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Unfinished Accounting Issues in Financial Institutions: Modelling Fair Value and Prudence

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UNFINISHED ACCOUNTING ISSUES IN FINANCIAL INSTITUTIONS: MODELLING FAIR VALUE AND PRUDENCE

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Abstract

This paper describes an actuarial approach to accounting and valuation issues that clearly distinguishes between realistic and prudential accounts. It outlines the process of model development, highlighting its messy and provisional nature. This brings up some differences between the actuarial or financial paradigm, and that which appears to underline the framework of the International Accounting Standards Board (IASB). It discusses some of the controversial issues in new International Financial Reporting Standards (IFRS), in particular the interest rates to use in the determination of fair value, and the treatment of intangible assets, and makes some recommendations.

1 INTRODUCTION

The introduction of the new insurance IFRS has been frustrating. In the accompanying debate, it proved difficult to communicate with other actuaries, let alone with the accountants. As we prepare for the IASB's phase II project on insurance accounting, this paper sketches an overall framework in which to consider the changes, attempting to make assumptions explicit, clarify the key debates and making some apparently new suggestions. Some aspects are likely to be overtaken by events before it is completed, but it is written in the hope of contributing to the convergence of understanding.

The confusion arises from the unprecedented convergence in financial reporting and prudential standards internationally, and between insurers and banks. The IASB is in the process of introducing new standards for the financial instruments issued by banks and insurers. The "New Basel Capital Accord" (Basle II), of the Bank for International Settlements, is significantly revising the method of determining the prudential reserves of banks. Many regulators, not least the European Commission with its Solvency II project, are adapting insurance reserves in similar fashion. In all this, regulators, actuaries and accountants are attempting to apply more recent and sometimes still controversial theoretical developments in financial economics.

The first section of the paper contextualises the discussion, and describes an actuarial approach to accounting and valuation issues that clearly distinguishes between realistic and prudential accounts.

Both accounting and actuarial work require the building of models. The second section attempts an explicit outline of the process of model development, highlighting its messy and provisional nature. Consideration is given to model and parameter risk, the distinction between random and controllable variables, and the impact of Bayesian estimation on the volatility of reserves. This justifies the use of relatively unsophisticated stress tests, and again raises the distinction between best and

prudential estimates. It also suggests a more pragmatic approach to operational risks. It also highlights the place of the analysis of surplus in the use of financial models.

Determining fair value, the objectives of the IASB and the implications of this actuarial approach, are the subjects of the next section. It is suggested that it is consistent, and useful, to include all intangible assets or goodwill on the balance sheet. The determination of risk adjustments to the appropriate rate of discount is covered at some length, as it is still the subject of considerable debate.

The fifth section then outlines the implications for the determination of prudential capital.

2 AN ACTUARIAL APPROACH TO THE ISSUES

2.1 Fair value and risk models

The apparently inexorable shift to fair value in accounting, and risk models in reserving, are related in that they both abandon the certainties of the past (historic accounting and simple reserve formulae), and require coherent, but provisional, assumptions about the future. The new way of thinking is more difficult because it requires greater tolerance of ambiguity.

2.2 Some preliminaries

Financial statements are required for – at least – three purposes:

- one retrospective - where has the money gone?
- one more or less current - what is the fair, present value?
- and a third prospective – what capital is required for the future - under both positive and adverse scenarios?

The different purposes require different approaches. It may not be possible to make the same accounting figures realistic, prudent and objective. Retrospective accounting must be accurate and objective. Current fair value accounts should be as realistic as possible, based on the most likely outcomes and reconciled to market values. Reserves need to be prudent and consider unlikely events.

There is an active debate amongst accountants, such as in Benston (2003), as to how best present retrospective and fair value accounts. The need for separate prudential rules is more the focus of actuaries, and financial sector regulators.

2.2.1 Financial models

We use financial models for all accounting and reserving. Even for traditional bookkeeping, the classification of accounts is based on a model of the firm. We obviously need economic models for estimating realistic current values and prudent reserves.

All financial institutions use them. The Basel I capital requirements were very simple, but the most complex internal models that could emerge from Basel II will still involve simplification of reality.

We need to make the process of model building as explicit as possible, firstly so that we understand each other, and secondly so that we better understand their limitations. Section 2 of this paper discusses modelling in more detail.

2.2.2 Resolving common misunderstandings

I would like to make a few points under this heading.

a) People can approach a question with entirely different paradigms[1]. If so, there is a need to examine and perhaps change whole sets of presuppositions before they can understand each other. In such a case, communication requires a very careful listening, not so much to the conclusions but to the presuppositions of others.

b) Accounting standards that attempt to meet all three accounting objectives in one, or even two, numbers will frequently fail. It seems to me that many differences of opinion normally arise from attempting to do so. "Realistically prudent" can be, for instance, an oxymoron. The obvious solution is to use two or more numbers when this would be helpful. It is necessary first to understand why some seem to be insisting on one number.

c) Another common source of misunderstanding arises from the use of rules of thumb. Given that we cannot fully understand everything, we need rules of thumb (heuristics) to survive.[2] Heuristics that proved adequate in the past will not

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[1] There is a significant literature on how alternative paradigms or theories explain different sets of data and how scientific progress involves a shift of paradigm that better explains new data. All that is suggested here is that people can bring a different set of presuppositions to a discussion and find it difficult to hear what others are attempting to say.

[2] This is the main contribution for which Herbert Simon won his Nobel Prize for Economics. We neither know everything nor can understand everything we know, so we operate under a bounded rationality. Moreover, once we have developed a rule of thumb that enables us to

necessarily be useful in the new regime. New heuristics will need to be developed. Both new and old rules will need to be justified. I believe it would lead to more fruitful discussions if we see heuristics as both necessary - and as approximations that need justification when in policy discussions.

d) The determination of national and international standards is a political one. There are differing interests on at least two continuums: one between realism and conservatism in the determination of both profits and capital, and the other between those wanting less work and those wanting more. There are also different approaches to theory that are also hotly contested because of the different personal investments made in understanding the alternative approaches. Where possible, it can be helpful for people to declare their interests. I am an actuary, working for a regulator!

2.3 Different objectives

It would seem that accounting has at least three different objectives.

2.3.1 Retrospective, or strict, accounting

Retrospective accounting is essential for providing historical data. It needs to determine where the money has come from, and on what it has been spent. It is essential for all performance measurement.

At its simplest it produces only cash flows.

In order to make evaluate profit income has to be matched to outgo, which necessitates the introduction of accruals and amortization. Determining these amounts requires a model, whether one is amortising physical assets or accruing intangibles such as deferred acquisition costs. More complex, because they are more sensitive to assumptions and model design, are long term insurance type liabilities that require estimation of and discounting of the distant future.

The purpose of the more complex models has been to provide a reasonable evaluation of the profit of the company that can be used to estimate future earnings – ignoring the effect of random items such as changes to market value. It is obviously useful to separately report items such as changes to market values and to future assumptions that have a significant, once off, effect.

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function adequately, we are normally “satisficed”, by which he means sufficiently satisfied so as to stop pursuing improvements.

We may need non-accounting data to develop useful projection models. For instance, in life assurance we need, *inter alia*, rates for risk benefits and discontinuances, policy numbers and terms for expenses projections. In banking, we need default rates, loss given default, and product details for expense projections.

2.3.2 Fair, or present, value accounting

Fair value accounting aims at an estimate of the present value of assets and liabilities, and, thus, of the company. It is defined by the IASB (2001):[3]

> Fair value is the amount for which an asset could be exchanged or a liability settled between knowledgeable, willing parties in an arm's length transaction. In particular, the fair value of a liability is the amount that the enterprise would have to pay a third party at the balance sheet date to take over the liability.

Fair value accounting is used by IASB standards in balance sheets when it can be "reliably" determined. Increases in fair value are included in reported profits if they are considered part of a company's normal trading operations.

Managements often resist realistic reporting because its volatility is difficult to explain. It may also expose their company's weaknesses, and even their own. These are not good reasons. Realistic profits are vital information for both management and shareholders. In addition, a breach of good corporate governance arises if management is privy to significant information not shared with shareholders.

There is still much debate on how to determine fair values. Section 4 discusses in more detail.

2.3.3 Prudential Reporting and reserving

A firm's financial statements should indicate the risk in the company's business, and the level of capital necessary to ensure solvency. Reserving is a more complex question as it conceptually requires future financial statements for all reasonable scenarios.

The best estimates used for fair value calculations provide an appropriate foundation for the determination of capital, as they include all possible sources of income and outgo. Fair value calculations will be based on the mean of the distribution of outcomes, prudential calculations on the adverse, tail, probabilities.

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[3] Chapter 3

A significant difference in approach is required. When fair values change, management may want to realign the company's business, but the changes can be assumed to take place at market values at the time. The ability to change the future should not have much of an impact on current fair value, but can – and sometimes should – have a significant impact on the company's prudential capital.

Reserving is discussed further in section 5.

2.3.4 Profit

Three different types of profit are therefore necessary.

- Historic cost accounting should produce an estimate of sustainable profit, distinguishing between ongoing and exceptional items.
- Fair value methods give an increase in real wealth.
- The change in free reserves, after deducting prudential capital reserves, is the distributable profit.

These three have to be reconciled to each other for proper accountability.

3 MODELS

Financial models are developed to help understand the interaction and development of the underlying reality. Actuarial models, described in Whitelock-Jones (2003), also make future projections. All models are inevitably based on assumptions that may be wrong, or become outdated. The development and use of models requires judgement - and humility.

3.1 Philosophy of model building

This turns out to be more complicated than might be expected. Huber and Verall (1999) and Pemberton (1999) discusses in some detail. To risk a summary, the issues seem to depend on:

- The relative importance of empirical data and reason – or theory.
- The balance between using simple and complex models. Even the most sophisticated models cannot capture all the relevant information. Complex models are also costly, and may be so overwhelming that they obscure rather

than reveal.[4] We may therefore prefer simple models, which may bring us back to Simon's rules of thumb.

Arguments can become heated for the reasons set out in 2.3 above.

In developing a model that will be widely used it is necessary to set out the purpose, the assumptions and the structures clearly. A proper defence will require some justification of the balance between data and theory, of its degree of complexity, and of the effect on the financial interests of interested parties.

3.2 Developing a model

3.2.1 Purpose

A model requires a purpose, of which for our purposes, four are set out in 2.4 above.

No model is entirely right, although they can be wrongly constructed. For academic teaching purposes, the value may be in its interest, but for our purposes models must be useful for making essential decisions. This may mean that they are inadequate in other respects, e.g. they may not be statistically significant because of inadequate data.

3.2.2 Identification and classification

Perhaps the first step is the identification of the variables of interest and how data might be classified. The data will include:

- Those that have a direct relationship with the purpose. These would be accounting numbers in our case, and
- Those that may be related directly and indirectly to these data. These can perhaps be classified as economic, demographic and insurance risk related.

The classification will attempt to identify groups that are homogeneous with respect to the influences of interest. The classification will involve theory based assumptions, which can be tested, and will depend on the purpose of the model. e.g. salary expenses may be aggregated for historical accounting purposes, but are often divided by

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[4] The additional costs do not provide a sufficient reason to use a simple rather than a complex model as is suggested, *inter alia*, by the EC DG Internal market report (2002). Simple models may be misleading, in which case other ways of saving costs should be investigated: using less data, pooling data etc.

organizational division for budgeting purposes, and by age and sex for calculating defined benefit pension accruals. It is also known that rates of increase also depend on educational level, and marital or parental status.

The data will require testing, and will normally require cleaning.

3.2.3 Possible relationships

In identifying and classifying, the modeller will be considering hypothetical relationships between the homogeneous groups. This again involves theory based assumptions, which can be tested and will depend on the purpose of the model.

Every set of numbers has statistical properties: a mean and a variance for instance. In addition, there are a vast number of mathematical and statistical relationships between every two sets of numbers. Such properties and relationships are descriptive but may be meaningless. Even reporting these relationships may give a spurious (counterfeit) impression of significance – which is one reason why there are "lies, damn lies and statistics".

The relationships are more likely to be valid:

- if they can be theoretically justified, and have been found to be valid:
- over many observations,
- in a wide range of circumstances, and
- over a long period of time.

The validity of the relationships should also be judged by statistical methods but these are not infallible. In particular, the more relationships between variables that have been tried, the more likely it is to find a spurious relationship that passes statistical significance tests.[5] Data mining, given enough data and time to find alternative patterns, will *always* find some *meaningless* statistical relationships.

Given that most people learn by looking at the concrete (actual numbers) before the abstract (formulae), it is also essential to look at summary statistics and the numbers themselves, or graphs of the relationships, and of the residuals[6].

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[5] See Ferson et al (2000) for a description of relationships published in reputable academic journals, which on further investigation appear to be spurious.

[6] These are the noise or random errors that are not explained by the hypothesized relationship.

Spurious relationships can also be “discovered” by just looking at the (concrete) numbers. Taylor (2000) provides an easy to read summary of behavioural finance literature, which frequently finds people find patterns in random information and are overconfident in applying them.

3.2.4 Random and controllable variables

Random variables are generally defined as being unpredictable, but it might for some purposes be more helpful to think of them as uncontrollable.

Company managers have control of some variables to a greater or lesser extent. They can, for instance, reduce some expenses, like advertising, almost immediately. While it would be possible to develop a statistical model of advertising expenses, it would have no value to managers in projecting the future, because it is probably entirely under their control.

The same may apply to variables under the control of customers, or government. The former may bring about anti-selection whereby the relationships between variables will be different – especially as a result of an insurance contract. Government, understood widely, may also manipulate insurance and investment contracts for its own interests. They have – perhaps arguably – in the case of the super-inflation of tort claims, and in creating higher inflation in some countries.

Other variables, such as some claim rates, are largely uncontrollable. Once insurance business is accepted, for instance, managers can seldom legally change the rate or size of claim.

Statistical models are only really useful for random variables, and can be used to estimate the capital required to absorb random losses. The prudential reserves required for controllable variables should be calculated differently and require a different type of risk management. The variance of advertising expenses, for instance, is irrelevant. The prudential capital required is the amount that will be spent before a decision to stop the spending becomes effective. Proper systems of management control for these variables, are more important than capital for risk management purposes.

It is difficult to draw the line between the random and the controllable. Even when variables depend on the actions of many people, the people may not be acting unpredictably. On the other hand, a single individual may make decisions that are effectively random. As mentioned above, controllable variables also have statistical

properties such as variances, trends and mean reversion - but it may be more useful to know the controllers' intentions than to analyse the statistics.

3.2.5 Economic variables

Economic variables are particularly difficult to classify as random or not.

- Inflation in a large free market economy is likely to be random; in one that is centrally planned it may not be.
- Short term interest rates are dependent, at the most, on a few individuals in the central bank; long term interest rates may also depend on a few decision makers - in the government treasury. The people concerned can however be influenced by random events that may make their actions unpredictable.
- Market values (of shares and interest rates) may be random, but Danielsson et al (2001) make the point that regulators may effectively force financial institutions to behave in the same way, so reducing the random element or changing the underlying distribution.
- It can also be predicted - with some certainty - that bubbles will burst, although the timing is uncertain. The efficiency of markets will depend on their institutional structure. Grossman and Stiglitz (1980) show that markets will not be perfectly efficient if there is a cost to obtaining the information necessary to establish "correct" prices. More generally, markets will be inefficient if there are insufficient participants attempting to establish "correct" prices. Such participants are discouraged by a belief that the market is unpredictable so – paradoxically – markets can only be efficient if enough people believe that they are not. Market efficiency is often mistakenly equated with being random. If price movements they are predictable, markets are clearly inefficient, but inefficient markets may also be unpredictable. Bubbles, particularly, seem to be inefficient and unpredictable.[7]

Other variables are dependent on long term social and technological changes which make every "cycle" unique. They are therefore often not susceptible to useful statistical modelling. One example is that of house prices, which depend on the value

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[7] This idea goes back at least to Keynes's "greater fool" theory, although is implicit in "Res tantum valet quantum vendi potest. (A thing is worth only what someone else will pay for it). Ofek and Richardson (2002) provide a discussion of the recent internet bubble. Panics, on the other hand, will not necessarily abate: many salvaged nothing after the Communist and Nazi takeovers of the twentieth century.

of land, which in turn is entirely dependent on supply and demand. Past relationships between the two may well have no bearing on the current cycle.

3.2.6 Future Projections

There is a lot of space between Henry Ford's "history is bunk" and Santayana's dictum: "those who do not remember the past are doomed to repeat it." At best, we can use mathematical or statistical models, based on past data and relationships, to project, rather than predict the future.

Simpler deterministic models may be acceptable when the risks are relatively symmetric (i.e. no options are present) or seem to display little variability. They also may be preferable when there is considerable uncertainty in finding an appropriate statistical distribution, and measuring its underlying parameters.

More complex stochastic models are necessary when there are options and guarantees that are contingent on future unpredictable events.

A stochastic model implies a range of future scenarios. What might be called "scenario validation" of the model involves a more detailed consideration of a selection of these possibilities. It allows for a check on the reasonability of the scenarios generated by the stochastic models, and can be used as a basis for risk management. The more likely scenarios may be examined for business purposes; the less likely possibilities are more of interest for solvency purposes as described by Feldblum (1995). Scenario validation is essential for more complex statistical models to ensure the reasonability of the output.

Scenario, or stress, testing involves the application of possible future scenarios - which can also be generated stochastically. Schachter (2001) describes its use in assisting to determine prudential capital requirements. Controllable variables can also be modelled using alternative scenarios.

3.3 Statistical models

To the extent that variables are random, statistical or stochastic models can be developed. The following items need specific consideration in the development of these models:

3.3.1 Model, parameter and stochastic risks

There are 3 major sources of risk that a model will not provide the correct answer. The first arises from wrongly specified models and the second from parameters that have not been properly estimated, or vary over time. The third is the stochastic variability that arises by chance if the model is otherwise correct. The errors that arise from the model and parameter risks may well be many times larger than risks that arise from random variation.

No model is complete without some consideration of each of these risks. The relative importance of parameter and model risk increases when considering new business developments: new products, markets, or administrative processes for instance.

3.3.2 Data to use

All other things being equal, it is desirable to use as much information as possible, including historical data from the company and from local and international markets. Statistical tests can test whether different data sets are comparable, but judgement is also required.

The latest relevant experience must be given the most weight, depending on its size; its validity given that it may not be adequately clean; and relatively subjective views of whether underlying conditions have changed.

Linked to this question is whether one:

- Tests the company's recent data to see if it is consistent with given parameters – which would have been developed from other industry data. This involves testing the nul hypothesis that the given parameters are valid.
- Uses the company's recent data to estimate the parameters.
- Uses Bayesian type methods to estimate the parameters using both company and industry data.

The third approach should produce the better estimates, and should be used in preference to the first when estimating company specific claim rates and expenses.

There is a clear distinction between the requirement to be realistic and that to be cautious. For prudential reserves, one might well be cautious, which means that the model used would include an adverse trend where such a trend is a possibility.

There is evidence, mentioned for instance in SwissRe (2001), that the general insurance industry experiences cycles that may be caused by delays in responding to new information. This is aggravated to the extent that recent data is combined with that from previous years. In such markets, a more rapid pricing response to changes in the level of claims is important both for profitability and solvency.

3.3.3 Lags

Many variables and the relationships between them are "lagged".

This will be true, in particular, of all best estimates that are revised as new data becomes available. A Bayesian, or credibility, approach will give less than 100% weight to the new data. This has, inter alia, an impact on the measurement of the underlying variability - which will be greater than the variability of the best estimates. This needs to be taken into account when estimating prudential reserves.

3.3.4 Catastrophes

The likelihood of catastrophes is difficult to calculate; adverse scenarios are often more common than if the variables were distributed normally. There seem to be two main technical approaches to this problem.

- The first is to consider the catastrophes as separate events and attempt to measure their probability more or less independently of related events. (It effectively assumes that common events are in a different category to catastrophes.) The statistically sophisticated approach to this is extreme value theory (EVT) described in Embrechts, *et al* (2001). This is based on a model where the correlations between the underlying causal variables are higher - when observations are in the tail.
- The second is to attempt to fit fat tailed distributions to a variable that captures both minor incidents and catastrophes. This has the advantage of using more data to estimate the parameters – assuming that common events do give us information about catastrophes. Compound distributions which separately model the different "causes" of the variability are fatter tailed. "Regime shifting" investment models where the underlying parameters change over time also produce fatter tails.

Again these models should be checked by considering whether they would allow for known catastrophe scenarios, and can, at the same time, be used to check the

adequacy of the scenarios. Schachter (2001) and IAIS (2003) are amongst those recommending this.

3.3.5 Aggregating variables

For each of the models concerned, we are ultimately interested in a single number: profit, fair value or prudential capital. This single number is an aggregate of the underlying variables, but given that the sum of variables are frequently more stable and more likely to be normally distributed, there are good reasons for modelling the aggregate rather than the components.

Problems arise when important component variables are controllable, include obvious one off events or trends, or can give rise to catastrophic events that swamp the dampening effects of aggregation.

3.3.6 Option and guarantee pricing

Two main approaches can be taken to developing the stochastic models necessary to value options and guarantees, discussed briefly in Hairs *et al* (2002), but in numerous other financial economics texts.

- "Realistic" assumptions can be made as to the distribution of future cash flows, and the results discounted back at an appropriate risk adjusted rate. There is however considerable difficulty in estimating the equity risk premium and any errors will be exacerbated by the gearing of options – which may require very high rates of discount. "Deflator" based models use simulation to determine prices in this way.
- The second is to use a risk neutral model based on a notional risk neutral distribution of returns, which can be inferred from the market price of options. Cash flows that cannot be valued using quoted prices (like some tax payments) have to be adjusted – somewhat arbitrarily - before they can be discounted.

In both instances, however, the distributions inherent in short term options may not be a good indicator of longer term distributions. Realistic methods may well be preferable but their long term implications can, and should, be carefully examined for reasonability.

3.4 Types of risks

Many different approaches can be taken. I find the following helpful in disaggregating company profit.[8]

3.4.1 Asset risks

The risk arises from the volatility in realisable value of the assets, or more strictly, the volatility in the difference between the realisable value of the assets and associated liabilities.

Realisable value depends both on asset quality, and on supply and demand. Both depend, in different ways, on a range of economic, political, technological and demographic factors. Asset prices can be modelled in the aggregate, or as a function of the underlying factors.

For interest paying investments, asset quality is measured by credit risk, which depends on the cash flows of borrowers. The quality of equity type investments also depends on the underlying attributable cash flows – mainly profits or rents.

Supply and demand depends on market conditions. In efficient markets, prices will depend on:

- The overall level of supply and demand for investments. This should, *inter alia,* also be reflected in a change in interest rates.
- Changes in expectations that may relate to the particular asset, asset class, or overall economic activity.

If there are insufficient willing buyers or sellers markets can become illiquid or inefficient. The market for some assets, like direct property, is necessary illiquid because each asset is unique and there is only one seller and a limited number of buyers at any time. Other markets may become illiquid or inefficient in a crisis. All markets, including that for bank deposits, are subject to the risk of irrational exuberance or panic.

Fluctuations in efficient markets, and the booms and panics of malfunctioning markets are not easily distinguished. While the former represents a stochastic and effectively uncontrollable risk, the latter represents a catastrophe that will be difficult

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[8] More or less corresponding to APRA's GGN110.2 (ht tp://www.apra.gov.au/General/General-Insurance-Prudential-Standards-and-Guidance-Notes.cfm)

if not impossible to model. Danielsson *et al* (2001) make the further point that certain regulatory regimes will have a particular adverse impact in that the regulation may force major market participants to act in the same way at the same time.

Elements of asset risks that are sometimes separately identified are asset concentration risk, interest rate, mismatching and market risk.

3.4.2 Insurance risks

The risks can arise from underestimating the mean and thus inadequate pricing, or of failing to provide for volatility in which inadequate reserved leading to insolvency in the event of unusually adverse circumstances.

Inadequate pricing can arise from underestimating the number or size of the claims. Particularly problems arise from anti-selection, which can follow from inadequate underwriting, or unexpected inflation - especially legally driven "super-imposed" inflation. These could be described as "controllable" risks: the former by policyholders, the latter by the courts.

The risk can be mitigated by reinsurance – which creates a further risk of failure.

3.4.3 Business risks

This is the set of risks that the expense loading element of revenue is inadequate to cover expenses. It includes all management or operational risks that affect expenses, and market risks that affect revenues.

Expenses and revenue are, in large measure, controllable, and the risks will be closely linked to the management's ability to budget accurately, operate effective accounting systems, and react quickly to variances. A critical element in any expense model is an appropriate allocation between overhead and marginal costs.

3.4.4 Operational risks and Basel

The Basel II (2003) framework defines operational risk as "the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risks." The latter risks are to be covered by pillar 2 capital requirements which will be determined by regulators.

Banks are able to use a “basic indicator” which will set the operational risk at 15% of their income (net of interest costs); a “standardised” approach which allows for percentages ranging from 12% to 18% depending on the nature of the business; or “advanced measurement approaches” that model the required capital based on incidents of operational loss. These must be measured in seven different categories (Internal Fraud; External Fraud; Employment Practices and Workplace Safety; Clients, Products and Business Practices; Damage to Physical Assets; Business Disruption and System Failures; and Execution, Delivery and Process Management).

It is suggested here that this is an excessive level of disaggregation. From both the accounting and risk points of view it is easier and more appropriate to treat operational risks as an element of expense risk.

From an accounting point of view, their inclusion as asset or insurance losses would be misleading. Of course, this might occur inadvertently if the loss was not identified as such, but the loss would be then be incorporated in the volatility of the asset and insurance results. The other accounting problem with the Basel definition is in quantifying the losses: it is far easier to measure the volatility of expenses – even though these incorporate a significant element of controllable expense.

From a risk viewpoint, operational risks are sufficiently infrequent to be modelled easily. To differentiate between asset, insurance and expense versions reduces the reliability of the data even further, as does the introduction of the seven listed categories. Treating them as part of the overall business risk is also more complete – covering all variances in revenue and expenses, not just those that fall into the seven listed categories.

3.5 Analysis of surplus

The actuarial analysis of surplus provides a critical check on the reliability of models.

An analysis of surplus has the format set out in table 1.

- Each row balances.
- The surplus, in each group of three rows, is equal to the assets less the liabilities.
- The actual and expected assets, liabilities and surplus are equally at the beginning of the year.
- The analysis of surplus, the third group of three rows, shows the actual experience less that expected (the difference between the first two groups).

Table 1: Analysis of surplus

	Beginning of period	Income	Expenditure	End of period	Change to assumptions	End of period after changes to assumptions
Actual experience from the accounts						
Assets						
Liabilities						
Surplus						
Expected experience from the valuation model						
Assets						
Liabilities						
Surplus						
Analysis of surplus						
Assets	0					
Liabilities	0					
Surplus	0					

The analysis provides information as to the reporting period's experience relative to the assumptions, a reality check on the assumptions, a check on the data used for the valuation model, and an audit of the accounting items.

It can be performed with varying degrees of sophistication. Both asset and liabilities can be divided up into their constituent cash flows if required.

The analysis of surplus does not necessarily require detailed disclosure of the model assumptions. Some life insurance regulatory regimes have however required a tri-annual, detailed breakdown of the assumptions and model values determined for each policy type.

3.6 Personnel

From the above, it will be clear that the development of a model requires considerable knowledge of the variables and expertise in their classification and manipulation. Actuarial training focuses in some detail on building life insurance models, but it may not be adequate for all purposes even within life insurance. It may well be that a team approach will prove superior.

4 FAIR VALUE

Fair value models attempt to determine the current value of items in the accounts. There are two separate issues under this heading that more or less correspond with the IASB's phase I and phase II insurance project.

4.1 Realism vs. prudence

The first issue arises because the use of fair values drives a wedge between the concepts of prudence and realism. To the extent that fluctuations in the fair value of assets put a company at risk, they require separately identifiable prudential reserves. The IASB standards have not yet adequately recognised this. Paragraph 37 of their Framework, set out in IASB (2003a) includes the definition:

> Prudence is the inclusion of a degree of caution in the exercise of the judgements needed in making the estimates required under conditions of uncertainty, such that assets or income are not overstated and liabilities or expenses are not understated. However, the exercise of prudence does not allow, for example, the creation of hidden reserves or excessive provisions, the deliberate understatement of assets or income, or the deliberate overstatement of liabilities or expenses, because the financial statements would not be neutral and, therefore, not have the quality of reliability.

Does this require margins or not? Prudence answers yes in the first sentence. Reliability answers no in the second. As a result, the paragraph confuses, and worse, neither prudence nor reliability is satisfied.

Of course, requiring all companies to determine appropriate capital requirements would be a major change to accounting standards, and one that the IASB may not want to pursue. In the interim, there are major consequences for institutions that are required to use fair value for some of their assets and liabilities:

- The unhelpful division (in IAS39) of assets and liabilities into those valued at market or amortised value. As a result, perhaps one fifth of IASB (2003a) is required for wasteful discussion about what is and what is not insurance, what is and what is not a hedge, and what is and what is not available for sale. These discussions, and subsequent system amendments, represent a totally unnecessary burden on institutions.
- The arbitrary introduction of inappropriate prudential requirements into the standards. If implemented, this will unreasonably reduce the reported capital of all companies, and the reported profits of those that are growing.

4.1.1 Probable and reliable

This ambivalent attitude to prudence can be seen to derive, or is at least consistent, with the IASB Framework's definition of probability.

> The concept of probability is used in the recognition criteria to refer to the degree of uncertainty that the future economic benefits associated with the item will flow to or from the enterprise.

This is a binary concept: an event is either probable, in which case it is counted, or improbable, in which case it is not. In similar vein, one can ignore “a little bit of prudence”.

It is adapted in some circumstances to allow for statistical probabilities in the determination of present values, but is fundamentally unsettling to actuaries and others used to thinking in terms of discounted expected values, as Buchanan (2003) has pointed out in suggesting changes.

The application of the concept of reliability suffers from the same oversimplification. The IASB Framework defines reliable as

> …free from material error and bias and can be depended upon by users to represent faithfully what it either purports to represent or could reasonably be expected to represent.

The IASB framework then requires items that cannot be reliably measured to be excluded less they mislead. This is dangerous nonsense. It is nonsense because an uncertain result is preferable to one that is certainly wrong, and the correct response to greater uncertainty is to disclose that uncertainty. It is dangerous because it is easily used as a veil for vested interests - as in the case of the determination of the value of share options.

4.1.2 Models

It is suggested that the accounting framework could helpfully be augmented by the concept of models. This means accepting that once the accounts move beyond the certainty of cash flows into the uncertainty of estimation of value, then reliability takes on a new meaning.

4.2 Intangible assets

Perhaps the main inconsistency of mixing fair values with prudence comes out in the treatment of intangible assets and goodwill – where questions of reliability and probability also figure prominently.

The IASB standards currently recognise goodwill arising in another company, the shares of which are held as an investment. Goodwill in a wholly owned acquired company is recognised unless it fails the impairment tests in IAS36. Internally generated goodwill is also recognised, but in limited circumstances under IAS38. IAS38 is retrospective and inconsistent with the current value basis for fair values.

> The summary of IAS38: Intangible Assets on the IASB website says: “an intangible asset should be recognised initially, at cost, in the financial statements, if, and only if: (a) the asset meets the definition of an intangible asset. Particularly, there should be an identifiable asset that is controlled and clearly distinguishable from an enterprise's goodwill...”

This retrospective view leads to inconsistency in that it is possible to legitimately create a recognised asset by carefully structured transactions. Selling internal goodwill and then repurchasing it (or a non-consolidated proportion), converts it into a recognisable asset.

If published accounts should reflect an estimate of the fair value of a company, then they should make an attempt at valuing its goodwill. This includes intellectual property, brands and all “franchise” value, while “agency” costs might need to be deducted - as suggested by Hancock et al (2001)[9] and others.

Although subjective and subject to errors, the results would be of enormous value to managers, shareholders and regulators. If the company is listed, the total value of its assets and liabilities can be properly reconciled to market values by calibrating them with its own market capitalization. (One additional benefit of these calculations might be in dampening irrational share price bubbles.) It is relevant to note that management is already, or should be, party to this information and it is arguably unfair to keep it from other shareholders.

The intangibles would have to be determined by the discounting of estimated future cash flows. In actuarial terms this involves determining the embedded and appraisal values. Mehta *et al* (1996) apply this to the financial management of unit trust and investment companies and the same approach would clearly have application to banks.

The determination of intangible assets would have to be subject to the same disclosure regime that appears to be envisaged in the IASB’s (2004) draft ED7 governing disclosures for financial instruments. An actuarial formulation would involve an analysis of the surplus emerging.

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[9] Franchise value can be seen as the value of intangible assets plus the present value of entrepreneurial profits and rents (see section 4 below) that would be lost if the firm ceased to trade. Agency costs are the rents that managers, who are agents of the shareholders, extract for themselves - over and above the market cost of their services.

4.3 Degrees of reliability

There will be a difference in the reliability between intangible assets. Many jurisdictions have recognised the reliability of embedded value cash flows arising from existing policies with readily predictable cash flows.

The value of future new business is much less reliable. It does not however arise out of nothing. The challenge to management is to quantify it, and report to shareholders. It may arise from a distribution network, which Australian companies have quantified. As the value of the network changes – for instance with recruiting and training or aging of the staff – shareholders would like to know. It should be clear that the value is volatile and uncertain, but that requires additional information, not stubborn silence.

4.4 Profit on new business

The three different approaches to accounting can be summarised:

- Historic accounting values new business at cost – in terms of commissions paid and expenses incurred. It then distributes profits and losses over the life of the contract. The net premium method achieved this elegantly; MoS and various GAAP methods do it rather more laboriously – if more exactly.
- Fair value accounting could use the price that a reinsurer, or other insurer, might place on the business. Otherwise, it would require a present value using realistic estimates of the cash flows and risk adjusted discount rates.
- Prudent reserving would also take a present value approach, but use a worst, reasonably possible, scenario.

Traditional actuarial methods took the view that the worst possible result was 100% lapses, so took no value into account initially, and then used various methods to spread the earned profit more or less equally over the lifetime of the contracts. This was prudent, and allowed for the smooth emergence of distributable profits.

A realistic basis does not defer profits that have effectively already been earned. The fair value of new business contracts is their market price. This will be the value (positive or negative) for which they could be traded in the reinsurance market (or estimated to be traded). Profits can arise from the efficiency or brand of the company concerned, or because of the difference between the investment and retail financial service markets as suggested by IAAust (2003).

4.4.1 IASB current approach

This question has exercised the life insurance industry for years and has again arisen in the new IASB standards[10]. If it is accepted that all intangible assets should be reported, the issue is irrelevant. The problem seems to arise because of incoherent views on prudence – as appears to be reflected in the IASB's indecision on the matter. In IASB's Insurance Contracts (phase I) project summary[11] in relation, there are 4 issues arising from the application of IAS39 that could lead to a significant reduction in the reported profits of life insurers. These are:

- A narrower basis for acquisition costs (paragraph 25 (a)),
- Deposit (surrender value) floor (paragraph 29 (c) and (e)),
- Recognition of profits at inception (paragraph 29 (e) and (f))
- The recognition of renewal premiums (to be addressed in phase II – see paragraph 31)

They are interrelated. The central question is whether the value of a liability can be reduced by the expected value of future premiums even if, under fair value assumptions, they exceed the value of future benefits. The effect is to treat the future cash flows under the policy as an asset. This question is the same as the recognition of renewal premiums which is ostensibly deferred until phase II of the project.

There are effectively three views on this question.

- The profits have not been "earned" until the premiums have been paid.
- It would be imprudent to recognise profits that may not arise if the policy is lapsed or surrendered.
- The policies have a positive expected (fair) value and so contribute to profit, even though capital reserves are required to cover losses from future discontinuances.

The Insurance Contracts (phase I) Draft Statement of Principles (IASB, 2001) discusses the issue and took the third view in favour of recognition of the premiums if policyholders have "uncancellable renewal options that are potentially valuable to them" (paragraph 4.50). It explicitly recognises that this may lead to the policy being

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[10] Discussed, for instance, in paragraph BC117 of IFRS4.

[11] The July 2003 version could be found at http://www.iasb.org.uk/docs/projects/insurance1-ps.pdf

an asset (4.56). It also makes the connection with the deposit floor and the recognition of profits at inception (4.62). The connection is that net present value of expected cash flows can effectively be less than zero and be deducted from a cash surrender value, which itself may effectively be zero at inception. The DSOP explicitly reverses (in paragraph 4.63) an earlier discussion of the IASC (1999) (paragraph 425).

The definition of acquisition costs is relevant to the determination of deferred acquisition cost, which becomes a separate asset linked to the policy. This is only relevant in non-fair value, retrospective methods of valuation – as discussed in the Insurance Issues Paper, paragraph 631. Although the DSOP has not been endorsed by the IASB, it does not appear that reasons for the change in approach have been given.

The summary is also in conflict with actuarial standards in many countries. Forfar[12] reports that USA and Australian standards do not permit profits at inception, but Canada and UK standards do. The Australian standards do not apply a full surrender value minimum except for capital reserves.

This problem is well over a century old. The traditional net premium method of valuation incorporated a "Zillmer" adjustment to adjust for initial expenses. This extract from Zillmer's biography puts the problem clearly:

> "Zillmer first published his method in a monograph "Contributions to the Theory of Life Insurance Reserves" in Stettin in 1863. The Zillmer Method did not become the standard valuation technique in Germany for some time. Just as established American companies fought against preliminary term valuation, established German companies fought against the Zillmer method. The net premium reserve method was a significant barrier to entry into the life insurance industry. The established German companies were able to safeguard their markets and their profits almost into the 20th century. ..."
> From http://www.washburn.edu/sobu/broach/zillbio.html

The same arguments still apply. It is particularly important that rapidly growing companies report accurately on their expected profitability. If rapid growth always leads to reported losses, then investors have no means of evaluating real profitability, and this approach would undermine the usefulness of general purpose financial reports. This would contribute to difficulties of rapidly growing companies to raise the capital that should provide a buffer against the risks they face. Established companies, on the other hand, have an interest in reporting the much smoother profits that arise if new business profits are spread over the lifetime of contracts.

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[12] In comment letter (CL25) on the IASB website, paragraph 5.

4.4.2 Estimating future new business profits

GAAP, MoS and the net premium method spread new business profits over the lifetime of the policy. This means that each year's reported profits are a weighted average of new business profits from many years – perhaps decades - previously. Seen this way, they are clearly meaningless.

It seems to me that meaningful reporting from the company would be last year's new business profits on a realistic basis and compared with previous budgets, budgets for the ensuing year, and some commentary.

4.5 Determining fair value

The Financial Accounting Standards Board (2002) sets out a useful hierarchy.

1. If there is an observable market transaction, the amount of cash exchanged for the same or similar item should be used.
2. If market values are not available, an enterprise should use an estimation technique (such as present value, option pricing models, or appraisals) using market-based assumptions with the objective of determining the item's fair value.
3. If neither market values nor market-based assumptions for estimating a value are available, management should use the same estimation techniques as above incorporating information that was not contrary to market-based assumptions.

The major problem appears to be the determination of a market-based interest rate. The discussion in this section is divided into the question of a "risk free" rate, and then appropriate allowances for the various risks involved.

4.5.1 The risk free rate

Determining the value of insurance liabilities requires the future cash flows, allowing for probability of payment, to be discounted. The cash flows, the probability of payment and the discount rates may all be unknown. If so, they must be estimated using mathematical models.

Discount rates, for all but the longest periods, are usually available from the bond market. If we ignore considerations of risk and market anomalies, the risk free rate to use will be that available on readily available investments with minimal risk denominated in the currency of the liabilities. (The currency may be nominal or real – i.e. inflation adjusted – depending on the liability.)

This rate is usually approximated by the yield on government issued instruments of appropriate term. These yields may however not be based on the operation of the free market. Examples might be temporary manipulation of short term interest rates by a

central bank, shortage of supply at some durations or unwillingness on the part of fund managers to take up a particular type of new issue – as for instance initially happened with inflation linked bonds in many markets. The government rate can be used as the benchmark discount rate if enough market participants have significant government debt instruments in their portfolios, and are able to exchange these for the cash flow under consideration (i.e. they can effectively borrow or invest at the risk free rate.)

If there are insufficient government instruments or market participants, other approaches will be needed. Some are suggested by IAA (2003). In current circumstances, the "swap curve" appears to offer an adequate benchmark – in spite of the inherent credit risk.

4.5.2 Liquidity risk

Some insurance policies do not allow for surrender or trading. By not giving this "real" option to trade, the insurer must be gaining some value, which might allow it to reduce the size of its liability. The IASB DSOP allows for this – if "there is persuasive evidence that enables an insurer to quantify them by reference to observable market data". Such evidence would be the presence of illiquid, and otherwise riskless, stocks in the insurer's portfolio that match the liability and are valued at a higher discount rate. The existence of such stocks in the market would not be sufficient unless allowance was made for the full costs of purchasing them.

Babbel et al (2002) give a more detailed discussion.

4.5.3 Own credit risk

A credit risk would take account of the probability of default by the issuer on the instrument or cash flow under consideration. The reduction in liability value can be described as a put option given by creditors to shareholders that allows them to walk away from the obligation if liabilities exceed assets. This is clearly the correct approach for the cash flows of non-regulated entities. Otherwise identical liabilities of higher risk organizations are worth less than those of better risks.

For prudential regulated entities, shareholders are likely to face a variety of costs and restrictions that become increasingly onerous as solvency deteriorates. These make it less likely that the put option, given to policyholders and depositors, will be realised, and may well outweigh the value of the option. Regulators that accept credit risk in the determination of liabilities are effectively accepting that such risks are acceptable without their intervention. Regulators do accept lower ratings for the debt obligations

of financial institutions, but it is suggested that no regulator would accept a significant likelihood of default on insurance obligations. Allowances for credit risks would not therefore appear to be justifiable.

The IASB IFRS4, paragraph BC6 suggests that for phase II:

> The fair value measurement of an insurance contract should reflect the credit characteristics of that contract, including the effect of policyholder protections and insurance provided by governmental bodies or other guarantors.

This may effectively mean that no allowance will be made for credit risk, and all parties should be satisfied.

4.5.4 Diversifiable risk

The DSOP, which is apparently still intended as the basis for phase II, requires values to reflect both diversifiable and market, or undiversifiable, risk and appears to want liabilities to be increased depending on their relative volatility. This goes against prevailing economic theory, which depends on much more general assumptions than CAPM as shown in Sherris (2003), and which suggests that:

- No allowance is necessary for diversifiable risk per se because capital providers can easily diversify their exposure to any one risk.
- Positive correlation with market risks will reduce the value of a cash flow (whether it be an asset or a liability), while negative correlations will increase its value.

This section discusses only diversifiable risks; the next looks at market risks.

Babbel et al (2002) argue that:

> Contrary to the implications of CAPM, providers demand substantial equity risk premiums, and insurance company managers price and reserve their products accordingly. Even though the insurance industry is generally deemed to be competitive, the actuarial process adds "market value margins" into reserve calculations.

They go on to suggest that these are frictional costs that arise from misperceptions, and real difficulties in diversification that they believe will reduce over time. They express the hope that their inclusion in company accounts could increase competition so speeding up the process.

There are problems with this line of reasoning. Firstly it cannot apply to life insurance companies issuing mainly investment contracts as there is no obvious non-

diversifiable risk, but the same pricing strategies are used. Secondly insurance companies do not appear to be particularly profitable. Swiss Re (2001) analyses the profitability of the worldwide insurance market and finds, even before September 11, that ROE is comparable with other companies, and that in the USA in last ten years insurance company shares have underperformed the market. Admittedly, the eighties were better for life insurers particularly.

Loadings play a different role in pricing and reserving. In pricing, Smith et al (2003) suggest they provide compensation for a company's franchise value, which they equate to intangible assets and which might be recognised by IAS38 in that they arise from some "investment". The ability to charge higher premiums may also arise from innovation, luck or monopolistic power – the profit loading being determined as a producing a "reasonable" monopoly rent. I would suggest that the profitability of much life insurance during the last 50 years is consistent with the latter explanation.

In reserving, excessive loadings in determining a company's profits have the advantage, for established companies especially, of deferring the reporting of profits. This defers taxes and also allows them to smooth their profits. If it can be forced on growing companies, it makes them under-report profits and so makes it more difficult for them to raise capital, and so entrenches existing market participants.

In both cases however, it would also be explained by many actuaries as being prudent – especially in the face of managerial optimism. The results in the Swiss Re report would tend to confirm that short term premiums, at least, are not too high. Significant losses from annuity portfolios in a number of markets also suggest some overoptimism.

The conflict between actuarial prudence and sales optimism is discussed in Chalke (1991). If they are locked into such conflicts, actuaries are not likely to abandon theories that have justified their position by appeals to prudence. Chalke, however, also suggests an algorithm to generate theoretically justifiable prices where both sales and actuarial management take responsibility for making realistic estimates. It is suggested that such approaches are much more likely to be fruitful in the long run, and that the market value margins (MVM) adjustments for non-diversifiable risk should be resisted.

The price paid to transfer a liability should exceed the present value of claims discounted at the risk free rate. Part of the excess will relate to market imperfections; part to the costs of managing the risks. These costs relate to administration, regulation and tax and the avoidance of moral hazard as discussed in Hancock *et al*. Reserving

for these costs effectively provides an allowance for these risks. Another argument against MVMs is, therefore, that making a further allowance is double counting.

Insurers' raison d'etre is to pool risks for their clients. If they have not done so sufficiently for their shareholders, then the shareholders are normally free to sell a portion of their shareholding. Fair values are being determined primarily for shareholders, and the argument for MVMs amounts to reducing the shareholders' value because some of them may be insufficiently diversified.

This problem is aggravated by the DSOP suggestion that the allowance for volatility should depend on the size of the book of similar policies which are to be used as the unit of account. The principles underlying this approach are wrong, and somewhat flagrantly favour larger companies by requiring smaller ones to defer profits. If diversifiable risks were ignored, then the same liabilities will have the same value to all participants in the market. Smaller companies are likely to require greater prudential reserves and have fewer economies of scale; the present value of their liabilities should however be determined no differently from those of the larger ones.

4.5.5 Market risk

It is worth exploring the loading for undiversifiable risk in more detail.

- If the risk is positively correlated with the investment or consumption universe (however defined), then risk reduces the value of the cash flow – as a liability and as an asset.
- If the correlation is negative, then risk increases the value of the cash flow – as a liability and as an asset.

The actual allowance for the market risk to be applied to each separately identifiable cash flow depends both on this correlation and the universe's risk aversion. In CAPM terminology, this is its likely "beta" and the future "equity" premium. Both are difficult to measure and dependent on the models used, and thus can give to a wide range of acceptable values. The major insurance items are discussed below.

- Disability rates and insurance mortality almost certainly have a negative correlation with the universe. They reduce with improving economic circumstances. The effect would be however that they would require positive loadings. (Holding an insurance policy which is worth more when other assets decline is attractive, so one might pay 102 for a distribution of payments with an expected value of 100; having a liability which grows as your assets decline is less attractive because it creates greater volatility, so one might require 102

to accept for a distribution with an expected liability of 100.) This might be achieved by reducing the interest rate used to determine liabilities. These contracts may however not build up significant reserves so a MVM might be more appropriate.

- The longevity cost of annuities is positively correlated with economic conditions and will have the opposite effect. This could justify negative loadings and would be consistent with what appears to be a cavalier approach to annuity pricing by some life insurers.

  On the other hand, the longevity risk can be seen to be a significant element in the universal "market" - of assets and liabilities. The present value of future pension liabilities (including social security funded by tax payments) is more or less comparable to the value of all marketable assets. It is a universal liability: everyone has to reduce their current consumption if they are going to live longer in retirement. People will therefore not want to increase their exposure to this risk, and positive loadings might be required for them to do so. The net effect is unclear.

- Babbel *et al* argue that most general insurance risks are not related to the stock market, and even the impact of the very largest would justify a very small "beta". The co-incidental timing of the September 11 attack and the share market fall provides a counter example. There is at least an argument that the attack is at least partly responsible for the subsequent events that have contributed to the economic downturn. Even if it is an outlier, the correlation between insurable events and market returns can conceivably be seen as negative, which would contribute to the use of positive loadings.

- Expenses tend to reduce under adverse economic conditions, and may therefore have a positive "beta", and permit negative loadings or a higher discount rate.

Ultimately there appears very little reason to deviate much from the swap rate, with its limited credit risk loadings.

5 DETERMINING CAPITAL

The third purpose of the accounts is to demonstrate that the company had sufficient prudential capital. This section offers an overview of the principles that emerge from section 3.

5.1 Probability and possibilities

It is instructive to consider prudential requirements in terms of possibilities rather than probabilities. An example illustrates. Consider a company that issues only one policy with a 1% probability of a claim of $100. A fair premium would be of the order of $1. The insurer should have capital of at least $99 or it will be misleading the policyholder. The possibility of a claim is the issue, not the fact that this requires some ten standard deviations of the risk.

Similar conditions apply to probable maximum loss (PML) or maximum expected loss (MEL) scenarios. The question is whether policyholders would accept a reduction in their claims in the event of particular possible, albeit unlikely, scenarios. This consideration again underlines the importance of stress tests, as discussed in Schachter (1998 and 2001)

5.2 Prudential capital

This should provide for a "range of adverse but reasonably possible conditions". There are two ways of making such a determination.

- The first is to take the stress test or maximum event retention (MER) approach, and consider the worst possible events for which the insurer should be able to survive. This has the advantage that it is not necessary to consider the probability distribution of the risk. The regulator can specifically outline the scenarios in which insurers are expected to survive.
- The second is to consider the probability distributions of the various risks and to determine a required degree of adequacy – such as 99.9%. This can be called a value at risk approach (VaR). While the probabilities are arbitrary and has the danger of giving the spurious impression of accuracy, it does provide for a measure to compare (however imperfectly) the size of reserve required for different risks.

5.3 Basic solvency risks

5.3.1 Liquidity risks

These were discussed in principle in section 3.4.1. It seems to me that while models can be developed to determine economic capital requirements when markets are functioning, this is not the case when they fail. Provision for illiquidity needs to be incorporated into policy contracts in terms which allows for a suspension of normal

payments when it is not possible to realise otherwise marketable assets in an orderly fashion.

It may be that this might usefully apply to banks as well. Current wisdom is that Governments will intervene to support runs on demand deposits in large banks – in order to prevent systematic collapse. Gizycki and Lowe (2000) give the current Australian position:

> One important consideration not addressed by the (Wallis) Inquiry is whether governments would allow retail depositors in an authorised institution to suffer losses. The absence of failures of private banks in Australia for almost seventy years makes this difficult to judge. However, the experience in other countries suggests that governments find it extremely difficult to allow depositors to incur losses, even when they have no legal responsibility to protect, or guarantee, deposits.

It is not easy to distinguish between market values that are merely depressed and those which arise from the illiquidity of a failed market. The earlier discussion of asset quality, in section 3.4.1, proposes that the distinction lies in present value of underlying cash flows. It is suggested that under a catastrophic scenario, where the present value of the underlying cash flows at some high real interest rate is greater than the realisable value of the asset, policyholders (and deposit holders) could reasonably expect financial institutions to restrict payments, and impose penalties on those that received money.

5.3.2 Other asset risks

If an institution offers unhedged guarantees, it will require capital in excess of fair values. The capital required can be determined by VaR type methods, as the problems of herding raised by Danielsson *et al* are covered by liquidity measures.

A VaR measure will depend on the volatility of the assets concerned and the period of the guarantees. If the guarantees can be hedged in a deep market, but are not, then the relevant interval is the period between suffering a trading loss and implementing a decision to hedge. Unless firm delegations from the board of the company are in place for making such decisions, this period has to be measured in months if not in years. The approach used for banks is to use a 10 day horizon even though decisions are made daily. This gives a considerable margin, but perhaps not unreasonably so given the uncertainty in the modelling.

If the suggestion in the previous section that financial instruments should have a liquidity opt-out, then stress tests could be linked to such opt-out provisions.

5.3.3 Insurance risks

The variability of insurance costs arise more from model and parameter risk rather than purely stochastic risks. Even with perfect models, the parameters themselves are unlikely to be stable given the sensitivity of claim rates to economic, social and other factors. Capital requirements should therefore be derived from the variability of claim rates over time, rather than from a static statistical model.

Expansion into new markets will require greater reserves to compensate for greater measurement error.

As discussed above, Bayesian methods should be used for estimating general and disability insurance reserves at fair value. The mean estimate of claims on which to base prudential reserves should however be calculated using the most recent data - if this requires higher reserves.

The reserves so calculated may require stress tests related to PML or MEL.

5.3.4 Business risks

These are ultimately all controllable, although it takes some time to extract a company from longer term business expense obligations. It can perhaps be noted that Ferris (2003) reviews a number of studies on the causes of insolvency, and it appears that most are related to poor management rather than the random events which capital is intended to cover.

a) New business expenses

These can be reduced over a relatively short period. The need for prudential reserves will depend largely on:

- The company's "tolerance" for losses before making a decision to reduce costs. Tolerance may depend as much on the quality of expense control, which can be measured by the frequency and accuracy of reporting as well as historic deviations from budgets, as on any explicit policy.
- Greater uncertainty often comes with change: business growth or contraction, corporate restructuring and the introduction of new products and systems. Greater prudence is required under these circumstances.
- Commitments to items such as retrenchment costs and property leases.

- Specialist operating assets that cannot be redeployed elsewhere. IT expenditure inevitably falls in this category. The standard regulatory approach would be to require regulated entities to write off such assets.

It is common actuarial practice to provide reserves to cover the "stress" of closure to new business. Most regulatory approaches do not however explicitly consider the commitments implicit in the first three items above.

b) Lapses and Surrenders

These are less amenable to management action after inception of the policy. Higher levels of lapse for cohorts of business often become evident at very short durations. Traditional actuarial practice, and the IASB currently, is to allow for a 100% lapse or surrender stress test. This is probably unnecessarily conservative, as 100% lapses will usually be unlikely in even the most stressed scenario.

c) Renewal and claim expenses

Adverse experience can arise from inflation and mismanagement.

- The best estimate for administration costs is that they will rise at the same rate as general inflation, but there is likely to be a significant tracking error. A common approach is to assume that productivity benefits will not be forthcoming, which then suggests inflation in line with salary growth – perhaps 2% p.a. faster than inflation.
- Mismanagement – culpable or not – is sufficiently likely as a scenario to require reserves. Paradoxically, the better managed now, the greater the reserves will be, because the greater the proportional impact of future mismanagement will be. It is difficult to envisage how this might be incorporated into reserves.

The reserves required should perhaps partly be based on the variability of expenses relative to budget. The relationship does not appear to have been researched anywhere. The first page of a Google search on "budget variance" produced seven reported variances that averaged 12%, all being overspent! This is probably fairly typical. The Basel requirement of 15% of net income for operational risk is probably a reasonable basis for expense risks. In the case of insurance companies, net income should refer to expense loadings or charges.

An accurate reflection of experience could perhaps best come from measuring the variability of the ratio of actual to budgeted expenses. The ratio can adjusted to the

extent that there was a direct link of the variability with associated revenue. This is far from perfect, but surely no worse, and much easier, than collecting the statistics required for Basel II's suggested operational risks. The main objection is that budget variances are controlled; the counter is that the variances are residual after unsuccessful controls, and so do provide a measure of the risk.

5.3.5 Gearing and guarantees

Non-financial companies adjust their risk profile (the relationship between the volatility of profit and their capital) by changing their gearing. If an insurer is unable or unwilling to raise additional free capital, it may be able to adapt its risk profile by reducing the guarantees embedded in its insurance contracts. These come in three main forms:

- Investment guarantees and options. These can often be hedged in the investment market.
- Insurance guarantees of premium rates or cover over an extended period. These can invariably be reinsured.
- Guarantees of expense charges. Some can be hedged using inflation linked investment instruments and others can be reinsured. A company with long term liabilities (including long tailed general business) may have to give some guarantees to reduce the moral hazards to which policyholders would otherwise be exposed.

Profit sharing and the issue of participating business provide other means of limiting guarantees and reducing moral hazards.

Guarantees are not intrinsic to insurance, which is essentially the pooling and management of risks. Investment, insurance and expense guarantees need be added only if policyholders are prepared to pay, and the company is able to raise the capital required.

The longer the period of the guarantee, the greater the capital required.

6 CONCLUSION

The new IASB standards on fair value and the Basel reserving proposals can be brought together in a coherent framework, although both need extension.

Perhaps the most important element of a potential new world of consistent fair values and internal risk models is to distinguish between best estimate market values and prudential reserves.

It is also important to appreciate the uncertainties inherent in the mathematical models used to determine both. Of greatest uncertainty is perhaps the determination of goodwill, but this turns out to be essential in calibrating estimates of fair value.

The accounts would then provide a basis for a much fuller understanding of the profitability and security of a company's operations.

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