

International Developments and their implications on Loss Reserving

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Abstract

Loss reserving is always in the forefront of actuarial research worldwide. This paper summarizes the current international developments that are taking place in the Property and Casualty Insurance Industry and how they might change the existing approach to Loss reserving. Guidelines of various actuarial bodies which have been considered in determining definitions of best estimate and risk margins have also been discussed.

Key words: Solvency, technical provisions, best estimate, risk margin

Introduction

The year 2007 presents a lot of challenges not only to the Indian Insurance Industry but to the Global Insurance Industry as a whole. The Indian Property and Casualty Insurance market will be deregulated effective January, 1, 2007 and the regulatory body [IRDA] has introduced tough norms in monitoring the solvency of the property and casualty insurance companies on a monthly basis. It is expected that the companies will aggressively try to capitalize on the market conditions which may lead to potential insolvent scenarios.

Globally, there is a consensus about the lack of uniform standards of reporting and valuation of insurance companies. This has led to crystallization of effort in developing a common framework that can be uniformly used by companies in different countries. This will greatly facilitate the comparison of insurance companies using a common risk matrix and terminology.

In this paper we focus on some of the changes that are happening in international markets and how it may change the perception to loss reserving. We also focus on various international guidelines and the current standards that are being developed to make loss reserving more objective.

Solvency II

Definition – Solvency can be defined as the financial ability of an entity to pay its debts when they become due with available cash.

Background – Solvency II is the European Union's [EU] project to reform prudential regulation of insurance by providing a safety net for policyholders and supporting market stability. The global economy is undergoing a radical transformation with far-reaching changes in the pattern of economic activity posing challenges and opportunities for all advanced economies. To respond successfully the EU will need a financial services sector which can increase the flexibility and dynamism of the wider economy. Solvency II can contribute by creating a level playing field in prudential requirements for insurers,

fostering a deeper single market in insurance services, with benefits for users as well as providers, and more efficient allocation of capital.

The foundations of the current EU solvency regime were laid in the 1970s. Since then there has been a dramatic change in the landscape surrounding solvency, the insurance sector, financial markets, the approach to prudential regulation, techniques for risk management and accounting standards. The current EU regime has been left behind and among the most important consequences is a dislocation between regulatory capital requirement and insurers' own assessment of the capital needed, given the nature of their business.

The European Union has had regimes in place for setting minimum required solvency margins, together with the elements available to cover these margins, for direct insurance companies since 1973 (non-life) and 1979 (life). Broadly, the original minimum solvency margins for general insurance business were the higher of (i) 16% / 18% of written premiums and (ii) 23% / 26% of the average of incurred claims over a three-year period.

The appropriateness of the solvency regime was investigated from 1997 to 2002 under the EU's Solvency I project. This culminated in the Solvency I Directives of March 2002 where minor changes were made to the existing rules for calculation of the required minimum margins, the more important of which for property and casualty business were:

- Disallowing the discounting of claims provisions for solvency purposes
- Increasing the margins by 50% for certain 'risky' classes of business.

Since the directives were specific to minimum required margins, member states were allowed to set up higher minimum required margins.

Even before the end of the Solvency I project, the European Commission (Internal Markets Division) had decided that a much wider review of the whole solvency regime for insurance companies was justified and the initiatives in this regard have culminated into the Solvency II project.

The Solvency II project is expected to be completed under the **Lamfalussy approach**. (which was first adopted for securities regulation). Under this approach the regulatory framework for financial services will be split into different stages:

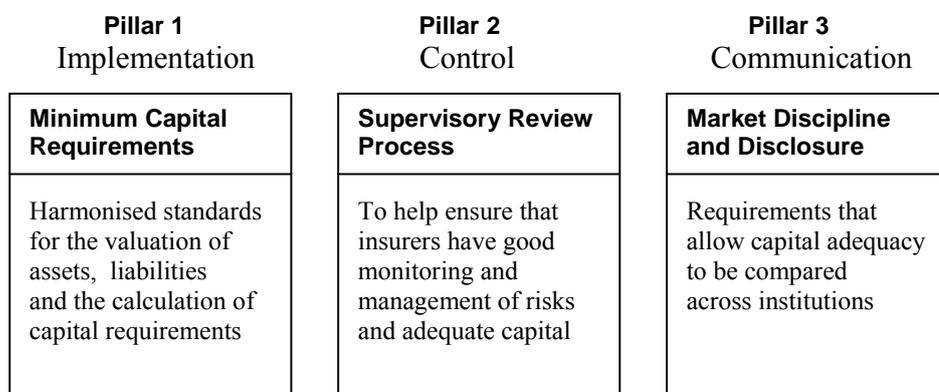
Stage 1: Directives for setting out a framework of overarching principles. Proposed by the Commission and then submitted to the Member States and the European Parliament for consideration.

Stage 2: Measures for implementing the principles in the Stage 1 directive. The Commission develops these measures with technical input from Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS) and adopts them following consultation with Member States through the European Insurance and Occupational Pensions Committee (EIOPC) of representatives from Finance Ministries.

Stage 3: Measures to foster supervisory convergence developed and agreed by national regulators working through the Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS). For example, these may include guidance for national regulators to ensure consistent interpretation of the stage 1 directive and stage 2 measures.

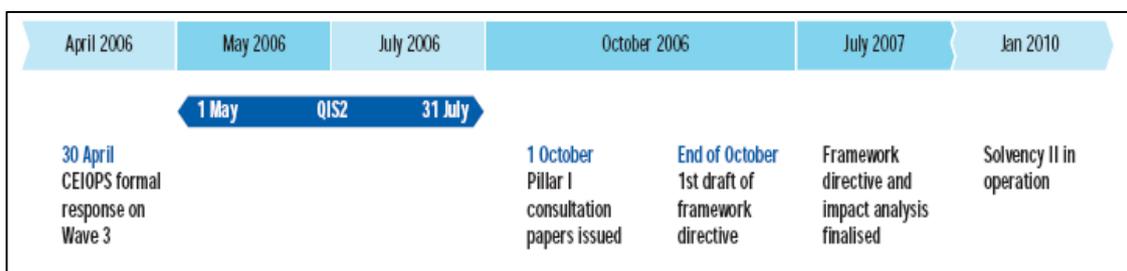
Stage 4: Enforcement by the European Commission to ensure effective and consistent implementation of EU legislation.

The commission has proposed that a Basel II type pillar structure be adopted for regulating insurance firms



Broadly, Pillar 1 represents the set of technical rules that will need to be followed at the time of valuation of assets, liabilities and required solvency margins. Pillar 2 represents an enhanced supervisory process to achieve a greater harmony of supervisory processes and methods. Pillar 3 is all about disclosure requirements including public and private disclosure.

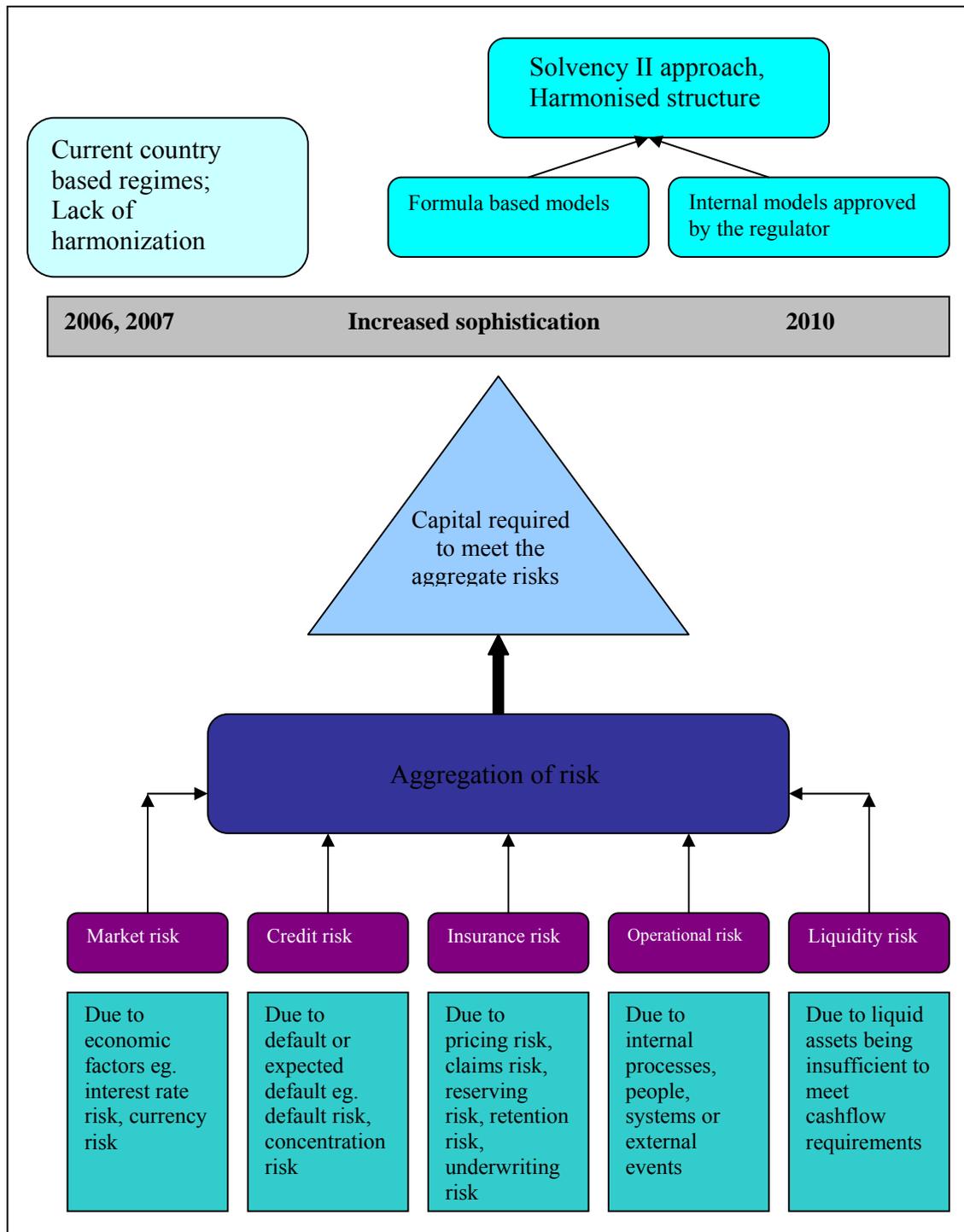
The following timeline has also been adopted by EU for implementation of Solvency II.



Currently it is felt that the existing approaches lack a certain degree of risk sensitivity. Hence we expect the proposed Solvency model to be more risk sensitive and rigorous. The overall valuation of the solvency model is expected to be determinable using formula based models recommended by the regulator or by approved internal models developed by insurers and reinsurers re(in)surers. To ensure that the project is operational by 2010,

CEIOPS is working actively with other international agencies in establishing the current best practices and challenges in the insurance industry.

Following is a diagrammatic overview of the evolving risk structure under Solvency II framework..



The valuation of loss reserves falls under the Pillar 1 structure. CEIOPS is working with

other international organizations to determine a common framework for terminology and methodology for loss reserving and reporting. It has published some relevant articles which discuss approaches and issues in loss reserving and statutory reporting. We discuss some of the issues and approaches to loss reserving in the sections that follow.

The current thinking is that the implementation of the Solvency II project will bring in changes ranging from increased prudent technical provisions to increase in capital requirements for (re)insurers. Overall it is felt that

- ✓ the standard for technical provisions shall either be equal to the combination of the best estimate (which will be discounted) and the risk margin or based on an approach using economic capital. The risk margin being greater of 75% of level of sufficiency or half the standard deviation of possible outcomes;
- ✓ Solvency Capital requirement¹ (SCR) is expected to be defined as assets able to meet the technical provisions at 99.5% level after one year period. It will be determined either by using a formula based approach or an approved internal model;
- ✓ Minimum Capital requirement (MCR) is expected to be lower than SCR and will be determined by a simple formula. It is expected to be the capital below which supervisory action will be triggered.

Current Developments

In this section we discuss some of the initiatives being carried out by international organizations and outline some of the conclusions and findings of these investigations on loss reserving.

International Accounting Standards Board (IASB) – There was an absence of International Accounting Standard for insurance contracts till late 1990's. A project was initiated in 1997 to formulate a comprehensive accounting standard on insurance contracts for the insurance industry. IASB has come up with accounting guidelines which are required to be followed by listed re(in)surance companies at the time of statutory reporting. One of the major areas for concern for re(in)surance companies in this regard is in the area of loss reserving. Under the proposed structure for loss reserving, re(in)surers will be expected to separately identify the expected value of future cashflows, and any margins associated with it. Several approaches have been discussed for determining a range of reasonable estimates in loss reserves. They can be broadly categorized as:

- ✓ Deterministic approaches – Valuation methodologies using fixed value assumptions fall in this category. Developing a range of estimates using this approach will be achieved by varying assumptions in a stepwise fashion. This will generate a set of results which will be used to determine the range of reserve estimates.

¹SCR – Reflects the amount of reasonable capital that enables an insurer to absorb significant unforeseen losses.

- ✓ Stochastic approach – Valuation methodologies that can generate a distribution of reserve estimates from which the expected value of the reserves and ranges around the expected value can be determined, fall in this category. These approaches will help in generating various scenarios which may give a better idea about the book of business.

Overall there is a general consensus that although the cost of setting up a stochastic approach for routine reserve purposes is expensive, their ability to build in uncertainty while assessing reserve requirements is an advantage over deterministic approaches.

CEIOPS, Quantitative Impact Study-1 – The Committee of European Insurance and Occupational Pensions Supervisors has been instrumental in ensuring the progress of the Solvency II initiative. It had approached each European national supervisor to carry out investigations in line with the specifications and guidelines prepared by the various working groups under CEIOPS. This is expected to help in determining the final framework for the valuation of loss reserves. The findings have been published as quantitative impact study-1. Our focus in this paper will be on the aspects of loss reserving.

Findings of Quantitative Impact Study-1

Based on the questionnaire provided individually to the supervisors, nineteen European national supervisors submitted their reports on the current practices followed by over 150 property casualty companies. We focus on some of the observations made in the study about loss reserves and methods to evaluate the same.

- Methods for estimation of best estimates and percentiles – The methods commonly applied are Chain Ladder, Bornhuetter Ferguson, Benktander, loss ratio, link ratio, Cape Cod and the grossing up method. Percentiles were determined either using Bootstrapping or by applying results of Mack on the prediction error of the estimate.
- Kind of data analyzed – Paid/Incurred run off triangles are usually used by the property casualty undertakings. Other forms of data that are also considered are number of claims, average claim size and historical loss ratios.
- Claims inflation – There is no standard approach while dealing with claims inflation in loss reserving. Some undertakings ignored the impact of inflation by assuming it to be minimal while others used projection methods or made explicit allowances for deterministic/statistic inflation.
- Impact of large claims – Currently there is no standard approach to deal with the impact of large claims on loss reserves. Approaches varied, from not considering the impact of large claims to separately making allowances for them either deterministically or probabilistically.

- Reinsurance ceded – There is a lack of uniform approach in dealing with the aspect of reinsurance in loss reserving. Two standard approaches are observed:
 - ✓ Net provisions being determined by applying a net to gross ratio after evaluating gross provisions
 - ✓ Net provisions are directly determined based on net of reinsurance loss data
- Diversification – A few companies are able to determine provisions by allowing for diversification at the company/group level. The variance of the total portfolio was based on the variance of sub portfolios by means of correlation assumptions.
- Use of simulation models – The availability and use of simulation models varied from country to country. Simulation techniques are not considered essential as analytic options were available. However in six countries all the property and casualty companies were able to run simulation models for determining their risk margins.

Global Actuarial practices and definitions on Best estimates and Risk margins in Loss Reserving

There has been a lot of debate and discussion on what possibly could a best estimate be and what risk margin means in the context of loss reserving. There is however a general consensus that a best estimate means the expected value of group of reasonably possible outcomes. In this section we focus on the current actuarial guidelines published by various actuarial bodies. Even though there is a difference in the content of guidelines followed by various actuarial organizations, there is a distinct similarity in loss reserves being valued on a prudent basis and based on reasonable assumptions.

- Casualty Actuarial Society, USA, ASOP 36 – The actuarial statement of principles on property casualty loss and loss adjustment expenses talks about best estimate, risk margins and uncertainty:
 - ✓ 3.6.3 Expected value estimate/Best estimate – “...the actuary should consider one or more expected value estimate of the reserves, except when such estimates cannot be made based on available data and reasonable assumptions. Other statistical values such as the mode or the median may not be appropriate measures for evaluating loss and loss adjustment expense reserves, such as when the expected value estimates can be significantly greater than these other measures.... In arriving at such expected value estimates it is not necessary to estimate or determine the range of all possible values, nor the probabilities associated with any particular value.”
 - ✓ 3.6.4 Range of reasonable reserve estimates – “... A range of reserve estimates is a range of estimates that could be produced by appropriate actuarial methods or alternative sets of assumptions that are reasonable. The actuary may include risk margins in a range of reasonable estimates

..... A range of reasonable estimates however does not represent the range of all possible outcomes.”

- Institute of Actuaries, United Kingdom, GN 12 – The guidelines on Property and Casualty Insurance business broadly discuss the best estimate and uncertainty:
 - ✓ 7.2 Additional considerations related to reports on reserving – “The actuary should state the basis on which he or she has assessed the provisions or claims estimates (i.e. best estimate or some other basis). Where the actuary states that his or her estimate of outstanding claims is on a best estimate basis, this should mean that it represents the expected value of distribution of possible outcomes of the unpaid liabilities.”
 - ✓ EXD 62, 8.1 Uncertainty – “The report should normally indicate the degree and sources of uncertainty surrounding the point estimates that the member has made and the sensitivities to key assumptions. Uncertainty for a particular point estimate would normally be quantified by providing a range of values around the point estimate together with an indication of the likelihood that the true value lies above, below or simply outside the range. This can be achieved by specifying quantiles or by using any other descriptive summary.”
- Institute of Actuaries, United Kingdom, GN 50 – The guidelines on Property and Casualty Insurance discuss principles about providing point estimates and communicating uncertainty:
 - ✓ 2.6 Point estimates – “When providing quantitative advice the member (actuary) should normally include a specific point estimate in the context of the purpose of the advice. Provision of a range of outcomes is often desirable.... But the provision of a range of outcomes without a specific point estimate could be open to interpretation.”
 - ✓ 2.7 Communicating uncertainty – “The member must communicate the uncertainty surrounding advice or opinions formed and communicate this appropriately. The need to communicate uncertainty will depend upon the audience and the degree and importance of the uncertainty in the context of the purpose of the work. The less likely the audience is able to appreciate the importance of the extent of this uncertainty, the greater is the need for the member to communicate it.”
- Canadian Institute of Actuaries, Canada, and Standard of Practice – The standard of practice was recently revised in June 2006. It has several sections which discuss in detail the reporting framework that needs to be followed for statutory reporting. We briefly discuss some of the sections which contain definitions and assumptions for best estimates, margin for adverse deviations (MAD) and provisions for adverse deviations (PFAD):

- ✓ Definitions:-
 - “Best estimate means without bias, neither conservative nor un-conservative”
 - “Margin for adverse deviations is the difference between the assumption for a calculation and the corresponding best estimate assumption”
 - “Provision for adverse deviations is the difference between the actual result of a calculation and the corresponding result using best estimate assumptions”

- ✓ 1730, Appropriate Assumptions, Acceptable Range – “Variability in the circumstances of cases is significant and calls for significant variation in assumption among cases.. the crux of the matter is the selection of assumptions appropriate to a particular case from the relatively wide set of assumptions applicable to all cases.”

- ✓ 1740, Provision for adverse deviations – “....The amount of provision should
 - take into account the effect of uncertainty of the assumptions and the data used for calculation of loss reserves on the financial security of those affected by the calculation,
 - not take into account of the possibility of catastrophe or other major adverse deviation which is implausible in usual operations, except when the calculation of reserves specifically addresses that possibility”

- Institute of Actuaries, Australia – The failure of HIH¹ in Australia led the Australian Prudential Regulatory Authority (APRA) to come up with guidelines which made it compulsory for property and casualty insurance companies to book reserves at the 75th percentile confidence interval. We discuss the guidance on prudential standards 210,300 which deal with best estimates and risk margins.
 - ✓ Prudential standard 300, Actuarial reports and advice on general insurance technical liabilities – It defines the central estimate of liabilities at the expected value. In other words if all the possible values of the liabilities are expressed as a statistical distribution, the central estimate is the mean of that distribution.

¹HIH – An insurance group in Australia whose failure in 2001 resulted in the largest corporate failure ever in the Australian industry. For more details visit: <http://www.hihroyalcom.gov.au/finalreport/index.htm>

✓ Prudential standard 210, Liability valuation for General Insurers – Paragraph 9 states “ The valuation of insurance liabilities for each class of business must comprise of :

- (a) a central estimate value of the Outstanding Claims Liabilities;
- (b) a central estimate value of the Premiums Liabilities;
- (c) risk margins that relate to the inherent uncertainty in each of these central estimate values.

✓ Guidance note 210.1, Actuarial Opinions and reports on general insurance liabilities – We briefly outline the relevant sections that talk about the various steps that need to be considered by the actuary while preparing the actuarial report.

- Para 50 – It states that for each line of business the valuation must be done separately for outstanding claims and unexpired risks. The central estimate and the valuation margin must then be added together and the overall sum reduced by a diversification benefit. This is to ensure that the overall margin meets the “75% adequacy test, but is not less than half of the combined standard deviation.”

- Para 53- Here it states that the actuary is required to quantify the uncertainty, which will generally require use of one or more of the following:

- (a) statistical analysis;
- (b) sensitivity analysis, changes to claim experience assumptions or the valuation models;
- (c) comparison with previous valuations;
- (d) analysis of scenarios;
- (e) judgement

- Para 58 – In this section it states that the actuary is not necessarily required to follow a notional probability distribution while determining the reserve position. The actuary is however required to adopt a figure which is higher of

- (a) the 75th percentile confidence interval
- (b) half the coefficient of variation

In case the actuary uses a particular notional probability distribution it is required that the same be described in his report along with the reasons of its appropriateness.

- Swiss Association of Actuaries – The Swiss Association of actuaries has recently come up with new guidelines on loss reserving effective September 2006. We document the relevant sections on best estimates:
 - ✓ It states that “the required loss reserves are a conditional best estimate of the conditional expected value of future payments based on the information available at the time of the estimate. They are therefore considered to be the best estimate, i.e. neither on the cautious nor the incautious side, and do not contain any intentional increases.”
 - ✓ It also states that “The estimate of the required loss reserves therefore has to be completed by indicating the run-off risk. This indication can consist of a distribution, a confidence interval, a standard deviation or some other parameter. It should be supplemented with any special scenarios considered and must be accompanied by specification of the time horizon.”

The general view about estimating loss reserves is that, it has to be prudent, reliable, objective and comparable between re(**in**)surers. It must make optimal use of information and data available on technical risks. It must be the sum of a best estimate and a risk margin. This is in line with international developments.

The best estimate shall be equal to the expected value of future cashflows based on current information and realistic assumptions. The risk margin must cover the risks related to the future liability cashflows over the whole time horizon. It must be determined in such a way that the re(**in**)surers obligations can be transferred or put into a complete runoff. This will reasonably ensure that the policyholders rights are protected and the margins take care of the uncertainty of valuation of the best estimate.

Further, there is a general consensus on the kind of risks that margins should be applied. There is a general agreement that the current technical risks can be classified into two broad categories of hedgeable and non-hedgeable risks.

- ✓ Hedgeable risks – Insurance risks whose exposure can be fully hedged in a sufficiently liquid and transparent market will be classified as hedgeable risks. Margins will not be required for these risks as they will be valued at market value.
- ✓ Non hedgeable risks – Insurance risks whose exposure cannot be valued or traded in a sufficiently liquid and transparent market will be classified as non hedgeable risks. Valuation of these risks will be determined based on the cumulative value of a best estimate and a risk margin.

After extensively going through current practices on loss reserving, Groupe Consultatif Actuariel European in 2006 has defined a **best estimate** and broadly categorized the existing approaches in detail in quantifying **risk margins**.

According to the Groupe a best estimate for loss reserves is defined as “expected **present value** of all future cash flows [realistically attributed and based on company own analysis of expenses to an in-force insurance policy or portfolio]”.

Further it has classified the existing loss reserving approaches into three categories and outlined the criteria for a good risk margin. We outline some of the important criterion as follows:

- ✓ ease of calculation
- ✓ stability of calculation between classes and years
- ✓ consistency between different companies
- ✓ consistency with overall solvency system
- ✓ sit on top of best estimate(defined as mean value of discounted reserves)
- ✓ capture uncertainty in parameters, models and trends to ultimate
- ✓ be harmonised across countries

Based on these criteria the Groupe has classified the various existing loss reserving approaches into the following three categories:

- ✓ Percentile approach – Methodologies which are of stochastic nature fall in this category eg. Mack, Bootstrap etc.
- ✓ Cost of capital approach – This is a new approach which has been recently developed as a part of the Swiss Solvency test. It uses the cost of future capital as a measure for valuation of liabilities.
- ✓ Assumption approach – All the standard methodologies like chain ladder, Bornhuetter Ferguson etc fall in this category.

A detailed comparison of the three approaches has also been published. We briefly outline the relevant sections from that comparative study.

	Percentile approach	Cost of capital approach	Assumption approach
Historical background	First described for regulatory purposes and has been prescribed by the Australian regulator(APRA)	This approach was published as a white paper on Swiss Solvency test. This has been implemented in Switzerland in 2006. Some companies in Europe are following this internally.	Popular industry practice. Non stochastic approaches fall in this category Parameters selected based on judgement
Definition of Risk margin	The 75% percentile The EU proposes that the percentile is not allowed to be less than 50% of the standard deviation above the	Cost of future capital to run off the existing liabilities Requires a projection of future capital requirements for the liabilities under consideration	Based on implicit assumptions example prudent development factors and initial expected loss ratios

	mean		
Ease of calculation	Best practice will be to consider a stochastic approach, which will also rely on actuarial judgement Key assumption will be whether the distribution is based on the overall company portfolio or by line of business with or without allowing for diversification	The calculation is mechanically driven by external factors, but actuarially complex Key assumption being: 1> existence of marginal capital 2> setting of the cost of capital The calculation will be expected to cover the full run off period	Easy and transparent but not harmonised across companies
Extent of coverage of all risk categories	Focused on insurance risk, in particular reserving risk	Focused on all risks included in capital measure including insurance, market, credit and operational risks	Arbitrary
Level of margin	Hard to predict	Hard to predict	No separation between best estimate and risk margin
Challenges	Technical provisions to be dependent on levels of aggregation Lack of methodology to deal with long tailed lines Perception if actually market run off is different to the set percentile	Projection of capital base Provide explicit protection Release of profit linked to reserving risk	Lack of harmonization Not transparent Easy to manipulate over the cycle

Loss Reserving, Current thinking

Loss reserving as a science has evolved greatly over the last couple of decades. With changes in legislation and markets becoming more competitive, actuarial valuation of loss reserves has become even more challenging. The role of the actuary has become more important with increased supervision of regulating agencies, monitoring by credit rating agencies and increased expectations from investors.

The current thinking is that there needs to be a greater uniformity in terms of an approach [accounting approach, accident year approach, underwriting year approach] in determining technical provisions. There will also be an increased focus in harmonizing actuarial standards on key issues like

- ✓ claims inflation,
- ✓ criteria and development of large claims,
- ✓ modelling loss data gross or net of reinsurance,
- ✓ aspect of correlation within different classes of business,

to ensure there is uniformity in the methods used to determine loss reserves. Loss reserving will continue to be based on credible and realistic assumptions. However common loss reserving approaches like the Chain ladder and Bornhuetter Ferguson may not yield desired results in quantifying uncertainty around the best estimate. Uncertainty can be quantified by separately stating the risk margin and the best estimate. The risk margin should be determined in a way to enable re(**in**)surance obligations to be transferred or put into run off. Hence actuarial judgement will have to be substantiated by approaches which will be more objective and statistical.

The reserving actuary will need to look at more challenging methods, in a stochastic or a capital based framework to achieve this objective. The road ahead for the profession is expected to be both exciting and challenging.

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Experience:

Mr. Sen joined the firm in May 2005. He has 3.5 years of actuarial experience. Prior to joining the firm, he worked for Bajaj Allianz General Insurance Company in India. At Bajaj Allianz General Insurance he worked closely with the Appointed Actuary in establishing actuarial best practices in the company. His consulting experience has focused on personal and commercial lines. His clients include insurance companies, self-insured entities and re-insurance captives.

His experience includes:

- Perform Loss reserving for statutory reporting
- Product development and pricing
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- Actuarial due diligence on mergers and acquisitions
- Working on developing best practices for determining risk margins in loss reserves
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