Interim report to GIRO September 2006, Vienna

General insurance reserves for accounting and solvency: incorporating provision for risk

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Readers who are reasonably familiar with this subject are advised to read the first seven sections very quickly or to skip them altogether for the first time of reading. The more detailed analysis starts at Section 8

Our main focus in this paper is one which until recently has been in the "too difficult" category, and is now moving to the "must do" category, namely how do you determine the margin? Or a very similar question: how do you determine the total provision?

Our story starts with a discussion paper published in 1999 by what is now the International Accounting Standards Board (IASB). Fair value, the principle proposed for valuing assets and liabilities, was defined in that paper as "*the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arms length transaction*".

Since that time, countless papers have been written on the subject of accounting for insurance liabilities, including a few for GIRO. The subject is as controversial as ever, and many papers are less about academic research and discussion than lobbying to promote a special interest. It is up to the reader to judge where on that spectrum this paper currently lies. Similar points apply to the regulatory question of what the technical provisions should be for the solvency test. The International Association of Insurance Supervisors (IAIS) is working to develop a common approach. The IAIS "Roadmap" published in February 2006 included a request to the International Actuarial Association (IAA) for advice on issues related to the determination of best estimate policy obligations and technical provisions, and assessing their adequacy, in the context of an insurer's total balance sheet.

This current paper is not a final work product, but should be regarded as an interim report to GIRO capable of much improvement. We very much welcome feedback both during and, more importantly, after GIRO on any aspect.

It seems increasingly likely that technical provisions for both accounting and regulatory purposes will be the sum of a discounted mean estimate plus a risk margin, though these ideas are by no means accepted by all parties. Important issues that remain in best estimates are (a) who controls the assumptions and (b) the extent to which the mean really covers all scenarios.

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1 Summary

This working party was set up to help find solutions for the planned convergence in accounting and regulation of insurance. It therefore represents a small part of the actuarial input around the world. Three of our members are members of overseas actuarial associations; one from the US and two from Australia.

Our main focus has been to develop numerical examples which can feed into the discussions of the International Actuarial Association (IAA), and this is what the paper achieves in the later sections. More work remains to be done, however and as we say on our front page, this is only an interim report, with many gaps and imperfections which we would be delighted to have pointed out.

We must make the usual statement that the views stated in this paper are not those of any of our current or past employers – and given the interim nature of this report we can not say that they all necessarily represent a consensus amongst the members of the working party. Our hope is that our readers find the discussion interesting and come back to us to suggest improvements and further lines of enquiry.

Whilst there has for some time been a trend towards acceptance of the principle of discounted mean reserves (we believe it will be difficult but not impossible for those jurisdictions which do not currently discount to maintain that position), it is a slow process, as is the development of consistent international standards for an industry with such divergent current practices as the insurance industry.

We find there is no easy solution to the problem of risk margins, but then others have made that finding before us. We do think there may be some promise in the cost of capital approach, but the process of setting the numbers in a world where there is no good reference market for second-hand insurance risks is difficult and ultimately arbitrary.

Even when decisions are finally made with the agreement of many nations, it is our view that the best way to develop the frameworks for regulatory and general purpose accounts is to agree on matters of principle, permitting the technical implementation to develop as knowledge and experience grows – but that it is not possible to develop principle-based frameworks without a good understanding of the issues, which itself requires exposure to numerical examples.

2 Introduction

In this section, we do more than provide an introduction to the rest of the paper. It is one of the features of accounting and solvency that in order to put the interesting technical questions into context it is necessary to spend some time describing the accounting and solvency frameworks and some of the issues they raise. So this section introduces and discusses a range of issues, some of which are developed elsewhere in the paper, but all of which we believe are relevant to the question of risk margins relating to insurance liabilities.

2.1 About this paper – work in progress

We would emphasise the interim nature of this report. Work will continue after GIRO on a number of aspects, including improving the quality of the discussion, ensuring it is as balanced as possible, and extending the numerical examples. There are also some ideas which we have discussed in our meetings which we have yet to develop or even include in the paper. We particularly welcome feedback both during and after GIRO, and we will also ask for comments from interested members of the International Actuarial Association (IAA).

Whilst our main interest is in searching for and analysing solutions to the risk margin problem, we hope that this paper will be useful to those who are not very familiar with current international developments in accounting and solvency of non-life insurers, as well as to those who are familiar with many of the technical questions. Some material has being placed in appendices in order to make the main text as digestible as possible.

Readers familiar with the background and interested in the numerical examples will get more out of the paper by skimming the first few sections at the initial reading, but we welcome all comments and suggestions arising from any part of the paper.

2.1.1 What we are trying to achieve and why

Our main objective is to discuss possible "solutions" in terms of risk margins in technical provisions, but we also want to develop some numerical examples. Real progress on this topic was in the "too difficult" category for the first few years of deliberations on international accounting standards (IAS) for insurance, and also in the more recent thinking on convergence of solvency regimes.

This paper is being written at a time of rapid change and development in thinking. It represents just a small part of the actuarial contribution to international discussions on insurance accounting. It is likely that within the next ten years most significant insurance markets will be operating with broadly consistent accounting and solvency regimes – a major change compared to where we are today.

Whilst this paper is in some senses a continuation of work done by previous GIRO working parties, the main motivation for this paper is to contribute to the international debate.

Risk margins only have meaning in the context of the financial statements as a whole, so we devote a significant part of this paper to issues such as the principles and objectives used to determine the estimates of the liability for each of the following two functions: general-purpose accounting and regulation of solvency. There are of course many more functions, including taxation and management information, but whilst taxation in particular is an extremely powerful motivator and influences companies' attitudes to every aspect of the business, these other functions do not concern us directly.

2.1.2 Scope

The scope of this paper is all gross <u>policyholder obligations</u>, for example claims, unexpired portions of policies, and legal defence costs that are part of the policy coverage. We do not include company administrative costs associated with policy or claim handling, although these must be addressed elsewhere in the balance sheet.

Our main focus is risk margins related to the unpaid insurance claim liabilities rather than reinsurance assets. The valuation of the reinsurance recoverable asset is a very important subject, but it is even more complex than the valuation of gross unpaid claim liabilities. It remains a work-in-progress of the IAIS, IASB and other parties. This paper also largely leaves reinsurance as a work-in-progress, though we do discuss it in places. Further development of this paper will include much more thorough consideration of reinsurance. We see no reason why the same valuation principles should not apply to each of the gross liabilities, the reinsurance asset and the net liability, but thinking about consistency between these reveals some problems for some proposed solutions to risk margins.

If we accept the argument that the net of reinsurance position is more important to get "right" than the gross, this suggests that the company buying reinsurance can be a bit more approximate about what happens in extreme circumstances (although only to the extent that reinsurance picks these up). A regulator responsible for monitoring an individual company will pay great attention to its reinsurance arrangements. A good example in the UK is unlimited excess of loss reinsurance cover of a motor porfolio. No such comfort will exist when we look at the reinsurer itself; all those less manageable exposures have to end up somewhere.

This paper does not cover other risks, such as asset, underwriting (future business) or operational risk. The solvency regime should in future pick up all of these risks in one way or another, with a mixture of capital requirements and operational requirements. Our focus is on current liabilities to policyholders, not business yet to be written. For our purposes, current liabilities include unexpired risks.

2.1.3 How we have gone about it: research

In preparing for this paper, we looked as widely as we could at the current literature on accounting and solvency, and we have also seen much of the recent debate within the international actuarial community. The discussions on the accounting side are led by the International Accounting Standards Board (IASB) and on the regulatory/solvency side they are led by the International Association of Insurance Supervisors (IAIS). The IASB has set up an Insurance Working Group (IWG) which includes actuaries amongst its members.

The EU is pushing ahead to develop and then implement Solvency 2 and has also, in principle, decided that member states should adopt International Accounting Standards (IAS). The clear consensus is that there **should not** be two fundamentally different approaches to technical reserves for the two purposes, so those wishing to understand or influence the debate have to be aware of both accounting and solvency aspects. However, practice is always more messy than theory; even if the rules for both are similar we can not be certain they will be applied consistently in all places.

There are many parties feeding ideas, position papers, and so forth into IASB, IAIS and the EU. These include the international actuarial community, primarily through the IAA, which has been asked for advice by both IAIS and IASB. Also in Europe the Actuarial Groupe Consultatif has provided advice to CEIOPS, a body representing supervisors in Europe which itself advises the European Commission.

As a result of the activities of these bodies there is a wealth of reading matter. We include a number of references within of this paper, particularly in Section 12, where we discuss many of the debates which are taking place and the different positions currently being taken. A more comprehensive set of references is one of our tasks after September 2006.

Some jurisdictions have had statutory actuarial involvement in non-life reserving for some time. A literature on reserving uncertainty has been developing, in particular in Australia. In recognition of this, and also because of the international, not just UK, relevance of this topic, one of our principal authors is a fellow of the Casualty Actuarial Society, and we have had the benefit of two corresponding members in Australia, one of whom is a member of The IASB's Insurance Working Group.

It is interesting that one jurisdiction where there is considerable anxiety at the prospect of discounting reserves to reflect future investment income, the USA, has produced a great deal of literature on premium rating and reserving, specifically discussing the impact of volatility of outcomes and uncertainties in estimates, in anticipation of a discounting environment. This has been in part a response to changes in the US tax regime which took place about 20 years ago, the requirement to discount reserves for the time value of money for tax purposes. So for many years insurers in the US have lived with the requirement to reserve on an undiscounted basis for solvency purposes and on a discounted basis for tax purposes. The actuarial bodies in the USA have sponsored the "Risk Premium Project" on cost of capital, which has produced a number of useful documents.

As mentioned above, we were keen to develop numerical examples. There is currently no consensus on an appropriate level of risk margins within technical reserves, and there is unlikely to be any such consensus for some time. To move the debate forward we have produced some worked examples of a cost of capital approach, and used these examples to illustrate some of the sensitivities and issues involved. We have also looked through the literature for suggestions on how to decide on some of the parameters which have to be selected to arrive at numerical results. We found that working through the examples gave a number of useful insights.

This paper follows on from earlier GIRO papers on this topic, and we very much hope the work will be continued in future years. Whilst we know that the discussion still needs work, we intend that the focus of future work will be on developing and explaining more numerical examples, as this, rather than more extended discussion, is

what the decision makers need to develop the framework of rules which govern the accounting and solvency frameworks of the future.

It is our view that the best way to develop these frameworks is to agree on matters of principle, permitting the technical implementation to develop as knowledge and experience grows – but that it is not possible to develop principle-based frameworks without a good understanding of the issues, which itself requires exposure to numerical examples.

2.1.4 How we have gone about it: constructing this paper

Those readers who have been watching the developments carefully over the last few years will be able to miss out parts of this paper. But we have tried to make our work accessible to those who are not so familiar, and to give a sufficiently thorough picture that readers who want to make their own minds up on the various questions have at least a good base from which to start. Very many decisions have yet to be made in both accounting and solvency areas.

When discussing issues amongst ourselves, we have found that it is all too easy to appear to be at cross-purposes when we are not sufficiently precise about the topic under discussion. Much disagreement arises from misunderstanding rather than fundamental differences of view. For this reason, and also because there is an element of inter-dependence between accounting and solvency measures and objectives, we include a section on how accounting, solvency and capital tie together. We later introduce the idea of a "reference company", a useful theoretical device for achieving inter-company consistency of reserves for accounting purposes.

The current "mainstream" proposed approach to deriving technical reserves which include appropriate levels of risk margin, is the "cost of capital" approach. This is the approach on which we have based the numerical work within this paper, but we have also considered some of the alternatives which have been put forward. There is currently no "right" approach and there may never be a single best answer in all cases. Everyone is looking for a "good enough" approach which is better than the status quo, and which is capable of improvement over time without the need to develop a new international consensus every time an improvement is made.

Therefore, before we reach the cost-of-capital examples, we try to look at the challenges from first principles and from the perspectives of the different interested parties, all of whom are "users" of published accounting information and of solvency regulation to different degrees. Whilst "fair value" was the accounting principle initially proposed by the IASB, it works best – and also without too much controversy – where there are deep and liquid markets available in the item to be valued. This, of course, is not the case for insurance liabilities, and the degree of uncertainty which can attach to insurance liabilities compounds the problem. We have not limited our discussion to "fair value", useful though the concept is.

In an attempt to make the paper as readable as possible, we have made use of appendices to shorten the main paper. An example of this is "user needs", where there is a lengthy discussion in Appendix A, whilst our chapter on the subject brings out only a few of the issues.

2.2 Accounting Today

By "accounting", we mean to include both general and regulatory purposes. In most jurisdictions, but by no means all, the general purpose accounting uses the technical reserves which are required by the regulatory regime.

Current practices in reserving for general insurance unpaid claims vary considerably from country to country, for example:

- Discounting is required in Australia, but not generally permitted in the US. Exceptions in the US include discontinued operations: permitted under US GAAP, but requiring specific permission for regulatory purposes. Where discounting is permitted in the US, there is flexibility over choice of basis providing there is consistency over time. In most jurisdictions, current practice is not to discount.

- Explicit risk margins are added in some jurisdictions. For example, they are required in Australia by virtue of a 75th percentile reserving standard and permitted in Canada where reserves are also discounted. Again, the basis for determining margins is generally required to be consistent over time.

- Implicit conservatism is viewed as good in many jurisdictions ("better too much than too little").

  Reserves are considered "inadequate" if they show "too much" adverse development against the estimate, but there is no standard what constitutes "too much". Any adverse development is considered "too much" in some contexts, but substantial adverse development is not surprising in other contexts (mass torts).

  Unpaid claim liabilities are seldom transferred on a stand-alone basis. Reserves are more commonly transferred as part of the sale of a company or of a portfolio of business or in a reinsurance context. From a business perspective, the adequacy of reserves, while important, is only one element in a transaction that involves expected profits from future business (sale of company or portfolio) or an ongoing business relationship (a reinsurance transaction).

In accident-year regimes, claims associated with unearned premiums are covered by a pro-rata portion of the premium. In such regimes there are frequently also adjustments added for cases where the unearned premium is judged to be insufficient. Where this occurs in the UK, these additions, or alternatively, the entire liability established for these claims, are called "unexpired risk reserves". Some accounting regimes using pro-rata unearned premiums have rules for tests of whether those amounts are sufficient to defray the associated claims; these rules vary by regime, for example in whether or not investment income is allowed for in the sufficiency test.

Other regimes, such as Lloyd's and the IFRS proposals, require the establishment of claim reserves to cover both earned and unearned exposures. On the whole, this would appear be a simpler approach, but then a decision has to be made whether to require that profit should not be recognised until the exposure period has passed. Questions such as this are not particularly interesting from an actuarial perspective, but attitudes to them vary greatly from jurisdiction to jurisdiction.

Thus, even apart from the interest in fair-value accounting, a common approach to unpaid claim reserves is needed establish a consistent international financial-reporting approach, and it is not at all surprising that insurance accounting is one of the last

areas for the IASB to tackle in its task of achieving international consistency in accounts.

2.3 Summary of current developments

Regulatory and General Purpose Accounting

General-purpose and regulatory financial reporting serve difference purposes and, in many jurisdictions, different regimes for general-purpose regulatory financial reporting are in place. As the IASB and the IAIS are in the process of restructuring the general purpose and regulatory financial reporting, they are attempting to eliminate, or at least rationalise, any differences.

General-purpose financial reporting focuses on operating results and the current financial position of the company. In that sense, general purpose accounting is interested in appropriate treatment of assets and liabilities and the resulting income statements. Regulators are more interesting in financial capacity to satisfy the obligations to policyholders. Regulatory accounting therefore is focused on the balance between assets and liabilities. Historically that meant that regulatory accounting established conservative valuations for assets (low) and liabilities (high). Any distortions in income relative to general-purpose accounting were an accepted by-product.

There does appear to be a regulatory trend away from conservative valuation of assets and liabilities to risk based capital (RBC) using market value of assets and (in Australia) a proxy for fair value of liabilities, and shifting the conservatism into asset and liability related charges in the minimal capital requirement (MCR)

Capital - IAA

For regulatory purposes the IAA has proposed (*A Global Framework for Insurer Solvency Assessment*, 2004[1] "Bluebook", section 1.1) that the focus of solvency should on determining "the total funds needed to provide a chosen level of confidence to policyholders and shareholders that the insurer's policyholder obligations will be met. IAA suggests that with a focus on the total balance sheet assets and liabilities can be separately stated on a realistic basis with "no hidden surplus/deficit". Setting capital explicitly without trying to have "conservative" treatment of assets and liabilities separately is a change in perspective which, if followed, makes it more practical to achieve convergence of regulatory and general purpose financial reporting.

Capital - IAIS

IAIS is moving to accept the IASB (fair value) treatment of assets and liabilities (IAIS 2nd set of comments to IASB May 2006[2]). The regulatory interest in solvency will be

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[1] http://www.actuaries.org/LIBRARY/Papers/Global_Framework_Insurer_Solvency_Assessment-members.pdf

[2] *Issues arising as a result of the IASB's insurance contracts project - phase II, second set of IAIS comments* is the most relevant to fair value accounting. www.iaisweb.org/060601__Second_Liabilities_Paper_final.pdf

reflected by adopting the total balance sheet perspective on solvency (Common Structure for Solvency Assessment, May 2006). The standards for capital will take account of the standards used to value assets and liabilities.

2.4 Why and where do we need prudence relating to existing liabilities in general insurers?

Since the whole point of insurance is to give security to the policyholder against uncertain adverse scenarios faced by the policyholder, there is no disagreement with the statement that margins of safety have to be held somewhere. But exactly where should they be?

We use the term "risk margin" to mean the amount by which what we hold in technical provisions exceeds the expected cost of the liabilities). We are using the term "margin of safety" here in the wide sense of aspects of insurance company financial arrangements which protect policyholders, as opposed to just "risk margins". Balance sheet prudence will normally contain the most important margins of safety, but a margin of safety can also be provided, for example, by a parent company guarantee.

2.4.1 Assets, liabilities, or capital?

Balance sheet prudence (whether for accounting or for solvency) can be achieved by any combination of the following: fs

- Putting a "prudent" (low) value on the assets

- Putting a "prudent" (high) value on the liabilities

- Holding extra assets as capital (whether built up by shareholder subscription or from retained profits does not matter)

The last of these will always be needed, but the current consensus is to support a "total balance sheet" approach which considers the position of the company as a whole. This is explained in the "Roadmap" paper produced by the IAIS, available on http://www.iaisweb.org/060216_Roadmap_paper_16_Feb_06_.pdf. So regulators will wish to take account of the degree of prudence in the values placed on assets and liabilities – always assuming they are aware how much such prudence there is – when setting requirements for explicit levels of capital.

Achieving prudence through individual components which are in themselves unrealistic has a disadvantage, since accounts prepared on this bases give the user little insight into performance against realistic objectives.

2.4.2 Implicit or explicit?

Any prudence existing in the values placed on the assets or liabilities can be either explicit or implicit, that is, it can be disclosed or undisclosed. Historically, the prudence in most jurisdictions has been implicit, though it has become common in those jurisdictions where investment assets have been held at the lower of book value or market value for the market value to be disclosed. So, to the extent that the degree of asset valuation prudence is disclosed, we can regard it as explicit and observers could alter their own assessments of the free capital accordingly, provided they can

assess the impact of any tax which might become payable on the realisation of the assets.

On the liability side, our main pre-occupation, prudence is always implicit unless a realistic (by which we mean one that is unbiased and takes into account the full range of potential outcomes) estimate of the discounted mean liabilities is also disclosed. It is very likely that the accounting and regulatory regimes of the future will require this disclosure, something which is not universally the case at the present time.

The character of the accounting or solvency regime will be quite different depending on whether or not the prudential elements are all explicit. For example meaningful dialogue with shareholders is easier if the components are all explicit. In most jurisdictions there is currently no or minimal discounting for the time value of money, which provides an implicit margin on the liabilities. This margin depends on the discount rate that would have been used and on the mean term of the liabilities. The margin is dissipated to the extent that value placed on outwards reinsurance is not discounted, as the credit taken will be greater than its discounted value. There is a logic to using the same approach for both gross liabilities and reinsurance, but the total margin in the account will depend, in an undiscounted regime, on the balance between gross liabilities and reinsurance. So whilst not discounting can create an implicit margin of safety for the account as a whole, the extent of this margin can vary not only in relation to the average term of the liabilities but also depending on the degree of reliance on outwards reinsurance.

2.4.3 The future: where the reserve margins will be held

The "traditional" approach holds that, because it is so difficult to be precise about estimates, a generally prudent approach should be taken to making reserve estimates, introducing margins of safety at every stage. This of course leads to implicit margins of safety, but it is important not to disregard the traditional argument altogether. It highlights the most important facts of life relating to insurance reserving, namely that there is always fundamental uncertainty present, and that, whilst more research and a deeper knowledge of the account can reduce the level of the uncertainty of the estimates, there will always be a substantial, inherent and irreducible level of uncertainty as to the final outcome.

There is, however, a growing consensus that all margins should be disclosed, and therefore that discounted mean estimates will be made and disclosed, (together with related information about the uncertainty of those estimates), for both accounting and solvency purposes. This makes many people closely involved with reserving nervous, lest users assume, as we suggest it is human nature to do, that there is something much more "factual" or "certain" about published numbers than is really the case. This represents a major communication challenge for the actuarial profession and others – and also for the users, who need to listen and assimilate the issues as well. This important professional issue is touched on in the GRIT report[3].

There are a number of different views on whether the technical provisions should include a margin for uncertainty, or whether they should be discounted mean

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[3] A Change Agenda for Reserving, Jones *et al* March 2006. Available at http://www.actuaries.org.uk/files/pdf/sessional/sm20060327.pdf.

estimates with no prudence margin, in which case capital requirements would include an element for prudence related to the liabilities. Does it make a difference?

For solvency, it doesn't really make a difference which approach is used, because regulators will adjust their capital requirements to take account of the reserving approach that is to be used. But for accounting, the commercial accounts will treat the technical provisions as a cost charged to income, so that recognition of profit will be correspondingly deferred if a margin for prudence is included. Shareholders will tend to argue that this should be the case; as the margin is not available for distribution, it is only truly "earned" as the run-off risk associated with the liabilities itself runs off, and to do otherwise would send misleading signals about the economic reality of the business as well as reducing to zero the chance that the amount concerned would be deductible against income for tax purposes. One could argue that this is exactly what a fair value would achieve; the risk margin required to transfer the liabilities to a willing buyer is exactly what the profit element in a fair value would be.

Uncertainty has an economic value. And in section 4.1 we describe an extreme instance of this which we would describe as increasing "toxicity" in the tail.

We think there is a growing consensus is that discounted mean estimates should always be disclosed and that a specific margin should be added which is treated as part of the provisions for accounting or solvency purposes. Precisely how this margin should be determined is the focus of this paper.

2.4.4 Relationship between accounting and solvency; a change in focus

A primary purpose of accounts is for the directors of the company to report to the owners of the company, the shareholders, on the directors' stewardship of their wealth. This information is needed by the shareholders in order to exercise their own rights and responsibilities, in particular to make changes in the board of directors. Over the years there has been an ever-growing emphasis on the quality of the information in company accounts, where "quality" includes many common-sense concepts such as not misleading, giving as complete a picture as reasonable materiality permits, as objective as possible, etc. The objectives of accounts as suggested by the IASB includes giving information which is useful (to many parties) in the making of economic decisions. This includes the maintenance of fair markets in the shares of publicly-traded companies. We note that discussions at FASB, the US Financial Accounting Standards Board, have tentatively concluded (see the Conceptual Framework project at http://www.fasb.org/project/conceptual_framework.shtml) that providing shareholders with information on stewardship should not be specifically mentioned as a primary purpose of accounts. This decision is a little surprising, and would not appear to place shareholders' interests as paramount.

In recent years, accounting standard setters have been moving away from prudence, or conservatism, as a core principle of company accounts, because that principle permitted a wide range of levels of prudence. The consequence of that permitted wide range was to limit the comparability of the accounts of different companies and, if levels of prudence (implicit margins) varied over time, the declared earnings could easily be misleading. This is especially important where stock markets pay great

attention to declared earnings. So the principles adopted now by the IASB lean towards realistic estimates, as opposed to large margins of (implicit) prudence.

Until very recently, of course, insurance accounts have been unaffected by these changes in international accounting standards. Insurance liabilities in particular have been left untouched by new accounting standards. Whilst Phase 1 of the IASB's insurance accounting project was implemented in the standard IFRS4, it left the principles for determining insurance liabilities largely untouched.

Accounts for insurers traditionally used solvency numbers

For insurance, sitting alongside accounting requirements and from a regulatory perspective trumping the requirements which exist to protect the interests of shareholders we have a solvency regime imposed. This regime involves a series of operational measures and financial information requirements, all for the purpose of protecting the policyholders.

So the traditional approach is to use the same (prudent) reserve estimates developed for solvency in the accounts. This has a forceful justification: the reserve amounts are required in the business and are not available for shareholders; indeed, one could argue that they are held in trust on behalf of the policyholders

Whilst the traditional approach does have considerable advantages for shareholders, where it involves implicit margins there is a strong danger that the managers will not have as clear an understanding of the business as if all the margins were explicit. And their reporting to shareholders would also be deficient as a result. Implicit margins are also capable of deliberate manipulation, which would obscure the performance of the business from the shareholders.

In future, accounts for insurers will not necessarily use solvency numbers

The focus for accounts in future will be on correctly describing the economic substance of the existing business. This does not mean that technical reserves will not include margins, but that those margins will be consistent with the more general accounting principles. So we could quite easily get a divergence between reserves for solvency and reserves for accounting.

But the clear preference is to use the same underlying discounted mean reserve estimates and information on uncertainty in both accounts and solvency returns

There is agreement in most quarters that the provisions for accounting and solvency should either be identical, or very closely related with the relation between them easily understood. Nobody wants to go through two separate reserving exercises for the two different purposes.

2.5 Is there a problem of circularity with accounting and solvency?

Readers new to our subject matter will need a few words of explanation here. If our accounting principle is "fair value", or as close an analogy to fair value as we can devise given the absence of any real market for second-hand insurance liabilities, then we need to ask how much a rational and well-capitalised insurer would require to take on the liabilities in question. (We can ask this question from the viewpoint of a reference company or a specific company – it doesn't matter as the questions are the same.) So what factors should that company take into account?

We will discuss this vital question more thoroughly later in this paper. But one factor will be the regulatory capital requirement which will result from writing the additional piece of business. But capital is limited; holding it in insurance companies imposes many sorts of costs on the shareholders, and a "fair value" will involve a level of compensation for this. This is why the "cost of capital" approach is one of the ways used by insurers to rate all types of business.

So we have:

…**regulatory capital requirement** being imposed by regulators

…which, possibly together with market pressure (rating agencies) on capital requirements, influences **fair value.**

But **fair value** is also suggested, in some proposals for the solvency regime (Solvency 2 in the EU is a good example), as the value to be placed on liabilities for solvency **purposes.**

But does the **regulatory capital requirement** set to cover existing liabilities (remember that this paper is not concerned at all with new business, only existing business) have to be **in addition** to any safety margin included in fair value, or should it **include** it?

If the latter, this is inevitably complicates the calculations, but it could hardly be called circular. (These issues are explored in detail in the numerical examples in Section 9 of this paper) If the former, one could argue that the regulators should take into account the fact that companies will (they hope!) be holding a margin of safety in their fair value estimates, in which case the regulatory target setting itself involves quite complex calculations.

In sum, we do not believe there would be any significant technical problems arising from a need for companies to "solve" for certain elements of their financial-statement numbers, something which we believe is likely to occur if a "fair value" or similar approach is required in the accounts.

Some commentators have suggested that the "circular" aspects of, for example, cost of capital calculations will make them too difficult for some companies. We do not subscribe to this argument – if you are capable of understanding your business and making realistic reserve estimates, then the maths involved in a few calculations will hardly present a problem.

2.6 Reserving first, risk margins second

Whatever the framework of rules, we should remember that the first step in convergence of companies in all jurisdictions to consistent financial reporting is consistent estimates of the liabilities, consistent both in terms of principles and objectives and in terms of degree of caution or otherwise. Moving towards this consistency may represent a major change in some jurisdictions and it cannot happen overnight.

Judgement is unavoidable, and it is important to recognise that a consistent strength of reserving over time should not permit smoothing of results and, for many lines of

business, will reveal the true volatility of earnings.[4] Whilst actuaries will tend to focus on financial strength and balance sheets of insurers, we should remember that reported earnings can be a motivator for management to an extent which is not necessarily in the best interests of either shareholders or policyholders. There is some evidence that financial markets have less confidence in the reported earnings of non-life insurance companies than in the reported earnings of almost any other industry. However, in time the recently-introduced requirements for disclosure of reserve-run-off in IFRS4 will permit users of accounts to understand better the accuracy of past reserving in all jurisdictions, though in some jurisdictions such as the US statutory reports have long required as least a degree of detailed disclosure of run-off information. If, over time, significant reserve deficiencies were to become less common, the confidence of financial markets in the integrity of insurers' financial statements would grow. This may lead to both behavioural and governance changes within companies, perhaps including the way in which actuarial advice is taken into account.

From the perspective of most users of accounts the integrity of the mean discounted reserving estimates, together with information about the uncertainties and sensitivities of those estimates, is more important than the solution which is eventually found to the problem of risk margins relating to the reserves. For this reason we do discuss best estimates in this report. We can think of the mean as the first order quantity, while the margin is second order. The first task is to get a good estimate of the mean. The required margin is a function of second and higher order moments. Estimates of these are inevitably more uncertain than estimates of the mean.

Readers wanting to know more about reserving are referred to GRIT

2.7 Implementing the new frameworks – some of the challenges involved

Our purpose here is to try and identify the challenges, not develop discussion around them. We particularly welcome discussion on these and on 2.8 below, both at GIRO and afterwards

- Process challenges; how to get to a common approach, starting from the great differences in practices which exist not.

- Setting down the objectives and principles unambiguously, in order to get understanding and then, hopefully, agreement

- Recognise all the different agendas, including the unspoken ones.

- We suggest the big decisions should be taken at the principles level, with flexibility to develop technical solutions and calibration over time, without the need for further rounds of massive international consultation.

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[4] See Sir David Tweedie's guest editorial in B.A.J. 9, IV, 719-723 (2003) Facing up to reality: accounting that tells it as it is.

2.8 Some difficult professional questions

- For actuaries and others involved in reserving, developing commonly accepted ways of adjusting estimates for model and parameter uncertainty. This may come into future work streams of GRIT

- Similarly, developing ways of estimating and communicating the uncertainties involved in reserves.

- For users, being prepared to listen and accept the facts on uncertainty ….

2.9 Accounting policy questions we are not worrying about

- Deferral of acquisition costs (this is something which is unlikely to apply in future, as all costs and associated receipts from policyholders will probably be recognised.

- Whether the accounting results for a cohort of business are adjusted – for example to ensure no profit at issue.

- Many more technical matters we are not even aware of.

2.10 Treatment of (outwards) reinsurance

This is one area we cannot discuss in depth in this paper, but we would hope to do so in due course in a development of this paper.

1. The net provision is more important than the gross, or more precisely the net financial position taking account of everything

2. But the current accounting principle is now to show gross and reinsurance asset separately, so all components have to be explicit

3. In a world where insurance liabilities are recognised as needing a margin, it follows that the provision for reinsurance recoveries can only be meaningfully determined in the context of the associated gross liabilities. It can not be treated as an independent asset whose value would be reduced by a margin for the uncertainty of the amounts payable. Rather, its value is enhanced, because it reduces the uncertainty of the net liability.(although it should be reduced by a margin for any uncertainty in whether the reinsurer will make the payments for which it is contractually liable)

4. When evaluating outward reinsurance, its risk responsiveness to the inward liabilities is what matters, especially to the most adverse scenarios. It is no good, for example if the cover runs out or if the reinsurer won't or can't pay.

5. Best estimate, discounted, accounting before adjusting for risk margins will reflect the true cost of reinsurance, whereas discounting will disguise it.

6. If the reinsurance is sufficiently risk-responsive and protects the reinsured against particularly adverse scenarios, rather than just paying a proportion of everything or running out of limits when the experience gets at all bad, then adjusting for risk will in theory have two effects:
   - o The first effect is on what we might call "fair value". If very risk-responsive, an alternative reinsurer would require a very large risk

margin to take it on. So, providing the gross liabilities are valued consistently, there is no objection to the credit taken being greater than the discounted expected value.

- But doesn't the willing-buyer, willing seller test come a bit unstuck here? If you, as a reinsured, want to cash in your reinsurance, you will be in a difficult position as you cannot force your reinsurer to pay up. So you could not realise the full "fair value"

- o The second effect is on the **capital requirement**. Whilst reinsurance does (barring occasional madness by the reinsurance market) have a significant cost over and above its expected value (profit load, expenses, etc), it can, if suitably risk-responsive for the reinsured, materially reduce its capital requirement, and the saving in capital employed, or alternatively the more efficient use of the capital that is available, can compensate for the cost of reinsurance. Without reinsurance, small insurers, or even many large ones, could not operate soundly.

7. If the approach used to allow for risk is a statistical measure like a probability associated with a value at risk, it is not possible to design a coherent set of measures to apply to each of gross, reinsurance and new positions. It is necessary to target either a net position or a gross position. The resulting reserve will not reflect the underlying distributions involved – a T-var would be better but would still present problems. Statistical measured such as these are perhaps more suited to assessing individual companies' total capital requirements than they are to assessing accounting provisions.

3   Accounting, solvency and capital

We now include a section on how accounting, solvency and capital tie together. There are no surprises here, and we have already touched on the interrelationships briefly. However, it helps to understand the direction in which the international regulators are going.

We will also discuss what we might mean by "capital", as this is this is something which can lead to misunderstanding.

We will then discuss some traditional sources of prudence and their implications, including on the credit taken for outwards reinsurance.

3.1 The proposed regulatory framework

The following diagram is taken from the IAIS paper

> *"Towards a common structure and common standards for the assessment of insurer solvency: Cornerstones for the formulation of regulatory financial requirements, October 2005"*   (it is Figure 2 in that paper):
> http://www.iaisweb.org/051021_Cornerstones_paper.pdf

Figure 2: The supervisory assessment of the financial position of an insurer and the public financial reporting of an insurer
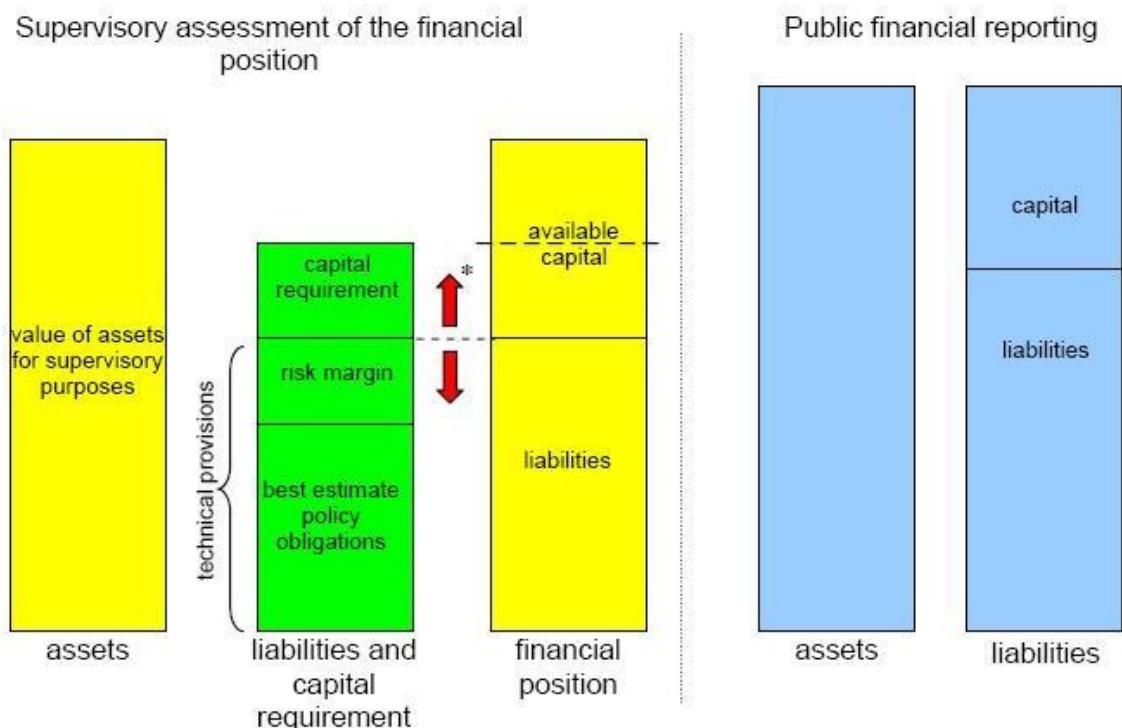
This diagram illustrates how the solvency (on the left) and the general purpose accounting (on the right) numbers might relate to each other. As can be seen, this envisages that all the numbers could differ between the two perspectives.

The red arrows show that, if the regulators are interested in the sufficiency of the total asset **requirement**, being the sum (green column, second from the left) of best

estimate, risk margin and capital requirement, and if they are also in a position to specify how that total is to be determined, then the precise amount of the risk margin is less critical as the explicit capital will move in the opposite direction.

This diagram, prepared by regulators, says nothing about the technical reserves required for accounting purposes, even though in the framework currently being proposed in Solvency 2, the total technical reserves for regulatory purposes is proposed to be a theoretical fair value, defined in this case as being sufficient to persuade another insurer to take on the liabilities. If the general purpose accounts use fair value, the two numbers could be the same. We will leave for now the question of whether a fair value really exists for most non-life insurance liabilities.

3.2 *What do we mean by capital?*

As can be seen from the diagram above there are a number of possible meanings. We are now going to take a few words to define our terms. We will first discuss a few possibilities and then we will choose our terms for the purposes of this paper.

3.2.1 Possibilities:

- A: regulatory capital = assets-liabilities, both determined in accordance with the regulatory (solvency) regime to which the company is subject

- B: accounting capital (equity) = assets-liabilities, both determined in accordance with the accounting (reporting to shareholders) regime to which the company is subject

(of course, a company may be subject to more than one regulatory regime or more than one accounting regime if numbers are prepared for consolidation with a parent company in another jurisdiction, or if a company is quoted in the stock exchanges of more than one country)

- C: the "true" (or "economic") capital within the business, including the value embedded within it, which shareholders own but which is not available or visible to them because of the accounting or solvency rules. Even this strand has at least two meanings:

    o C1: the present value to shareholders of the existing business, reflecting how this value would become visible and available for distribution over time, and

    o C2: as C1, but including the value of future business.

    We note that "economic capital" means different things to different people.

- D: the portion of capital "in use" in the business. The idea here is that only as business is written is the capital exposed. As we will discuss later however, there are inevitably constraints accepted by the owners of insurance companies on the capital they subscribed, whether it is used to underwrite insurance business or not. This is a significant issue for most insurance companies, a good example being double taxation of equity dividend income. . So there is an argument that all capital is exposed in some way.

- E: Target capital, being the level of capital an insurer might hold in an attempt at an optimal balance for the shareholders between the competitive, franchise value and cycle management advantages of high capital levels on the one

hand, and the tax and other disadvantages of having high levels of capital employed and at risk within the business.

- F: Shareholder value including intangibles, measured by market value rather than accounting information.

As we move from meanings A and B above through C to D and E, their determination becomes increasingly judgmental. This is not to suggest that there is no judgement in determining A, particularly the values to place on the liabilities. The most old-fashioned, historic cost, approach to the question of capital is the sum of the capital originally subscribed by the shareholders plus the amounts retained within the business. This has less meaning in the context of an insurance company than in most types of business because regulatory requirements will tend to absorb or hold back the release of capital.

In contrast, a more recent idea is that, in an undistorted market, a quoted company's share price is an assessment of the capital available to the shareholders. If investors are buying the shares today, they may think in terms of the prospective return they hope to receive in future, taking the price they pay as the start point, irrespective of what may be the situation within the company in terms of accounted values and franchise values not recognised in the accounts. However this measure of value is not available to back policyholders' liabilities and it is of little use for either accounting or solvency purposes. It is also circular, in the sense that it might lead to self-justification of the market price. Also, share traders dominate markets and think of returns on the basis of what they can sell the shares, plus short term dividend expectations, not long-term dividend streams.

We regard the assessment of franchise values as outside the scope of either accounting or solvency reporting, though the impact of regulatory and relative financial strength pressures is to constrain the rate at which cash can be paid out to shareholders and thus is one of the drivers of franchise value. One of the uses of accounts is to help market participants to place their own subjective value on a company's business franchise.

3.2.2 Our selected meaning(s) of "capital"

In this paper, unless the context or text indicates otherwise, we will use both A and B above and will refer either to "regulatory capital" or "accounting capital". On one theory, an insurance company is primarily constrained by rules in place to protect policyholders, Regulators don't necessarily believe this: the main focus is customers and rating agencies, so the regulatory focus becomes getting good information into the public domain. But the volume of business you are theoretically permitted to write is a function of your regulatory capital and we might suggest the pressure of the rating agencies requires more, so this is the place where business steering tends to start. We understand, however, that one or two companies went out of business (i.e. went into run-off) after Katrina because their capital fell below the levels regarded by the rating agency as adequate.

We should emphasise that there is, as yet, no final international consensus on either the solvency regime or the accounting regime. In this paper we will discuss a number of different possibilities for both regimes, and so the amount and meaning of the

regulatory or accounting "capital" measure we will be using will depend on the context.

3.3 Traditional approach to prudence: not discounting, sometimes together with other implicit margins

The management of an insurer can be prudent by holding no implicit margins in either assets or liabilities, whilst holding large amounts of explicit free capital. The traditional approach, however, has been to try to place caution at almost every stage of estimation

With respect to assets, in some jurisdictions, where there was historically a large difference between market values of assets and their book, or historic cost, values (market values were higher), there was a large implicit margin of safety created by holding assets at book value. This margin could be made explicit by showing assets at market value in balance sheets, less any potential tax which would become payable on realising the assets.

With respect to liabilities, it is common today throughout much of the world for non-life insurers not to discount their liabilities for the time value of money. This is a form of implicit prudence, to the extent that the gross liabilities exceed the reinsurance asset. But the amount of implicit prudence arising from not discounting will vary from company to company and from time to time in ways that are not necessarily related to the risks for which the prudence might be required. There are at least four situations that generate this variation.

First, the lower (nominal) interest rates are, the lower the amount of prudence. Over the last 20 years, nominal rates have varied greatly in many parts of the world, a common range being from as high as 14% to as low as 4%. In Japan, interest rates have been at or close to zero for some time.

Second, the shorter is the tail of the liabilities, the lower is the amount of prudence. So different lines of business would have greatly differing implicit margins from this source.

Third, as the ratio of reinsurance to gross liabilities rises, the lower the amount of prudence. This is more subtle, since in an undiscounted world the credit taken for reinsurance purchased will typically materially exceed its discounted value. In recent years reinsurance, particularly "financial" reinsurance purchased to "protect the balance sheet", has sometimes been used as a means of manipulating the financial results of companies, and in a discounting environment the potential for such manipulation will be almost totally curtailed. It is interesting to note that the IAIS recently issued a paper, *Guidance Paper on Risk Transfer, Disclosure and Analysis of Finite Reinsurance, October 2005*[5] on the treatment of financial reinsurance which, though it uses the word discounting four times, appears not to point out that the problem would be severely reduced in the event that liabilities had to be discounted at risk free rates.

Fourth, the knowledge that there is prudence arising from not discounting may encourage companies not to give appropriate weight to adverse scenarios or to underestimate the likely impact of inflation.

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[5] http://www.iaisweb.org/051021_UPDATED_Finite_Reinsurance_Guidance_Paper.pdf

In sum, we would suggest that discounted reserves with explicit and disclosed margins of prudence, together with a clear requirement to estimate mean values which take into account the full range of potential outcomes will result in financial statements, whether for solvency or accounting, which are more meaningful and more comparable over time and between companies than is the case currently where there are undiscounted reserves.

A further problem with a traditional approach to reserving arises when a realistic valuation of reinsurance requires a stochastic approach. This is not the case with all lines of business. If the reinsurance credit is estimated as a product of the mean of the gross liabilities but without taking account of the potential variation of the gross liabilities, there is a strong chance that the reinsurance will be overvalued because no weight is given to reinsurance exhaustion, loss sensitive features of pricing, etc. The reverse is true in the situation where a large part of the true value of the reinsurance was not yet impacted on the basis of the mean of the gross liabilities.

For the majority of those arguing against discounting, there may be two great concerns. The first is that explicit margins may not be large enough to compensate for the introduction of discounting; this school feels that insurers have such a poor reserving record, particularly in long tail lines, that an explicit margin regime will not compensate sufficiently for this tendency. The second is that not discounting may accelerate companies' tax bills. The key issue here is whether and the extent to which explicit margins will be permitted by the various tax authorities as deductions against taxable income. We should note that the USA, where companies are reluctant to support the introduction of discounting, companies already suffer discounting of reserves for tax purposes – and their tax position might even improve if international accounting standards adopted risk margins as part of the technical provision.

Finally, it is interesting to note that HIH in Australia were able to deduct undiscounted reinsurance from discounted gross before the latest changes to the rules in AASB1023 Also it is possible to structure reinsurance so that recoveries come well after gross payments. In this case, taking undiscounted credit for reinsurance fails to recognise the financing cost between gross payout and reinsurance recovery, so that the undiscounted view incorporates a negative margin.

3.4 Do accounting and solvency have to be closely related

The usual reasons given for the technical reserves for accounting and solvence to be closely related are firstly avoiding double work, and secondly that companies will be less cavalier about a single underlying estimate which has to serve both purposes.

The IAIS are quite clear that they wish to see as much consistency as possible between regulatory and general purpose reserving. The regulators are therefore fully supportive of the IASB's efforts to harmonise general purpose accounting

In contrast, we have currently jurisdictions where the two numbers are quite different.

If we were to abandon fair value as an objective, or to abandon it for regulation but not for general purposes, the world would not stop turning. Fair value breaks down anyway for the uninsurable / untransferrable toxic risks. For them, for regulatory purposes, a belts and braces (draconian formula, perhaps?) approach could easily achieve other objectives such as consistency across time, across companies, portfolio independent, not manipulable etc..

4 User perspectives

User perspectives are discussed in some detail in Appendix A; the purpose of the paragraphs below is to identify properties which accounts, and, by extension, provisions should have if they were to serve the interests of our various categories of user. We do not discuss here all of the users which appear in Appendix A

4.1 Shareholders

There is a limit to what accounts can achieve for shareholders. More than anything, they want to know that a company is well run by managers who are acting in the shareholders' interests. If this is the case, they will be satisfied with the managers' stewardship and the company is likely to create superior value for them over the years. Accounts can provide some of the information to assess this, but only some. And there can be many undesirable features of the information in accounts which can reduce this "some" almost to nothing. We will consider these undesirable features in order to suggest that the opposite, and more, are the qualities accounts need to possess for shareholders.

- Manipulated by management to "manage" earnings and shareholder / stock market perceptions

- Mistaken; not properly reflecting the economically important features and facts about the business which are in the scope of a retrospective (i.e. excluding franchise value) assessment

If we now look at the matter positively, what are the properties which accounts, and therefore, now back to our agenda, the provisions within them, should have?

Shareholders will focus on the general purpose accounts rather than the regulatory accounts – **unless** they are sophisticated and find that the regulatory accounts are more meaningful or contain more information.

The shareholder perspective is discussed in some detail in Appendix A, but we would suggest the following as desirable properties of technical reserves from this perspective.

- Set at a consistent level of prudence over time; not adjusted to "manage" earnings. (This leads to the declaration, depending on the nature of the business, of a very uneven earnings stream, so there is a considerable communication challenge / opportunity for the managers in explaining the dynamics of the business and their strategy in managing it.)

- Permitting the shareholders to understand the level of prudence; this can be achieved, other things being equal, by disclosing the discounted mean estimate using suitable and available risk free assets as the source of discounting basis.

- Set consistently with other companies, so that meaningful comparisons may be made between companies. The property which achieves this most effectively is that the reserves should be portfolio-invariant

- Not set in such a way as to be disadvantageous from a tax perspective. It is not in shareholders' long term interests to accelerate the company's tax bill

unless this is a necessary step to achieving what the directors decide is an appropriate dividend policy. It is probably more appropriate to suggest that the reserves should be set at a level which includes a risk margin above a discounted mean estimate which properly reflects the risks still to be run over the term of the remaining liabilities. This may be described as "releasing margins as the risks run off"

- Not manipulable by management, but whilst recognising that an honest judgement has to be made in all reserve estimation. This property does follow from the properties set out above, however.

These qualities describe the reserves; what about the framework of rules which governs the reserves? The requirements should be specific and clear. It is clear that a "fair value" concept is very close to what shareholders might wish to be used, always providing that the risk margins are realistic and sensitive to the nature of the business.

To illustrate this, consider a well-behaved property book, even a reinsurance or retrocession property book on the one hand and a US casualty account writing comprehensive general liability (CGL) accounts on an occurrence basis over many years, either directly or as reinsurance.

The property book will exhibit considerable underwriting uncertainty, but the period and quantum of reserving uncertainty once the period of exposure has passed will be small. Whilst the account will need large amounts of capital to support it during the underwriting uncertainty, there is little need for material risk margins to be held back during the run off of the reserves. It is not just a matter of the shortness of the run-off tail; the relative uncertainty in that tail is low.

In contrast, the US casualty account is extremely difficult to assess in terms of the mean, let alone the risk margin. There exists considerable model and parameter risk as well as process risk – which is a nice way of saying that we don't have much idea how the account will develop. But we do understand a number of things; the limits sold each year will frequently be exposed indefinitely, so that the account remains indefinitely exposed; there will be correlations between the risks in the sense that they are exposed to similar legal and other drivers; the relative risk (in relation to the estimate of the mean) of material deterioration rises over time, rather than falls. Another way of thinking about this is that, with a long tail book, what remains as the account runs off becomes more "toxic" over time.

In the case that the reserves are very difficult to assess, become more difficult over time, and are increasingly correlated with each other over time, and have potential deterioration which is financially threatening to the company, this is a fairly good example of an uninsurable risk. Characteristics of risks which are insurable include the following: downside understood, cost estimable within reasonable bounds, uncertainty diminishes over a manageable (sufficiently short) timescale, diversifiable. Those long tail portfolios which remain after many years of run off display none of these characteristics.

This analysis suggests that, for the most difficult risks, there can be no fair value, only a rule-of-thumb approach which is designed to be very cautious. A willing-buyer, willing-seller price would require the buyer (of the cover) to pay a very large premium to conpensate the seller (of the cover) for the model and parameter risk, and the correlation exposure.

We have deliberately chosen an extreme example to show the limitations of a fair value approach. This does not invalidate the approach altogether, of course. But it is notable that whilst most lines of busines are quite manageable in this sense, we believe the lines which are less manageable represent a meaningful proportion of the total liablities of the industry.

4.2 Policyholders and regulators

We consider these together as their interests are reasonably aligned. Policyholders want to pay premiums as low as possible to companies which stay solvent and (also) pay their claims. If premiums are too low, however, insolvencies will result.

Divergence will occur between the interests of the regulator and the policyholders when there is solvency protection mandated by the government for a particular line of business. The regulator will want to minimise the risk of claims occurring on guarantee funds.

Policyholders' need for security in lines of business which are not solvency protected in any way will be reflected in the needs of their advisers to show that they had advised properly, including in the selection of insurers. Hence the role of the rating agencies, on whom brokers place considerable reliance.

The interests of all of these parties are served when accounts are honest, drawn up with the right care and skill and are consistent over time. Transparency rather than hidden, or hinted at but not disclosed, margins of safety in liability or asset assessment.

As far at the reserved are concerned, this leads to considerations which are surprisingly similar to those of the shareholders as discussed above, and to similar aversion to situations of the "less quantifiable" kind.

Policyholders should be concerned to understand precisely the regulatory objective, in terms of expected policyholder deficit, for the combination of the strength of regulatory provisions and the minimum capital requirement below which run-off is imposed. In run-off, a one-year target for maximum likelihood of failure is meaningless, and a target such as "70% probability of completely solvent ultimate run-off " says nothing about the expected policyholder deficit for the different classes of policyholder. We suspect that were policyholders aware of the implications of such a target, they would be concerned.

This last point is very important for setting provisions which reflect a theoretical price for transferring the liabilities, since it implies that run-off portfolios ought to require, for some classes at least, very large capital to back them.

4.3 Those parties interested in a fair market for shares.

It is in the shareholders interests that the accounts are as transparent and as consistent as possible in terms of reserve strength, as this will minimise the chances of share prices being either too high or too low. If too high, they can lose in two ways; either they overpay when buying the shares, or the management get too confident and lose the money. If too low, they will not get a fair price when they sell or, even worse for an investor who has confidence in the company and wants to stay invested for many years, they will get taken out by a takeover bid.

4.4 Final thoughts on the less insurable risks

There is a strong case, if only shareholders could achieve this, for operating a good bank / bad bank strategy. If there were a way of avoiding business, the run off of which is capable of becoming toxic, it would make sense to separate funds invested in insurance into two parts, the "good" business, which they write in companies unpolluted by "bad" business, and the balance. This is broadly equivalent to writing property and reliably short tail other business in large well capitalised companies, with the balance, a small proportion of the total insurance investment funds, being invested in companies which are as thinly capitalised as marketing considerations permit, thus minimising the shareholders' wealth destruction in the event of adverse liability trends affecting a wide market.

5 Developing the objectives: what might define a "good" solution?

5.1 Practicalities of implementation

We have already touched on these in 2.7. Whatever framework is chosen, apart from the obvious need for it to be accepted by a critical mass of countries with important insurance markets, it will have to be sufficiently flexible to permit knowledge and methodology to develop. At the same time the objectives and principles chosen must be sufficiently clear that form triumphs over substance, thus limiting scope for "misunderstandings".

It will not make sense to lay down the techniques to be used, say to estimate the expected cash flow for the un-off of an account. But it would make sense to require that practitioners used approaches that conformed to best current practice, to leave the practitioners to establish what best current practice should be, and then to encourage it to evolve.

The IAA is already involved with the IASB and IAIS, and actuarial bodies are advising the European Regulators. So there is no problem in gathering together expert groups. The challenge will be to involve the appropriate people and companies in those areas where there is not a large actuarial resource.

5.2 General purpose reserves consistent between companies

This requires a portfolio-independent approach to determining risk margins. That means that a large company would hold the same reserve for the same risk as a small company. This is attractive for accounting as it ensures that there is not accounting gain on loss relating to reserves on the merger or break-up of companies.

5.3 Regulatory provisions and capital requirement appropriate to each company

In relative terms, a small company needs the sum of regulatory provisions and regulatory capital to be high in order to offer a similar level of security to its policyholders. This has either to be achieved in the capital or the regulatory provisions or both. Since the regulators are only concerned about the combined total, they can live with the regulatory provisions being portfolio-independent and consistent between companies, providing the adjustment to reflect each company's circumstances is made to the capital requirement.

5.4 Is there enough margin in the general purpose provisions?

This will be a concern when there is no good reference market. It is the absence of a good reference market which makes it so difficult to achieve a consensus on an appropriate model for determining risk margins, and how to fix the numbers within it.

One useful test is to ask whether a sensible reinsurer would willingly take on a risk at a given price if there were no legal or other constraints on the transaction. Our

suspicion is that realistic risk margins will vary greatly from situation to situation, and it is difficult to see at this stage how a methodology can be devised which appropriately reflects each situation without giving such flexibility in interpretation as to become an earnings smoothing tool.

It is easy to devise simple rules which would tend to give margins of safety in most circumstances, but which would give correspondingly rough justice. They would not give "fair values"

5.5 How important is fair value?

Fair value, if we can determine what it should be, does have all the properties one would regard as appropriate – though perhaps with two exceptions

First, if we were to regard the market's current apparent willingness to take insurance risk as a valid driver to put into the model, there would be large swings as the underwriting cycle evolved. This would lead to exaggerated volatility in both reserve strength and reported earnings. A workable approach must be independent of the market's cycles.

Second, the "if we can determine what it should be" caveat may be too much of a stretch. Or perhaps it will be too much of a stretch for the most difficult liabilities.

5.6 Alternatives may be good enough

Given the discussion in Appendix A and in Section 4 above, one might conclude that something akin to fair value (always accepting that there is no real market in second-hand insurance liabilities) was the obvious solution, certainly for general purpose accounts. And we know that the IAIS are currently happy with the prospect of relying on fair value reserves developed for general purpose accounts.

But it may be that more crude alternative approaches, which are easier to specify and implement, provide an easier start point, rather than trying for a fair value.

5.7 Is the capital requirement sufficient to protect policyholders in run-of situations

Cornerstone 1 from the IAIS Cornerstones Paper (the reference is in Section 3.1) emphasises the need to an insurer to meet its liabilities under all reasonably foreseeable circumstances, in the short and long term. The minimum capital required to back run off liabilities, together with the technical provisions, has to be sufficient under these "reasonably foreseeable circumstances". We are uncertain as to the precise level of security, in terms of expected policyholder deficit for the different cohorts and types of policyholder, the regulators plan to specify. The most difficult types of liability would have very high capital requirements and vice-versa – which would drive a cost of capital calculation, if that was the approach used for fair value.

In the next section we look at a number of approaches, following which the rest of this paper investigates a cost of capital approach to fair value and develops some numerical examples.

6 The search for solutions

6.1 What approach would be used to price a portfolio in real life?

This is something we would be particularly interested to hear about at GIRO. Cost of capital is a useful concept in pricing generally, which we shall discuss in some depth in later sections, but we have some concerns whether it sufficiently captures the reinsurer's risk aversion in the event that there is considerable uncertainty regarding the mean and shape of the distribution.

We should remember that subject to a minimum price below which an insurer will not trade, insurers will charge what the market will bear.

6.2 The three approaches covered in the Groupe Consultatif's letter – attached as a separate document

This letter was produced as a response to CEIOPS request to compare three approaches to risk margins. These three approaches are set out below, and we will take these as our universe in the search for solutions. We will not repeat the full discussion from the GC letter, which sets out the comparisons in a convenient tabular form.

6.2.1 Percentile approach

The suggestion here was for the total provisions to be the greater of the 75th percentile of the distribution of the discounted future payments and the discounted mean plus 50% of the standard deviation. This is a similar test to that applied by the Australian regulators, the APRA.

6.2.2 Cost of capital approach

This is described in more detail later in this paper. The important concept is that writing business requires capital support, albeit reducing amounts of capital each year, but that the price charged has to be sufficient to meet the liabilities as they fall die plus to provide a margin with which to provide a return on that allocated or exposed capital. It is necessary to decide a basis for the amount of capital required each year, and also on the return required on that capital.

6.2.3 Assumption approach

This approach simply describes what happens currently in some jurisdictions – parameters are judgmentally selected to be prudent, but there is no clear framework of rules.

6.3 Discussion

6.3.1 Heavy handed approach

Looking at the three different approaches against a number of criteria, the cost of capital appeared to be the least unacceptable. No methods were easy.

It would have been possible to recast the Assuption approach as a still arbitrary, but much more constrained method, in such a way that there was no flexibility for companies to set reserves as they pleased, and no scope for manipulating results by purchasing reinsurance. An example would be as follows

- All companies to estimate in as unbiased a manner as possible their mean expected gross cash flow and the mean expected reinsurance recoveries

- The gross liabilities would be discounted at a rate equal to risk free less 2% pa

- The reinsurance asset would be discounted at a rate equal to risk free plus 2%

- The balance would be the net liability.

This would be simple to do and it would generate reasonable margins of safety for longer tail lines. But for shorter tail lines there would be very little margin, so the net liability above could be multiplied by a constant such as 1.05 or 1.1, again chosen arbitrarily by the authorities.

This "heavy handed" approach would answer most of the complaints against the assumption approach, except that it would not be attempting to be close to a fair value. If one were persuing the following objective it might make good sense:-

"an acceptable and realistic level of prudence, which cannot be fiddled or got round in any way, and which is easy to apply"

6.3.2 Looking at the other approaches together

From the traditional policyholder protection perspective, the concept (as described before) is to establish asset and liability values that are sufficiently prudent. Reserving at a nominal value without a discount for interest is one way that was done.

If reserves are to be discounted, the concept of prudence has lead to the idea of setting the discounted amount at a value above the expected value, for example at a certain percentile (e.g., 75% or 90%) or by putting explicit or implicit margins into the reserve calculation. Those ideas do not connect immediately to the fair value idea of "transfer to a third party. However, for mark-to-model purposes we could assume that (a) reserves at a certain percentile represented a fair transfer value or (b) that margins, explicit or implicit, are established at a level that represents a transfer value. With that assumption, the market value margin becomes the differences between the expected value (without margin) and either (a) reserves at the specified percentile or (b) reserves with the margins. While those approaches do not immediately speak the "financial economics" language, they remain legitimate candidates.

Alternatively, we have the "cost of capital" idea which is designed in "financial economics" terms. Because there is no market for unpaid claim liabilities and those liabilities are not routinely transferred between insurers, the idea of fair value as a market value though cost of capital or otherwise is not a comfortable idea to insurance

professionals. The fear is that inappropriate models will under-estimate liabilities to the detriment of policyholders and shareholders.

Nevertheless, the cost of capital idea, the percentile idea and the margin idea may ultimately produce broadly similar answers. We are not sure we can conclude much from this, though. In any case an important check on any of the possible models is a comparison of the results compared to current practices, which, whatever their imperfections, have produced reasonably strong insurance industry.

7 Cost of capital approach: a brief introduction

For each future year in the run-off of a portfolio, we specify

- The amount of capital deemed to be at risk

- The extra rate return, over and above risk free, to be generated by the opening premium

We then project the account to exhaustion, each year showing cash flow, the new level of capital requirement, etc.

There is not one unique way of specifying the capital requirement.

The rate of return required could be applied over the whole period of the run-off, or it could be set as constant each year.

The difficulties are in the various choices that have to be made. If we are trying to model the market's theoretical willingness to take run-off risks on different portfolios, we have to think:

- How to determine the capital requirement given the nature of the business

- How to determine the return in excess of risk free

- And can you get sensible results by holding the excess return constant and flexing the capital, or do you have to flex the excess return as well.

And, more fundamentally, given that the margin generated is only a function of the capital, the excess return, and the length of the tail, will the approach generate sufficient margins for the shorter tail risks with very high levels of uncertainty?

To work as a generator of numbers for accounting purposes, and have all the properties of consistency etc, it may be necessary for an external authority to specify the parameters. In which case, how much of an improvement is it on the "heavy handed" approach set out in the previous section?

8 Fair Value Liabilities- A Framework"

This section provides a high level summary of the main features of a fair value accounting framework for insurance unpaid claim liabilities.

8.1 Fair Value Accounting

By analogy to other businesses, financial and otherwise, insurance liabilities can be characterised in the language of financial economics in four categories as shown in Table 8.1-1

Table 8.1-1 –Liability Risk Types

	Hedgeable	**Non-hedgeable**
Financial	Traded debt	Long duration interest products (60 year Euro, USD or Yen)
Non-Financial	Cat exposure (hedgeable with cat bonds)	Mortality risk General Insurance reserves

The Chief Risk Officer (CRO) Forum, 17 February 2006 "Solutions to Major Issues for Solvency II" submission to the EU, page 17
http://www.cea.assur.org/cea/v1.1/posi/pdf/uk/position277.pdf

The fair value measurement methodologies for each of those risk types are described by the CRO as shown in Table 8.1-2.

Table 8.2-2- Fair Value Approach

	Hedgeable	**Non-hedgeable**
Financial	Mark-to-market, i.e., look up price in the market	Mark-to-<u>model</u> using models that extend available market information to these asset categories
Non-Financial	Mark to market - Cat bonds to price market value of contracts exposed to cat risk.	Mark-to-<u>model</u> by developing a model that expresses the transfer value (market value) of the liability.

Thus, the fair value methodology for general insurance liabilities requires a model to produce a value that serves as a proxy for the market value.

Typically, a mark-to-market model, if presented in terms of general insurance liabilities would be expressed as follows:

- Estimated present value of future cash flows

  Plus

- A "market value margin (MVM)" to reflect the additional cost of transferring the liabilities to a third par<u>ty</u>.

As previously discussed, the MVM might be determined with a cost of capital, percentile or assumption approach. The key technical issues in implementing any of those approaches are outlined in the sections below.

8.2 Key Issues – Best Estimate

The areas that must be specified in to fully describe a best estimate model are the following:

Estimated value of future cash flows

1. Whether expected future cash flows is a single deterministic result or the expected value from a range of scenarios

2. Does the expected value represent a statistical mean, median or mode, conceptually, whether or not the full distribution is explicitly analysed.

3. The range of scenarios to be considered in item 2

4. Constraints, if any, on the use of methods to project ultimates

5. Constraints, if any on use of data

   o Data regarding the portfolio of contracts/data regarding the insurer/industry data

   o Data when policy is written/data at valuation data

6. The disclosure implications is all scenarios are not considered

Present Value

7. Interest rates for discounting

8. Payment patterns

8.3 Key Issues – Market Value Margin

For any of three approaches (cost of capital, percentile, or assumption) the areas that must be specified to fully describe a market value margin model are the following:

1. The characteristics of the entity which assumes the transferred obligations (the *reference company*), e.g., is it

   a. A third party insurer

      i. A typical insurer in the relevant market

      ii. A mono-line insurer for each line of business

      iii. Other specifications

   b. The same as "ceding" insurer, as if transferring the liabilities to itself

   c. A non-insurance entity

2. Constraints, if any, on the use of methods used to project ultimates

3. Constraints, if any on use of data

   a. Data regarding the portfolio of contracts/data regarding the insurer/industry data/other

   b. Data when policy is written/data at valuation data

For a cost of capital model we also need to specify:

4. The amount of capital required or the method to determine the amount of capital

5. The "cost of capital" or the method to determine the cost of capital

For percentile models, beyond issues 1-3 above, we also need to specify:

6. Whether "percentile" is

    a. "Value at Risk" (VaR), ruin probability, or

    b. "Conditional Tail Expectation" (CTE, sometimes called Tail VaR or T-VaR), expected cost of ruin,

    c. Drawn from a broader class of risk functions such as proportional hazard transforms.

7. The selected "percentile", e.g., 75% or 90% for VaR or 1% for CTE

8. The actuarial model, and related data, for measuring reserve variability

For "assumption approach", beyond issues 1-3 above, we also need to specify:

9. Are assumptions explicit or implicit

10. Can assumptions be converted to levels of security in VaR, CTE or other percentile or cost of capital terms

There are further sub-issues to be specified and theoretical and practical issues to be addressed and we identify those (as fully as practical for now) in later sections of this paper.

9 A straw-man Specification of "fair value" model for general insurance company unpaid claim liabilities

To illustrate the framework set out in Section 8, in this section we set out a specific "straw-man" fair-value accounting framework for general-insurance liabilities. This "straw man" is not a recommendation, but it is one of the logical ways to implement a fair-value measurement regime that is consistent with the needs explicitly or implicitly expressed by regulators, through IAIS, financial reporting regulators, through IASB, and a number of interest groups.

Section 9.8 provides a numeric illustration of this straw-man approach.

9.1 Specification

Stating the formula from section 8 more specifically, we propose that the fair value of a portfolio of general insurance unpaid claim liabilities equals:

- A "_best estimate_" equal to the _probability-weighted average_ of the _present value_ of _future cash-flow scenarios_ using _current assumptions_ related to the _experience of the portfolio_

  Plus

- A "_market value margin (MVM)_" to reflect the additional _cost of transferring_ the liabilities to _a third party_.

The terms used here are defined more fully below

9.1.1 Specification of the Best Estimate

The key terms in the best estimate specification are the following

Probability-weighted average – implies the valuation has assigned probability weights to alternative scenarios to the extent necessary for the analysis. Giving consideration to a number of alternative scenarios is required. A stochastic modelling process might be used, but it is not required.

Present value – calculated using a cash flow/payment pattern and a risk-free discount rate, based on zero-coupon government securities with maturities matched to the projected cash flows.

Future cash-flow scenarios – This considers all scenarios that affect the expected value, including low-frequency but high-cost events.

Current assumptions means the most up-to-date assumptions, methods and data, not "anchored" to the original pricing assumptions. These include development patterns, inflation rates, claim-frequency levels, interest rates and other relevant economic factors; they are based on information at the valuation date, regardless of initial pricing information. Nonetheless, it can be appropriate to apply loss ratio, Bornhuetter-Ferguson or other methods that use exposure information.

The use of current assumptions applies to the best estimates, payment patterns, and interest rates for discounting.

Data – Current assumptions are to be based on the experience of the portfolio, the experience of the insuring entity or market information as appropriate to achieve the

best estimate of the expected cash flows for the portfolio of business as it will be handled by the insurer.

Portfolio, Entity and Market assumptions –The "data" principle stated above means we are estimating expected cash flow scenarios related to the portfolio of policy obligations based on the way that the insuring entity would settle those obligations.

In most cases reference to "handling by the insurer" would be unnecessary as expected cash flow scenarios relate the portfolio, independent of the insuring entity. To the extent the assumptions relates to the portfolio and not to the insuring entity the assumption is referred to as a *"portfolio-specific" assumption*.

In some cases, the handling of the insurer may affect the claims. An insuring entity might settle at higher than required costs in order to maintain brand standing in the market. Policyholders in that case have, implicitly, probably paid a premium for that higher level of service, and may have a legitimate expectation of receiving that level of service. Similarly, in the other direction, an insuring entity might settle claims at lower costs than other companies in the market. For this straw-man we propose that the claim costs reflect the company settlement practices. That would constitute the use of an *"entity-specific" assumption*.

Methodology – the actuary uses professional judgement to select the most appropriate method at each valuation date.

Treatment of unearned premiums – The experience is, in effect, evaluated on an underwriting-year basis. The future cash-flow scenarios relating to claims arising from unearned premiums are analysed on the same basis as those arising from claims that have already happened. The liability is not routinely established as a percentage of written premiums.

9.1.2 Specification of the Market-Value Margin

We recognise that there is no market in which liabilities are routinely transferred from one company to a third party. The MVM is determined by a model which is intended to be reasonable, but which inevitably will have weaknesses if regarded as a "true" price.

For purposes of this straw-man the MVM is determined as follows:

1. Cost of capital approach

2. Transfer is to a third party we call the "*reference company*" that is a realistic large, multi-line, diversified, financially secure insurance company doing business with each of the lines of business subject to the valuation.

   a. "Large" means large enough that "process risk", fluctuation about the expected value, is as small as practical. For most lines of business, given that the reference company is large, we expect that process risk will be negligible compared to parameter and model risk. Process risk may be significant for some lines of business, e.g., property-catastrophe and high-layer excess property or liability coverages.

      Parameter and model risk for the reference company is not expected to be small.

   b. "Multi-line, diversified" means the realistic benefits of risk diversification across lines of business and territories (including with

and between countries to that that such diversification is observed) are recognised in determining capital, cost of capital, reserve variability, margin setting, and other parameters.

    c. "Financially secure" means having resources consistent with typical insurance company, for example an "A" rating. It means a company with "minimum statutory surplus" would not be consistent with this straw man.

    d. "Doing business with each of the lines of business" means that determination of the characteristics of the reference company is based on a review of an appropriate set of companies.

3. Total required capital is determined from the observed relationships between capital and exposure using measures such as premium or unpaid claim reserves (for earned and unearned exposures) as appropriate for companies like the reference company.

4. Capital is allocated to reserves based on market-place studies of unpaid claims reserves and total risk.

Allocation to reserves is needed because we are considering unpaid claim-reserve run-off risk without new business. (This does not need to be the case, but new exposures may not diversify the risk so the proposed treatment may not change the ultimate result significantly.)

The cost of capital needed for this analysis is the capital required by the reference company. It is <u>not</u> the amount of capital that might be required by the company subject to valuation. Since we are interested in this for the reference company this is more of an industry exercise rather than a company-by-company exercise.

5. Step 4 assumes that the portfolio being reserved has the same risk characteristics, and therefore requires the same level of capital, as the business in the reference company. It is possible that the individual portfolio has different risk characteristics, and requires a different level of capital. If a difference could be demonstrated it should be reflected.

6. Cost of capital is based on capital requirement for a company like the reference company.

The process of determining cost of capital is discussed in the parameterisation section. Two points worth noting are the following:

    a. The after-tax return required by investors in a company like the reference company.

    b. The before-tax return within the reference company required to provide investors with the target return in 6a after considering all frictional costs.

It should be noted that this description of the reference company is not unchallengeable. Fair value is based on the assumed existence of a free market in insurance liabilities. In such a free market, it might be argued, any entity would be free to accept the liability, and a large well-capitalised non-insurance company would be more diversified, would therefore diversify the risks inherent in the liabilities more than an insurer could, and would therefore need to dedicate less capital and would

have a lower risk-adjusted cost of capital than any insurance company. The reason that we have used an insurance company of the type described as our reference company is that even if a market developed in insurance liabilities it is unlikely that regulators would permit the liabilities to be transferred to a non-insurance entity; therefore the benefits of diversification would be limited to those that could be achieved by transfer to such a reference company. However, this could be too conservative a view, given the recent securitisations of insurance risk that have taken place.

9.2 Elements Not Included in the Specification of Best Estimate or MVM

There is an argument that the price for a reserve transfer, if there were a market, would depend on the size of the ceding company, because large companies assuming the business would not "give away" their size advantage in their price. The counter-argument is that the market would determine the price and any price advantage the large assuming company had over the small ceding company would be eliminated by competition among the large assuming companies. The straw man takes the position that the size of ceding company will not affect the transfer price.

The straw-man model does not reflect the fact that in a real market the reference company would need to consider the risk that "ceding company" had more information about the determination of appropriate parameters and models for valuing the future cash flow scenarios than it had, and the price of the transfer might reflect that risk (lack of transparency).

The model assumes the ceding company is financially sound, and there is no "transfer price" adjustment for the fact that a troubled company, probably having recently suffered adverse reserve development, would not be able to obtain a transfer price at normal terms.

The straw-man model applies to policy obligations and does not address claim handling or other expenses, although the cost of these obligations would have to be covered.

The analysis considers only gross liabilities. As the analysis is expanded to consider reinsurance, it would need to consider the reinsurance program of the company being evaluated and also the impact of reinsurance on the reference company.

9.3 Selection of Capital Amounts

A cost-of-capital approach is based on the assumption that capital must be committed to the run-off of reserves: if there is no capital its cost cannot be recompensed. To some extent this is driven by regulation: regulators would not permit the transfer of obligations to an acquirer that was not properly capitalised. It might be a tempting business opportunity to set up a special-purpose vehicle with only token capital to run off the liabilities, but we assume this will not be allowed to happen. (A properly-capitalised special-purpose vehicle would be a different matter, but it would sacrifice any diversification benefit and would therefore require higher capital than the reference company, and would not be an efficient arrangement.)

We have discussed above the nature of the reference company, which is a large, well-diversified insurance company. The amount of capital that such a company will hold

is driven by a mixture of the consideration of risk, regulation and rating agencies, although the three are increasingly directed towards the same end. Ultimately, therefore, our capital commitment as the reserves are run off will be driven by rating agencies who will be considering regulators' requirement, among other factors.

In the United Kingdom minimum capital is determined by the Financial Services Authority (FSA) on consideration of a risk-based review of the ability to pay liabilities, with the most important generally-applicable parameters being those in the enhanced capital requirement. Fortunately for our purposes this was parameterised for large, well-diversified companies, such as our reference company. It was also parameterised according to the old accounting classes used for the FSA returns, which is a convenient categorisation for reserving. Certainly as a basis for illustrating the straw man it provides a good reference. It does not reflect any difference between portfolios within the same accounting class, which, if it were used in practice would give rise to some opportunities for arbitrage.

One important characteristic of the UK Enhanced Capital Requirement (ECR) for capital to support the runoff of reserves is that the requirement varies with the measured riskiness of the class, between 7.5% and 17%. We have illustrated the straw-man examples with capital requirements of 25% of reserves for the long-tail example, which is intended to be liability, and 15% for the short-tail example, which is intended to be motor. The rationale for these values, which while illustrative placeholders, are intended to be realistic, is as follows.[6]

	Liability	**Motor**
ECR requirement	14%	9%
Uplift of 50% to	21%	13½%
Ratio of DBE to UBE[7]	0.8038	0.9275
Adjusted ECR requirement to DBE	26.2%	14.6%

The straw-man example is built on the assumption that the capital requirement will be expressed as a defined percentage of the discounted best estimate of liabilities and held in excess of the fair value, so that total funds held are equal to the discounted best estimate plus the MVM plus the capital. Other plausible formulations may be made; for example the capital might be held as a fixed proportion of the fair value[8] or total funds held might be fixed as a proportion of the discounted best estimate. The formula for calculating the fair value in the second of these cases is derived in Appendix C.

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[6] It is assumed that in practice companies need to hold a significant margin in excess of the minimum requirement, hence the 50% uplift. The ECR is applied to undiscounted best estimate, not discounted; our capital proportion is applied to discounted best estimate which is the reason for the second uplift.

[7] UBE is the undiscounted best estimate of total future cash flow, DBE is the best estimate discounted at the risk-free rate of 4%.

[8] As demonstrated in Leigh Fair Value Accounting – Implications for General Insurers, Leigh, SIAS March 2003, http://www.sias.org.uk/siaspapers/listofpapers/view_paper?id=FairValueAccounting

9.4 Derivation of Market-Value Margin

In a cost-of-capital approach the release of the capital and return thereon defines the MVM. We have assumed that once the original capital and market-value-margin are defined, the proportionate relationships between the discounted best estimate, MVM and capital are fixed. In this case, the total fund held in respect to these claims at the end of year t (t = 0, 1, 2, …) will be equal to $(1 + m + k) \, DBE^a_{t-1}$, where

> m is the MVM as a proportion of discounted best estimate

> k is the capital required as a proportion of discounted best estimate

> a is the risk-free rate of interest

> $$DBE_t = \sum_{u=1}^{\infty} v_a^{\,u} \, P_{t+u},$$

> P_t is the claim payment expected to be made at the end of year t.

We may write DBE^a for DBE^a_0, the discounted best estimate of claims at the date of the valuation. (This is based on the assumption that all payment are made at the end of each year. This is a simplification that should not affect the illustration of the principles.)

The return to the acquirer at the end of year t is

$$(1 + m + k) \, DBE^a_{t-1}(1 + a) - P_t - (1 + m + k) \, DBE^a_t$$

$$= (1 + m + k) \left[\sum_{u=1}^{\infty} v_a^{\,u} \, P_{t-1+u} \, (1 + a) - \sum_{u=1}^{\infty} v_a^{\,u} \, P_{t+u} \right] - P_t$$

$$= (1 + m + k) \left[\sum_{u=1}^{\infty} v_a^{\,u} \, P_{t+u} + P_t - \sum_{u=1}^{\infty} v_a^{\,u} \, P_{t+u} \right] - P_t$$

$$= (m + k) \, P_t$$

To return the required cost of capital this must return the required cost of capital, which we shall denote x, to the acquirer for his submission of capital at time 0. This gives the following equation of value.

$$= (m + k) \sum_{u=1}^{\infty} v_x^{\,u} \, P_t = k \, DBE^a = k \sum_{u=1}^{\infty} v_a^{\,u} \, P_u$$

$$= (m + k) \sum_{u=1}^{\infty} v_x^{\,u} \, P_t = k \, DBE^a = k \sum_{u=1}^{\infty} v_a^{\,u} \, P_u$$

so $\qquad (m + k) \, DBE^x = k \, DBE^a$

so $\qquad m = k(DBE^a \div DBE^x - 1)$.

This defines the market-value margin as a proportion of the initial discounted best estimate.

9.5 Selection of Cost of Capital

The cost of capital reflects the return on accounting equity required so that investors can reasonably expect to achieve their target return. Ultimately it is set by the market.

Methods of determining the market return are discussed in various sources. Cummins and Phillips[9] and Sigma 2005/3[10] are two recent sources. Cummins produces an indicated 1993-2000 cost of capital of 18% (13% above the corresponding historical risk free). Sigma suggests a current cost of capital equal to 4-5% plus risk free rates. While the 18% rate does not reflect current conditions, we believe the Swiss Re provision may be too low. For purposes of illustrating the straw-man we have selected a cost of capital equal to 8% above current risk free rates of 4-5%.

The proper cost of capital for the reference company is a significant variable and is an area that requires further research.

Insurance is a risky business and those who apply their capital risk that capital. Therefore they will expect a return on that capital that is greater than the risk-free rate. How much higher that return should be is a matter of some controversy. Some commentators argue that insurance risks are diversifiable in the whole economy and therefore only an extra profit margin to cover "frictional costs" is needed. Even if they are not diversifiable within a company dedicated to writing insurance business shareholders can diversify the insurance-specific risks through the balance of their total portfolio of investments. It is beyond the scope of this paper to address these questions; we will simply note that some extra return is to be sought and that the values used in calculating the value of liabilities in the straw-man examples are illustrative only. However, some considerations should be addressed.

Firstly, should the cost of capital vary between different classes of business because they have different risk characteristics? Secondly, should the cost of capital be the same during the whole period until the reserve is run off?

The argument that different classes should have different costs of capital because they have different risk characteristics has been rejected on the grounds that we must calibrate our cost-of-capital model to the reference company, which is likely to have one overall cost of capital. Against this, it could be objected that the reference company's cost of capital is an average cost of capital; it may require a higher rate of return on risky business than on more reliable business. If it was less diversified but the classes of business it retained were simple, short-tail ones then its overall cost of capital would probably be lower; if the classes it retained were the most risky ones then the cost of capital would be higher. Financial theory suggests that when a company undertakes a number of projects the cost of capital hurdle for each should depend on the risk level of the project, not the risk level of the company as a whole. We did not regard this objection as compelling, since the capital held to run off the liabilities is not the amount necessary the finance the necessary outgo. Rather it is there to provide a level of certainty for the payment of creditors. The whole of the capital is at risk, but it is not equally at risk. Larger amounts of capital must be

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[9] CUMMINS, J.D., & PHILLIPS, R.D. (2005). Estimating the cost of equity capital for property-liability insurers. *The Journal of Risk and Insurance*, 2005, Vol. 72, No. 3, 441-478. An earlier version of this paper is available at the CAS Winter Forum 2004.
http://www.casact.org/pubs/forum/04wforum/04wf327.pdf.

[10] SWISS RE *sigma* No3/2005. Insurers' cost of capital and economic value creation. Swiss Re Technical Publishing.
http://www.swissre.com/INTERNET/pwsfilpr.nsf/vwFilebyIDKEYLu/MPDL-6FR9MH/$FILE/
sigma3_2005_e.pdf.

provided for more risky liabilities; it is this that varies between classes, not the cost of capital.

Similarly, if a portfolio of unpaid claims is runoff the risk is not the same in every stage: in general it will get proportionately greater as the book ages and only the most problematic and most toxic claims are left. This would suggest that the cost of capital should rise as the book ages. However, the arguments in the last paragraph might be used against this position. The implication of always returning the same cost of capital at any time during the runoff is that the market-value margin will reduce as a proportion of the discounted best estimate of the claims as the portfolio become older, more problematic and more toxic; this is not we would expect.[11] On the other hand, it is what is required to get a constant return equal to the cost of capital; if our approach is to be describes as a cost-of-capital approach then surely we must accept the implications? We cannot impose a condition such as "the market-value margin must increase as a proportion of the liabilities" if we require the result to be truly market consistent.

Another contrary argument is that in practice in most companies the unpaid claims will have aged after a year and been topped up by the unpaid claims arising from newly-written business. Unless a line of business is in runoff it should not age or become relatively more toxic from year to year.

It should also be noted that the requirement that the proportionate relationship between capital, discounted best estimate and market-value margin should be kept constant produces a return on capital to the acquirer that, generally, increases as time goes by. However, this is a by-product of the process. A method that allowed explicitly for an increasing cost of capital would produce a more complicated formula than any of those we have demonstrated, but one that is not different in principle. It would not, however, produce the constant proportionate relationship that we have selected.

This question has been the subject of much discussion in the working party. Although the various approaches lead to answers that are not very different the differences in principle are very important and should be pursued further.

9.6 Expected Value of Future Cash Flow Scenarios-Nominal Value

The undiscounted best estimate, 875m in our example below, is derived in two steps.

First, a value of , say, 850m is derived in the usual way using chain ladder, BF, loss ratio, etc., as appropriate. The 850m is the result of a single scenario, e.g., current rates of inflation (i.e., social, medical and general inflation), current law affecting liability claims, and no mega-events not already reflected in the data, e.g., no claims related to the "next asbestos", global warming, or EMF radiation. It excludes unusual data points; and, as there have been changes in claim handling procedures in the past several years the reserves reflect management's judgments regarding the effectiveness of those new procedures in effecting claim costs.

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[11] This is what we find if we apply either of the methods set out in **Error! Reference source not found.** or the method in Leigh if applied to the "liability" claims pattern used for the straw man.

Alternative scenarios regarding factors such as those will lead to higher or lower estimates of liabilities. Since insurance risks are subject to skewed probability distributions, and this has the effect that the result of the single best estimate scenario will often be less than the probability weighted average of all possible scenarios. For example, expected inflation might be 4% with 75% probability, and 2% or 8% (half or twice the expected value) with probabilities 12.5% each, so that a probability weighted average of scenarios might have an effective inflation rate of 4.25% rather then most likely scenario estimate of 4%.

Expected cash flows should reflect the probability weighted average of all possible outcomes, so those alternatives should be reflected in the selected best estimate.

Moreover, there are extreme events which potentially contribute significant amounts to the probability weighted expected value. Even though estimates of frequency and severity are judgmental, a provision for those events should also be included in the best estimate.

In addition to including provision for the most uncertain events, the straw-man suggests disclosure.

This approach requires more extensive analysis of alternative scenarios and probability distributions than current practice in many jurisdictions.

The effect of these additional considerations was to increase the value of the best estimate from an initial one-scenario estimate of 850m to the "all-scenario" estimate of 875m. Appendix B shows further details on the type of calculation contemplated by the straw-man the calculation.

9.7 <u>Payment Patterns and Interest Rates</u>

The straw-man proposes that payment patterns be determined in the usual techniques, data and professional judgment. If alternative best estimates scenarios require different payment patterns, then those differences should be reflected.

Interest rates are to be based on assets as close as possible to prices for zero coupon risk free securities of the appropriate duration to match the expected payment pattern from a deep liquid market at the valuation date. For the example, for simplicity, we have assumed an interest rate of 4% at all durations. In the normal course we would expect the rate to vary by duration.

9.8 Straw-Man Example

Tables 9.8-2 and 9.8-3 show the market value margin and the final liability provision based on the assumptions in Table 9.8-1. The basis for the assumptions in Table 9.6.1 was discussed above.

Table 9.8-1Straw-man assumptions

Item	Amount
Undiscounted best estimate of future claims payments – short-tail	240 million
Undiscounted best estimate of future claims payments – long-tail	875 million
Risk-free rate of return	4% uniformly, regardless of duration
Investor target rate of return	12% (8 % in excess of risk-free rate)
Total required capital – long-tail	25% of discounted reserves

Total required capital – short-tail	15% of discounted reserves
Payment pattern	As shown in tables

The analysis could apply to gross liabilities or liabilities net of reinsurance (with appropriate adjustment for bad debt and cost of outwards reinsurance disputes).

Table 9.8.2: Market-Value Margin on Cost-of-Capital Basis: Long-Tail

Risk free return	4.0%	Market-Value Margin required*	10.8%
Risk cost of capital	8.0%	Internal rate of return achieved	12.0%
Total cost of capital	12.0%	Market-Value Margin required	76
Capital required*	25.0%	Fair Value of Liability	779
		Required Capital Commitment	176

* as a proportion of the discounted best estimate of future claim payments

Year end	Cash Flow from Claims		Disounted Reserve	Capital required	MVM	Total Funds in Excess of Discounted	Total fund (capital + reserves)	Return on total fund	Funds released
	Undiscounted	Discounted							
	A	B	C	D=C×25.0%	E	F=D+E	G=C+F	H=G×4.0%	I=G_{-1}+H-A-G
0		96	703	176	76	251	955		-176
1	100	92	631	158	68	226	857	38	36
2	100	89	557	139	60	199	756	34	36
3	100	85	479	120	52	171	650	30	36
4	100	82	398	100	43	142	540	26	36
5	100	40	314	79	34	112	426	22	36
6	50	38	277	69	30	99	376	17	18
7	50	37	238	59	26	85	323	15	18
8	50	35	197	49	21	71	268	13	18
9	50	34	155	39	17	55	211	11	18
10	50	16	111	28	12	40	151	8	18
11	25	16	91	23	10	32	123	6	9
12	25	15	69	17	7	25	94	5	9
13	25	14	47	12	5	17	64	4	9
14	25	14	24	6	3	9	33	3	9
15	25	0	0	0	0	0	0	1	9
16	0							0	
TOTAL	875	703						233	137

Fair Value Factor=779/875-1.0=-11.0%)

Table 9.8.3: Market-Value Margin on Cost-of-Capital Basis: Short-Tail

Risk free return	4.0%	Market-Value Margin required*	2.2%
Risk cost of capital	8.0%	Internal rate of return achieved	12.0%
Total cost of capital	12.0%	Market-Value Margin required	5
Capital required*	15.0%	Fair Value of Liability	228
		Required Capital Commitment	33

* as a proportion of the discounted best estimate of future claim payments

Year end	Cash Flow from Claims		Disounted Reserve	Capital required	MVM	Total Funds in Excess of Discounted	Total fund (capital + reserves)	Return on total fund	Funds released
	Undiscounted	Discounted							
	A	B	C	D=C×15.0%	E	F=D+E	G=C+F	H=G×4.0%	I=G_{-1}+H-A-G
0		96	223	33	5	38	261		-33
1	100	69	132	20	3	23	154	10	17
2	75	44	62	9	1	11	72	6	13
3	50	9	14	2	0	2	17	3	9
4	10	4	5	1	0	1	6	1	2
5	5	0	0	0	0	0	0	0	1
6	0	0	0	0	0	0	0	0	0
TOTAL	240	223						20	8

(Fair Value Factor 223/240-1=-6.7%)

10 Alternative Parameterisations of Cost of Capital Models

In this section we compare the results of the following:

1. Tillinghast and PwC cost of capital models prepared as part of a CAS fair value analyses project. (add references)

2. CEA and SST cost of capital models

3. The straw-man model described above using various capital and cost-of – capital assumptions.

10.1 CAS Fair Value Project-Tillinghast and PwC results

In 2004 the Casualty Actuarial Society sponsored a project in which Tillinghast/Tower Perrin (Tillinghast) and PricewaterhouseCoopers LLP (PWC) were selected to research the impact of discounting and risk margins on property/casualty insurance company financial statements and illustrate the effects on three US coverages: private passenger automobile (PPA), workers compensation (WC) and medical malpractice MM).   The report describing their work, *Fair Value of P&C Liabilities: Practical Implications*, 2004, can be obtained at http://www.casact.org/pubs/fairvalue/FairValueBook.pdf

For avoidance of doubt, the research objective was to show one or more examples of what <u>might</u> be done with available data based on the researchers understanding of 'fair value' and risk margins from an accounting and regulatory perspective at the time of the research project. The examples do not represent the firms' view of what "ought" to be done and may not represent the current thinking of either of those firms.

PwC assumed the following:

•   Cost of capital equal to 10% after 30% charge for US income taxes (14.3% before taxes), and

•   Required capital equal to twice the US Risk Based Capital reserve risk charge by line without a diversification credit.

PwC cost of capital was based on judgement. The use of loaded RBC reserve charge was based on the observation that companies typically capital equal to a multiple of the amount calculated by the RBC formula. Unlike the UK ECR formula which allows for diversification implicitly, the US NAIC RBC formula includes a credit of up to 30% in RBC amounts based on the degree of diversification across lines of business. PwC allowed no diversification credit in their capital assumption.

Tillinghast did not explicitly select a cost a capital amount. Instead, for each coverage they used historically observed profit margins, expressed as a percentage of historical present value of claims and claim specific defence costs (hereafter referred to claims), to calculate the market risk margin for new business. The data from 20 insurance groups is used for each line. In total the sample represents 60% of the US personal automobile market, 20% of the WC market and 50% of the MM market.

The market risk margin for unpaid claim liabilities as a percentage of the present value of expected future claim payments is (a) the risk margin from pricing, step 1 above, times (b) the ratio of (b1) the coefficient of variation (CV) of claim liability distribution to (b2) the CV of the distribution of new business net present value claim amounts.

a. The "pricing" risk margin CV is based on the ratios of actual present value claims to expected present value claims (premium less expenses) for 27 years; the 20 companies combined for 21 years (1982-2002) plus industry composite data for six years prior to 1982.

b. The CV of the claim liability distribution is based on individual company data using either Mack or stochastic simulation model described by Hodes, Feldblum and Blumsohn (*Workers Compensation Reserve Uncertainty,* Proceedings of the Casualty Actuarial Society, 1999 pg 263-392).

This approach does not provide returns as a percentage of capital. To support this IAA project Tillinghast prepared an additional "internal rate of return" (IRR) analysis for PPA and WC to express their cost of risk analysis in terms of capital and cost of capital (MM data was not sufficiently stable to make the analysis useful for that coverage). In that analysis the Tillinghast capital requirement is based (a) surplus to expected claims ratios of 22% and 26% for PPA and WC respectively, based on observations over the underwriting cycle and (b) the ratio of variability in reserves to variability in pricing.

The IRR model indicates a total return, including the return on investment of surplus after US federal income taxes and assuming technical reserves plus 65% of surplus is invested in fixed income securities (i.e., only 35% of surplus is invested in equities) of 11% for PPA and 13% for WC. This level of return would be higher than long term bond rates (about 9% over this period), but, assuming 300 basis point equity premium above long-term bond returns, for example, the PPA return is slightly below equity returns and the WC is only slightly above anticipated equity returns.

Table 10.1-1
Ratio of 'Fair Value' reserves, discounted with risk margin, to
GAAP undiscounted reserves

Coverage	Tillinghast	PWC
PPA	-1% to -2%	+5%
WC	-6%	+20%
MM	-2% - 3%	+30 to +50%

Source: Tillinghast page 57-59 and tables 6.1.2-A, B, C
PWC pages 138, 150 and 161, Charts 5, 22, and 36.

The comparison of Tillinghast and PwC to other calibrations is shown below in Table 10.1-1in Section 10.2.

10.2 Comité Européen Des Assurances (CEA) - European Standard Approach (ESA) -a Cost of Capital Model

The ESA proposed by the CEA is detailed in the following document:

http://www.cea.assur.org/cea/v1.1/posi/pdf/uk/position291.pdf

This method is similar to the straw-man example, and is described in the CEA position paper.

"Under the ESA the calculation of the MVM with a cost of capital approach could be done in five steps:

Step 1: Calculation of the SCR for non-hedgeable risks (SCR^{CoC})at time 0.

Step 2: Calculation of the (SCR^{CoC}) for each point of the projection until run-off

Step 3: Calculation of the capital charges for each year until run-off

Step 4: Calculation of the present value of capital charges

Step 5: The final step would be to incorporate the MVM to the BEL to obtain the market value of liabilities that would serve as one of the inputs for the calculation of available capital under the ESA."

10.2.1 Level of capital

The capital required is based on regulatory capital, but ignores market (investment) risk completely. This effectively assumes that the transferring company will have the same level of diversification as the company holding reserves, but will adopt a completely risk-free investment strategy. This differs from the SST approach, which assumes that there will be a single year of investment risk within the capital requirements, before the reference company would be able to transfer the assets of the holding company into risk-free assets.

10.2.2 Cost of capital assumption

The cost of capital is assumed to be 4%, although there is no detail of why this is an appropriate amount, rather it is considered as a "placeholder" by the CEA.

10.3 Swiss Solvency Test (SST)- a cost of capital model

The Swiss Solvency Test is described fully in the following document:

http://www.cea.assur.org/cea/v2.0/uk/solvency/solvdocs/SST_SwissCostofCapital_20060328%5B1%5D.pdf)

The method is similar to that used by the straw-man example, and is described within the above paper:

1. Determine the SCR for years 1, 2, until the run-off of the portfolio. The SCR take into account only run-off risks, not current year risks since no new business is assumed. To calculate the future SCR, several possibilities exist:
- Do a full SST given the projected assets and liabilities and risks, for each year 1, 2, … Do not take into account any future new business.
- Assume that the run-off risk is proportional to the best estimate of technical provisions and project the insurance risk part of the SCR for year 1,2,… given the SCR for year 0 and the best estimate of technical provisions at t = 0.
2. Discount the future SCR for years 1, 2,… using the risk free yield curve to t = 0 and determine the present value.
3. Multiply the present value of future SCR with the Cost of Capital factor, which is currently set to 6%. The result is the MVM.

10.3.1   Level of capital

The Swiss Solvency Test uses the following definition for capital:

"The necessary 1-year risk capital (SCR) at t = 0 is defined as the expected shortfall (TailVaR) of the change of risk bearing capital over one year (year 0)."

It is a working assumption that nothing would be known about the level of diversification from the company that would accept the insurer's liabilities. This means that the capital within the assessment is the regulatory capital of the insurer and therefore the MVM calculation is independent of the (hypothetical) insurer taking over the portfolio.

The capital requirement reduces as the liabilities run-off, and this is considered using one of two methods. Firstly, the capital could be simply reduced in line with the liabilities. Alternatively, the SCR can be split into the:

- new business component (which gets ignored)
- reserve component (which is pro-rated in line with reserves)
- financial market component (which gets ignored after the first year, since it is assumed that the company taking on the liabilities would invest in near risk-free assets, and the asset mix can be changed to a optimal replicating portfolio)

10.3.2   Cost of capital assumption

The real cost of capital is fixed at 6% in the Swiss Solvency Test. This was built up from an observed cost of capital for AA/A rated companies (between 3% and 4.5%), uplifted to reflect the cost of capital for a BBB rated company (the SCR being assumed to broadly reflect a BBB rated company).

10.4 Sensitivity of Straw Man Model to Parameter Selection

Table 10.4-1 below compares the assumptions and resulting fair value factor, fair value reserves divided by reserves on a "today accounting" basis, i.e., undiscounted reserves without risk margin (FVF). The table shows this result for US Motor and workers compensation, as examples of shorter (but longer than property) and longer lines of business. The table shows this result for the strawman calculation using the assumptions described above. It uses the CEA and SST method on the same assumptions except that the SST method assumes a cost of capital of 6% above the risk free rate or 10% rather than the 12% selected for the other examples and the CEA method assumes a cost of capital of 4% above the risk free rate or 8% rather than the 12% calculated in the example.

The FVF assumes that the same best estimate has been used in all the analyses, including the determination of "today's accounting" basis. Please note, however, that the straw-man approach assumes a higher standard to setting best reserves than has been applied in many jurisdictions in the past. Appendix B showed that reasonable assumptions could produce a difference of 2.4% between "today's accounting" best estimates and "straw man" best estimates even for well-behaved lines of business.

Table 10.4-1
Comparison of Fair Value Factors

Risk Margin Working Party: GIRO 2006 interim report

Model	Line of Business	Capital[12]	Cost of Capital[13]	Fair Value Factor[14]
Tillinghast	Motor	22%	15.5%	-1% to -2%
PwC	Motor	47%	14.3%	+5%
Straw-man	Short	15%	12%	-6.7%
CEA	Short	15%	12%	-5.4%
SST	Short	15%	10%	-6.2%
Tillinghast	WC	26%	18.4%	-6%
PwC	WC	48%	14.3%	+20%
Straw-man	Long	25%	12%	-11.0%
CEA	Long	25%	12%	-11.2%
SST	Long	25%	10%	-15.5%

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[12] Expressed as percent of net present value of reserves
[13] Percent of required capital. Before 30% income tax. Including risk free rate.
[14] Nominal reserve less fair value reserve as percentage of nominal reserve

11 "Percentile" and "Assumption" Models

This section discusses percentile and assumption models.

11.1 Percentile Models

By analogy to the cost of capital model, we can specify the fair value liability in a "percentile" model as follows

- A "*best estimate*" equal to the *probability weighted average* of the *present value* of *future cash flow scenarios* using *current assumptions* related to the *experience of the portfolio*

  Plus

- A "*market value margin (MVM)*" to reflect the additional *cost of transferring* the liabilities to *a third party*.

The best estimate is determined as described in the cost of capital straw-man.

The MVM is determined as the difference between the best estimate and the discounted value of the nth percentile of the unpaid claim reserve liability. The nth could be set at 75%, as in Australia, under APRA, or at some other level.

For consistency with the straw man specification, the percentile level would be based on the percentile for the "reference company" rather than then the company with the portfolio. The percentile level and would be based on a variability in the total reserves of a company with a diversified set of reserve exposures, with percentile levels "allocated back to lines of business."

The actuarial issues in determining the percentile MVM are very similar to those in determining capital and cost of capital in that both involve of determining the percentile level   In fact, most actuarial models for determining capital requirements require a model for reserve uncertainty that could be used measuring percentile levels.

On the surface, some areas appear more difficult in a percentile environment than in a cost of capital environment. For example, there are fewer pre-existing benchmarks for percentile levels than there are benchmarks for capital requirements. However, that situation would quickly resolve itself if determining percentile levels were a financial reporting requirement. Selecting the target percentile level, while somewhat arbitrary, could be based on calibrating a percentile level to a cost of capital level for a typical portfolio of businesses.

11.1.1   PWC percentile model

PWC, in the CAS sponsored research discussed above, used the cost of capital model to calibrate MVM based on percentiles or number of standard deviations from the mean. Since PwC analysed data by line they produced different calibrations that vary by line of business and method of measuring variability as follows:

Table 11.1-1—Standard Deviation (SD) and Percentiles vary by line of business and methodology when calibrated to cost of capital method

Line of Business	Development Method SD Multiple	Stochastic Simulation SD Multiple	Stochastic Simulation Percentile
PPA	1.2	2.0	90%
WC	1.0	1.5	92%
MM	1.5	2.3	95%

Notes3: Model calibration results showing the multiples of standard deviation, and percentile to be used for calculating the Market Value Margin.
Note: "Development Method" and "Stochastic Simulation" are two methods PWC used to measure variability and thus establish the standard deviation and percentile levels.
Source PWC page 131, Table 3

11.2 Assumption models

By analogy to the cost of capital approach, we can specify the fair value liability in an "assumption" model as follows

- A "*best estimate*" equal to the *probability weighted average* of the *present value* of *future cash flow scenarios* using *current assumptions* related to the *experience of the portfolio*

   Plus

- A "*market value margin (MVM)*" to reflect the additional *cost of transferring* the liabilities to *a third party*.

In order to apply that specification, the assumptions would need to be explicit, at least in total.

Some examples approach that could be characterised as an "explicit" assumption approach are the following:

- Fixed factor Fair Value Factor by line of business

- Use risk free rate minus a constant to discount reserves (Julian Leigh SIAS paper cited above)

- Continue "today's accounting" for discount. Provide best estimate without discount. The amount of discount equals the MVM.

These approaches can be calibrated to each other and to percentile or cost of capital methods. The fixed fair value factors can be derived from industry studies of cost of capital methods or percentile methods. Julian Leigh's approach is a cost of capital method with particular assumptions regarding reserve variability by development age.

12 The debate

12.1 Introduction

Actuarial, accounting, regulatory and industry bodies have participated in the discussion of fair value accounting concepts to general insurance reserving. Table 12.1, below, lists the organisations we have reviewed, gives a brief summary of their level of participation and identifies the documents we have used to identify their positions.

Based on our review of those comments, we have identified a number of issues that are central to the actuarial role in fair value analysis. Table 12.2 below lists those issues.

Fair value reporting applies to life insurance as well as general insurance, but our comments are restricted to issues that affect general insurance.

12.1.1   The Parties

The table below identifies the parties and the key documents that describe their positions.

Table 12.1
The Parties

Party	Comments
	Accounting
IASB	**International Accounting Standards Board** It has issued a number of discussion documents supporting the developing of IFRS for insurance contacts. The most recent material is the *Insurance Contracts (Phase II)* Project Updated dated 1 September 2006. www.iasb.org.uk/uploaded_files/documents/16_18_ProjectUpdateInsurance.pdf The IASB have not yet concluded whether its proposed measurement basis for financial reporting is a fair value. The IASB refers to its proposed measurement basis as "current exit value".
FASB	**Financial Accounting Standards Board (USA)** FASB is interested in fair value accounting but has not played a visible role in the emerging debate related to general insurance issues. This project not specific to the insurance industry. We have not, therefore, commented on its views. The FASB released an invitation to comment of *Fair Value Measurement* and are working on an exposure draft. The latest updated was 18 August 2006. www.fasb.org/project/fv_measurement.shtml The FASB have also produced an invitation to comment titled *Bifurcations of insurance and reinsurance contracts for financial reporting* dated 26 May 2006. www.fasb.org/draft/pv&ic_ed.shtml
	Regulators

IAIS	**International Association of Insurance Supervisors** IAIS has published several relevant documents, specifically two sets of comments on IASB Phase II work, May 2005 and May 2006. IAIS has also published a discussion of standards for regulatory capital requirements (July 2006). The comment letter titled *Issues arising as a result of the IASB's insurance contracts project - phase II, second set of IAIS comments* is the most relevant to fair value accounting. www.iaisweb.org/060601__Second_Liabilities_Paper_final.pdf Initial IAIS comments: www.iaisweb.org/050606_paper_with_press_release.pdf
CEIOPS	**Committee of European Insurance and Occupational Pension Supervisors** CEIOPS will make recommendations to the European Commission on Solvency II. At time of drafting the latest Qualitative Impact Study is QIS2. Comments in this paper have been taken from the *QIS2 technical specification* reference CEIOPS-PI-08/06 www.iaisweb.org/050606_paper_with_press_release.pdf
FOPI (SST)	**Swiss Federal Office of Private Insurance** (FOPI) has produced the process known as the Swiss Solvency Test (SST) which is an actual implementation, in practice, of market value margins based on a cost of capital method. The process is described in *The Swiss Experience with Market Consistent Technical Provisions - the Cost of Capital Approach* dated 28 March 2006. http://www.cea.assur.org/cea/v2.0/uk/solvency/solvdocs/SST_SwissCost ofCapital_20060328%5B1%5D.pdf
APRA (Australia)	**Australian Prudential Regulatory Authority** (APRA) Australian has had a percentile based liability reporting mechanism for several years. It is described and results of it are reported in. *APRA General Insurance Risk Margins Industry Report*, October 2005. http://www.apra.gov.au/General/loader.cfm?url=/commonspot/security/g etfile.cfm&PageID=9316
	Actuaries
IAA	**International Actuarial Association** IAA has been responding to IAIS requests for comments on standards for capital and liability measurement and for other financial and related regulatory issues. IAA guidance on capital and financial regulation generally is reported in *A Global Framework for Insurer Solvency Assessment*, 2004 at http://www.actuaries.org/LIBRARY/Papers/Global_Framework_Insurer _Solvency_Assessment-members.pdf IAA perspective on market value margins is contained in comments on the IAIS second set of comments to IASB regarding phase II insurance liabilities project. www.actuaries.org/LIBRARY/Submissions/IAIS_Draft_Second_Liabilit ies.pdf

GC	**Group Consultatif** This European actuarial group has been responding to CEIOPS request for comments. GC comments on fair value methodology are contained in a letter from the Groupe Consultatif titled *Solvency II: Risk Margin Comparison*, dated 13 February 2006. http://www.gcactuaries.org/documents/ceiops_rmcomparison_130206.pdf
ASB (USA)	**Actuarial Standards Board (USA)** The Actuarial Standards Board (ASB) is the organisation sets standards of practice for actuaries working in the USA. ASB has issued an exposure draft *Proposed Actuarial Standard of Practice, Property/Casualty Unpaid Claim and Claim Adjustment Expense Estimates, February 2006.* The Actuarial Standard of Practice relates to the fair value subject because it addresses the way actuaries prepare estimates. www.actuarialstandardsboard.org/pdf/unpaidclaims_exposure.pdf *ASB #20 Discounting of property and casualty loss and loss adjustment expense reserves*, dated April 1992, addresses discounting property casualty claim reserves. www.actuarialstandardsboard.org/pdf/asops/asop020_037.pdf
CAS	**Casualty Actuarial Society** The CAS has taken no position in the debate (because taking positions is impractical under its by-laws and IAA effective handles public statements on issues internationally.) However the CAS had a Task Force prepare a *White paper on fair Value valuing property/casualty insurance liabilities*, dated winter 2001. http://www.casact.org/research/tffvl/whitepaperfinal.pdf The CAS also sponsored research conducted by PwC and Tillinghast on possible ways to implement fair value reporting The results of that work are presented *Fair Value of P&C Liabilities: Practical Implications*, 2004 http://www.casact.org/pubs/fairvalue/FairValueBook.pdf
	Industry
CEA	**Comité Européen Des Assurances** CEA is the federation of national insurance associations in Europe. The CEA has proposed a European Standard Approach (ESA) in its paper titled, *CEA Working Document on the Standard Approach to for Calculating the Solvency Capital Requirements,* 22 March 2006. www.cea.assur.org/cea/v2.0/uk/solvency/solvdocs/ECO6072Annex1CEAESA22March2006.pdf The CEA has produced a paper on the use of the cost of capital techniques, titled *Solvency II, cost of capital* dated 21 April 2006, which includes a detailed cost of capital methodology for calculated market value margins. www.cea.assur.org/cea/v1.1/posi/pdf/uk/position291.pdf CEA has issued some further comments jointly with CFO Forum and/or the CRO Forum. The CEA jointly with the CRO Forum gave a presentation titled *Solutions to major issues for Solvency II*, on 17 February 2006. Comprehensive slides from this presentation have been published. www.cea.assur.org/cea/v1.1/posi/pdf/uk/position277.pdf

CFO Forum	The CFO Forum is an organisation of the Chief Financial Officers of a group of major European insurers. The CFO Forum published *Principles for an IFRS phase II insurance model* in July 2005 and followed this with the publication of Elaborated *principles for an IFRS phase II insurance model in June 2006.* www.cfoforum.nl/phase_ii_principles.pdf www.cfoforum.nl/elaborated_principles.pdf
CRO Forum	The CRO Forum, an organisation of the Chief Risk Officers of a group of major European insurers. The CRO Forum jointly with the CEA gave a presentation titled *Solutions to major issues for Solvency II*, on 17 February 2006. The slides from this presentation can be found through the CEA website address given above or www.abi.org.uk/Display/File/Child/608?Raj_Singh_Slid4es.ppt
GNAIE	The Group of North American Insurance Enterprises (GNAIE) consists of the Chief Financial Officers of eleven leading insurance companies. All major participants in the US markets. GNAIE issued *GNAIE extended principles for non-life insurance* and *A non-life illustration* on 27 June 2006. www.gnaie.net/images/GNAIE_ExtendedNePrinciples.pdf www.gnaie.net/images/IllustrationGNAifeAppendix.pdf

In order to understand the views of different parties in the fair value debate it is necessary to understand the position they are taking. Those parties most concerned with financial reporting tend to have different priorities to those concerned with ensuring solvency and the need for capital. Insurers and reinsurers will be affected by both and there are mixed views on whether the two bases should be the same.

The IASB and FASB as standard setters are seeking a relevant, reliable, consistent and comparable measurement basis that will stand up to the critical scrutiny of investors, regulators and governments. CEIOPS, IAIS, FOPI and APRA are focussed on regulatory requirements. FOPI and APRA have risk based approaches in place for the purpose of solvency regulation whilst CEIOPS is trying to make recommendations to the European Commission on such an approach.

The various market groups CFO Forum, CRO Forum, CEA and GNAIE have sought to influence the debate. The European insurance industry will be affected by both international financial reporting and the impact of Solvency II and are seeking to influence in both areas. The CFO Forum, GNAIE and the CEA have been seeking to influence the IASB whilst the CRO Forum and the CEA have been engaging in the Solvency II debate.

12.2 The Issues

Table 12.2 below summaries the issues. The issue is stated in terms of the straw-man approach described in section 9 versus alternatives.

Table 12.2
Measurement issues

1A. Best Estimate	
1.1	The best estimate of expected future cash flows is the expected value from a range of scenarios rather than a single deterministic result.
1.2	The best estimate considers all scenarios, not just a range of likely scenarios.

1.3	Conceptually, the best estimate is the expected value (mean) rather than the median or mode, whether or not the full distribution is explicitly analysed.
1.4	Assumptions required to calculate the best estimate should reflect the company's own portfolio and settlement approach rather than that of a reference company or industry averages.
1.5	Methods are chosen by the actuary at the time of valuation, based on professional judgment, rather than being limited to prescribed methods or frozen at inception.
1.6	Data at the valuation date is used to determine parameters and set assumptions. No parameters are frozen at inception or limited in other ways.
1B. Time value of money	
1.7	Liabilities are calculated on a present value basis rather than a nominal basis.
1.8	The discount rate in the present value is based on risk free securities with duration matched to expected payment pattern.
1.9	Risk free rates are based on gilts.
2. Market Value Margin	
2.1	Use the cost of capital method rather than percentile method, assumption method or other methods.
2.2	The required amount of capital is based on the needs of the reference company, not the company doing the valuation.
2.3	The reference company is an 'A-rated' insurer rather than an insurer with minimum regulatory capital.
2.4	The straw man does not specify how the cost of capital is determined, but since the cost of capital is the reference company cost of capital, it is the same for all companies.
2A – Percentile Approach – Market Value Margin	
2.6	Is percentile level based on the portfolio of reference company (analogous to the straw-man) or the portfolio of the company being valued (as in Australia)?
2.7	Is the percentile a Value at Risk (as in Australia), conditional tail expectation or something else?
2.8	What percentile level is used (75th percentile in Australia)?
2B – Assumption Method	
2.9	Are assumptions explicit or implicit?
2.10	What is the standard for setting assumptions?
3. Other Issues	
3.1	Unearned exposures are subject to the same valuation as outstanding and incurred but not reported claims based on expected future claims rather than as percentage of initial premium or as percentage of premium adjusted to claim levels expected at the valuation date.
3.2	The credit standing of the company is not considered in doing the valuation.
3.3	Reinsurance – Further work is required on fair value for outwards reinsurance.

12.3 Areas of Agreement

This section and the following section compare the views of the groups listed in Table 12.1 above with the issues considered in coming up with the straw man. References in brackets refer to the issue numbers in Table 12.2 above.

All the parties described above broadly agree on the measurement of liability for insurance contracts, at least as a minimum. There is general consistency in opinions for a prospective valuation comprising best estimate of future cash flows, discounted to reflect the time value of money (except for GNAIE) plus a margin. There is less agreement on the method to produce the margin, but this valuation is generally perceived to be consistent with the price an insurer would have to pay to get another party to accept the liabilities. Indeed the CRO Forum specifically state that where market price exists this would already contain a "market value margin" and no additional margin is required. The

12.3.1 Best estimates (1.3, 1.4, 1.5, 1.6)

All parties agree that the best estimate of future cash flows should be the mean (1.3). The industry and solvency regulators advocate arguments supporting using the most appropriate loss experience to determine best estimates, which would normally be an entities own experience taking into account any factors that may change that expected future experience (1.4). There is no explicit discussion of the issue of how claims handling and settlement practices would affect the timing and amount of future cash flows but industry commentators would look to management to identify appropriate assumptions in determining expected future cash flows (1.4). All parties recognise the need to apply judgement when determining appropriate non-financial assumptions. Few parties have explicitly commented on methodologies for determining best estimates and there seems to be a general acceptance that current practices will continue with the use of a range of techniques depending on which is most appropriate to the liabilities being measured (1.5, 1.6).

12.3.2 Discounting (1.7, 1.8, 1.9)

All parties except GNAIE agree that reserves should be discounted. The IASB's tentative conclusions, which are supported by industry groups is for a current market risk free discount rate that takes into account the nature of the liabilities being valued including the timing, currency and liquidity of future cash flows. This gives some additional flexibility in selecting the discount rate compared with the straw man in this paper.

12.3.3 Market value margin (2.1)

There is general acceptance, apart from GNAIE, for the need for a margin in the insurance liabilities to reflect the likely variability in expected future cash flows. The industry favours a cost of capital approach but the IASB is not seeking to specify the method, preferring to consider what should be taken into account to come up with a margin rather than specifying a method. CEIOPS is still considering the merits of different methods.

12.3.4 Reinsurance (3.3)

The measurement debate encompasses insurance and reinsurance assumed but reinsurance ceded and policyholder financial reporting is yet to be considered.

12.4 Areas of debate

Although there is general consensus on the key items of a measurement basis as described in section 12.4 above, debate remains around all the points in Table 12.2 except for 1.3.

12.4.1   One scenario, multiple scenarios or all scenarios in best estimates (1.1 and 1.2)

IASB and IAIS explicitly support consideration of all scenarios.

The straw-man has a particular interpretation of how all scenarios should be considered (see Appendix B and Section 9.8). It is not clear whether IASB and IAIS would consider that approach appropriate.

The Actuarial Standards Board (USA) does not have a position on what is appropriate for financial reporting, but ASB #36 exposure draft observes that actuaries usually produce a "central estimate" which does not consider low frequency and/or speculative scenarios. ASB #36 would allow actuaries in the USA to continue to prepare central estimates in the normal course.

FASB is usually interpreted as treating extreme events as contingencies that should not be included in the best estimate.

The other parties, CEIOPS, FOPI (SST), Group Consultatif, CFO Forum, CRO Forum, CEA and GNAIE take it as read that companies, with the help of their actuaries, can produce best estimate reserves and there is no need to address details. The CFO Forum and GNAIE specifically put the responsibility for evaluating the best estimate of future cash flows on an entity's management.

12.4.2   Methodology and assumptions to estimate future cash flows (1.4, 1.5, 1.6)

There is wide acceptance that existing techniques and practices for determining best estimates will continue to be most appropriate in future. Moreover, all parties agree that the minimum liability measurement basis should be based on current assumptions taking into account all relevant data up to the valuation date. Both the CFO Forum and GNAIE have, however, proposed a measurement basis that links the measurement of unexpired risks, also referred to as the pre-claims liability, to the premium charged to the policyholder at inception of the contract. The liability measurement in the straw man and the IASB's "current exit value" could lead to the recognition of profit on inception of an insurance contract. GNAIE and the CFO Forum consider that no gain should be recognised on day one of a contract as no service under the contract has been provided. This is referred to as the "no gain on issue" position. They argue that, as the service provided is the acceptance of insurance risk, entities should recognise profit as the risk they accepted expires. Since for many non-life insurance contracts it may be assumed that the risk profile is effectively uniform this approach may not be very different from current unearned premium.

12.4.3   Discounting for the time value of money (1.7, 1.8, 1.9)

GNAIE considers that discounting and risk margins increase the subjectivity of liability valuations due to the high variability of expected future cash flows arising from general insurance policies. When the amount and timing of future cash flows

are known with a high degree of certainty, for example annuity type payments under workers compensation policies, then GNAIE consider that discounting is appropriate.

Although all other parties accept the need for discounting there are different views on the discount rates that should be used. For the purpose of the straw man we chose to use gilts. Some parties would favour corporate rates adjusted for default risk and any other risks not relevant to the liabilities whilst others would favour swap rates as providing a more liquid market in some territories.

12.4.4 Cost of Capital Methodology (2.1)

There is almost surprising agreement within the European insurance industry that the cost of capital is <u>one of</u> the appropriate methods to consider. This was initially driven by the desire for an economic model for liability measurement for solvency regulation. CEA, CRO Forum and FOPI argue that the cost of capital method is the only method that should be used.

Group Consultatif have produced a document that compares various methods and, in our opinion, leaves the impression (not stated) that cost of capital is better than the other methods. CEIOPS is still considering the various methods and has not expressed a view on its preferred approach although QIS 2 required a margin based on a 75th percentile approach whilst giving respondents the option to also provide an alternative impact assessment based on cost of capital. It will be interesting to see if this emphasis changes in future impact studies.

APRA currently has a liability measurement basis that requires a margin based on a 75th percentile confidence interval.

The IASB has not taken any position on an appropriate methodology for determining risk margins and has indicated that it will set out the factors and characteristics that should be taken in to account when determining a risk margin without commenting on the appropriateness of any particular method.

12.4.5 Amount of capital determined based on Reference company or own company business (2.2)

There has been relatively little comment or debate on the assumptions for the cost of capital method but the CRO Forum and the CEA favour the capital assumption being based on the Solvency II ECR calculation. This would certainly achieve some consistency of approach within the European Union although this will depend on the extent to which local regulators specify the underlying assumptions. This does not address the issue for financial reporting where the local solvency bases in non-EU territories may not provide an appropriate or consistent value for this calculation.

12.4.6 Reference company rating (2.3)

Since the CEA and CRO Forum propose that the capital assumption for the cost of capital method is based on each company's own ECR under Solvency II it would reflect the level of security required by the regulator in the ECR calculation.

In QIS 2 CEIOPS invited respondents to provide alternative impact assessments based on either the SST approach or using their own internal models. Large companies using their own models, will assume a capital level based on the company's' own rating.

The SST assumes capital is the regulatory "standard capital requirement", a minimum level and assumes that corresponds to a BBB rating. The cost of capital is adjusted upward from there assumed cost of capital for the average company.

All commentators except the IASB consider that the liability measurement basis should not reflect the credit standing of the liabilities being measured. This would seem to imply that the capital assumption should be based on a reference company or market average rating rather than the companies own credit standing. Alternatively it may be argued that an entity specific valuation of the risk margin should reflect capitalisation for the actual entity for financial reporting purposes.

12.4.7 Cost of capital amount (2.4)

As noted above, there has been relatively little comment or debate on the assumptions for the cost of capital method apart from in the SST, which requires a 6% pre-tax return on capital in excess of the risk free rate. The CEA and the CRO Forum are seeking a market consistent approach which suggests that all entities would use the same assumption. A 4% cost of capital assumption has been used in the CEA's illustrations of the technique.

12.4.8 Unearned Premium Reserve (3.1)

GNAIE and the CFO Forum are both proposing a measurement basis for unexpired risks that is not dissimilar from the current unearned premium reserve approach.

12.4.9 Own Credit Rating (3.2)

Own Credit Rating (OCR) is usually more of a life issue than a general insurance issue. For both life and non-life the price of a product can be affected by the credit standing of the issuer, e.g., an AAA insurer might be able to charge more than a BBB insurer. If claim liabilities are set based, in part or whole, on premium, then the insurer's credit standing affects its reserves. Also, an insurer that was AAA and became BBB or lower might be able to settle claims for less than full value. The OCR issue is whether the value of the liabilities should be affected by the credit standing of the insurer. The straw-man model proposes that the liabilities are not affected.

The IASB believes that the valuation of insurance liabilities should reflect the credit standing of those liabilities. This would take into account a number of factors including the own credit standing of the insurer and any guarantees that protect the payment of the liabilities.

All other parties who have commented do not believe that the measurement of insurance liabilities should reflect the credit standing of the liabilities being valued.

The debate in this area is complex. Many parties consider that it is "wrong" for liabilities to be reduced to reflect the relatively lower credit standing of a particular insurer. Others would argue that this is a divergence from trying to achieve a true economic basis for measurement as, in the event of a real transaction between parties with different credit ratings, the price agreed would reflect this discrepancy.

12.4.10 Reinsurance (3.3)

The parties recognise that reinsurance issues are important, but have generally deferred analysis of outwards reinsurance issues for later.

13 Evaluating MVM proposals

Our analysis to date is discussed in the sections below, but this is an interim report and our evaluation should be considered preliminary.

13.1 Evaluation Criteria

Evaluation criteria for accounting methodologies have been proposed by several audiences.

Tillinghast, in *Fair Value of P&C Liabilities: Practical Implications*, 2004, (pg 13-14) observes that from an accounting perspective a good method of valuing liabilities would be relevant, reliable, consistent, and comparable. They suggest that variation in methodology by company would limit the reliability of the results, but that suggest that standardisation would help make the results more reliable. They suggest that while fair value was marginally more relevant to economic reality than US GAAP, the movements in loss reserves significantly limits the connection between economic reality and reported results. Finally, they suggest that there will be substantial costs in implementing fair value, in part because of the new data requirements.

CEA suggests the following criteria: consistency with overall framework, transparency, verification and auditability, homogenous application and workable precedents (pg 4-5). CEA concludes that the cost of capital approach is better than the percentile approach with respect to each of those criteria.

Group Consultatif identified the following criteria for a good risk margin: ease of calculation, stability of calculation between classes and years, consistency between different companies, consistency with overall solvency system, consistency with future IFRS Phase 2, as close as possible to market consistency. They further suggest the risk margin should sit on top of the best estimate (mean value of discounted reserves), capture uncertainty in parameters, models and trends to ultimate, be harmonised across Europe and provide a sufficient level of policyholder protection together with the MCR/SCR (page 3). While the stated no conclusions, their analysis seemed to suggest that the cost of capital met those criteria better than percentile or assumption methodologies.

We suggest additional criteria, albeit somewhat over-lapping with the criteria above as follows: supports solvency regulation, practical to implement, cost effective, has a logical framework and "does no harm" relative to the present accounting and solvency regimes.

13.2 Analysis—Features that distinguish between the approaches

Firstly, as a theory, the cost of capital provides a logical framework for establishing liabilities in a way which theoretically yields consistency between asset and liability valuation in each companies financial reports and consistency between financial reporting in the insurance industry and other industries.

The theory underlying percentile approaches, i.e., establish reserves that are high enough to have a selected probability of being sufficient, is logical and provides consistency across insurance enterprises but it does not produce consistency between assets and liabilities or between insurance and other industries. The assumption

approaches, especially if assumptions are explicit, can also produce reserves that meet selected criteria and are consistent across insurance enterprises. However, the assumption approach will also not produce consistency between assets and liabilities or between insurance and other industries.

Secondly, , we observe that in practice, the cost of capital in a reference company context may have a small advantage over percentile and assumption approaches because of all the work that has been done on reserve risk analysis in US and UK risk based capital formulas.

Thirdly, reference company approaches have different implications than individual company approaches with respect to consistency across companies. For example, MVM's for the same portfolio of business might be different depending on what other lines of business each of the companies underwrote (the effect of differences in diversification). Also, if two companies draw insureds from the same pool of risks, but have different volumes of business, an individual company approach to MVM's will produce smaller MVM's (less capital per unit of premium or less variation within the selected percentile band) in the larger company than in the smaller company. Thus a reference company approach helps to preserve consistency across companies.

13.3 Analysis – Features that _do not_ distinguish between the approaches

Firstly, we note that CEA and GC appear to compare the percentile approach (and assumption approach in the case of GC) in an individual company framework to a cost of capital approach which would be standardised reference-company-like framework, at least for many of the smaller companies. That may be appropriate because the percentile approach has only been applied in an individual company basis. However, many of the advantages they suggest for cost of capital versus percentile are really advantages of reference-company-like framework vs. individual company frameworks. In particular, the benefits of transparency, verification and auditability, homogenous application ease of calculation, stability of calculation between classes and years, and consistency between different companies can be achieved for any of the methods if the approach is standardised, e.g., with the use of the reference company as in the straw-man approach. In the same spirit, while Tillinghast did not compare methods, it observed that the cost of capital approach would be simplified by standardisation.

Secondly, we note that for the larger companies, where CEA appears to suggest the use of individual company capital models, it is not clear that auditing percentile models would be more difficult that auditing individual company capital models. In particular, capital models necessarily include a reserve risk component which would normally be the source of the percentiles analysis.

Thirdly, the cost of capital approach has been described as having "workable precedents". While cost of capital ideas are used in various ways in the insurance industry and some companies may have applied it to their reserving, the only broad scale application to financial reporting of reserves to date is in the Swiss Solvency Test and that application is new. Percentiles methods, on the other hand, have been in longer use in Australia. The application of any of the methods is more accurately viewed as experimental.

Fourthly, GC identifies the criteria that the method is "as close to market consistent as possible". From a theoretical perspective, the cost of capital method is intended to do exactly that. However, in practice, there are few transactions involving the transfer of reserves without ongoing business. Among those transactions, we are aware of valuations that considered cost of capital approaches and percentile analysis, sometimes both for the same transaction. Therefore we believe the question of what method replicates the results is used by "the market" to price liabilities is best considered an open question.

Fifthly, it is desirable if reserves by segment or company "add up" to get total reserves for a company or for a group of companies. Suppose MVM's are determined with capital and cost of capital (or percentile) based on individual company experience (rather than reference company experience). If MVM's are determined by line and also for the business as a whole, then the sum of the results by line will not equal to result from analysing the business in total. This could be resolved by deciding whether the "real" answer is the sum of the parts (no diversification credit) or the total allocated back to the parts in some fashion (with diversification) credit. However, the issue of treatment of additivity and diversification exists if capital, cost of capital or reserve variability are based on individual company experience.

Finally, there are practical issues in calibrating models based on any of the approaches, and this is discussed in the next section.

13.4 In practice

Any model and calibration, however logical and thoughtful, will be arbitrary because there is, at most, a sporadic market for insurance liabilities.

One reasonableness check on a methodology is the extent to which the final liability amount (best estimate less discount plus MVM) is below undiscounted reserves (today's' more typical approach). This can be measured by the "fair value factor", the ratio of fair value reserves to undiscounted reserves. Arguable it would be surprising if the FVF should be much less than one. If large discounts were appropriate we might expect to see more "sales" of reserves than have been observed. Similarly, it would be surprising if the FVF is much above one it would be surprising because in that case we would expect M&A transactions to reflect some additional reserve charge. From the perspective of reserve run-off transactions, when they do occur, seem to occur at modest discounts rather than surcharges from nominal reserves.

From Table 10.4-1, the FVF's show a larger decrease in reserve that appears appropriate based on this reasonableness test. That could easily be due to the selected levels for capital, cost of capital or in the details of the cost of capital calculation.

13.5 Issues to Watch

From Table 10.4-1, the FVF's show a larger decrease in reserve that appears appropriate based on this reasonableness test. That could easily be due to the selected levels for capital, cost of capital or in the details of the cost of capital calculation. Some of the issues that may be driving that result and other issues to consider in the ongoing developing of fair value accounting are discussed below.

Firstly, as a real transfer value, the transfer should be supported by typical levels of capital rather than minimum levels. The use of ECR or SCR capital levels will produce low MVM's that are not representative of the real risk.

Secondly, the term cost of capital has many meanings. When cost of capital is derived from financial markets data, using CAPM, Fama-French 3 Factor (FF3F), market consistent pricing methodology(MCPM) or other like methods, the cost of capital represents the a return on market values that meets investor expectation. The cost of capital to be applied to the accounting capital as part of the reserve run-off calculation is <u>not</u> the same number. The cost of capital on an accounting basis needs to reflect the following:

1. Income taxes

2. The ratio of market value to book value of the transferee. It appears that current discussions assume a market to book ratio of 1.0.

3. The way the frictional costs relate to financial distress, agency risk and regulatory risk make market consistent returns less than the result of a simple model. (i.e., need higher cost of capital if those frictional adjustments to income are not made).

These are areas that require further research.

Thirdly, reserves contain a higher proportion of long-tail liabilities than short tail liabilities, and the older the reserve, the higher the concentration of these long-tail liabilities. This is particularly true in runoff companies. Logically, this "increasing toxicity" of reserves with age should be reflected in the cost of capital approach, but it is difficult to do and is not reflected in examples in this paper or in work done by the various parties that have commented on MVM methods. As a special case of this issue we have claims related to asbestos for which it not clear that any MVM (cost of capital, percentile or assumption) method would be anything but arbitrary

Fourthly, we should watch the question of what is the best estimate. Most outside audiences believe we are now producing a best estimate reflecting all scenarios that would have a material effect on that best estimate. This paper has suggested that we are not normally doing that. That gap in expectations may need to be resolved through better disclosure or refinements in our methods.

Finally, based on experience in Australia is seems clear that disclosure of results is more helpful than disclosure of details of methodology. The amount of MVM is the most important/ useful disclosure. Further high level details like he amount of capital required and cost of capital assumed (if that is the method) may be helpful.

Appendix A.   User perspectives

A 1 The Users of Accounts

In this section we consider the various users of accounts, and the extent to which considerations of fair value are relevant to their needs. We have considered the following users.

– Shareholders

– Management

– Policyholders

– Regulators

– Taxation authorities

– Rating agencies

A 2 Shareholders

Shareholders are concerned with the value and performance of their investments and the assessment of the stewardship of the people they have engaged to manage their company. We may extend this category to include people and institutions who may consider investment in a company's shares.

We will assume that ownership and management are separated, since this is the normal model in insurance companies.

It seems obvious that shareholders need "correct" accounts in order to fulfil these functions. This naturally prompts the question as to what constitutes correctness in accounts, which is part of the theme of this entire paper. However, there are a number of implications for approaches to accounting, and specifically to the setting of provisions in the accounts of insurance companies, that this criterion implies.

Firstly, it should exclude the possibility of management discretion in setting reserves, which is different from saying that it should exclude the use of management judgement. In the extreme case, if management can set provisions as they please, and vary them as they please, results can become completely opaque; the accounts become meaningless, unless the company is evidently in danger of running out of money. In such a situation the accounts will not disclose a meaningful figure for net asset value or give a sensible basis to assess the value of the company's assets or liabilities; nor will they provide a useful basis to assess the quality of managers' stewardship. It is true that the payment of a reliable stream of dividends may still provide an indication of the success or otherwise of the company, but this is still subject to manipulation, and companies may reasonably pursue a passive dividend policy that says more about management's view of the long-term prospects of the company than year-to year-performance.

This brings us to the second implication, which is that the approach to setting provisions should be consistent over time. Even if provisions are set wholly unrealistically, if they are set on a consistent basis every year then a reasonable indication of yearly profit may emerge from annual accounts. Provisions that are plainly higher than is needed to fund the payment of claims will slow the emergence

of profits during a period of expansion, so that changes in growth rates will obscure the level of profitability somewhat, but a period of trading unprofitably will be reflected in lower profits (or losses) emerging from the annual accounts, while an improvement in profitability will also be reflected in the next set of accounts.

This leads inexorably to the conclusion that companies' provisions for unpaid claims should be based on the best estimates of the expected cost of paying those claims. However, that is only a starting point. The questions of discounted value, undiscounted value and fair value immediately present themselves.

It is simple to show[15] that if provisions correctly anticipate the amount and timing of claims payments then holding undiscounted provisions delays the recognition of profits. In long-tailed lines business may be profitable at combined ratios in excess of 100% and there will be a loss on writing (or, possibly, earning) the premium, which is refunded and more as claims are paid. On the other hand fully discounting the claims provisions recognises in full the profit to be earned as soon as the business is written or earned.

We therefore need to ask which of these better reflects the value achieved for the shareholder by writing an extra insurance contract. If the contract is genuinely expected to be profitable then it should be expected to enhance the value of the company immediately it is accepted. Writing it should make the company more valuable. What has actually happened is that the company has received a certain amount of money that is more than is expected to be needed to pay the concomitant liabilities. This suggests not only that claims provisions should be based on discounted expected values, but that unexpired risk reserves should be based on exit values (in other words, the discounted value of claims expected to arise from the unexpired portion of policies) rather than unearned premium.

Following this logic, we would conclude that the discount rate should reflect the investment income that the company expected to earn on its invested assets. If the company follows a risky investment strategy then it may expect to get a higher yield than if it follows a low-risk or a nil-risk strategy. The result of this will be that a company that follows a risky investment strategy will set up lower provisions than one with a risk-free strategy, and therefore show more profit on the writing of the contract. As time goes by, if receipts and payments occur in line with the expected values, investment earning should match exactly the unwinding of the discount on the provisions, and the provisions should be reduced every year matching exactly the payment of claims. At the end of this process the provisions are exhausted and the company with the risky strategy is left with more money than the other, reflecting the greater profit that it took at the outset of the contract.

This conclusion follows logically from the earlier reasoning, but should give immediate concern. Discounting liabilities at risk-free rates of interest has become almost universally accepted as appropriate for valuation of other financial liabilities. Is this consensus really wrong for general insurance or for policyholders in particular? And if the conclusion is wrong for the choice of the discount rate, does it follow that it is also wrong to use expected values for the selection of liability amounts to use as the basis for provisions? The company has written a policy which it expects to be

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[15] See, for example, Leigh (ibid)

profitable. This surely would increase its value for shareholders, and that should be reflected in the accounts.

Against this position it may be noted that some of the major accounting scandals in the United States in recent years involved the booking at outset of the expected profit from the full term of a contract that companies had entered into. The obituary of Kenneth Lay pointed this out in respect of Enron and noted the consequences.[16]

Discounting the provisions at the rate of return that the company expected to earn surely exaggerates the value added at the time to shareholders of the company entering the contract. It is equivalent to taking the same stream of receipts and payments (including the enhanced investment return) arising from risk-free assets and liabilities, which would surely be valued more highly as it entails no risk but has the same expected value.

Considering the value of assets on the balance sheet begins to provide the resolution of this problem. It is now generally accepted, at least in the United Kingdom, that market values should be used to value financial assets. A market value encapsulates the market's view of the expected value of the income to be generated from the asset and the appropriate adjustment (if any) to the risk-free rate to be applied to those expected values in order to reflect the risk inherent in the income stream. Of course it is not possible to observe these two facets separately, but the market price may reasonably be assumed to encapsulate both. It is the value because it is what the company (on behalf of the shareholders) can actually get for it; if the expected value is higher because of a risk discount then they must wait for the expectation to become reality before they can get the value for it.

The same considerations lead us to fair value on the liability side of the balance sheet. The definition of fair value is what the liability would fetch in the open market. The writing of a new insurance contract adds money on the asset side of the balance sheet and an uncertain amount, albeit one for which we may be able to assess an expected value, on the liability side. If the company can "sell" the liability[17] then it will turn the liability into a certain amount; if it wishes to take advantage of the expected value being lower than this price then it must wait until uncertainty has become certainty, at which point the full value will have been realised. Indeed, if the market adjustment for risk is large enough then the company may have to accept that at the start of a contract the value of the liability it has taken on is greater than the amount it has accepted for doing so. If the shareholder wants to realise the current values he can sell his shares at any time; the price he achieves should reflect these market values.

This brings us to an important difficulty in implementing the fair value proposal. There is no ready market in insurance liabilities. The fair value approach as enunciated by the IFRS states that where there is no market then assets or liabilities

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[16] The Times, 6 July 2006:

In Enron's annual report, Lay disclosed that the company had started to use the so-called "mark-to-market" method of reporting. This meant it would book all of its expected profits over the lifetime of a 20-year contract upfront. This kind of book-keeping carried vast risks, as any change in the expected profits would have to be booked as an unexpected loss.

[17] The word "sell" is placed in quotation marks because such a transaction would involve the company parting with money, the reverse of what "sell" normally means. However, it seems the best word to use in the circumstances.

should be valued by reference to equivalent markets or using a market-consistent model. This is all very well, but if there is no market then the company cannot actually dispose of its liability and make it certain. Unless other and potential shareholders accept these surrogates then they are not the value that a shareholder will actually be able to realise for the transaction the company has entered into on his behalf: they will not reflect its value to him.

There is a further inadequacy of this approach: it makes no allowance for franchise value. By making allowance only for the value of the assets and liabilities directly arising from the contract the accounts will not make allowance for the full value of the transaction. In writing a piece of new business there is an enhanced probability of writing it again in future years. The extent of this enhancement will vary from class to class and market to market, but there is no doubt that in most classes of business in most markets it does exist. Some research suggests that the seasoning effect in certain classes of business is very important. This means that business that stays with the company for renewal after renewal becomes more profitable the longer the relationship lasts, and a relationship may very well be worth capturing even if losses or wholly inadequate profits have to be borne for the first year or two. Can and should this value be captured by accounts? It would certainly be a factor to be taken into account by a shareholder considering selling or a prospective shareholder considering buying. On the other hand, taking such a value into accounts would seem to take us further down the road towards the practices noted above in connection with Enron.

It may be helpful here to remember why accounts are so called. They are produced to account for the financial transactions of the company. At its most basic, this means where the money came from and where it went to. This would seem to suggest that their remit should extend only to contracts entered into and stop before a reckoning of franchise value. However, our specific focus is on shareholders, and their interests include monitoring the stewardship of their managers. Should it not also include monitoring their success in enhancing the franchise value?

The resolution of this question is beyond the scope of this paper, but does illustrate that it is unreasonable to expect a set of accounts to answer all the questions shareholders may have. The objections set out above to the alternative methods of assessing market value may be seen in this light. Their answers may not be the best answer to the question of what value the contract has created for the shareholder, but it is the best methodology we have to answer the right question.

Several efforts have been made to set out a rubric for the calculation of the fair value of an insurance liability on the basis suggested by the IFRS.[18] Leigh uses an explicit rate of return on capital needed to support the liabilities as they run off, and this is also one of the approaches explored by Littman *et al*. Conger *et al* assess the appropriate level of profit in the fair value by reference to the closest real market to a second-hand market in insurance liabilities: the market for new policies. The first two correspond most closely to a cost-of-capital approach, and lead to the question of what cost of capital should be used. In general, the wider the class of possible purchasers the lower the answer, since the extent of diversification that can be achieved is greater. If our reference point is shareholders then it seems to be

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[18] See Leigh (ibid), Conger Hurley and Lowe, CAS 2003, http://www.casact.org/pubs/fairvalue/1.pdf, and Littman, Thomas, Tarrant and Gutterman, CAS 2003, http://www.casact.org/pubs/fairvalue/115.pdf

reasonable to use a rate that could actually be achieved in the only market that shareholders actually have to take on or lay off such losses, which is the market in shares for insurance companies. This is not a complete answer for two reasons. Firstly, the return on capital arising from writing insurance is not directly observable from the market, and secondly different rates would be appropriate for different tranches of insurance liability, depending on their risk characteristics. However, at least is provides a reference point, and is probably consistent with the approach of Conger *et al.*

One objection to the use of fair values is that they are open to manipulation by management to the disadvantage of shareholders. This is a reasonable objection, but the disclosure of assumptions should go some way to relieving it. In any case, if management want to manipulate the accounts there is likely to be far more scope for this in the initial estimation of the amounts and timings of future cash flow than there is in the conversion to fair value. One other objection is that all three papers quoted above concluded that in most cases fair value was likely to be close to, and slightly below, the undiscounted best estimate. One might reasonably question whether or not making a small but complex adjustment will in practice add any value for shareholders.

A final point is that most studies of fair value conclude that the fair value of toxic liabilities (as the term is used elsewhere in this paper) may be substantially greater than their best-estimate value. This surely does reflect shareholders' interests. A tranche of such liabilities does constitute a value-destroying consideration in decisions on whether or not to acquire businesses, and is often a stumbling block in takeover or merger negotiations. A high accounted value would reflect real transactional considerations.

A 3 Management

We shall assume that management want accounts to assist in the management of the company: the possibility that they want to manipulate accounts to deceive other market participants and improperly manage the company for their own personal benefit does exist, but will not be pursued further, except to note that in that case complete discretion in reserving is probably most convenient.

It is a commonplace that management requires a separate accounting system from that used for reporting outside the company; management accounting is, indeed almost a separate discipline from financial accounting. Reporting to management must be on a much more frequent basis and a more detailed basis than external reporting and has to be quicker.

These differences exist in insurance as much as they do in manufacturing and trade. It is not usually possible to carry out a full reserving exercise each month or to do so within a day of each month end, unless the basis is wholly mechanical, and the subdivision of an IBNR reserve by the finer divisions of a company's business is likely to be misleading; indeed calculating loss ratios on too fine a basis without adjustment for large losses can lead to ill-informed decisions.

To say that these things are not possible may be true, but it is also a dereliction of duty: management need these things and a proper management information system must supply them, or as close an approximation as may be possible. However, the point is irrelevant to the subject of this paper, which is the basis on which reserves

should be set. Management have a number of uses to which they put reserve estimates, and the use should determine the basis. For example, for cash budgeting undiscounted reserves by date of payment would be required: separate budget estimates of cash flow from investments and premiums would be used to estimate the cash available to meet the outflow. In these circumstances slightly conservative reserves might be appropriate: it is usually more convenient to have a surplus of cash available than a deficit, although temporary financing of a small cash flow deficit is unlikely to present a problem for a solvent company. However, most managements would probably prefer to be given best estimates for this purpose and build in any margins for themselves to ensure day-to-day liquidity.

Pricing is a major management function for which reserve estimates are a vital part of the input. Fair values of liabilities and discounting are probably irrelevant to this process, as a detailed pricing process will allow explicitly for investment income, for the capital required and for the required return on capital. However, the process should also allow for the expected return of capital and emergence of profit, and the required reserves for the business as it runs off can affect this: if fair values are required then the emergence of profit will not be the same as if undiscounted best estimate or best estimate is used; other requirements such as equalisation reserves will also affect the emergence of profit.

In pricing, best-estimate reserves are almost certainly required as a starting point: conservative reserves are at best obscurantist (if known to be conservative) and at worst misleading (if not so known). It is also likely to be important that reser4ves should be as realistic as possible at the level of individual lines of business, and possibly by subdivision of line of business, and by year of account. Reserves may also be irrelevant for certain, possibly large, parts of the business: those that are too old to be relevant to current pricing or that have been discontinued.

Toxic reserves may also be irrelevant in the pricing context. If management thought that they were likely to be taking on any such liabilities with new business they would surely not be prepared to write it. While there is always some possibility of taking on latent risks, and this should probably be considered to be normal in many forms of liability insurance, in these cases the past may not be a good guide to the future. How to allow for future latent claims is an important subject in itself, but the reserves from past events are probably not the best approach.

A 4 Policyholders

Policyholders' interest in their insurance companies is limited to the concern that their claims will be paid in full. They should be satisfied so long as it is clear that their insurers are solvent. (Those who are fully protected by arrangements such as the Financial Services Compensation Scheme may not be concerned even this far.) If a company is maintaining reasonable margins of solvency then small distinctions between fair-value and undiscounted-best-estimate reserves may be irrelevant. If a company's solvency depends on such distinctions then it is almost certainly true that many plausible scenarios of the company's runoff lead to its being insolvent and unable to meet its commitments to policyholders. It is also likely that any such companies will have been forced by their regulator to go into runoff: it may already be too late for policyholders to ensure that their claims are likely to be met.

If assessing ability to pay claims is the chief concern of policyholders it is reasonable that reserves should be set directly by reference to the amounts that claims are

expected to cost. Undiscounted or discounted best estimates are candidates for this, as are fair-value reserves that are slight adjustments of these. (The required criteria of solvency under the various dispensations would certainly be different.) However, some of the more radical interpretations of fair value may be wholly inappropriate for this purpose. For example, a reasonable interpretation of the principles of fair value would indicate a reserve that was much less than the amount needed to pay the claims during a soft market. Accounts that included reserves set on such a basis would be useless in allowing a policyholder to assess the security of his insurance asset. Similarly, fair-value reserves that incorporated an allowance for the credit standing of the insurer would be entirely useless from a policyholder's point of view.

It is possible to draw distinctions between policyholders with long-tail policies and those with short-tail liabilities. (In the former case one might also include the minority of general-insurance policyholders whose policies have multi-year terms.) However, the distinction is probably one of degree rather than one of type: the long-tail policyholder needs a guarantee of solvency that goes longer into the future than the short-tail policyholder; such a distinction is probably not possible but a larger margin of solvency is probably the next-best thing. We often see this distinction in practice when the security requirements for placing insurance or reinsurance are more stringent for long-tail than short-tail classes of business.

Many companies that become insolvent and fail to pay their policyholders go through a period before their insolvency becomes apparent when their reserves are insufficient. (By this we mean that they prove to be less than enough to fund the claims on whatever basis they have been set up.) In these cases, it is often said that the insolvency, and therefore the inability to pay policyholders, was "caused" by inadequate reserving. This suggests that policyholders' interests are directly affected by reserving. However, this characterisation of such an event is surely wrong: the holding of reserves that are inadequate to fund claims may improve the reported solvency position of a company and it may persuade management that they are writing business profitably when they are actually losing money but it cannot of itself erode the capital that had has been subscribed or earned. It may allow the company to continue trading for longer than it would have been able to had larger reserves been posted earlier, and thus allow the insolvency to be worse when it is finally recognised.

All actuaries know that their reserve estimates are, at best, only a central estimate of the cost of paying the underlying claims. It is, therefore, perfectly possible that claims will be higher than the reserve estimate, sometimes much higher. At the end of an unfavourable runoff it should be possible to look back and see that, given the evidence at the earlier time, the estimate that was used was, in fact, appropriate. However, this is not normally the case when revised reserves precipitate an insolvency. In these cases it is far more common to see that there has for some time, possibly for several years, been sufficient evidence in the development statistics to see that the reserves were less than the expected cost of paying the claims. In some of these cases it may be that management had been overconfident, and had not been prepared to accept, or accept fully, the emerging evidence that previous estimates were proving inadequate; in other cases it is difficult to accept that they could ever have seriously entertained the view that the selected reserves were appropriate.

In either case, policyholders' interests will have been damaged by the holding of inadequate reserves, but it is unlikely that the basis on which the reserves were purported to have been set was at fault: the problem is likely to have been that the

reserves were not appropriate as selections on the purported basis. It is also unlikely that the company was insolvent at the most recent point at which the reserves were a reasonable selection given the evidence available (even if, those selections would, in the light of hindsight, have proved inadequate) since solvency standards usually allow for extreme variations from best-estimate reserves. Policyholders' interests are surely served by ensuring that companies hold reserves that are genuinely adequate on the basis on which they are purported to be set.

In this section, policyholders' interests have been presented as being one-sided: they will lose money if the company should prove to be insolvent, but they will gain nothing if its solvency is even better than it seems. Holding inadequate reserves may obscure an insolvent position and allow an insolvent company to continue trading and make the eventual insolvency worse to policyholders' detriment. Is it therefore to policyholders' advantage to hold reserves that are demonstrably more than necessary to pay claims? There are two reasons why the answer is probably not. The first is that over-reserving is a method of holding capital; we have already observed that a policyholder should be concerned that his insurer is comfortably solvent and to be sure it is probably more helpful to be able to identify the reserves separately from the capital that provides the solvency margin. The second reason is that a policyholder is also an insurance buyer, and extra capital has to be financed. Holding capital beyond the level that is needed to provide an appropriate level of satisfaction on the payment of claims will drive up the price of insurance; there is a trade-off here to be sure, but excessive reserves are not clearly in policyholders' interests.

Toxic liabilities may not be of immediate concern to the majority of current policyholders. Toxic reserves tend to be very long-tailed, and even normal liability risks are likely to have run off before too much deterioration takes place. So long as these liabilities are sensibly reserved and there is sufficient capital to cover the likely level of deterioration over the next few years even in an unfavourable scenario, policyholders are likely to be satisfied.

"Policyholders" includes those who hold the liabilities for toxic claims, although they may not be current policyholders, or even policyholders at all, technically. (In the last instance, they could be former employees of an employers' liability policyholder. They are likely to be concerned with the long-term solvency of the company. If it is still trading they have an interest in its continued profitability: unprofitability will erode the capital base while profitability will build it up. Their interests do not appear to require any particular approach to reserving but only an assurance of solvency, the more comfortable the better. Therefore reserves should be adequate on whatever basis is chosen, but the actual choice of basis may not be too important.

A 5 Regulators

When we think of regulators, we naturally tend to think of our own regulators, but we should remember that not all regulators have the same priorities. Some may be concerned wholly with the solvency of the industry they regulate, others with pricing, with ethical conduct, with the maintenance of competition, the collection of statistics or any combination of these, and this is not an exhaustive list.

If the regulator is concerned principally with solvency, then the basis for reserving may not matter a great deal: as with policyholders is it probably more important that the basis be well defined, that reserves be set properly and adequately according to this basis and that the solvency regime should be appropriate for the basis than

whether the basis is actually best estimate or 75th or 90th percentile, discounted or undiscounted, or fair value. Fair value might have a more compelling case to make if liabilities could actually be readily exchanged at that price in an active market, but while this remains a theoretical construct they do not have this advantage. That fair values contain a market-value margin that is likely to be greater the greater the uncertainty of the amounts of the runoff may make fair values easier to fit into a consistent solvency framework, but there are other ways to achieve this.

A regulator that is concerned with pricing may be concerned either that prices should not be too low or that they should not be too high. The latter is normal in American states where premiums are regulated and is seen as a consumer-protection measure, but the former is not unknown, and was for example the rationale for pricing control in Spain before the European Union regulated for freedom of contract. A concern that prices should not be allowed unless they can be shown to be sufficient is an indirect regulation of solvency.

A regulator concerned that prices are not too high will be concerned that the allowance for claims within the premium is not excessive. In these cases the separate elements of the insurance would normally need to be specified, so that an undiscounted best estimate of reserves in current business (assuming that current business is to be used as the basis for the price) would be an appropriate measure of expected claims; allowance for the investment income and an appropriate return on capital would be made separately and explicitly. Probably the same applies to a regulator who wants to ensure that prices are sufficient, but the concern of the first regulator would be that the company was being too generous in its provision and of the latter regulator that it was not providing enough.

The other concerns of regulators mentioned above probably do not touch on the basis for setting claims reserves

A 6 Taxation Authorities

The cynical view is that the objective of taxation authorities is to maximise tax take. More appropriately, the objectives should be to ensure that no tax that is due escapes them, and that it is collected sooner rather than later. This begs the question of how much is due. Assuming the basis of taxation is profit (rather than, say, premium) and that reserves are allowed as deductions in determining profit the derivation of reserves is clearly of legitimate concern to taxation authorities. If a consistent basis is used to determine reserves from year to year then once profits have begun to emerge the details of the basis are unlikely to change the level of profits much, and will only bring forward or delay the recognition of profit (and, therefore the payment of tax) for a year or two.

The details are not wholly irrelevant. If a company is growing then using undiscounted best estimates will delay the emergence of profit while using discounted best estimates will accelerate it. (This applies also to a new company, in other words one growing from nothing.) Fair values, if they are, as we expect, somewhere between these two possibilities for most business most of the time, will produce an intermediate position. If we accept the philosophical justification for fair-value accounting then profits based on it will be those truly earned on behalf of the shareholders and the tax levied will be a fair burden; therefore they have a certain intrinsic attractiveness.

What is probably more important for taxation authorities is that it should not be possible to manipulate the reserves and thereby manipulate profit. This suggests that it is probably more important that reserving standards and calculation are transparent and consistent with previous years than that a particular standard be adopted. Leaving discretion to managers would be completely inconsistent with these objectives. Managers would be pulled in two directions if they had complete discretion: over-reserving would reduce the company's tax bill but a lower reported profit would undoubtedly be of concern to shareholders. Rather than systematically over-reserve or under-reserve as a matter of course, management might be more likely to build in a margin to reserves that could be built up or reduced from time to time in order to smooth profits; it is evident that this has been the practice in a number of jurisdictions at different times. (A permissive environment such as this also enables managements in failing companies to delay the recognition of their failure, often with wholly malign consequences.) So long as the extra margin is not great, if it is used to smooth profits this may not be wholly unwelcome to taxation authorities, since it may well improve the tax take when it is otherwise likely to be depressed: it smoothes the tax take as well as profits. However, in such circumstances it would become very difficult for the authorities to determine whether or not they are receiving their due.

A 7 Rating Agencies

Rating agencies are called on to give opinions on the claims-paying ability of insurers. (They may also give opinions on the quality of insurance companies' debt.)

Appendix B. Considering All Scenarios in determining Best Estimates

The following outlines how the full range of scenarios might be considered and the impact of those considerations used to adjust the "one scenario" estimate.

1--Inflation

Anticipated inflation might be 5% per year (normal and social inflation combined).

The range of possible inflation income might be distributed as follows:

Average Inflation over claim payout period (based on long-term history)	Probability
2.5%	10%
5.0%	69%
10%	15%
15%	5%
20%	1%
Avg-Total—6.2%	100%

2—Court decisions with retroactive affect

Assume our insurer operates in multiple jurisdictions, counties and states/provinces within countries. We might anticipate 1 in 50 jurisdictions having a retroactive (reserve-effecting) decision each year. The average affect on that state might be 10%. The average countrywide affect might be 0.5% (1/50).

Note: Data used in setting reserves is adjusted to current law level, so that the historical data movements from significant historical court decisions are removed. If the historical data movements are not removed and if we expect future data movements to be similar to past data movements then the adjustment discussed here would not be necessary.

3—Changes in Claim Payment or Reserving Practices

These changes are always targeted at improvements.

If the change is recent, and the targeted improvement is 5%, the actual results might be (5) % (5% worse rather than better), 0% better, 5% better (as targeted) or 10% better. Relative to the target assumed in the reserve setting the results could be -10%, -5%, 0% or 5%. Assuming probabilities of 5%, 20%, 50%, 25%, the average impact is 0.25% worse than estimated by assuming the targeted improvement.

If the change is in the past, the uncertainty will be decreased.

4 –Modelling error for natural disaster impact on unearned exposure

Say a 25% error for events with a frequency of 1%. The average impact is 0.25% on unearned premium. This would affect unearned premium in an accident year accounting framework, but would affect claim liabilities in an underwriting year framework.

5—Mega events

These have large, but unknown impact and small probabilities.

The impact might be in excess of 100% for some lines. An expected provision of 0.5% might be considered appropriate.

6 Combined Effect on Expected Value:

Reserve Element	Mean
From triangulation analysis	100% (base)
Social, medial, Inflation (1)	+1.2%
Court Decisions (2)	+0.5%
Changes in claim settlement and reserving (3)	+0.25% (if recent)
Natural disaster modelling (4)	0.25%
Mega events (5)	+0.5%
Total	102.4%

Use 0.4%, an average of (4) and (5) based on mix of property and liability claim liabilities.

850MM times 1.024 is approximately 875MM.

Supporting the type of analysis shown above, consider the following analysis of Australian Experience

I do not really expect conditions to remain unchanged, but am not sure in which direction they are likely to move. The main environmental factors that could change this value can be categorised as wage inflation, superimposed inflation and changes to the operating rules.

Wage inflation has recently been running in a reasonably narrow range, between 3% and 5% per annum and there is a general consensus that 4% per annum is a reasonable assumption. The mean term of the liabilities is about 5 years, so a 1% change in the inflation rate would result in about a 5% change in the liability. Longer term inflation statistics suggest that there is not much chance of sustained wage inflation averaging below 2% per annum over the term of the liabilities but there have been episodes of several years in excess of 10% per annum and one peak of nearly 20%. Some time ago, before the Reserve Bank of Australia was given a mandate to manage price inflation in the range 2% to 3% per annum, I adopted a rule of thumb that economic uncertainty, for liabilities fully responsive to wage inflation, could be characterised by a coefficient of variation of about 2.5% for each year of the mean term of those liabilities. This is arguably a little high now, but a change of government could easily trigger a more volatile environment, as could external economic turbulence.

Superimposed inflation is harder to come to grips with, comprising a mixture of political, judicial and administrative decisions, reflecting social attitudes to a greater or lesser degree from time to time. It is far more erratic than wage inflation, with periods of little change, or even reversal, interspersed with periods of rapid increase and, sometimes, discrete jumps in response to a landmark decision or legislative change. Over the 40 years to the mid 1980s, the average rate experienced by both workers compensation and third party liability (motor third party bodily injury) was about 10% per annum. Since then, there have been the usual mixture of periods of stability, usually in response to concern about rising premium rates, and rapid increase, most notably in the early 1990s, when the estimated rate for third party liability was about 8% per quarter over three years (in response to a soft market and complacency, following a change of scheme). There is a general consensus among actuaries doing this work that it is reasonable to assume a superimposed inflation rate of 6% per annum. The sensitivity of the valuation result to this assumption is essentially the same as for wage inflation and the uncertainty is substantial, but difficult to quantify.

Uncertainty arising from operational changes is also difficult to quantify. It generally takes about five years for the courts to bed down a new set of rules. During this period, claimants' legal advisers are reluctant to settle claims, so settlement and payment patterns are quite untypical of what will follow. There is rather greater uncertainty if legislative changes are

proposed but not settled, or if there is general public disquiet about inadequate benefits or excessive cost. Reading these entrails, I have, at various times, characterised the combined uncertainty from superimposed inflation and recent or potential changes in terms of a coefficient of variation of between 10% (unusually stable conditions) and 40% (during and shortly after major changes). These estimates of uncertainty are, of course, themselves highly uncertain.

What we have then, is a base estimate within a rather narrow range, subject to some key assumptions that are not very susceptible to statistical analysis, but are generally understandable to management, auditors, supervisors, analysts, etc. Provided they are disclosed, it is fairly easy to assess the impact of changes in those assumptions.

Appendix C. Market Value Margin Calculations and Explanations

This Appendix derives formulae for the market-value margin under two rules for capital or total funds to be held that are different from those in Section 9.4, but related to it. In these two formulations we ensure that the market-value margin held at the end of each year of runoff returns the required cost of capital for the future when assessed as a separate transaction. We have considered a situation in which the expected claims cash flow in future years is financed with a market-value margin (provided by the insurer transferring the risk) and capital (provided by the company acquiring the risk). The requirement is that the transaction delivers an internal rate of return to the acquirer equal to the specified cost of capital. We have considered two requirements for capital: that the total funds held at any time should be equal to a specified multiple of the discounted present value of the future claims and that the capital held by the acquirer in excess of the sum of the discounted present value plus the market-value margin is a specified multiple of the discounted present value of the future claims. We assume for simplicity that the claims payments will be made at the end of the year.

Let the payment expected on claims at the end of year t be P_t $(t \in \mathbf{N})$

Let the discounted best estimate of all future claims at time t (that is just after the payment due then) be

$$DBE_t = \sum_{u=1}^{\infty} v_a{}^u \ P_{t+u},$$

<div align="center">Where: a is the risk-free return</div>

The present value is DBE_0.

Note that $DBE_{t-1} = v_a (DBE_t + P_t)$

On the first formulation of the capital requirement, the total funds that need to be held at time t are $(1 + f) DBE_t$, where f is the proportionate loading. Note that $f DBE_0$, which we may call F, is the sum of the market-value margin and the capital required to support the runoff, say MVM + K.

The amount released to the transferee at the end of year t is the funds at the start plus interest minus the funds required at the end minus payments. This is

$$(1 + f) DBE_{t-1} (1 + i) \ - (1+f) DBE_t - P_t$$

$$= \quad (1+f) v_a (DBE_t + P_t) (1 + i) - (1+f) DBE_t - P_t$$

$$= \quad (1 + f) DBE_t + (1 + f) P_t - (1+f) DBE_t - P_t$$

$$= \quad f P_t$$

So to get the required rate of return on capital we require

$$K = \sum_{t=1}^{\infty} v_x{}^t \ f P_t, \text{ so that } MVM = f DBE_0 - K = f \sum_{t=1}^{\infty} v_a{}^t \ P_t - \sum_{t=1}^{\infty} v_x{}^t \ f P_t$$

$$\therefore \text{MVM} = \quad f \sum_{t=1}^{\infty} (v_a^{\,t} - v_x^{\,t})\, P_t$$

Where x is the risk-adjusted return (x > a)

On the second formulation of the capital requirement, the capital itself must remain at the same proportion of the discounted value of claims. To achieve the required return on capital the market-value margin at any time must be the present value of the excess return above the risk-free rate required on the capital in each future year. Let the required capital at time t be $f\, DBE_t$. Then the extra cost of capital in the year from t to t+1 is $(x-a)\, f\, DBE_t$. To provide the required rate of return the market value margin at time t must be given by the following formula.

$$\text{MVM}_t = \quad \sum_{k=0}^{\infty} (x-a)\, f\, DBE_t\, v_a^{\,k+1}$$

$$= \quad \sum_{k=0}^{\infty} f\ (x-a) \sum_{u=1}^{\infty} P_{t+k+u}\, v_a^{\,u}\, v_a^{\,k+1}$$

$$= \quad f\,(x-a) \sum_{k=o}^{\infty} \ \sum_{u=1}^{\infty} P_{t+k+u}\, v_a^{\,u}\, v_a^{\,k+1}$$

$$= \quad f\,(x-a)\, v_a \sum_{k=o}^{\infty} \ \sum_{u=1}^{\infty} P_{t+k+u}\, v_a^{\,k+u+1}$$

$$= \quad f\,(x-a)\, v_a \sum_{u=1}^{\infty} u\, P_{t+u}\, v_a^{\,u}$$

At the time of the transaction, or valuation, this gives

$$\text{MVM} \ = \quad f\,(x-a)\, v_a \sum_{u=1}^{\infty} u\, P_u\, v_a^{\,u}$$