"Generalised Solvency Principles"

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Summary

This paper examines the basic principles that should underpin solvency valuations. A number of principles are derived which apply to all types of financial service companies. This is needed as boundaries between product types and countries are blurring.A basic solvency method is proposed together with a procedure for establishing risk margins.

"Solvenz-Bewertungsmethode - Verallgemeinert"

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Zusammenfassung

In diesem Papier werden die Grundsätze geprüft, auf denen die Solvenz-bewertungen beruhen. Es werden Prinzipien abgeleitet, die auf alle Arten von Finanzdienstleistungsfirmen anzuwenden sind. Dies ist nötig, weil sich die Grenzen zwischen Produktarten und Ländern zunehmend verwischen.

Zusammen mit einem Prozedere für das Aufstellen von Risikospannen wird eine Grundsolvenzmethode vorgeschlagen.

Generalised solvency Principles
Or
The Art of avoiding Boojums

Contents

Part One Introduction

This paper was originally presented to The Society of Actuaries in Ireland on 15th May 2001. This version is slightly modified to reflect the forum in which it is presented.

"What I tell you three times is true"

Snarks and Boojums

The above quote is taken from the hunting of the Snark which is to my mind the greatest of Lewis Carroll's work. In it he describes the antics of nine motley characters (a Bellman, a Boots, a Barrister, a Broker, a Billiard Marker, a Baker, a Beaver, a Butcher and a maker of Bonnets and Hoods) in their mad chase after a Snark. What a Snark actually might be is never revealed but Carroll does say: -

> If your Snark be a Snark that is right,
> Fetch it home by all means
> You may serve it with greens
> And it's handy for striking a light

But there is another terrible possibility. Your Snark may be a Boojum, in which case you will be: -

> Softly and suddenly vanished away
> And never be met with again.

The pursuit of corporate profits in the financial services industry seems to me to resemble a Snark hunt. Sometimes the Bellman (the CEO in Carroll's poem) will reap rich rewards, which can be shared with the other members of the crew. But too many times the Boojums have appeared and this has lead to some companies softly and suddenly vanishing away. The list is long and includes some famous cases e.g. Mirror Pension Fund, BICC, Confederation Life. Since I started thinking about this paper last autumn, Chiyoda Life, Kyoei Life, Equitable Life, Tokyo Mutual, HIH and Chester Street Insurance have all entered troubled waters.

Failure and insolvency are unfortunately part of corporate life but Financial Services have a special feature; when the Boojum strikes the victims may be not only the Bellman and company but also members of the public who trusted others with their money. It is for this reason that authorities in most countries impose rules and regulations on companies that wish to transact business with other peoples' assets.

These regulations have been put together over a long period. There is a constant dynamic between the forces of change and the regulators adapting their rulebooks in order to keep up to date.

Threats.

But I believe the balance between free market forces and regulators is in danger of being upset. Two connected forces are at work, which may impair or even destroy the effectiveness of regulation.

The first force is globalisation. Companies have spread across borders with increasing speed. The Internet in particular is diminishing borders in retailing activity. It is possible to buy goods or services from a company in one country, delivered from a second country, to a location in a third country, for a consumer in a fourth country, who pays for them with a credit card from a fifth country, which is reimbursed from the customer's bank account in a sixth. Where did that transaction take place? Under what law or laws does it operate?

The problems posed by globalisation have grown and that growth will accelerate.

The second force is the pace of innovation around products. This creates new forms of contracts that may have risks never before regulated. It may move types of risk from one type of company, where there is specific regulation, to another where there is not. Indeed this may be the whole point of the exercise.

The risks in these contracts may be hard to evaluate. Of course, the companies selling this business will do their own evaluation but that is not regulation. A basic principle of this paper is that a separate and independent set of eyes is essential for the protection of consumers. Many of the recent less successful Snark hunters had their own people checking out their own risks; they still have encountered the dreaded Boojums.

Globalisation and Innovation are not of themselves bad. I believe they are of themselves good, offering consumers a far greater variety of choice than before, and often at a lower price. Nevertheless the threats to effective regulation are real, and if we want to avoid a protectionist backlash, it is vital to recognise and meet those threats.

It, therefore, follows that actuaries should not ignore these processes and, rather than restricting themselves to their own individual specialised fields, should be generalising their skill in the function of solvency management.

We are not the only profession which is involved in solvency, but we are the only one which has a specific statutory role in any area of this nature. I believe that this places us in the best position to start to reach out across professional, national and product boundaries to develop generalised solvency principles.

Paper Structure

This paper is in a number of parts, but the next one contains my essential argument with the rest being supporting material. Part 3 is a brief synopsis of some solvency regimes operating in Ireland. Part 4 amplifies how my proposed method would work.

Thank You's
I would like to particularly thank Bruce Maxwell for much help and encouragement in writing this and for supplying Section 2.4; Vera Cronin for supplying details on the banking supervisory regime; David Paul for suggesting one of the principles; Philip Shier for providing the details on pension funds; and all the Actuaries in the Society of Actuaries in Ireland who have helped with comments or ideas.

Part Two Central Argument.

2.1 What is a Solvency Regime?

2.1.1 Solvency Regimes ("SR's") are attempts by third parties to control the activities of applicable companies with a view to protect the interests of the customers of that company from loss of their assets.
2.1.2 Unfortunately SR's are sometimes misused to protect the interests of an existing industry or the perceived interests of the state. Therefore any element of an SR, which is not necessary for genuine solvency reasons, should be deprecated.
SR's may consist of one or a combination of the following: -

Constraints over what or how much the company may sell (marketing regulations).
Constraints over what assets the company may hold
Requirements over what moneys are held to back contracts sold by the company (Valuation of liability regulations)
Requirements to hold extra sums of money (Solvency Margins)
Requirements over the value placed on assets (Valuation of Asset regulations)

And when all else fails

Mechanisms for compensating customers if the company does go under.

2.1.3 There is also a mechanism whereby the company's position is distilled into a simple number (e.g. Solvency ratios) or Credit Rating. The value of these is that members of the public (or informed publics acting on their behalf) may make their own judgements about a given company based on the simple measure.

2.1.4 It should be noted that sometimes this legislation may make companies hold more capital to cover risk. More often it acts in a normative way whereby companies avoid certain behaviour if it would generate a need for more capital. The likely industry response to legislation needs to be considered during its drafting.

2.2 What is Current Practice in Ireland?

2.2.1 In Part Three I describe the SR's currently applying to some types of Financial Services companies. The following is a very brief summary.

2.2.2 Life Insurance.

Life Insurance companies have elements of each of the possible SR methods. However the most significant are rules on Valuation of Liabilities.

2.2.3 General Insurance

General Insurance companies have some constraints over assets and liabilities. However the main solvency protection comes from a solvency margin, which is typically of the order of 16% of premiums. It is believed that, in practice, regulators look for higher levels.

2.2.4 Credit Institutions

The Central bank has solvency margin requirements relating to banking and investment activity. The calculations are percentages of holdings but internal models assessing risk are permitted. The Credit Institution's capital must be greater than the requirement.

2.2.5 Pension Funds

Defined benefit pension schemes need to have their solvency on a wind-up basis certified at least every 3.5 years. There is no allowance for adverse deviation in this process.

2.2.6 There are more financial services entities that could be considered e.g. Credit Unions, Friendly Societies and Intermediaries.

2.3 Commentary on Existing Practice

2.3.1 Section 3 also contains comments on the individual areas but there are some generalisations that can be made. In practice the systems seem to generally work, but there are some theoretical weaknesses.

a) There can be a large disparity between the methods for ensuring solvency depending on which type of financial service company is undertaking the risk.

b) Most of the regimes include the use of solvency percentages. These are manifestly theoretically weak. The same percentage will be applied to risks within a class that may have entirely different exposure. Consider for example a stop-loss treaty on a motor portfolio compared with the underlying portfolio or that portfolio after the taking out of the reinsurance. Further, if the risk has been priced wrongly in the first place, how can an arbitrary percentage lumped on top be the right amount?

c) Risks which are not the business of that class of company may be ignored altogether.

d) Most critically of all, in none of these SR's is a genuine attempt made to force a consideration of the risks that the company faces.

2.4 What is happening?

2.4.1 Following a number of years reviewing the situation relating to solvency rules for insurance companies, the EU Commission has issued two draft Directives updating the solvency regime. There are no major changes proposed to the approach that has been used for the past twenty years. The most relevant changes are the proposals to give regulators official discretion to impose greater solvency margin requirements on (individual or all) companies than the minima laid down in the rules. It is not at all clear what objective or quantifiable criteria may be used by the regulators when they are considering imposing such extra requirements. It is unlikely that such criteria will be developed uniformly across the EU.

2.4.2 These changes have come to be known as "Solvency I". This is because the EU Commission has opened up a debate to review the current position on the assessment of the overall financial position and solvency of insurance undertakings. This is referred to as "Solvency II" and has become the bucket into which all radical ideas about the 'appropriate' approach to such matters are being parked. As part of this review the Commission has invested in a study that was contracted to a leading firm of auditors following a tender process. The study is into the methodologies to assess the overall financial position of an insurance undertaking from the perspective of prudential supervision.

2.4.3 The study is intended to cover the following aspects (quoted in brief):

Identify the main types of risks that an undertaking is exposed to and make an assessment of the general importance of the different risks. Comment on the usefulness of related existing stress test techniques, and on the internal risk models used by leading financial market players (insurance and non-insurance) and assess risk for insurance undertakings from a cross-sectoral perspective.

Describe methods for determining non-life technical provisions, identification of best practice and new trends.

Describe methods for valuing insurance assets, identification of best practice and new trends.

The role of reinsurance in the future and its integration in a future harmonized solvency system. Supervisory techniques to assess a cedant's reinsurance arrangements should be addressed.

The use of asset liability management techniques, financial reinsurance, ART, derivatives, etc to control or transfer risk, the impact of these instruments in the present system, their potential in a possible future system, and supervisory techniques to monitor the use of these instruments.

An analysis of changes in accounting principles that could impact on technical provisions, their coverage, relevant assets and on the solvency margin system.

An analysis of the potential assistance supervisors could obtain from rating agencies.

A summary comparative analysis of advantages and disadvantages of solvency margin methodologies (or other approaches) currently used in major non-EU countries, in particular the US, as compared to the EU model.

2.4.4 The Commission intend to involve all interested parties fully in the ongoing review.

2.4.5 The Group Consultatif is naturally keen to be involved in this process and this paper has been submitted to the working party involved in this area.

2.5 Underlying Principles

These are the principles that I think should apply to any SR.

a) Independence

By this I mean that the function of solvency must be independent of those that sell.
I also mean independence of any current world view. Solvency must take a larger and wider view of the future and be independent of current fads and fancies.

b) Assessed purely on the future

Historical or nominal values are of no interest whatsoever. Assets are only worth what they can be sold for. Liabilities are what they will cost. Any attempt at accounting profit recognition, or period matching or smoothing of values is completely inappropriate for solvency.

c) Integration

This means that in assessing risk, all aspects of the company's activity must be considered together, e.g. assets and liabilities together so that any mismatching may be observed. It also means that in considering variation of parameters (i.e. those that affect the value of a risk) they should be considered together. For example in valuing domestic mortgages, high real interest rates might imply high default and falling house prices. Varying each of these three independently would significantly underestimate the risk.

d) Risk based

A method should be based on the real risks that a company faces. If there is not a realistic risk, then there should not a requirement for solvency capital to meet it. If there is, then there should.
Simple adding on of SR percentages without risk assessment is not right.
Note that the technique known as Risk Based Capital is in fact a series of percentages and is not truly based on the specific risks of the company.

e) Simplicity

The method used should never be more complex than is necessary. It is necessary to recognise that informed publics may want to understand the SR. They may reject it if it is too complex for an intelligent informed outsider to comprehend.

f) Speed

A SR must be able to keep pace with changes in the market and the environment. It is unlikely that a rigid set of prescriptive rules can be kept up to date.

A general approach set out in legislation backed up by professional bodies may be able to act faster that a state body and much faster than a para-state body such as the EU.

g) Reproducibility

Ideally the reserves required for a given company should not depend on the personal attributes and attitudes of the person doing the calculations. Within reasonable limits the same result should emerge if the calculation is done twice separately.

h) Appropriateness

Not all financial services companies deal with matters vital to their customers. Pet insurance or dental treatment insurance matter less than pension annuities. I suggest that companies that consider themselves less vital to public interest could apply for exemption or reduction in their required SR.

2.6 The Basic Method

2.6.1 The basic method I propose for assessing the solvency of a company is as follows.

Cautious Fair Value

2.6.2 As a starting point, the company's value is assessed. For this purpose, all assets and liabilities are value at cautious fair value.

2.6.3 By cautious fair value I mean what assets and liabilities can be sold/bought for now or a net present value of their cash flows. A discussion of which should apply when and some details of calculation are in Part Four. Accounting prudence should apply to cautious fair value (again see Part Four).

Deviation Allowance

2.6.4 There should be calculated a Deviation Allowance ("DA").

2.6.5 To do this the activity of the business should be split into blocks. The aim being to have all business with similar characteristics together and to have sufficiently few groups to make close examination of each group possible. Normally the blocks would be chosen to make parameter sets for each block independent (other than perhaps the simpler financial ones of interest and inflation rates).

2.6.6 Scenario testing should then be used to determine how much capital is necessary. The scenarios must test the most extreme position consistent with Reasonable Extreme Deviation ("RED"). Stochastic modelling (which is a form of scenario testing) will often be used in conjunction with simple scenarios. There is a discussion of the merits of stochastic compared to simple scenarios in Part Four.

2.6.7 The final DA is the sum of the individual DA's for each block.

2.7 Operating the Method

2.7.1 I believe that to have credibility the results must be either calculated by or reviewed by a party external to the company.

2.7.2 However it may well add strength to the system for an internal person who understands the company to also be responsible for the solvency. I believe the Internal Appointed Actuary system does have great merit, but without independent external review, I do not believe it will carry sufficient credibility.

2.7.3 Therefore each company should appoint a Solvency Compliance Officer ("SCO") who will be responsible for maintaining solvency in the same way that an Appointed Actuary is today for life companies.

i. Performing regular (quarterly) solvency assessments (or valuations)
ii. Advising the board of the company of the solvency implications of courses followed
iii. Ensuring that the company meets solvency requirements at all times.

2.7.4 This would then be backed up by regular external review (at least annually).

2.7.5 The standards for what is RED should be set for certain main parameters by an International Standards Board.

2.7.6 Failure to comply to Solvency Standard should require qualification of accounts and notification by the SCO to all jurisdictions in which the company does business.

2.8 Some Other Considerations

Cost of Solvency

2.8.1 Some might say that adding more solvency capital will cost too much. That this will be a heavy burden which will cost the public in higher prices.

2.8.2 I would firstly state that even if this is true, it is a price well worth paying.

2.8.3 But I do not believe it is true. If companies are already well capitalised then there is no more capital required so no extra cost. If not then surely from the customers' point of view a little extra is a worthwhile insurance premium to insure the insurance company (or other financial service company) against insolvency.

2.8.4 But further than that I believe that there is no cost at all and I set out my arguments for this in Section 4.7.

Credit Rating Agencies.

2.8.5 There is another, radically different, solution to the solvency problem. That is the commercial one of credit rating agencies.

2.8.6 Under this approach the credit rating agency investigates the solvency position of each applicable company. This would be with the assistance of the company. It condenses its assessment into a simple credit rating. Informed publics may then inform the less informed public of whether this company is fit to do business with.

2.8.7 This sort of solution may particularly appeal to those who are very firm believers in market forces.

2.8.8 My concern is that to be truly effective the credit agencies would have to be powerful. This could give too much power to commercial enterprises. They have a profit motive to obey. What if they fail? Could they be intimidated by threat of litigation?

2.9 Where from Here?

2.9.1 As mentioned in Section 2.4, the debate on the future of Solvency is beginning in Europe (and elsewhere).

2.9.2 There are no doubt at least as many ways that this could turn out as there are people involved in the debate. We must finish in the same spot but we are starting from many different places.

2.9.3 This is why I feel it necessary to start by agreeing the basics.

2.9.4 My hope is to stimulate debate: firstly on the principles I have put forward; secondly on the possible method. If we can bring ourselves to a consensus, we may bring others to it.

3.1 : Current SR for Life Insurers In Ireland.

Marketing Regulations

3.1.1 There are some prohibitions on what can be sold but these are slight. Tontines require special authorisation and in practice this is unlikely to be granted. Although there is no restriction on the types of assets that linked business may be linked to, for assets that are not approved under the Valuation of Assets regulations there would be no value allowed for the backing assets. The Government's guidance notes state that this effectively stops companies selling them as they would still have to put up liabilities.

Asset Regulations

3.1.2 There are few restrictions on what may be held as assets. There are restrictions on derivatives which may only be used for risk reduction or efficient portfolio management. In practice this seems to allow companies to pursue most reasonable strategies as the interpretation of both concepts seem to be reasonably generous.

Valuation of Liability Regulations

3.1.3. The valuation of liability rules are extensive and mainly rely on the use of margins in the choice of assumptions. There are also a number of rules which are designed to enforce prudence i.e.: -

a) No policy may be treated as an asset
b) Reserves must be sufficient so that there will be no future valuation strain if one projects on the valuation basis.
c) Future expenses must be allowed for.

Solvency Margins

3.1.4. There is an extra amount to be set up called the Required Solvency Margin ("RSM"). This amounts to 4% of reserves for some classes of business (but less for classes, which are perceived as being less risky). In addition 0.3% of the sum at risk (i.e. the difference between the sum assured and the reserve held) is required for the insurance element.

Valuation of Asset Regulations

3.1.5 There is a list of assets which are allowed to have value. This is well drafted and covers nearly all reasonable asset classes. A particular restriction is that no value may be taken for debts of intermediaries.

In addition there are rules for the assets backing non-linked business governing the concentration of assets. For example the equity of a single company may not exceed 5% of the value of the liabilities. Any excess is valued at zero.

Commentary

3.1.7 The problem with this approach is that it is generally perceived as being conservative but does not have a systematic examination of risks and their impact. The large number of little bits of conservatism lead industry participants to assume that the reserves are in aggregate well stuffed with cushions. The presence of a required solvency margin on top adds to the perception. However there is no clear consensus on what is a prudent margin. Lots of little bits may in some circumstances be insufficient if there is a big movement in an important factor. The RSM is widely criticised as being very unscientific but replacing it is turning out to be a very slow process. Drawn up as it is on a EU wide basis it is perhaps fairer to praise it for being there at all!
3.1.8 There is a specific person responsible for carrying out the calculations called the Appointed Actuary. The person is responsible for solvency at all times. This is the only sphere of the Financial Services area for which there is such an official. I believe that this is a strength. That person does have to consider if there should be extra reserves above what the rules require.
3.1.9 There has been growing acceptance of the need to move the regulation towards general statements and let the actuarial profession regulate through its guidance.

3.1.10 In general the system appears to have worked well in Ireland.

3.2 Non-life Insurance.

Marketing Regulations
3.2.1 None relating to solvency.

Asset & Valuation of Asset Regulations
3.2.2 Similar to that for life assurance (see Section 3.1)

Valuation of Liability Regulations
3.2.3 Very little. The legislation simply states that technical reserves are required to cover insurance liabilities. If premiums are in deficiency then an unexpired risk reserve is required. Explicit discounting (but not implicit) is permitted though it is subject to some restrictions which provide some small margin. Unearned premium reserves are calculated gross of acquisition costs with Deferred Acquisition Costs ("DAC") being allowed as an asset.

Solvency Margins
3.2.4 The RSM is significant. It is calculated as the greater of two calculations; one based on premiums, the other on claims. The premium calculation is based on premiums written in the last year and is 18% for the first €10 million and 16% thereafter. The claims calculation is based on claims incurred averaged over the last three years and is 26% for the first €7 million and 23% thereafter. The RSM can be reduced by up to 50% for reinsurance.
3.2.5 In practice,it is widely believed that the regulator looks for the RSM to be covered by a factor of 150% to 200%.

Commentary

3.2.6 The Non-life SR places all the solvency protection in one place. This has the merit of making it clear what is available and allowing analysis both of trends over time for a single company and cross company comparison.

3.2.7 A margin of 16-18% of premiums written or 23-26% of claims incurred seems rather low to cover all possible situations. There could also be situations where it would be unnecessarily high.

3.2.8 In some sectors of non-life business claims may rise with economic downturns. Therefore it is not impossible for asset risks and claims risks to coincide. This increases potential pressure on solvency margins.

3.2.9 Non-life business is more volatile than life. The market is cyclical. It can be some time before experience is known and eventual turn out can be quite different from expected. The obvious examples are asbestosis and US pollution super-fund.

3.2.10 It seems therefore quite inappropriate to have a one size fits all RSM. A risk based approach is manifestly necessary.

3.2.11 The use of a DAC as an asset is in theory to be deplored. It is not an asset but an accounting construct. In practice it works OK.

3.2.12 The restrictions on the use of discounting do not seem to have any real value.

3.2.13 Examples of actual failures (and Ireland's record cannot be said to be good) suggest that good business controls are vital and that without them no SR will succeed. The risk based approach must ensure that there is adequate knowledge within the company of what each part of the company is doing.

3.3 Current SR for Credit Institutions in Ireland

3.3.1 Credit Institutions are organisations "whose business is to receive deposits or other repayable funds from the Public" (First Banking Directive). It covers both Banks and Building Societies but Friendly Societies and Credit Unions are excluded.

3.3.2 Credit Institutions are assessed by calculating a solvency ratio equal to "Own Funds" divided by "Risk Weighted Assets" ("RWA").

Own Funds

3.3.3 Own Funds are essentially what a reasonable person would call shareholders' equity available for solvency e.g. goodwill is excluded. There are limitations on some forms of holding by splitting the Own Funds into "Tiers". Tiers 2 and 3 include subordinated debt of different kinds. There are limits as to how large Tiers 2 and 3 can be compared to Tier 1 (without being left out of account).

3.3.4 The Central bank has the power to exclude certain items should it so desire or to include. There are limits to the amount it may include (1.25% of Risk Weighted Assets) and they fall into Tier Two.

Risk Weighted Assets

3.3.5 The RWA is a combination of a calculation for credit risk on the "banking book" and a calculation of investment risk on the "trading book".

Credit Risk.

3.3.6 The credit RWA are calculated by taking the total of all assets including off balance sheet items and contracts but deducting amounts for assets that might be considered less risky.

3.3.7 Effectively this results in a number of classes of assets who contribute more to the RWA according to risk (the riskier the higher the contribution up to a maximum of 100%). The categories are as follows: -

Low Risk (0% weighting); Cash and assets that might be regarded as absolutely secure e.g. EU government stock.

Medium/Low Risk (20% weighting); Very high security assets eg deposits with other regulated Credit Institutions.

Medium risk (50% weighting); E.g. Mortgages on residential property and good security backed loans.

Full Risk (100% weighting); everything else.

3.3.8 Off balance sheet items are categorized according to the same sort of approach, examples would be swaps and other derivatives.

Investment Trading Risk

3.3.9 For the investment risks, calculation is made of exposure which is converted back to RWA terms by dividing by 8%.

3.3.10 The "exposures" are then calculated as series of percentages of positions and assets held. These percentages are dependent on the duration and type of position, the credit nature and the extent to which positions match. For some classes of assets there are both specific and general risk exposures to be calculated and added.

3.3.11 There is also allowance for counterparty risk and settlement risk. Currency exposure must also be allowed for.

3.3.12 A major feature of the Investment Trading Risk allowance is that internal models may be used instead of the percentage rules provided they fit criteria laid down by the Central Bank. An important element of these criteria deals with the risk management process.

Commentary

3.3.13 The regulation is very much concerned with the internal aspects of the credit institution and less with the behaviour of customers. Banking has been an activity that is day to day with only limited promises being made about how customers will be treated in the future. If charges or rates are too low or high they can be increased or decreased. This freedom may be restricted in the future. Perhaps PRE exists for credit institutions!

3.3.14 The investment trading rules are much more sophisticated than anything one meets in insurance. This reflects the nature of investment activity in particular its speed and complexity. I lack the expertise to analyse the detailed rules but it appears well thought out. It could be accused of being cumbersome and it is certainly not easy to follow! The permitting of use of internal models (subject to constraints) is commendable.

3.4 Pension Funds

3.4.1 The trustees of defined benefit pension schemes are required to submit to the Pensions Board a certificate from their Scheme actuary at least once every 3.5 years. This is to certify that the assets of the scheme are greater than the liabilities that would exist if the scheme were to cease on the date of certification.

3.4.2 For these purposes the assets are valued at market value less selling costs. There are rules limiting the value of investments in the company operating the scheme and rules limiting values if the assets are over-concentrated.

3.4.3 The liabilities are valued separately for pensions in course of payment and deferred/active members.

3.4.4 The pensions in payment are usually valued by reference to the cost that would be incurred in buying out from an annuity provider. This can be problematical if the pension has some form of linking that is not offered in the annuity market.

3.4.5 For other benefits the legislation gives the trustees power on winding-up to buyout the liabilities with transfer values. This means that the actuarial value of the liabilities on transfer is the relevant value. Guidance issued by the Society of Actuaries in Ireland recommends a standard basis for the calculation of transfer values which thus forms the minimum value.

3.4.6 Were the liability to be the cost of buying out the actual deferred benefit then it is likely it would be much greater than this as there is not much of a market in these benefits. As the exercise is a hypothetical one forcing the company to value on this basis would not create a market. This is therefore an interesting example of where open market values are not appropriate.

3.4.7 The wind-up/transfer value approach must allow for some increases to the hypothetical deferred pensions but this (for active members) is less than the value of the effect of future salary increases. This means that the past service liability assessed on assumption of continuation is higher.

3.4.8 If the funding standard is not satisfied then the Trustees are required to submit a funding proposal that would rectify this by the date of the next certificate i.e.3.5 years. If this is not submitted then the Pensions Board has the power to intervene and amend benefits.

Commentary
3.4.9 No allowance at all is made for adverse deviation. Whether this is right or not depends on ones understanding of the benefits. In practice continuing employers will usually pay what is necessary to keep the scheme on track. In extremis, benefits can be reduced.

3.4.10 Employees might not understand the conditional nature of their benefits. This conditional nature will probably be theoretical more than real but it does exist.

3.4.11 But is it in the interests of any party to put by solvency margins on purpose. Defined benefit schemes might become rarer were costs to increase. Whether or not this matters depends on one's views of the defined benefit versus defined cost pension system. In that comparison the solvency issue is probably not the most important factor.

3.4.12 Funding calculations on an ongoing basis can use different assumptions. Therefore I understand that it is possible for schemes to appear adequately funded on one basis but not on another. Perhaps this is useful, as it must make it more apparent that solvency is dependent on assumptions being realised (or bettered) and is not unconditional.

4.1 Cautious Fair Value

4.1.1 This section applies equally to assets and liabilities and I use the term "object" to mean either.

4.1.2 The starting point for calculating cautious fair value is separating all objects that need to be valued into those that can be valued at a free market value and those that can not. Generally speaking assets will normally be capable of being market valued and liabilities not.

4.1.3 Assets with a free market value are those that are traded on a market or exchange (however defined) by enough independent parties to generate a price that is independent of the company doing the valuation.

4.1.4 This in practice means the world's investment markets (with attendant secondary markets and derivatives) and property.

4.1.5 It is important not to allow the overwhelmingly attractive features of market values to blind one to the need for independence. If an object is traded by only a tiny number of parties then it is quite likely to be mis-priced. Certainly independence of value is lost.

4.1.6 An example may make this clear. Suppose one is operating in the mortgage market, there may exist a secondary market in the form of opportunities for securitisation. The price that this would put on the mortgage book is not suitable unless there are plans for imminent sale of the book.

4.1.7 If the market value approach is valid then the cautious fair value is market value net of selling costs.

4.1.8 If there is an expectation of forced sale then the selling costs should include the possible effect of the forced sale depressing the market price to an extent, This might apply more often in the case of the scenario tests used for calculating the Deviation Allowance.

4.1.9 There will be some objects which though not possessing a free market value will be similar to those that do. Obviously in such a case a corresponding value can be used.

Projected Values

4.1.10 If (and only if) market values are not applicable then the object should be valued at projected values.

4.1.11 Projected values are the best estimate of the cash flows of the object discounted back to the present at an appropriate rate of interest.

4.1.12 The question of appropriate rates of interest takes us into the field of modern financial theory. To avoid getting side tracked onto this, I will just note that the rate of interest for objects which are not quoted but resemble quoted objects (e.g. stock in a private company) should be the same as for the quoted comparison.

4.1.13 For liabilities the risk free rate of the appropriate duration should be used. The exception to this is if the liability varies with the return on a given asset/set of assets in which case this should be used.

4.1.14 The projected value should allow for the costs of the investment process and if necessary tax.

Caution

4.1.15 Caution should be brought into the best estimate. This means that when there is doubt, a conservative view must be taken. This is quite different from the concept of prudence as understood by actuaries but akin to accounting practice.

4.1.16 No margin is intended to be acquired by the use of caution. If we know the probability distribution of an outcome then the cautious best estimate is at the mean outcome. If we do not know then that is when caution must be exercised.

Projection

4.1.17 In making best estimates of non-financial parameters it is necessary to consider where that parameter is tending. It is probably necessary to consider at least what is happening to the second derivative. This needs to be tempered with logic. For example if we believe that the decline of annuitant mortality is accelerating then we should take that into account in assessing annuity business. It is perfectly reasonable to expect that this will continue for at least as long as the annuity book will last. If personal injury costs are rising due to court settlement inflation well above background inflation then this may continue for a period but not indefinitely.

4.2 RED Zone A: The Matrix

4.2.1 In choosing the appropriate Reasonable Extreme Deviation ("RED"), two questions need to be answered for each risk.

(A) Do I believe this risk could happen?

(B) If it did happen would it be reasonable for the public to expect the company still to be solvent?

4.2.2 This gives a 2x2 matrix

		Could it happen?	
		Yes	No
Expectancy of Solvency	Yes	RED	Danger
	No	Not RED	Not RED

4.2.3 As can be seen it is only necessary to consider a deviation as RED if it fulfils both criteria.

4.2.4 There is however danger in the state "can't happen but should be able to survive it". In those circumstances one must be certain indeed that it indeed cannot happen.
The SCO is betting the customers' money on his/her judgement. He/she had better be right.

4.3 RED Zone B: Types of Risk

4.3.1 In assessing what to allow for by way of RED, it is logical to examine the source of the risks a company may face. The following is a selection of some of those risks.

Parameter Risk.
4.3.2 In most financial services there one or more assumptions covering non-financial factors. Examples of these could be mortality (life insurance), claims rates (non-life), default rates (loans) or withdrawal rates (deposits).
Risk 1 : That non financial parameters ("NFP") may be incorrectly assessed.
Risk 2 : The NFP may be different for the company/product in question than for the observed population in general (selection being a typical reason).
Risk 3 : The NFP's may change:-

a. An adverse trend over a period
b. A permanent shock change
c. A temporary shock change
d. Stochastic deviation

Credit Risk
4.3.3 There are a number of ways in which credit risk may be adverse.

Risk 4 : Customer Credit Risk

Risk 5 : B2B credit risk (e.g. reinsurer failure)

Risk 6 Environment Credit Risk (e.g. exchanges have been known to collapse completely)

Risk 7: Asset credit risk

Investment/Asset risk
4.3.4 Apart from the asset credit risk there are:-

Risk 8 Asset values may fail to meet expected levels due to market performance.

Risk 9 Asset values may fail to meet expected levels due to individual performance.

Risk 10 Assets may not be realisable at the required time (liquidity).

4.3.5 Some more miscellaneous risks would be ;-

Economic Risk
Risk 11 General inflation is different from expected

Risk 12 Specific inflation is different from expected

Risk 13 A specific economic activity upon which the company depends may change.

Operational Risk
Risk 14 The administration of contracts may prove more expensive than expected.

Risk 15 The computer systems are not adequate for the business.

Customer Risk
Risk 16 Customers may act in ways that were not expected.

Risk 17 Dissatisfied customers may take legal action or conduct public campaigns against the company.

Legal Risk
Risk 18 The legal drafting of a contract may be deficient.

Risk 19 The legal environment may change causing costs to increase.

4.3.6 These are only a small selection from a potentially huge list. Ryan et al (1) lists 81 risks! However for most classes of business there are likely to be only a few salient ones to consider as most important.

4.4 RED Zone C: How Extreme is RED

4.4.1 To assess what is reasonable I believe there are some simple principles that can be of great use.

Principle of Precedent

4.4.2 This simply says that it is worth considering what has gone before.

4.4.3 When I use the term gone before, I mean with a very wide perspective. It is not unreasonable to examine back to say 1900, albeit recognising that changes have occurred since then. Our world goes through phases. Threats in one can be quite different from those in others. Practitioners of one generation have much to gain by studying what happened to other generations. If we believe that our current paradigm will last forever, we risk all.

4.4.4 An obvious example of this is low interest rates. To all but the most senior amongst us it is a new phenomenon, but the long view shows that "low" rates are actually the norm.

4.4.5 The precedent rules are: -

(Risk Rule 1) If it has happened here before then it can probably happen again.

(Risk Rule 2) If it has happened elsewhere before then it could possibly happen here.

(Risk Rule 3) If something has happened before then it might be possible for the reverse to happen.

(Risk Rule 4) If something has happened before to degree X then it may not be impossible for X + dX to happen.

Principle of Acceleration

4.4.6 It is a commonplace that the world moves faster than it used to. The speed of communication and the globalisation of markets and environments will increase and go on increasing.

4.4.7 To add to this is the human process of anticipation. If an event X has in the past lead to Y, then people will expect Y and factor it in immediately as soon as X occurs. This may cause Y by pure reaction to precedent.

(Risk Rule 5) The pace of an adverse deviation may be quicker than it has been in the past.

(Risk Rule 6) The public will be better informed and make choices in their own favour more vociferously than in the past.

The Reality Principle

4.4.8 In considering parameters of financial services, it is easy to get caught up in the abstraction and forget that they are embedded in reality. Few factors can continue getting worse and worse indefinitely.

(Risk Rule 7) If the consequences to society of a hypothetical change would be so great that the insolvency of a single financial services company was not of great import, then the RED is too extreme.

4.5 RED Zone D: What the Public Expect

Public Perception Principle

4.5.1 In a previous paper (2) I proposed the following principle
"it is best to act in matters of prudence in such a way that if something does go wrong then the public would perceive one's actions as reasonable even knowing that it proved wrong in practice". This Section contains a few further thoughts around this idea.

4.5.2 All events happen within a context and are judged within that context. Therefore the public perception will be affected by the external context and to a lesser extent by the internal context.

External Context

4.5.3 The external context is what the rest of the world is doing. The public are more likely to forgive a company's failure under any of the following conditions:-

(a) Other companies are failing
(b) No other company has failed in the past for the same reason (where the past is sufficiently far distant for the newly failing company to have learnt from its predecessor's mistake)
(c) The cause of failure is likely to cause sympathy
(d) The cause is not one that the public would have foreseen

Internal Context

4.5.4 The behaviour of the company in the recent past is likely to affect the public perception. Many companies which fail have a history of recent aggressive expansion. This may be the true cause of the failure.

Ruin Probability

4.5.5 The classic actuarial approach to determining solvency requirements involves setting a ruin probability and determining how much capital is necessary to put the chance of failure below the ruin probability. Typically this might be 1 in a 100 or perhaps 1 in a 1000.

4.5.6 I am very sceptical about how this concept would sell to the public. Imagine inserting into a television ad, something along the lines of "our company is financially strong with only 1% chance of going bust".

4.5.7 With our grounding in statistics, we are accustomed to the idea that there is no point on most probability distributions which is 100%. It is also true that there is no sane amount of capital which generates solvency in all possible situations. The majority of the public are not accustomed to these ideas and if asked what chance of ruin is acceptable would say "none".

4.5.8 To illustrate this further let us assume that there exist scenarios which are purely statistical. There are none, of course, but let us assume one does exist. What is the acceptable ruin probability?

4.5.9 The first task is to establish what time period we are considering. The lifetime of all the contracts on a company's books is the logical choice; but for these theoretical purposes is not really suitable as lifetime will vary according to what the contract is. So to keep the concept simple let's say one year.

4.5.10 There might be in the region of about 50 financial services companies operating in Ireland. How often will the public permit one to go bust?

4.5.11 Again expressed like this, the person on the street is likely to say never. Perhaps we could phrase this differently and ask if N financial service companies had failed in the period since (say) 1950 would this be unacceptable?

4.5.12 Perhaps such research should be conducted but pending that I suggest the value 1. This would give a one-year ruin probability of one in 50*50=2500.

4.5.13 This is much lower than the 1 in a 100 even when translated into lifetime figures. Very often of course such modelling is only part of the solvency allowance or may be only on part of the business. I cannot believe that anybody would be happy with a failure rate of one every other year (which is what 1 in a 100 implies if we have 50 companies).

4.5.14 On the other hand it would seem to be not far out from the concept of around 1 in 1000.

4.5.15 Practical experience suggests that while more informed publics are happy with the insolvency of companies as a theoretical concept, actual real cases are never acceptable. This leads me to believe that in any period for any geographical area the correct number of insolvencies is one half!

4.6 RED Zone E: Stochastic or Simple Scenario

4.6.1 In the calculation of a DA there are two possible approaches. Using scenario testing, an extreme set of circumstances (RED) are envisaged which test the solvency capital.

4.6.2 In stochastic methods a large number of sample scenarios are generated randomly and an extreme value (e.g. the 99th percentile) is chosen as the DA.

4.6.3 Either may be appropriate in some circumstances but in general I believe that a simple scenario is preferable to stochastic. Reasons being:-

a) Stochastic is more time consuming and expensive to carry out.
b) Simple scenario is much easier to explain to the layperson.
c) For many factors that need to be projected we have no idea of what the underlying distribution may be. Modelling on this may be spurious.
d) Even when there is data it may be the distribution over the recent past period (or even quite a long period) may be misleading about real variability. For example consider house price movements in Ireland.
e) The very word stochastic modelling may mislead others into thinking that there is more science in what is being done than exists in reality.

4.6.4 However stochastic has its strong points: -

a) There are some contracts which are better considered stochastically. Typically these are when there is an interaction between something that varies and something that does not e.g. annuity option guarantees.
b) It is easy to forget that stochastic variation can be quite wide. Modelling it will ensure that it is picked up, However I would doubt than any company has ever failed due to mere adverse statistical variation.
c) It sets a minimum for adverse movements.
d) It is necessary for complex situations where combinations of effects must be studied.

4.6.5 In conclusion it should be noted that a scenario is a stochastic run of one, The two methods are complementary.

4.7 The Cost of Solvency

4.7.1 In traditional examinations of SR's, it is generally accepted that there is a trade-off between asking for too little solvency capital which exposes consumers to risk and asking for too much which creates extra costs which must inevitably be passed onto the purchaser.
I agree that on the low side lurks a Charybdis, which may sink the whole ship. But is there really a Scylla on the other bank, devouring sailors individually in the form of higher prices?
4.7.2 The arguments for higher prices are

(a) Excess returns are required
(b) Activity Constraints
(c) Barriers to Entry

4.7.3 Let's attack each one in its turn

(a) Excess returns are required
4.7.4 The argument is that when a financial services organization is asked to put up more capital, it will require an extra return over what that capital is invested in to compensate for the loss of ability to return to shareholders. In the embedded value methodology of actuaries this is explicitly set out as "the Shareholders' required rate of return".
4.7.5 In more general financial assessment of projects this is expressed in times of the required rate of return on capital. Basic financial theory suggests that you select the projects with the highest NPV after such deduction.
4.7.6 But if one studies the theory of cost of capital a little closer one finds that this cost is dependent on the risk attached to the capital staked in the project and that in turn depends on how much is staked in the project. Thus if a company is required by a SR to put up more capital, then apart from Agency costs (which I discuss below), the presence of that capital will bring down the cost per amount invested so there is no cost to the extra capital.
4.7.7 To demonstrate this further consider an arbitrage model. A shareholder in a company with solvency capital C1 can convert it artificially to one of capital C2 by buying or selling the difference in the same asset that the company holds the C1 in.

(b) Activity Constraints
4.7.8 A related argument is that a company can only do so much with its capital. Should we require it to increase its solvency capital per sale by 10%, then it will have to sell 10% less. It will then need to increase its fixed overheads recovery by 11% to make the same profit.
In terms of financial assessment of projects, we may have to reject projects with positive NPV if we have insufficient capital.
4.7.9 I question however that there really is a shortage of capital. Stock markets are normally awash with money and well-run companies can usually raise capital if they have need. Furthermore most financial services have secondary markets. If you can sell profitably then you can sell on with only a small loss of your margin.
4.7.10 Is capital really the scarce resource? My own experience has always been that systems, people or time are far greater constraints in practice. When I tackled my Finance MBA tutor on

this I was told that the only reason that capital was chosen as the scarce resource in all literature and (as far as he was aware) all practice was that the math's was tractable.

(c) Barriers to Entry

4.7.11 Lastly the requirement to hold large levels of capital may be held to be a barrier to entry to a market. Porter's five forces model tells us that such barriers lead to above average returns which must mean higher prices to the consumer.

4.7.12 But the levels of capital required are not very significant compared to other barriers to entry. In many Financial services far greater barriers exist e.g. the cost of establishing branch networks or creating customer brand awareness.

4.7.13 Plus the solvency capital required under most regimes both existing and proposed is related to volumes of business. There is no huge fixed cost that must be borne before entering business in solvency capital. I have already argued that capital is not scarce.

Agency Costs

4.7.14 Having attacked the case for the prosecution, I'd like to put forward a case for the defence. This is based on the concept of Agency costs.

4.7.15 Let us assume that the management of companies is aligned with that of shareholder interests. In making a decision about the company's activity they risk first the shareholder's money then the customers'. If they lose all the former they are no worse off if they lose some of the latter also. This means that it may be in their interest to take a gamble that if it were their own money they would not. This leads to inefficiency and the cost is an example of agency costs.

To put this another way; why should the customers' money ever be at risk given they have no control over the company?

5.1 References

Specific References

(1) Ryan et al "Financial Condition Assessment" presented to the Institute of Actuaries 26.3.01

(2) Jeffery "Demographic Margins for Prudence" presented to Society of Actuaries in Ireland November 1998