Market-Consistent Economic Valuations for the Wealth Management Industry

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1 INTRODUCTION AND OVERVIEW

Appraisal and embedded valuation techniques have been in widespread use in the wealth management industry for well over a decade and have generally served the industry well in that time. They provide stakeholders with a value-oriented view of a business that is not distorted by statutory accounting conventions and so is comparable across jurisdictions. The concepts and techniques used by actuaries in these valuations have gained widespread acceptance from industry stakeholders including management, shareholders, equity analysts and regulators.

However, in recent years some weaknesses in the methodology have begun to appear. These have become particularly apparent in the light of the recent significant downturn in global equity markets and accompanying reductions in interest rates.

The purpose of this paper is to examine the weaknesses in traditional appraisal valuation techniques and propose some new and improved, practical techniques that address these weaknesses. These "next generation" appraisal valuation techniques produce results that we believe are more consistent with the valuation by the market of equivalent instruments, hence the label: market-consistent valuations.

2 WEAKNESSES OF CURRENT VALUATION TECHNIQUES

The traditional methodology for calculating appraisal values can be characterised as:

- a deterministic projection of distributable profits;
- using best estimate, or prudent best estimate, assumptions;
- discounted using a single risk-adjusted discount rate;
- with an allowance for the opportunity cost of holding a specified level of capital.

Under this methodology, the impact of risk on the value of the business is allowed for implicitly via the use of a risk-adjusted discount rate applied to distributable profits, which allow for the lock-in of capital required to support the business.

Over the years, these traditional valuation techniques have served the wealth management industry well by providing insight into the financial drivers of value. Unlike some other commonly used measures of financial performance, they have the advantage of being realistic and responsive, and are not distorted by accounting conventions.

However, traditional techniques suffer from a number of shortcomings, principally:

- no, or inappropriate, allowance for the cost of options and guarantees;
- capitalisation of mismatch profits that should only be recognised as they emerge in the future;
- capitalisation of credit spreads that should only be recognised as they emerge in the future; and
- the use of an average allowance for the impact of risk on value which does not change as the risk profile of the business changes and does not reflect the risks inherent in an individual line of business.

These shortcomings all stem from the use of a single risk-adjusted discount rate to allow for both the cost of assuming risk and the costs associated with providing capital to a business, and the lack of responsiveness of this risk discount rate to changes in the profile of the business. Compared to alternative techniques in use today within the finance sector, this technique represents a relatively crude way of valuing risk and capital costs. While it may produce a reasonable outcome in aggregate for a large, well-diversified wealth management company, this relies on the selection of appropriate assumptions regarding the risk discount rate and the quantum of capital assumed to be locked into the business. These assumptions are quite difficult to set, particularly at a product level or for businesses with an atypical product mix. As a result, traditional techniques can produce inappropriate results when looking at the detail of value by line of business or the value implications of specific management actions.

2.1 Options and Guarantees

Many insurance contracts offer policyholders various types of options and guarantees. These are often in the form of embedded financial options, such as in the case of investment account and traditional participating business. In addition, certain unit linked contracts may contain minimum investment return guarantees, although these are usually quite limited.

Often, the cost of these options/guarantees is not explicitly considered in valuations based on traditional techniques, but rather is allowed for implicitly on an average basis in the assumed risk discount rate. This is particularly true when options embedded in a product are hidden. Where an explicit allowance for the option cost is made, a fixed deterministic cost assumption is frequently used; for example the cost of providing investment guarantees may be modelled as an annual expense, expressed as a percentage of funds under management. Such an allowance is typically determined at a particular point in time and then used at subsequent valuations, hence it may not respond to changes in market conditions that could have a significant effect on the cost of embedded options.

Neither of the above commonly used methods results in allowances for option costs that are consistent with the pricing of similar options in the capital markets.

2.2 Failure to Recognise the Cost of Market Risk

Mismatch risks arise in a wealth management business whenever revenues do not perfectly match outgoings. Common examples include:

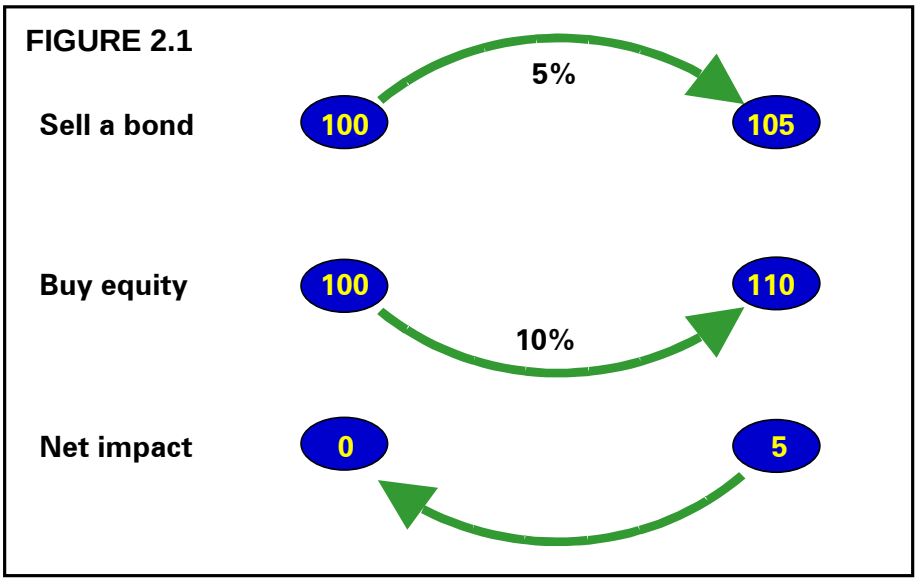
- fees on unit linked products set as a percentage of funds under management, while expenses are fixed per contract in nature; and
- guaranteed liabilities that are backed by risky assets, for example backing an annuity portfolio partially with equity assets.

In most of these instances, the insurer expects to make a profit to compensate for the mismatch risk assumed. Traditional appraisal value techniques tend to capitalise at the valuation date these expected future margins arising from the assumption of mismatch risk, rather than leaving them to be recognised as the risk is borne and the

profit realised. This occurs because the traditional valuation techniques do not take proper account of the price of market risk in such circumstances.

To illustrate the point, consider the following example. Assume that an investor borrows $100 at 5% pa to be repaid in a year's time and invests the proceeds in equities with a best estimate return of 10% pa. This investor has assumed a mismatch risk, and, on a best estimate basis, expects to make a profit of $5 in one year's time to compensate for the risk assumed. Figure 2.1 illustrates the investor's position now and in one year's time.

FIGURE 2.1



Most people would readily agree that the value today of this position is zero; the assets of $100 are exactly offset by the liability of $100. Using traditional appraisal value techniques, however, we would determine the expected profit in one year's time as $5 and then discount this at a risk-adjusted discount rate to give the value today. However, if the expected profit in a year's time is $5 and the value today is zero, there is clearly no finite risk discount rate that will provide the correct result.

If we take the example one step further and now assume that instead of buying equities with the borrowed $100, the investor invests in property assets, with a best estimate return of 9% pa. Now the expected profit in one year's time has reduced to $4, and, using traditional appraisal value techniques, we would probably say that the value of the investor's portfolio has decreased.

This illustrates one of the key principles of financial economics that is violated by traditional appraisal value techniques, the principle of no arbitrage. This principle provides that it is not possible to make an immediate, risk-free profit, for example, by simply switching between $100 of property and $100 of equity assets. As the liabilities in the two examples are identical, the only way such a profit could arise is if the value of assets changes; in other words, if $100 of equities is not worth the same as $100 of property. The traditional method must therefore be implicitly revaluing assets.

Whilst the above examples may appear simplistic, this type of problem arises on a regular basis in the determination of appraisal values of wealth management businesses. Consider the following example regarding the valuation of a single premium, non-participating, capital guaranteed bond.

Initial investment	$10,000
Guaranteed return	4% pa
Guaranteed maturity benefit	$12,167 after 5 years
Risk-free rate	5% pa
Equity return (best estimate)	10% pa

Ignoring any capital requirements, if we assume that the assets backing the liability perfectly match that liability and are risk-free, we obtain expected profits of approximately $100 per annum for each of the next five years. Discounting the annual projected profits at the equity rate of return gives a net present value at issue of $408.

Alternatively, if the backing assets are assumed to be invested in equities, then the expected future profits would increase to approximately $600 per annum and the net present value at issue, still discounting at the equity rate of return, increases to $2,446. The apparent increase in value is artificial and results from a failure to adjust the discount rate to allow for the additional mismatch risk assumed.

Traditional appraisal value techniques, however, do make some adjustment for the cost of bearing mismatch risk by applying a cost to the capital required to support the business. In Australia, this is typically done by assuming that capital equal to the Life Insurance Actuarial Standards Board (LIASB) capital adequacy requirement is held to support the business. If we were to allow for the cost of capital on LIASB capital adequacy requirements in our example, the two values would reduce to $371 and $2,083 respectively, however, there is still a significant apparent divergence in value caused by the difference in asset mix.

The market-consistent approach to valuation considers the value of at the assets and liabilities separately. The liability is a risk-free payment of $12,167 in five years and so is discounted at the risk-free rate to give $9,533. The assets are worth their market value today, which in this example is $10,000. The market-consistent value is therefore $467.

2.3 Failure to Recognise the Cost of Credit Spreads

A particular example of the problem of capitalising mismatch risk margins is the capitalisation of credit spreads. If, for example, the risk-free rate is 5%, and a highly liquid corporate bond is yielding 6%, then this implies that the market is demanding a 1% credit spread for an investment in that corporate bond. This credit spread comprises:

- the expected cost of default;
- a credit risk premium for bearing the risk of default; and
- an illiquidity premium (which would be small in this example).

Using traditional techniques, the projected return on assets would usually be determined by adjusting the 6% quoted yield downwards by removing the expected cost of default. This adjusted rate would presumably be somewhere between 5% pa and 6% pa, where the difference between the risk-free rate and the adjusted rate is due to the credit risk premium and the illiquidity premium. As discussed in the preceding section, traditional techniques would then result in this assumed margin above the risk-free rate being inappropriately capitalised into the current value of the business, meaning that we would implicitly be valuing the corporate bond at more than its market value.

2.4 The Cost of Capital

Traditional appraisal value techniques include an allowance for a cost of holding supporting capital, effectively being a function of the difference between the risk-adjusted rate at which future profits are discounted and the assumed earning rate on the capital. This traditional cost of capital combines an allowance for risk together with the true economic costs associated with holding capital. The traditional cost tends to be relatively consistent across companies and lines of business, being affected only by the assumed mix of assets backing the capital, the assumed risk discount rate, and the projected term of the portfolio of business.

There are two key shortcomings of this approach. Firstly, it gives the counter-intuitive result that capital invested in riskier assets generates a lower cost. Secondly, it is not responsive to the specific risks associated with the business being valued.

It is sometimes argued that traditional appraisal value techniques make allowance for changes in the risk profile of the business being valued by changing the projected capital requirements. However, in practice, it is unlikely that the projected capital requirements will be determined in such a way that they exactly reflect the market-based price of risk in the business.

An alternative approach to defining and measuring the cost of capital as part of the market-consistent economic value framework is outlined below in Sections 3 and 4. Under this alternative approach, the allowance for asset and liability risk is separated from the determination of the cost of capital. The valuation impact of asset and liability risk is reflected in the valuation of assets and liabilities. The cost of capital is then determined explicitly by identifying the sources of the cost and quantifying the valuation impact of each source.

3 MARKET-CONSISTENT VALUATION TECHNIQUES

3.1 Overview

Market-consistent valuation techniques are based on a combination of financial economics and corporate finance principles and provide solutions to the shortcomings of traditional appraisal values discussed in Section 2. The key principles are summarised in Appendix A.

By applying these principles to modify our traditional appraisal value approaches, we can address the weaknesses identified above and place an objective, market-consistent

value on most wealth management assets and liabilities. In this way, we can determine an estimate of the economic value of the company itself.

In practice, we can estimate the economic value of any company by answering three questions.

- What is the value of the assets held by the company?
- What is the value of the liabilities of the company?
- What is the value impact of conducting the business through a company structure?

We will now look at each of these items in more detail.

3.2 Valuation of Assets

When calculating a market-consistent economic value of a company, all assets should be valued at market value. Market values for most of the assets of Australian wealth management businesses should be readily available either from the balance sheet or from internal management accounts. The main area of complication concerns assets where market values are not directly available, for example for holdings in over-the-counter options, or investments in illiquid property assets.

As discussed in Section 2.2, traditional appraisal value techniques may implicitly restate the value of assets to other than their market values, even though they are apparently based on the market value of assets at the valuation date. The application of market-consistent valuation techniques as discussed in this paper should guard against such implicit revaluations.

3.3 Valuation of Liabilities

As wealth management liabilities are not traded in a free and liquid market, determining a market-consistent value for these can be more difficult than for assets. A market-consistent value is, by definition, a relative value. The value of a set of liability cash flows is determined by reference to the values of traded assets and liabilities. This ensures that the valuation of the wealth management business's liabilities will be consistent with the market's treatment of risk and the appropriate price or reward for risk.

To the extent that certain of the cashflows comprising the liabilities of a wealth management business can be directly replicated by traded assets, then the value of those cash flows should equal the value of the replicating traded assets. However, replicating assets are difficult to locate for a large number of the cash flows underlying the liabilities of wealth management businesses, and so numerical techniques will be required to determine market-consistent values of these.

Financial economics provides us with a number of practical ways of determining the market-consistent value of wealth management liabilities. These are discussed in more detail in Section 4.2 below.

3.4 The Impact of Company Structure

The company structure through which the business is transacted may itself have a positive or negative impact on value that should be taken into account in determining the economic value of the enterprise. This impact is excluded from the market-consistent valuations of assets and liabilities discussed above, which represent the value as if the assets and liabilities were traded in an open market.

The key components of (positive or negative) value in the company structure are:

- franchise value, which represents the ability to write profitable new business in the future;
- the value of operating through a limited liability company structure;
- taxation effects;
- agency costs; and
- the cost of financial distress, which represents the potential impact on the value of the business should the company experience periods of financial distress.

Franchise Value

Franchise value represents the ability of the company to write profitable new business in the future. It arises when a company is able to exploit its existing physical capital base, experience and expertise, which form barriers to entry for new participants, in order to sell new business for positive value, as measured on a market-consistent basis. The market-consistent value of any company should reflect the market's expectations regarding the level, profitability and growth of future new sales.

The Limited Liability Put Option

Under Corporations Law, shareholders are generally not compelled to invest additional capital into a limited liability company that has liabilities greater than its assets. This ability to walk away from a company that has gone bankrupt is of potential value to investors, effectively giving them a put option on the value of the company's assets. We refer to this as the Limited Liability Put Option (LLPO).

While for a well-capitalised wealth management company with effective regulation this value should usually be small, it may become material for certain companies at certain points in time.

Double Taxation and Tax Shields

In many countries, the taxation implications for shareholders of investing capital in a wealth management company differ from those associated with taking on wealth management liabilities and holding assets directly. The differences can typically be divided into two opposing effects:

- double taxation of investment income; and
- tax shields and deferral.

In Australia, these differences are relatively small due to the operation of a dividend imputation system, which allows tax paid within a company to be used to offset tax payable by investors on dividends. However, some taxation effects arise due to:

- imputation credits not being valued by the market at 100% of their face value, which means that there is some residual value loss due to double taxation;
- the ability of groups of companies to manage their tax affairs on a group basis, for example offsetting taxable profits and losses within group companies, or deferring capital gains tax when assets are sold between group companies; and
- an asymmetry in the tax basis, whereby profits are taxed immediately, but losses can only be carried forward and relieved against future taxable profits.

Agency Costs

Shareholders are likely to mark down the value that they place on a company's capital because they do not have direct control over its use. This is an example of the "Principal-Agent Problem", first discussed by Jensen and Meckling in the 1970s. The principal (in this case the shareholder) cedes control to the agent (the management of the company), but cannot be certain that the agent will always act in the principal's best interests, which is to maximise value to the principal.

Agency costs can manifest themselves in a number of ways – company jets and expensive boardroom fitouts are examples often cited, but other examples include pursuing sales volume rather than profitability, expansion into markets or industries where the company does not have a competitive advantage, or even outright fraud. Perhaps a more subtle cost is that which arises from the different risk tolerances of management and shareholders, which can occur because shareholders are able to diversify away non-market related risk, but management, whose remuneration depends on the performance of a particular line of business or project, is not.

Shareholders can mitigate the effects of agency costs to some extent by requiring transparent management accounting practices and through independent audit. However, these steps clearly have costs associated with them, and recent events around the world have shown that they may not be as effective as previously thought. Performance management systems that tie managers' remuneration to shareholder value are another attempt to reduce agency costs.

Agency costs are generally thought to be a function of free cash flow or free capital, and in this way form a component of the economic cost of capital. The actual value that shareholders place on agency costs will depend on a number of factors that are difficult to quantify, including investors' perceptions of the quality of management, the quality of financial reporting, the company's past practice in managing capital and management incentives.

The Cost of Financial Distress

The ability of a wealth management business to generate future cash flow is highly dependent on it maintaining (or appearing to maintain) a strong capital position and effective risk management procedures. While a company is strong, it can carry on writing profitable new business and its management is focused on day-to-day

activities. When a company is experiencing financial difficulty, however, management becomes focused on short-term issues, the company may have to start spending material sums of money on expert advice, persistency may deteriorate, and it will find it much more difficult to write profitable new business; all of which will reduce the economic value of the company. This potential reduction in economic value is referred to as the cost of financial distress.

For most wealth management businesses, the main driver of the cost of financial distress will be the impairment to the franchise value, although the potential costs of the other items should not be underestimated. The impact on economic value of the costs of financial distress will be influenced by both the probability of the company falling into financial distress and the extent of the potential cost should that occur. Note that in this regard, financial distress does not refer to the situation where a company actually becomes insolvent, but rather a situation in which it is operating close to insolvency.

The Economic Cost of Capital

The combined effects of the LLPO, double taxation, taxation shields, agency costs and the cost of financial distress can be thought of as representing the economic cost of capital. This is often significantly lower than the cost of capital used in traditional appraisal value calculations, as it does not include any allowance for the cost of market-related risks in existing assets and liabilities.

As the level of capital in the company increases, the value of the LLPO and the cost of financial distress decrease, and double taxation and agency costs increase. The decrease in the cost of financial distress in isolation causes the economic value to increase, however, this is countered by a reduction in economic value resulting from changes in the value of the LLPO, double taxation and agency costs. As the level of capital falls, the opposite effects occur. Theoretically there is an optimal level of capital that is sufficient to allow the company to write profitable new business without restraint, but is not so excessive as to increase unreasonably other components of the capital costs.

3.5 The Economic Balance Sheet

We can pull together each of the components of economic value, as discussed in the preceding sections, into an economic balance sheet, as illustrated in Figure 3.1. From the economic balance sheet, we are able to determine the market-consistent economic value of the business under consideration.

FIGURE 3.1

Economic Balance Sheet – Illustrative

Assets		Liabilities	
Market value of balance sheet assets	2,000	Market value of debt	50
Franchise value	100	Market-consistent value of liabilities (including policy liabilities)	1,750
Limited liability put option	10	Agency costs	30
Tax shields	20	Double tax	20
		Cost of financial distress	10
		Economic equity	**270**
Total	2,130	Total	2,130

The market-consistent economic value of the company is then simply the economic equity derived above. Note that this value is derived as the difference between the market-consistent value of the assets and liabilities of the business, and is readily explained and understood as such. In contrast, traditional techniques determine the value by discounting projected net cash flows with no explicit valuation of the individual components of the economic balance sheet.

4 VALUING THE COMPONENTS OF THE ECONOMIC BALANCE SHEET

In this section, we discuss techniques that may be used to determine the value of each of the components of the economic balance sheet on a market-consistent basis. We propose some practical techniques for valuing the more material components (ie assets, franchise value, debt, liabilities). While certain of the other components can be difficult to value, in our experience these tend to be less material and so we provide some suggestions for valuing these approximately.

4.1 Determining the Market-Consistent Values of Assets and Debt

As discussed in Section 3.2, in most cases the market value of assets will be readily available. Debt amounts should be restated to market value where material.

4.2 Determining the Market-Consistent Value of Liabilities

There are a number of ways to determine a market-consistent value of wealth management liabilities. Some of these are computationally easy, while others require complex stochastic modelling.

Typically, complex methods are only required where there is material optionality or asymmetric risk embedded in a product. These are most commonly found in traditional participating and investment account business, although other features such

as selective lapsation may result in asymmetric outcomes for certain other lines of business. Fortunately, participating products with guarantees have not been sold on a large scale by the Australian wealth management industry for a number of years, and so it should be possible to determine a good estimate of a market-consistent value of most liabilities using some relatively simple techniques.

4.2.1 Products with No Optionality

For products without optionality, the calculations required to value the liability are relatively straightforward.

In theory, each of the projected cash flows should be discounted at a rate that reflects the risk associated with the cash flow.

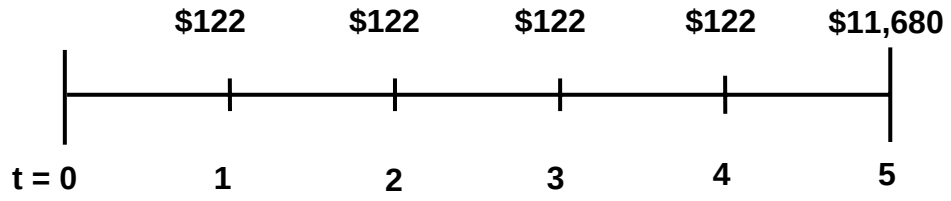
Risk-Free Cash Flows

Let us return to the single premium, non-participating, capital guaranteed bond example from Section 2.2. In this example we have a fixed liability cashflow of $12,167 due in five years. Ignoring mortality for the moment, this is a guaranteed cash flow and so we should value it using the yield on a five-year, risk-free zero coupon bond. Assuming this rate to be 5% pa, the value of the liability would be $9,533. The use of any other discount rate would produce a value that was inconsistent with the price of the matching asset.

Cashflows with Diversifiable Risk

We can extend this argument to valuing cash flows that contain only diversifiable risk. Let us now introduce mortality risk into our example, with an assumed annual mortality rate of 1% of the initial population, and a death benefit equal to the guaranteed maturity benefit of $12,167. Assuming all deaths occur at the end of each year, we would have the following expected payouts.

FIGURE 4.1



If we assume that mortality risk is uncorrelated to market risk, then it is possible for the owner of this liability, ie the shareholder, to diversify away this risk (by selling a large number of these policies, by the use of reinsurance, or by investing in other types of business where the risks are uncorrelated with mortality risk). In an efficient market, there is no reward for assuming diversifiable risk. Therefore, we are able to discount the expected payouts at the risk-free rate to determine the market-consistent value of the liability. Assuming that the same risk-free rate of 5% pa applies to all time periods, then the market-consistent value of this liability would be $9,583.

Cashflows with Market-Related Risk

We need to take a different approach when cash flows are correlated with asset markets. Consider two assets each worth $100 today, one being an equity and the other a government bond, both of which we intend to hold for a year. Assuming a one-year risk-free rate of 5% and an equity rate of return of 10% pa, our best estimate is that at the end of the year the equity will be worth $110, but the bond will only be worth $105. We know that both are worth $100 today, so we must infer from this that the market is telling us that the additional market-related risk associated with investing in the equity rather than the bond is worth 5% pa. Thus, to value the two assets today, using a discounted cash flow method, we should use a discount rate of 5% for the bond and 10% for the equity. Using these rates we obtain the market value of each asset today of $100.

Simply put, the appropriate risk discount rate for asset-related cash flows is the expected earning rate of the asset.

This principle applies not only to the value of assets, but also when valuing cash flows that are themselves derived from asset values. To take another simple example, consider a $10,000 single premium unit linked product with a 1% annual management charge due at the end of the year. As this cash flow depends entirely on the value of the investment assets at the end of the year, then the market-related risk associated with the cash flow is the same as that of the investment assets. Thus, the appropriate discount rate depends on the asset mix of the investment assets.

In this example, if we assume that the assets are invested in equities, then our best estimate of the annual management charge cash flow in one year's time is $110. Discounting this at 10% gives a value of $100, or 1% of the value of assets today. Alternatively, if the assets were invested in government bonds, our expected charge would be $105, which, discounted at 5%, also gives a value of $100 or 1% of today's assets.

Certainty-Equivalent Techniques

The complication with the above approach is that it requires us to use a different risk discount rate for each cash flow in our projection. The solution to this problem is to use the certainty-equivalent approach. This works by risk-adjusting the cash flows to remove the market price of risk and then discounting all adjusted cash flows at the risk-free rate. The certainty-equivalent approach is closely related to the stochastic risk-neutral approach used for option pricing.

In the above example regarding the annual management charges on a unit linked bond, we have shown that the value of next year's charge today must be 1% of today's asset value, ie $100. Mathematically we could have obtained this result by choosing any future investment return assumption we liked, as long as we used the same rate to discount the projected cash flow. Thus to simplify our calculations, we could have assumed that the equities will only earn the risk-free rate in the future (ie that the risk premium for all assets is zero) and then discounted the resulting projected cash flow at the risk-free rate.

The certainty-equivalent approach is an extremely powerful tool in the determination of market-consistent valuation results. It allows us to determine market-consistent valuation results easily for many wealth management products. Moreover, because all cash flows are discounted at the same discount rate, it means that we can use existing appraisal value models with little in the way of modification.

The approach represents a significant advancement on traditional techniques by removing the need to determine appropriate risk discount rates and capital levels, issues which have caused considerable debate in the industry for some time.

It is important, however, to remember that the cash flows projected using a certainty-equivalent technique are no longer real world cash flows, and so it is not possible to use them for other purposes such as business planning. In order to derive cash flows for profit projection or business planning purposes, we simply rerun our projection models with investment assumptions set using a traditional best estimate approach.

Appendix B contains a more detailed example of the application of this approach.

Cash Flows that are Partially Market-Related

Until now we have assumed either that cash flows have no market-related risk or that it is easy to observe their degree of market-related risk by examining the assets with which they are associated.

In practice, however, there are a number of cash flows relevant to wealth management products that our instincts tell us may be related to market movements, but there is not a direct, observable correlation. Examples include lapse rates, morbidity rates and potentially expenses.

The certainty-equivalent technique applies equally to such cash flows. The cash flow under consideration should be adjusted from its real world projected value to its certainty-equivalent value. The cash flow may then be discounted at the risk-free rate along with the other cash flows in the model.

The conversion of such cash flows from a real world basis to a certainty-equivalent basis requires an assessment of the degree of market-related risk inherent in the cash flow. This assessment may be made on the basis of sensitivity testing or statistical analyses. In most cases, a significant degree of judgement will be required in addition to numerical analyses due to the difficulties involved in obtaining a sufficient volume of credible data.

Determining the Risk-Free Rate

The choice of an appropriate risk-free rate is a key consideration in applying the certainty-equivalent method.

Traditionally, actuaries have used government bond rates at appropriate durations as proxies for risk-free rates. However, recent research suggests that government debt may be a poor choice as a proxy for the risk-free asset. This is due to political influences on the supply of government debt which mean that shortages or even a

complete lack of supply can occur at certain places in the maturity spectrum, which can impact the shape of the yield curve.

Over recent years, the banking and finance community has moved away from using government bond rates to using swap rates as a proxy for risk-free rates. Swap rates essentially represent the rate at which a high credit quality company can borrow, provided it maintains its credit rating. The advantages of using swap rates over government bond rates are:

- global swap markets are extremely liquid, and far more so than most government bond markets globally;
- being synthetic instruments, swaps are largely immune from supply and demand irregularities such as those that affect government bond rates; and
- swap rates appear to be more consistent with the market prices of traded derivatives than are government bond rates, which is particularly important when the risk-free rate is used along with other asset prices to calibrate stochastic economic valuation models.

Summary

In this section, we have shown that the market-consistent valuation of liabilities for products with no optionality can be determined in a relatively straight-forward manner using the certainty-equivalent approach by:

- assuming all assets earn the risk-free rate;
- adjusting non-asset-related cash flows to remove the market price of risk where material; and
- discounting all adjusted cash flows at the risk-free rate.

4.2.2 Products with Optionality

The certainty-equivalent approach can be easily applied in situations where all cash flows are fixed or linearly related to underlying market returns and values. Further consideration, however, is required where cash flows react in a non-linear or asymmetric nature to changes in market returns and values. The most common example of this is a minimum payment guarantee, such as exists in investment account or traditional participating business.

Where material non-linear or asymmetric cash flows (options) exist, we need to use option pricing theory to determine a market-consistent value of the liabilities.

Option Pricing Formulae

For simple options, it is usually possible to value the liability, at least approximately, as a combination of the certainty-equivalent liability ignoring the option, plus an option whose value is determined either by reference to traded options or by using a pricing formula. For example, a single premium unit linked policy with a return of premium guarantee may be valued as a non-guaranteed unit linked policy plus a put option on the fund with a strike price equal to the initial premium.

We can also use option pricing formulae to value many of the participating business types seen in different markets, where the participation is defined by a tariff formula. Option pricing formulae are, however, more difficult to apply to the more complex discretionary participating business that forms a large part of the closed books of many Australian insurers. This is because of the number of path-specific elements to these policies (specifically the reversionary and terminal bonus structure and asset mix) and because of the operation of statutory funds, which means that shareholders' participation in profits operates at the fund level rather than at policy level.

In order to determine an accurate value of most of the options and guarantees typically found in Australian wealth management businesses it would be necessary to use stochastic techniques, as described below. However, in many cases, the materiality of these guarantees is such that an accurate determination of the value is not warranted. In these cases the use of replicating portfolios and option pricing formulae as approximations may give sufficiently accurate results, depending on the purpose of the economic valuation being undertaken.

Stochastic Modelling

For some participating products, the liability risk profile is too complex to be valued accurately using the analytic solutions described above. This may arise because:

- the level of guarantees depends on the historical asset returns (ie path-dependence); and/or
- discretions available to management to alter the guarantees (through bonus policy and asset mix) and to policyholders to choose when they realise their policy, can have a material impact on their eventual cost.

Where an accurate valuation of such products is required, stochastic modelling is usually the best approach. To obtain a value of liabilities using stochastic modelling, we need the following components:

- A suitable asset model

  The first key requirement is that the asset model is arbitrage-free, which means that it will return a unique price for any asset no matter what the holding period. The second key requirement is that it be calibrated to observed market prices at the valuation date. The calibration data set will usually contain at least the prevailing yield curve (to generate the term structure of interest rates) and the prices of certain equity options and interest rate swaptions.

- A liability model

  In some cases the model used for deterministic policy liability or economic value projections will suffice, but typically the products will need to be more heavily grouped in order to achieve acceptable run times for multiple scenarios. The method of grouping should, however, be approached with care. As options, by their nature, do not average out, it is important to group according to the features that drive option prices, for example term to maturity and the relationship between underlying asset values and projected guaranteed values.

- A model of the interactions between assets and liabilities

  This model should reflect the following features of the business, including how they may be expected to change in response to changing asset and liability values:

  — asset strategy;
  — bonus policy; and
  — policyholder behaviour.

  These factors can have a significant impact on the cost of guarantees, so it is important to reflect them as accurately as possible. As an example, it may be possible to reduce the cost of guarantees to close to zero through a strategy of matching projected guaranteed payouts with risk-free assets. On the other hand, more aggressive asset mixes can result in significant guarantee costs.

Once these models are in place, market-consistent values are determined by:

- generating a large number of scenarios from the asset model;
- projecting the liability cash flows for each of these scenarios based on these asset return assumptions;
- discounting each cash flow at the appropriate scenario-specific discount rate; and
- taking the average of the discounted cash flows across all scenarios.

The theory behind this calculation is outlined in Appendix C.

The scenario-specific discount rate will be generated as part of the asset model, and will depend on the type of model used. For example, if the model is set up on a risk-neutral or certainty-equivalent basis, the discount rate will be the risk-free rate for the appropriate duration.

4.3 Double Taxation and Tax Shields

The cost of double taxation can be determined using the same methods as those described in respect of valuing liabilities. This involves projecting the additional tax burden in excess of that already allowed for in the liability valuation using certainty-equivalent assumptions, and discounting it back to the valuation date at the risk-free rate. The additional tax burden projected should take into account the compensatory effects of any tax shields available.

The impact of double taxation on economic value will depend on the assumed period for which the capital is required to be held within the company being valued. We therefore need to take care in projecting the future capital position of the company, particularly that the dynamics between capital required for existing business and that assumed to be backing future new business are dealt with appropriately.

In many jurisdictions the tax basis will itself contain asymmetries, in particular in relation to the treatment of tax losses. If the company being valued has a reasonable probability of generating tax losses then the impact of taxation may have to be assessed on a stochastic basis in order to capture this asymmetry correctly.

4.4 Agency Costs

Agency costs are difficult to quantify objectively, as they are predominantly driven by investors' perceptions about a company rather than explicit cash flows. Studies of the values of closed exchange-traded investment companies and investment trusts suggest write-downs by investors of between 5% and 15% of capital due to agency costs. This implies a cost of approximately 0.5% to 2% of capital per annum in perpetuity, depending on the assumed discount rate. We might expect that insurers would be at the upper end of this range as they are typically less transparent than investment companies, so a range of 1% to 2% of capital per annum may be reasonable.

Consideration needs to be given to the level of capital to which this cost is applied and for how long the cost is incurred. For example, it may be reasonable to assume that the agency cost associated with tied regulatory capital is less than that of free capital, as the level of scrutiny to which a company is subject increases as its level of capital approaches the regulatory minimum.

In practice, the best way to begin to determine assumptions regarding agency costs may be to determine the other components of the economic balance sheet and then backsolve for the level of agency costs applied by the market in respect of large, well-diversified wealth management businesses. These implied agency costs could be measured over time and used to help set agency cost assumptions in the future.

4.5 The Limited Liability Put Option

The simplest way to estimate the value of the limited liability put option is to calculate the market-consistent value of liabilities on a certainty-equivalent basis, but replacing the assumed risk-free rate with a rate that reflects the credit standing of the company's promise to policyholders. The difference between this value and that calculated using the risk-free rate is the value of the limited liability put option.

A more theoretical, but far more complex, approach is to use option pricing techniques and model the full dynamics of the cash flows at company level. However, this approach would rarely be warranted on materiality grounds. Further, it could lead to spurious results due to difficulties in selecting option valuation parameters. It is worth noting that a common approach to setting the credit spread on corporate bonds uses a simplified version of this latter approach (the Merton model), so the two methods should not be inconsistent.

4.6 Franchise Value

Franchise value is essentially the value of future new business determined on a market-consistent basis. As with traditional appraisal value techniques, this may be determined either by projecting all future years' new business, or by determining the value of one year's sales and then applying a multiplier. Under either method, both the value of each tranche of new business, and the discount applied from the point of sale to the valuation date, should be determined using market-consistent methods and discount rates.

There will always be a significant amount of subjectivity in the assessment of franchise value, however the franchise value will often form a large part of the

economic value of a company. Significant differences between the economic value of a company and its market value, where these exist, are often explained by differences in the assessment of franchise value.

4.7 The Cost of Financial Distress

The cost of financial distress is probably the most difficult component of the economic balance sheet to quantify. We can, however, identify the driving factors of its value and use these to determine a first-order estimate of its value. This would involve considering the following questions.

- What are the drivers of financial distress?

  Typically this would focus on company solvency.

- How do policyholders/customers react to financial distress?

  What is the relationship between volume, unit profitability and company solvency?

- What is the probability of entering a state of financial distress?

  Stochastic risk models may be used to assess this.

- What other costs are associated with financial distress?

  These typically include costs associated with management activity to remediate the situation, as well as lost business opportunities while management attention is diverted.

The cost of financial distress can then be determined as the product of the probability and degree of financial distress, and the impact this has on the value of future sales as well as other associated costs.

5 VALUE IMPLICATIONS FOR TYPICAL AUSTRALIAN PRODUCTS

In this section, we analyse the likely implications of adopting market-consistent valuation techniques for the valuation of common Australian wealth management products. The analysis uses numerical examples, which we have attempted to make as representative as possible of typical products in the Australian market. However, variations in product design can have a significant impact on the market-consistent value of certain lines of business, and so the reader should be careful about applying the conclusions reached in this section to a different portfolio of business. Where possible, we have attempted to identify product features or variations that may result in different results to those shown.

Details of the example products, model portfolios and assumptions underlying the numerical examples in this section may be found in Appendix D.

5.1 Unit Linked and Unit Trusts

From the shareholder's perspective, writing unit linked or unit trust business can be thought of as a geared play on investment markets. Fees are generally related to funds under management, and so vary in line with movements in asset values, whilst expenses are largely fixed in proportion to the number of contracts written. As such, actuaries have tended to use betas in excess of 1 when applying the Capital Asset Pricing Model to set risk discount rates for traditional discounted cash flow models to value unit trust business. The market-consistent valuation framework provides a justification for this practice, as well as some insight as to the appropriate level of the beta, and how this varies with product design.

Table 5.1 shows economic valuation results on both a market-consistent basis, and a traditional discounted cash flow basis for a sample portfolio of unit linked business. The table also shows results for the same portfolio of business written in a unit trust environment (ie without life insurance capital requirements). The business is assumed to have fees proportionate to funds under management, and expenses proportionate to the number of contracts in force, as shown in Appendix D.

TABLE 5.1

Unit Linked and Unit Trust Business – Fees Proportionate to FUM

	Unit Linked Life		Unit Trust	
	High Equity Mix	High Bond Mix	High Equity Mix	High Bond Mix
Value of Existing Business ($):				
– Traditional basis				
value of profits	13.6	11.2	13.0	10.8
initial capital	2.2	2.2	0.0	0.0
cost of capital	(0.2)	(0.5)	0.0	0.0
total value	15.6	12.9	13.0	10.8
– Market-consistent basis				
value of profits	13.1	13.1	13.1	13.1
initial capital	2.2	2.2	0.0	0.0
cost of capital	(0.3)	(0.3)	0.0	0.0
total value	14.9	14.9	13.1	13.1
Risk-free return	5.25%	5.25%	5.25%	5.25%
Traditional basis – risk discount rate	10.25%	10.25%	11.25%	11.25%
Market-consistent basis – implied risk discount rate(1)	11.1%	7.0%	11.1%	6.8%
Market-consistent basis – implied beta(2)	1.17	0.36	1.16	0.31

(1) The internal rate of return that equates real world cash flows to the market-consistent value.

(2) Assuming an equity risk premium of 5.0%.

The key point to note from the results in Table 5.1 is that whilst the value of these products on a traditional basis varies as the asset mix changes, the market-consistent value does not.

As Table 5.1 shows, the impact of introducing market-consistent valuation techniques on the value of unit linked and unit trust products will depend on the asset mix of the product and hence the degree to which fee income and expense outgo is matched. Products with a high equity backing, where the fees charged are dependent on the performance of equity markets but costs are largely fixed, will typically expose the shareholder to more risk than that recognised under traditional techniques and so the value of these products may be expected to decrease on a market-consistent basis. Conversely, fees and expenses generated by cash trusts are actually quite well matched and so the risk to the shareholder of these products is probably less than that allowed for by traditional techniques. As a result, the value of these products may be expected to increase.

Following on from the logic above regarding the gearing inherent in these products, if a product were designed to reduce the degree of gearing to investment markets from the shareholder's perspective, then we would expect that an increase in the market-consistent value could be achieved for the same level of projected fee income. In order to demonstrate this, we have altered the product design used in our above example, so that fees are partially related to funds under management, and partially fixed per contract, as detailed in Appendix D. Fees have been determined such that the value of the unit linked life business under the high equity asset mix scenario using traditional discounted cash flow techniques is the same as in Table 5.1.

TABLE 5.2

Unit Linked and Unit Trust Business – Fees Partially Fixed per Contract

	Unit Linked Life		Unit Trust	
	High Equity Mix	High Bond Mix	High Equity Mix	High Bond Mix
Value of Existing Business ($):				
– Traditional basis				
value of profits	13.6	11.9	13.0	11.5
initial capital	2.2	2.2	0.0	0.0
cost of capital	(0.2)	(0.5)	0.0	0.0
total value	15.6	13.6	13.0	11.5
– Market-consistent basis				
value of profits	14.4	14.4	14.4	14.4
initial capital	2.2	2.2	0.0	0.0
cost of capital	(0.3)	(0.3)	0.0	0.0
total value	16.3	16.3	14.4	14.4
Risk-free return	5.25%	5.25%	5.25%	5.25%
Traditional basis – risk discount rate	10.25%	10.25%	11.25%	11.25%
Market-consistent basis – implied risk discount rate	9.3%	6.5%	9.1%	6.2%
Market-consistent basis – implied beta	0.82	0.25	0.76	0.19

The above examples show that changes to the product design that reduce market-related risk for the shareholder result in an increase in the value of the business when calculated on a market-consistent basis, although this is not necessarily evident when using traditional techniques. This result is intuitively appealing, and provides useful information to management involved in the product design process.

It should be noted that the results shown above are also theoretically achievable using traditional appraisal value techniques, if the reduction in risk to the shareholder was reflected in a reduction in the risk discount rate used to value the business. However, the weakness of the traditional approach is that it is very difficult to ascertain how much the risk discount rate should be reduced to allow for the change in risk, and any over or under statement of this adjustment may result in the calculations sending the wrong message regarding product design. Using market-consistent valuation techniques, the change in risk is automatically allowed for by the technique, and the appropriate risk discount rate to apply to real world cash flows is an output of the process.

5.2 Yearly Renewable Term

Much of the volatility inherent in yearly renewable term life insurance business is not related to investment market conditions, being largely driven by variations in mortality cost. As such, we would expect that market-consistent valuation techniques

would reveal that standard industry risk discount rates are too high for this class of business, and as such, the business has traditionally been undervalued.

This result is borne out by the example in Table 5.3.

TABLE 5.3

Yearly Renewable Term Insurance

Value of Existing Business ($):	
– Traditional basis	14.3
– Market-consistent basis	18.5
Risk-free return	5.25%
Traditional basis – risk discount rate	10.25%
Market-consistent basis – implied risk discount rate	6.3%
Market-consistent basis – implied beta	0.21

The results in Table 5.3 are interesting because they imply that shareholders should not expect to earn much more than the risk-free rate on a book of term life insurance business. In fact, were it not for the effects of costs on capital, the implied beta would be zero. This result, while perhaps not intuitively obvious nor appealing to management, is consistent with the proposition that the market does not reward non-systemic risk. Effectively, it assumes that although the term life business itself is risky, for an investor holding the market portfolio it does not contribute significantly to the overall risk of the portfolio.

From the perspective of management, however, the picture looks quite different. Management will be judged on the results of the business they manage, which in most cases will be relatively homogeneous and so they are not in a position to diversify their risk of failing to achieve budgets. From this perspective, they may be less prepared to invest in a portfolio of term insurance business, unless they expect to earn a rate closer to their required return on equity. This potential misalignment in objectives between shareholders and management may be thought of as an example of an agency cost.

Whilst the diversifiable mortality risk taken on in this example does not have a direct impact on the economic value of the insurance liabilities, it may be expected to have an impact on the cost of capital component of the valuation. The capital required to be held by an insurance company depends on the aggregate level of risk to which the company is exposed, irrespective of whether that risk is diversifiable or not. These increased capital requirements will be subject to capital costs, such as agency costs and double taxation, which will act to reduce the economic value of the operation.

5.3 Immediate Annuities

Immediate annuities represent perhaps the clearest example of traditional appraisal value techniques potentially resulting in misleading valuation results by not properly recognising mismatch risk. Table 5.4 below shows valuation results in respect of a single term-certain annuity at issue, using both traditional and market-consistent techniques, assuming different investment policies for the backing assets. The annuity is described in Appendix D.

TABLE 5.4

Immediate Annuity Business

	Asset Mix		
	100% Corporate Bonds	**20% Equities, 80% Fixed Interest**	**100% Matched**
Value of New Business ($):			
– Traditional basis			
value of profits	447	213	(18)
cost of capital	(21)	(222)	(62)
total value	427	(9)	(80)
– Market-consistent basis			
value of profits	(21)	(21)	(21)
cost of capital	(20)	(135)	(30)
total value	(41)	(156)	(50)
Risk-free return	5.25%	5.25%	5.25%
Traditional basis – risk discount rate	10.25%	10.25%	10.25%
Market-consistent basis – implied risk discount rate	74%	13.4%	7.4%
Market-consistent basis – implied beta	14	1.63	0.42

As Table 5.4 shows, using traditional appraisal valuation methods to value annuity business can result in values that differ as the asset mix backing the portfolio differs. However, as neither the value of the annuity liability nor the value of the assets is altered by the change in asset mix, this is an artificial result implying the existence of arbitrage.

Under the market-consistent basis, the value of profits does not vary by asset mix, however the aggregate market-consistent value varies as a result of the considerable variation in the cost of capital. At the individual product level, the differing levels of capital requirements appear to have a significant impact on market-consistent value. However, the cost of holding capital on a market-consistent basis considers all capital held in the business whether or not this is required to be held. Therefore, to the extent that free capital is available within the company and so there is no need for the

company to raise additional funds, then the market-consistent value at the total company level would not be impacted by the change in asset mix.

The results for the corporate bond asset mix scenario in Table 5.4 show a very large implied risk discount rate and beta. This is caused by the combination of relatively high projected profits (on a real world, best estimate basis), which are generated by the asset-liability mismatch, and low regulatory capital requirements. Under the matched asset mix scenario, the beta is greater than zero due to cost of capital effects.

The results in Table 5.4 show an example of traditional techniques capitalising the future projected mismatch profits, without adjusting the risk discount rate for the additional risk involved in mismatching the assets and liabilities. Market-consistent valuation techniques do not do this. To the extent that previous valuation techniques have capitalised future expected mismatch profits, determining a market-consistent valuation of the business may be expected to result in a reduction in the apparent value of the portfolio. Mismatch profits will then be recognised in future periods as the risk is borne and the profit is realised.

Conversely, traditional techniques will tend to understate the value of business that is perfectly matched because the risk discount rate is likely to be too high for the level of market-related risk in the product.

5.4 Participating Business

The impact of changing from traditional to market-consistent valuation methods on the value of a portfolio of investment account or traditional participating business is two-fold. Firstly, the economic cost of the gearing effect described in respect of unit linked business needs to be allowed for. This is done in the same manner as for unit linked business, and may be expected to result in similar valuation impacts.

In addition, the economic cost of the guarantees provided by the product needs to be allowed for explicitly. This cost depends very much on both the underlying guarantees of the product and the manner in which the business is managed. As such, it is difficult to generalise on how large an impact this will have on value. Allowing explicitly for the cost of the guarantee on a market-consistent basis may be expected to result in a reduction in the apparent value of the product.

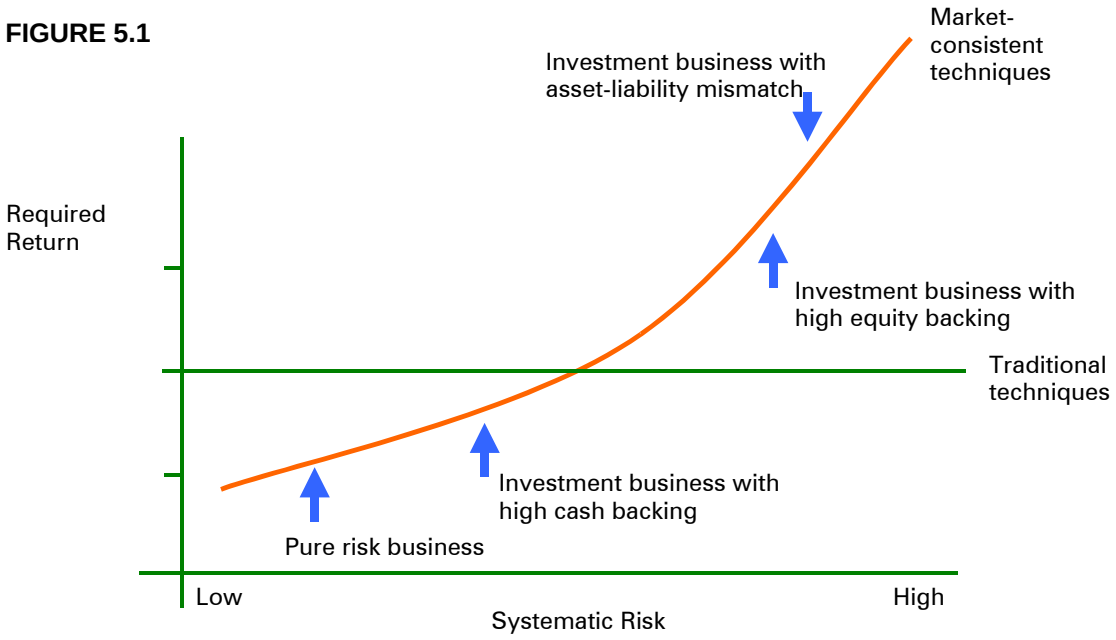
In determining the impact of the guarantee on shareholders' economic value, we need to be careful to properly reflect the operation of the participating business sub-fund of the relevant statutory fund. In most cases, the profit sharing mechanism is such that if a guarantee becomes payable in respect of a particular policy, then the cost of meeting that guarantee will be shared by the remaining policyholders and the shareholders in accordance with the profit sharing proportions. It is only when the aggregate level of guarantees payable exceeds the available assets in the participating business sub-fund that the cost falls 100% to shareholders.

Given the complexities involved and the product and portfolio specific nature of any results produced, we have not prepared numerical examples in respect of these products for the purposes of this paper.

5.5 Summary

Based on our analysis above, we would expect the likely required return by class of business on a market-consistent basis to be as represented in Figure 5.1.

FIGURE 5.1



The introduction of market-consistent valuation techniques may therefore be expected to have the following impact on the valuation of Australian wealth management products.

TABLE 5.5

Expected Impact on Value of Australian Wealth Management Products

Product	Expected Valuation Impact
Unit linked / unit trust	Depends on: asset mix, profitability level and fee structure
Risk	Increase
Immediate annuities	Depends on degree of mismatch. Matched business should increase, while significantly mismatched business should decrease
Investment account	Decrease
Traditional participating	Decrease

Overall, we anticipate that for large, well-diversified wealth management businesses, the impact on the aggregate value of the company is likely to be small, however, the allocation of the value by line of business is likely to change. Less well-diversified or mono-line businesses may see material changes in their aggregate valuation results.

6 IMPLICATIONS FOR BUSINESS MANAGEMENT

The examination of economic value on a market-consistent basis could have wide-ranging implications for wealth management businesses, well beyond simply business valuation and reporting. The implications of the new methodologies may be expected to be felt in the areas of:

- product pricing and design;
- mergers, acquisitions and other business investment decisions;
- asset allocation and investment policy;
- assessment of reinsurance arrangements; and
- profitability targets and assessment.

In particular, as more and more companies begin to adopt market-consistent valuation techniques in the management of their business, those that do not run the risk of being selected against, as a result of sub-optimal decisions regarding the trade-off between risk and return.

6.1 Pricing and Product Design

By better understanding the cost of guarantees, options and mismatches inherent in products, and therefore the expected profitability in a range of situations, companies are better able to determine an appropriate price for the risk they are taking on in writing a contract. Further, the impact of variations in product structures on risk and value from the company's perspective becomes apparent. For example, using market-consistent value techniques, the cost to a company of mismatched fee and expense structures in respect of unit linked products can be assessed relative to alternative fee structures that provide a better match to expenses. The example in Section 5.1 clearly shows how changes in product design can have a significant impact on the market-consistent value of a product.

In the short term, an assessment of the value of sales on a market-consistent basis will enable companies to target the segments of the market in which they wish to be most active, that is, those where current prices exceed those that would be required on a market-consistent basis. Conversely, it will also highlight those products where market prices are below those that would be required on a market-consistent basis, and companies will then be in a position to consider their new business plans in the light of this information.

Over the longer term, if the majority of companies are undertaking product design and pricing on a market-consistent basis, then market prices for various products may be expected to move to be more consistent with the results of these analyses.

6.2 Mergers, Acquisitions and Other Business Investment Decisions

In making decisions regarding purchases and sales of assets, investors are essentially forming a view as to whether or not the expected return available from a particular investment is sufficient to compensate them for the risks assumed. By applying market-consistent valuation techniques, investors are better able to make this assessment, taking into account the risk profile of the asset under consideration. This

is particularly important when investment decisions concern single lines of business or companies with a business mix that is not typical of the aggregate market.

The manner in which market-consistent valuations apply a cost to capital also has implications for investment and divestment decisions. As all capital is assumed to be subject to certain costs, rather than only locked-in capital as is the case in traditional valuation techniques, examining value on a market-consistent basis may provide a stronger case for companies to use excess capital or return it to shareholders, rather than leave it on the balance sheet.

6.3 Asset Allocation and Investment Policy

One of the key weaknesses of traditional appraisal values is that value appears to increase as additional investment risk is taken on. This can provide misleading signals to management regarding optimal investment strategies and the value of implementing hedging strategies.

Using market-consistent valuation techniques, the value of most liabilities will be independent of the assumed asset mix backing those liabilities. However the asset/liability profile will have an impact on the value of the company holding them due to the impact on both the capital requirement and the cost of financial distress, either or both of which may increase as a result of taking a more mismatched position. There is therefore a trade-off between the increase in expected return from taking a mismatched position against the impact on value from doing so.

In relation to certain lines of participating business where asymmetric risks exist, the asset allocation can have an impact on the economic value of the business to shareholders, because changes in the risk profile of the business can affect the allocation of value between policyholders and shareholders. In such cases, market-consistent valuation techniques enable the economic benefit of a reduction in risk profile to be determined. Shareholders and management are then in a position to make appropriate and well-informed decisions regarding the optimal asset mix for such business.

6.4 Assessment of Reinsurance Arrangements

Under traditional appraisal value techniques, the assessed impact on value of reinsurance arrangements depends only on the best estimate cash flows generated by the reinsurance arrangement. No allowance is made for the impact of the reinsurance on the risk profile of the business. Using market-consistent valuation techniques, the impact on economic value can be properly assessed by considering the impact on both expected returns and on risk.

This may result in certain reinsurance arrangements, where market-related risk is transferred from the cedant to the reinsurer, appearing more attractive than previously thought. Conversely, reinsurance arrangements that transfer only diversifiable risk, such as mortality and morbidity risk, away from the cedant may appear less attractive although they may still add value via a reduction in the market-consistent cost of capital.

6.5 Profitability Targets and Assessment

The market-consistent economic value framework may be used to assess company and management performance over a period, on a basis that takes into account both the returns generated and the risks assumed in generating those returns, particularly the risks that are yet to be borne at the valuation date. This is in contrast with traditional performance measures that focus only on returns and can implicitly reward managers for increasing the risk profile of their business.

The framework may also be used to determine a value-added measure for performance management, which compares the value generated in the year against the cost of capital provided to generate that value.

7 RELATIONSHIP BETWEEN MARKET-CONSISTENT VALUATIONS AND INTERNATIONAL ACCOUNTING STANDARDS

Developments in the creation of an international accounting standard for insurance liabilities are continuing with increasing momentum. However, a definitive set of valuation standards still appears quite a long way off. While it is dangerous to draw too many conclusions as to the shape of the final valuation standards while such change is going on, it appears highly likely that the underlying principles that will be adopted will be broadly consistent with the market-consistent valuation principles outlined in this paper. As such, companies that update their economic valuation techniques to a more market-consistent basis may expect to be better placed to implement international accounting standards when these are introduced.

We can, however, assume with reasonable confidence that whatever form the final standards take, there will be some potentially significant deviations from a pure market-consistent economic value approach. These differences may emerge in the determination of the cost of capital, the allowable franchise value, and also the valuation of existing liabilities. It is our expectation, therefore, that companies will still need to report to the market supplementary value information, much like the appraisal value information supplied today, but on a market-consistent basis.

8 CONCLUSION

8.1 Conclusions

Appraisal value techniques have served the wealth management industry well for many years. However, the techniques currently in widespread use have a number of weaknesses, and with the developments that have occurred in financial economics techniques over recent years, it is time for the actuarial profession to update some of its practices.

Key weaknesses of traditional appraisal value techniques include:

- no, or inappropriate, allowance for options and guarantees;
- capitalisation today of mismatch profits that should emerge in the future;

- capitalisation today of credit spreads that should emerge in the future; and
- the use of an average allowance for the impact of risk on value which does not change as the risk profile of the business changes and does not reflect the risks inherent in an individual line of business.

These can all be addressed by introducing financial economics techniques into the determination of economic values. These techniques enable the actuary to assess the true risks to which the business is subject, and value the business accordingly, without the need for assumptions regarding appropriate risk discount rates or capital levels.

For most Australian wealth management products, where there are limited embedded options and guarantees, market-consistent economic values can be determined in a relatively straight-forward manner using the certainty-equivalent approach by:

- assuming all assets earn the risk-free rate;
- adjusting non-asset-related cash flows to remove the market price of risk where material; and
- discounting all adjusted cash flows at the risk-free rate.

In most cases this can be done using existing models.

In other cases where the impact of options and guarantees could be significant, techniques are available to estimate the potential cost of these, ranging from identifying replicating assets for which a market price is observable to the construction of detailed stochastic models.

We expect that over the next few years, the adoption of market-consistent valuation techniques will have wide-ranging implications for the Australian and global wealth management industries, well beyond simply business valuation and reporting. The implications of the new methodologies may be expected to be felt in the areas of:

- product pricing and design;
- mergers, acquisitions and other business investment decisions;
- asset allocation and investment policy;
- assessment of reinsurance arrangements; and
- profitability targets and assessment.

Companies adopting these techniques will be much better placed than previously to assess the impact on company value of different business alternatives, taking into account both the risk and return implications. This will allow management to make better informed business decisions appropriately focussed on enhancing shareholder value.

8.2 Acknowledgments

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APPENDIX A - KEY PRINCIPLES UNDERLYING MARKET-CONSISTENT VALUATIONS

No arbitrage:	If two assets or liabilities have exactly the same cash flows in all possible circumstances, then they will have the same current value.
Replication:	Any asset (or liability) whose cash flows are driven solely by the performance of traded assets can be replicated through (dynamic) investment in a portfolio of these traded assets and the risk-free asset.
Equilibrium:	If two assets or liabilities have the same degree of market risk then the risk premium implicit in their value will be the same.
Diversification:	Investors do not require compensation for risks that they can remove through diversification.
Agency costs:	Investors require compensation for the loss of control over their capital.

APPENDIX B - PROJECTION APPROACHES

The example below provides a simple example of the application of the certainty-equivalent approach. We show how the market-consistent value of a simple investment bond policy can be calculated using a real world projection, and then derive equivalent results using the certainty-equivalent approach.

Projection Assumptions

Initial contribution	100,000
Term (in years)	5
Risk-free rate	5%
Equity risk premium	5%
Equity rate of return	10%

Proportion of account invested in equities	70%
Proportion of account invested in bonds	30%

Fees	1%	of account balance per annum
Expenses	200	dollars per annum

Using traditional techniques, we would project best estimate cash flows and use these to determine projected distributable profits. These projected distributable profits would then be discounted at the assumed risk discount rate, as shown in Table B.1 below. In this case we have assumed that the risk discount rate is equal to the assumed rate of return on equities (ie. a beta of 1.0 under the Capital Asset Pricing Model methodology).

Table B.1 TRADITIONAL APPROACH

Year	**NPV**	**1**	**2**	**3**	**4**	**5**
Policyholder Account						
Account BoY		0	107,415	115,380	123,935	133,125
Contributions		100,000	0	0	0	0
Investment income		8,500	9,130	9,807	10,534	11,316
Fees		1,085	1,165	1,252	1,345	1,444
Withdrawals		0	0	0	0	142,996
Account EoY		107,415	115,380	123,935	133,125	0
Company Profit and Loss Account						
Revenue	4,705	1,085	1,165	1,252	1,345	1,444
Expenses	758	200	200	200	200	200
Profit	**3,947**	885	965	1,052	1,145	1,244

In order to determine a market-consistent value, however, each cash flow should be discounted at the rate appropriate to the market-related risk in that cash flow. Table B.2 shows the results of such a valuation. The projected cash flows are exactly the same as those in Table B.1; it is only the present value of these cash flows that has changed. In this case, the value is determined not by discounting the projected profit, but by subtracting the discounted value of projected expenses from the discounted value of projected revenues.

Table B.2 MARKET CONSISTENT APPROACH: Real World

Year	NPV	1	2	3	4	5
Policyholder Account						
Account BoY		0	107,415	115,380	123,935	133,125
Contributions		100,000	0	0	0	0
Investment income		8,500	9,130	9,807	10,534	11,316
Fees		1,085	1,165	1,252	1,345	1,444
Withdrawals		0	0	0	0	142,996
Account EoY		107,415	115,380	123,935	133,125	0
Company Profit and Loss Account						
Revenue	4,901	1,085	1,165	1,252	1,345	1,444
Expenses	866	200	200	200	200	200
Profit	**4,035**	885	965	1,052	1,145	1,244

Alternatively, we can use the certainty-equivalent approach to determine the market-consistent value, which allows us to use a single risk discount rate applied to projected profits. To do this, we need to project all cash flows on a certainty-equivalent basis. In this example, this means projecting the assets to earn the risk free rate of return. Table B.3 shows the results of this projection. In this table, all asset related cash flows (ie. all cash flows except expenses) are different to those shown in Tables B.1 and B.2. We can now obtain the market-consistent value simply by discounting the projected profits in Table B.3 at the risk-free rate.

Table B.3 MARKET CONSISTENT APPROACH: Certainty-Equivalent

Year	NPV	1	2	3	4	5
Policyholder Account						
Account BoY		0	103,950	108,056	112,324	116,761
Contributions		100,000	0	0	0	0
Investment income		5,000	5,198	5,403	5,616	5,838
Fees		1,050	1,091	1,135	1,179	1,226
Withdrawals		0	0	0	0	121,373
Account EoY		103,950	108,056	112,324	116,761	0
Company Profit and Loss Account						
Revenue	4,901	1,050	1,091	1,135	1,179	1,226
Expenses	866	200	200	200	200	200
Profit	**4,035**	850	891	935	979	1,026

APPENDIX C - STOCHASTIC MODELLING

When we calculate a market-consistent value of an asset or liability, we are solving the following equation:

$$V_0 = E^Q\left[\sum_{t=0}^{T} H_t * \frac{D_t}{D_0}\right] \qquad \text{A.1}$$

where V_0 is the value at time t=0
H_t is the asset or liability cash flow at time t
D_t is the value of a numeraire asset D at time t
Q is a probability measure associated with asset D that preserves the following martingale property for any asset S:

$$S_t = E^Q\left[S_T * \frac{D_T}{D_t} \mid F_t\right] \qquad \text{A.2}$$

In other words, the expected discounted value of any asset, discounted at the return on the numeraire, is equal to the actual value.

This property is used in all option pricing applications, and underlies all of the analytic solutions to option prices, such as the Black-Scholes formula. The most common probability measures used are the risk-neutral measure, where the numeraire is cash, and the forward measure, where the numeraire is a zero coupon bond with term equal to the projection term. An alternative approach is to use state-price deflators, where the probability measure is set to be a so-called real-world measure (ie. each asset has an expected return that reflects its inherent level of risk) and the numeraire is chosen such that it makes equation A.2 a martingale.

The stochastic Monte Carlo method outlined in Section 4.2.2 is a numerical approximation to the expectation in equation A.1, and uses stochastic asset scenarios generated under the probability measure Q.

APPENDIX D - PROJECTION DETAILS

D.1 Unit Linked / Unit Trust Portfolio

TABLE D.1

Unit Linked / Unit Trust Portfolio Details

Average policy size	$28,802
Average age	48.6
Maintenance expenses (indexed with inflation)	$180 per annum
Annual management charge:	
– unmatched (Table 5.1)	1.60% per annum of funds under management
– matched (Table 5.2)	1.22% per annum of funds under management
Policy fee (indexed with inflation):	
– unmatched (Table 5.1)	$0 per annum
– matched (Table 5.2)	$120 per annum
Asset commission	0.40% per annum of funds under management
Asset mix:	
– high equity	80% equities, 20% bonds
– low equity	20% equities, 80% bonds
Earned rates:	
– equities	10.23% per annum
– bonds	5.23% per annum
Inflation rate	2.0% per annum
Discontinuances:	
– policy surrenders age <55	5% per annum
– policy surrenders age 55-64	15% per annum
– policy surrenders age 65+	30% per annum
– partial surrenders	2% per annum
– mortality	80% IA9092
Capital adequacy requirement:	
– unit linked	0.75% margin over account balance
– unit trust	0% margin over account balance
Agency cost of capital per annum	2.0% (applied to capital adequacy margin over account balance)

D.2 Yearly Renewable Term Portfolio

TABLE D.2

Yearly Renewable Term Portfolio Details

Average sum insured	$194,826
Average premium	$661 per annum
Average age	38.5
Maintenance expenses (indexed with inflation)	$100 per annum
Renewal commission	15% of premium
Asset mix	20% equities, 80% bonds
Earned rates:	
– equities	10.23% per annum
– bonds	5.23% per annum
Inflation rate	2.0% per annum
Lapse rate	
– year 1	10%
– year 2	15%
– year 3+	10% per annum
– attained age 60 and above	additional 15% per annum
Mortality	80% IA9092
Capital adequacy requirement	Unearned premium reserve
Agency cost of capital per annum	2.0% (applied to capital adequacy margin over market-consistent best estimate liability)

D.3 Term-Certain Annuity

TABLE D.3

Term-Certain Annuity Model Point Details

Annuity consideration	$11,197
Annuity payment per annum (in arrears)	$2,374
Term	5 years
Initial expenses	5% of premium
Maintenance expenses	$100 per annum
Earned rates:	
– equities	10.25% per annum
– corporate bonds	7.25% per annum
– government bonds	5.25% per annum
Capital adequacy requirement(1)	
– 100% corporate bonds	103% of annuity consideration
– 20% equity / 80% bonds	118% of annuity consideration
– 100% matched	104% of annuity consideration
Agency cost of capital per annum	2.0% (applied to capital adequacy margin over market-consistent best estimate liability)

(1) Capital adequacy requirement figures shown in this table are the initial capital adequacy requirement amounts immediately after the annuity consideration is paid but before any other cash flows.