long time coming. There have been considerable delays, firstly with the development of the new analysis system IDEAS which has been used to produce the tables on which this report is based and subsequently with attempting to make sense of the data submitted to the investigation when inconsistencies were found during the analysis of results.

This report has been published without verification from the companies who contributed data. The results with respect to their experience alone were separately provided to them in the process of the production of this report. We had hoped to get at least an indication as to whether the results experienced by the company as identified in this investigation were consistent with those in their own investigations covering the same period. Despite several attempts to get feedback from participating companies, with one or two notable exceptions, none was received.

As a result we have done our best to review the reasonableness of the results of this experience study. We have made efforts to assure ourselves of the validity of the outputs of the investigation based on what we considered to be the most reasonable interpretations of the data provided (which in some instances was particularly suspect) and we have developed commentary on what we thought were real features worthy of note. The quality of the results however, is subject to the quality of the data provided and may not be a reasonable representation of the actual industry experience over the period of the investigation.

Australian experience investigations still suffer from having no easy way to determine what percentage of total market share is represented by the data provided for the investigation. As an indication of the volume of data included in the report, the below

table gives a breakdown of Exposure, Open Claims and New Claims for each year of the investigation.

Table 1.1: The volume of data included in the report.

	Policy Years Exposed to Risk	Open Claims at start of year	New Claims during year	Open Claims at end of year
1998	324,214	5,028	7,177	5,183
1999	319,061	5,183	6,950	5,913
2000	353,630	5,913	7,654	6,112
2001	397,285	6,112	7,393	6,611

1.2 Key features

- This report covers the period from 1 January 1998 until 31 December 2001 for data provided by contributing companies and utilises a new analysis tool, IDEAS developed specifically for the Institute.
- IDEAS and the old approach do not differ materially on calculations of exposure and incidence, however there are material differences in the calculation of claim durations and claim cost between the two systems. IDEAS generally has longer claim durations especially for later years of claim payments.
- The underlying data demonstrated some significant inconsistencies for particular companies and in some areas shows significant volatility from period to period for attributes such as occupation class and sex where steady trends would be expected.
- There is a steady reduction in 2-week deferment period business and an increase in 1-month and 3-month deferment period business though there was still not enough business inforce in the 3-month category to enable detailed analysis.
- Generally incidence rates have been trending downwards but this is not as apparent in some occupation classes and the relative differences between male and female lives by occupation class have become more pronounced.

- Relativities in incidence rates between occupation classes since the last investigation period seem to have narrowed for 2-week deferment periods and widened for 1-month deferment periods.
- Average claim durations are much longer for 1-month deferment period than for 2-week deferment period but have increased significantly for both over the previous investigation period.
- There is a strong indication of increasing claims duration by size of benefit paid over both sexes and all occupation classes.
- Claims durations are for the first time longer than CIDA for all occupations and age categories.
- Claims terminations are higher for 2-week deferment period business for the first 6 weeks of claim after which 1-month period business has higher termination rates, and overall have decreased in the first 12 months in comparison to the previous investigation period and increased thereafter.
- Relative to short benefit period policies, cost of claims for longer benefit period policies demonstrated in the experience are significantly different to that suggested by the IAD89-93 table.
- Cost of claims for 2-week deferment against 1-month deferment policies are also significantly understated by IAD89-93 table.
- The lengthening of claims durations has more than offset improvements in claim incidence rates and is the biggest contributor to increased claims costs in this investigation.
- There are signs of negative selection over almost all sex and occupation classes. Non-smokers have better experience than smokers for all occupation classes.
- The variation between individual companies experience has increased over the previous investigation with the company

with the worst claims cost being over three and a half times the company with the best claims cost experience.

1.3 Closing remarks

The collection and analysis of insured lives experience is increasingly important to the Australian life insurance industry as it comes under greater scrutiny and challenge to the appropriateness of its pricing practices and the right to underwrite. Application of such analyses is not limited to pricing and underwriting but also includes reserving, product design, solvency standards and international comparisons. In Australia the statistical justification for risk classification structures by common rating factors such as age, sex and smoker status may well depend on the adequacy of investigations such as this.

At the same time it appears that both the quality of the data being provided (and indeed the level of detail actually stored on company administration systems) is dropping. The industry is being confronted by ever more complex products with more and more ancillary benefits and points of differentiation. This is happening without the ability to measure whether the basis under which these features and benefits are priced is borne out in experience.

A significant improvement in the level of detail supplied to experience investigations is required. Indeed the quality and detail of electronically stored data on company administration systems also needs improvement. Without this the industry risks losing not only a reasonable basis on which to set premium rates, but also a basis on which to set capital and solvency standards. In addition without this data there would be no basis on which to defend, using Australian experience, the current rating factors used in premium bases.

This investigation only covers the years to 2001, how experience after this time is to be investigated is still being discussed within the Institute of Actuaries of Australia. Whether there should be an investigation conducted by the Institute of Actuaries of Australia or whether there is a better alternative is yet to be decided. Much will

depend on the response from Industry to the preparedness to both fund the costs of conducting the investigation and their ability to deliver comprehensive experience data in a timely and accurate manner (appropriately checked and signed off by the company).

2 Introduction

2.1 Basis for the report

The Life Risk Insurance Committee was established in 2004 when it was decided to amalgamate the experience investigation activities of the Institute of Actuaries of Australia into a single committee who would have a broader focus on issues affecting the risk business of life insurers. This report represents the first Disability Income investigation completed by the Committee, with a previous Lump Sum Experience Investigation published in October 2004.

The data for this investigation was provided by most companies within a short time following the end of the investigation period but as part of the development of the IDEAS system and checking of the results of the investigation, subsequent data submissions were received that affected both this investigation and the previous investigation period as well.

As a result this investigation breaks the analysis of the results up into three distinct approaches to permit an adequate investigation into the causes of variations in results. The first reworks the data for the previous investigation period already reported on in the previous experience investigation reports – this time analysing the old data using IDEAS, allowing a comparison of results between the old and new methodologies to identify what allowance may be need to be made when looking at trends over time given that results have been obtained using different analysis tools.

The second approach takes all the data available for continuing companies (including recently submitted data) covering both the previous and current investigation periods to investigate what trends might be identified over time between the two investigations.

Thirdly we take all the data provided by all companies for the current investigation period and analyse it to obtain an estimate with greatest credibility for the level of incidence and termination experience over the period of investigation.

Another enhancement that this report introduces is a comparison against a new standard table. IAD89-93 and CIDA are two well-known and commonly used base tables for pricing and valuation (indeed many companies use a blend of the two as their basis). Recently the Individual Disability Experience Committee (IDEC) of the Society of Actuaries (SOA) has produced a new report covering the period 1990-1999 and we have tested the resultant tables for consistency with the Australian experience.

Due care and judgement are required in reaching conclusions based on this report or in applying the results. Factors to be considered include;

- Quality of the data;
- Changes in market share of contributing offices and inclusion of new contributors;
- Variations in experience between individual contributors;
- Variations in experience between the years of the investigation, and;
- Economic conditions.

2.2 Previous reports and comparability

The previous reports from the Institute, which are relevant to this report, are:

Report	Release Date
Report of the Disability Committee	2002
Interim Report of the Disability Committee	2000
Report of the Disability Committee	1997
Current Issues in Disability Insurance	1996

The full publication details of each report are provided in the Bibliography together with a list of references to papers and sources of data that would be useful to students and practising actuaries requiring more detailed knowledge in the field of disability income insurance.

2.3 Provision of data

Whilst the vast majority of the data used in the investigation has come from eight portfolios of the major life offices active in the disability income market, this investigation also includes data from a total of 16 different portfolios as listed on the inside cover of this report. As the industry has been undergoing consolidation over the period of this investigation there are a number of companies contributing at the start of the investigation which are no longer separate companies today. Where the volume of data was reasonable and has been separately contributed throughout the investigation we have reported it as a separate portfolio. This means that it is possible for one company to be identified by several different identifiers for their different blocks of business.

Some of the data used in the investigation is limited to only 1998 as it was contributed to the previous investigation (there is a one year overlap between investigations as has been the practise in the past). The table below shows the number of distinct blocks of business for which data has been contributed for any year of the investigation and the number of blocks of business for which there

was data provided at some point in the investigation. So for instance although there was only ever at most three companies contributing in any one year for Level Guaranteed business, the investigation includes four different blocks of business as some companies dropped out of the investigation and others commenced contribution in later years.

This means that the results of the investigation will reflect the change in the mix of contributors over time. This is the reason for the investigation looking at both the total data contributed for determining the current state of the market and only looking at those who have contributed over the life of the previous and current investigations (continuing companies) when looking for trends over time.

Table 2.3.1: Number of portfolios contributing data for each of the policy types in the report, by calendar year and in total by year of investigation.

	Number of Offices by Year				
Policy Type	1998	1999	2000	200	1998-2001
Level Guaranteed	1	2	3	2	4
Level Non Guaranteed	10	7	6	7	10
Stepped Guaranteed	1	3	3	3	4
Stepped Non Guaranteed	13	11	10	11	16
Level Cancellable	3	1	2	2	4
Stepped Cancellable	6	4	4	5	8

Excluding Business Overheads

2.4 Disclaimer

The Life Risk Insurance Committee and Australian National University have endeavoured to ensure the accuracy of the data on which this report is based and to provide a useful interpretation of its results. Nevertheless, neither the Life Risk Insurance Committee nor Australian National University can accept any responsibility for errors or for the use or misuse of any information in this report. Actuaries and others using the results should exercise professional

care and judgment in ensuring that they are suitable for the intended purpose.

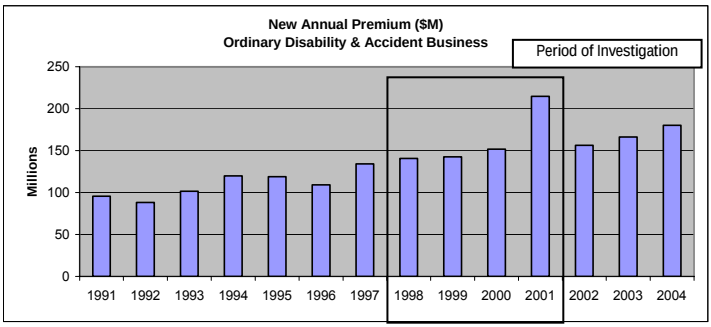
3 Individual Disability Income Insurance in Australia

3.1 The Australian market

Of the 31 currently registered life companies in Australia (excluding reinsurers), 20 sell individual disability income business. Market share is dominated by a few companies, and has been for some time.

Reinsurance plays an important part in the individual disability market with roughly 25% of the business being reinsured.

Graph 3.1.1: New Disability Income Business by Annual Premium

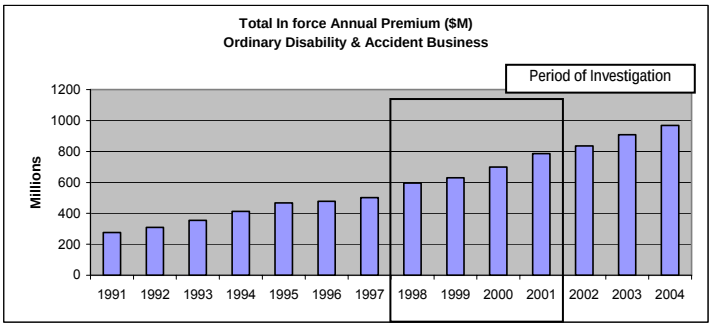


Source: DEXX&R, December 2004

Note that 2001 was a one off year that reflected high switching of business between companies following significant premium rate increases and possible miscounting of new business when policies were converted to new series products. These high switching rates may impact analysis of claims inception by policy duration.

Unfortunately due to a lack of available data no information is available on number of new business policies at an industry level.

Graph 3.1.1: Inforce Disability Income Business by Annual Premium



Source: DEXX&R, December 2004

Unfortunately due to a lack of available data no information is available on in-force numbers of policies at an industry level.

3.2 Description of products applicable for 1998 to 2001 experience period

The standard product

The standard product sold in Australia consists of an income payment made on total disablement. Payments are made monthly in arrears, with benefits accruing from the end of the deferment period. Payments continue until the end of the benefit period. Premiums are generally stepped, and are not guaranteed. The product is usually guaranteed renewable.

There are a large number of product variations within that standard approach. The main variations are described below.

Benefit periods

The benefit periods generally available for new business are:

- fixed term – 1 year, 2 year, 5 year
- to specified age – 55, 60, or 65

Note:

- The most common benefit period is to age 65.
- A common benefit period for previous new business was lifetime. Due to adverse experience, this benefit period has been withdrawn for new business.
- Previously, new business benefit periods were differentiated for accident and sickness. Generally, benefit periods are now sold as coterminous.
- The choice of benefit period is sometimes used as an underwriting tool. High-risk occupations are sometimes restricted to fixed terms of 2 or 5 years.

Deferment periods

This period typically ranges from 7 days to 2 years. However, the most common deferment period is 1-month, and then 2-week with these deferment periods covered 85% of lives exposed in 1998-2001. More recently 3-month deferment periods have become increasingly common and whilst they are still not significant enough to warrant full analysis, some sections of this report have included analysis of this deferment period as well. A further 8% of lives exposed are from this deferment period.

The 2-year deferment period segment of the market is also seeing growth. This is primarily used by individuals who have corporate cover (usually limited to a 2 year benefit period for tax reasons) wanting to top up their cover to retirement age. Limitations with the new analysis tool have prevented inclusion of this deferment period in sections of the analysis.

Longer deferment periods can be often used as an underwriting tool to provide the cover requested by the client for most conditions, while allowing the insurer to limit exposure to problematic frequent conditions.

Premiums

Originally, most products in Australia had level premiums. Virtually all business is now sold on a stepped premium basis, with premiums changing each year in line with age.

The main rating factors are:

- Age;
- Occupation;
- Sex;
- Smoker status;
- Level of impairment.

There has been an increasing trend of life companies extending the range of occupational categories to better target pricing particularly for higher claim segments. A key driver for this change has been reinsurers who have incurred losses for certain occupational groups. As this is yet to feed through to the in-force data we are not yet able to analyse the experience on these more detailed categories but we hope to be able to do so in future investigations.

Level of impairment is not treated in the same way it is for lump sum risk products. Instead of premium loadings, impairments are commonly handled by applying an exclusion or longer deferment period to the condition causing concern, eg. for an existing lower back problem.

Premium guarantees and guaranteed renewability

A feature of the Australian market is that most products:

- have non-guaranteed premiums - while future premium rates are not guaranteed, any review must apply to a whole class of business.

- are guaranteed renewable - once a life has been accepted for insurance, the policy cannot be cancelled – even though premium rates can be reviewed.

The trend of premium increases continued over the 1998 to 2001 period in respect of both inforce and new business. Note that premium increases following this period have significantly reduced both in size and frequency.

Benefit escalation

Insured benefits for those policies not on claim are usually increased by any increase in the Consumer Price Index (CPI).

Benefits for those on claim are commonly increased after payments start. The increase is usually set as the CPI change subject to a fixed upper limit (typically 10% per annum). This product feature is normally an option for which an extra premium is paid.

Definition of disability

The definition of disability typically contains three segments:

- the insured person must be unable to do at least one of the important duties of their occupation; and;
- the insured person must not be working; and;
- the insured person must be under the regular care of a medical practitioner.

Replacement ratios

Most disability income products on sale in Australia in the period 1998 to 2001 were on an agreed value basis. This means that the original benefit level agreed at the underwriting stage plus indexation is fixed over the life of the contract, even if the individual's future earnings fall below the level applicable at underwriting.

Indemnity products are becoming more prevalent, both as a means for insurers to contain claims costs and as an additional, cheaper offering to consumers in the face of rising premiums. Replacement ratios are similar to those for agreed value products; however, pre-disability income is typically measured over the 12 months prior to disability occurring. A premium discount of around 15%-25% usually applies relative to agreed value products.

The maximum replacement ratio is generally 75% of pre-disability income, being measured when the policy is issued for Agreed Value and over the 12 months preceding claim for Indemnity contracts. Some companies permit 100% of superannuation contributions to be covered, usually paying the benefit directly into a super fund.

Pre-disability income definitions vary in practice, and may result in higher replacement ratios. For example, superannuation contributions are often included in the definition, effectively enabling employees to 'cash in' their super.

The 75% scale is reduced for high-income earners. A typical approach would be:

- 75% of the first $250,000 of annual salary, plus;
- 50% of the next $100,000 of annual salary, plus;
- 20% of any balance.

Claim offsets

To ensure that the maximum replacement ratio is not exceeded, other sources of disability income are usually offset. Common offsets are:

- Social security;
- Worker's compensation;
- Transport Accident and other statutory income schemes;

- Other disability income from superannuation and life policies in force and not disclosed prior to cover commencing.

In principle, insured cover affected last is subject to offset reduction first (to avoid two insured covers offsetting each other or both covers 'yo-yo-ing' up and down against each other in alternative months). However the practice with offsets varies between insurers.

For some policies further other sources of disability income, including accident only policies, may be offset.

Partial disablement

This benefit is designed to encourage claimants to return to work by allowing them to maintain benefits, proportionally reduced, while returning to work on a part-time basis. Generally, a claimant must meet the conditions for total disability prior to any entitlement for partial disability benefit There is concern that the relaxation of conditions for this benefit, and the possibility of going on partial disability benefits before being totally disabled, will increase the cost of this benefit beyond what was expected.

Auxiliary benefits

There is a wide range of auxiliary benefits designed to cover minor gaps in benefit provisions as well as to encourage rehabilitation. Auxiliary benefits are also added on marketing grounds to differentiate the product. Some have minor costs but others (such as nursing care) can be quite costly. Common auxiliary benefits are:

- Trauma benefit: If the insured suffers a specified trauma event, the monthly benefit is payable for a guaranteed period, usually 6 months, irrespective of the actual period of the individual's disability.
- Specified injury benefit: This benefit operates in the same way as Trauma benefits, but different guaranteed benefits are

applied to a number of specified injuries, eg. 3 months for a broken femur, 5 years for paraplegia.

- Rehabilitation costs: These are paid up to a maximum amount. They come in two forms:
  - Reimbursement of costs incurred as part of an approved rehabilitation program, or incurred during rehabilitation, eg. purchase of a wheelchair;
  - Additional incentive payments to encourage rehabilitation.
- Nursing care: If the insured requires nursing care during the deferment period, a payment is made for each day that care is required.
- Travel benefit: This benefit pays the costs of repatriation if the insured is disabled while away from home.
- Death benefit: If the insured dies while on claim, a death benefit is paid. This can take the form of a small lump sum or the continuation of the income for a period, typically three months, after death.
- Interim Accident benefit: This is paid in the event of the insured becoming disabled from an accident whilst the proposal is being considered, usually with a maximum monthly benefit and maximum term (typically 6 months).
- Accelerated Accident Options: These pay the monthly benefit during the waiting period in the event of the insured becoming disabled due to an accident.

Distribution

Distribution of these products is mainly through third party advisers and brokers.

Rating houses are major drivers of product development through their recommended lists and product ratings. Product design has

occasionally suffered as a result of this, both in terms of consumer need and shareholder value.

Takeover of existing disability income cover from other writers with reduced underwriting has significantly reduced compared to earlier periods. Previously 'clean-skin' takeover policies with less than 3 years in-force were often accepted on just a personal statement. The stricter underwriting practice reflects:

- adverse experience;
- reinsurers no longer supporting reduced underwriting;
- particular importance of underwriting screening for a disability definition that has a low threshold to turn on.

Pricing approaches

At least since 1998, most companies have used IAD89-93 for pricing (replacing the previous use of US CIDA 85 tables). Given the wide difference in inter-company experience, the tables require company-specific adjustment.

3.3 Current Developments as at the Time of Writing This Report (2006)

The Australian disability income market has undergone significant changes in recent years. Key recent developments and ongoing issues are:

- Claims management and underwriting resources/practices have been considerably strengthened. Many companies have invested in early intervention rehabilitation programs to help claimants return to work within the first 12 months of a claim (as return to work can be very difficult once an individual has been away from the work place for a long period).
- Price increases have continued but at a lower level. Recent price increases have typically been single rather than double-digit increase every two years.

- Reinsurers have taken, in the face of losses, a more active role in ensuring changes to improve results. In particular the reinsurance market will no longer support lifetime benefit periods and will generally not insure monthly benefits in excess of $20,000.
- Many insurers have increased their range of occupational categories, with higher premium rates applying for certain higher claim segments, allowing more targeted premium rating.
- Recent strong economic conditions and availability of work has had a favourable impact on claim costs. This may have temporarily halted a trend of lengthening claim duration.
- Indemnity business has increased in popularity as the premium is cheaper and the financial underwriting requirements less onerous.
- Profitability has generally improved. Some of this arises from the one off impact of closing down longer duration claims with improved claims management. Profitability remains a concern, particularly if the economy weakens or claim management weakens.
- Larger scale insurers have the advantage that they can employ more specialists and have better segmented experience results.
- Tougher conditions for Funds Management business (particularly margin squeeze) may result in pressures to grow disability insurance and reduce costs.

4 The Data

4.1 Exposure

The amount of data available for analysis continues to grow significantly. The data used in this report relates to calendar years 1998 to 2001 inclusive.

Total exposure is now 1,394,190 years of exposure. This is a 20.8% increase over the total exposure for the 2002 report which covered the period 1995-1998. Total female exposure has increased by 25% to 232,442 years. Exposure in the 2-week and 1-month deferment period was 1,190,764 years. This is 85.4% of total exposure compared with 89.3% in the previous period.

4.2 Attributes of the Data

Table A in the full report shows the number of inforce and claim records collected for the investigation. Years of exposure and numbers of claims occurring are shown in Table B and Table C in the full report. Excluding business overheads and cancellable business, the 1,904,765 inforce records provide 1,394,190 years of exposure. Numbers of claims are counted as the proportion of the benefit at which they commence (1 for a total disability claim and less than one for a partial claim/offset claim). The 29,174 records for new claims provide a total of 27,949 claims.

If claim rates for sub-groups are calculated from the inforce and claim records in Table A in the full report, the indications as to the degree of risk of morbidity may be clouded by the composition of those sub-groups. For example, females would appear to have lower overall claim rates than males. This is because the difference between male and female morbidity has been masked by the higher proportion of blue collar lives amongst males.

Table A in the full report indicates the following changes in the data collected over the period 1998 to 2001:

- a continuing increase in the proportion of 1-month deferment period business;
- a decrease in the proportion of business with lifetime accident and sickness benefits, and;
- a major discontinuity in the proportion of non-smoker business and the corresponding proportion of aggregate business.

These last two changes are due to the changing mix of contributing companies.

Table B in the full report shows the age distribution of the total exposure, which is very similar to that shown in previous reports. The distribution for each occupation class is also similar although heavier risk occupation classes tend to be younger. Female lives also tend to be younger than male lives.

4.3 Data inclusion and exclusion

Inforce Data

The main analysis relates to non-cancellable business with a benefit period of at least one year. Lives with exclusions, out-of-working-hours coverage and business accepted under automatic acceptance arrangements are included in the analysis.

Separate analyses are performed for business overheads and cancellable business.

Data collected as part of the investigation but not used in generating results includes group data, overseas data and certain excluded occupations.

The investigation does not collect data relating to loaded lives nor on ancillary benefits on policies.

The following table shows for each type of business the exposure and the corresponding table in which the experience is analysed.

Table 4.3.1: Types of Business analysed, Report Table and Total Exposure.

	Table	Exposure (in years)
Guaranteed renewable	Table B to Table N of the full report	1,394,190
Cancellable business	Table P of the full report	44,376
Business overheads	Table O of the full report	42,573

Claims

Claim details are collected to enable incidence and termination rates to be calculated. Specifically, claims data are not collected for benefits paid within the deferment period or additional amounts paid over and above the insured monthly benefit.

4.4 Changes Made to the Submitted Data

As noted in Section 5.3 certain claim terminations originally recorded as recoveries have been excluded due to the closeness of termination to the end of the benefit period.

An arithmetical check of the reconciliation

```
OpenClaims[YearEnd]    = OpenClaims[YearBegin]
                       + NewClaims
                       - ClaimsTerminated
```

revealed that one company in particular had recorded a significant number of claims as recoveries each year but the same claims were still shown as Open at the start of the next year (and not reported as reopened claims). All such claim recoveries were excluded from the analyses of claim terminations.

4.5 Market Share

It has not been possible to verify the extent to which data submitted represents all of a contributor's business. However, if all contributors submitted data which represented 100% of their business then around 75% of the total industry would be represented by the data used in this report.

5 Method of Analysis

5.1 Presentation of results

There is an emphasis on the 'actual versus expected' style of comparison where 'expected' is mainly based on the Australian table IAD89-93. Comparisons have also been made with the US CIDA 85 table as this was the 'expected' table in earlier reports and the new, provisional, US analysis IDEC.

The elements of incidence and termination of disability are shown as separate items. This type of presentation allows results to be used readily for rating under Australian conditions.

5.2 Incidence Rates

Exposure is calculated using a modified census method. Every record which is present in both the in-force at the beginning of the year and in-force at year end is given exposure for the whole year. Records which commence in the year are given exposure from the date of commencement. Records which are in force at beginning of the year but not at year end are given half exposure for the whole year. This assumes that exits are uniformly distributed over the calendar year.

All exposure is calculated in days. All durations are also initially calculated in days. For active lives, durations are recorded at monthly intervals. Ages are calculated as age last and all ages & durations change exactly ie. on the birthday or the appropriate anniversary of entry date. Exposure is calculated separately for each month of time. No exposure is recorded in the period from entry (event date) to entry+deferment period (payment commencement).

Expected is generally calculated on the basis of IAD89-93 based on the recorded exposure. Some tables show expected on CIDA or the new, provisional, US analysis IDEC.

All claims which reach the end of the deferment period during the calendar year of investigation are counted as a claim in that year. Claims which are recorded as commencing prior to the end of the deferment period are ignored for the purposes of incidence but, if the claim continues past the deferment period, will be recorded as incidence at the end of the deferment period.

All incidence analysis is performed on a benefit per cent basis ie. the claim is counted as [1 x benefit per cent at the end of the deferment period].

5.3 Termination Rates

Exposure for termination is calculated exactly for every claim which was open at the beginning of the year or which became a claim due to incidence during the year.

All exposure is calculated in days. All durations are also initially calculated in days. For claims, durations are recorded daily for the first 90 days then monthly up to 3 years then annually. Claim durations are calculated from the date of disability. Ages are calculated as age last and all ages & durations change exactly ie. on the birthday or the appropriate anniversary of date of disablement. Exposure is calculated separately for each month of time. No exposure is recorded in the period from entry (event date) to entry+deferment period (payment commencement) nor is any exposure recorded whilst a policy remains on claim.

All claims which are recorded as either a recovery or death are counted as a claim termination. Claims which are recorded as a recovery but within a defined tolerance period prior to the end of the benefit period are recorded as an assumed End of Benefit Period and are excluded from actual claim terminations. They are separately identified and can be separately analysed if this was considered worth doing.

The tolerance periods depend on the benefit period as follows:

Table 5.3.1: Tolerance Periods

Benefit Period (years)	Tolerance (days)
< 5	90
5 - 9	180
> 9	365

Claims which terminate prior to the end of the deferment period are ignored.

5.4 Lump Sum Settlements

Claims which terminate by way of lump sum settlements are excluded from all analyses of claim durations and termination rates.

Since lump sum settlements represent less than 0.2% of total claim terminations the Committee does not believe that this approach distorts the results in any material fashion.

5.5 Other Benefit Terminations

There have been other benefit terminations that have been excluded from terminations for this investigation. This exclusion extends to those claims whose recorded 'recovery' was reversed as described above in Section 4.4.

5.6 Claim Durations, Costs and Continuation Tables

In the calculation of average claim durations, claim costs and continuation tables the following mathematical approaches have been adopted.

The **EXPECTED CLAIM TERMINATIONS** at any duration [d] are calculated as;

$$Exposure \times (1 - (l_{d+1} \div l_d)^{(1 \div (days(d+1) - days(d)))})$$

where:

l_d	is the number of claims continuing at duration d according to the table being used (currently IAD89-93)
days(d)	is the number of days of duration since disability commenced for duration d
Exposure	is calculated in days for each duration d, and age, deferment, etc

The **CLAIM DURATION FOR THE EXPECTED TABLE** is calculated as follows;

$$cp(d) = (l_d - (l_d - l_{d+1}) \times (dfac - 1) \div (2 \times dfac)) \times dfac$$

where

cp(d)	is the payments made during duration d to d+1
dfac	$= days(d+1) - days(d)$
Claim Duration	$= \sum_{d=deferment}^{d=endperiod} cp(d)$
endperiod	is the end of the period in question ie. one year, etc.

The **CLAIM DURATION FOR THE ACTUAL EXPERIENCE** is calculated as follows;

$$al_{d+1} = al_d \times (1 - acl_d \div \exp_d)^{dfac}$$

where

al_d	is the calculated actual number of claims continuing at duration d
acl_d	is the actual number of claim terminations in the period d to d+1
exp_d	is the exposure in days for the period d to d+1

The calculation of the claim duration then follows the same approach as for expected but using al_d

The underlying assumption is that terminations occur uniformly over the period d to d+1.

5.7 Rating Factors

Morbidity is affected by many factors. This report analyses data by:

- Sex;
- Age;
- Occupation class;
- Deferment period (2-week and 1-month).

Note that a deferment period of 15 days is treated as 2-week, and 28 and 30 days as 1-month.

There is also partial analysis of:

- Selection;
- Smoking status;
- Cause of claim;
- Other deferment periods;
- Business overheads insurance;
- Cancellable insurance;
- Variation by company;
- Benefit size.

At this stage, although the new system – IDEAS – allows analysis on the following factors, no analysis has been carried out because the effect is considered likely to be swamped by other rating factors or variation by contributor.

- Medical evidence;
- 'Own' versus 'any' occupation definition of disability;

- Benefit period;
- No claim bonus;
- Claims escalation;
- 24 hour/out-of-working-hours coverage policies.

No analysis is possible at this stage, either because the data is not collected or because of system constraints, for:

- Benefit size as a proportion of income (replacement ratio);
- Impaired lives;
- Non-coterminous benefit periods;
- Occupation on a more detailed basis;
- Source of business (tied, independent, direct);
- Geographic location;
- Second claims;
- Nursing benefits;
- Rehabilitation or ancillary benefits.

The effects of minimum benefit periods for specific injuries and partial disability benefits are reflected in the experience, but are not separately identified in the analysis.

5.8 Occupation Classifications

The tables in this report and IAD89-93 are divided into four occupation classes A, B, C and D. These four classes separate occupations into the following broad categories:

A Professional, white collar and sedentary, eg. accountant, barrister, doctor, teacher. Other sedentary white collar, eg. clerk, estate agent.

B Other sedentary including supervision of manual workers, eg. restaurateur (no cooking, no bar), lab technician.

C Light manual workers, eg. carpenter, building foreman, printer, shoemaker, butcher (retail shop).

D Moderate manual workers, eg. barman, bricklayer, crane operator, couriers. Heavy manual workers, eg. butcher (slaughterer), labourer.

To achieve consistency over all contributors and to avoid the necessity for a contributor to examine individual cases to classify them, contributors supply the Committee with the broad guidelines used by their underwriters. The Committee then advises the contributor on classification. Contributors also supply their own occupation class codes.

Contributors may not always contribute to each category. There is also variation in the classification of occupations. For example, the allocation of four occupations across classes, obtained from a past survey of some contributors, is:

Table 5.8.1: Variations in Occupation Classification between Companies

Occupation	A	B	C	D
Auctioneer	8	4	-	-
Interior Decorator	-	2	7	2
Butcher (Retail)	-	1	8	3
Bricklayer	-	-	4	6

The variation in occupation classification would be expected to result in varying experience between companies.

CIDA 85 also uses four occupation classes, which are broadly in line with the Australian classifications.

IDEC uses the four classes plus a medical occupation class. Although the Committee sought indications from all participating companies for which of their occupation classes, if any, were specific to medical occupations, no details were provided so we were unable to do any comparison of the Australian experience with IDEC the

Medical class. Even so we expect that there is currently little data which is classified in this fashion as it is a relatively new development in the Australian market. The Australian class A experience has been compared with the IDEC class A which excludes medical occupations.

5.9 Deferment Periods

This report sets out detailed results for the 2-week and 1-month deferment periods, because they contain the greatest volume of data – 84%. Full analysis of data for other deferment periods has not been included because they represent only a small proportion of the exposure. The 3-month deferment is growing but still represents less than 8% of the data.

5.10 Selection

Selection has been investigated using a select period of the first and second year of the policy.

5.11 Data Collection & Verification

A PC program has been supplied to contributors, which was designed to edit the data and report on common errors. This enables the larger part of the data verification procedures to be done before the data is sent to the Committee. Companies are asked to sign off the completeness and accuracy of the data which was collected far enough after the end of the relevant periods that all claims developments should have occurred by the time the data was reported.

When received, more extensive tests are performed and items of significance are raised with the relevant contributor. Results are also carefully evaluated in the light of the previous report and the Committee's general experience with disability income business.

The specific validation tests are described in Section 11.

In this way, the quality of the data is enhanced, but it is not possible for the Committee to test all aspects of the data.

In particular, the Committee is highly dependent on the individual contributors to supply correct data, and encourages companies to test their contributions carefully and ensure that sign off is entrusted to the actuary who is in the best position to identify data problems. Further the Committee sends preliminary and company specific results back to the contributing companies to seek verification of the results and to allow them the opportunity to highlight any inconsistencies with internal investigations.

For this report only one company has responded to the Committee about the preliminary and company specific results when the committee sent out the company specific results and asked whether they were consistent with each participating company's own investigations.

5.12 Calculation of Standard Errors

Approximate standard errors for the actual to expected ratios are shown in some tables. The ratios and their respective standard errors are given as percentages. The standard error is calculated by multiplying the ratio by the square root of the reciprocal of the number of expected claims.

5.13 Confidentiality of Data

The Committee has procedures in place to ensure the security and confidentiality of the data provided by contributors. This process is particularly enhanced given that the management of the data is outsourced to the Australian National University. In particular, where data is being prepared which could be identified as relating to an individual contributor this data is only available to the ANU and any Committee members who are not employees of any life office. This applies especially to the data used in Section 8 of this report (where variation in experience by contributor is analysed).

6 Summary of Previous Investigation Results under Ideas

6.1 Introduction

A new computer system has been used for the investigation which produced the results set out in this report. This section describes the differences in certain definitions between the new and the old computer systems.

IDEAS was validated through three sets of tests:

- Individual record calculations,
- Comparison of a set of data supplied by one of the reinsurers with the results compared between IDEAS and the reinsurer's internal system, and,
- Comparison of one year's actual data of one of the larger contributors with results compared between IDEAS and the company's internal experience analysis.

In each case the IDEAS results were validated.

In order to see the differences in results caused by the changes in definitions and approach the key tables in respect to the period 1995-1998 have been produced using the new system.

The old system, known affectionately as the 'Black Box', has been used since the first report of the Disability Committee. The fundamentals of the system remained unchanged although amendments had been made to streamline the processing and to produce easier data validation.

The new system, known by the acronym 'IDEAS' – Institute of Actuaries of Australia Disability Experience Analysis System – uses the key definitions and approach as described in Section 5.

Data are provided by contributing companies using the same instructions as previously. No change has been made in any data submission definitions or formats. Data are provided on each in force policy at 31 December in each year. Data are also provided on every claim for which a payment was due in the calendar year to which the data relates. No fundamental change has been made to the data validation algorithms.

Throughout the black box the age definition is: *Age nearest birthday at the policy anniversary occurring in the year of the record*. This applies to both in force and claims.

On the other hand IDEAS calculates ages as *age last birthday* at each day of the investigation and age changes exactly on the recorded birthday.

As a result the age definition under IDEAS is on average half a year less than under the old method.

6.2 Data

The data recorded by each system are extremely close for all major components, the largest difference being almost indistinguishable from zero.

Table 6.2.1: Active Lives – Number of In Force Records at 31 December

Year	Black Box	IDEAS
1994	289,922	289,914
1995	303,964	303,963
1996	318,144	318,143
1997	340,259	340,258
1998	308,291	308,234
TOTAL	1,560,580	1,560,512

Table 6.2.2: New Claims – by Number

Year	Black Box	IDEAS
1995	7,828	7,829
1996	7,748	7,748
1997	8,091	8,092
1998	6,770	6,773
TOTAL	30,437	30,442

Table 6.2.3: Claims Terminated – by Number – 1995-1998

Cause of Termination	Black Box	IDEAS
Expiry	1,175	1168
Death	281	281
Recovery	27,918	27,924(1)
Lump Sum Payment	38	38
Other	427	425
TOTAL	29,839	29,836

(1) Before excluding 1,354 terminations as Forced Expiry [see Section5.3] and 374 terminations within the deferment period.

6.3 Exposure

The Black Box calculation of exposure for incidence is as follows

Definitions:

INVESTIGATION_FIRST_DATE: 1 January of the earliest year of claims being processed in the run

INVESTIGATION_LAST_DATE: 31 December of the latest year of claims being processed in the run

POLICY_ANNIVERSARY_1: The policy anniversary which occurs in the year of the record

POLICY_ANNIVERSARY_2: The policy anniversary which occurs one year after POLICY_ANNIVERSARY_1

DEFER: The deferment period relevant to the record

EXPOSURE_DATE_1: Later of;
(POLICY_ANNIVERSARY_1 + DEFER) and
INVESTIGATION_FIRST_DATE

EXPOSURE_DATE_2: Earlier of;
(POLICY_ANNIVERSARY_2 + DEFER) and
(INVESTIGATION_LAST_DATE + 1 day)

For in force the exposure is calculated as:

(EXPOSURE_DATE_2 - EXPOSURE_DATE_1)/365.25 to four decimal places

The values above are accumulated algebraically for each record to arrive at the total exposures.

Note: This formula can lead to errors for deferment periods greater than 1 year. For a one year investigation period, two year deferment policies can get negative exposures! This was probably not thought of when the program was written.

Two year deferment cases were the main discrepancy between IDEAS and Black Box exposures.

For IDEAS exposure is calculated on a daily basis with each day of exposure counting as 1. The final accumulation is divided by 365.25 to obtain exposure in years.

Table 6.3.1: Exposure in Years

Group	Black Box	IDEAS [1]	Ratio IDEAS/BB
Males – A	450,528	469,070	1.041
Males – B	80,302	83,394	1.039
Males – C	271,204	276,876	1.021
Males – D	165,853	169,110	1.020
MALES – TOTAL	967,887	998,450	1.032
Females – A	142,606	147,257	1.033
Females – B	17,193	17,643	1.026
Females – C	21,001	21,397	1.019
Females – D	5,125	5,226	1.020
FEMALES - TOTAL	185,925	191,523	1.030

[1] Excluding 2 year deferment policies

6.4 Incidence

Table 6.4.1: New Claims (as Benefit Per Cent at inception)

Group	Black Box	IDEAS [1]	Ratio IDEAS/BB
Males – A	5,872	6,122	1.043
Males – B	1,613	1,664	1.032
Males – C	10,157	10,423	1.026
Males – D	7,465	7,495	1.004
MALES – TOTAL	25,109	25,705	1.024
Females – A	2,625	2,701	1.029
Females – B	410	422	1.029
Females – C	605	617	1.020
Females – D	185	180	0.973
FEMALES - TOTAL	3,827	3,920	1.024

Excluding 2 year deferment policies

There is a greater difference between the Black Box and IDEAS for claims measured by benefit per cent than when measured by numbers [1.024 versus 1.0002]. The reasons for this difference have not been explored.

The ratios between IDEAS and Black Box for claims and for exposure are very similar and the overall result is that the experiences incidence rates as measured by IDEAS are less than 1% lower than those measured by the Black Box. This result strongly suggests that the change in computer systems and their underlying methodology has had no effect on the conclusions which are drawn from the experience results with regards to incidence rates.

6.5 Terminations

The Black Box calculation of exposure for claim termination is as follows

Definitions:

INVESTIGATION_FIRST_DATE: 1 January of the earliest year of claims being processed in the run

INVESTIGATION_LAST_DATE: 31 December of the latest year of claims being processed in the run

POLICY_ANNIVERSARY_1: The policy anniversary which occurs in the year of the record

POLICY_ANNIVERSARY_2: The policy anniversary which occurs one year after POLICY_ANNIVERSARY_1

DEFER: The deferment period relevant to the record

EXPOSURE_DATE_3: Later of (DATE_PAYMENTS_START and DATE_FALL_SICK)

EXPOSURE_DATE_4: Date payments cease

For claims the exposure is calculated as:

(EXPOSURE_DATE_4 - EXPOSURE_DATE_3)/365.25 to four decimal places

The values above are accumulated algebraically for each record to arrive at the total exposures.

For IDEAS exposure is calculated on a daily basis from the end of the deferment period to the date payments cease, with each day of exposure counting as 1. The final accumulation is divided by 365.25 to obtain exposure in years.

6.6 Claim Durations

For the Black Box an array of claims in progress is set up by daily duration since date-fall-sick and quinquennial age, taking benefit percentage into account. This is used to build up continuance tables. However distortions can arise for payments starting in the year prior to the beginning of the investigation. Durations of the claim up to Dec 31 are not taken into account in building up the continuance table. Therefore the number of claims at duration x+1 can be greater than at duration x. This can lead to significant distortions, especially if the number of claims is low.

There are numerous data errors in the claims records. The black box and IDEAS treat these differently. Generally IDEAS attempts to include the claim record whereas the Black Box tends to exclude the claim record.

IDEAS calculates claim durations and continuance according to the formulae set out in Section 5.6. Changes in benefit percentage during claim are ignored. This is a quite different approach to the Black Box.

Not surprisingly there are material differences in the calculation of claim durations and claim cost between the two systems. IDEAS generally has shorter claim durations calculated than the Black Box especially for later years of claim payments. Since this is where smaller claims numbers will be still being paid the distortions in the Black Box method, described above, should be noted.

Table 6.6.1: Claim Durations in Months

Group	Years of Benefit Period	Black Box	IDEAS
Males - A	1	4.80	4.47
	2	6.72	7.16
	3	8.05	7.79
Males – C	1	3.89	3.42
	2	5.00	4.78
	3	5.63	4.95
Females - A	1	5.04	4.56
	2	6.88	7.31
	3	7.90	7.87

The shorter claim durations as measured by IDEAS are also found in the comparison of continuance tables.

Whilst percentage of benefit paid is included in reported claims records and is used in the calculation of incidence rates, no analysis has performed on the level of or subsequent changes to the benefit per cent for claims durations. Each claim is measured as one claim regardless of the percentage of benefit paid and may either terminate or continue (whether it is at the same or a different per cent of benefit paid) at each duration. There may be value in investigating experience by per cent of benefit paid but that is outside the scope of this investigation.

Table 6.6.2: Claims Still in Payment per 1000 at deferment Males Class A, 1-month deferment Period

Duration (months)	Black Box	IDEAS
1	1,000	1,000
3	594	497
6	377	321
12	213	210
18	161	161
24	135	97
36	84	64

7 Summary of Results

7.1 Introduction

As this was the first time IDEAS was used as the analysis tool, a lot of time and effort was spent on investigating the results produced, checking them against other sources (or indeed by manual calculation) and discussing the methodology and assumptions made.

We were very fortunate to have a key member of the previous investigations join the committee to provide his knowledge and experience with the old BLACK BOX analysis tool and to enable a better understanding of where differences in results may be coming from.

Once we were happy that the new analysis tool was producing reasonable results and that the results were consistent with one company's internal investigations we set about sharing out the task of reviewing the output of the analysis for this investigation.

The analysis was divided between various committee members with a team of three assigned to incidence, another team of three assigned to terminations and a further member covering claims costs. This enabled each section to be worked on at the same time, for each team to have some internal peer review as the progressed and to share the workload amongst the volunteers on the committee.

The implementation of IDEAS has not been without its challenges. Several times during the analysis of the findings inconsistencies were found identifying shortcomings in the current approach and requiring a review of the process, new results to be produced and another round of analysis and commentary to be prepared and peer reviewed. This report has been through several iterations and while there are question marks attached to some of the data provided, the results do represent a significant amount of work and provide the best indications of trends and relativities that existed at the time.

7.2 Comparison with the Previous Investigation Period (calculated using IDEAS)

As was mentioned in Section 2.1, this investigation has been performed using three distinct sets of data to account for each of the possible different causes of change between investigations.

Firstly there has been the change in the analysis tool used to generate the results. So to facilitate the comparison with the previous investigation period all the results of the previous investigation were redone using the new tool. This means that the results of the previous investigation reported in this report and in the previous report may differ due to the change in the tool used.

Secondly there was additional data provided for the previous investigation period which means that the absolute results reported for the previous investigation period in this report may differ from those in the previous report due to there being additional data used in this report.

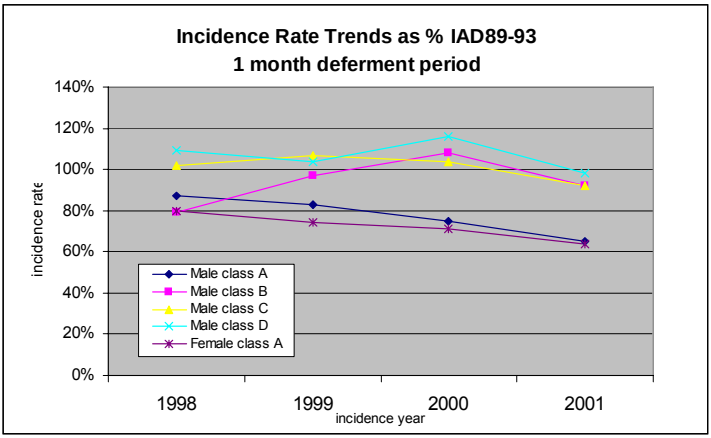
Thirdly when analysing trends over time (from the previous investigation period to the current investigation period) we were mindful that not all companies contributed throughout the whole of the two investigation periods. As there is significant variation between companies in business written and in incidence and claims experience it was important that only those companies who contributed for the whole of the period (the 'continuing companies') were included in the investigation of trends over time. This means the values reported for the previous investigation will differ from those reported in the previous report where less than 100% of the companies contributing for the previous investigation also gave data for the current investigation.

As such care needs to be taken when comparing results between this and previous investigation reports and to appreciate where some of the sources of difference may be coming from.

7.3 Variation in Experience by Year/Across Investigation Periods

The graph below shows incidence experience as percentage of IAD89-93 by year across all ages for 1-month deferment period. For male occupation classes A, C and female occupation class A, there is a decreasing trend over the years. Due at least partly to the lack of data the trends for male occupation classes B and D are not so clear.

Graph 7.3.1: Incidence Rates as % IAD 89-93 for 1-month deferment periods



7.4 Exposed to Risk and Numbers of New Claims – Table B and Table C

Table B and Table C in the full report show the exposed to risk and numbers of claims in some detail. This allows users to assess the exposure distribution and the statistical reliability of various results.

7.5 Incidence Rates by age – Table D

Table D in the full report shows incidence rates by age, sex and occupation. Incidence rates in most cases increase steadily with age. This increase in incidence rates with age seems to be lighter than the increase implied in IAD89-93, as can be seen in Table F1 in the full

report and in Graphs E through H in the full report with generally decreasing A/E with age.

7.6 Incidence Rates by Occupation Class – Table D

Table D in the full report also compares the incidence rates for the four occupation classes by age. As there are only four classes professionals are not separated from other white collar workers nor are we currently able to identify specific sub-groups within the data (eg medical and legal professions).

For males, incidence rates increase as one moves through the occupation classes. The difference between occupation classes in percentage terms decreases with increasing age.

Compared with the last investigation period, the ratios have increased for male 1-month deferment period but the ratios have reduced for 2-week deferment period male and female. The increasing ratios for male 1-month deferment period could be due to the greater improvements in experience for class A relative to the other classes.

The ratios also show a convergence of experience between classes C and D for 2-week deferments. The differentials between these two blue collar classes have markedly reduced.

Table 7.6.1: Weighted Average Incidence Rates as % of Male Class A

	2-week	1-month
Male B	152% (156%)	174% (156%)
Male C	238% (243%)	370% (320%)
Male D	241% (273%)	437% (379%)

(Figures in brackets are for 1995-98)

Table 7.6.2: Weighted Average Incidence Rates as % of Female Class A

	2-week	1-month
Female B	137% (138%)	130% (134%)
Female C	143% (164%)	197% (157%)
Female D	139% (176%)	128% (174%)

(Figures in brackets are for 1995-98)

7.7 Incidence Rates by Deferment Period – Table D

Table D in the full report also shows incidence rates for the two major deferment periods. Incidence rates reduce significantly as the deferment period increases.

Table 7.7.1: Ratio of Weighted Average Incidence Rates

1-month to 2-week	Males	Females
Class A	36% (36%)	40% (41%)
Class B	38% (36%)	39% (43%)
Class C	51% (45%)	57% (40%)
Class D	60% (47%)	38% (43%)

(Figures in brackets are for 1995-98)

Graphs A to D in the full report present the crude incidence rates for 2-week and 1-month deferment periods, by quinquennial age.

7.8 Incidence Rates by Sex – Table E

Table E in the full report compares the number of female claims with those expected if female experienced the rates of incidence experienced by males in this investigation.

Note that, due to the small volume of data, Table E in the full report demonstrates great variability by age and occupation class in the ratio of female to male incidence rates.

Trends

The results for companies who provided data for both the 1995-1998 and 1998-2001 investigation periods are shown below.

Table 7.8.1: Ratio of Female to Male Incidence Rates 2-week Deferment Period

	1998-2001	1995-1998	No of new female Claims
Class A	136%	139%	640
Class B	124%	112%	157
Class C	80%	96%	157
Class D	84%	94%	58
COMBINED	117%	122%	1,012

Table 7.8.2: Ratio of Female to Male Incidence Rates 1-month Deferment Period

	1998-2001	1995-1998	No of new female Claims
Class A	159%	169%	1,310
Class B	129%	152%	444
Class C	91%	96%	309
Class D	62%	88%	63
COMBINED	132%	146%	2,125

Table 7.8.3: Ratio of Female to Male Incidence Rates 3-month Deferment Period

	1998-2001	1995-1998	No of new female Claims
Class A	129%	104%	52
Class B	225%	226%	24
Class C	110%	96%	10
Class D	*	*	*
COMBINED	142%	147%	89

*Less than 10 claims reported

The results for 1998-2001 appear consistent with those for 1995-1998 for 2-week deferment, while the 1998-2001 results are lower for the 1-month deferment. The number of claims for classes B, C & D is still small, so care needs to be taken with interpreting the results. There is very little data for the 3-month deferment period, so no conclusions can be drawn for this section.

7.9 Comparison with Standard Tables –Table F

Table F1, Table F2 and Table F3 in the full report show the actual number of claims compared with the number expected using IAD89-93, CIDA 85 and IDEC respectively.

Comparison with IAD89-93

Both males and females have exhibited lighter incidence than expected. Class A experience is relatively lighter than the other classes.

Table 7.9.1: Ratio of Actual Claims to Number Expected on IAD89-93 – All current investigation data

	2-week		1-month		3-month	
	Males	Females	Males	Females	Males	Females
Class A	72%	75%	76%	71%	102%	78%
Class B	80%	86%	95%	77%	90%	138%
Class C	82%	67%	100%	79%	83%	93%
Class D	74%	55%	106%	47%	88%	92%
Combined	78%	73%	94%	72%	95%	90%

Trends

Using only the data from companies who provided data for both the 1995-1998 and 1998-2001 investigation periods, and examining all age groups, the following tables show a comparison of the experience over each investigation period.

Table 7.9.2: Ratio of Actual Claims to Number Expected on IAD89-93 – Continuing Companies only, 2-week deferment period

	Males				Females			
	1998-2001	Std Error	1995-1998	Std Error	1998-2001	Std Error	1995-1998	Std Error
Class A	72%	0.02	99%	0.02	74%	0.03	96%	0.03
Class B	79%	0.03	93%	0.03	88%	0.07	95%	0.07
Class C	83%	0.01	96%	0.01	65%	0.05	92%	0.06
Class D	74%	0.01	95%	0.01	55%	0.07	82%	0.08

Table 7.9.3: Ratio of Actual Claims to Number Expected on IAD89-93 – Continuing Companies only, 1-month Deferment Period

	Males				Females			
	1998-2001	Std Error	1995-1998	Std Error	1998-2001	Std Error	1995-1998	Std Error
Class A	77%	0.01	102%	0.02	72%	0.02	96%	0.03
Class B	91%	0.03	96%	0.04	76%	0.04	94%	0.06
Class C	102%	0.02	106%	0.02	79%	0.05	90%	0.05
Class D	111%	0.02	114%	0.02	59%	0.07	89%	0.11

Graphs E to H in the full report plot the ratio of Australian crude incidence rates to IAD83-93.

Comparison with CIDA and IDEC

It can be seen from both Table F2 and Table F3 in the full report that the actual to expected ratio increases with age.

The actual to expected ratio is lighter under both CIDA and IDEC than under IAD89-93, with this trend more noticeable for females than males.

Neither CIDA 85 nor IDEC incidence rates by age are appropriate for Australia.

Graphs I through L in the full report plot the ratio of Australian crude incidence rates to CIDA 85.

Graphs M through P in the full report plot the ratio of Australian crude incidence rates to IDEC.

Table 7.9.4: Ratio of Actual Claims to Number Expected on CIDA – Continuing Companies only, 2-week Deferment Period

	Males				Females			
	1998-2001	Std Error	1995-1998	Std Error	1998-2001	Std Error	1995-1998	Std Error
Class A	57%	0.01	71%	0.02	42%	0.02	51%	0.02
Class B	50%	0.02	57%	0.02	41%	0.03	42%	0.03
Class C	60%	0.01	67%	0.01	32%	0.03	43%	0.03
Class D	54%	0.01	67%	0.01	30%	0.04	43%	0.04

Table 7.9.5: Ratio of Actual Claims to Number Expected on CIDA – Continuing Companies only, 1-month Deferment Period

	Males				Females			
	1998-2001	Std Error	1995-1998	Std Error	1998-2001	Std Error	1995-1998	Std Error
Class A	53%	0.01	64%	0.01	37%	0.01	46%	0.01
Class B	41%	0.01	43%	0.02	31%	0.01	37%	0.02
Class C	56%	0.01	56%	0.01	36%	0.02	38%	0.02
Class D	61%	0.01	61%	0.01	26%	0.03	38%	0.04

Table 7.9.6: Ratio of Actual Claims to Number Expected on IDEC – Continuing Companies only, 2-week Deferment Period

	Males				Females			
	1998-2001	Std Error	1995-1998	Std Error	1998-2001	Std Error	1995-1998	Std Error
Class A	76%	0.02	87%	0.02	36%	0.01	40%	0.01
Class B	77%	0.03	85%	0.03	43%	0.03	42%	0.03
Class C	91%	0.01	100%	0.01	31%	0.02	41%	0.02
Class D	56%	0.01	68%	0.01	27%	0.03	37%	0.04

Table 7.9.7: Ratio of Actual Claims to Number Expected on IDEC – Continuing Companies only, 1-month Deferment Period

	Males				Females			
	1998-2001	Std Error	1995-1998	Std Error	1998-2001	Std Error	1995-1998	Std Error
Class A	55%	0.01	64%	0.01	35%	0.01	42%	0.01
Class B	60%	0.02	62%	0.02	40%	0.02	46%	0.03
Class C	104%	0.02	104%	0.02	47%	0.03	49%	0.03
Class D	77%	0.01	77%	0.02	33%	0.04	46%	0.06

7.10 Average Claim Duration – Table G

Table G1 in the full report compares average claim durations and claim costs for curtate benefit durations of 1, 2 and 3 years against IAD89-93. The following comments are based on the first three years of benefit.

Average claim durations are much longer for 1-month deferment business than for 2-week business. This is consistent for the first year, first two years and first three years of the claim period.

Table 7.10.1: Ratio of durations for 1-month to 2-week deferment periods

	Occupation Class	1st Year	1st 2 Years	1st 3 Years
Male	A	108%	128%	135%
Male	B	95%	111%	117%
Male	C	104%	120%	123%
Male	D	108%	123%	129%
Female	A	121%	142%	144%
Female	B	112%	124%	128%
Female	C	114%	127%	129%
Female	D	91%	115%	130%

A comparison of policies with long benefit periods (10+ years) against those of shorter benefit periods shows that the policies with shorter benefit periods have lower average claim durations, this is consistent across all 3 curtate claim durations. Occupation classes A and B have a large proportion of claims with long benefit periods (68%-78% are long), occupation class C is fairly evenly split and occupation class D has predominantly short benefit periods (31% are long).

Table 7.10.2: Ratio of Claim Durations for Short versus Long Benefit Periods – 1-month deferment period, 3-year curtate claim durations

Occupation Class	Males	Females
A	83%	71%
B	88%	67%
C	75%	72%
D	73%	54%

For the first time we have been able to look at the impact of benefit size on experience. Analysis of claim duration by benefit amount indicates a strong trend of claim durations increasing with benefit amount. The table below shows results by occupation class and sex and the increasing claim duration by benefit amount is fairly consistent across all these categories.

Table 7.10.3 Claim Duration (in months) by Benefit Size, 3-year curtate benefit period

Benefit	Sex		Occupation Class			
	Male	Female	A	B	C	D
0 - 1,999	5.66	7.35	7.20	7.58	6.27	4.62
2,000 - 3,999	6.57	8.03	8.26	7.17	6.19	6.14
4,000 - 5,999	8.58	9.69	8.81	9.10	8.46	8.76
6,000 - 9,999	10.09	9.43	9.94	13.68	7.16	11.51
10,000 - 14,999	11.60	8.23	11.51	4.71	11.40	
15,000 and over	10.19	3.94	9.76	1.07		
All Amounts	6.43	7.86	8.30	7.45	6.26	5.29

Average claim durations have increased significantly in all three curtate benefit periods. This can be seen in the table below which compares the claim duration in 1998-2001 with the claim duration in 1995-1998 for a 1-month deferment period.

Table 7.10.4: Ratio of Claim Duration 1998-2001 to 1995-1998 1-month deferment period, Continuing Companies only

	Occupation Class	1st Year	1st 2 Years	1st 3 Years
Male	A	120%	124%	123%
Male	B	110%	115%	116%
Male	C	123%	134%	134%
Male	D	108%	110%	110%
Female	A	117%	118%	116%
Female	B	110%	105%	103%
Female	C	116%	132%	132%
Female	D	123%	124%	132%

The average claim durations over the first 3 years of benefit across all age groups is roughly 185% of IAD89-93 for males with a 1-month deferment period. The increase in the average duration compared to 1995-98 is once again apparent in the table below.

Table 7.10.5: Comparison of Average Duration Against IAD89-93 Continuing Companies only

	2-week Deferment	1-month Deferment
Male Class A	213% (144%)	185% (155%)
Male Class B	238% (158%)	211% (195%)
Male Class C	209% (141%)	192% (152%)
Male Class D	172% (121%)	163% (155%)
Female Class A	199% (148%)	206% (183%)

(Figures in brackets are for 1995-98)

With respect to the CIDA table the relativities of Australian business have changed. Historically Australian average claim durations have been shorter than CIDA for 2-week deferment business, for the duration of this investigation however, Australian durations are longer than CIDA in all occupation and age categories.

Table 7.10.6: Comparison of Average Duration Against CIDA 3 year curtate benefit duation

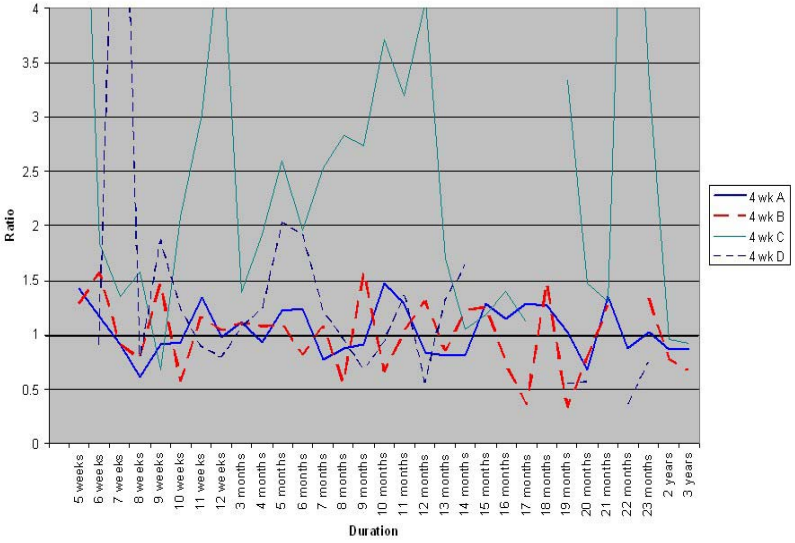
	2-week Deferment	1-month Deferment
Male Class A	167%	185%
Male Class B	176%	174%
Male Class C	155%	160%
Male Class D	130%	141%
Female Class A	181%	223%

7.11 Claim Continuance – Table H

Table H in the full report shows the number of lives still claiming at each duration, out of 1,000 lives initially claiming, separately for each occupation class.

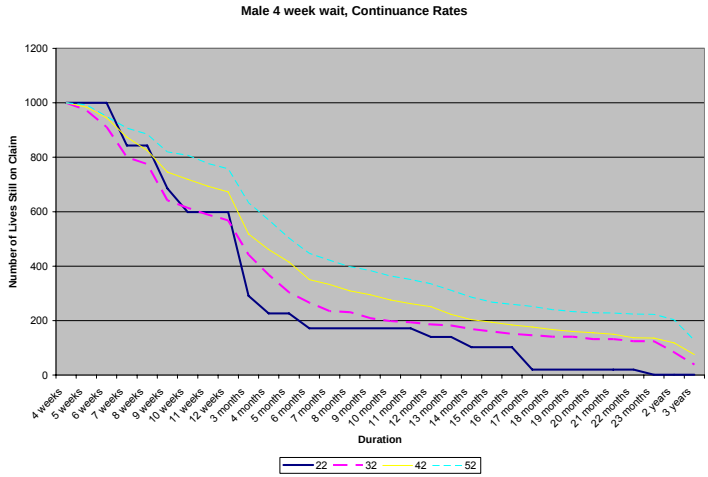
Claim continuance rates show no significant difference between males and females. The graph below shows the ratio of male and female termination rates for the 4-week deferment period. The Class A and B results show that males and females have very similar termination rates. The Class C and D results are very variable due to a lack of data particularly for females in these classes.

Graph 7.11.1: Ratio of Male to Female Termination Rates for all Occupation Classes



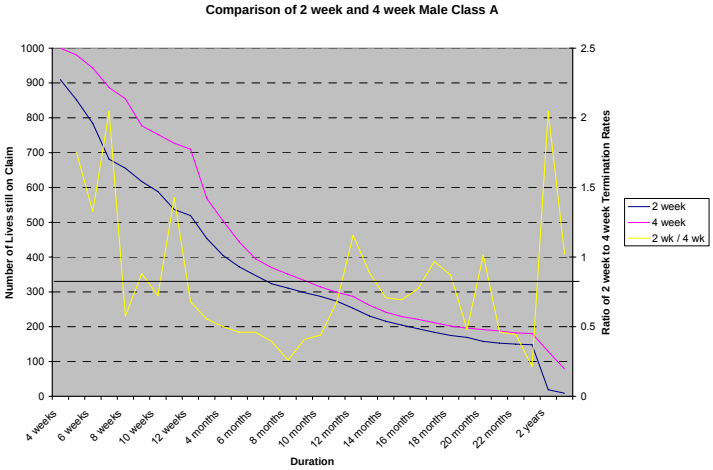
Claim continuance rates continue to increase with age as is shown in the table below for the male 4-week wait period.

Graph 7.11.2: Male 1-month deferment period, Continuance Rates



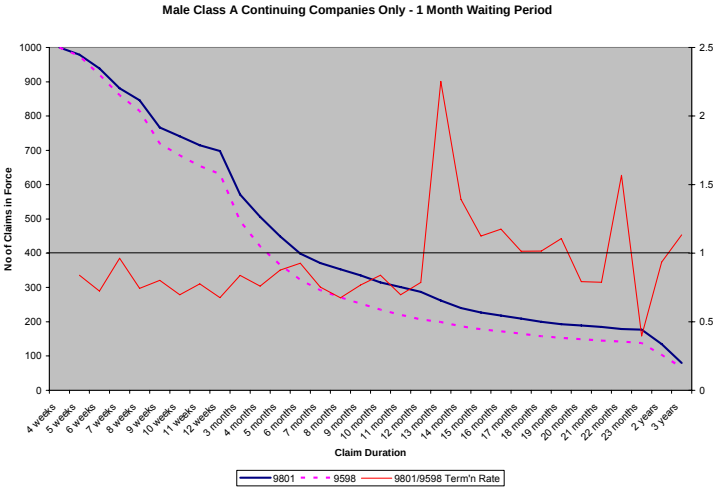
Termination rates are higher for 2-week business than for 4-week business for claim durations up to 6 weeks. After that termination rates are generally higher for 4-week business. Whilst the table below shows the pattern for Male Class A, the pattern is typical for all sex/class combinations.

Graph 7.11.3: Comparison of Claim Durations for 2-week and 1-month deferment periods, Male, Class A



Termination rates have decreased slightly in the first 12 months of claim with an increased termination rate thereafter. This change is fairly consistent between males and females but differs between occupational classes, with occupation classes B and D showing the least change in pattern from the last survey. The table below shows the comparison between the continuance rates in 1995-1998 and 1998-2001 for continuing companies only. As can be seen the termination rates are lower in 1998-2001, with a spike at the 1-year mark. This could indicate that companies were relying more upon duration specific decision points to terminate claims rather than a more general ongoing claims management strategy. All classes show a spike at the 12 month mark.

Graph 7.11.4: Comparison of Claim Durations for 1995-1998 and 1998-2001, continuing companies only, Male, Class A, 1-month deferment period



7.12 Claim Costs

By age, the curve of actual claim costs is less steep than the present shape of the standard table. This is not to say claim costs do not rise in absolute terms with age. Rather, the ratios of actual to expected claim cost have generally been running at higher levels in

the ages between 25 and 45 years compared to ages greater than 45 years.

As in the previous investigation period, costs of claims in 1998-2001 remain significantly in excess of predictions based purely on the IAD89-93 table and this has been due to longer than expected claim durations.

Table G1 by benefit period

Results were grouped separately for benefit periods less than or equal to 10 years, and for benefit periods more than 10 years or expiring at a certain age of the life insured.

The latest results confirm the cost of claims on policies with long benefit periods predicted by the IAD89-93 table are significantly understated relative to those with short benefit periods. This pattern was also observed in the previous investigation period.

For any given benefit period, the IAD89-93 table appears to be understating claim costs for claims on policies with a 2-week deferment period relative to a 1-month deferment period.

Table 7.12.1: Ratio (%) of actual to expected claim costs in 1998-2001 by length of benefit period for the first 2 years of benefits 2-week deferment period

	Occupation class	Benefit Period ≤ 10 years	Benefit Period > 10 years
Male	A	147%	167%
Male	B	200%	191%
Male	C	161%	231%
Male	D	125%	196%
Female	A	140%	164%
Female	B	183%	214%
Female	C	146%	234%
Female	D	144%	214%

Table 7.12.2: Ratio (%) of actual to expected claim costs in 1998-2001 by length of benefit period for the first 2 years of benefits 1-month deferment period

	Occupation class	Benefit Period ≤ 10 years	Benefit Period > 10 years
Male	A	115%	141%
Male	B	181%	185%
Male	C	146%	230%
Male	D	140%	246%
Female	A	110%	157%
Female	B	130%	199%
Female	C	148%	243%
Female	D	110%	144%

Trend in claim costs over time

Given the changes in both the analysis tool and in the data set for the previous investigation - due to the contribution of new data from one company relating to the previous investigation period - combined with the need to correct the data for wrongly reported claims terminations (see Section 4.4), considerable care is needed in looking at trends in claims costs over time.

As such the analysis of trends in claim costs over time was conducted using the IDEAS system to produce the results from the both the previous and current investigation only in respect of the same group of companies which contributed data throughout the period (that is, continuing companies). This ensures that any trends in claims costs over time revealed are only due to the underlying experience and not due to either the change in system, the change in the mix of companies contributing or the data corrections made that may have not been identified in the previous investigation.

What is clearly evident is that the lengthening of claims durations consistently more than negated any improvements gained in claim incidence rates.

Since the prior period, claims with a 2-week deferment period increased in cost while reductions were recorded in some 1-month deferment period claims. Worsening claim durations are the main contributor to the increasing costs of claims with a 2-week deferment period.

Table 7.12.3: Change (%) in ratio of actual to expected claim costs by component for the first 2 years of benefit period between 1995-98 and 1998-2001, 2-week deferment period, continuing companies only

	Occupation class	Incidence	Duration	Claim Cost
Male	A	-27%	+45%	+5%
Male	B	-15%	+49%	+26%
Male	C	-14%	+45%	+25%
Male	D	-22%	+41%	+11%
Female	A	-23%	+32%	+2%
Female	B	-8%	+48%	+37%
Female	C	-29%	+57%	+12%
Female	D	-32%	+22%	-18%

Table 7.12.4: Change (%) in ratio of actual to expected claim costs by component for the first 2 years of benefit period between 1995-98 and 1998-2001, 1-month deferment period, continuing companies only

	Occupation class	Incidence	Duration	Claim Cost
Male	A	-25%	+20%	-10%
Male	B	-5%	+7%	+1%
Male	C	-4%	+26%	+21%
Male	D	-3%	+5%	+1%
Female	A	-25%	+15%	-14%
Female	B	-19%	-1%	-19%
Female	C	-12%	+27%	+12%
Female	D	-33%	+26%	-16%

The results for any given combination of sex, occupation class and benefit period indicate a widening in costs between 2-week and 1-month deferment periods. In fact, reductions in costs (or smaller

increases) were observed for claims with a 1-month deferment period.

For any given combination of sex, occupation class and deferment period the results give no clear indication that costs in respect of short benefit claims have changed out of step from claims with long benefit periods.

Table 7.12.5 Change (%) in ratio of actual to expected claim costs for the first 2 years of benefit period between 1995-98 and 1998-2001, for benefit periods 10 years or less, continuing companies only

	Occupation class	2-week deferment	1-month deferment
Male	A	+3%	-9%
Male	B	+28%	+23%
Male	C	+21%	+3%
Male	D	+7%	+2%
Female	A	+13%	-20%
Female	B	+41%	-27%
Female	C	+7%	+8%
Female	D	-12%	-21%

Table 7.12.6: Change (%) in ratio of actual to expected claim costs for the first 2 years of benefit period between 1995-98 and 1998-2001, for benefit periods are-related or longer than 10 years, continuing companies only

	Occupation class	2-week deferment	1-month deferment
Male	A	+7%	-13%
Male	B	+29%	-14%
Male	C	+28%	+25%
Male	D	+34%	-18%
Female	A	-6%	-17%
Female	B	+19%	-21%
Female	C	+27%	-2%
Female	D	-62%	-19%

Aggregating the experience for all benefit periods, the movement in claim cost has not been uniform across the different deferment periods and occupation classes. In percentage terms, the greatest deterioration has been in occupation classes B and C and claims with a 2-week deferment period.

Table 7.12.7: Change (%) in ratio of actual to expected claim costs for the first 2 years of benefit period between 1995-98 and 1998-2001, continuing companies only

	Occupation class	2-week deferment	1-month deferment
Male	A	+5%	-10%
Male	B	+26%	+1%
Male	C	+25%	+21%
Male	D	+11%	+1%
Female	A	+2%	-14%
Female	B	+37%	-19%
Female	C	+12%	+12%
Female	D	-18%	-16%

Trend in claim costs over time by cause of disability

In males accidental causes were the leading cause of disability in 1998-2001. However in females accidents ranked second to mental disorder claims.

In 1998-2001 the four highest costing sickness causes of disability claims in males were musculoskeletal, mental disorders, circulatory system disorders and neoplasms. In females the significant sickness related causes were mental disorders, musculoskeletal, neoplasms and genitourinary system diseases.

Table 7.12.8: Actual claim costs in 1998-2001 by component, cause of disability and sex

Cause of Claim	Male TOTALS						
	Claim Incidence rate	Average Duration of Claim [Months]			Claim Cost per $1 per month		
		1st year of benefit	1st 2 years of benefit	1st 3 years of benefit	1st year of benefit	1st 2 years of benefit	1st 3 years of benefit
infective diseases	0	3.77	5.23	5.33	0.001	0.001	0.001
neoplasms	0.001	6.74	9.5	9.68	0.005	0.008	0.008
endocrine diseases	0	4.78	6.64	6.85	0	0.001	0.001
blood diseases	0	7.31	9.71	9.9	0.001	0.001	0.001
mental disorders	0.001	7.04	10.61	11.03	0.01	0.015	0.016
diseases of the nervous system	0.001	4.84	7.46	7.84	0.002	0.004	0.004
circulatory system diseases	0.001	6.09	8.63	8.79	0.006	0.009	0.009
respiratory system diseases	0	3.78	5.09	5.11	0.002	0.002	0.002
digestive system diseases	0.001	3.16	4.04	4.08	0.005	0.006	0.006
genito-urinary system diseases	0	2.73	3.45	3.48	0.001	0.001	0.001
pregnancy	0	3.25	3.25	3.25	0	0	0
skin diseases	0	3.41	4.52	4.59	0.001	0.001	0.001
musculoskeletal diseases	0.003	5.23	7.47	7.6	0.017	0.024	0.025
congenital abnormalities	0	1.82	1.82	1.82	0	0	0
not relevant	0	0	0	0	0	0	0
senility	0	5.42	6.85	6.85	0	0	0
accidents	0.008	3.99	5.27	5.36	0.032	0.043	0.043
AIDS	0	6.96	9.68	9.81	0.001	0.001	0.001
HIV+	0	4.16	5.84	5.97	0	0	0
Unknown	0.006	0	0	0	0	0	0
All Claim Causes	0.024	4.51	6.26	6.38	0.109	0.151	0.154

	Female TOTALS						
Cause of Claim	Claim Incidence rate	Average Duration of Claim [Months]			Claim Cost per $1 per month		
		1st year of benefit	1st 2 years of benefit	1st 3 years of benefit	1st year of benefit	1st 2 years of benefit	1st 3 years of benefit
infective diseases	0	5.06	8.85	9.65	0.002	0.003	0.004
neoplasms	0.001	7.24	11.13	11.64	0.008	0.013	0.014
endocrine diseases	0	7.02	11.74	12.84	0.001	0.002	0.002
blood diseases	0	5.84	8.69	8.71	0.001	0.001	0.001
mental disorders	0.002	7.67	11.36	11.58	0.017	0.025	0.025
diseases of the nervous system	0.001	5.7	9.41	9.91	0.004	0.007	0.007
circulatory system diseases	0	4.17	5.46	5.54	0.002	0.002	0.002
respiratory system diseases	0	4.08	5.51	5.56	0.002	0.002	0.002
digestive system diseases	0.001	4.56	6.8	6.85	0.004	0.006	0.006
genito-urinary system diseases	0.002	3.21	4	4.05	0.006	0.008	0.008
pregnancy	0	3.75	4.49	4.56	0.001	0.002	0.002
skin diseases	0	3.29	4.16	4.37	0.001	0.001	0.001
musculoskeletal diseases	0.002	6.08	8.89	9	0.011	0.017	0.017
congenital abnormalities	0	0.13	0.13	0.13	0	0	0
not relevant	0	0	0	0	0	0	0
senility	0	2.19	2.79	2.8	0	0	0
accidents	0.003	4.38	6.13	6.3	0.014	0.019	0.02
AIDS	0	7.1	12.35	14.81	0.001	0.001	0.002
HIV+	0	4.75	7.97	8.72	0	0	0
Unknown	0.004	0	0	0	0	0	0
All Claim Causes	0.018	5.14	7.54	7.77	0.092	0.136	0.14

The longer than average claim durations of mental illness disorder and musculoskeletal claims have the effect of raising their relative significance in cost.

Digestive system related causes of claim in males and females, and genitourinary system diseases experienced increasing costs (in absolute terms) between the previous and current investigation. On the other hand, infective diseases were down the most. Respiratory system diseases experienced the greatest lengthening in average claim duration.

Table 7.12.9: Change (%) in actual claim cost by cause of disability and sex between 1995-98 and 1998-2001

	Male TOTALS						
Cause of Claim	Claim Incidence rate	Average Duration of Claim [Months]			Claim Cost per $1 per month		
		1st year of benefit	1st 2 years of benefit	1st 3 years of benefit	1st year of benefit	1st 2 years of benefit	1st 3 years of benefit
infective diseases	-100%	28%	35%	37%	-67%	-75%	-75%
neoplasms	0%	15%	25%	27%	-17%	0%	0%
endocrine diseases		12%	10%	11%	-100%	0%	0%
blood diseases		39%	40%	42%	0%	0%	-50%
mental disorders	-50%	21%	30%	34%	-17%	-12%	-6%
diseases of the nervous system	0%	25%	40%	45%	-33%	0%	0%
circulatory system diseases	0%	37%	44%	47%	-14%	0%	0%
respiratory system diseases	-100%	81%	101%	102%	0%	0%	0%
digestive system diseases	-50%	56%	76%	78%	0%	20%	20%
genito-urinary system diseases		39%	56%	57%	0%	0%	0%
pregnancy		21%	21%	21%			
skin diseases		38%	57%	59%	0%	0%	0%
musculoskeletal diseases	-40%	27%	36%	38%	-11%	-4%	-4%
congenital abnormalities		52%	52%	52%			
not relevant							
senility		9%	9%	9%		-100%	-100%
accidents	-38%	39%	51%	52%	-14%	-7%	-7%
AIDS		-7%	-19%	-22%	0%	0%	0%
HIV+							
Unknown							
All Claim Causes	-17%	32%	44%	45%	12%	22%	23%

	Female TOTALS						
Cause of Claim	Claim Incidence rate	Average Duration of Claim [Months]			Claim Cost per $1 per month		
		1st year of benefit	1st 2 years of benefit	1st 3 years of benefit	1st year of benefit	1st 2 years of benefit	1st 3 years of benefit
infective diseases	-100%	0%	0%	-2%	-71%	-75%	-69%
neoplasms	0%	25%	38%	40%	-11%	8%	17%
endocrine diseases		18%	7%	0%	0%	-33%	-33%
blood diseases		74%	115%	103%	0%	0%	0%
mental disorders	-50%	19%	18%	17%	-29%	-31%	-32%
diseases of the nervous system	0%	21%	23%	22%	0%	0%	0%
circulatory system diseases	-100%	3%	-2%	-3%	-33%	-50%	-50%
respiratory system diseases	-100%	94%	128%	129%	0%	0%	0%
digestive system diseases	0%	80%	109%	109%	0%	20%	20%
genito-urinary system diseases	-33%	57%	85%	88%	0%	33%	33%
pregnancy	-100%	16%	9%	10%	-50%	-33%	-33%
skin diseases		30%	50%	56%	0%	0%	0%
musculoskeletal diseases	-33%	25%	37%	38%	-21%	-6%	-6%
congenital abnormalities		-58%	-58%	-58%			
not relevant							
senility		13%	19%	19%			
accidents	-40%	19%	23%	20%	-26%	-24%	-26%
AIDS		19%	48%	58%	0%	0%	100%
HIV+							
Unknown							
All Claim Causes	-22%	24%	33%	33%	-2%	5%	5%

The increase in claim costs was even greater for claims with a 2-week rather than 1-month deferment period for any given cause of disability.

Considering the results for the first 2 years of benefits, claim costs for digestive system disease bucked the trend, up 20% in males and females. Costs of mental disorder claims were down by 12% in males and 31% in females. Costs of musculoskeletal claims were down 4% in males overall and 6% in females overall. Female neoplasm claims also showed cost increases.

Table G1 by sum insured band

The following commentary is based on results reported by sex, occupation class and waiting period for claim costs measured in absolute values, and not a comparison of actual versus expected. The results for the prior period reported by sum insured bands do not appear reliable because of possible data problems. Hence only observations are made using the 1998-2001 experience and limited to the first 2 years of benefits and continuing companies only.

Generally claim costs are higher for larger sums insured although there does not appear to be a smooth pattern of increases with each sum insured band. The following table gives some indication.

Table 7.12.10: Claim cost per $1 per month for first 2 years of benefit, by amount band, for males in 1998-2001 and 2-week deferment period

Amount Band $	Male A	Male B	Male C	Male D
0 - 1,999	0.188	0.303	0.276	0.223
2,000 - 3,999	0.165	0.203	0.296	0.287
4,000 - 5,999	0.201	0.205	0.377	0.474
6,000 - 9,999	0.181	0.243	0.570	1.249
10,000 - 14,999	0.201		0.039	
15,000+	0.231			

In occupation classes A and B, claim costs for the smallest sum insured band ($0-1999) are actually greater than the next immediate ($2000-3999) band.

In females for occupation classes other than class A, the results are not credible.

Similar results exist for 2-week and 1-month deferment periods.

Due to suspected problems about the quality of sum insured data recorded in the 1995-98 investigation, no conclusions may be drawn on temporal trends.

7.13 The effect of Selection – Table I

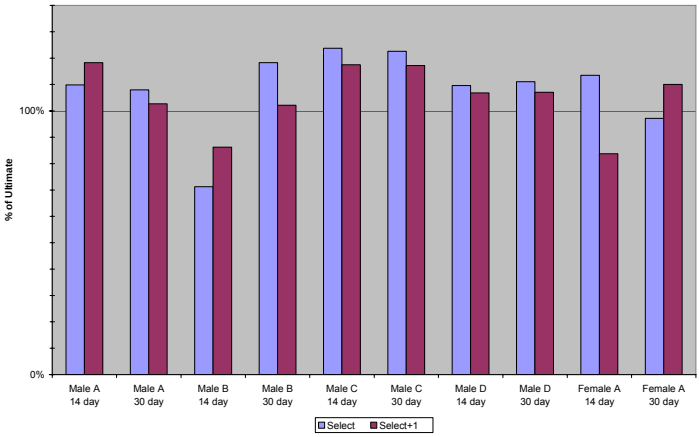
Table I in the full report shows the ratio of the actual to expected incidence ratio in the first year and in the second year of a policy to the overall actual to expected incidence ratio (where this overall ratio includes the experience of policies in their first and second years). Ratios less than one generally will indicate the presence of a selection effect, while ratios greater than one generally indicate anti-selection.

Table I in the full report examines these ratios by age, gender, occupation class and deferment period. These results are summarised in the following table and graph.

Table 7.13.1: Ratio of Actual to Expected Incidence Ratios in the First & Second Policy Years to Overall Actual to Expected Incidence Ratios – All Companies 1998-2001

Sex	Occupation class	Deferment period	Select to Overall Ratio	Select+1 to Overall Ratio
Male	A	1-month	108%	103%
Male	B	1-month	118%	102%
Male	C	1-month	123%	117%
Male	D	1-month	111%	107%
Female	A	1-month	97%	110%

Graph 7.13.1: Ratio of Select to Overall Incidence Rates 1998-2001 – All companies



For most data categories the select actual to expected incidence ratios exceed the overall ratios, indicating anti-selection is present. This is most marked for Male Occupation Class C, where select ratios exceed overall ratios by more than 20%.

7.14 Accident Experience – Table J

Table J in the full report shows the proportion of new claims due to accident by age, gender, occupation class and waiting period.

32% of new claims overall were caused by accident, and 68% by sickness. The proportion of claims due to accident was higher for males (34%) and lower for females (17%). The results also show that the proportion of new claims due to accident generally decreases with age, and generally increases with occupation class.

The proportions of new claims due to accident shown in this report is lower (and usually significantly lower) than those shown in the previous investigation period. This may arise from poorer data quality, as there has been a significant increase in the proportion of new claims for which no cause has been recorded. These claims of

unknown cause have been classified as sickness claims, but some may have been due to accident.

The effect on durations is to inflate expected durations as sickness claims have longer durations than accident, therefore the actual over expected ratio will be worse that reported.

This experience is summarised in the table below.

Table 7.14.1: Proportion of Claims due to Accident All Companies 1998-2001

Occupation Class	Males	Females	Total
A	19%	14%	17%
B	37%	23%	34%
C	39%	25%	38%
D	37%	20%	37%

It is noticeable that occupation class A has a much lower proportion of claims by accident than do the other occupation classes.

7.15 Incidence Rates by Cause of Claim – Table K

Table K in the full report shows incidence rates by cause of claim for new claims from all participating companies for the period 1998 to 2001.

The following tables show the analysis of the major cause of claim by sex and occupation classes for 2-week deferment business. The results for business with a 1-month deferment period are not dissimilar.

Table 7.15.1: Proportion of Claims by Cause for 2-Week Deferment Business – All Companies 1998-2001, Males

	Male			
	Class A	Class B	Class C	Class D
Mental & Nervous Disorders	22% (19%)	11% (8%)	9% (6%)	9% (7%)
Digestive System	11% (9%)	9% (10%)	12% (9%)	10% (8%)
Genito-urinary	2% (2%)	2% (2%)	1% (1%)	1% (1%)
Musculoskeletal	16% (14%)	24% (17%)	24% (16%)	29% (21%)
Accident & Violent Cause	17% (28%)	36% (45%)	36% (52%)	33% (49%)
Others	32% (29%)	19% (18%)	18% (15%)	19% (14%)
TOTAL	100%	100%	100%	100%

(Figures in brackets represent the 1995-98 equivalent)

Table 7.15.2: Proportion of Claims by Cause for 2-Week Deferment Business – All Companies 1998-2001, Females

	Female			
	Class A	Class B	Class C	Class D
Mental & Nervous Disorders	22% (22%)	16% (16%)	20% (17%)	14% (15%)
Digestive System	8% (8%)	3% (6%)	11% (9%)	5% (7%)
Genito-urinary, Pregnancy & Childbirth	17% (15%)	16% (16%)	12% (14%)	12% (10%)
Musculoskeletal	16% (12%)	20% (15%)	13% (12%)	28% (16%)
Accident & Violent Cause	10% (18%)	24% (23%)	20% (23%)	14% (30%)
Others	26% (25%)	21% (24%)	24% (25%)	27% (23%)
TOTAL	100%	100%	100%	100%

(Figures in brackets represent the 1995-98 equivalent)

Claims reported without a cause have been distributed in the same proportion as sickness claims with known causes, as in previous investigations. Unfortunately the proportion of sickness claims without a reported cause was high for this investigation (around 39% of all male sickness claims with 2-week or 1-month deferment, and around 29% of the corresponding females claims). Results from the above tables (with the exception of the proportion of claims due to accident) should there fore be used with caution.

That being said, certain features of past investigations are repeated in this data:

- The proportion of musculoskeletal (which includes back complaints) and accident are generally significantly higher for occupation classes B, C and D than for class A.
- The proportion of such claims for males is significantly higher than the corresponding proportions for females.

Mental & Nervous Disorders

Occupation class A continues to have a relatively higher proportion of claims due to mental and nervous disorders than other occupation classes. This proportion continues to grow for male lives for all occupation classes, but for female lives the proportion of mental and nervous disorder claims appears to have plateaued.

Female lives continue to have a higher proportion of mental and nervous disorder claims than male lives particularly in blue collar occupations, but the gap has closed somewhat in the results of this investigation.

7.16 Female to Male Experience by Cause of Claim – Table K

The results of Table K in the full report have been summarised below to show the number of female claims, per 1,000 years of exposure, in excess of the corresponding number experienced by male lives. This has been analysed separately for five main causes of disablement, for the remainder of the causes, and in total. As shown in the previous section these five main causes account for around 75% of all new claims.

Table 7.16.1: Excess of Female Incidence over Male Incidence Rates (per 1,000 life years exposed) – All Companies 1998-2001, 2-week deferment

	2-Week Deferment Business			
	Class A	Class B	Class C	Class D
Mental & Nervous Disorders	1.4 (2.7)	3.0 (4.0)	3.9 (5.9)	1.5 (4.6)
Digestive System	-0.2 (0.4)	-2.0 (-1.2)	-1.3 (0.3)	-2.9 (-1.1)
Genito-urinary, Pregnancy & Childbirth	4.9 (5.3)	6.4 (6.5)	4.3 (7.4)	4.4 (4.7)
Musculoskeletal	1.0 (0.3)	-0.1 (0.2)	-6.7 (-2.6)	-2.9 (-3.8)
Accident & Violent Cause	-1.1 (-1.4)	-2.9 (-6.9)	-9.7 (-16.4)	-10.7 (-14.5)
Others	0.3 (0.9)	2.2 (4.2)	0.7 (5.3)	1.9 (4.2)
TOTAL	6.3 (8.3)	6.6 (6.8)	-8.7 (-0.2)	-8.8 (-5.8)

(Figures in brackets represent the 1995-98 equivalent)

Table 7.16.2: Excess of Female Incidence over Male Incidence Rates (per 1,000 life years exposed) – All Companies 1998-2001, 1-month deferment

	1-month Deferment Business			
	Class A	Class B	Class C	Class D
Mental & Nervous Disorders	1.2 (1.6)	1.0 (1.3)	1.7 (1.6)	-0.5 (2.9)
Digestive System	0.2 (0.0)	-0.5 (-0.2)	-1.4 (-0.4)	-1.3 (-2.0)
Genito-urinary, Pregnancy & Childbirth	2.1 (2.4)	3.0 (3.3)	3.5 (3.1)	1.9 (4.2)
Musculoskeletal	-0.2 (0.4)	0.7 (0.8)	-2.0 (-0.5)	-3.5 (2.1)
Accident & Violent Cause	-0.0 (0.0)	-1.4 (0.6)	-4.2 (-8.2)	-8.5 (-11.7)
Others	0.3 (0.5)	0.2 (-0.2)	0.5 (1.7)	-2.7 (-0.6)
TOTAL	3.7 (4.9)	2.9 (5.6)	-1.9 (-2.7)	-14.4 (-5.1)

(Figures in brackets represent the 1995-98 equivalent)

Incidence rates for females are higher for occupation classes A and B, and lower for classes C & D. This is mainly due to extra mental and genitor-urinary claims for females, and musculoskeletal and accident claims for males.

Compared to the previous period, the excess female incidence has reduced for occupation classes A and B, and the excess male incidence has generally increased for classes C and D.

7.17 Non-Smoker to Smoker Experience –Table L

Table L1 in the full report shows ratios of non-smoker to smoker experience for incidence rates, claim durations and claims costs. Non-smoker experience is better for all occupation classes. Results in the previous experience investigation indicating better smoker experience for male occupation class B have not been repeated in this investigation.

The ratios of non-smoker to smoker claims costs are shown below. Note that the paucity of data in some classes can distort the detailed results.

Table 7.17.1: Ratio of Non-Smoker to Smoker Claims Costs for the First 3 Years of the Benefit Period – All Companies 1998-2001

	Male A	Male B	Male C	Male D	Female A
2-week	91%	82%	81%	79%	90%
1-month	88%	93%	79%	86%	91%

The comparison of non-smoker experience to aggregate experience is shown in Table L2 in the full report. Interestingly, the experience of non-smoker claims with respect to aggregate experience is generally better than the non-smoker experience with respect to smoker experience.

7.18 Average Length of Claims by Occupation Class

For males claim duration reduces as the occupation class moves from A to D. For females the claim duration of occupation class D is the longest, with occupation class A about half a month shorter.

Table 7.18.1: Claim Duration (in months), 3-year curtate benefit period – 1 month deferment period,

Occupation Class	Males	Females
A	9.75	9.47
B	8.43	8.11
C	7.10	8.52
D	6.28	10.07

7.19 Business Overheads – Table O

Analysis to this point in the report has been based on data that excludes business overheads business to prevent any differences in the experience between disability income and business overheads from clouding the results.

Table O in the full report shows the experience of business overheads business for Class A males deferment periods 14 days and 30 days. There is insufficient exposure to examine the experience for females and other occupation classes for males.

Compared to non-business overheads, business overheads have slightly lower incidence rates for 14 day deferment, and incidence rates about 20% higher than non-business overheads for 30 day deferment.

Trends

Incidence experience has improved between 1995-98 and 1998-2001. This is consistent with the trend in incidence rates for non-business overheads.

Table 7.19.1: Ratio of Actual to Expected claims on IAD89-93 Business Overheads Class A Male

Deferment	1998-2001	1995-1998
2-week	74%	91%
1-month	103%	125%

7.20 Cancellable Business – Table P

Analysis in this report has also only been based on Non-cancellable business. As a reasonable volume of cancellable business is reported in the data some comparative analysis has been done.

Table P in the full report shows a comparison of cancellable business with non-cancellable business.

There is no clear trend as to whether cancellable business has higher or lower incidence rates compared with non-cancellable business.

The section of business with the highest exposure, Male Class D, shows cancellable business has 10-15% lower incidence rates than the Class D Male non-cancellable business.

The number of lives included for cancellable business in the 1998-2001 investigation is considerably less than the number in the previous investigation, with a total exposure of 44,000 years of exposure compared with 84,000 in the 1995-1998 investigation. One company, having more than 50% of the exposure for this business in 1995-1998, did not provide data for 1999-2001 for cancellable business. This accounts for the decrease in exposure for this investigation.

8 Variation in Experience by Company

The Committee's previous reports have highlighted the wide variation in experiences between offices. For eight contributing companies the following table compares the actual experience with IAD89-93. In the past this table has been done comparing against average industry experience so care needs to be taken as this table is not directly comparable to past investigations

8.1 Incidence, Duration and Claims Costs

Ratios of actual to expected are shown for number of claims and average duration and average claims cost are for the first three years of benefit as per Table G in the full report. The data includes all occupations, and both sexes but only 2-week and 1-month deferment periods.

Table 8.1: Comparison of Incidence, Duration and Claims Costs Experience between companies for the investigation period 1998 – 2001 versus IAD89-93

Company	Incidence	Claim Durations	Claim Costs
A	69%	122%	85%
B	81%	136%	111%
C	68%	170%	116%
D	57%	212%	121%
E	62%	173%	108%
F	105%	169%	177%
G	91%	152%	138%
H	88%	347%	306%
These Companies	85%	187%	158%
ALL Contributing Companies	84%	188%	158%

The table clearly shows that the variation between companies can be very wide. It should be noted that for some of the companies listed there are multiple portfolios representing both their 'current' product and other legacy and inherited products resulting from takeovers and mergers.

For Incidence the worst relative experience (105%) is 184% of the best relative experience (57%).

For Claims Durations the worst relative experience (347%) is 284% of the best relative experience (122%).

And for Claims Costs the worst relative experience (306%) is 360% of the best relative experience (85%). That is the company

with the worst experience is experiencing claims costs over three and a half times the as high as the company with the best experience. These figures do not take into account the variations in exposure between companies but only look at their overall relative results.

When comparing against the average for ALL contributing companies to allow some comparison with the previous investigation it can be seen that incidence experience this time varies from 68% to 125% of industry average as against 67% to 130% in the previous investigation. In contract Claims Durations are from 65% to 185% in this investigation whilst only 76% to 123% in the previous investigation, highlighting that there has been a significant increase in the variability between companies in this area.

Possible reasons for the differences in experience between companies include:

- underwriting controls,
- claims management,
- demographic mix,
- product design, and
- differences in occupation classifications
- differences between mix of occupations within an occupation classification

Overall claim costs vary between 54% and 194% of industry average in this investigation as opposed to 67% to 160% in the previous investigation, suggesting that the variability between companies experience is increasing making it even more important that companies need to adjust aggregate rates to reflect their own particular experience. To use the overall rate from the Australian experience would be inappropriate without adjustment.

9 Future Developments

9.1 Data

The committee has already put in considerable effort into reviewing the data specification and discussing with companies what attributes of the data would be considered worth investigating further or what other aspects of disability income experience would be worthy of investigation.

At the more general level, just as with the previous lump sum investigation it was considered worthwhile obtaining additional data to allow for more detailed analysis and acknowledging we are no longer limited to the record length we used to be (when data was to be provided/input on punch cards). This does of course mean that there is an expectation that companies do hold digital data to the proposed levels of detail so that collection can be facilitated with a minimum of fuss.

Items considered for inclusion are:

Event date, Notification date and Admission date which would allow analysis of reporting delays, IBNR's, RBNA's etc.

An indication as to whether a claim is a TOTAL or PARTIAL disability claim. Currently all that is recorded is a percentage of benefit payable at outset and this may be due to many different reasons, not just due to being a partial disability payment.

Claim details on ancillary benefits to facilitate analysis of the experience and adequacy of pricing for a number of optional and built in ancillary benefits.

As no data has been collected by the Institute for several years there may be a question as to what the next period of investigation will be and whether it will be possible to maintain a continuous investigation period. Much of this will depend on the companies supplying the data.

9.2 Graduation

The process of graduating the results and developing a separate table is outside the scope of this investigation. Given that some of the results and underlying data are questionable and have not been verified by contributing companies it would not be appropriate to commence a graduation without first getting the views of the contributing companies on the validity of the results in respect of their individual businesses and whether the data provided is a fair representation of their business at the time.

10. Bibliography

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Interim Report of the Disability Committee, November 2000, Disability Committee, Institute of Actuaries of Australia, 2000

Report of the Disability Committee, Disability Committee, Institute of Actuaries of Australia, 2002

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11. Internal Consistency Checks

All the data provided for the investigation was checked for conformity with the standard set of codes and to validate various fields for internal consistency and reasonableness.

The following situations were set to generate a validation error:

Date of Birth

- Year of birth < 1930
- age < 15

Date of Entry

- < 1970

Expiry Age

- < 30
- Policy already past expiry age

Disability Start Date

- < 1970
- < entry date

Payments Start

- If claim is a continuation then if date of payments start is NOT 1/1/YYYY

Payments Stop

- If claim is a continuation (not terminated in year) then if date of payments stop is NOT 31/12/YYYY

Claim Cause

- If Accident claim - if Claim Cause is NOT 'Q'

- If Sickness claim – if Claim Cause = 'Q'

Benefit Rate

- Amount of Benefit > 40,000 per month

12 Specifications to the Morbidity Investigation

Section 1: Introduction and Timetable

The IAA Disability Investigation is coordinated by the Disability Committee of The Institute of Actuaries Australia. We are pleased that your company, along with most Australian writers of disability business, has chosen to participate in the Investigation.

These Instructions tell you how we need your in force and claims data arranged. It is important you follow these Instructions to ensure all contributors use a consistent layout. ***Even if you have previously extracted or checked data for a Morbidity Investigation, please review the Instructions to ensure you have allowed for recent product developments and changes in our layout.***

Confidentiality

The Disability Committee treats data submitted by each contributing office as confidential. It confidentially provides individual contributors with statistics of their own experience. Combined results are reported to the Council of the IAA. Reports based on combined results have been made available to all members.

Data submission after 3 months

In previous Investigations, we asked you to submit data as soon as possible after June 30 each year, allowing a 6 month lag between the end of the Investigation period and submission of data. While this allowed you to include more late reported claims, it meant results for your own company were not available as quickly as you and your management team may like.

To allow you to get information as quickly as possible, you now have the option of submitting data at any time after 31 March each year. That is, there is now an optional 3 month data submission timetable.

If you wish to take advantage of the 3 month data submission timetable, we will need details of your Reported But Not Admitted (RBNA) claims data at 31 December each year. This should be submitted (with your admitted claims and in force data) as part of the 3 month data submission timetable. Updated claims should be submitted within 6 months of 31 December each year. Details are provided in Section 2.

Example

If you are submitting data for 2003 as part of the 2000-03 Investigation, you would have previously

submitted data for 2000-02.

As soon as possible after March 31, 2004, you would provide claims, RBNA and in force data for 2003.

And you would send us updated claims records (replacing RBNA data) as soon as possible after June 30, 2004.

You can submit in force and claims data separately

We have also changed our data collection methodology to allow you to submit in force and claims data separately. This is aimed at speeding up data submission, and may help in resource scheduling. For example, you may submit:

- in force and RBNA information extracted from your valuation data - as soon as you receive this letter; and
- claims information - when finalised a month or two later.

Please note that your data must be run through the Disability Committee's software checking programme, and signed off by an actuary before you submit it. If you submit in force and claims data separately, the actuary must sign-off both data submissions.

We need your help to produce results quickly

We can't produce combined results until most, or all, contributors submit data. The sooner you contribute data, the sooner we can produce useful results for your company, other contributors, and the industry. So please submit your data as soon as possible.

The most common reason for delay in providing your own company's results is submission of 'non-clean' data. That is, companies submitting data without fixing problems detected by the Committee's software checking programme. Please ensure your data is 'clean'.

We will provide results for your company **within a month** of receiving 'clean' data.

Contact person

We have assigned a contact person from the Disability Committee to assist you with any questions. The actuary responsible for signing off the data produced by this specification will have that person's details. If you have any problems or questions about your data, please talk to that contact person. Often, they have been asked similar questions in the past. Asking the questions *before* you do a data extraction may save you from having to re-run it!

Section 2: Timing and Data

For Disability Committee investigations, 'in force' means:

- active lives (not on claim); and
- disabled lives (on claim, or awaiting claim admittance).

'Claim' means any policy on which a claim payment becomes due in a given year. It is recognised that delays in claims reporting mean some IBNR (Incurred But Not Reported) and RBNA (Reported

But Not Admitted) claims won't be included in data submitted for the most recent calendar year.

Claims, RBNA and in force records are needed at every 31 December:

- from the earliest year your company provides data (which should be as early as possible); and
- to the calendar year prior to that of the current Investigation.

RBNA claims should use a lower Percentage of Benefit in Field 24 (eg. 50%) to reflect the expected ultimate acceptance rate.

You can submit claims and in force data separately (Section 1). But please submit all data as soon as possible after:

- March 31 for claims, RBNA and in force data; and
- June 30 for updated claims data.

Example

You are submitting data for 2003 as part of the 2000-03 Investigation. You have previously provided data for 2000-02.

*You extract data for 31 December 2003 on **15 April, 2004**. You submit the following to the Committee:*

- in force records as at 31 December 2003;
- admitted claim records for 2003;
- RBNA claim records for 31 December 2003.

For the 2000-03 Investigation, the Committee now holds a full set of 'snapshots' of claims, RBNA and in force data for your company at 31 December 2000, 31 December 2001, 31 December 2002, and 31 December 2003. The Committee sends you results for your own company's experience for the period 2000-04.

*On **July 7, 2004**, you send the Committee updated the RBNA/claim records. The Committee sends you updated*

results for your own company. Later in 2004, the Committee publishes combined results for all contributors.

Refer to the example in Section 7 for more details.

Inclusions and exclusions

Please read this section each year to check your data is handled appropriately, particularly for 'bell and whistle' and 'top-up' claim payments.

If you are uncertain about the treatment of a particular benefit, please contact a member of the Committee. The guiding principle is that we are only interested in claims or payments which affect incidence and duration.

The following should be included in your data:

- individual life data (even if the policy is a group policy)
- guaranteed renewable, non-cancellable and cancellable policies (differentiated in Field 19)
- Business Expense policies with benefit period of at least one year
- policies accepted with exclusions (exclude if they also have loadings)
- policies providing 24 hour a day cover
- policies providing out of working hours cover only
- claims for a specified minimum benefit period, regardless of the period of disablement eg. a benefit paid for 6 months after a heart attack.

The following should be excluded from your data:

- policies with a maximum benefit period of less than one year
- cases accepted with loadings

- claim amounts, and claims, which start and end in the deferment period eg. nursing care or hospitalisation benefits
- for claims starting in the deferment period, exclude claim amounts effective in the deferment period (but include claim amounts and claims from the end of the deferment period).
- claims amounts paid under additional 'bell and whistle' features eg. home assistance benefits, additional amounts paid on death, spouse payments, accommodation or 'away from home' benefits
- 'top-up' claim amounts paid in addition to 'base' or normal claim amounts eg. exclude the 'top-up' claim amount sometimes paid for the first 3 months of a claim. (But include the 'base' claim amount).

Example

A client has a policy with a 1 month deferment period.

The client suffers a heart attack (a defined crisis with a minimum benefit period of 6 months). The client is paid:

the insured monthly benefit for 6 months from the end of the deferment period, despite recovering 3 months after the heart attack. ***Include this benefit until recovery after 3 months****.*

an extra 25% of insured monthly benefit for the first 3 months of the claim. ***Exclude the extra amount paid****.*

a special crisis benefit equal to the insured monthly benefit. This is paid from the date of disablement until the end of the deferment period. ***Exclude this period****.*

Note that actual ($) claim amounts are not collected - claim amounts are expressed as the percentage of the benefit paid.

Format and number of records

Please provide in force and claim records in the format summarised in Section 5.

Each in force policy results in one In Force record. Sometimes more than one claim record is required for a given policy. This is an important point, and is discussed in Section 3 (multiple claim records), and in Section 6 (data fields related to the starting and ending of claims).

Data checking

We supply software to help you with basic data validation. It will help you isolate and remove problems. The software is maintained by Committee members with practical disability experience, so it detects common problems. We will send you any updates which are produced if other problems emerge. The software also produces data summaries which are useful in checking results.

Please use the software to check your data before submitting it to the Disability Committee. For example, if you use values of fields, or fields, not shown in these Instructions, the software will generate errors for those fields. The actuary must confirm no errors are detected when signing off data being submitted. As noted above, if you submit in force and claims data separately, the actuary must sign-off both data submissions.

Formatting of data

Please provide data on 3.5' 1.44mb diskettes. If you compress data, please use PKZIP, or compression software that generates self-expanding files.

Subdivisions of data

Morbidity rates of insured lives depend upon a number of factors. The Committee has chosen the factors it believes should be recorded because they appear to be the most relevant. The way we collect your data was designed so we can sub-divide information collected by any fields in the in force or claims records.

We believe it is worthwhile collecting data in a format which will allow us to sub-divide data in future, though it will be some time before there is sufficient data in the Investigation to make some sub-divisions. Meanwhile, considerable aggregation of sub-divisions is required.

Section 3: Multiple policy or claim records

Please read this section to confirm your current treatment of multiple policy or claim records is appropriate.

Unique policy numbers are essential

It is crucial that each policy record shown in your force data uses a unique policy number (Field 30).

Handling non-unique policy numbers

If you have more than one record with the same policy number, please treat them as noted below:

Multiple increment or layer records relating to the one policy

This is usually the result of inflation increases for a policy. Your company may treat this as one, or multiple, in force records.

Those additional records should be excluded from the Investigation, as we require the submission of cases only. The Committee's data checking program produces a warning for any in force record with a monthly rate of benefit lower than $250.

Multiple benefit types for the one policy

An example is a single policy with different determent periods, or benefit periods, or both. Your company may treat this as one, or multiple, in force records.

The way you should submit this information to the Committee depends on the way your company would produce claims records for these policies. If you would treat a claim under such a policy:

- as a single claim record in this Investigation: use a single in force record
- as multiple claim records in this Investigation: use multiple in force records with unique policy numbers (see below).

Multiple lives covered by the one policy (including group business)

For such policies, use multiple in force records with unique policy numbers.

If you have to use multiple records to cover the situations noted above, you will need to modify your Company's policy number so each record submitted has a unique Policy Number for the purpose of the Investigation.

The Policy Number on the submitted record can be different to your Company's policy number. But it must be easily traceable by you. For example, we may find a problem with a specific Policy Number, and need your help investigating it. So you must be able to identify the 'real' policy. A simple way to create a unique Policy Number for the Investigation is to add an extra character to your Company's policy number.

Section 4: Items referred to the Committee

This section notes areas where you need to provide supplementary information to the Committee. You may also need to ask the Committee to allocate codes so we can ensure consistently among contributors.

We may need policy documents or other information

If you are affected in the areas noted below, you need to send us the relevant sections of your policy document or underwriting guidelines with your data. This applies if:

- you have not submitted data to the Investigation before;

- you offered something new after the last Investigation (eg. heavy smoker rates, lifetime benefit periods, launched a new or modified product);
- you changed existing policy conditions and practices after the last Investigation (eg. changed occupation code allocation of your definition of disability for new and/or existing clients).

When we receive the relevant information, the Committee will tell you the codes they have allocated to the relevant field, if not immediately obvious. If we tell you certain codes should be used, please continue to use that code until you make subsequent changes (which must themselves be referred to the Committee). Please store any written confirmation the Committee sends you, with records of the Investigation.

Fields affected

The fields affected, and information needed by the Committee, are noted below.

Disability Definition (Field 3): We need a copy of the policy's definition of disablement so we can assign the appropriate code.

Occupational Rating (Fields 6 or 33): We need a description of your occupation codes.

Field 6 was used for many years until Field 33 system was adopted. If you use Field 6, it means your company previously provided the Committee with broad occupation guidelines, and the Committee advised which Disability Committee classes (A, B, C or D) correspond to your company's occupation classes. You should continue using those assigned codes until you change your occupation guidelines.

Field 33 was introduced in 1991. It records your company's occupation class. If you are using this field for the first time, you need In Force data at the start of the year in which the claims are first classified using this field. For example, if 31 December 1998 in

force records use Field 33, it is not needed for 1998 claims, but must be used for 1999 claims.

Frequency of Benefit Payment (Field 14): If code 4 applies (claim benefits are payable other than weekly, monthly, or yearly), please give details to the Committee.

Rate of Benefit (Field 15): If it causes significant practical difficulties to eliminate amounts of waiver of premium from claim payments, this doesn't have to be done. However, please tell the Committee.

Mode of Cessation (Field 26): If code 4 or 6 applies (lump sum or special claim termination), please give the Committee details such as the claim cause, termination amount, and reason for special termination.

Cause of Claim - AIDS Claims (Fields 28 and 29): Please provide details of any misreporting that has occurred in previous data submissions. This is not uncommon, as AIDS claims are not always initially identified as such, and may have been reported under another cause of claim.

Smoking Status (Field 31): We need a copy of your definitions of smoking status.

AIDS Exclusion (Field 32): We need a copy of your AIDS exclusion.

Section 5: Summary of Data Fields

Two types of records are required: In Force records and Claim records. The layout required for both types of records is summarised in the table below. A detailed description of the fields, and codes required, is shown in Section 6.

Note: If a field is not used or required, please fill it with spaces. For example, fill the Cause of Claim field (Field 28) with spaces for In Force records.

Field No.	Field Name	Start Position	Length	Required for In Force Record?	Required for Claim Record?
1	Contributor Code	1	3	Yes	Yes
2	Territorial Classification	4	1	Yes	Yes
3	Disability Definition	5	1	Yes	Yes
4	Record Year	6	2	Yes	Yes
28	Cause of Claim	8	1	NO	Yes
29	Cause of Claim subdivision	9	3	NO	Yes
	space	12	1	Yes	Yes
33	Contributor Occupation Class	13	3	Yes	Yes
5	Sex	16	1	Yes	Yes
6	Committee Occupation Class	17	1	Yes	Yes
7	Sickness Deferment Period	18	3	Yes	Yes
8	Accident Deferment Period	21	3	Yes	Yes
9	Date of Entry	24	4	Yes	Yes
10	Date of Birth	28	4	Yes	Yes
11	Policy Expiry Age	32	2	Yes	Yes
12	Sickness Benefit Period	34	2	Yes	Yes
13	Accident Benefit Period	36	2	Yes	Yes
14	Frequency of Benefit Payment	38	1	Yes	Yes
15	Rate of Benefit	39	5	Yes	Yes
16	Type of Benefit	44	1	Yes	Yes
17	Medical Evidence	45	1	Yes	Yes
18	Group/Individual	46	1	Yes	Yes
19	Type of Contract	47	1	Yes	Yes
20	No Claim Bonus	48	1	Yes	Yes
31	Smoking Status	49	1	Yes	Yes

Field No.	Field Name	Start Position	Length	Required for In Force Record?	Required for Claim Record?
32	AIDS Exclusion	50	1	Yes	Yes
	space	51	1	Yes	Yes
21	Date of Disability	52	6	NO	Yes
22	Date Payments Start	58	4	NO	Yes
23	Mode of Commencement	62	1	NO	Yes
24	Percentage of Benefit	63	2	NO	Yes
25	Date Payments Stop	65	4	NO	Yes
26	Mode of Cessation	69	1	NO	Yes
27	Cause of Disability	70	1	NO	Yes
30	Policy Number	71	10	Yes	Yes

Section 6: Detailed description of Data Fields

Please note: if additional fields are included in your data, the software provided by the Disability Committee is likely to show those fields as errors.

Field 1 Contributor Code (In Force/Claim) Position 1, Length 3

Contributor code number (as defined by the Committee)

Field 2 Territorial classification (In Force/Claim) Position 4, Length 1

1 = Australia
2 = Papua New Guinea
3 = New Zealand

Field 3 Disability Definition (In Force/Claim) Position 5, Length 1

Description of definition of disability:
1 = own occupation for 2 years any occupation* thereafter
2 = own occupation
3 = any occupation*
4 = own occupation for 5 years any occupation* thereafter
5 = own occupation for 3 years any occupation* thereafter
6 = own occupation for 1 year any occupation* thereafter
7 = any occupation at all

*For codes 1 to 6, occupation means any occupation for which the insured person is reasonably suited by education, training or experience.

Field 4 Record year (In Force/Claim) Position 6, Length 2

Last 2 digits of calendar year in which Census taken.

Field 5	Sex	(In Force/Claim)	Position 16, Length 1
	1 = male 2 = female		
Field 6	Committee Occupational Class	(In Force/Claim)	Position 17, Length 1
	A, B, C or D (E reserved), as specified by the Committee for each contributor. This field should not be used if the Contributor's Occupation Class is used (Field 33).		
Field 7	Sickness Deferment Period	(In Force/Claim)	Position 18, Length 3
	Period of deferment of sickness benefit expressed in days. For the purposes of this field, one month will be regarded as equal to 30 days. This field should be 999 if there is no cover for sickness.		
Field 8	Accident Deferment Period	(In Force/Claim Only)	Position 21, Length 3
	Period of deferment of accident benefit expressed in days. For the purposes of this field, one month will be regarded as equal to 30 days. Use 999 if there is no cover for accidents. If the entry to be made in this field is identical to the entry in Sickness Deferment Period (Field 7), either enter the accident deferment period, or leave this field blank.		
Field 9	Date of Entry	(Claim Only)	Position 24, Length 4
	Date of entry to policy (risk commenced), in format MMYY.		
Field 10	Date of Birth	(In Force/Claim)	Position 28, Length 4
	Date of birth of life insured, in format MMYY.		
Field 11	Policy Expiry Age	(In Force/Claim)	Position 32, Length 2
	The age of the life insured when the policy expires.		
Field 12	Sickness Benefit Period	(In Force/Claim)	Position 34, Length 2
	Maximum sickness benefit period in years (to nearest year) at date of entry. This period is measured from the end of any deferment or waiting period. Use: • 99 if the sickness benefit period extends over the life of the insured person; • 98 if the sickness benefit period expires on the date of expiry of the policy; • 00 if the maximum sickness benefit period is 6 months (round to zero years).		
Field 13	Accident Benefit Period	(In Force/Claim)	Position 36, Length 2
	Maximum accident benefit period in years (to nearest year) at date of entry. This period is measured from the end of any deferment or waiting period. Use: • 99 if the sickness benefit period extends over the life of the insured person; • 98 if the sickness benefit period expires on the date of expiry of the policy; • 00 if the maximum sickness benefit period is 6 months (round to zero years).		
Field 14	Frequency of Benefit	(In Force/Claim)	Position 38, Length 1

Payment

The frequency to which the rate shown in Rate of Benefit (Field 39) relates.

1 = weekly

2 = monthly

3 = yearly

4 = special - please supply details to the Committee (see Section 4).

Field 15 Rate of Benefit (In Force/Claim) Position 39, Length 5

Rate of benefit is the insured monthly benefit. For claims, Field 24 (Percentage of Benefit) shows the proportion of the insured monthly benefit actually being paid. Field 15 should:

- be rounded to the nearest dollar;
- exclude any waiver amount (premiums waived while the insured person is on claim);
- be gross of reinsurance.

Notes:

- if code 2 or code 4 applies in Field 16 (increasing Type of Benefit), show the initial rate of benefit here;
- if it causes significant practical difficulties to eliminate amounts of waiver of premium from claim payments, this doesn't have to be done. However, please tell the Committee (refer Section 4);
- include reinsurance ceded to other insurers or reinsurers. Exclude reinsurance accepted from other insurers or reinsurers;
- refer to Section 3 for a discussion on the way you should treat records for policies where increases in benefits are treated as multiple records by your company.

Field 16 Type of Benefit (In Force/Claim) Position 44, Length 1

1 = level benefit, 24 hours a day cover

2 = increasing benefit, 24 hours a day cover

3 = level benefit, out of working hours cover

4 = increasing benefit, out of working hours cover

Increasing benefit, or claims escalation, refers benefits which increase automatically after a claim has started. It does not mean cover that automatically increases, or is indexed, when the insured person is not on claim.

Field 17 Medical Evidence (In Force/Claim) Position 45, Length 1

1 = medical examination

2 = non-medical (with or without PMA report)

3 = automatic acceptance

4 = reserved

5 = reserved

6 = other (please specify).

Field 18 Group/Individual (In Force/Claim) Position 46, Length 1

1 = Individual

2 = Group

3 = Individual Business Overheads

Field 19 Type of Contract (In Force/Claim) Position 47, Length 1

1 = level guaranteed premiums
2 = level non-guaranteed premiums
3 = stepped guaranteed premiums
4 = stepped non-guaranteed premiums
5 = level premiums, cancellable policy
6 = stepped premiums, cancellable policy

Field 20 No Claim Bonus (In Force/Claim) Position 48, Length 1

Does the product provide a no-claim-bonus.
1 = no
2 = yes

Field 21 Date of Disability (Claim Only) Position 52, Length 6

Date of becoming disabled. That is, the date the deferred or waiting period starts. In format DDMMYY. If the claim record relates to an interrupted claim (including a change in the Percentage of Benefit (Field 24)), use the date the insured person first became disabled.

Field 22 Date Payments Start (Claim Only) Position 58, Length 4

Date payments are payable from, in the present record year, in the benefit period to which present record relates. In format DDMM. Use '0000' (zeros) if the claim is a continuation from the previous year. A new record is required each time:

- an interrupted claim is resumed;
- the Percentage of Benefit (Field 24) is changed.

Field 23 Mode of Commencement (Claim Only) Position 62, Length 1

Mode of commencement of present claim benefit:

0 = continuation of an existing claim, where the Percentage of Benefit (Field 24) has not changed since last year (refer note below)
1 = new claim, for which Date Payments Start (Field 22) is immediately after expiry of the deferment or waiting period
2 = new claim, for which Date Payments Start (Field 22) is not immediately after the expiry of the deferment or waiting period
3 = claim resumed, after interruption
4 = continuation of an existing claim, where the Percentage of Benefit (Field 24) has changed since the Date Payments Start (Field 22) (refer Note).

Note: The Percentage of Benefit (Field 24) does not change when claims escalation (Field 16) is applied to a claim.

Field 24 Percentage of Benefit (Claim Only) Position 63, Length 2

The Percentage of Benefit currently being paid, as a percentage of the insured amount (Rate of Benefit Field 15). The amount currently being paid should reflect the inclusions and exclusions we ask you to make in Section 2 eg. hospitalisation or 'top-up' benefits.

Show zeros if full rate is being paid ie. 100% of insured benefit is being paid.

Where code 2 or 4 applies in Field 16, the Percentage of Benefit should not

change simply because escalation increases have been applied. (The insured benefit is normally escalated at the same rate as the claim payment, keeping the Percentage of Benefit constant.)

Note: in this Investigation, Partial Disability is defined as the proportion of full benefit being paid. Partial disability in physical terms is not considered.

Field 25 Date Payments Stop (Claim Only) Position 65, Length 4

Date payments payable to in benefit period to which claim record relates. In format DDMM.

Use '9999' if still claiming at 31 December.

If the claimant has died:

- insert the date of death in this field;
- ignore any benefits payable because of the death (typically 1-3 months' benefit).

If benefits are being paid because a certain event has occurred, some products allow them to be paid for a specified period, regardless of whether the insured person is disabled for that entire specified period. For example, someone suffering a major broken bone or heart attack is typically paid benefits for 3 or 6 months, even if they fully recover within 1 month. If the date of recovery is known, and is within the specified period, show that date in this field (refer example under point 19).

Field 26 Mode of Cessation (Claim Only) Position 69, Length 1

Mode of Cessation of present benefit:

0 = claim in force at end of record year (Mode of Commencement (Field 23) will be '0' in the following year)

1 = benefit expired or voided (for reason other than death or lump sum payment)

2 = death

3 = recovery

4 = termination of claim by lump sum payment

5 = claim continues, but the Percentage of Benefit (Field 24) has changed (so a new claim record is required)

6 = other (please specify)

Note: If you use Code 4 or 6, please add an explanatory note including the amount of any lump sum payment.

Field 27 Cause of Disability (Claim Only) Position 70, Length 1

Cause of disability for claim, as follows:

1 = sickness

2 = accident.

Generally, accident claims are coded with the event which caused the disability (eg. car accident not neck injury). Sickness claims are coded with the impairment.

Fields 27 and 28 must be consistent. For example, if a claim is due to an accident, Field 27 must be 2, and Field 28 must be Q.

Field 28 Cause of Claim (Claim Only) Position 8, Length 1

Alphabetic Cause of Claim. Refer to Appendix. Fields 27 and 28 must be consistent. For example, if a claim is due to an accident, Field 27 must be 2,

and Field 28 must be Q.

Field 29 Cause of Claim Subdivision (Claim, optional Field) Position 9, Length 3

This Field is optional. It allows numeric subdivision of cause of claim (refer to Appendix). In format of two numeric digits, or blanks (if this Field is not used).

Field 30 Policy Number (In Force/Claim) Position 71, Length 10

Policy number must be unique (refer to Section 4). You must also be able to trace it in case we have a query about your data. Format: left justified.

Field 31 Smoking Status (In Force/Claim) Position 49, Length 1

1 = Don't know, or don't differentiate by smoking status, or smoking status is not used for premium rating

2 = Non-smoker with periodic checks (ie. right to revise premium status after entry)

3 = Non-smoker during 12 months before entry (ie. cannot revise premium status after entry)

4 = Light smokers

5 = Smokers

6 = Heavy smokers

Field 32 AIDS Exclusion (In Force/Claim) Position 50, Length 1

0 = AIDS covered

1 = AIDS excluded

Field 33 Contributor Occupation Class (In Force/Claim) Position 13, Length 3

Contributor's occupation class, right justified. This field should not be used if the Committee's Occupation Class is used (Field 6). (Refer to Section 4.) If you are using this field for the first time, please refer to Section 4.

Section 7: Example: Accruals Basis Data

The example is worth reading before you start, to confirm you understand the information we need.

A Claims should be reported on an 'accruals' basis ie. using effective dates.

B The accruals basis means that Date Payments Start (Field 22) should equal:

- Date Falling Sick (Field 21) plus Deferment Period (Fields 7 and 8).
- This applies even if the first payment is made months after Date Payments Start.

C Similarly, Date Payments Stop (Field 25) should be the effective date to which payments were made, regardless of the date when the final payment was made.

D The same principles apply even if the first payment is made in the calendar year after the Date Payments Start.

Example

A client's policy and claim details are:

Deferment period	30 days
Date of sickness	1 November 1998
Date notified	1 February 1999
Date admitted	8 February 1999
First payment made	9 February 1999
Date of recovery	31 March 1999
Final payment made	15 April 1999

Data should be submitted to the Disability Committee as follows:

Record Year	1998	1999
Date Falling Sick	011198	011198
Date Payments Start	0112	0000
Mode of Commencement	1	0
Date Payments Stop	9999	3103
Mode of Cessation	0	3

If this claim is recorded as a 1999 claim only, with Date Payments Start of 9 February 1999, and Mode of Commencement 2 (ie. not immediately after the expiry of the deferment period), the effect is:

- under-reporting of 1998 incidence in 1998;

- when 1999 data is submitted, the claim will count towards 1998 incidence (from the end of the deferment period);
- the claim will be treated as being on claim from the end of the deferment period;
- the claim will be treated as a recovery on the Date Payments Stop. If this is later than the actual recovery date, claim duration will be overstated.

Section 8: Checklist

Before submitting data, please check that:

- You have included RBNA claims, if you are using the optional 3 month data submission timetable.
- You have included and excluded data we asked for (Section 2).
- You have checked your treatment of multiple policy and claims records (Section 3).
- You have checked whether you have:
  - offered a new disability product;
  - changed an existing product; or
  - changed the way you rate occupations, smoking status, AIDS exclusions, or other items noted in Section 4.

If so, please check that you have told us about those changes, and included copies of the information we need, eg. extracts of policy documents and occupation guides (Section 4).

- If your data is compressed, you have used a software package which generates self-expanding files (Section 2).
- You have run the software checking programme for both claims and in force data, and corrected any highlighted problems.

- The actuary responsible for the data has completed the sign-off sheet for both claims and in force data.
- You have noted the need to submit updated claims information as soon as possible after June 30, if you are using the optional 3 month data submission timetable - and you do it!

Appendix: Cause of Claim Codes

Cause of Claim codes are classified according to the 8th Revision of the World Health Organisation's International Classification of Diseases (ICD).

The codes use the first two or three figures of this classification. An easily accessible source of these classifications is the 'Cause of Death' for 1978 and earlier years published by the Australian Bureau of Statistics.

Additional codes have been added for AIDS.

Alphabetic	Numeric Subdivision	
A	Infective and parasitic diseases	
	00	Intestinal infectious diseases
	01	Tuberculosis
	02	Zoonotic bacterial diseases
	03	Other bacterial diseases
	04	Poliomyelitis
	05	Viral diseases with exanthem
	06	Do not use (encephalitis use F32)
	07	Other viral diseases
	08	Do not use
	09	Venereal Diseases
	11	Mycoses
	12	Helminthiasis
	13	Other infective and parasitic diseases
B	Neoplasms (MN = Malignant and BN = Benign)	
	14	MN of mouth and pharynx
	15	MN of digestive organs
	16	MN of respiratory system
	17	MN of bone, skin, connective tissue and breast
	18	MN of genital-urinary system
	19	Other MN
	20	Neoplasms of lymph and blood forming tissue
	21	BN of digestive, respiratory systems etc.
	22	BN of ovary, CNS, endocrine etc.
	23	Unspecified neoplasm
C	Endocrine, Nutritional and Metabolic diseases	
	24	Thyroid
	25	Other endocrine glandS
	250	Diabetes Mellitus
	26	Nutritional deficiencies
	27	Other metabolic disorders
	274	Gout

Alphabetic	Numeric Subdivision	
D	Diseases of the blood and blood forming organs	
	28	All such diseases
E	Mental disorders	
	29	Psychoses
	30	Neuroses
	31	Mental retardation
F	Diseases of the Nervous system and sense organs	
	32	Inflammatory diseases of CNS
	33	Hereditary and familial diseases
	34	Other diseases of CNS
	340	Multiple sclerosis
	345	Epilepsy
	346	Headaches/migraine
	35	Diseases of the nerves and peripheral ganglia
	36	Diseases of the eye - inflammation
	37	Other conditions of the eye
	38	Diseases of the ear
G	Diseases of the circulatory system	
	39	Rheumatic heart disease
	40	Hypertensive disease
	41	Ischaemic heart disease
	413	Angina
	42	Other forms of heart disease
	43	Cerebrovascular disease
	44	Arterial disease
	45	Vein disease
	456	Varicose veins
H	Diseases of the respiratory system	
	46	Acute respiratory infections
	47	Influenza
	48	Pneumonia
	49	Bronchitis, Emphysema and Asthma
	50	Other diseases of the upper respiratory tract
	51	Other diseases of the respiratory system
I	Diseases of the digestive system	
	52	Diseases of the mouth
	53	Diseases of the oesophagus, stomach and duodenum
	533	Peptic ulcer
	54	Appendicitis
	55	Hernia
	56	Other diseases of the intestine and peritoneum
	57	Disease of the liver, gallbladder and pancreas
J	Diseases of the genito-urinary system	
	58	Nephritis and nephrosis
	59	Other diseases of the urinary system
	60	Diseases of the male genitals
	61	Diseases of the breast, ovary, Fallopian tube and parametrium
	62	Diseases of other female genitals

Alphabetic	Numeric	Subdivision
K		Diseases of Pregnancy and childbirth
	63	Complications of pregnancy
	64	Do not use
	65	Delivery
	66	Do not use
	67	Complication of the puerperium
L		Diseases of the skin and subcutaneous tissue
	68	Infections
	69	Other inflammatory conditions
	70	Other diseases
M		Diseases of the musculoskeletal system and connective tissue
	71	Arthritis and rheumatism
	72	Other diseases of the bone and joint
	725	Displacement of intervertebral disc
	728	Lower back pain
	73	Other diseases
N		Congenital anomalies
	74	All such disorders
	75	Do not use
P		Senility and ill defined conditions
	78	All such conditions
	79	Do not use
Q		Accidents, poisoning and violence (external causes)
	80	Railway accidents
	81	Motor vehicle traffic accidents
	82	Motor vehicle non-traffic and other road vehicle accidents
	83	Water transport accidents
	84	Air and space accidents
	85	Accidental poisoning by drugs and medicant
	86	Accidental poisoning by other solids and liquids
	87	Accidental poisoning by gases
	88	Accidental falls
	888	Falls at work
	889	Falls at sports
	89	Fires
	90	Natural and environmental factors
	91	Other accidents
	92	Explosion, mechanical, cuts and electrical accidents
	93	Surgical and medical misadventures
	94	Do not use
	95	Self inflicted injuries
	96	Homicide and purposely inflicted injury
	97	Legal intervention
	98	Injury undetermined if accident or purposeful
	99	War
R		100 AIDS related complex and full blown AIDS
S		101 HIV+ and Lymphadenopathy

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