

Risk Management & Solvency Assessment of Life Insurance Companies

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Abstract

This paper summarises the work done in this area by various parties, including the IAA and suggests a possible risk management process that can be adopted in India. It also discusses how this process and the other solvency assessment methods could be used in assessing the solvency position and solvency capital requirement of life insurers. The Appendix to this paper gives examples of some of the important regulatory provisions in India, the risk categories they try to assess and whether the risks, which these regulations are meant to address, are directly provided for under the present solvency regulations.

Keywords

Risk Management; Risk Classification Systems; Risk Measure; Risk Adjusted Return On Capital; Solvency; Solvency Capital

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Introduction

This paper attempts to put together the various issues surrounding the risk management process in life insurance companies. It also discusses how this process could be used in assessing the solvency position of life insurers.

The paper is split into the following three sections:

1. What is 'Risk Management'?
2. Description of a Risk Management Process
3. Solvency Assessment.
4. Conclusion

1. What is 'Risk Management'?

'Risk Management' is an integrated process that identifies, classifies, analyses & quantifies the financial impact of various risks involved in running a business. It is a tool that recognises the potential threats to the business's objectives and allows management to make informed decisions on the appropriate course of action, be it to mitigate, transfer or allocate capital to the risk.

Risk management is a fundamental business practice and, for it to be truly effective, a company must ensure that risk management is embedded within its culture.

Risk management is not a new concept in life insurance and many of the basic principles are as old as the insurance industry itself. The majority of companies already have some form of risk management process in place. However, over recent years, there has been significant progress in developing and formalising these processes and even in using them for regulatory purposes.

2. Description of the Risk Management Process

There are many ways in which the risk management process can be and is defined and carried out within different organisations. Given below are the steps involved in one possible approach -

a. Set up the risk management function

In larger organisations, it is common to form a separate risk management function staffed by a multi-disciplinary team. At a minimum, the purpose of this team is to provide sufficient challenge to the risk management practices of the rest of the organisation, but in many cases the risk management function's responsibilities extend far beyond this. The work of this team is facilitated by nominated personnel in each of the various departments such as Underwriting, Legal / Compliance, Actuarial, Finance, Marketing & Sales, Policy Owner Servicing, Claims, MIS etc. For smaller insurers, an independent risk management function may not be practical and the task may be assigned to senior individuals with other responsibilities. However, consideration should always be given to the possible dangers in combining risk management and risk taking roles.

b. Identify risk areas

This is an important step and involves the collection of data from various sources and extensive discussions within the team. Frequently, the risks faced by a life insurer are not isolated and one risk may trigger another risk event. Each department has to carefully consider the risk areas they are subject to and also whether the areas identified by other departments would affect the smooth functioning of their own department. Care will be required to ensure that risks are neither missed nor double counted.

It is often convenient to adopt a questionnaire-based approach to gather information from various levels within a department. The key personnel should then decide whether the issues identified in the questionnaire would really form a risk and this process is often facilitated through a workshop. Consolidated risk summaries from each department would then be discussed with the risk management function. At this stage, duplicate or similar risks could be grouped and some additional risks may be identified as a result of these discussions.

Alternative approaches to identify risks may include using standard templates currently available in some insurance markets or for some other financial industries (e.g. banking) and identify risks fitting into these templates. Care will be required not to exclude the risk areas that may be unique to

the individual company or market (if templates from other markets are used) or the life insurance industry (if templates from other industries are used).

c. Classify risks and assign responsibilities

There is no single generally accepted classification system of insurance company risks. Indeed, the insurance companies or the supervisory groups around the world adopt different terminology or summarise risks in different ways. In some countries, the supervisory authorities have an integrated risk classification system for the insurance and banking industries. Some of the classification systems in use are –

A) India (Reserve Bank of India)

(for the banking industry)

In its October 1999 "Guidelines for Risk Management Systems in banks in India", the Reserve Bank of India suggested the following broad categories for risk classification –

- Credit Risk
- Market Risk (which include Liquidity Risk, Interest Rate Risk, Foreign Exchange Rate Risk, Commodity Price Risk, Equity Price Risk)
- Operational Risk

The nature of some of these risks may differ in life insurance companies from those in banks. Also, the period over which a life insurer is considered to have exposure to a risk may also typically be longer than in banks. Some of the unique risks in life insurance companies (e.g. underwriting risk) will not be present in banks. Nevertheless, the above risk classification system can be used as a starting point to develop a classification system that is suitable for life insurance companies.

B) Canada (Office of the Superintendent of Financial Institutions)

(common for the insurance and banking industries)

- Credit Risk
- Market Risk
- Insurance Risk
- Operational Risk
- Liquidity Risk
- Legal And Regulatory Risk
- Strategic Risk

C) UK (Financial Services Authority)

(common for the insurance and banking industries)

- Credit Risk
- Market Risk
- Liquidity Risk

- Insurance Risk
- Operational Risk
- Group Risk

D] The International Association of Insurance Supervisors (IAIS)

The risks are classified according to their impact on the solvency of an insurer –

- Technical Risks (liability risks)
- Investment Risks (asset risks)
- Non-technical Risks

E] The International Actuarial Association (IAA) Working Party on Solvency

In its November 2002 report, the IAA Working Party on Solvency suggested the following system of broad categorisation of insurance risks–

- Underwriting Risk
- Credit Risk
- Market Risk
- Operational Risk
- Liquidity Risk

The various components of the risk categorisation suggested by the IAA Working Party are briefly described below -

1. Underwriting Risk

These are the risks undertaken by life insurance companies through the contracts they underwrite. The risks within this category are associated with the perils covered (e.g. death, critical illness) and with the specific processes associated with the conduct of life insurance business. They include -

- Underwriting process risk → e.g. financial loss related to selection and approval of risk to be insured
- Pricing risk → e.g. financial loss due to insufficient premium charged for a risk undertaken
- Product design risk → e.g. exposure to events not anticipated in the design and pricing of the life insurance contracts
- Claims risk → e.g. more than expected number of claims arising
- Economic environment risk → e.g. adverse affect on the company due to change in socio-economic conditions
- Net retention risk → e.g. losses due to catastrophic or concentrated claims experience arising due to higher retention of risk within the company
- Policyholder behaviour risk → e.g. unanticipated behaviours of the policyholders adversely affecting the company
- Reserving risk → e.g. inadequate provision in company accounts for policy liabilities

2. Credit Risk

These are the risks arising due to default by and change in credit rating of those to whom the company has an exposure. They include reinsurance companies, companies in which the insurer has invested its funds. These risks also include external events affecting the creditworthiness of these companies. Examples being -

- Business credit risk → e.g. failure of a re-insurer
- Invested asset credit risk → e.g. non-performance of invested assets
- Political risk (affecting credit worthiness of securities held by the insurer)
- Sovereign risk (affecting credit worthiness of securities issued by government or government entities)

3. Market Risk

These are the risks arising due to movements in the level of financial variables such as interest rates, share prices etc. Examples being -

- Interest rate risk → e.g. losses arising due to change in interest rates
- Equity and property risk → e.g. losses arising due to drop in equity prices
- Currency risk → e.g. losses arising due to adverse movements in exchange rates
- Basis risk → arising because the yields on instruments of varying risk quality, liquidity and maturity don't move together; affecting the assets and liabilities of the company independently.
- Reinvestment risk
- Concentration risk
- ALM risk
- Off balance sheet risk → losses arising from assets or liabilities not shown on the balance sheet eg payments required under futures agreements with zero value at the balance sheet date

4. Operational Risk

There are various definitions available for Operational Risk. The definition used by the British Bankers' Association and adopted under Basle II is as follows –

“Operational risk is the risk of direct or indirect loss resulting from inadequate or failed processes, people and systems or from external events.”

In recent years, it has been widely accepted that Operational Risks are significant risks and at the same time are difficult to identify and measure. They include -

- Human capital risk → e.g. failure to attract and retain well-trained personnel
- Management control risk → e.g. failed internal controls, disciplines etc.
- Systems risk → e.g. systems failures
- Strategic risk → e.g. management failure to implement appropriate business plan, make decisions, allocate resources and adapt to changing environment

5. Liquidity Risk

These are the risks of losses in the event that insufficient liquid assets are available to meet the cash flow requirements of the policyholders' obligations when they are due. They include -

- Liquidation value risk → e.g. risk of having to realise assets in adverse market conditions
- Affiliated company risk → e.g. risk of difficulty in realisation of interests in an affiliated company
- Capital market risk → e.g. risk of inability to obtain funding from outside the company or group

The risks identified will be allocated into the set of risk categories specified. If the risk category definitions differ from those used by the regulator then caution will be needed to ensure that users of the risk categories understand their true meaning and scope. At this stage, we may also want to assign responsibilities to key personnel to oversee management of these risks. This may be carried out by setting out formal risk policies for each risk category. Risk management responsibilities may include –

- Suggesting ways to reduce likelihood of these risks arising or reducing their impact if they arise
- Identifying key risk indicators (KRIs)
- Monitoring the development of the risk exposures (e.g. risks which are insignificant under present scenario may become substantial in due course)
- Assessing and regularly reporting the key risk measurement factors in the pre-determined formats to the senior management
- Preparing and maintaining contingency plans and corrective measures, should the risk events take place
- Maintaining risk policies
- Training staff on contingency plans

d. Analyse risks and quantify financial impact

Data & Model

Some risk events are relatively easy to analyse, as there is a large amount of statistical data already available. For example, the risk of actual mortality experience on life insurance policies being higher than expected can be studied using familiar actuarial and statistical techniques and the past claims data available. However, it may be difficult to gather past data for some other risk events (e.g. human errors or frauds resulting in financial losses). This occurs, in part, through the (hopefully) infrequent occurrence of large unexpected losses and partly through difficulties in allocating risks to a particular source and making appropriate allowance for modified behaviour e.g. greater controls leading to a reduction in fraud risk.

A suitable model is also required that would analyse these risks events using the data gathered. There may be many tools that can be adopted to analyse and quantify the financial impact of these risks –

- Historical simulation

This is simply taking the observed values of some risk factor e.g. mortality levels or equity returns from the past and applying the range of values observed to the current portfolio. The chosen percentile result e.g. 95th percentile can then be read off.

- Value at risk (VaR) type analysis adopted in banking industry

This approach usually assumes that the risk factor has a Normal distribution. The standard deviation of the risk factor is derived (either from historical data analysis, from market implied volatilities in option pricing or through expert opinion) and the mean assumption is set. The limiting value of the risk factor for a particular confidence level can then be determined by taking the mean plus or minus a defined multiple of the standard deviation.

- Collective models

These models have two components – a probability model for the frequency or incidence of the risk event and a probability model for the severity or quantum of the loss resulting from the risk event.

- Aggregate models

When it is not possible to develop the probability of frequency/incidence and severity/quantum of loss separately, aggregate models may be used.

- Stress analysis or stochastic modelling techniques

Stress analysis is the sensitivity analysis commonly used in actuarial pricing of life insurance products. The 'stress', is the quantum by which the variables modelled are varied, either one at a time or together, to determine the amount of capital required. The 'stress' can be determined with reference to expert opinion, historical observation or VaR techniques. Stochastic modelling of financial variables may also be used to value some of the risks.

The model selected should, as far as possible, be able to analyse risks with their distribution pattern.

If little or no data is available for a particular risk or if the available data may not be suitable to be used in the model, a value judgement has to be made about the likely impact of the risk on the financials of the company.

The risks can be analysed separately and then combined using formulae that reflect their co-relations or dependencies. Alternatively, some risks can be grouped in a combined model and can be represented by some common variables (e.g. interest rates, inflation etc.) that influence these risks, for example cascade models often used in econometric modelling.

An appropriate time horizon and confidence level will need to be determined for calculating the risk exposures. Frequently used approaches include looking at the holding period for a risk (i.e. the time for which it will be on the books) or the period over which mitigating action can be taken (i.e. the period until the emergence of the risk can be detected and suitable action taken – hedging, reinsuring or raising capital).

Risk Measure

Our aim in quantifying the financial impact need not be restricted in producing just a single number representing the amount of financial loss for any risk event. A single risk figure facilitates communication, but neglects a lot of risk information. Such a single risk measure may be desirable in certain circumstances (e.g. for regulatory purposes). However, results showing the financial impact of the distribution of the risks [i.e. the volatility risk (risk of random fluctuations), uncertainty risk (model or parameter mis-estimation) and extreme event risk (high impact, low frequency events)] may be much more informative. Also, we may look at the risk that assets fall short of liabilities in a wind-up or closedown scenario to assess the risk of insolvency, whereas the business will be more focused on profitability and growth – another factor pointing at the use of multiple risk measures.

e. Using the results from the analysis and the financial impact

The analyses can be helpful in many ways –

For shareholders in:

1. Quantifying the total capital requirements to run the insurance business
2. Developing business plans or amending existing plans
3. Using the analysis for controlling risks–
 - Risk reduction (e.g. Re-pricing of contracts / Re-training of staff / Imposing additional controls)
 - Risk integration (i.e. Changing strategies that would affect both sides of the balance sheet in a similar fashion - e.g. Investing in assets that match the liabilities)
 - Risk diversification (e.g. Promoting different products rather than depending on one / Developing alternative distribution channel / Ceding business to more than one re-insurer etc.)
 - Risk hedging (e.g. Selling annuities and life insurance policies to the same group of customers / Buying options etc.)
 - Risk transfer (e.g. Selling more unit linked policies / Ceding more business to the re-insurer)
4. Allocating capital to different departments / profit-centres based on their risk profile, enabling an optimal allocation of the scarce capital. Coupled with this, the target rate of return on allocated capital can be set so that the departments / profit centres with high capital allocation (implying higher inherent risks) would have to produce higher profits. Alternatively, decisions can be made based on risk-adjusted returns on capital (RAROC).

For the regulator in:

1. Identifying the key risks to the life insurer's ability to meet its liabilities. Such information may not be easily available from the conventional regulatory returns.
2. Monitoring and revising minimum regulatory capital requirements (i.e. 'solvency capital' – please see Section 3).
3. Encouraging insurers to better manage the risks they undertake.

3. Solvency Assessment

'Solvency' is defined differently by different users. Broadly, it is the ability of an insurer to meet all its liabilities whenever they fall due. Simplistically, it is represented by the excess of an insurer's assets over its liabilities.

One of the many uses of the risk management process is to determine the solvency requirements or standards. These standards can be set from internal management perspective or from regulatory perspective.

Internal

From the management's point of view, having identified the total capital requirements from the risk management process, the capital representing the 'tail' events (i.e. the risk of the high impact, low frequency events) would essentially be the capital required to ensure that the company remains solvent even under adverse circumstances. This assumes that low impact, high frequency events are covered by the prudent margins in the reserves. If we move towards a realistic valuation of liabilities (as under the IAS), capital requirements would need to cover all types of deviations from best estimate assumptions. In any case, given that there may be various approximations used in the estimation of the total capital and that the model & the parameters used may always have an element of error, in practice, the desired level of solvency may be higher than that represented by the 'tail' events.

In the absence of any regulatory requirement, the capital actually held by the company to support these 'tail' events may then depend upon the risk taking appetite of the shareholders and the cost of capital.

Regulatory

The regulators' primary role is to protect policyholders' interests. They have to ensure that insurers always have sufficient funds to meet the policyholders' dues under any circumstances (i.e. even under most of the extreme circumstances).

It is important to consider the circumstances under which regulators may want to ensure solvency of a life insurer. They may be either on a break-up basis/close-down (i.e. to ensure that the insurer will be able to meet the liabilities of the in-force business) or on a going concern basis (i.e. to ensure that the insurer will be able to meet the liabilities of the in-force business as well as the new business that may be written in future). The level of 'solvency capital' required under these two circumstances may be very different.

From the regulatory point of view, the 'solvency capital' is required for various reasons –

- To reduce the likelihood of the insurer not meeting liabilities when they fall due
- To provide a cushion to limit the losses, in the event of insolvency
- To provide an early warning system for regulatory intervention and early corrective action
- To promote the confidence of the general public

The 'solvency capital' has been determined in a variety of manners. These, along-with their features are described below –

- Absolute Amount - A certain minimum amount (e.g. Rs.150 crores)
Such an approach obviously does not allow for the amount of risks undertaken by a life insurance company and hence is usually used only as a starting requirement.
- Fixed Factors - A certain minimum amount arrived at by using fixed factors that are applied to various items of an insurer's balance sheet or financial statements. (e.g. x% of mathematical reserves + y% of net amount at risk + z% of assets).

The amounts to which these fixed factors are applied are proxies for the risk exposure of a life insurer.

In theory, the fixed factors are generally determined based on the ruin theory approach and are set to reflect the conservative view of an industry-average exposure to risk. In practice, they are determined rather arbitrarily, striking a balance between the various interest groups.

The factors approach does not necessarily reflect a company's true solvency capital needs. With the advent of new processes, selling techniques, administration systems and complex products, such an approach may not adequately reflect the true underlying risk of all life insurance companies. It also often has the perverse effect of increasing the capital requirements for the most prudently reserved companies.

However, factors remove the subjectivity involved in some other approaches (described below) and are simple to calculate and compare – making them very effective for regulatory monitoring.

- Absolute Amount with Fixed Factors - A combination of the above two forms (e.g. x% of reserves + y% of net amount at risk + z% of assets, subject to a minimum of Rs.150 crores).
- Dynamic Solvency Analysis – Under this approach, insurers may be required to test their solvency against a range of adverse conditions in the form of prescribed scenarios. These scenarios may include 'shocks' or 'tail' events and the insurers need to hold solvency capital to withstand these 'shocks' or 'tail' events with an acceptable probability of ruin over a prescribed time period. These scenarios may apply to either in-force business or only include new business.

Such an approach attempts to overcome some of the shortcomings of the methods mentioned earlier. The inclusion of new business may indirectly allow for the risks involved in some insurance processes (e.g. underwriting, sales etc.) and the companies may be forced to estimate the impact on its solvency positions of such processes going wrong. However, the choice of scenarios and the time period over which new business is considered, involve a degree of arbitrariness. Also, the scenarios chosen may not reflect the individual insurer's risk profiles in all the circumstances.

- Internal Risk Management Model - A certain minimum amount arrived at by using company specific internal risk management models to assess their unique solvency capital needs.

For obvious reasons, regulators like a solvency capital requirement, which is objective, comparable between insurers and easily verifiable. However, there have been moves towards using internal capital assessments based on regulator approved models in the banking and insurance industries in recent years.

The current solvency regulations in India provide for some of the Technical Risks (liability risks) - in the form of 4% of reserves and 0.3% of net amount at risk - and some of the Investment Risks (asset risks) – in the form of z% of assets (although z is set to zero for the time being). However, it does not explicitly address the Non-Technical risks. One view suggests that the current allowance would implicitly provide for the Non-Technical risks as well.

Appendix I gives examples of some of the important regulatory provisions in India, the risk categories [as defined by the International Association of Insurance Supervisors (IAIS)] they try to assess and whether the risks, which these regulations are meant to address, are directly provided for under the present solvency regulations. It can be seen that the assets and the liabilities are well covered through a variety of risk control mechanisms and there also exists an additional solvency margin requirement to address related risks. There are many regulations aiming to address the Non-Technical risks, but there is no explicit solvency requirement at present.

There are plenty of recent examples of huge financial losses (& even insolvency) arising from Non-Technical risks, both in the insurance sector (Pensions mis-selling in the UK, 'Vanishing Premium' law suits in North America) and in the non-insurance sector (Enron, WorldCom) around the world. Thus, the Non-Technical Risks may no longer be considered to be trivial and explicit allowance for such risks may be required so that suitable controls may be exercised.

It is possible that the cost of the additional capital required may outweigh the benefits obtained through increased solvency capital covering the Non-Technical risks. In this event, any attempt by the regulators to impose such an additional solvency capital requirement may result in shareholders finding it unattractive to do business or the cost of insurance rising significantly. But even if no such additional solvency capital requirement is imposed, it is important to be able to recognise and monitor the level of these risks.

Given the merits of the risk management model approach, a hybrid method could be developed which combines the risk management approach and the traditionally used factors approach. If appropriate disclosures of the internal risk management models are required, such a hybrid approach may overcome the shortcomings of the approaches discussed above.

4. Conclusion

In summary, risk management is a fundamental business practice and, as a matter of course, all insurance companies should formalise their internal risk management systems. It is also an evolving area, which is yet to be fully developed. However, attempts can be made to put in place the system now so that insurers can manage more effectively the risks to which they are exposed. Further, the system could also be used in determining the internal & regulatory capital requirement for an insurer. Even without a regulatory requirement, sufficient incentive should come from the fact that high quality risk management systems can provide a decisive competitive advantage.

In India, the current regulatory solvency requirement does not directly address the Asset Risks (as the % is set to zero) and the Non-Technical risks. The regulators may want to consider using risk management models to assess the impact of such risks on insurance companies and if required, provide for the same.

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