The economics of insurance
How insurers create value for shareholders
## Contents

1 Introduction 4
   1.1 Why economic value? 5
   1.2 Document structure 6

2 How insurers create value for shareholders 7
   2.1 Insurers are liability-driven financial intermediaries 7
   2.2 Value creation in insurance companies 8
   2.3 Cost of capital for insurers 9
   2.4 Replicating portfolio 10
   2.5 Products with systematic risk 11
   2.6 Replication and mismatch risk 11
   2.7 Frictional capital costs 13

3 Economic value of liabilities 15
   3.1 A simple example 15
   3.2 Section appendix: incorporating all frictional items 18

4 Performance measurement 22
   4.1 A simple example revisited 22
   4.2 Treasury function and transfer pricing 23
   4.3 Performance attribution analysis 26
   4.4 Target setting 26
   4.5 Incentive compensation 27
   4.6 Section appendix: incorporating all frictional items 30

5 Managing risk and capital 32
   5.1 Drivers of the cost of taking risk 32
   5.2 Risk and capital management: main issues 34
   5.3 Amount of capital required 35
   5.4 Type of capital required 39
   5.5 Investing capital 40

Appendix: Literature 43
Foreword

The greatest shareholder value is generated by those insurers who identify and capitalise on the best business opportunities and have optimum operating efficiency. There are three important prerequisites for accomplishing these goals. First, a good understanding of the value creation process allows a clear identification of competitive advantages and an unambiguous allocation of responsibilities to specific functions within the organisation. Second, a framework for measuring value creation is indispensable in that it enables quantification and allocation of performance. And third, a consistent incentive system is needed to align the interests of management with the value creation goal.

Implementing a value measurement framework will also foster a better understanding of the value proposition for insurance or reinsurance – that the cost of taking risk is lower for the insuring entity than for the client. Understanding that value proposition allows employees to better identify value-creating solutions for both their clients and their own companies.

This publication provides this type of framework for understanding and measuring value creation based on a careful analysis of the fundamental economic principles underlying insurance business. In particular, this framework emphasises the importance of accounting for the cost of holding risk capital. It also shows that it is not the investment management activities of an insurance company, but their business origination skills and efficient capital cost management that ultimately enable them to create sustainable value for their shareholders.

Although this publication is founded on a detailed economic study, it specifically caters to practitioners. Examples that clearly demonstrate how to apply the framework in practice are provided, making it invaluable for insurance management seeking to improve long-term profitability.

Bruno Porro
Chief Risk Officer
Swiss Re

John H. Fitzpatrick
Chief Financial Officer
Swiss Re
1 Introduction

During the 1990s, many insurance markets worldwide experienced major changes. Until then, tight regulation had kept competition low and profit margins high. A strong focus on volume was all that was needed to manage an insurance company. The high profit margins did the rest. In such an environment, it is not surprising that managers were primarily assessed on market share. However, due to the combined effects of deregulation and globalisation, competition has intensified, bringing margins down. Competition has come not only from within the industry; the boundaries between banking and insurance have become increasingly blurred. Moreover, value awareness has increased across the entire economy, so that policyholders tend to focus less on long-standing relationships than on obtaining the best value for money.

As a result, volume alone has become an inappropriate driver of value. It has prompted insurers to sell covers at lower prices and to be less cautious in underwriting in order to protect and increase market share. In fact, prices dropped so low that the industry was effectively writing losses in economic terms. In its issue of 16 January 1999, The Economist describes the insurance industry as “an industry in dire straits”. Risks were being underwritten at half the price of only a few years earlier. The seriousness of the situation was partially masked by cosmetic accounting practices, such as the release of reserves accumulated in the past. However, reserves are not inexhaustible, and the true economic state of affairs has already started to show through: the industry has been selling its products at prices below production cost, thereby often destroying shareholder value.

In a changing environment, guiding principles need to be revisited. For the insurance industry, this means that to return to past levels of profitability, it is necessary once again to reflect on the underlying mechanism of value creation. Rules of thumb, such as maximisation of market share, frequently break down when conditions change. To address this need, this publication focuses on the value creation process in insurance. Having a clear idea of how value is created and how it can be measured is a necessary first step in managing for value. An economic value measure allows products to be priced with built-in value creation targets. Also, though not easy to implement, it makes it possible to relate management incentive systems to value creation, thus better aligning the interests of employees with those of shareholders. Moreover, an economic value measure allows strategic capital and risk management decisions to be assessed in terms of their ability to enhance company value.

---

1 In this publication, the generic term insurance encompasses reinsurance. Although the analysis is framed in terms of a shareholder company, it applies equally well to mutuals.
1.1 Why economic value?
Managers are ultimately judged on their ability to create value for the owners of the companies they manage. This is the case today, and always has been in the past. In current years, however, the topic has been the subject of renewed attention.

The discussions that have resulted from this increased attention focus less on whether value should be measured at all than on how it should be measured. Both the insurance industry and, more generally, the financial services industry until recently relied heavily on accounting methods to determine the value of assets and liabilities. However, there is a growing discomfort with these measures since, as is now widely recognised, they fail to reflect the true economic state of companies.

From an economic perspective, assets should be valued at market values and liability cash flows according to best estimates taking into account the time value of money. Ignoring this principle will conceal important economic information. First, artificial valuation principles will mask the true level of value created by a company, a primary concern for shareholders. For example, property and casualty liabilities are frequently valued at nominal values, ignoring the impact of interest rates. Second, artificial valuation methods may mislead managers about the risk associated with key sensitivities. For instance, using artificial discount rates may obscure the fact that insurance liabilities are potentially exposed to considerable interest rate risk. Also, many accounting valuation rules value assets and liabilities conservatively, which amounts to building hidden reserves. This is an open invitation to one of the most widely used cosmetic accounting techniques: smoothing results by appropriately timing the release of hidden reserves with the effect that emerging profits no longer reflect current performance. Other accounting rules, such as US GAAP, deliberately aim to smooth the emergence of profits in order to limit the scope for manipulating reserving levels. However, smoothing distorts the volatility and true economic condition of the underlying business. It may temporarily disguise underlying difficulties and prevent corrective action from being taken while it is still possible. Yet another drawback of accounting measures is that the underlying valuation principles can vary in detail across different countries, and even different product lines, making it virtually impossible to compare performance.

While these shortcomings may not be critical in a highly profitable and stable industry, they have become more pressing as competition and volatility have increased. These changes have reduced the tolerance for error in financial decision making. Moreover, more sophisticated measures of value are now required to properly assess the more complex products that insurers offer.
These issues have not gone unnoticed by the accounting profession. In particular the International Accounting Standards Board is in the process of developing a new standard for insurers based on economic valuation principles\(^2\).

Also from the actuarial side or from consulting firms drawing on standard banking practice, there has been no lack of attempts to overcome these deficiencies. In the life insurance industry, the embedded value method\(^3\) attempts to provide an economic view. However, though embedded values address the greatest problem of uncovering hidden reserves, it is not based on economic principles (see Section 4). On the non-life side RAROC\(^4\), or variations thereof, have also been proposed as a possible way out of the accounting trap. These methods are more or less straightforward extrapolations from standard corporate finance. However, the standard corporate finance toolkit, which was developed mainly to deal with industrial companies, does not translate well to insurance companies. As a consequence, these alternative methods are equally unsuited for insurers.

The inadequacy of the standard corporate finance toolkit is due to the peculiarities of the insurance business, a topic that has been the subject of much attention in recent years\(^5\). The special role of capital as a cushion against unexpected losses, as well as the many inefficiencies associated with holding this capital within an insurance company – regulatory, fiscal and other frictions – demand a more careful analysis. An important part of our considerations will be devoted to elaborating this point.

1.2 Document structure

This publication defines economic value in the context of insurance and provides a practical framework for measuring and managing value creation. Section 2 describes the value creation process for insurers. Using the analogy of a leveraged investment fund, it defines the cost of capital for an insurer. This shows that insurers create value chiefly through business origination and efficient capital cost management rather than through their investment activities.

For the practitioner, sections 3 and 4 provide a workable framework for measuring economic value. This framework is illustrated by way of an example. Section 3 describes how to measure the economic value of insurance liabilities. Section 4 shows how to construct an economic balance sheet and income statement. This chapter also highlights the three core functions within an insurance company: business origination, capital and risk management, and asset management. In particular, it describes how the performance for each of the three functions should be measured. A comparison with RAROC and the Embedded Value method is provided.

Section 5 considers how the framework can be used in business steering, stressing the importance of managing frictional capital costs.

A list of selected references is provided for the interested reader.

---

2 See the Insurance Accounting Standards Board’s Insurance Issues Papers available at their web page (www.iasb.org.uk).
3 The embedded value method estimates the value of excess reserves by discounting the expected future statutory profits from business in force.
4 RAROC stands for Risk Adjusted Return on Capital. This type of measure adjusts the returns of an insurer or bank for risk and puts it in relation to capital employed.
2 How insurers create value for shareholders

Shareholders of insurance companies provide risk capital that is invested on their behalf in financial assets. In so doing, shareholders relinquish direct control over the management of this capital and expose it to insurance risk. Moreover, due to the regulatory and tax environments of insurers, they are at a competitive disadvantage when investing this capital. Issuing insurance contracts only creates value after shareholders have been compensated for the resulting frictional costs. However, these distinctive costs which are characteristic for financial intermediaries are generally overlooked by traditional accounting practice and standard corporate finance theory.

2.1 Insurers are liability-driven financial intermediaries

In contrast to industrial companies, insurers do not generally leverage themselves as a means of financing attractive business opportunities. Instead, they do this because it is an integral part of their business operations. Insurers borrow money (premiums) by issuing debt in the form of insurance policies that pay the lender (policyholder) financial compensation if a pre-specified uncertain event occurs. The payments the insurer agrees to make are often uncertain concerning their size and timing.

To ‘produce’ insurance contracts, insurers rely on diversification and financial markets. By pooling contracts that are not perfectly correlated, aggregate losses become more predictable. By investing part of the premiums they receive in financial assets, insurers are able to generate the future cash flows needed to pay expected claims. Thus, insurers are liability-driven financial intermediaries: they originate financial contracts, ie insurance policies, and use financial markets to bridge the gap between today’s premiums and tomorrow’s claims.

A second distinctive feature of insurers is that they hold risk capital. While pooling reduces uncertainty, unexpected losses may still arise, potentially jeopardising the insurer’s ability to meet its obligations. This is a concern for policyholders and regulators, especially since insurance is usually purchased to transfer unwanted risk. Moreover, unlike bondholders who can readily reduce their credit risk exposure by holding a well-diversified portfolio of bonds with different issuers, policyholders generally cannot mitigate insurer default risk in any cost-efficient way. For this reason, policyholders usually accumulate their credit exposure with one or a few insurers and are thus particularly sensitive to the financial strength of the insurer, where financial strength is determined by rating agencies and regulators. Insurers recognise this need for security by holding risk capital, which provides a cushion against unexpected losses.
2.2 Value creation in insurance companies

The balance sheet of an insurance company essentially shows investments in financial assets balanced by insurance liabilities and the risk capital provided by shareholders. Thus, an insurance company resembles a leveraged investment fund in which debt is raised through the sale of insurance policies rather than via capital markets. However, two important features separate insurance companies from investment funds: their competitive disadvantage in investing and their competitive advantage in raising funds.

On the investment side, insurance companies compare unfavourably to an investment fund. They are more opaque and operate in a much less beneficial tax and regulatory environment than investment funds. For example, in contrast to investment funds, insurance company shareholders in most markets are liable to pay tax twice on the investment return on their risk capital. These returns are first taxed when they flow through the insurer’s taxable earnings and then again as part of shareholder’s taxable income when distributed as dividends. This makes it difficult for insurers to create value through investing.

Conversely, insurers have the ability to create value by borrowing in the much less efficient insurance market, rather than in capital markets. The insurance market’s inefficiency allows insurers to raise funds by selling policies for more than their economic cost, i.e., what it costs to ‘produce’ them. In so doing, they create value.

So why are policyholders willing to pay more than what it costs to produce the cover they buy? In principle, individuals could enter a pooling arrangement independent of an insurance company. However, risk-pooling arrangements are costly and insurance contracts have been found to provide an efficient means of lowering these costs. As long as it is cheaper to buy the cover from an insurer, policyholders will be willing to pay a premium above the production costs of a cover.

The value of the company to its shareholders has a tangible component (economic net worth) and an intangible component (franchise value) which represents the present value of economic profits from future business.

---

6 A leveraged investment fund is an investment fund which finances the purchase of financial assets partly by fund-holders’ capital and partly by debt (leverage).

8 Swiss Re: The economics of insurance
7 Economic net worth denotes the market value of assets less the the economic value of liabilities (debt).

The ability of insurers to create value is reflected in their franchise value. If insurers were only able to sell insurance at its economic value, their market capitalisation would be equivalent to their economic net worth. However, insurance companies generally trade at a premium over economic net worth. This premium, or franchise value, reflects the present value of investors’ expectations regarding the value created by future business. It is a reminder that shareholders expect insurers to create value.

2.3 Cost of capital for insurers

Up to this point, the value creation process has been discussed in general terms. The following subsections address the more technical aspects of value creation. Section 3 then shows, by way of example, how they can be applied.

Following the analogy of the previous section, an insurer’s opportunity cost of capital is the return that shareholders could otherwise achieve by investing their risk capital directly themselves plus additional compensation for various frictional costs that are specific to insurers. This provides the benchmark for value creation in insurance.

The return that they would have otherwise achieved by investing in a leveraged fund is called the base cost of capital. It represents the return that investors demand for the financial market risk that their capital is exposed to and depends on the investment strategy of the insurer. For example, for a UK insurer that closely matched its insurance liabilities and used the FTSE 100 index as a benchmark for excess capital, the base cost of capital would be equal to the return on the FTSE 100 index. This may be surprising at first. However, if a substantial part of the return on capital is obtained by investing this capital in financial assets, why should this return component differ from the return of a regular investment fund?

Thus the base cost of capital is equal to the benchmark return on the investment portfolio less the return required to support the insurance liabilities, known as the replicating portfolio return. This return is comparable to the cost of debt for a leveraged investment fund.

This would be the end of the story were it not for the fact that investing capital in financial markets through an insurance company gives rise to frictional costs which do not arise when investing the same capital more directly through an investment fund. These costs include compensation for lack of transparency and control, for the additional costs related to potential financial distress, for regulatory restrictions, and for any additional tax on investment income. These costs are discussed in further detail below.

Therefore insurers can create value in only two ways: first, by issuing insurance contracts that more than cover the associated ‘production’ costs, including frictional capital costs. Secondly, by achieving an investment result that beats the benchmark implicit in the base cost of capital on a risk-adjusted basis.

“...”

T. Copeland, T. Koller, J. Murrin
McKinsey & Company, Inc.
2000

9 Swiss Re: The economics of insurance
Having provided an overview of the value creation process, the following sub-sections provide further details on the key concepts, namely the replicating portfolio and frictional capital costs.

The replicating, or hedge, portfolio is used to determine the cost of the liability cash flows and the investment return required to support the insurance liabilities. It is simply defined as the portfolio that best matches the corresponding liability cash flows. For example, in the case of pure insurance risks, the liability cash flow can be replicated using risk-free fixed-income instruments with appropriate maturities. The market value of the replicating portfolio is then used to determine the value of the liability cash flows.

Replicating portfolios are routinely used in finance to value cash flows that are not actively traded. If non-traded assets were not valued relative to traded ones, investors would arbitrage the difference by essentially purchasing the cheaper cash flow and selling the more expensive one. This principle is known as the no-arbitrage principle. It ensures that clients are not able to arbitrage the insurer and that value reflects the market, or shareholder, view.

Therefore, the replicating portfolio provides the cash flows needed to meet expected future claims payments, to cover expenses, and to service capital costs, thus “producing” the liability.

Investing in the replicating portfolio will not eliminate all risk, as it is not possible to match insurance risk by replication. In principle, this risk component has no economic cost because it is non-systematic, i.e. it can be diversified away by shareholders. However, when insurance risk is held on the balance sheet of an insurer, it gives rise to frictional costs, which are considered in Section 2.7.

---

8 This means that the financial market risk of the net position – replicating portfolio less liability – is minimised.
2.5 Products with systematic risk
So far, the focus has been on pure insurance risk products. The only systematic risk that these products have is interest rate risk, which can be hedged by holding a matching fixed-income portfolio. However, insurance liabilities can and do have many types of systematic risk, both explicit and implicit. For example, some life insurance products have a savings component with a return that is linked to the performance of the insurer’s portfolio, subject to a guaranteed minimum rate of return. From the insurer’s perspective, this is equivalent to issuing a call option on its asset portfolio. The inflation risk embedded in many forms of insurance is also implicit systematic risk, since inflation is highly correlated with financial markets.

Although less tractable, products with a systematic risk component can be ‘produced’ in a similar manner. A replicating portfolio can be set up to hedge the systematic risk embedded in insurance liabilities. Standard derivative pricing techniques and factor models, such as the CAPM, can typically be used to construct these portfolios. The remaining risk is largely diversifiable and can be dealt with by pooling and holding risk capital.

Systematic risk is frequently not given specific attention in insurance valuation, possibly because the calculations are relatively complex. However, this practice is dangerous because valuation is particularly sensitive to systematic risk. Shareholders demand a significant premium for bearing this type of risk, as it cannot be diversified.

2.6 Replication and mismatch risk
It may not always be possible to find a portfolio of traded instruments that replicates the expected liability cash flows. For example, the cash flows from certain life insurance or long-tail business may extend beyond the horizon of available fixed income investments. This replication risk is the consequence of the strategic decision to be active in the insurance market for this type of product. It should be reflected in the frictional capital costs allocated to this product.

Replication risk is very different in nature from the risk of mismatching. By investing in the replicating portfolio, the insurer can hedge most of its exposure to systematic risk. This makes it clear that taking systematic risk is an active choice of the insurer, not an unavoidable consequence of doing business. The issue of whether or not to mismatch assets and liabilities will be further discussed in Section 5.

Option to default and value of liquidity
For convenience, the replicating portfolio is constructed using default-free and liquid market instruments. In practice, however, insurers could default on their liabilities, and it may be possible in principle to replicate the liability payments using less liquid instruments. These intangible factors reduce the value of the economic liabilities and the return required by shareholders. These technical aspects are considered in this section. Readers not interested in technical details can skip this section.
The insurer’s option to default

As with standard debt instruments, insurers have the option to default on their liabilities in the event of insolvency. Following bankruptcy, policyholders may not receive the full payment entitled to them. This option is an asset to the insurer and thus lowers the value of liability cash flows. As a result, the economic value of liability cash flows corresponds to their replication value less the value of the default option.

The fact that the option to default is an asset to the insurer does not imply that the insurer has any interest in defaulting. By defaulting, the insurer generallystands to lose substantial franchise value.

Excess liquidity and value

So far, the economic value of insurance liabilities has been described as the value of a replicating portfolio less the value of the insurer’s default option, where the replicating portfolio has been taken to be default-free and liquid. Another component that may also decrease the value of liabilities is related to the predictability of their timing and amount. Insurance cash flows are typically uncertain regarding both amount and timing. Due to diversification, however, a pool of contracts often displays a high degree of predictability both in timing and amount. This suggests that replication could actually be achieved by using illiquid assets. This is because the replicating portfolio would in principle not need to be adjusted over time. Instead, it could be held to maturity.10

Illiquid assets tend to sell at a discount with respect to their liquid counterparts, i.e., there is a premium for liquidity. Therefore, using illiquid instruments to replicate could in principle lower the production costs of liabilities or, equivalently, the cost of borrowing through insurance.

Unfortunately, illiquid instruments such as corporate bonds usually carry additional risks, such as default, subordination and call risk, which make them unsuitable for replication: they would not result in a portfolio that best matches the financial market risk sensitivity of the liability cash flows. These additional risks also make it difficult to quantify the liquidity premium. As a result, there are widely differing views on its size.

---

10 This condition would typically exclude life insurance contracts with surrender guarantees or natural catastrophe coverage.
2.7 Frictional capital costs

Unfortunately, unlike investment funds, insurers are subject to an unfavourable tax treatment and operate in a highly regulated environment where regulations are designed to protect policyholders rather than shareholders. These inefficiencies or frictions translate into the need to provide shareholders with an additional return on their risk capital over and above the base cost of capital. Frictional capital costs represent the insurer’s cost of taking insurance risk and capture the opportunity costs shareholders incur when investing capital via an insurance company rather than directly in the financial markets.

There are essentially four sources of frictional capital costs: double taxation, costs of financial distress, agency costs and costs of regulatory restrictions. Section 3 illustrates how to incorporate these costs into pricing, and Section 5 considers how these frictional costs can be managed.

Costs of double taxation

The first component is double-taxation costs, which has already been mentioned. Insurance companies are taxed on their investment return before it can be distributed to shareholders. This produces an additional cost component relative to an investment fund.

Costs of financial distress

The second component amounts to the compensation for potential direct and indirect financial distress. Selling insurance introduces the risk that an insurer will experience financial distress. Financial distress can be costly due to both direct costs – such as the dead-weight costs of needing to raise fresh capital, legal fees and lost value from distressed sales – and indirect costs – primarily loss of reputation and associated franchise value.

Note that financial distress costs are related to the riskiness of the insurance business. The resulting additional return will thus be linked to company-specific insurance risk or the risk of ruin, as opposed to systematic risk, even though this risk could in principle be diversified by shareholders. Financial distress costs thus provide the link to actuarial techniques that have traditionally focused on the probability of ruin.

Agency costs

The third component is agency costs. When shareholders invest via an insurance company, they entrust their capital to management, who take investment and underwriting decisions on their behalf. Shareholders expect management to act in their best interests, but this is difficult to control due to an intrinsic lack of transparency. As a result, shareholders require an additional return to compensate them for the possibility that management may not always act strictly in their best interests.

Agency costs are comparable to moral hazard in insurance, which occurs when the interests of the policyholder and the insurer are not in line with each other. The policyholder is likely to have better information than the insurer concerning the insured event and may seek to take advantage of this. In addition, being insured may encourage less prudent behaviour. Insurers manage this by way of...
careful contract design and by including the expected cost in premium rates. Similarly, shareholders require additional compensation for having given up control over their investments and for not being able to closely monitor the decisions taken on their behalf.

Cost of regulatory restrictions
The fourth and last component of frictional capital are regulatory capital costs that arise due to regulatory restrictions that may require insurers to hold minimum levels of capital to support specific blocks of business. These restrictions may take the form of either conservative reserving standards or minimum capital requirements. They create additional potential costs for shareholders, because this capital is not readily available to support other lines of business. It can only be physically accessed by selling the underlying business, which generally gives rise to additional costs that are heightened by the lack of a liquid market in insurance liabilities.

As discussed in Section 4, the cost of regulatory restrictions is the focus of the embedded value method.

Cost of capital and the CAPM
Insurers often confuse the return that shareholders demand on capital, i.e., the cost of capital, with the cost of taking risk. The return that investors demand for the use of their capital is composed of the base cost of capital – i.e., the return that investors could have obtained by investing those funds in financial markets directly – plus frictional capital costs – i.e., the extra return to compensate them for the fact that insurers are investing their capital through an insurance company to support risk taking in the insurance markets. Not making this distinction creates difficulties in determining value created by underwriting activities. This is because the benchmark for underwriting is given by the frictional costs and not by the full cost of capital. In addition, as returns on financial markets are volatile, the full cost of capital is a noisy and unreliable measure of value creation from the insurance side of the business.

An exclusive focus on the total cost of capital can be even more misleading if the cost of capital is measured using the CAPM, which was developed with industrial companies in mind and focuses on the systematic risk a company takes. Insurance companies take most of their systematic risk on the investment side. Whatever systematic risk is embedded in insurance liabilities can be hedged by offsetting positions on the asset side, so systematic risk is not the most important driver of the cost of taking insurance risk. The more important drivers, frictional capital costs, are not explicitly captured by CAPM. This will inevitably lead to wrong conclusions regarding the cost of taking risk for insurers. In addition, CAPM provides no, or misleading, guidance to insurers on how to manage their cost of taking risk.

Focusing on the cost of taking risk – as reflected by frictional capital costs – rather than on the total cost of capital gives insurers a better measure of value creation and also provides greater transparency as to how risk and capital management decisions can minimise this cost.

11 Depending on the circumstances, rating agency restrictions may be tracked in a way similar to regulatory restrictions.
3 Economic value of liabilities

The economic value of insurance liabilities is calculated as the present value of all expected future cash flows, including the cost of risk. In this calculation, the present value should be determined using a replicating portfolio to ensure that it incorporates current financial market information and accounts for the systematic risk characteristics of the cash flow. The cost of taking insurance risk is captured by the frictional costs of holding risk capital. This section illustrates this calculation by way of example.

3.1 A simple example

As discussed in Section 2, the economic value of liabilities is determined by their replication value, including frictional costs, less an allowance for the insurer’s option to default and any liquidity value of the contract.

This is best illustrated by way of a simple example that will also be used in Section 4 on performance measurement. The example focuses on the valuation of a pure insurance risk contract with cash flows payable over two years as shown in the table below.

<table>
<thead>
<tr>
<th>Time</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premiums</td>
<td>55</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>Claims</td>
<td>0</td>
<td>30</td>
<td>70</td>
</tr>
<tr>
<td>Expenses</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Risk capital¹²</td>
<td>20</td>
<td>15</td>
<td>0</td>
</tr>
</tbody>
</table>

For simplicity, we start by considering frictional risk capital costs only. This is sufficient to illustrate the principle. In the appendix to this section, we describe how to integrate the other key components, namely the option to default and the liquidity value, taxes on investment income, and regulatory capital costs.

The figures in the above table represent expected values, and all future cash flows are assumed to be paid at the end of each year¹³. Hence at inception this contract generates a premium of 55 and incurs initial expenses of 5. The risk capital needed to support the contract amounts to 20 during the first and 15 during the second year. Risk capital costs are assumed to be paid at the end of each year and amount to 2.5% of risk capital at the start of each year. The first step in determining the value added by this hypothetical contract is to determine the net cash flow payable, which is made up of claims and expenses less premiums. This cash flow pattern is shown in the table below. Frictional capital costs then need to be added and the resulting cash flow discounted.

Since the contract covers pure insurance risk only, the cash flows can be replicated using fixed-income instruments of appropriate maturities. Thus the value of the replicating portfolio can be derived by discounting the expected liability cash flows at risk-free rates of appropriate maturities. In this example, we use 5% per annum for the maturities of both one and two years¹⁴.

¹² Risk capital is defined as the amount of capital necessary to support the risk to which the company is exposed.
¹³ The assumptions used reflect the specific costs to the entity, rather than industry average conditions. For example, they reflect the actual expense structure of the insurer issuing the contract rather than the expense structure of a typical insurer. Non-entity-specific assumptions have been recommended where the objective is to determine the ‘exit’ value of the contract, regardless of who currently owns it. This is analogous to the issue in accounting of whether to value property according to its current use, eg a bowling alley, or its optimal potential use, say a parking lot. However, our objective is to determine the value of the contract to the company that issued it; we ask how much it costs them to produce the liability.
¹⁴ In practice, the discount rates should reflect the current term structure of interest rates.
The discounted values are also illustrated in the table below which shows that the economic liabilities that need to be established at inception are 47.12. Since the company received an initial payment of 50 after expenses, we can conclude that this contract generates an economic value of 2.88.

<table>
<thead>
<tr>
<th>Time</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net cash payments</td>
<td>50.00</td>
<td>19.00</td>
<td>-71.00</td>
</tr>
<tr>
<td>Risk capital cost</td>
<td>0.00</td>
<td>~0.50</td>
<td>~0.38</td>
</tr>
<tr>
<td>Net cash flow after frictional costs</td>
<td>50.00</td>
<td>18.50</td>
<td>~71.38</td>
</tr>
<tr>
<td>Economic liabilities</td>
<td>47.12</td>
<td>67.98</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Hence the replicating portfolio in this example has a market value of 47.12, consisting of zero coupon bonds of two years’ duration with a market value of 64.74 and a short position, or borrowing, in one-year zero coupons with a market value of -17.62.

This example can also be illustrated in the format of an income statement as shown below, where investment return is simply the return of the replicating portfolio. Note that the economic view recognises all anticipated profit at the start of the contract.

<table>
<thead>
<tr>
<th>Income statement</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premiums</td>
<td>55.00</td>
<td>50.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Investment return</td>
<td>0.00</td>
<td>2.36</td>
<td>3.40</td>
</tr>
<tr>
<td>Claims</td>
<td>0.00</td>
<td>~30.00</td>
<td>~70.00</td>
</tr>
<tr>
<td>Expenses</td>
<td>~5.00</td>
<td>~1.00</td>
<td>~1.00</td>
</tr>
<tr>
<td>Change in economic liabilities</td>
<td>~47.12</td>
<td>~20.86</td>
<td>67.98</td>
</tr>
<tr>
<td>Result</td>
<td>2.88</td>
<td>0.50</td>
<td>0.38</td>
</tr>
<tr>
<td>Risk charge</td>
<td>0.00</td>
<td>~0.50</td>
<td>~0.38</td>
</tr>
<tr>
<td>Economic profit</td>
<td>2.88</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

As mentioned earlier, insurers create value for shareholders by borrowing from policyholders at below-market interest rates. To highlight this point, the economic profit generated in this example can be expressed in terms of the cost of borrowing. The cost of borrowing is given by the internal rate of return based on the net cash flow. In this example, the internal rate of return is 2.4%. Since the equivalent market yield available to investors is 5%, the insurance contract generates a spread of 2.6%. In other words, this contract provides the insurer with funds at a borrowing rate of 2.6% below market rates. Note that, when performing this calculation, it is important to include frictional capital costs in the net cash flow and to use the replicating portfolio to determine the equivalent market rate. Moreover, it is often mathematically impossible to calculate an internal rate of return for insurance cash-flow patterns. For these reasons, we recommend that contracts should be assessed using economic profit rather than borrowing spreads.
As noted earlier, for the more technically interested reader, the appendix to this section extends this example by incorporating the default option and liquidity value, double tax, and regulatory capital costs.

Quantifying frictional capital costs
The quantification of capital costs is difficult in any valuation framework and requires a great deal of professional judgement. While this publication does not offer a recipe for quantifying capital costs, this section provides a rough guide as to how these costs may be determined.

Double taxation costs will depend on the tax jurisdiction and on how the assets are managed. As a rule, tax rates on investment income are readily available and may vary depending on the type of asset held or the type of income generated. As these rules are usually explicit, this generally does not present any difficulties in valuation. However, additional assumptions, such as the frequency with which capital gains are realised, may well be necessary.

Financial distress costs will largely depend on the risk profile of the company — ie on the likelihood of financial distress — and on the value of its intangible assets or franchise value. Studies of industrial companies have revealed that financial distress, as opposed to bankruptcy, results in costs of around 10–20% of market value. These costs are likely to be higher in the insurance industry due to the credit-sensitive nature of policyholders. An upper range for these costs is the franchise value of the company.

Agency costs depend on factors that are hard to measure, such as reputation and transparency. Nevertheless, they can be estimated by considering market comparables. For instance, spreads on cat bonds, which are unfamiliar and thus opaque to investors, can be considered as representing some type of agency charge. Also, the discounts typically applied by analysts to companies with excess capital on their balance sheets can be interpreted as being largely an agency charge. Based on these types of comparison, estimates of their size range between 5 and 200 basis points of capital held.

Regulatory restrictions are akin to liquidity restrictions, which have numerous market comparables. These include securities that are issued with trading restrictions, spreads on private placements, or the spread on off-the-run treasuries. Depending on the nature of the restrictions and the composition of the portfolio, estimates for these costs range between 0 and 200 basis points.

The default option and liquidity value can be quantified by considering the spread on the standard debt issued by the insurer, or like insurers. This spread typically represents an upper bound because policyholders usually rank above debt holders in the event of default. If the underlying liabilities are considered to be liquid in the sense described previously, then this spread should be further reduced by the liquidity premium implicit in corporate debt. This liquidity premium can be quantified using the same market comparables as those used for the regulatory restrictions.
3.2 Section appendix: Incorporating all frictional items

For completeness, this appendix briefly describes how to include the value of the option to default and liquidity value, taxes on investment income, and regulatory capital costs.

Default option and liquidity value

For valuation purposes, the option to default and liquidity value can be incorporated into the calculation of the liability value by increasing the discount rate applied to the net cash flows. For example, if the spread due to default and liquidity is 50 basis points then, as shown in the table below, the economic value of the liabilities at inception is reduced by 0.53 to 46.59. This increases the economic profit to 3.41.

Note that this does not imply that the replicating portfolio earns this additional return. As discussed previously, the replicating portfolio best matches the liability cash flows and is constructed using default-free and liquid instruments. The additional return of 50 basis points reduces the frictional capital costs; the replicating portfolio does not earn it.

<table>
<thead>
<tr>
<th>Time</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net cash flow after frictional costs</td>
<td>50.00</td>
<td>18.50</td>
<td>-71.38</td>
</tr>
<tr>
<td>Economic liabilities</td>
<td>46.59</td>
<td>67.65</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Including double taxation costs

The example of Section 3 can be further extended to incorporate tax, including double taxation costs, assuming a tax rate of 35%. In addition, assume that the total assets held to back the contract are given in the table below.

<table>
<thead>
<tr>
<th>Time</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory and tax reserves</td>
<td>100</td>
<td>70</td>
<td>0</td>
</tr>
<tr>
<td>Risk capital</td>
<td>20</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Total assets</td>
<td>120</td>
<td>85</td>
<td>0</td>
</tr>
</tbody>
</table>

As illustrated in the box on page 19, double tax costs can be determined by assuming that the assets held earn a risk-free rate of return. As a result, the expected risk-free investment return is 5% of 120, or 6, in the first year and 5% of 85, or 4.25, in the second year. These returns can then be incorporated into the tax calculation as shown in the income statement below.
Including this in the original net cash flow and discounting, allowing for the default option and liquidity value, results in an initial economic liability value of 65.86 and a corresponding economic profit of 1.64. This is shown in the table below.

<table>
<thead>
<tr>
<th>Time</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net cash flow after frictional costs</td>
<td>50.00</td>
<td>18.50</td>
<td>-71.38</td>
</tr>
<tr>
<td>Tax</td>
<td>17.50</td>
<td>-19.25</td>
<td>-1.14</td>
</tr>
<tr>
<td>Net cash flow after tax</td>
<td>67.50</td>
<td>-0.75</td>
<td>-72.51</td>
</tr>
<tr>
<td>Economic liabilities</td>
<td>65.86</td>
<td>68.73</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Valuing tax on investment income

Tax on investment income provides a good example of how replication can be used for valuation purposes. It is particularly useful because it shows how common intuition and practice can lead to misleading results.

The future tax payment is equal to the investment return earned on the capital invested multiplied by the appropriate tax rate. For example, if the capital invested is 100, the return 10%, and the tax rate 35%, then the tax payment would be 3.5.

To replicate this payment, we can use the following strategy: First, invest an amount equal to the tax rate times the capital in the same asset category as the underlying capital. In this example this would mean investing 35, which would be worth 38.5 at year-end.

Second, borrow by issuing a zero coupon bond with a face value equal to the tax rate times the capital. In this example, the bond would pay 35 at year-end.

Hence the year-end total cash flow on this portfolio would be 38.5 less 35, which equals the tax payment of 3.5. Note that the year-end value of this portfolio is always equal to the tax payment, no matter what return is earned on the underlying assets. As a result, it replicates the tax payment.

The present value of this replicating portfolio is equal to the capital invested of 35 less the amount borrowed. As the tax will be due with virtual certainty, the borrowing should be discounted at risk-free rates. Hence the amount borrowed would cost 33.33, assuming a 5% risk-free rate. Therefore the total cost of the replicating portfolio is 1.67.
Another way of looking at this is that the tax payment could be valued using risk-free rates of return. In other words, value the tax payment assuming that the capital is invested in risk-free instruments. In this example, this would be given by 35% of 5 discounted at 5%, or 1.67.

**Regulatory capital costs**

The calculation of regulatory capital costs is complicated because these costs depend on the size of the economic liabilities but at the same time are part of economic liabilities. This creates a circular calculation. Nevertheless, this can be overcome relatively easily.

The following income statements and balance sheets show the calculation assuming regulatory costs of 1%. Regulatory costs are assumed to be paid at the end of the interval based on the restricted capital at the start of the interval. This calculation assumes that the minimum regulatory capital requirements are 5 at inception and 3 at time one. The regulatory reserves were given in the previous section.

<table>
<thead>
<tr>
<th>Income statement</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premiums</td>
<td>55.00</td>
<td>50.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Investment return</td>
<td>0.00</td>
<td>3.31</td>
<td>3.44</td>
</tr>
<tr>
<td>Claims</td>
<td>0.00</td>
<td>-30.00</td>
<td>-70.00</td>
</tr>
<tr>
<td>Expenses</td>
<td>-5.00</td>
<td>-1.00</td>
<td>-1.00</td>
</tr>
<tr>
<td>Change in economic liabilities</td>
<td>-66.27</td>
<td>-2.51</td>
<td>68.77</td>
</tr>
<tr>
<td>Before-tax result</td>
<td>-16.27</td>
<td>19.81</td>
<td>1.21</td>
</tr>
<tr>
<td>Tax</td>
<td>17.50</td>
<td>-18.31</td>
<td>-0.85</td>
</tr>
<tr>
<td>After-tax result</td>
<td>1.23</td>
<td>1.50</td>
<td>0.36</td>
</tr>
<tr>
<td>Default option and liquidity value</td>
<td>0.00</td>
<td>0.33</td>
<td>0.34</td>
</tr>
<tr>
<td>Double taxation</td>
<td>0.00</td>
<td>-0.94</td>
<td>-0.28</td>
</tr>
<tr>
<td>Risk capital cost</td>
<td>0.00</td>
<td>-0.50</td>
<td>-0.38</td>
</tr>
<tr>
<td>Regulatory capital cost</td>
<td>0.00</td>
<td>-0.39</td>
<td>-0.04</td>
</tr>
<tr>
<td>Capital costs</td>
<td>0.00</td>
<td>-1.50</td>
<td>-0.36</td>
</tr>
<tr>
<td>Economic profit</td>
<td>1.23</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

The balance sheet shows the full breakdown of the liability value. Note that the above regulatory capital costs are simply equal to the restricted capital at the start of the interval multiplied by the 1% liquidity charge.
Also note that the default option and liquidity value are reported separately under the total assets. This is because there is more uncertainty associated with the quantification of this component and it is controversial, since deterioration in credit quality increases value. A decline in credit rating would increase the profitability of existing business, but possibly at the expense of the franchise value. As the franchise value is not included in these economic financial statements, it is important to separately quantify the impact of a reduction in credit rating on the existing business.

<table>
<thead>
<tr>
<th>Balance sheet</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investments</td>
<td>120.00</td>
<td>85.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Default option and liquidity value</td>
<td>0.63</td>
<td>0.33</td>
<td>0.00</td>
</tr>
<tr>
<td>Total assets</td>
<td>120.63</td>
<td>85.33</td>
<td>0.00</td>
</tr>
</tbody>
</table>

| Liabilities            |     |     |     |
| Discounted liability   | 44.44 | 66.67 | 0.00 |
| Expense provisions     | 1.86 | 0.95 | 0.00 |
| Deferred tax liability | 18.21 | 0.81 | 0.00 |
| Double tax liability   | 1.15 | 0.27 | 0.00 |
| Risk capital cost liability | 0.82 | 0.36 | 0.00 |
| Regulatory cost liability | 0.41 | 0.04 | 0.00 |
| Economic liability     |     |     |     |
| (before default option) | 66.89 | 69.10 | 0.00 |
| Restricted shareholder capital | 38.73 | 4.23 | 0.00 |
| Unrestricted shareholder capital | 15.00 | 12.00 | 0.00 |
| Total liabilities      | 120.63 | 85.33 | 0.00 |
4 Performance measurement

The previous sections have illustrated the importance of economic value and the way in which economic value is determined. This section shows, by way of example, how to structure an insurance company’s financial statements to facilitate performance measurement on an economic basis.

Performance measurement is a key component in value management. Historical performance should feed back into compensation arrangements, risk management, and future pricing assumptions (see Section 5). Monitoring the economic value of the company is also essential for managing capital and capacity levels and is important for shareholder communication. Therefore, a key ingredient in managing value is a set of financial statements that a) determine the economic capital of an insurer and the return achieved on that economic capital and b) explain the drivers of historical performance.

The underlying method used in performance measurement should be the same as that used in valuation or pricing. As a result, economic performance measurement is based on the same underlying principles as those discussed in previous chapters. These include the use of expected value assumptions, the use of replicating portfolios, and the incorporation of frictional capital costs. Moreover, economic performance measurement should recognise all anticipated profit at the inception of the contract.

4.1 A simple example revisited

In Section 3, we demonstrated the basic structure of the economic income statement and balance sheet for a single contract. In this section, we will extend that example to include deviations from expected cash flows as well as the investment returns earned on actual investments held. We also show how the economic result can be attributed to the various functions within the company. Before doing this, we will recapitulate the example in Section 3.

The expected cash flows at inception are shown in the table below:

<table>
<thead>
<tr>
<th>Time</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premiums</td>
<td>55</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>Claims</td>
<td>0</td>
<td>30</td>
<td>70</td>
</tr>
<tr>
<td>Expenses</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Risk capital</td>
<td>20</td>
<td>15</td>
<td>0</td>
</tr>
</tbody>
</table>

Again, starting with the simplest case of zero tax and regulatory capital costs, providing that everything develops as expected and under the assumption that interest rates do not change, the value of the contract at the end of the first interval is as follows:

<table>
<thead>
<tr>
<th>Time 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discounted liability</td>
</tr>
<tr>
<td>Expense provisions</td>
</tr>
<tr>
<td>Risk capital cost liability</td>
</tr>
<tr>
<td>Economic liability</td>
</tr>
</tbody>
</table>
Now suppose that the one-year interest rate at the end of the first year is 6%, rather than 5% as expected, and all other assumptions remain the same. Then the value of this contract is shown in the table below. The economic liability has reduced from the original expectation because the expected future cash flows are now discounted at a higher interest rate.

<table>
<thead>
<tr>
<th>Time 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Discounted liability</td>
<td>66.04</td>
</tr>
<tr>
<td>Expense provisions</td>
<td>0.94</td>
</tr>
<tr>
<td>Risk capital cost liability</td>
<td>0.35</td>
</tr>
<tr>
<td>Economic liability</td>
<td>67.33</td>
</tr>
</tbody>
</table>

In addition to the change in interest rates, assume that the actual claims and expenses paid at the end of the first year are 25 and 2, respectively, rather than 30 and 1 as expected. The corresponding economic income statement is shown below.

<table>
<thead>
<tr>
<th>Income statement</th>
<th>Time 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premiums</td>
<td>50.00</td>
</tr>
<tr>
<td>Investment return (replicating portfolio)</td>
<td>1.71</td>
</tr>
<tr>
<td>Claims</td>
<td>-25.00</td>
</tr>
<tr>
<td>Expenses</td>
<td>-2.00</td>
</tr>
<tr>
<td>Change in economic liabilities</td>
<td>-20.21</td>
</tr>
<tr>
<td>Result</td>
<td>4.50</td>
</tr>
<tr>
<td>Risk charge</td>
<td>-0.50</td>
</tr>
<tr>
<td>Economic profit</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Note that the investment return has reduced from 2.36 in the projected income statement calculated at inception to 1.71. This reflects the value reduction of the replicating portfolio due to the increase in interest rates. Note, however, that the change in economic liabilities is now -20.21, compared to the expected value of -20.86 at time zero. The replicating portfolio therefore immunises the result from changes in interest rates.

The economic profit of 4 results from claims being 5 lower than expected and expenses being 1 higher than expected. The change in interest rates has no impact on the economic result.

4.2 Treasury function and transfer pricing

The income statement in the previous section is based solely on the replicating portfolio. However, insurers generally do not invest in the replicating portfolio and the overall financial statements should reflect the performance of the actual investment portfolio held. Furthermore, they should distinguish between earnings generated by underwriting activities and earnings generated by investment activities. This is achieved by introducing a treasury function.
The treasury function is used to properly allocate investment returns and capital costs between the underwriting and investment activities within an insurer. This need not necessarily be an explicit function within the organisation, but it is always implicit. It is used to split the overall financial statements into investment, treasury, and underwriting components using the replicating portfolio and a Strategic Asset Allocation (SAA) benchmark portfolio, as shown in the graph below.

The process underlying this approach can be summarised as follows.

As the underwriting function specialises in insurance risk, it minimises its exposure to financial market risk by purchasing the replicating portfolio from the treasury. This ensures that the underwriting performance is not influenced by investment decisions. The underwriting function is supported by shareholder capital held in the treasury balance sheet. The cost of providing this support is represented by the frictional capital costs paid.

The treasury function determines the level of financial risk that the company should take for strategic reasons by specifying the SAA benchmark for the investment function. As a result, the treasury balance sheet is comprised of assets represented by a loan to the investment function of the SAA portfolio and liabilities represented by borrowing from the underwriting function of the replicating portfolio. Therefore, the treasury function isolates the impact of the strategic asset-liability mismatching decision. The shareholder capital, or equity, in the company resides in the treasury balance sheet. Note that by specifying the SAA, the treasury function tacitly determines the base cost of capital.

For simplicity, this graph excludes the default option and liquidity value components. The impact of these components is illustrated in the graph in Section 2.
The investment function uses the SAA as a benchmark, but has discretion, within limits, on tactical asset allocation and stock selection. The investment balance sheet includes the actual investment portfolio as the asset and the SAA benchmark as the liability. The investment balance sheet separately identifies the impact of investment decisions.

The above separation implies a corresponding separation of the income statement. This can be illustrated by extending the above example. Assume that the insurer in this example holds total assets of 120 at inception that earn a return of 10%, compared with a return of 9% on the SAA benchmark for a similar level of market risk. Then the investment function adds value of 1% of assets or 1.2 and the overall income statement is structured as shown below.

<table>
<thead>
<tr>
<th>Income statement</th>
<th>Total</th>
<th>Insurance</th>
<th>Investment</th>
<th>Treasury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premiums</td>
<td>50.00</td>
<td>50.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment return</td>
<td>12.00</td>
<td>1.71</td>
<td>12.00</td>
<td>-1.71</td>
</tr>
<tr>
<td>Claims</td>
<td>-25.00</td>
<td>-25.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expenses</td>
<td>-2.00</td>
<td>-2.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in liabilities</td>
<td>-20.21</td>
<td>-20.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Result</td>
<td>14.79</td>
<td>4.50</td>
<td>12.00</td>
<td>-1.71</td>
</tr>
<tr>
<td>Base cost of capital</td>
<td>-9.09</td>
<td>0.00</td>
<td>-10.80</td>
<td>1.71</td>
</tr>
<tr>
<td>Risk capital cost</td>
<td>-0.50</td>
<td>-0.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital costs</td>
<td>-9.59</td>
<td>-0.50</td>
<td>-10.80</td>
<td>1.71</td>
</tr>
<tr>
<td>Economic profit</td>
<td>5.20</td>
<td>4.00</td>
<td>1.20</td>
<td>0.00</td>
</tr>
</tbody>
</table>

The insurance function receives the return on the replicating portfolio from the treasury function. The investment function receives the total investment return and is charged with the return on the SAA benchmark. The treasury function is not a profit centre; it is merely used to transfer payments between the investment and insurance functions. It pays out the return on the replicating portfolio to the insurance function, subsequently receives the return on the SAA benchmark 10.80, and is charged with the overall base cost of capital -9.09 (1.71 in aggregate).

Note that, in this example, the expenses of the investment function have been included in the insurance function’s expenses. This is because the insurance function is assumed to pay a fee to the investment function that precisely matches their expenses. In practice, these fees and expenses may be explicitly reported to assess whether the additional expenses associated with active management are justified by additional returns.

The appendix to this section shows how to include the option to default and the value of liquidity, double taxation costs and regulatory capital costs.
4.3 Performance attribution analysis

While the economic income statement records the overall result, it is generally insufficient to fully explain it. This difficulty is exacerbated if multiple business lines, with contracts having different inception dates, are consolidated together in a single statement. To address this, a *performance attribution analysis* is required.

A performance attribution analysis is designed to explain the overall result in terms of the key drivers of value. On the insurance side, the minimum requirement for an attribution analysis is to split the overall result by main line of business and into the contribution from new business and from existing business. This could be extended by splitting the performance of existing business by year of inception. For the new business, the result should be compared with the initial profit targets set. For the existing business, the expected result is zero and any deviations should be explained. For example, by identifying the impact of any changes to the reserving assumptions or by identifying the impact of experience being different from each key assumption. As the importance of these factors vary by product and market, it is not possible to produce a generalised insurance attribution analysis.

On the investment side, an attribution analysis would split the investment economic profit into the key factors driving investment performance, including asset allocation, currency selection, stock selection, or sector selection. This information is essential for understanding the result so that appropriate management action can be taken where necessary.

4.4 Target setting

As discussed previously, shareholders typically expect insurers to earn an economic profit, and this expectation is implicitly reflected in the company’s franchise value. Only if shareholder profit expectations are exceeded will the share price increase. As a result, for incentive compensation and in communicating with shareholders, it is important for managers to set economic profit targets.

The franchise value of an insurer provides an overall yardstick for value creation, but it says nothing about when this economic profit is expected to arise or which units are expected to deliver it. It is possible to estimate the annual profit expectations by multiplying the franchise value by a suitable discount rate, which reflects current long-term interest rates and a systematic risk premium associated with realising future new business sales. This approach assumes that the franchise value reflects a constant profit stream paid in perpetuity. However, there is no mechanistic way of setting profit targets for individual business units.

The targets for individual business units should be based on a range of considerations relating to the current and likely future competitive state of the local insurance market. This is, and always has been, one of the key tasks of management: to judge the level of profit that maximises long-term value. These targets should be benchmarked against other companies operating in similar circumstances, if possible. They should also be added up and com-
pared with the overall target implicit in the franchise value. This comparison provides management with an indication of the extent to which the market is over or undervaluing the company. This information is invaluable for investor relations and capital planning.

4.5 Incentive compensation

Having an incentive compensation system linked to economic profit is not only an essential part of encouraging value creation, but is also vital for risk management. The primary cause of financial fiascos is usually a misalignment of incentives.

However, effective incentive systems need to be carefully constructed and do not simply entail including economic profit in bonus calculations. Incentive compensation should be unambiguously linked to economic value creation. In addition, senior management must be seen to be fully committed to value management, and employees need to be well informed about the value measure. The value measure must be accepted as being fair.

Implementing economic value-based incentives in insurance is further complicated by the nature of the insurance business. Insurers make risk-taking decisions on an *ex ante* basis – i.e. before risks are realised. An ideal incentive system would reward decision makers for making the right decision *ex ante* rather than reward them for being fortunate or penalise them for being unfortunate. In most cases, however, the performance of business units and managers can be measured only on an *ex post* basis – i.e. after risk is realised. An *ex ante* system would also be difficult to justify to shareholders, and would probably result in increased agency costs.

Implementing an incentive system for insurers is also complicated because it should be based on the full downside of the risk as well as on the full upside. Giving managers who create economic profits on an *ex post* basis a bonus, but not penalising those managers who produce negative economic profits, gives managers a free put option. They can maximise the value of this option by maximising the amount of risk taken. But this behaviour leads to poor operating efficiency and puts the solvency of the firm at risk.

Including the full downside of risks in an incentive system can be problematic, particularly for low-frequency, high-severity risks. One solution is to implement a deferral system where bonuses are initially paid into a trust and only paid out to employees after a number of years. Negative bonuses can then be offset against any positive balance in the bonus trust. In effect, the deferral system averages out the riskiness of economic profit. It also encourages employee retention if the trust is not paid out when the employee leaves the firm. However, the amount of smoothing that can be accomplished with a deferral system is limited, since incentives lose their impact when the payout is extended far into the future. This is a particular difficulty for long-tail business, such as casualty and some life lines of business where even a five-year deferral system is relatively short.
It is reasonable to base incentives on total economic profit for executives who are responsible for a diversified portfolio of risks. However, for line managers at a lower level, the portion of total compensation tied to economic profit is limited by the riskiness of the underlying business. For high-risk business, which produces either losses or extreme profits, it would be unacceptable to base compensation entirely on economic profit.

For employees below the line management level, incentives based upon the economic profit produced by their business units are less effective. This is because the impact of an individual on the performance of the group is diluted. A more effective incentive system at this level would identify the drivers of profit that an individual can impact and then link compensation to those drivers only. For example, in companies where the underwriting function is separate from the marketing function, it is advisable to implement a two-stage incentive system. Underwriters calculate the economic value of insurance contracts. This economic value is used as a benchmark to measure the performance of the marketing unit. Marketing staff are rewarded for selling insurance above this economic value. Underwriters are rewarded for producing \textit{ex ante} risk prices that are in line with their \textit{ex post} costs. In this incentive system, it is important that the incentives for underwriters be symmetric -- i.e. they are penalised when the \textit{ex post} cost is either higher or lower than their \textit{ex ante} price. In practice, this implies a high baseline bonus that is subsequently reduced to the extent that the price was higher or lower than cost.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
\textbf{Comparison with other value measures} & \\
\hline
\textbf{Embedded Value} & The embedded value method is most popular with British life insurance companies. It calculates the value of existing business, termed in-force value, as the discounted future statutory profits that are expected to emerge on this business. The risk discount rate used in this calculation is intended to represent the insurer’s overall cost of capital and is typically around 3\% above risk-free rates. The embedded value is then given by the sum of the in-force value and the market value of the statutory shareholder capital. The reason given for basing the embedded value calculation on statutory accounts is that they determine when the capital is available for distribution. \\
\hline
\end{tabular}
\caption{Comparison with other value measures}
\end{table}

The embedded value method is a special case of the economic framework described in this publication. It can be derived by using expected earned rates on the backing assets rather than spot forward yields, by setting the risk capital costs to zero, and by setting the regulatory capital cost to the difference between the risk discount rate and the expected earned rate. This indicates that the embedded value method is not based on economic principles for the following reasons:

Firstly, using the embedded value method, value is based on the composition of the backing assets rather than on the risk characteristics of the cash flows being valued. This is because the projected statutory profits are calculated incorporating expected investment returns. For example, the projected investment cash flows on corporate bonds are assumed to be the future coupons multiplied by the probability that the bond is not in default. As spreads on corporate bonds are typically greater than their corresponding default probabilities, the embedded value method generally places a higher in-force value on business backed by corporate rather than government bonds.
The embedded value method creates a bias towards high-yield investments that is not justified from an economic perspective. The value of the liabilities should be independent of the composition of the backing assets.

As a result, the embedded value method fails to respect a fundamental principle of financial economics: that the cost of capital should depend on the use of funding and should only depend on the source of funding to the extent that the source of funding affects frictional costs, such as tax and costs of financial distress. Whether a project is funded by equity or debt should be largely irrelevant to its value. In so doing, the embedded value method does not properly account for the difference between non-diversifiable, or systematic, versus diversifiable risk.

Secondly, the embedded value method levies frictional capital costs solely on the basis of regulatory restrictions. It does not explicitly allow for frictional risk capital costs. Thus, in the extreme, if two lines of business were written in different territories, the one line being virtually risk-free but requiring high regulatory reserves, the other being risky but only requiring low levels of regulatory reserves. Then the embedded value method would penalise the former line regardless of the level of risk inherent in the other line.

Thirdly, under the embedded value method, the level of the regulatory capital charge is highest for business backed by the lowest yielding assets. This would typically mean that the least risky business would be allocated the highest frictional capital costs.

Lastly, as the embedded value method is based on expected cash flows it does not easily accommodate options and guarantees. The economic method properly allows for these by valuing them based on a corresponding replicating portfolio. Valuing these options based on expected cash flows is likely to understate their value.

RAROC
RAROC, or risk-adjusted return on capital, is a performance measure that is typically defined as discounted economic profit divided by risk capital. There are many different variations to the name and calculation of this measure. It is not inconsistent with the economic framework outlined in this publication and can be a useful steering measure if capital were a scarce resource.

If capital were plentiful, then the only criteria for accepting business should be whether economic profit is positive. Conversely, if capital were scarce, then it should be allocated to the projects that are expected to earn the greatest economic profit relative to the capital invested. This relationship is quantified by the RAROC measure and is equivalent to allocating profit targets based on risk capital.

The difficulties with RAROC measures tend to arise because of the measures of profit or capital that are sometimes used. In many cases, capital costs are not included in the economic profit measure. Instead, they are incorporated in a RAROC hurdle rate. This is problematic because this approach implicitly assumes that all capital costs are proportionate to economic capital. However, this is generally not the case for regulatory and tax costs.

Another problem with the application of RAROC hurdle rates lies in the way the hurdle rate is calculated. In many cases, the hurdle rate is measured using the CAPM model. As stressed previously, the capital costs incurred as a result of writing insurance risks are primarily frictional capital costs. Capital cost measures based upon CAPM largely ignore these costs, stressing instead the base cost of capital that is primarily incurred on the investment side of the business.

16 This is a consequence of the Modigliani and Miller propositions.
Some versions of RAROC also consider capital utilisation only in the initial year. This tends to overstate the profitability of longer-term contracts. Properly constructed, RAROC measures should include the discounted risk capital over the duration of the contract, rather than just initial risk capital.

Some RAROC measures also discount expected returns at the expected earned investment rate. This approach has similar problems to the embedded value method. It does not properly value systematic risk and it is biased towards higher yielding backing assets. It is important that the replicating portfolio replicates the systematic risk in the corresponding cash flows. Note that risk capital generally does not properly account for systematic risk because it is measured relative to the insurer’s insolvency, rather than market, risk.

If misinterpreted, RAROC can also create incentives to take excessive investment risk. When a company takes more investment risk, the amount of economic capital allocated to investment risk rises and the amount allocated to insurance risks generally falls. As a result, RAROC results for insurance units will tend to rise as insurers increase their investment risk. However, this does not necessarily imply that the profitability of the company has increased.

4.6 Section appendix: Incorporating all frictional items
To make the above example more realistic, tax, company default risk, and regulatory restrictions on capital should also be included. This is illustrated in the financial statements shown below. These statements are based on the original assumptions and further assume that statutory reserves are equal to undiscounted expected future claims and that in addition regulators require minimum capital of 5 at inception and 3 at time 1.

A tax rate of 35% has been used, where tax is payable on the statutory result and is initially due at inception.

The allowance for the insurer’s default option and liquidity value is assumed to be an additional spread of 50 basis points. The impact of this spread has been included in the base cost of capital for the insurance operations in the income statement and under the assets in the balance sheet. As mentioned previously, this enables the impact of a change in credit rating to be isolated and excluded if necessary.

The income statement shows that the insurance operations achieved an economic profit of 2.60 after tax, which is simply the pre-tax profit of 4 less tax at 35%. The investment operation achieved an economic profit of 0.78, which is the pre-tax outperformance of 1.20 less tax at 35%. The overall economic profit is equal to 3.38.
Note that the investment return allocated to the insurance function is considerably higher than in the previous example. This largely reflects the return on the portfolio that replicates the double taxation payment. As in the original simplified example, this illustrates that the insurance function result is immunised from changes in investment conditions.

In addition, the line item double taxation does not add any additional costs to the insurer overall because tax on investment income is already included in the tax line item. The double taxation line item is used to re-allocate the tax incurred on the SAA benchmark to the insurance and treasury functions.

The balance sheet shows that the total economic shareholder capital is 16.59. Of this total, 4.59 cannot be realised without infringing the regulatory restrictions and 12 can be realised without restriction. It also shows the full breakdown of the economic liabilities, including the default option and liquidity value.
5 Managing risk and capital

Measuring the economic value of insurance contracts renders transparent the costs of producing insurance and thus reveals the actions insurers can take to manage these costs. Of particular importance is managing the cost of taking risk, which is determined by frictional capital costs. These are often a significant component in providing insurance coverage. However, they are often managed inefficiently or even ignored.

Insurers have many opportunities to manage capital costs. For example, diversification and hedging are tools that can be used to lower the amount of capital a company needs to support insurance risks. Holding tax-efficient investments, such as equities that allow tax deferral on capital gains, reduces the cost of holding capital. Risk transfer to financial and reinsurance markets can also be used effectively whenever the cost of taking risk is higher than the cost of transferring risk.

The assessment of most risk and capital management strategies is complicated by the fact that they inevitably involve a trade-off between risk and return. For instance, investing in equities can save on tax expenses and result in higher investment returns, but can also involve taking more risk and therefore increase capital costs. As a result, the ability to quantify the risk-return trade-off on company value is a critical ingredient for effective risk and capital management.

5.1 Drivers of the cost of taking risk

The goal of risk and capital management should be to enhance operating efficiency by minimising the costs of taking risk. This requires a deep understanding of the drivers of capital costs as well as the tools that insurers have at their disposal to influence those drivers. The sources of these costs were discussed in previous sections. Here, we emphasise the drivers of those costs.

Base cost of capital

The base cost of capital is the benchmark return on the asset portfolio less the return on the replicating portfolio. As a result, the base cost of capital depends on the insurer’s investment strategy. An insurer who invests his capital conservatively will have a lower base cost than one who pursues an aggressive investment strategy.

However, the base cost of capital does not directly impact value creation or operating efficiency. This is because shareholders do not benefit from a strategy that only changes the base cost of capital. In principle, they could unwind changes to the base cost of capital by making corresponding changes to their own portfolios. For example, if an insurer switched from equities to bonds, then shareholders could in principle nullify the impact of this by selling equivalent bonds and purchasing equivalent equities in their own portfolios. Shareholders would only benefit indirectly to the extent that the investment strategy reduces operating and frictional costs. Though it obviously has an important impact on the earnings of the company, the base cost of capital per se is not a driver of value creation. It just represents the appropriate reward for the level of financial market risks to which shareholders’ capital is exposed and therefore merely provides a minimum benchmark for asset management.
Double tax
Insurers in most countries pay tax on the investment income they receive from their capital base. Investors could avoid this tax if they held these investments either directly or in an investment fund. The tax payments on capital income are a cost of holding capital in an insurance company and therefore are a cost of taking risk.

Insurers can manage their double tax costs by their financing and investment decisions. For instance, insurers can finance themselves with hybrid equity, which has the tax characteristics of debt, but the risk characteristics of equity. They can also hold their investments in low-tax environments and invest in assets that are taxed favourably. Even the choice of active or passive management styles influences the tax burden on capital income. These issues will be discussed in more depth later.

Cost of financial distress
Taking insurance risk increases the probability that an insurer will experience financial distress. Financial distress can be costly due to both direct costs, such as legal fees and lost value from distressed sales, and indirect costs, primarily loss of reputation and franchise value. Generally, indirect costs are the dominant source of costs from financial distress and so this cost is sensitive to the size of the company’s franchise value. Companies with a substantial franchise value therefore have an incentive to control their risk level. This can be achieved by either holding a greater amount of risk capital or by the use of risk transfer.

An additional benefit of efficiently controlling risk is that it reduces the level of noise or unnecessary volatility in the profit and loss statement. This is particularly important because of the high level of agency costs in the insurance industry. Eliminating noise helps insurers to clearly demonstrate their ability to create sustainable value.

Agency costs
Investors are naturally reluctant to allow someone else to manage their money for them simply because there is always a possibility that they may not manage the money in their best interest. This is true for any investment, but is particularly important for an insurer because the insurance industry is not transparent to outsiders. This makes it difficult for investors to monitor the decision making of insurers. As a result, investors demand a higher return on their capital.

Reputation, transparency, and incentive structures are critical factors for reducing agency costs. Reputation is a particularly important factor for agency costs. A long record of doing the right thing with investors’ money makes investors more comfortable with the potential future decisions of the company. A good reputation with investors is a valuable asset for an insurer and can form a significant part of a company’s franchise value. However, reputation needs to be constantly reinforced because of the relative opaqueness of insurance companies. Once shareholders lose confidence in management, it is extremely difficult to restore.
Transparency is improved by better and more timely, rather than more voluminous, reporting. There are limits to the amount of information that investors can efficiently process and producing this information is costly. Moreover, client confidentiality and competitor pressures limit the type of information that can be disclosed. As far as the relevance of the information disclosed is concerned, accounting profit and loss statements are notoriously bad indicators of value creation for insurance companies, as investors are well aware. Insurers have a long history of using numerous accounting mechanisms to smooth profits. This may be advantageous in the short-term, but in the long run makes investors distrustful and is likely to be counterproductive. As a result, many companies are now reporting their internal measures of value creation to shareholders in an effort to improve transparency.

Agency costs can be further reduced if these internal measures are linked to incentive compensation: this obviously assumes that the measures are valid and accepted by shareholders. This better aligns the interests of managers with the interests of shareholders.

The scale of a company also impacts the transparency it can achieve because large companies are more likely to get press coverage and be followed by financial analysts. Financial analysts spend a great deal of time sorting through accounting statements trying to get a better picture of shareholder value creation that they then pass on to shareholders.

Lastly, the life cycle of the company is an important determinant of agency costs. Young companies have typically not had a chance to establish a reputation. Because they are generally small, it is also harder for them to get their message across and so transparency suffers. This creates a considerable barrier to entry in the insurance market.

**Regulatory capital costs**

Regulators impose restrictions on the level of capital held to support insurance business. These restrictions result in potential liquidity costs because this capital is not readily available to support other lines of business.

The primary driver of this cost is the regulatory environment the business is written in. To a limited extent, insurers can exercise control over this cost by efficient risk transfer.

### 5.2 Risk and capital management: main issues

The process of risk and capital management can be broken down into three basic decisions:

*How much capital to hold?* How much capital does the company need to operate efficiently? What can be done to manage regulatory and rating agency requirements? How can the company be steered to improve diversification? Can the company operate more efficiently by transferring risk to financial or reinsurance markets?

*What type of capital?* Is equity the only option? *How to invest capital?* Should the company mismatch assets and liabilities? How much market risk should it take?
All these decisions are critical factors in determining the cost of taking risk, and companies that properly manage them will have a competitive advantage. However, making the right management decisions is not always easy, since it generally involves multiple trade-offs. For example, investing in equities rather than bonds can lower the tax burden on investment income, but can also increase the amount of capital the company needs to hold. Or, all else remaining equal, holding more capital reduces the cost of financial distress but increases double taxation costs. Having a framework for measuring the impact of risk and capital management decisions on the cost of taking risk is therefore an invaluable decision-making tool.

An integrated approach to risk and capital management

Most risk and capital management decisions must also be made centrally. The cost of taking risk depends on the risk and capital structure of the entire firm, not on single operating units or lines of business. Allowing business units to make unilateral decisions on issues, such as reinsurance programs or capitalisation, can result in one business unit offsetting the decisions of other business units. This will result in higher overall costs.

As a result, the traditional separation of risk and capital management decisions into virtually isolated treasury, risk management, and investment management functions is likely to result in inefficient risk and capital management.

5.3 Amount of capital required

From an economic perspective, the right amount of capital is determined by balancing benefits against costs. Although holding as little capital as possible will certainly lower double tax, agency costs, and increase the value of the option to default on existing liabilities, it will also keep away profitable clients, who are credit-sensitive, and puts the franchise value of the firm at risk. Conversely, holding too much capital will increase frictional capital costs to a point where, in spite of the increased financial strength, policyholders will not be willing to pay the higher premiums needed to cover them. These considerations need to be carefully weighed up to determine the optimal amount of capital that maximises company value.

As shown in the graph below, this depends critically on the size of the insurer’s franchise value. If an insurer has little franchise value, then it can extract value for shareholders by minimising the amount of capital held. This increases the value of the shareholders’ option to default on the existing insurance liabilities. However, this relationship is well understood by regulators who generally prevent this strategy from being pursued.

In the more normal situation where an insurer has a substantial franchise value, the level at which policyholders are prepared to pay the highest margins largely determines the optimal level of capital. This is a complex decision and requires a thorough understanding of the preferences of the target client market. This decision is frequently driven by rating agency requirements, which creates the need to efficiently manage the level of capital required to secure a particular rating.
Other important considerations in determining the optimal level of capital have already been discussed: they include the value of the default option and the level of frictional capital costs. Holding more capital reduces financial distress costs and decreases the value of the default option, but increases double tax costs, and agency costs. In principle, a model of all these costs should be constructed to determine the optimal level of capital.

Insurers have two tools at their disposal for managing their overall level of risk and consequently the amount of capital they need to hold: diversification and risk transfer.

**Diversification**

By pooling independent risks, insurers can reduce the riskiness of their balance sheet. Effectively managing diversification, however, can be a challenge.

When market units price and write business, they need to know ahead of time how the risk they are underwriting diversifies with the other risks on the company’s books. Risks that diversify well are less costly for the company to underwrite than risks that do not. If risks were written one at a time, this would not be difficult to measure. However, market units within an insurer all write business simultaneously, so that a capital and capacity planning cycle is necessary.

At the beginning of this cycle, risk and capital managers, together with market units, must decide how much of a particular risk will be underwritten in the course of the planning cycle. A capital plan must also be developed to support those risks, whether the risks will be kept on the books of the insurer and backed with capital or transferred via financial or reinsurance markets. Based upon this plan, the expected cost of taking various risks may be determined and these costs may be included in actuarial pricing.
Insurers will inevitably deviate from the plan as market conditions change, which will impact the cost of taking risk. For performance measurement purposes, it is not appropriate to change the level of frictional costs for market units if they have no control over these deviations. However, when a market unit deviates from the plan – eg by writing more, or less, business than expected – that market unit should bear the full costs of the deviation.

The time horizon of the capital and capacity planning process should be long enough to allow market units to implement a business plan, and short enough to keep the company sufficiently flexible to react to changing market conditions and opportunities.

**Risk transfer**

Risk transfer can be used effectively as a capital substitute whenever the cost of transferring risk is lower than the cost of keeping that risk on the company’s books. Risk can be transferred either to financial markets or to reinsurance markets.

Risks can be transferred to financial markets by hedging or securitization, depending on the type of risk. Systematic risk embedded in insurance liabilities, for example interest rate risk, can be hedged by taking offsetting positions on the asset side of the balance sheet. In many cases, the offsetting position is a simple long position. For more complex risks, however, the offsetting position may involve derivatives, for instance in the case of life contracts with a guaranteed minimum return. Insurers have the option of purchasing those derivatives from derivative houses or else constructing those derivatives themselves through the use of dynamic hedging. The choice should be based upon both transaction costs and on whether the company wishes to avoid potential dynamic hedging risk.

Securitization can also be used to transfer insurance risks to financial markets. The value proposition for securitization is clear. Due to their immense size, financial markets have enormous potential for diversifying risk, which enables them to hold that risk without incurring the potential costs associated with financial distress. Packaging insurance risks together with capital to support the risk into a security and then floating that security on financial markets also gets that capital out of the double-tax insurance environment.

Agency costs, however, pose a formidable barrier to the realisation of securitization’s potential. Insurers will always know their portfolio of risks better than outside investors, especially those not familiar with insurance risks. Consequently, there is always the adverse selection risk that insurers will try to transfer only unfavourable risks, keeping favourable risks on their books. The sizeable risk premiums that the market currently demands for insurance securitizations clearly demonstrates that investors are not yet comfortable investing in and managing insurance risks directly. Apparently, they prefer to take those risks indirectly by holding shares in insurance companies, thereby allowing insurers to manage insurance risks for them and avoiding moral hazard problems. Despite the clear advantages of securitization, this market
will not take off until a dedicated class of insurance-risk investment managers develops.

Insurers can also reduce their cost of taking risk through the use of reinsurance. The value proposition for reinsurance is well developed. Professional reinsurers are specialised in obtaining a low cost of taking risk. They generally are well diversified and have large capital bases, good access to capital markets, and expertise in carrier management to minimise tax and regulatory burdens.

Direct insurers can, of course, obtain all of those characteristics themselves and some global insurers have already done so. The ability to transfer risk to reinsurers and leverage their low cost of taking risk, however, enables companies to maintain a focus on geographic regions and lines of business where they create the most value, without putting themselves at a disadvantage in terms of their cost of taking risk.

Risk transfer in reinsurance markets does involve costs, however. Transaction costs are high and moral hazard and adverse selection problems reduce the efficiency of the reinsurance market. However, new reinsurance structures are targeted at reducing moral hazard and adverse selection problems and allow insurers to transfer only the risks that are most costly for them to keep. Better use of information technology is also reducing transactions costs and resulting in a more competitive market.

**Signalling capital**

Signalling capital refers to capital in excess of economic capital that insurers must hold in order to satisfy external requirements, such as regulatory or rating agency requirements.

Regulators and rating agencies must apply simple and universally applicable capital requirements. In addition, they prefer to err on the conservative side. As a result, it is sometimes the case that regulators and rating agencies require more capital than is economically justified. Insurers can manage the amount of signalling capital by choosing to transfer risks where external requirements are onerous. Reinsurance and accounting structures also exist that reshape risks into a more regulatory and rating agency-friendly form.
5.4 Type of capital required

Insurers hold capital to increase their ability to pay their insurance liabilities even under adverse circumstances. Insurers have an increasing number of choices for how they finance that capital. All of these choices vary in terms of both the cost of holding that capital and the security they provide. As a result, the optimal capital structure will be a trade-off between the amount of capital the company must hold and the frictional costs of holding that capital.

**Equity**

Equity is the safest form of capital since shareholders cannot demand dividend payments, nor can they demand repayment of their capital. However, because of disadvantaged tax treatment, it is also the most expensive form of capital. Corporate profits, which accrue to share investors, are taxed whereas interest payments, which accrue to bond investors, are treated as expenses and are tax deductible.

**Debt**

Senior debt finance cannot be used to support insurance risks since in the case of default, senior debt is repaid first. Debt that is subordinated to insurance liabilities could in theory be used to support risk taking. However, in practice, it is seldom used, for a number of reasons. To support risk taking, the subordinated debt must be longer in duration than insurance liabilities. In practical terms, this means that subordinated debt must be continually recalled and new, longer-duration debt issued. In general, regulators and rating agencies also do not treat this debt as risk-bearing capital.

**Hybrid debt and equity**

New classes of debt and equity have been developed in recent years. These new forms of finance are collectively referred to as hybrid and they blur the traditional line between equity and debt. In general, though, the objective of these new structures is to get the tax treatment of debt and the risk characteristics of equity.

There is a wide range of hybrid structures. Which structure an insurer uses will depend on the tax and regulatory environment. In general, though, there are limits to how much hybrid debt or equity an insurer can use. Few of these structures are true perpetual sources of capital. They will eventually be redeemed, so they do not provide the same level of security as equity capital.

**Contingent capital**

Insurers also have the option of arranging for contingent capital — contractually obligated investments that trigger under pre-defined conditions. The advantage of this sort of financing is that the capital is kept off balance sheet and so is not subject to taxation. By using contingent capital, however, the insurer exposes itself to credit risk of the contingent capital provider. Regulators therefore often limit the amount of contingent capital an insurer may use to support risk taking.
5.5 Investing capital

The third key issue of risk and capital management is concerned with determining the optimal investment strategy.

Market risk

Due to an historical focus on reporting accounting profits, insurers have often invested in high-yield products. The value proposition for yield, however, is unclear since to get a higher yield, the insurer must normally take additional risk and will incur additional frictional costs as a result.

The market risk that an insurer takes is passed directly on to shareholders who could have invested in these instruments directly. Insurers can therefore only create value by taking market risk if investors prefer to have an insurer manage these investments for them despite the fact that they will be surrendering control of these investments which, in addition, will be held in a regulated and taxed vehicle. As this is not likely to be the case, this suggests that insurers should focus on their core competency of originating and managing insurance risk by hedging market risk as far as possible. However, another consideration to be taken into account is that other frictional costs may create incentives for insurers to take investment risks.

Tax on investment income

In many cases, the biggest capital cost an insurer incurs is the tax payment on capital income. However, there are many opportunities for an insurer to manage this cost through the choice of investments and management style.

Tax codes can differ greatly from jurisdiction to jurisdiction. However, in most countries capital gains are taxed preferentially to investment income. The nominal tax rate on capital gains is often lower. In some countries capital gains are not taxed at all. Capital gains also carry the benefit of deferral since they are only taxed at realisation. By postponing the realisation of capital gains, insurers can gain the time value of money on their deferred taxes.

The amount gained by deferral of capital gains depends on how long capital gains are deferred and on the prevailing interest rate. The graph below shows the effective tax rate on capital gains as a percentage of the nominal tax rate for varying realisation rates and interest rates. If an insurer is very aggressive about postponing the realisation of gains, the tax rate can be reduced substantially. For instance, if the insurer realises just 10% of unrealised gains each year − an average investment horizon of just under 10 years − the effective tax rate drops to two thirds of the nominal tax rate. Reducing the realisation rate to 5% − average investment horizon of 15 years − cuts the effective tax rate to about half the nominal tax rate.
Favourable tax treatment of capital gains does create an incentive for insurers to invest in equities. However, investing in equities generally means taking more market risk and this creates additional frictional capital costs which will offset some, if not all, of the gains from lower tax rates.

**Liquidity**

Another frictional consideration in determining an insurer’s optimal investment strategy is liquidity. Insurance is a cash-rich industry. The cash flow in from premiums and investment income is often significantly greater than the cash flow out from claims and expenses. In addition, insurers usually keep large amounts of liquid assets on their balance sheet. As a result, many insurers have more liquidity than they need to support their business.

Insurers can extract value from this excess liquidity by investing in illiquid investments, such as corporate bonds, private equity, and restricted public equity. These assets return a higher yield to compensate investors for their illiquidity.

It is important to note that though nobody denies the existence of a liquidity premium in asset returns, opinions vary widely as to its order of magnitude. The difficulty in establishing the size of the liquidity premium is mainly due to the fact that illiquid instruments usually also carry other risk, such as credit risk, making it difficult to objectively attribute the spread over government bonds to any particular factor.

The additional market risk contained in illiquid investments also needs to be covered by risk capital. The fact that it is impossible to capture the liquidity premium without incurring other risk means that the premium needs to be weighed against the frictional costs implied by the additional risk taken.
Mean variance optimisation

It is also important to manage the diversification of investments in such a way that the investment risk taken by the company is efficient in the sense that, for a given level of market risk, the chosen portfolio yields the highest expected return. Otherwise, the company will be taking unnecessary investment risk. This efficient portfolio can be identified using a Markowitz mean variance type approach. It is important, though, that this analysis is done net of liabilities and net of taxes.

In general, because of regulatory and rating agency restrictions, it will not be possible to be on the "efficient frontier", so companies must strive for the best possible portfolio.
References


IASC, 1999, An issues paper issued for comment by the steering committee on insurance (London: International Accounting Standards Committee)


Swiss Re’s Technical Publishing series comprises the subcategories of Property, Casualty, Engineering and Industry, Aviation and Marine, and General. The General category includes a wide range of reinsurance-related topics, for example:

- The economics of insurance: How insurers create value for shareholders (2001);
- Late claims reserves in reinsurance (2001);
- Non-proportional reinsurance accounting (2000);
- The run-off phenomenon (1998);
- An introduction to reinsurance (1996)

To order or download any additional publications, please refer to the contacts on the back cover of this brochure.

© 2001
Swiss Reinsurance Company, Zurich

Title:
The economics of insurance
How insurers create value for shareholders (2nd edition)

Authors:
John Hancock, Paul Huber, Pablo Koch

Graphic design:
Galitzinski Gestaltung, Zurich

Editing and production:
UC, Technical Communications, Chief Underwriting Office

Photograph:
Cover: Image Bank, Zurich

Order no.: 207_01310_en

Property & Casualty, 4/02, 2000 en