Report of the Committee on Road Map for Risk Based Solvency Approach in Insurance Sector

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Hyderabad
April 22, 2014

22nd April, 2014R

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Mr. T S Vijayan
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Sir,

This has reference to Office Order No. IRDA/F&A/ORD/SOLP/263/12/2011, dated December 1st, 2011, constituting the Committee on Road Map for Risk Based Solvency Approach in Insurance Sector in India.

At the outset, we are thankful to the Authority for providing us an opportunity for professional discussion on the important aspect governing the insurance sector and to present the views of the Committee.

The Committee has met sixteen times to discuss the proposed approach to a Risk Based Solvency regime for the insurance sector, having regard to the terms of reference to this Committee. The Committee has finalized its Report relating to the life insurance sector. More work remains to be done relating to non-life insurance.

Certain parts of this Report are based on material published by European Insurance and Occupational Pensions Authority (EIOPA) and Office of the Superintendent of Financial Institutions (OSFI) of Canada. The IRDA has sought permission to use this material in its publication and is awaiting their responses.

We have pleasure to present the Report relating to life insurance sector. We wish to place on record our appreciation for the facilities and support extended by the Authority.

(P. A. Balasubramanian)
Chairman
Committee on Roadmap for
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Acknowledgements

The Committee has based certain parts of this Report on material published by EIOPA and OSFI of Canada.

The Committee acknowledges the many helpful the comments and suggestions made by Mr John Poole and Mr Sanchit Maini of Max Life Insurance Co. Ltd on sections of the draft Report, and the contributions made by them and by Mr Sanket Kawatkar, Mr Craig Lewis and Mr William Hines of Milliman.

Lastly, the Committee has greatly benefited from discussions with Mr. Donald Gambardella FCAS, Ergo Group, Mr. Mack, Director, HDFC Ergo, Mr. Samir Shah, CFO, HDFC Ergo General Insurance Co. Ltd, Mr. Paul Beresford, Actuary, HSBC , Hong Kong, Mr. Chirag Rathod, Appointed Actuary, Canara HSBC OBC Life Insurance Co. Ltd, Mr. Biresh Giri, Appointed Actuary, Max Bupa Health Insurance Co. Ltd, Mr. Manular Sandalyia, Appointed Actuary, ICICI Lombard General Insurance Co., Mr. Mehul Shah, Appointed Actuary, L&T General Insurance Co. Ltd, Mr K Gopalakrishnan, CEO, Aegon Religare Life Insurance Co. Ltd, Mr. Geoffrey Yau, Chief Risk Officer, Aegon Religare Life Insurance Co. Ltd, Mr. Sanchit Maini, Appointed Actuary, Max Life Insurance Co. Ltd, Mr. Varun Gupta, Actuary, Max Life Insurance Co. Ltd, Mr. Hiten Kothari, Mr. Shalab Mathur, Towers Watson and the Life Insurance Advisory Group of the Institute of Actuaries of India.

Any remaining errors or oversights are, however, solely the Committee's responsibility.

Chapter 1. Background and Terms of Reference of the Committee

Background

1.1 The solvency of an insurance company corresponds to its ability to meet its liabilities to policyholders. An insurer is insolvent if its assets are not sufficient to meet its liabilities or cannot be liquidated in time to pay the claims arising. The solvency of insurance company or its financial strength depend chiefly on whether sufficient technical reserves have been set up for the obligations entered into and whether the company has adequate capital to provide security in case of adverse events.

1.2 IRDA has mandated insurers to maintain a solvency ratio of 150%. (Details of the current regime are provided in Appendix F :F below.)

1.3 The existing solvency framework is believed to be quite conservative and strong, but this is principally due to the valuation of liabilities rather than to the capital requirements. However, the present solvency regime is not risk-based as it does not provide for identification of the risks to which an insurer is exposed or for setting aside capital for the risks identified. As a consequence, insurers with similar liability profiles would have to maintain similar RSM irrespective of their quality of risk management.

1.4 We note in this context that the Insurance Core Principles (ICP), issued by the International Association of Insurance Supervisors (IAIS), state, in Principle 17: 'Capital Adequacy: The supervisor establishes capital adequacy requirements for solvency purposes so that insurers can absorb significant unforeseen losses.'

1.5 Further, in Section 17.1, the ICP states: 'The supervisor requires that a total balance sheet approach is used in the assessment of solvency to recognise the interdependence between assets, liabilities, regulatory capital requirements and capital resources and to require that risks are appropriately recognised.'

1.6 Though these statements do not explicitly mandate a risk-based approach to solvency, such as value at risk (VaR) or conditional tail expectation (CTE) to capital requirements, they guide one in that direction. We note that the Authority has already mandated the estimation of economic capital for the life and non-life insurers.

Terms of Reference

1.7 By its Order, dated December 1st, 2011, the IRDA established a Committee on Road Map for Risk Based Solvency Approach in Insurance Sector. The order stated:

'Consequent upon introduction of Solvency II by the European Union, it has become imperative to finalise the road map for shifting to Risk Based Solvency Approach in Insurance Sector. In view of the same, Authority has been decided to constitute a Committee for finalisation of the road map for shifting to risk based solvency approach for insurance sector. The Committee shall comprise of the following:-

- Mr. P A Balasubramanian, Ex-Member-Actuary, IRDA, Chairman
- Mr. K Subrahmanyam[1], Ex-ED-Actuary, IRDA, Member
- Dr. Avijit Chatterjee, Actuary , ICICI Prudential, Member
- One representative from Institute of Actuaries of India, Member[2]
- One representative from Institute of Chartered Accountants of India, Member[3]
- Mr. S P Chakraborty , Deputy Director, IRDA, Member
- Mr. R K Sharma, Deputy Director, IRDA, Member Secretary[4]

1.8 'Terms of Reference for the Sub-Committee will be the following:-

a) Study of the Risk Based Solvency approach followed by USA, Japan and Singapore, identifying the issues which arising out of the RBC.

b) Study of the Solvency II and the issues arising out of the same.

c) Recommending the suitable approach in Indian context.

d) Aligning the suitable model to fit within the Indian regulatory system.

e) Any other ancillary or incidental matter thereto.

[1]Mr K Subrahmanyam resigned his membership of the Committee shortly after it was constituted
[2]Mr. Rajesh Dalmia was nominated by the Institute of Actuaries of India
[3]Mr. Nilesh S. Vikamsey was nominated by the Institute of Chartered Accountants of India and was subsequently replaced by J. Venkateswarlu.
[4]In addition, Dr K Sriram, independent consulting actuary, and Mr Michael Fung of Towers Watson were subsequently co-opted on to the Committee.

Chapter 2. Executive Summary

In this chapter we summarise the conclusions of the Committee constituted by IRDA and set out a road map to adoption of risk-based solvency.

2.1 Risk-based Model

2.1.1 Quantitative Aspects

The Committee recommends adoption of a market consistent model for valuation. We believe that this provides a relatively objective and coherent framework for the quantification of assets of liabilities. The absence of any margins in the quantifications allows for a transparent approach to the capital requirements.

The Committee recommends a value-at-risk approach to the capital requirements. It recommends that a standard approach be adopted, with the structure and parameters of the stresses to be specified by IRDA, rather than an 'internal model' approach.

For the valuation model, the Committee has largely followed the approach of Solvency II (except for adoption of an internal model) though it is not yet implemented, since it was considered to offer a comprehensive approach to risk-based solvency. The Committee has however recommended various simplifications of the Solvency II valuation model where these appear appropriate to the Indian context. We suggest that such an approach, while not binding the development of local regulation to Solvency II, would leave India well-placed to seek recognition of equivalence with Solvency II should it choose to do so in future.

We recommend that on adoption, a 'twin-peaks' approach to solvency should be implemented, whereby the current prudential reporting structure would continue, and the new structure would operate in parallel. (Financial statements may however continue to be produced on their current basis.) This would allow for bedding in of the new solvency standard with due regard for the security of policyholders' benefits.

2.1.2 Qualitative Aspects

The Committee notes the importance of the qualitative aspects of risk-based solvency. The purposes of the Regulator would, we believe, be served only if it were confident that insurance companies' standards of governance, in particular in the area of risk management, were appropriate to the risks they take.

While we note that IRDA has taken steps to ensure certain minimum standards, further refinement would be necessary to develop fully a risk-based regulatory environment. We note in Chapter 5, at a high level, the differences between Indian regulation and what is expected under Solvency II, but beyond that, in this Report, we do not comment on these qualitative aspects.

2.2 Road map to Adoption

In accordance with its terms of reference, the Committee proposes the following for the adoption of risk-based solvency. We emphasise that in parallel, qualitative aspects would require to be developed, but we have not incorporated them below.

2.2.1 Quantitative Impact Studies (QIS)

We recommend that the IRDA invite life insurance companies to participate in at least three QIS exercises. In Appendices A, B and C, the Committee has proposed the technical methods and bases for the valuation of assets, liabilities and capital requirements in the first such QIS. We expect that by conducting such an exercise, companies will gain insight into their own risk exposures, andalso that it would reveal the strengths and weaknesses of the valuation model. We expect that the valuation model would undergo certain changes in the light of the understanding gained from its application. The QIS exercises will therefore be an iterative process, during which the valuation model may be refined.

In order to gain the greatest possible insight from the QIS exercises, it would be advisable to carry out some sensitivity analyses at the point of application. For example, solvency may be reported given the observed market yield curve, but also at yield curves subjected to some parallel shift; or solvency may be reported given the fair value of equities and property, but may also be reported given a certain stress. Such sensitivity analyses would allow the industry participants and IRDA to come to an understanding of the sensitivity of the capital position under these proposals.

We suggest that the first QIS be conducted as at 31st March, 2014, and two more such exercises should be conducted as at the following two year-ends. If the results prove satisfactory, the 'twin-peaks' approach to solvency may be adopted by 31st March 2017.

2.2.2 Policy Issues

In parallel with the QIS exercises, we recommend that IRDA consider certain matters of policy such as:

- Consistency with the Insurance Core Principles of the IAIS.
- Consistency with IASB's proposals as they develop, assuming India's accounting standards continue to converge with IASB's. We note that these would affect the financial statements, not the statement of solvency, but, from the perspective of avoiding duplication of effort particularly where resources are scarce, it may be reasonable for any development of financial statements to be on a similar basis to that proposed for solvency.
- Recognition of equivalence with Solvency II.
- Whether there is any need to extend the valuation model to cover insurance groups.

- Definition and recognition of ancillary own funds and subordinated debt instruments in capital.

2.2.3 Intervention Ladder

The Committee recommends that the IRDA develop a basis of prescribed actions it would take if solvency cover were to fall below certain limits. These actions may be triggered by a combination of qualitative and quantitative assessments.[5]

The actual intervention ladder to be adopted may depend on the results of the QIS exercises.

2.3 Summary of Contents

In this section, we summarise the contents of the remainder of the Report.

In Chapter 3, we briefly describe the risk-based solvency regimes for life insurance of certain other countries, viz. Singapore, USA, Australia and Canada.

In Chapter 4, we focus on Solvency II and provide a high-level summary of both its qualitative and quantitative aspects. As with the latter, which we have adopted as the basis of our recommendations, we believe the former to form an essential part of a comprehensive approach to risk-based regulation, and we recommend that in its deliberations, IRDA consider it to be an appropriate point of reference for any developments in this area.

In Chapter 5 we provide a brief comparison of extant regulations with what is expected to be required under Solvency II on the qualitative aspects of risk-based regulation.

In Chapter 6, we consider at a conceptual level the various approaches to risk-based capital that are employed, and make the case for adoption of value-at-risk.

In Chapter 7, we set out the principles we propose for a risk-based regime. We recognize that the process of development and implementation will be iterative, and so we believe that a set of principles that can serve as a fixed point through the deliberations will prove useful.

In Chapter 8, we deal with transition arrangements.

The technical detail of the methods of constructing the balance sheet and the capital requirements are supplied in the Appendices. A market consistent approach is taken to assets and liabilities and a modular approach to capital requirements. By this, we mean that capital in respect of each individual risk, such as equity or mortality, is modelled in a bespoke module. These capital requirements are then combined using correlation matrices. A separate appendix deals with all forms of market and counterparty risks, since these will be common to all types of insurance. Two appendices discuss the treatment of with profits business, since the liability is itself loss absorbent and the surplus in the fund is not fungible. We also cover in some detail the risk-based regulatory framework under development in Singapore and we provide a summary of the existing India regime.

[5]We note that in Canada, OSFI publishes its intervention ladder at the following website:
http://www.osfi-bsif.gc.ca/app/DocRepository/1/eng/practices/supervisory/Guide_Int_e.pdf

Chapter 3. Risk-based Regimes in Other Countries

In this chapter we review the basis of quantification of the liabilities and briefly describe the risk based regimes already implemented in certain countries. Key features of the prudential regulatory systems are captured in this chapter.

3.1 Singapore

In the table below, we describe the salient points of the prudential regulatory system in Singapore.

KEY FEATURES	SINGAPORE
What is the approach to the valuation of the liabilities?	
Is the approach to valuation of liabilities prudent or is realistic? Does it include margins for adverse deviation, either implicit or explicit?	Life Insurers are required to calculate their policy liabilities on best estimate assumptions with provision for adverse deviation. They are required to use a prospective discounted cash flow approach method. The discount rate will be the risk- free rate. Where the policy liabilities are denominated in Singapore Dollars, the risk-free rate has to be chosen in a manner as prescribed by the Regulations. Where the policy liabilities are denominated in a currency other than Singapore Dollars, the risk-free rate will be the market yield on the relevant foreign government securities of similar duration at the valuation date.
Is the gross (office) premium valued or net premium?	Gross premium is valued
Is the basis market consistent or traditional?	Traditional – though the economic assumptions are taken from risk free rates, the incorporation of provisions for adverse deviations in the projected cashflows entails that this cannot be deemed a market consistent valuation.
Are embedded options valued using stochastic techniques?	No
What is the approach to the quantification of assets?	
Market value or (amortized) book value	Market value [or net realizable value in the absence of market value]
What is the approach to capital requirements?	
Is an internal model allowed?	Internal model is not allowed
If there is a standard model:	

KEY FEATURES	SINGAPORE
Is it: • formula-based, • designed to reflect the sensitivity of the balance sheet to specific risks, e.g. VaR, CTE, or • mixed?	The current RBC framework requires insurers to hold capital against their risk exposures and this capital requirement is referred to as the Total Risk Requirement [TRR]. The risk exposures are grouped into three components: [a] Component 1 [C1] Requirement relates to insurance risks. In the context of life insurance business, this requirement is calculated by applying specific risk margin to key parameters impacting policy reserves such as mortality, morbidity, expenses and policy termination rates. [b] Component 2 [C2] requirement is calculated based on the insurer's exposure to asset related risks such as market risk and credit risk. The C2 requirement also captures the extent of the asset-liability mismatch present in the insurer's portfolio. [c] Component 3 [C3] requirement relates to asset concentration risks in certain types of assets, counterparties or groups of counterparties. C3 charges are computed based on an insurer's exposure in excess of the concentration limits as prescribed under the Insurance [Valuation & Capital] Regulations, 2004.
If VaR or CTE is the basis, to what probability is the capital requirement calibrated?	The current RBC framework relies on Fund Solvency ratio [FSR] and Capital Adequacy Ratio [CAR] as indicators of solvency at the fund level and at the company level. These indicators do not take into account factors like confidence level and time horizon. In other words the current RBC framework does not rely on measures like VaR or CTE to calibrate capital requirements.
Is the capital requirement based on a modular structure, i.e. are capital requirements calculated separately for various risks, e.g. market, credit, operational, etc., which are then combined using a prescribed formula or approach, e.g. by applying correlation matrices?	The structure of the current RBC framework is modular with three modules – C1, C2 and C3- as explained above. The current framework does not allow for aggregation [diversification] benefits.

The Monetary Authority of Singapore [MAS] has embarked on a review of the current RBC framework. This initiative called "RBC 2" has recommended the following changes:

- Incorporating explicit risk charges to capture spread risk, operational risk and insurance catastrophe risk
- Recalibrating risk requirements using the VaR measure with a confidence coefficient of 99.5% over a one year period
- Not to allow for aggregation/diversification benefits until the insurance industry is able to substantiate [through robust empirical studies] that there are applicable correlations which can be relied upon during normal and stressed times.
- Allow for the use of internal models approved by MAS after the standardized approach as envisaged under RBC 2 has been implemented.
- Redefine Tier 1 Capital Resources in line with Basel III definition.
- Subject to certain restrictions, allow a part of negative reserves and aggregate provision for non-guaranteed benefits [under participating policies] as positive financial resource adjustments under Financial Resources
- Introduce two explicit solvency intervention levels – Prescribed Capital Requirement [PCR] and Minimum Capital Requirement [MCR]
- Redefine the approach for choosing the discount rate to be used for valuing the policy liabilities denominated in Singapore Dollars
- Deliberate with the insurance industry on using the cost of capital approach for determining the PAD [Provision for Adverse Deviation]
- Enhance insurers' risk management practices by introducing Enterprise Risk Management [ERM] requirements including requirements related to Own Risk and Solvency Assessment [ORSA].

A detailed summary of certain aspects of MAS's Consultation Paper on this subject is provided in Appendix G.

3.2 Canada

In the table below, we describe the salient points of the prudential regulatory system in Canada.

KEY FEATURES	CANADA
What is the approach to the valuation of the liabilities?	
Is the approach to valuation of liabilities prudent or is realistic? Does it include margins for adverse deviation, either implicit or explicit?	• The policy liabilities [insurance contract liabilities] are valued using the Canadian Asset Liability Method [CALM]. • According to this method the value of liabilities must be equal to the amount of the supporting assets as of the

KEY FEATURES	CANADA
	valuation date which is exactly sufficient to cover all future liability cash flows and will result in a "nil" surplus when the last liability cash flow is paid. • Under this valuation approach both asset and liability cash flows need to be projected together with net positive cash flows to be invested as per the investment policy; and net negative cash flows being funded by the sale of assets at that time. • Scenario testing is performed on economic assumptions to set provisions for adverse deviations [PfAD] on economic risks whereas simple margins for adverse deviations are applied on non-economic assumptions to set PfAD for non-economic risks. • For valuation of the general account insurance contract liabilities with segregated fund guarantees, the valuation of the guaranteed elements should be done using the CALM methodology coupled with stochastic modelling.
Is the gross (office) premium valued or net premium?	Gross premium is valued.
Is the basis market consistent or traditional?	Traditional.
Are embedded options valued using stochastic techniques?	Investment guarantees embedded in general account insurance contracts as described above are valued using stochastic modelling techniques.
What is the approach to the quantification of assets?	
Market value or (amortized) book value	Amortized book value.
What is the approach to capital requirements?	
Is an internal model allowed?	Internal model is not allowed.
If there is a standard model:	
Is it: • formula-based, • designed to reflect the sensitivity of the balance sheet to specific risks, e.g. VaR, CTE, or	• The risk based capital framework is governed by the guidelines issued by the Office of the Superintendent of Financial Institutions [OSFI]. These guidelines are referred to as the Minimum Continuing Capital and Surplus Requirements for Life Insurance Companies. The current guidelines are effective from 1st January, 2013.

KEY FEATURES	CANADA
• mixed?	• A life insurer's minimum capital requirement is determined as the sum of the capital requirements for each of the following five risk components : [a] Asset Default [C-1] Risk which covers losses resulting from asset defaults, loss of market value of equities and related reductions in income. It encompasses both on- and off- balance sheet risks of life insurers. [b] Mortality, Morbidity and Lapse Risks which refers to the risk those assumptions about mortality, morbidity and lapse will be wrong. [c] Changes in the interest rate environment [C-3] risk which refers to the risk of loss arising from changes in the interest rate environment [d] Segregated Funds risk which refers to the risk of loss arising from guarantees embedded in segregated funds. [e] Foreign exchange risk which refers to the risk of loss arising from fluctuations in currency exchange rates. The approach used for determining the minimum capital requirement for each of the above sources of risk is predominantly a factor based approach. On the asset side, the factors vary according to the type and quality of asset. • The method is predominantly factor based. However, companies must undertake Dynamic Capital Adequacy Testing (DCAT), whereby they estimate the resilience of the projected balance sheet to exogenous and endogenous risks.
If VaR or CTE is the basis, to what probability is the capital requirement calibrated?	For the purpose of determining the minimum capital requirement for segregated fund guarantee risk, the CTE approach is used and the capital requirement is calculated at CTE (95).
Is the capital requirement based on a modular structure, i.e. are capital requirements calculated separately for various risks, e.g. market, credit, operational, etc., which are then combined using a prescribed formula or approach, e.g. by applying correlation matrices?	The structure of the standard model is modular with the minimum capital being determined as the sum of the capital requirements for each of the five risk components as explained above.

3.3 Japan

The Committee regrets that it has been unable to consider the Japanese system owing to its being unable, as yet, to gain access to documents in English.

3.4 USA and Australia

In the table below, we summarise the approaches to prudential regulation taken in Australia and USA. We provide a summary of Solvency II as a point of reference.

KEY FEATURES	SOLVENCY II	AUSTRALIA	USA
What is the approach to the valuation of the liabilities?			
Is the approach to valuation of liabilities prudent or is realistic? Does it include margins for adverse deviation, either implicit or explicit?	A realistic approach is required without any margin for adverse deviation, but with an allowance for a risk margin that reflects the cost of holding capital for unhedgeable risks.	A realistic approach is required using best estimate assumptions, but with an allowance for future profits to ensure profits are released over time.	Prudent. Implicitly, there are margins included as much more conservative assumptions are used in valuation (no lapses assumed)
Is the gross (office) premium valued or net premium?	Gross premium is valued. Indeed best estimates of all future expected future cashflows are valued.	Gross premium valued, taking into account the best estimates of all future expected cash flows.	For most products, Net Premium is valued. For others (Variable Annuities), Gross Premium is valued
Is the basis market consistent or traditional?	Market consistent.	Market consistent.	Traditional for general account products, market consistent for separate accounts
Are embedded options valued using stochastic techniques?	Embedded options are valued on a market consistent basis using stochastic techniques.	'Where the distribution of potential liability outcomes is equally likely to result in a gain or loss, then it will normally be sufficient to adopt the mean of the assessed	Stochastic techniques are used to calculate certain statutory reserves (variable annuities' GMXB benefits). They are not valued on a market consistent basis.

KEY FEATURES	SOLVENCY II	AUSTRALIA	USA
		distributions of future experience for the Best Estimate Assumptions and calculate the Best Estimate Liability accordingly.'[6] 'Where the benefits contain options that may be exercised against the company, then either the value of those options must be determined (via a suitable option pricing model) and added to the Best Estimate Liability, or the Best Estimate Assumptions adjusted so as to appropriately capture the value of the options as part of the Best Estimate Liability.'[7]	
What is the approach to the quantification of assets?			
Market value or (amortized) book value	Market value	Market value	Book Value for general account, market value for separate accounts
What is the approach to capital requirements?			
Is an internal model allowed?	Calculations on a standard model are prescribed. An	The capital standard prescribes a standard method. An internal	Companies use a combination of their own models (C3P2) and

[6]Source: Section 5.3.2, AS 1.04, Valuation Standard for a Life Company, APRA.
[7]Source: Section 5.3.4, AS 1.04, Valuation Standard for a Life Company, APRA

KEY FEATURES	SOLVENCY II	AUSTRALIA	USA
	internal model is however allowed, subject to regulatory approval.	model-based method is allowed, subject to APRA's approval	factors to calculate risk-based capital (RBC). There is no concept of an internal model like in Solvency II
If there is a standard model:			
Is it: • formula-based, • designed to reflect the sensitivity of the balance sheet to specific risks, e.g. VaR, CTE, or • mixed?	The standard model is based on VaR in respect of directly financial risks like market risk, counterparty risk and insurance risk. A formula-based approach is taken to operational risk, whereby prescribed factors are applied to certain items from the financial statements. The approach is therefore mixed, though all components are in theory calibrated to a probability of ruin of 0.5% over a 1-year outlook.	The standard method is based on VaR and takes into account the following aspects: insurance risk, asset risk, asset concentration risk and operational risk. The operational risk charge uses a formula based approach based on factors from the financial statements. The overall approach is to ensure that the starting assets, along with losses at the 99.5 per cent confidence level over one year will be sufficient to cover adjusted liabilities at the end of the year.	For the most part, formula-based (covariance formula) Combination of: CO: Asset Risk-Affiliates C1: Asset Risk Other C2: Insurance Risk C3: Interest Rate Risk C4: Business Risk Each of these have factors to apply to a base that is specific to each company/ product/risk type But for C3 Phase 2 (Interest/Market Risk), you need to calculate CTE90
If VaR or CTE is the basis, to what probability is the capital requirement calibrated?	The capital requirement is supposed to be calibrated to a probability of ruin of 0.5% over a 1-year outlook.	The capital requirement is calibrated to a probability of ruin of 0.5% over a one year outlook.	For C3 Phase 2, this is calculated at the CTE90 level. RBC factors target 95% confidence level over a full economic cycle.
Is the capital requirement based on a modular structure, i.e. are capital requirements	The structure of the standard model is modular. (The internal model need not be modular.)	The structure of the standard model is modular with the following modules: insurance risk charge,	Life RBC is a formula based approach but each component is calculated separately

KEY FEATURES	SOLVENCY II	AUSTRALIA	USA
calculated separately for various risks, e.g. market, credit, operational, etc., which are then combined using a prescribed formula or approach, e.g. by applying correlation matrices?		asset risk charge, asset concentration charge, operational risk charge, an aggregation benefit and a combined stress scenario adjustment. The internal model needs prior approval of the prudential regulator (APRA) and the following aspects need to be ensured: well designed model, analysis and assumptions used are sound and the results of applying such a model are reasonable.	and combined in a covariance type formula CO+C4a+ Sqrt((C1o+C3a)^2 + (C1cs+C3c)^2 + C2^2 + C3b^2 + C4b^2)

The US is in the process of adopting Principles Based Reserving (PBR) for reserving and capital. This will replace the more traditional reserving structure and move towards a best-estimate-with-PADs approach along with more stochastic techniques. Once this new system has been adopted, the above items mentioned would all most likely change.

Chapter 4. Summary of EU Solvency II

4.1 In this brief Chapter, we summarize the salient points of Solvency II. We note that Solvency II is still developing and is not yet implemented anywhere. Our understanding is based on the most recent public information at the date of writing.

4.2 On the quantitative aspects of prudential regulation, Solvency II's approach is based on the following:

- Principles rather than rules
- All margins for prudence are held as capital
- Assets and liabilities are calculated on market consistent bases. (We note that this can easily result in negative reserves and reserves that are less than the surrender values of policies)
- Capital requirements reflect the risks run by an undertaking.

4.3 However, Solvency II is much more than just a means of regulating the solvency of a company. It comprises three pillars:

- Pillar 1: Quantitative Requirements, which include assets, liabilities and capital requirements, etc.
- Pillar 2: Qualitative Requirements, which include supervisory review, the 'use test,'etc.;
- Pillar 3: Market Discipline, which includes supervisory reporting, market disclosures, etc.

Pillar 1

4.4 Under Solvency II, assets and liabilities are to be valued under market consistent (or arbitrage-free) principles. More specifically:

- assets are to be valued 'at the amount for which they could be exchanged between knowledgeable willing parties in an arm's length transaction' and
- liabilities are to be valued 'at the amount for which they could be transferred, or settled, between knowledgeable willing parties in an arm's length transaction.'

4.5 Since insurance liabilities are not liquid, a 'market value margin' (or risk margin) must be assessed in addition to the best estimate liability. This reflects the cost of the capital (in respect of non-hedgeable risks) that the liability requires.

4.6 Capital requirements are considered in two steps:

1. Minimum Capital Requirement (MCR), which is formula-based; and
2. Solvency Capital Requirement (SCR), which is risk-based. This is the economic capital the insurer needs to hold to limit the probability of ruin to 0.5% over the next 12 months.

4.7 There are two approaches to the SCR:

a. Standard Capital Model, which is prescribed by EIOPA ; and

b. Internal Model, which is developed in-house by the insurance company, but is subject to the regulator's approval.

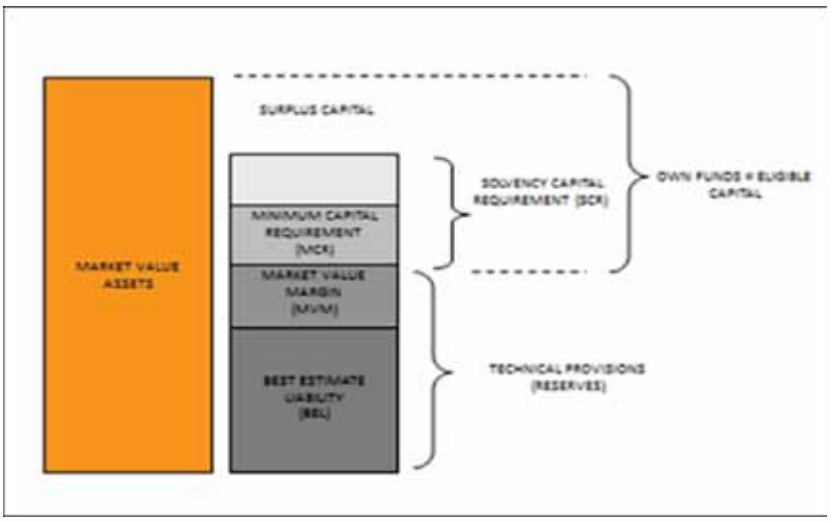

Figure 1 : Realistic Balance Sheet and Solvency Capital under Solvency II

Pillar 2

4.8 A risk management framework is the core of Pillar 2. The principal components of this framework are:

Own risk and solvency assessment (ORSA):

4.9 ORSA requires insurance undertakings to determine their overall solvency needs, beyond the capital adequacy requirements defined in Pillar I.

4.10 The ORSA process should take into account the effects of all the material risks such as underwriting, market, credit, reputational and strategic risks.

4.11 It should also consider planned management activity and external factors such as economic outlook.

4.12 It should include a 3-5 year time horizon for the firm's activities and risk outlook.

Risk and capital management information

4.13 Through Solvency II, the insurer will be required to improve the flow of risk information to senior management through regular production of Risk and Capital Management Information.

4.14 Typically the management information will include:

i. Risk exposure against risk limits

ii. Sensitivity of risk metrics to risk drivers – financial and insurance

iii. Reverse stress test results, e.g. scenarios where the embedded value operating profit falls by 10%, new business profit margin falls by 5%, etc.

Risk governance infrastructure

4.15 This is predicated on three lines of defence:

- o First line of defence (risk management)
- o Second line of defence (risk oversight)
- o Third line of defence (independent assurance)

4.16 Risk Management has primary accountability for day-to-day identification, control and reporting of risk exposures in accordance with the strategies, policies and risk parameters set by the Board.

4.17 Internal control (risk oversight) function oversees and objectively challenges the execution, management, control and reporting of risks.

4.18 Independent assurance provides review of the design and effectiveness of the overall system of internal control, including risk management and compliance.

Pillar 3

4.19 This covers the supervisory reporting and public disclosure aspects of the regime. Two disclosures are required from the firms, both subject to external audit:

- Solvency and Financial Condition Report (SFCR), a public disclosure, and
- Regular Supervisory Report (RSR), a private report to the regulator.

4.20 The two documents in 4.19 above are similar in structure but distinct: the regulatory report contains some additional confidential information like business strategies. Detailed information is required to be disclosed covering the areas of business performance, risk management, capital management, system of governance, SCR, Assets and Liabilities, Technical Provisions etc.

4.21 Disclosures in SFCR and RSR are extensive and subject to concepts of proportionality and materiality.

Proportionality & materiality principle:

4.22 The detail of information should be commensurate with the nature, scale and complexity of the risks. Firms are not required to fulfil reporting or disclosure requirements that are not applicable to them.

4.23 Materiality for disclosure is the same as that defined in International Financial Reporting Standards.

4.24 Additional disclosures may be required upon occurrence of certain predefined events or during enquiries.

Chapter 5. The Present Approach to Risk-based Regulation in India

In this Chapter, we provide a brief description of the differences between current Indian regulation and what is expected under Solvency II in respect of its qualitative requirements. (The differences in the quantitative approaches are numerous and will be clear from a perusal of Appendix A.) We note that the ability to comply with these qualitative requirements is expected, under Solvency II, to influence the capital requirements imposed upon a company by its regulator.

With regard to Pillar 2 of Solvency II, the Own Risk and Solvency Assessment (ORSA) occupies the heart of the risk management framework of an insurance (or reinsurance) undertaking. There is currently no regulatory requirement for life companies to submit such a document to IRDA, and nor is anyinsurer's regulatory capital requirement dependent in any way on the quality of its risk management.

Under Solvency II, a company would be expected to be able to demonstrate the flow of risk and capital information to its senior management. In India, while a Board Risk Committee is mandatory, its agenda is to a large extent at its own discretion. Any failure to supply it with appropriate information may result in regulatory censure, but there is no process for reflecting such a failure in a company's capital requirements. Furthermore, the requirements under Solvency II relate to information supplied to management, not to a Committee of the Board.

The risk governance infrastructure under Solvency II is predicated on three lines of defence. In India, many of the responsibilities are taken by the Appointed Actuary. However, this role combines elements of the first and second lines of defence, which would render it problematic under Solvency II.

Solvency II will require detailed disclosures to the regulator and to the capital markets regarding business performance, capital management, system of governance, etc. Some but not all of these matters are covered in the Appointed Actuary's Annual Report in India.

Chapter 6. Approaches to Risk-Based Capital

6.1 In this chapter, we consider two approaches to risk-based capital and their various benefits and drawbacks. Risk-based capital (RBC) represents an amount of capital, based on an assessment of risks, that a company should hold to protect policyholders against adverse developments[8].

Valuation of Assets and Liabilities

6.2 It is assumed in this chapter that the method of quantification of assets and liabilities for prudential purposes is already given, either on a realistic basis or on some prudent basis. The method of quantification of assets and liabilities should recognise any risk absorption aspects, for instance, hedging, risk absorption on profit sharing business, reinsurance, etc. For the purposes of this chapter, the bases of assets and liabilities are not directly relevant, except to recognise that in setting the parameters of risk-based capital, we should consider in addition capital held implicitly in prudent margins in the assets and liabilities since these margins also serve to protect policyholders. It simplifies the calibration of RBC if implicit margins in asset and liability valuation are not permitted, so that they might be on some realistic or fair value or best estimate basis.

Calibration

6.3 Calibration of tail events plays an important role irrespective of whether a standard approach or internal model is used in the quantification of risk charges. The most relevant, accurate and complete data must be used to calibrate the solvency model to achieve accurate and appropriate outcomes. However, we recognize that the only approach in many cases would be to extrapolate to extreme tail events using an assumed distribution where observed data does not confer statistical credibility.

Approaches

6.4 We consider below two approaches to RBC which were seen during the review of the various RBC solvency regimes discussed in Chapter 3 and Chapter 4.

Value at Risk (VaR)

6.5 In its pure form, Value at Risk measures the potential loss in value of a risky asset or portfolio over a defined period for a given confidence interval. Thus, if the VaR on an asset is $100 million at a one-week, 95% confidence level, there is a only a 5% chance that the value of the asset will fall by more than $100 million in any given week.

6.6 There are three key elements of VaR: a specified level of loss in value, a fixed time period over which risk is assessed and a confidence interval. The VaR can be specified for an individual asset, a portfolio of assets or for an entire firm.[9]

6.7 The Individual Capital Assessment (ICA), instituted by FSA, and the Solvency Capital Requirement (SCR) under Solvency II, which is under development in the EU, are both examples of the VaR approach. Both seek to calibrate the capital requirements of life insurance companies to a

[8]Please see http://rmtf.soa.org/riskbased_capital.pdf
[9]Please see http://people.stern.nyu.edu/adamodar/pdfiles/papers/VAR.pdf

probability of ruin of 0.5% over a one year outlook. Ruin is considered to be failure of a company to meet its liabilities, as quantified on a realistic basis. The one-year time horizon permits more qualitative and objective analysis than a longer duration since a number of assumptions have greater credibility over the shorter time interval.

6.8 We note in passing that an alternative risk measure is the tail-Var (TVaR) or conditional tail expectation (CTE), which is defined as the expected value of the loss, given that it exceeds some pre-defined confidence level. Compared to CTE, however, VaR is easier to calculate and communicate.

6.9 Arguably, the CTE is more revealing of the risk position taken by a company, since all extreme events beyond a certain threshold contribute to the calculation. However, we must recognise that probabilities attached to these events typically become more and more subjective as the events become more extreme. The apparent strength of the method can also be seen as a weakness. We do not consider CTE any further in this Report.

Formula Based Approach

6.10 In its pure form, RBC is calculated by applying factors to accounting aggregates that represent various risks to which a company is exposed, and then combining the resultant components using a pre-defined formula.

6.11 However, some components of RBC could be determined by other methods. For example, the current National Association of Insurance Commissioners' (NAIC) formula on risk based capital for life insurance companies is based in part on modelling the risk to the company from interest rate changes over many alternative interest rate scenarios[10]. Examples of such an approach include the capital requirements prescribed by MAS in Singapore as well as NAIC in the USA.

Salient Features of VAR

6.12 To estimate the probability of the loss, with a confidence interval, we need to define the probability distributions of individual risks, the correlations among these risks and the effect of such risks on the capital available. In fact, simulations are widely used to measure the VaR. This gives rise to a conceptual problem: it is very difficult, and some would say impossible, to calibrate, with any credibility, a stress of the risk factors to which insurance companies are susceptible, to a degree as extreme as would be required by a regulator, e.g. to 99.5% over a one year outlook.

6.13 However, this problem may be sidestepped or circumvented by avoiding the issue of a specific confidence level. The Regulator may instead simply prescribe a set of adverse stresses and scenarios to be applied to assets and liabilities. The capital requirement would be the quantum of assets required, in addition to those backing the liabilities, to ensure that post-stress, a company's liabilities to its policyholders would be met.

6.14 While the construction of the stresses and scenarios may inevitably somewhat arbitrary, the system does however have the virtue of demonstrably linking the capital requirement to the ability to meet plausible adverse events arising from the risk exposure of each company.

[10]Please see http://rmtf.soa.org/riskbased_capital.pdf

Furthermore, in specifying the stress events and scenarios, the Regulator would have the freedom to focus on risks that are pertinent to the insurance market in question.

6.15 However, in order to maintain some consistency from year to year and among the various risk categories, it is preferable for the stress events to be informed by statistical analysis, to the extent possible.The analysis would have to be supplemented by expert judgement, which would, to an extent, be subjective.Therefore, in order to maintain consistency among companies, the stress events should be prescribed by the Regulator. .

6.16 We note that in most instances, the probability of ruin of 0.5% over one year should be taken at most as indicative: from a theoretical perspective, any reasonable confidence interval for such an extreme percentile would be unreasonably wide. Nevertheless, it provides us with useful terminology for the severity of the stress events to be considered, and may therefore be understood as such rather than in theoretically strict, statistical terms.

6.17 The approach considers interactions between the assets and liabilities. For example, a stress event, such as an interest rate shock, would typically alter the values both of long-term liabilities and of the assets backing those liabilities. Since the approach considers the effect on the surplus post-shock and requires capital to be held such that the surplus does not become negative, the effects on both assets and liabilities are considered. Furthermore, to the extent that a company matched its assets and liabilities, its capital requirements would be decreased. Such an approach should therefore incentivise active risk management by giving regulatory capital credit for it.

6.18 Active risk management could however result in pro-cyclical behaviour. Pro-cyclicality refers to the tendency of regulatory capital requirements to rise with reductions in asset values and to fall with rises. It is associated mainly with equity risk, although this will depend on the risk exposure of firms. From the Regulator's perspective pro-cyclicality carries two major risks:

a. The possibility that a firm will breach its capital requirements at a time when it is unwilling (typically because of the high cost) or unable to raise new capital.

b. That actions taken by individual firms to reduce their risk, e.g. by cutting equity exposure, will make further market falls more likely. This could cause problems for the economy as a whole, as well as for policyholder security.

6.19 Let us consider a specific case: suppose for example, that the liabilities contain an embedded derivative such as an investment guarantee, as would be the case in with profits business. Suppose further that equities are held to back the asset shares. If the liabilities recognise the embedded derivative at its market consistent value, and assuming that it cannot be hedged with an option, the matching investment strategy for the embedded derivative will require a short position in equities. Furthermore, under stress, the short position would increase. Thus, to manage its capital requirements, the insurance company may have to sell risky assets in a falling market.

6.20 Solvency II has Three Important Mitigants of Pro-Cyclicality:

(a) The ability of the regulator to extend the recovery periods to make good breaches of the Solvency Capital Requirement (SCR) in the event of an exceptional fall in the capital markets. However, this does not apply to breaches of the Minimum Capital Requirement (MCR) and to this extent may not be effective in a highly stressed market.

(b) The standard model has been calibrated on a 'through the cycle' basis to historical rather than current data. However, we note that unless stresses by which companies calculate their capital requirements are weakened by the regulators at the bottom of the cycle, pro-cyclical effects are likely to persist.

(c) The use of the 'matching premium' whereby some element of credit may be taken in the valuation for the corporate spread.[11]

6.21 Whether this is a major concern in India would depend on the exposures to risky assets in the starting position. It has been seen to be a problem in cases where, traditionally, guaranteed liabilities have been backed by risky assets, such as corporate bonds held against annuities or equities held against participating business. Indeed, in the UK, until the around 2000, it was not uncommon for participating liabilities to be backed by assets with an equity backing ratio of over 80%. The situation in India is quite different in that risk exposures on the asset-side of the balance sheet are generally quite limited. Given our understanding of the fairly risk averse starting positions of Indian companies in relation to their investment exposures, we would not expect any significant pro-cyclicality to result in India from our recommended approach.

6.22 A pure VaR approach is somewhat arbitrary in its treatment of non-market risks, e.g. operational risk. Given the paucity of data, and given the absence of homogeneity among the sources of data, by geography, control environment, etc., it may not be practical even to attempt to calibrate an extreme stress. So, for example, in Solvency II (QIS 5), in the SCR calculation, the capital component in respect of operational risk is prescribed by a formula.

6.23 Furthermore, the capital requirements arising from different stresses are combined using a prescribed correlation matrix. This correlation matrix serves to recognise the benefits of diversification of risk. In practice, we see therefore that the total capital requirement is arrived at through a formulaic combination of various components. Those components that reflect risks that are amenable to modelling are calculated using a VaR approach, while others are purely formula-based.

6.24 We note that that there is a theoretical problem with the approach even to market risks that are amenable to modelling: the correlations are based on empirical data of the risk factors, e.g. equity markets, yield curves, credit spreads, etc., but they are applied to the calculated capital requirements. The approach ignores the problem of non-linearity. For example, the effect of a combination of simultaneous interest and equity stresses may not be accurately estimated by a linear combination, derived from the correlation of equity and interest rates movements, of individual capital requirements in respect of equity and interest rates.

[11]Please see 'Technical Findings on the Long-Term Guarantees Assessment' published by EIOPA.

6.25 Solvency II does permit the use of an internal model, which may, depending on company choice and regulatory approval, adopt a more purist VaR approach by an avoidance of formula-based approaches to capital. The problem of non-linearity in particular may be addressed by internal models in which the correlations are directly applied to the risk factors, though this would give rise to considerable complexity in the calculations. So, for example, a scenario generator may be constructed to output both economic and non-economic parameters, based on some input joint distributions. The realistic balance sheet of the company may then be estimated in each simulation. The distribution of the realistic surplus may then be estimated, and capital requirements would depend on the tail of this distribution.

6.25.1 Such a purist application of the VaR method would give rise to significant problems:

- the joint distribution of the economic and non-economic risk parameters would inevitably be subjective, particularly with regard to tail events; and
- a large number of scenarios would be required in order to estimate an extreme percentile with any credibility. But to estimate the balance sheet in such a large number of scenarios will inevitably require significant approximations.

6.26 We note that in any case, internal models are expected to provide a considerable challenge both to regulators' and companies' resources, given their requirements of design, build maintenance, review and approval. We suggest that internal models should not be recommended in the Indian industry even if, as a consequence, a purist approach to VaR is sacrificed.

6.27 In practice, even if an approach to capital similar to the SCR were adopted, whereby risk-based capital components are combined in a formulaic manner, it could be supplemented by some prescribed deterministic scenario analysis, in which simultaneous stresses of various risks were considered. This would meet some concerns over non-linearity without requiring the complexity of internal models. Development of these scenarios would require input from the companies' ORSAs (or other similar documents) so that account may be taken of the companies' risk exposures.

Salient Features of Formula-Based Approach

6.28 In its pure form, it is simple to implement. However, in its pure form, the approach can give rise to considerable distortions and inconsistencies among companies, and fail to curtail their risk exposures. For example:

a. Suppose, as with Solvency I, that the capital requirement is related directly to the reserves. Then a strengthening of reserves leads directly to an increase in the capital requirement. Effectively, there is, to some extent, a double-counting of prudent margins.

b. Suppose, as with NAIC's RBC formula, that capital requirements in respect of risky assets are specified as follows:

i. Calculated by applying factors (ranging from 0% to >30%) to investments in various classes of assets

ii. Split into 2 components - C1cs for shares and C1o for other investments

iii. Some examples of the factors are:

1. Bonds rated AAA to A – 0.3%

2. Bonds rated BBB – 1.0%

3. Bonds rated CCC – 17%

6.29 The approach recognises that certain assets give rise to risk, and calibrates the capital requirement to the perceived riskiness of the asset. However, the requirements can be hedged by holding more of the risky assets in the available capital resources. For example, a holding of risky bonds backing the capital resources could be used to hedge the capital requirement arising from the holding of such bonds in the assets backing the liabilities. It would however appear illogical to encourage a company to meet a risk arising from a risky asset by holding more of the same asset. Whether such an approach provides policyholder protection is debateable. From the perspective of capital markets however, the approach would provide stability and avoid issues of pro-cyclicality.

6.30 In its pure form, the approach does not recognise interactions between assets and liabilities, and so may not encourage active asset liability management. The Regulator may seek to design the formulae and to calibrate their parameters so as to mimic the effects of stresses on surplus, but this would be extremely difficult given a diverse range of companies with different risk exposures. The approach is therefore often modified to capture the effects of such interactions. For example, in the USA, the capital component in respect of interest rates consists of three sub-components:

a. A factor varying by product type and applying to reserves;

b. Factors applied to amounts paid to providers and intermediaries; and

c. In respect of market risk, capital to cover risk from guarantees on variable annuities. This is based on a CTE calculation at 90% with a floor given by a deterministic scenario.

6.31 The third sub-component in 6.30 above captures the effect on surplus of adverse scenarios and reflects the capital required to safeguard policyholder security even in these adverse events.

6.32 The formulae and parameters need to be kept under constant review by the Regulator having regard to changing risk factors and risk exposures in order to ensure that policyholder protection is maintained. This would be a complex task, and arguably more so than its equivalent in the VaR approach: in the former, the Regulator must prescribe factors and formulae that reflect the impact of stress events on various companies' levels of surplus; in the latter, the Regulator's task is to assess stress events, and the companies must assess their impact on surplus. Arguably, the former is not possible.

Conclusion

6.33 We note that the formula-based approach is sometimes modified to take account of the effect on surplus of stress events. This is done at the level of the components of capital requirements, which are then combined using a formulaic approach. Given these modifications, the approach looks similar in principle to the SCR under Solvency II. It appears that, starting from quite different places, the formula-based and the VaR approaches are converging.

6.34 We propose therefore that in the interests of practicality, we proceed along the lines of defining components of capital requirements in respect of individual risk categories, such as equities, interest rates, mortality, etc. Where the risk is amenable to actuarial modelling, we should base the capital components on a VaR approach, the stresses being prescribed by the Regulator; elsewhere we can adopt a formula-based approach, which again should be prescribed. The components of capital can then be combined by a prescribed formula which may give credit for some diversification benefits.

6.35 To allow for non-linearity, the calculations may be supplemented by calculations of the VaR in a number of prescribed scenarios in which individual risk factors are combined.

Chapter 7. Principles for the Future Direction[12]

7.1 The New Solvency Framework should incorporate a risk-based perspective.

7.2 Capital requirements should be quantified with the aim of protecting policyholder interests in the event of reasonably foreseeable adverse future events.

7.3 Adverse events may be considered to arise from the following categories of risk:

- o Insurance
- o Market
- o Credit
- o Liquidity and
- o Operational.

7.4 The method and process for quantification of each category in the capital requirements may vary depending upon the precision with which a risk can be measured.

7.5 The approach should reward companies that manage their risks to prudent levels.

7.6 Capital requirements should reflect risk mitigants, reinsurance, interrelationship and diversification, taking account of their effectiveness under normal and stressed scenarios.

7.7 The approach to risk-based capital should be practical and technically sound.

7.8 There should be a standard approach to every risk.

7.9 Capital requirements arising from different risks should be assessed consistently, to the extent possible. To this end, a uniform measure of risk should be adopted, e.g. value at risk at a confidence level of 99.5% over a one-year outlook.

7.10 Expert judgment should be used to supplement statistical analysis given the paucity of data and experts' skills should be used to calibrate stresses.

7.11 The new business expected to be written over the prospective timeframe may be included in the assessments of capital requirements and capital resources.

7.12 The approach to capital resources and requirements should be transparent, so that it may be readily demonstrated to be technically sound.

7.13 The approach to capital resources and requirements should be based on a total balance sheet approach. Capital requirements should be viewed together with liabilities, not in isolation. In particular, any loss absorbency of the liabilities should be considered when assessing capital requirements.

7.14 Assets and liabilities should be measured on a consistent basis.

7.15 In defining capital resources and requirements, risks should not be double-counted.

[12]These Principles have been adapted from those promulgated by the MCCSR Advisory Committee, OSFI, in May 2006

7.16 The approach to capital requirements should:

7.16.1 be prudent. Regulatory capital covers unexpected losses on both sides of the balance sheet in stress conditions. Unexpected losses will include those coming from volatility (statistical fluctuations), mis-estimation of best estimates, as well as from catastrophes or epidemics.

7.16.2 adapt international principles and best practices. The insurance market is global. International principles and best practices should be adapted to reflect the market, risks and products of Indian companies.

7.16.3 be part of intervention levels for supervisory action. The test of solvency should be part of a supervision rating process as a tool among a series of control levels that define possible supervisory interventions when the capital resources fall below a predetermined level.

7.17 The capital ratio level for intervention should be sufficiently high to allow supervisory action at an early stage.

Chapter 8. Transition Mechanism to RBC regime

Scope

8.1 In this chapter we consider the need for and the effects of a movement to a realistic basis of quantification of the liabilities, and also the arrangements that may be necessary to manage an effective transition.

8.2 We consider three specific aspects of the transition:

- the recommended basis of implementation, in which we outline a 'twin peaks' approach;
- the required preparations prior to implementation of any new regulations and
- an overview of the areas of regulation and legislation that may require amendment.

Basis of Implementation

8.3 Implicit in the notion of a risk-based prudential regime is the idea that liabilities should be measured on a realistic basis, i.e. without prudent margins, and that capital should be held to meet the risks of deviation from assumptions.

8.4 We note that under Solvency II, liabilities are valued on a realistic (in fact, market consistent) basis, and capital requirements are calibrated to a company's risk exposures. For the recognition of equivalence under Solvency II, CEIOPS's document, 'The methodology for equivalence assessments by CEIOPS under Solvency II' dated 12/11/2010, provides questionnaires in respect of reinsurance business, which is covered by Article 172, and group supervision of insurers and reinsurers with the parent undertaking outside the European Community, which is covered by Article 260. Each of them questions whether 'assets and liabilities are valued at the amount for which they could be exchanged between knowledgeable willing parties in an arm's length transaction.' Furthermore, in respect of capital, information is sought as to whether 'capital requirements aim at measuring all quantifiable unexpected risks of the undertaking.' It is clarified that the capital requirement should ensure 'an economic strength from the undertaking comparable to withstanding a 1 in 200 ruin scenario over a one year period or ensure that policyholders and beneficiaries receive at least the same level of protection.'

8.5 It may not be apparent prima facie why this approach, of quantifying liabilities at a realistic value and providing capital to meet risks, should be adopted. After all, it should be possible to test whether a more traditional system that mandates a prudent liability calculation and some formula-based approach to capital, would also require sufficient assets to be held in aggregate to meet policyholder liabilities under stress. However, even if such a traditional system were adopted, the crucial element of the calculation would be the realistic value of the liabilities under stress. This is because the ability that is being tested, under stress, is not that of covering statutory liabilities, but of meeting policyholder liabilities as they arise. Typically, we would not make this assessment on the basis of a matching of projected asset and liability cashflows, since in any case these are rarely matched. Instead, we would assess whether the present value of the liability cashflows was matched by the present value of the asset cashflows, i.e. we would assess whether, on a realistic basis, following a stress, the assets would cover the liabilities. Thus we see that a realistic assessment of the liabilities is required, at least following the

projected stress. Since in any case a quantification of the liabilities on a realistic basis is required post-stress, it would be superfluous as well as confusing to mandate any basis other than a realistic basis pre-stress. Therefore a realistic basis is also applied pre-stress and capital is required to be held to cover deficits that would arise in the event of adverse stresses.

8.6 We note that while the liabilities would be expected to fall on transition from the current basis to a risk-based regime, capital requirements would be expected to increase. This is because capital would be required to provide for the risks that may have been covered by margins for adverse deviation currently held in the liabilities. Furthermore, since, on a realistic basis, the liabilities would not be subject to a floor of zero or of the surrender value, capital should be provided to provide for persistency risk.

Consequences of a Realistic Quantification

8.7 This division between liabilities and capital requirements has several important consequences, notably:

1. When applied to financial statements, it can give a clearer picture of the creation or erosion of value in the company. This is because the liabilities will not be overstated on account of the prudent margins that are currently provided. So, for example, instead of new business strain, surplus may be recognised on writing new business, so long as it is expected to be profitable.

2. Disclosed results would be more revealing of financial strength and would allow more meaningful comparisons between companies, since there would be no implicit margin in the liabilities.

8.8 However, a step-change from the current regime to a risk-based regime would give rise to significant problems:

8.8.1 **Emergence of profit:** Currently, future profits are expected from the run-off of the liabilities. These arise from adjustments made to the liabilities in respect of surrender value floors or zeroisation and from the emergence of surplus from margins for adverse deviation. The present value of these future profits constitute the principal difference between an embedded value and the net worth disclosed in the financial statements. If the liabilities were quantified on a realistic basis, these future profits would be deducted from the liabilities, resulting in a one-off increase in surplus. Consequently, future years' profits would be significantly depressed, since the existing book at the point of transition would not contribute anything further, if future experience were in line with assumptions. This would be quite counter to shareholders' and market expectations.

8.8.2 **Acceleration of tax:** An accelerated emergence of surplus would also lead to an accelerated incidence of tax, since Indian life insurance companies are taxed on emerging surplus.

8.8.3 **Protection of policyholders' interests:** While we would expect that there would be extensive piloting and testing of a new system of prudential regulation, there would still be some regulatory risk involved in jumping from the old system to the new. The Regulator and Appointed Actuaries may feel some discomfort on these grounds.

8.8.4 It would therefore be desirable to avoid a step change.

Options available for Transition

8.9 We consider two options that would address the problems cited above – a 'Twin Peaks' approach and an amortizing liability approach.

Twin Peaks

8.10 Twin peaks approach would require a company to demonstrate its solvency on two bases, or peaks: the existing (regulatory) peak as well as on a new risk-based peak. Surplus distributable to shareholders would be limited to the lower of the two free surpluses disclosed. The principal consequences would be:

- Since the current system would be preserved as one of the peaks, policyholder protection could not be weakened.
- It would give time to companies and to the Regulator to fully understand the implications of the new system. In this twin-peaks environment, if the sum of liabilities and required capital turned out to be consistently less on the risk-based peak than on the regulatory peak, the Regulator could gradually modifythe regulatory peak so that the capital tied up in a company was not supererogatory. Indeed, the risk-based peak would come to provide a benchmark for the regulatory peak in this regard.
- Since the current basis of prudential regulation would be retained as the regulatory peak, there would no one-off emergence of surplus as a result of transition. There would of course be a risk of a one-off diminution of surplus distributable to shareholders.

8.11 However we note that:

- The risk-based peak itself would need to be piloted to ensure that its results did not surprise either companies or the Regulator; and
- If, after due piloting and analysis, it revealed a lower surplus distributable to shareholders, one would have to accept that as the price of appropriate policyholder protection.

8.12 The system could be used to demonstrate equivalence to Solvency II, so long as the risk-based peak was deemed equivalent.

8.13 The system could be developed from the current requirements whereby economic capital is reported in the AAAR[13]. We note however that this economic capital calculation would require considerable refinement and standardisation in order to serve the purpose of measuring solvency.

Amortising Liability

8.14 This would require the company to create a liability on its books at the date of transition to eliminate any surplus created by the transition. Net of this liability, the surplus generated on

[13]Appointed Actuary's Annual Report

transition would be zero by construction. Hence there would at the point of transition be no compromise of policyholder protection, nor any emergence of taxable profit.

8.15 Conceptually, we may consider it thus:

1. On moving from regulatory valuation of liabilities to realistic, we effectively deduct the value of the in-force (VIF);
2. The additional liability therefore consists of the VIF in respect of the existing business as on date of transition;
3. As these liabilities and hence the VIF run off, the additional liability should also run off.

8.16 This liability would be amortised as the existing business as at the date of transition ran off the books. Thus, the reporting system would be expected to move smoothly from the old basis to the new as the existing business came to be replaced by new business.

8.17 The principal considerations are:

8.17.1 The method involves the creation of an artificial additional margin in the liabilities.

8.17.2 An amortisation schedule would need to be specified for this margin.

8.17.3 We would need to consider whether this schedule should be fixed, or could the additional margin be 'unlocked' each year to reflect current circumstances.

8.17.3.1 If it is unlocked and recalculated each year, the total liabilities in respect of the existing business as at date of transition would behave like the current regulatory liabilities.

8.17.3.2 If it is fixed, these liabilities would behave like realistic liabilities, but with an addition that would be subject to fixed amortisation.

8.17.3.3 We suggest that annual unlocking to reflect the actual experience and updated assumptions of future experience would give rise to a more meaningful measure of the liabilities than would fixing the basis of amortisation. If either of these approaches is to be chosen, that in 8.17.3.1 would be preferred.

8.18 Under this method, inevitably, as the existing book runs off, the risk-based peak will come to form the basis of prudential regulation. The Regulator would therefore need to be sure at outset that this system provided adequate policyholder protection in all reasonably foreseeable circumstances.

Conclusion

8.19 Implementation of a risk-based regime should result in a decrease in liabilities since they would be quantified on a realistic basis. There may be a concomitant increase in required capital, as the implicit margins for adverse deviation would be replaced by explicit capital requirements in respect of risks. As a result, there would be a one-off release of reserves to equity, which would have undesirable consequences.

8.20 A step change to a risk-based regime instead of the current would also require the Regulator and Appointed Actuaries to have confidence that the new regime would provide sufficient policyholder protection.

8.21 These issues may be adequately addressed by a Twin Peaks regime, with an expectation that the Regulator would gradually move the regulatory peak towards the realistic peak. The Regulator would retain discretion over the pace of movement to the ultimate position of a single realistic peak. This may coincide with the run-off of the existing business.

8.22 The creation of an amortising liability provides a more limited, time-bound solution to these problems, and also involves an inherent artificiality.

8.23 We therefore propose that the twin peaks approach be adopted.

Preparations for Implementation

8.24 It would of course be advisable for both the Regulator and the companies to be aware of the expected effects on solvency and earnings of the introduction of a new approach to the balance sheet. Therefore, a programme of extensive pilots of the new proposals would be necessary prior to implementation.

8.25 Furthermore, it is acknowledged that though the capital requirement is designed to cover the value at risk at the 99.5thpercentile with a one year outlook, there is an element of subjectivity in its construction. An iterative process of consultation, testing and review of results is necessary to produce a robust and reliable system.

8.26 We therefore recommend that the Regulator commence a programme of Quantitative Impact Studies (QIS) to assess the impact on the balance sheet of the proposals made in this Report. Companies would be invited to participate in these studies and give feedback on any area of concern, for the Regulator to assess. We note that such a programme has been implemented in the EU, prior to implementation of Solvency II, and has been effective in amending draft regulations.

Overview of Regulatory and Legislative Changes

8.27 If the 'twin peaks' approach to implementation is adopted, **all existing statute and regulation will continue to apply.** In addition to the existing framework, new regulations would be needed to mandate the risk-based peak.

However, if in due course, the regulatory system moves to adopt the new risk-based system as the sole basis of solvency, and so the existing system is discarded, **a wide range of regulatory and legislative measures will require review.** In particular, any statute or regulation governing the valuation of assets and liabilities for solvency purposes will require review, for example:

1. IRDA (Assets, Liabilities and Solvency Margin of Insurers), 2000, would require significant amendment;

2. IRDA (Actuarial Report and Abstract) Regulations, 2000, prescribes the calculation of the required solvency margin for life insurers in Form K. This would no longer be required;

3. IRDA (Distribution of Surplus) Regulations, 2002, which inter alia, prescribes the operation of the 90:10 gate;

4. Section 64V(ii) of the Insurance Act, 1938, where it specifies particular measures of the liability in respect of unexpired risks; and

5. Section 64VA(1A)(ii) where it specifies the required margin of solvency of a general insurance company.

We note that in any case, the Insurance Laws (Amendment) Bill, 2012, proposes significant changes to the Insurance Act, 1938; in particular sections 64V and 64VA are proposed to be re-written, and specific references to solvency margins are to be removed.

8.28 As a consequence of moving to a risk-based regime, wherein capital would be held for the risks taken, IRDA may in due course reconsider the requirement to maintain restrictions on certain risk management activities, such as the investment norms mandated in IRDA (Investment) Regulations, 2000. The guiding principle, at some future point, would be that so long as a company maintains sufficient risk-based capital to cover its risk exposures and its risk governance processes are sound, it should be free to manage those risk exposures. There would be less need for further constraints on its risk exposures in those circumstances. However, such changes, though logical, would not be a necessary part of movement to a risk-based regulatory regime.

8.29 We note that in this Report, we have not considered any enhancement in respect of corporate governance or disclosure, either to the public or to the Regulator. Instead our focus has been on quantitative aspects. However, the qualitative aspects are important components of Solvency II. **We recommend IRDA to take this matter up and to enhance the qualitative aspects, in line with areas noted in Chapter 5.**

8.30 The rationale is that a risk-based regime should cover more than just the balance sheet; it should in particular ensure that appropriate processes are in place, so that on an on-going basis, risks are identified, measured, monitored and controlled. A snapshot of the financial position on the valuation date is insufficient evidence of such risk management processes. The corporate governance requirements of a risk-based regime attempt to ensure that regulated entities do indeed implement appropriate risk management. Disclosure is held to be an important component so that market discipline may compel companies to manage their risks appropriately.

8.31 In order for a risk-based regime to gain recognition of equivalence to Solvency II, these qualitative aspects would require enhancement.

On behalf of Committee
(P. A. Balasubramain)

Appendix A : Risk Based Capital for Life Insurers

A.1 In Chapter 6, we concluded:

'We propose therefore that in the interests of practicality, we proceed along the lines of defining components of capital requirements in respect of individual risk categories, such as equities, interest rates, mortality, etc. Where the risk is amenable to actuarial modelling, we should base the capital components on a VaR approach, the stresses being prescribed by the Regulator; elsewhere we can adopt a formula-based approach, which again should be prescribed. The components of capital can then be combined by prescribed formula which may give credit for some diversification benefits.'

A.2 In Chapter 8, we noted in our conclusion:

'Implementation of a risk-based regime should result in a decrease in liabilities since they would be quantified on a realistic basis. There may be a concomitant increase in required capital, as the implicit margins for adverse deviation would be replaced by explicit capital requirements in respect of risks.'

A.3 In this Appendix, we draw together our two strands, of realistic quantification of liabilities and of risk-based capital, to construct a risk-based approach to the quantification of solvency for life insurance companies.

A.4 Our approach starts with the economic valuation of the assets and liabilities and then calculates changes to them under various stresses. In this chapter we consider the stresses that IRDA may focus on in the context of any requirement for recognition of equivalence to Solvency II. The parameters proposed are for the first of a proposed series of Quantitative Impact Studies to be undertaken.

A.5 The Appendix is derived from various documents published as a part of EU's Solvency II Project.

A.6 Quite apart from the efficient use of capital, it is understood that a significant beneficial consequence of the implementation of risk-based capital could be for the Indian system to gain recognition of equivalence from the EU. For this reason and, more generally, in order to align with international standards, the solvency capital requirement below is benchmarked to the 99.5% percentile of future outcomes. As noted in Chapter 6 this approach to Value at Risk, is somewhat subjective. In respect of equity risk, however, we have validated stresses that we believe to be consistent with the desired maximum probability of ruin; in respect of other stresses we propose the calibration proposed by EIOPA, but strengthened where we believe this to be required by Indian conditions.

Principles for Valuation of Assets and Liabilities

A.7 We propose the following principles for the valuation of assets and liabilities:

A.7.1 Assets shall be valued at the amount for which they could be exchanged between knowledgeable willing parties in an arm's length transaction;

A.7.2 Liabilities shall be valued at the amount for which they could be transferred, or settled, between knowledgeable willing parties in an arm's length transaction.

A.7.3 When valuing liabilities under point A.7.2, above, no adjustment to take account of the own credit standing of the insurance or reinsurance undertaking shall be made.

A.7.3.1 The following general provisions shall apply:

The value of technical provisions shall correspond to the current amount insurance and reinsurance undertakings would have to pay if they were to transfer their insurance and reinsurance obligations immediately to another insurance or reinsurance undertaking.

A.7.3.2 The calculation of technical provisions shall make use of and be consistent with information provided by the financial markets and available data on underwriting risks.

A.7.3.3 Technical provisions shall be calculated in a reliable and objective manner.

A.7.3.4 The concept of materiality will apply to the calculations in line with International Accounting Standards: 'Information is material if its omission or misstatement could influence the economic decisions of users taken [on the basis of the financial statements]. Materiality depends on the size of the item or error judged in the particular circumstances of its omission or misstatement. Thus, materiality provides a threshold or cut-off point rather than being a primary qualitative characteristic which information must have if it is to be useful.'

Valuation Methods[14]

A.8 The use of quoted market prices in active markets[15] for the same assets or liabilities shall be the default valuation method, regardless of whether or not applicable Accounting Standards allow market consistent valuation methods for other purposes.

A.9 Where the use of quoted market prices for the same assets or liabilities is not possible, quoted market prices in active markets for similar assets and liabilities with adjustments to reflect differences shall be used.

A.10 Where the criteria for active markets are not satisfied, insurance and reinsurance undertakings shall, unless otherwise stated, use alternative valuation methods, other than those stated in Section A.9, above, provided that these are consistent with principles given above in Section A.7

A.11 For setting economic assumptions, the use of alternative valuation methods shall make use of relevant market inputs, and rely as little as possible on undertaking-specific inputs.

Contingent Liabilities[16]

A.12 Insurance and reinsurance undertakings shall recognise contingent liabilities, as defined in Accounting Standard (AS) 29, as liabilities.

A.13 Contingent liabilities are material if information about the current or potential size or nature of that liability could influence the decision-making or judgement of the intended user of that information.

[14]Source: Article 7 V3, derived from Article 75(1) of Directive 2009/138/EC.
[15]Following International Accounting Standard 38, an active market is defined to be one in which all the following conditions exist:
a) the items traded in the market are homogeneous; b) willing buyers and sellers can normally be found at any time; and c) prices are available to the public.
For the avoidance of doubt, compliance with this or any other International Account Standard is not required under these proposals.
[16]Source: Article 8 V4 derived from Article 75(1) of Directive 2009/138/EC

A.14 Contingent liabilities, based on the expected present value of future cash-flows required to settle the contingent liability over the lifetime of that contingent liability, should be valued using the basic risk-free interest rate term structure.

Treatment of certain Specific Assets[17]

A.15 Goodwill is to be valued at zero.

A.16 Intangible assets, other than goodwill, are to be valued at zero, unless the intangible asset can be sold separately and the insurance and reinsurance undertaking can demonstrate that there is a value for the same or similar assets that has been derived in accordance with Section A.7.1 in which case the asset shall be valued in accordance with that Section.

A.17 Deferred tax assets are to be valued in accordance with A.19, below.

A.18 Additional criteria related to holdings in other subsidiary or related companies:

A.18.1 holdings in related undertakings[18], using the default valuation method set out in Section A.8 above;

A.18.2 holdings in subsidiary undertakings[19], where a valuation in accordance with Section A.7.1, above, is not possible, based on the adjusted equity method;

A.18.3 Holdings in related undertakings, that are not subsidiary undertakings and where a valuation in accordance with Section A.8, is not possible, based on the adjusted equity method where possible and where not possible, based on an alternative valuation method in accordance with Section A.10.

A.18.3.1 The adjusted equity method referred in A.18.3, shall require the participating undertaking to value its holding in a related undertaking based on the participating undertaking's share of the excess of assets over liabilities of the related undertaking.

A.18.3.2 When calculating the excess of assets over liabilities for related undertakings, the participating undertaking shall value the related undertaking's assets and liabilities in accordance with all Sections of this Appendix.

A.18.3.3 When calculating the excess of assets over liabilities for related undertakings other than related insurance and reinsurance undertakings, the participating undertaking shall value the related undertaking's assets and liabilities in accordance with the equity method as prescribed in applicable accounting standards, where valuation in accordance with all Sections of this Appendix is not practicable. In such cases the value of goodwill and other intangible assets shall be valued at zero.

[17]Source: Article 9 V5 derived from Article 75(1) of Directive 2009/138/EC

[18]A 'related undertaking' means either:

• a subsidiary undertaking or other undertaking in which a participation is held, or

• an undertaking linked with another undertaking, with which it is not otherwise connected, but where both are managed on a unified basis pursuant to a contract concluded with that undertaking or provisions in the memorandum or articles of association of those undertakings.

[19]For the purposes of this chapter, the Regulator shall also consider as a parent undertaking any undertaking which, in the opinion of the Regulator, effectively exercises a dominant influence over another undertaking.

They shall consider as a subsidiary undertaking any undertaking over which, in the opinion of the Regulator, a parent undertaking effectively exercises a dominant influence.

They shall also consider as participation the holding, directly or indirectly, of voting rights or capital in an undertaking over which, in the opinion of the supervisory authorities, a significant influence is effectively exercised.

Deferred Taxes

A.19 Insurance and reinsurance undertakings shall recognise and value deferred taxes in relation to all assets and liabilities that are recognised for solvency or tax purposes in conformity with applicable accounting standards.

A.20 Notwithstanding A.19, insurance and reinsurance undertakings shall value deferred taxes, other than deferred tax assets arising from the carry-forward of unused tax credits and the carry-forward of unused tax losses. This deferred tax asset or liability shall reflect the difference between the values ascribed to assets and liabilities recognised and valued in accordance with this paper and the values ascribed to assets and liabilities as recognised and valued for tax purposes. For example, we note that, other things being equal, where the realistic liability is lower than that used for the tax calculation, a taxable surplus would expected to emerge in future. The tax liability arising from that expected surplus should be explicitly provided for in a deferred tax liability.

A.21 In the case of deferred tax assets the insurance and reinsurance undertaking must be able to demonstrate to IRDA that it is probable that future taxable profit will be available against which the deferred tax asset can be utilised, taking into account any legal or regulatory requirements on the time limits relating to the carry-forward of unused tax losses or the carry-forward of unused tax credits. Notwithstanding A.19, above, the deferred tax asset should be discounted to reflect the timing of its utilisation.

Financial Liabilities

A.22 Financial liabilities, as referred to in applicable accounting standards and in insurance regulations, other than those arising from insurance policies, shall be valued in accordance with those standards and regulations. There shall be no adjustment to take account of the change in the credit standing of the insurance or reinsurance undertaking after initial recognition.

Recognition and De-recognition of Insurance Liabilities

A.23 Insurance and reinsurance undertakings shall recognise an insurance or reinsurance obligation at whichever is the earlier of the date the undertaking becomes a party to the contract that gives rise to the obligation or the date the insurance or reinsurance cover begins. Undertakings shall only recognise the obligations and premiums within the boundary of the contract. The boundary of the contract shall be taken to mean its date of expiry or maturity, in accordance with its terms and conditions.

A.24 Insurance and reinsurance undertakings shall cease to recognise an insurance or reinsurance obligation only when it is extinguished, discharged, cancelled or expires.

Boundary of Insurance Contracts

A.25 An insurance contract boundary would be recognized as per the contract terms signed between insurer and policy holder. Any renewability option should not be recognized for extension of the contract boundary. However, in case premium or waiver of underwriting, etc. is guaranteed, the cost of such guarantee should be valued separately.

Limitations of Data

A.26 Insurance and reinsurance undertakings shall document appropriately any material limitations of the data in relation to the valuation of liabilities and assets, including a description of whether and how such limitations will be remedied and of the functions within the governance system of the undertaking responsible for this process. The absence of data shall be considered as a material limitation. The original data shall be recorded and stored appropriately.

A.27 Where insurance and reinsurance undertakings have insufficient data of appropriate quality to apply a reliable actuarial method, undertakings may use appropriate approximations to calculate the best estimate provided that the following requirements are met:

A.27.1 the insufficiency of data is not due to inadequate internal processes and procedures of collecting, storing or validating data used for the valuation of technical provisions;

A.27.2 there are no relevant external data which could be used by the undertaking to enhance the quality of the available data; and

A.27.3 it would not be practicable for the undertaking to adjust the data to remedy the insufficiency.

Technical Provisions – Calculations[20]

A.28 The value of technical provisions shall be equal to the sum of a best estimate and a risk margin as set out in Sections A.28.1 and A.28.5.

A.28.1 The best estimate shall correspond to the probability-weighted average of future cash-flows, taking account of the time value of money (expected present value of future cash-flows), using the relevant risk-free interest rate term structure. The calculation of the best estimate shall be based upon up-to-date and credible information and realistic assumptions and be performed using adequate, applicable and relevant actuarial and statistical methods. The cash-flow projection used in the calculation of the best estimate shall take account of all the cash in- and out-flows required to settle the insurance and reinsurance obligations over the lifetime thereof.

A.28.2 The best estimate is the average of the outcomes of all possible scenarios, weighted according to their respective probabilities. Although, in principle, all possible scenarios should be considered, depending on the type of risks involved and the materiality of the expected financial effect of the scenarios under consideration it may not be necessary, or even possible, in practice, to incorporate all possible scenarios in the valuation of the liability explicitly, nor to develop explicit probability distributions.

A.28.3 Insurers should use actuarial and statistical techniques for the calculation of the best estimate which appropriately reflect the risks that affect the cash-flows. This may include simulation methods, deterministic techniques and analytic techniques.

A.28.4 For the estimation of liabilities that do not need simulation techniques, deterministic and analytical techniques can be more appropriate.

A.28.5 The risk margin shall be such as to ensure that the value of the technical provisions is equivalent to the amount that insurance and reinsurance undertakings would be expected to require in

[20] *Derived from Article 77, Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009*

order to take over and meet the insurance and reinsurance obligations.

A.28.5.1 Insurance and reinsurance undertakings shall value the best estimate and the risk margin separately. However, where future cash flows associated with insurance or reinsurance obligations can be replicated reliably using financial instruments for which a reliable market value is observable, the value of technical provisions associated with those future cash flows shall be determined on the basis of the market value of those financial instruments. In this case, separate calculations of the best estimate and the risk margin shall not be required.

A.28.5.2 Where insurance and reinsurance undertakings value the best estimate and the risk margin separately, the risk margin shall be calculated by determining the cost of providing an amount of eligible own funds equal to the Solvency Capital Requirement necessary to support the insurance and reinsurance obligations over the lifetime thereof. **The rate used in the determination of the cost of providing that amount of eligible own funds (Cost-of-Capital rate) shall be the same for all insurance and reinsurance undertakings and shall be reviewed periodically by IRDA.**

Technical Provisions – Other Elements[21]

A.29 When calculating technical provisions, insurance and reinsurance undertakings shall take account of the following:

A.29.1 all expenses that will be incurred in servicing insurance and reinsurance obligations;

A.29.2 inflation, including expenses and claims inflation;

A.29.3 all payments to policy holders and beneficiaries, including future discretionary bonuses, which insurance and reinsurance undertakings expect to make, whether or not those payments are contractually guaranteed.

A.30 When calculating technical provisions, insurance and reinsurance undertakings shall take account of the value of financial guarantees and any contractual options included in insurance and reinsurance policies.

A.31 Any assumptions made by insurance and reinsurance undertakings with respect to the likelihood that policy holders will exercise contractual options, including lapses and surrenders, shall be realistic and based on current and credible information. The assumptions shall take account, either explicitly or implicitly, of the impact that future changes in financial and non-financial conditions may have on the exercise of those options.

Technical Provisions – Assumptions[22]

A.32 Insurance and reinsurance undertakings shall identify all relevant assumptions that the calculation of technical provisions are based upon. The choice of these assumptions shall comply with the following conditions:

A.32.1 insurance and reinsurance undertakings are able to explain and justify each of these assumptions, taking into account the significance of the assumption, the uncertainty involved

[21] *Derived from Articles 78 and 79, Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009*
[22] *Article 17 TP5, derived from Article 77(2) of Directive 2009/138/EC, of the European Parliament and of the Council of 25 November 2009.*

in the assumption as well as relevant alternative assumptions and the impact of those alternative assumptions on the value of the technical provisions;

A.32.2 the circumstances under which the assumptions would be considered false can be clearly defined; and

A.32.3 insurance and reinsurance undertakings establish and maintain a written explanation of the method used to set the assumptions.

A.33 Insurance and reinsurance undertakings shall ensure that assumptions underlying the calculation of the technical provisions are derived consistently over time and within homogeneous risk groups and lines of business, without arbitrary changes.

A.34 Insurance and reinsurance undertakings shall monitor experience, and justify and document the changes of assumptions from one period to another. They shall estimate the impact of material changes of assumptions from one period to another.

A.35 The Regulator may specify the risk free term structure to be used.

A.36 Otherwise insurance and reinsurance undertakings shall derive assumptions on future financial markets according to the following requirements:

- the undertaking is able to demonstrate that the assumptions are appropriate; and
- where the undertaking projects financial market parameters, it shall ensure that its model complies with the following requirements:

o it generates asset prices that are consistent with financial markets;

o the asset model should be calibrated to reflect the nature and term of the liabilities, in particular of those liabilities giving rise to significant guarantee and option costs;

o it assumes no arbitrage opportunity; and

o the calibration of parameters or scenarios is consistent with the relevant risk-free term structure, as referred to above in Section A.28.1.

A.37 Economic assumptions, if different from any specified by the Regulator, should nevertheless be consistent with the Regulator-specified assumptions, and a full justification of all differences should be provided, along with their derivation.

A.38 The calculation of the best estimate shall take into account expected future developments that will have a material impact on the cash in- and out-flows required to settle the insurance and reinsurance obligations thereof. For this purpose future developments and assumptions shall include demographic, legal, medical, technological, social, environmental and economic developments including inflation.

A.39 **The Regulator may provide the risk-free interest rate for various currencies and terms. The Regulator may also provide future assumptions with regard to general inflation (CPI or WPI) that should be used for derivation of economic assumptions by insurance and reinsurance undertakings.** Actuarial Practice Standard 10 issued by the Institute of Actuaries of India provides guidance in this regard which has been reproduced below.

'The reference rate used to discount the liability cash flows is a proxy for a risk free rate appropriate to the currency, term and liquidity of such liability cash flows as given below:

- Where the liabilities are liquid the reference rate should, wherever possible, be set to a liquid risk-free yield curve appropriate to the currency of the cash flows. This could be either the government bond yield curve or the swap yield curve, subject to the underlying assets being liquid and providing a robust basis for producing reference rates.

- Where the liabilities are not liquid the reference rate should be the reference rate yield curve with the inclusion of a liquidity premium, where appropriate.'

A.40 In evaluating the appropriateness of the inclusion of a liquidity premium (where liabilities are not liquid) consideration may be given to regulatory restrictions, internal constraints or investment policies which may limit the ability of a company to access the liquidity premium.

A.41 Where the available financial market data used to set the reference rate is shorter than the projected liability cash flows, the data should be extended using an appropriate methodology, for example:

- Assuming that either spot or forward rates remain level at the longest available term; or

- If there exists a relevant government bond yield curve which is longer than the financial market data used to set the reference rate, this could be used to extend the data by maintaining a constant margin from the end of the available data and assuming it remains level thereafter.

A.42 Where the financial market data used to set the reference rate is not available at all durations between the longest and shortest, the intermediate data points can be calculated by interpolation using an appropriate methodology. If the financial market data used to set the reference rate is not available at the very short end, other appropriate market information should be used instead.

A.43 Where liabilities are denominated in the domestic currency of Indian Rupees, best practice in current circumstances would be to base the risk-free curve on the government bond yield curve, rather than the swap curve. The former is deeper, more liquid and extends for a longer term. However, as market dynamics change, this position will need periodic review in the light of the above principles.

A.44 Where cash flows are denominated in overseas currencies we recommend that the risk-free rate for such cash flows be based on the government security yield curve of that overseas currency.

A.45 We note that A.44 appears to give rise to a conceptual issue. Suppose, for example, that liabilities are written in a currency with a higher gross redemption yield on government securities than is prevalent in India. We may infer that the premium available on those government securities reflects, at least in part, a higher risk of default. If furthermore the liabilities are written in a branch, rather than in a subsidiary, the contingent liability on any default of the branch would

typically revert to principal operating entity. There may then be an argument that the Indian risk-free curve be used to value these liabilities. However, we may assume that the overseas government would not default on its domestic debt; rather that it would print local currency to redeem any such debt. Therefore, cash in the local currency would be available to meet liabilities denominated in that currency. Therefore the local government security yield may be taken to be risk-free. We also note that if liabilities are written in a currency with a lower risk-free curve than is prevalent in India, the recommendation would require those liabilities to be valued at this lower risk-free curve.

Future Management Actions[23]

A.46 Future management actions are allowed under Solvency II to allow for the impact of the firm's strategy and risk management practices on the required capital. We propose that such future management actions should be allowed, where liabilities are loss absorbing.

A.47 The assumptions of future management actions used shall be determined in an objective manner. For this purpose, insurance and reinsurance undertakings shall establish a comprehensive future management actions plan, approved by the administrative, management or supervisory body of the insurance or reinsurance undertaking, which covers at least the following areas:

A.47.1 the identification of future management actions that are relevant to the valuation of the technical provisions;

A.47.2 the identification of the specific circumstances in which the insurance or reinsurance undertaking would reasonably expect to carry out each of the future management actions identified in point A.47.1;

A.47.3 the identification of the specific circumstances in which the insurance or reinsurance undertaking might not be able to carry out each of the future management actions identified in point A.47.1, and a description of how these circumstances are considered in the calculation of technical provisions;

A.47.4 the order in which future management actions would be carried out and the governance requirements applicable to these future management actions;

A.47.5 a description of any on-going work required to ensure that the insurance or reinsurance undertaking is in a position to carry out each of the future management actions identified in point A.47.1;

A.47.6 a description of how future management actions have been reflected in the calculation of the best estimate; insurance and reinsurance undertakings shall assess the quantitative impact on the best estimate of the future management actions implemented in its calculation; and

A.47.7 a description of the applicable internal reporting procedures that cover future management actions implemented in the calculation of the best estimate.

A.48 The reporting procedures shall include at least an annual communication to the administrative, supervisory or management body.

[23]*Article 19 TP6, derived from Article 77(2) of Directive 2009/138/EC*

A.49 Assumed future management actions shall be realistic and consistent with the insurance or reinsurance undertaking's current business practice and business strategy, including the use of risk mitigation techniques. If there is sufficient current evidence that an undertaking will change its practices or strategy, the assumed management actions shall be consistent with the changed practices or strategy.

A.50 Assumed future management actions shall be consistent with each other.

A.51 Insurance and reinsurance undertakings shall not assume that future management actions would be taken that would be contrary to their obligations towards policy holders and beneficiaries or to legal provisions applicable to undertakings. The assumed future management actions shall take account of any indications made public by an undertaking as to the actions that it would expect to take, or not to take, in the circumstances being considered.

A.52 Assumptions about future management actions shall take account of the time needed to implement the management actions and any expenses caused by them.

A.53 Insurance and reinsurance undertakings shall be able to verify that assumptions about future management actions are realistic through:

A.53.1 a comparison of assumed future management actions with management actions taken previously by the undertaking;

A.53.2 a comparison of future management actions taken into account in the current and past calculations of the best estimate; and

A.53.3 insurance and reinsurance undertakings shall document and be able to explain any relevant deviations in relation to points A.53.1 and A.53.2.

A.54 Where assumptions are made regarding future management actions, they should be endorsed by the authority that would in practice authorise such actions. So, for example, if assumptions are made regarding future bonus rates, such assumptions should be approved by the Board of the undertaking.

Future Discretionary Benefits (Bonuses)[24]

A.55 Future discretionary bonuses or future discretionary benefits means future benefits other than index-linked or unit-linked benefits of insurance or reinsurance contracts which have one of the following characteristics:

A.55.1 the benefits are legally or contractually based on one or several of the following results:

A.55.1.1 the performance of a specified group of contracts or a specified type of contract or a single contract;

A.55.1.2 the realised or unrealised investment return on a specified pool of assets held by the insurance or reinsurance undertaking; or

A.55.1.3 the profit or loss of the insurance or reinsurance undertaking or fund corresponding to the contract.

[24] *Article 20 TP7, derived from Article 78(3) and 108 of Directive 2009/138/EC*

A.55.2 the benefits are based on a declaration of the insurance or reinsurance undertaking and the timing or the amount of the benefits is at its full or partial discretion

A.55.3 Where the future discretionary benefits depend on the assets held by the insurance or reinsurance undertaking, the calculation of the best estimate shall be based on the assets currently held by the undertaking. Future expected changes of the asset allocation shall be taken into account in accordance with Sections A.46 to A.54, above. The assumptions on the future returns of the assets shall be consistent with the relevant risk-free interest term structure.

A.55.4 Policyholders' reasonable expectations should be taken into account while setting the assumption for future discretionary benefits.

Policyholder behaviour[25]

A.56 The determination of the likelihood that policyholders will exercise contractual options should include an analysis of past policyholder behaviour. This analysis should take into account the following:

- how beneficial the exercise of the options was or would have been to the policyholders under past circumstances
- the influence of past economic conditions
- the impact of past management actions
- any other circumstances that are likely to have influenced the decisions on whether to exercise the option

A.57 The likelihood that policyholders will exercise contractual options, including lapses and surrenders, shall be based on a prospective view of expected policyholder behaviour that makes appropriate and justified assumptions about the elements mentioned in A.56. The likelihood should not be assumed to be independent of the elements mentioned in A.56 unless there is empirical evidence to support such an assumption.

A.58 We note that there is likely to be a paucity of data regarding policyholder behaviour. In particular, the value of an option would depend on policyholder behaviour in a variety of extreme adverse conditions. By their very nature, such conditions are rare. Expert judgement should therefore be relied upon to complement empirical analysis. Any such judgement should be clearly documented.

Cash-Flows[26]

A.59 The cash-flow projection used in the calculation of the best estimate shall include, but shall not be limited to, the following cash-flows, to the extent that those cash-flows relate to existing insurance and reinsurance contracts:

- benefit payments to policy holders and beneficiaries;
- payments that the insurance or reinsurance undertaking will incur in providing contractual benefits that are paid in kind;
- payments of expenses;

[25]Article 21 TP8 derived from Article 79 of Directive 2009/138/EC
[26]Article 21bis derived from Article 77(2) of Directive 2009/138/EC.

- premium payments and any additional cash-flows that result from those premiums;
- amounts recoverable from reinsurance contracts[27];
- payments between the insurance or reinsurance undertaking and intermediaries related to insurance or reinsurance obligations;
- payments between the insurance or reinsurance undertaking and investment firms; and
- taxation payments which are, or are expected to be, charged to policy holders or are required to settle the insurance or reinsurance obligations.

Uncertainty of Cash-Flows[28]

A.60 The cash-flow projection used in the calculation of the best estimate shall, explicitly or implicitly, take account of all uncertainties in the cash-flows, including where relevant the following characteristics:

- uncertainty in the timing, frequency and severity of insured events
- uncertainty in claim amounts, including uncertainty in claims inflation, and in the period needed to settle and pay claims
- uncertainty in the amount of expenses
- uncertainty in policy holder behaviour
- dependency between two or more causes of uncertainty
- dependency of cash-flows on circumstances prior to the date of the cash-flow.

Expenses[29]

A.61 The expenses referred to in Section A.29.1 shall include administrative expenses, investment management expenses, claims management expenses and acquisition expenses which relate to recognised insurance and reinsurance obligations of insurance and reinsurance undertakings.

A.62 The expenses referred to in Section A.29.1, shall also include overhead expenses incurred in servicing insurance and reinsurance obligations.

A.63 The allocation of overhead expenses to homogeneous risk groups or the premium provisions and the provisions for claims outstanding shall be done in a realistic and objective manner and on a consistent basis over time. The same requirements shall apply to the allocation of overhead expenses to existing and future business.

A.64 Expenses in respect of reinsurance contracts shall be taken into account in the gross calculation of the best estimate.

A.65 Expenses shall be assessed on the assumption that the undertaking will write new business in the future.

[27]We note that the risk of default of such counterparties will be allowed for in the counterparty default risk module, Section 32.3.6. Therefore, it is not necessary to allow for any risk of default in the liability calculation.
[28]Article 23 TP10 derived from Article 77(2) of Directive 2009/138/EC.
[29]Article 24 TP11 derived from Article 79 of Directive 2009/139/EC

A.66 Insurers should consider their own analysis of expenses and any relevant market data. For the avoidance of doubt, no credit should normally be taken for expected future productivity improvements for the purpose of estimating future unit expenses. An exception to this may, for example, for a start-up operation which has not yet achieved critical mass.

Value of Contractual Options and Financial Guarantees[30]

A.67 When calculating the best estimate, insurance and reinsurance undertakings shall identify and take into account:

- all financial guarantees and contractual options included in their insurance and reinsurance policies; and
- all factors which may materially affect the likelihood that policy holders will exercise contractual options or the value of the option or guarantee.

When calculating the best estimate, insurance and reinsurance undertakings shall have due regard to the requirements of Guidance Note 22, issued by the Institute of Actuaries of India.

Currency of the Obligation[31]

A.68 The best estimate shall be calculated separately for cash-flows in different currencies.

Calculation Methods[32]

A.69 The choice of actuarial and statistical methods for the calculation of the best estimate shall be based on their appropriateness to reflect the risks which affect the underlying cash-flows and the nature of the insurance and reinsurance obligations. The actuarial and statistical methods shall be consistent with and make use of all relevant data available for the calculation of the best estimate.

A.70 Where a calculation method is based on grouped policy data, insurance and reinsurance undertakings shall be able to demonstrate that the grouping of policies creates homogeneous risk groups that appropriately reflect the risks of the individual policies included in that group.

A.71 Insurance and reinsurance undertakings shall analyse the extent to which the present value of cash-flows depends not only on the expected outcome of a future event, but also on how the actual outcome in certain scenarios could deviate from the expected outcome.

A.72 Where relevant and material, insurance and reinsurance undertakings shall use a method to calculate the best estimate for cash-flows which reflects dependencies of the present value on the future event. Cash-flows relating to policies which include financial guarantees and options shall be considered relevant for these purposes.

A.73 The best estimate shall be calculated in a transparent manner and in such a way as to ensure that the calculation method and the results that derive from it are capable of review by a qualified expert.

[30] *Article 26 TP13 derived from Article 79 of Directive 2009/139/EC.*
[31] *Article 27 TP14 derived from Article 77(2) of Directive 2009/139/EC*
[32] *Article 28 TP15 derived from Article 77(2) of Directive 2009/139/EC*

Homogeneous Risk Groups of Life Insurance Obligations[33]

A.74 The cash-flow projections used in the calculation of best estimates for life insurance obligations shall be made separately for each policy. Where the separate calculation for each policy would be an undue burden on the insurance or reinsurance undertaking, it may carry out the projection by grouping policies, provided that the grouping complies with the following requirements:

- there are no significant differences in the nature and complexity of the risks underlying the policies that belong to the same group;
- the grouping of policies does not misrepresent the risk underlying the policies and does not misstate their expenses; and
- the grouping of policies is likely to give approximately the same results for the best estimate calculation as a calculation on a per policy basis, in particular in relation to financial guarantees and contractual options included in the policies.

Calculation of Technical Provisions as a whole[34]

A.75 For the purpose of determining the circumstances where some or all future cash flows associated with insurance or reinsurance obligations can be replicated reliably using financial instruments for which a reliable market value is observable as referred to in Section A.28.5.1 undertakings shall assess whether all the criteria set out in sections A.76 and A.77 are met. In this case, the value of technical provisions associated with those future cash-flows shall be equal to the market value of the financial instruments used in the replication.

A.75.1 Where under the same contract a number of future cash-flows exist, some of which meet all the conditions mentioned above and other future cash-flows which do not, both sets of cash-flows should be unbundled in order to calculate the technical provision as a whole.

A.75.2 The main situation where insurance obligations can be replicated reliably using financial instruments for which a reliable market value is observable is where the benefit cash-flows of the insurance obligation consist of the delivery of a portfolio of financial instruments for which a reliable market value is observable or are based only on the market value of the portfolio at the time that the benefit is paid.

A.76 The cash-flows of the financial instruments shall replicate reliably the uncertainty in amount and timing of the cash-flows associated with the insurance or reinsurance obligations, in relation to the risks underlying the cash-flows associated with the insurance and reinsurance obligations in all possible scenarios. In particular, the following cash-flows associated with insurance or reinsurance obligations cannot be reliably replicated:

- cash-flows associated with insurance or reinsurance obligations that depend on the likelihood that policyholders will exercise contractual options, including lapses and surrenders;
- cash-flows associated with insurance or reinsurance obligations that depend on the level, trend, or volatility of mortality, disability, sickness and morbidity rates; and
- all expenses that will be incurred in servicing insurance and reinsurance obligations.

[33] *Article 29 TP16 derived from Article 77(2) of Directive 2009/139/EC*
[34] *Article 34 TP21 derived from Article 77(4) of Directive 2009/139/EC*

A.77 In order to be used in replications, the financial instruments must be traded in active markets as defined in applicable accounting standards and must also meet all of the following criteria:

- transactions involving a large quantity of financial instruments used in the replications can take place without significantly affecting the price of the instruments (deep);
- financial instruments can readily be converted through an act of buying or selling without causing a significant movement in the price (liquid); and
- current trade and price information is readily available to the public, in particular to the undertakings (transparent).

Segmentation[35]

A.78 Insurance and reinsurance undertakings shall segment their insurance and reinsurance obligations into homogeneous risk groups, and as a minimum by lines of business, when calculating their technical provisions.

Recoverables from Reinsurance Contracts[36]

A.79 The calculation by insurance and reinsurance undertakings of amounts recoverable from reinsurance contracts shall comply with Sections A.28 to A.78 of this Appendix.

A.80 When calculating amounts recoverable from reinsurance contracts, insurance and reinsurance undertakings shall take account of the time difference between recoveries and direct payments.

A.81 The results should be adjusted to take account of expected losses due to default of the counterparty. That adjustment should be calculated separately and should be based on an assessment of the probability of default of the counterparty, whether this arises from insolvency, dispute or another reason, and the average loss resulting there from (loss-given-default).

Data quality and Application of Approximations[37]

A.82 Insurance and reinsurance undertakings shall ensure that they have internal processes and procedures in place to ensure the appropriateness, completeness and accuracy of the data used in the calculation of their technical provisions.

A.83 Where, in specific circumstances, insurance and reinsurance undertakings have insufficient data of appropriate quality to apply a reliable actuarial method to a set or subset of their insurance and reinsurance obligations, or amounts recoverable from reinsurance contracts, appropriate approximations, including case-by-case approaches, may be used in the calculation of the best estimate.

Comparison with Experience[38]

A.84 Insurance and reinsurance undertakings shall have processes and procedures in place to ensure that best estimates, and the assumptions underlying the calculation of best estimates, are regularly compared with experience.

[35] *Source: Article 80, Directive 2009/139/EC*
[36] *Source: Article 81, Directive 2009/139/EC*
[37] *Source: Article 82, Directive 2009/139/EC*
[38] *Source: Article 83, Directive 2009/139/EC*

A.85 Where the comparison identifies systematic deviation between experience and the best estimate calculations of insurance or reinsurance undertakings, the undertaking concerned shall make appropriate adjustments to the actuarial methods being used or the assumptions being made.

Appropriateness of the Level of Technical Provisions[39]

A.86 Upon request from the Regulator, insurance and reinsurance undertakings shall demonstrate the appropriateness of the level of their technical provisions, as well as the applicability and relevance of the methods applied, and the adequacy of the underlying statistical data used. Insurance and reinsurance undertakings may simplify the methods they use, bearing in mind that errors introduced should not be material, and that the methods used should be commensurate with the nature, scale and complexity of the risks.

Increase of Technical Provisions[40]

A.87 To the extent that the calculation of technical provisions of insurance and reinsurance undertakings does not comply with Sections A.28 to A.86 of this Appendix, the Regulator may require insurance and reinsurance undertakings to increase the amount of technical provisions.

Risk Margin

A.88 The Regulator may specify:

- the circumstances in which technical provisions shall be calculated as a whole, or as a sum of a best estimate and a risk margin, and the methods to be used in the case where technical provisions are calculated as a whole; and
- the methods and assumptions to be used in the calculation of the risk margin including the determination of the amount of eligible own funds necessary to support the insurance and reinsurance obligations and the calibration of the Cost-of-Capital rate.

A.89 Where a risk is deemed to be hedgeable, the technical provisions shall be calculated as a whole, and shall incorporate the market price of hedging the risk; otherwise, an explicit risk margin shall be held.

A.90 The risk margin for the whole portfolio of insurance and reinsurance obligations shall be equal to the following: $RM = CoC \cdot \sum_{t \geq 0} \frac{SCR(t)}{(1+r(t+1))^{t+1}}$ where

- CoC denotes the Cost-of-Capital rate
- the sum covers all integers including zero
- SCR(t) denotes the component of Solvency Capital Requirement in respect of non-hedgeable risks after t years. This should be adjusted for any allowance for the loss-absorbing ability of the technical provisions, based on an application of A.146 to A.153, below, but with the stresses restricted only to non-hedgeable risks.

[39] *Source: Article 84, Directive 2009/139/EC*
[40] *Source: Article 85, Directive 2009/139/EC*

- Actuarial Practice Standard 10 issued by the Institute of Actuaries of India prescribes an approach to the identification of the capital art risk to non-hedgeable risks. This approach may be followed for the purpose of calculating the risk margin.
- The SCR is defined below. We note however that the SCR defined therein is dependent on the value of the liabilities, pre- and post-stress. In order to avoid circularity, for the purpose of the definition of the risk margin, the SCR should be calculated as set out below, but ignoring the component of risk margin in the liabilities.
- SCR(t) is calculated in respect of existing business at the valuation date; it does not include any allowance for new business.
- r(t+1) denotes the relevant liquid risk-free interest rate referred to in A.39for the maturity of t+1 years. This should be with regard to the relevant currency for the financial statement.

A.91 Insurance and reinsurance undertakings shall allocate the risk margin for the whole portfolio of insurance and reinsurance obligations to the lines of business. The allocation shall adequately reflect the contributions of the lines of business to the Solvency Capital Requirement over the lifetime of the whole portfolio of insurance and reinsurance obligations.

A.92 The calculation of the risk margin shall be based on the following assumptions:

- the whole portfolio of insurance and reinsurance obligations of the insurance or reinsurance undertaking that calculates the risk margin (the original undertaking) is taken over by another insurance or reinsurance undertaking (the reference undertaking);
- the transfer of insurance and reinsurance obligations includes any reinsurance contracts relating to these obligations;
- the reference undertaking does not have any insurance or reinsurance obligations or own funds before the transfer takes place; and
- after the transfer, the reference undertaking does not assume any new insurance or reinsurance obligations.

Own Funds[41]

A.93 Own funds shall comprise the sum of basic own funds, referred to in Section A.95 and ancillary own funds referred to in Section A.97.

A.94 In Appendix E :we discuss how to incorporate the surplus of a ring-fenced fund in a company's own funds.

A.95 Basic own funds shall consist of the following items:

- the excess of assets over liabilities, valued in accordance with Sections A.28 to A.92, above;
- subordinated liabilities, if any.

A.96 The excess amount referred to in A.95 shall be reduced by the amount of own shares held by the insurance or reinsurance undertaking.

[41]*Source: Articles 87 to 89, Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009*

A.97 Ancillary own funds shall consist of items other than basic own funds which can be called up to absorb losses. We note that given current regulation, some or all of these items may not exist.

A.98 Ancillary own funds may comprise the following items to the extent that they are not basic own-fund items:

- unpaid share capital or initial fund that has not been called up;
- letters of credit and guarantees, as and when allowed;
- any other legally binding commitments received by insurance and reinsurance undertakings.

A.99 Where an ancillary own-fund item has been paid in or called up, it shall be treated as an asset and cease to form part of ancillary own-fund items.

A.100 IRDA has constituted another committee to look into the quality of capital that may be allowed for solvency purposes. This Committee does not look into this matter.

Calculation of Solvency Capital Requirement[42]

A.101 The Solvency Capital Requirement shall be calculated on the presumption that the undertaking will pursue its business as a going concern.

A.102 The Solvency Capital Requirement shall be calibrated so as to seek to ensure that all quantifiable risks to which an insurance or reinsurance undertaking is exposed are taken into account. It shall cover existing business, as well as the new business expected to be written over the following 12 months. With respect to existing business, it shall cover only unexpected losses. It shall correspond to the Value-at-Risk of the basic own funds of an insurance or reinsurance undertaking subject to a confidence level of 99.5 % over a one-year period

A.103 When calculating the Solvency Capital Requirement, insurance and reinsurance undertakings shall take account of the effect of risk-mitigation techniques, provided that credit risk and other additional risks arising from the use of such techniques are properly reflected in the Solvency Capital Requirement.

A.104 Insurance and reinsurance undertakings shall calculate the Solvency Capital Requirement at least once a year and report the result of that calculation to the supervisory authorities.

A.105 Insurance and reinsurance undertakings shall hold own funds which cover the last reported Solvency Capital Requirement.

A.106 Insurance and reinsurance undertakings shall monitor the amount of eligible own funds and the Solvency Capital Requirement on an on-going basis. If the risk profile of an insurance or reinsurance undertaking deviates significantly from the assumptions underlying the last reported Solvency Capital Requirement, the undertaking concerned shall recalculate the Solvency Capital Requirement without delay and report it to the supervisory authorities.

A.107 Where there is evidence to suggest that the risk profile of the insurance or reinsurance undertaking has altered significantly since the date on which the Solvency Capital Requirement was last reported, the supervisory authorities may require the undertaking concerned to recalculate the Solvency Capital Requirement.

[42]*Source: Articles 101 and 102, Directive 2009/138/EC*

Structure of the Solvency Capital Requirement[43]

A.108 The Solvency Capital Requirement shall be the sum of the following items:

A.108.1 the Basic Solvency Capital Requirement, as specified in A.109;

A.108.2 the capital requirement for operational risk, as laid down in A.139, below; and

A.108.3 the adjustment for the loss-absorbing capacity of technical provisions and deferred taxes, as discussed in Appendix C :D, below.

A.109 The Basic Solvency Capital Requirement[44] shall comprise individual risk modules, which are aggregated in accordance with the formula given below. It shall consist of at least the following risk modules:

(a) life insurance risk

(b) health risk;

(b) market risk; and

(c) counterparty default risk.

The aggregation formula for Basic Solvency Capital Requirement (BSCR) is:

$$BSCR = \{\sum_{i,j} Corr_{i,j} SCR_i SCR_j\}^{1/2}$$

where SCR_i denotes the capital requirement for risk module i. In the calculation, SCR_i and SCR_j are replaced by the following:

- SCR life denotes the life underwriting risk module,
- SCR health denotes the health risk underwriting module,
- SCR market denotes the market risk module, and
- SCR default denotes the counterparty default risk module.

The factor $Corr_{i,j}$ denotes the item set out in row i and in column j of the following correlation matrix:

	Market	Default	Life	Health
Market	1	0.25	0.25	0.25
Default	0.25	1	0.25	0.25
Life	0.25	0.25	1	0.25
Health	0.25	0.25	0.25	1

A.110 The correlation coefficients for the aggregation of the risk modules referred to in Section A.109, above, as well as the calibration of the capital requirements for each risk module, shall aim to result in an overall Solvency Capital Requirement which complies with the principles set out in Section A.102.

[43] *Source: Article 103, Directive 2009/138/EC*
[44] *Source: Articles 104 and 105, Directive 2009/138/EC*

A.111 Each of the risk modules referred to in Section A.109 shall be calibrated using a Value-at-Risk measure, with a 99.5% confidence level, over a one-year period. Where appropriate, diversification effects shall be taken into account in the design of each risk module.

Life Insurance Risk Module

A.112 The life insurance risk module shall reflect the risk arising from life insurance obligations, in relation to the perils covered and the processes used in the conduct of business. It shall be calculated as a combination of the capital requirements for the following sub-modules:

A.112.1 the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of mortality rates, where an increase in the mortality rate leads to an increase in the value of insurance liabilities (mortality risk);

A.112.2 the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of mortality rates, where a decrease in the mortality rate leads to an increase in the value of insurance liabilities (longevity risk);

A.112.3 the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level, trend or volatility of disability, sickness and morbidity rates (disability – morbidity risk);

A.112.4 the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of the expenses incurred in servicing insurance or reinsurance contracts (life-expense risk);

A.112.5 the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level or volatility of the rates of policy lapses, terminations, renewals and surrenders (lapse risk);

A.112.6 the risk of loss, or of adverse change in the value of insurance liabilities, resulting from the significant uncertainty of pricing and provisioning assumptions related to extreme or irregular events (life-catastrophe risk).

A.112.7 The correlation coefficients[45], Corr(i,j), between the capital requirements in respect of the sub-modules of life insurance risk shall be equal to the item set out in row i and in column j of the following correlation matrix:

i \ j	Mortality	Longevity	Disability	Life expense	Revision	Lapse	Life catastrophe
Mortality	1	-0.25	0.25	0.25	0	0	0.25
Longevity	-0.25	1	0	0.25	0.25	0.25	0
Disability	0.25	0	1	0.5	0	0	0.25
Life expense	0.25	0.25	0.5	1	0.5	0.5	0.25
Revision	0	0.25	0	0.5	1	0	0
Lapse	0	0.25	0	0.5	0	1	0.25
Life catastrophe	0.25	0	0.25	0.25	0	0.25	1

[45]*Source: Article 104 LUR1 (Art. 105(3) of Directive 2009/138/EC), Level 2 text*

Mortality Risk Sub-Module[46]

A.113 Subject to Section A.114, below, the capital requirement for mortality risk referred to in Section A.112.1, above, shall be equal to the loss in basic own funds of insurance and reinsurance undertakings that would result from an instantaneous permanent increase of 15% in the mortality rates used for the calculation of technical provisions.

A.114 The increase in mortality rates referred to in Section A.113, above, shall only apply to those insurance policies for which an increase in mortality rates leads to an increase in technical provisions without risk margin, taking into account the following:

A.114.1 multiple insurance policies in respect of the same insured person may be treated as if they were one insurance policy; and

A.114.2 where the calculation of technical provisions is based on groups of policies, the identification of the policies for which technical provisions increase under an increase of mortality rates may also be based on those groups of policies instead of single policies, provided that it would give approximately the same result.

A.115 With regard to reinsurance policies, the identification of the policies for which technical provisions increase under an increase of mortality rates shall apply to the underlying insurance policies only and shall be carried out in accordance with Section A.112.1, above.

Longevity Risk Sub-Module[47]

A.116 Subject to Section A.117, below, the capital requirement for longevity risk referred to in Section A.112.2, above, shall be equal to the loss in basic own funds of insurance and reinsurance undertakings that would result from an instantaneous permanent decrease of 20% in the mortality rates used for the calculation of technical provisions.

A.117 The decrease in mortality rates referred to in Section A.116, above, shall only apply to those insurance policies for which a decrease in mortality rates leads to an increase in technical provisions without risk margin taking into account the following:

A.117.1 multiple insurance policies in respect of the same insured person may be treated as if they were one insurance policy; and

A.117.2 where the calculation of technical provisions is based on groups of policies, the identification of the policies for which technical provisions increase under a decrease of mortality rates may also be based on those groups of policies instead of single policies, provided that it would give approximately the same result.

A.118 with regard to reinsurance policies, the identification of the policies for which technical provisions increase under a decrease of mortality rates shall apply to the underlying insurance policies only and shall be carried out in accordance with A.116.

[46]*Source: Article 105 LUR2(Art. 105(3) of Directive 2009/138/EC), Level 2 text*
[47]*Source: Article 107 LUR 3(Art. 105(3) of Directive 2009/138/EC), Level 2 text*

Disability-Morbidity Risk Sub-Module[48]

A.119 The capital requirement for disability-morbidity risk shall be equal to the loss in basic own funds of insurance and reinsurance undertakings that would result from the combination of the following instantaneous permanent changes:

A.119.1 an increase of 35% in the disability and morbidity rates which are used in the calculation of technical provisions to reflect the disability and morbidity experience in the following 12 months;

A.119.2 an increase of 25 % in the disability and morbidity rates which are used in the calculation of technical provisions to reflect the disability and morbidity experience for all months after the following 12 months; and

A.119.3 a decrease of 20 % in the disability and morbidity recovery rates used in the calculation of technical provisions in respect of the following 12 months and for all years thereafter.

A.120 Where life insurance companies have written health insurance on an indemnity basis, the approach to capital requirements should be consistent with that of non-life companies. Further, the correlation between the risk module in respect of health and other risk modules shall be taken to be 0.25.

Life-Expense Risk Sub-Module[49]

A.121 The capital requirement for life-expense risk shall be equal to the loss in basic own funds of insurance and reinsurance undertakings that would result from the following combination of instantaneous permanent changes:

- an increase of 2 percentage points to the expense inflation rate (expressed as a percentage) used for the calculation of technical provisions
- an increase of 10% in the amount of expenses taken into account in the calculation of technical provisions.

A.122 With regard to reinsurance obligations, insurance and reinsurance undertakings shall apply these changes to their own expenses and, where relevant, to the expenses of the ceding undertakings.

Lapse Risk Sub-Module[50]

A.123 The capital requirement for lapse risk referred shall be equal to the largest of the following capital requirements:

- the capital requirement for the risk of a permanent increase in lapse rates
- the capital requirement for the risk of a permanent decrease in lapse rates
- the capital requirement for mass lapse risk

[48]Source: Article 109 LUR4 (Art. 105(3) of Directive 2009/138/EC), Level 2 text
[49]Source: Article 110 LUR5(Art. 105(3) of Directive 2009/138/EC), Level 2 text
[50]Source: Article 113 LUR7(Art. 105(3) of Directive 2009/138/EC), Level 2 text

A.124 The capital requirement for the risk of a permanent increase in lapse rates shall be equal to the loss in basic own funds of insurance and reinsurance undertakings that would result from an instantaneous permanent increase of 50% in the option exercise rates of the relevant options set out in Sections A.126 and A.127, below. However, the resulting increased option exercise rates, following the application of the instantaneous permanent increase of 50%, shall not be deemed to exceed 100 %. The increase in option exercise rates shall only apply to those relevant options for which the exercise of the option would result in an increase of technical provisions without the risk margin.

A.125 The capital requirement for the risk of a permanent decrease in lapse rates shall be equal to the loss in basic own funds of insurance and reinsurance undertakings that would result from an instantaneous permanent decrease of 50% in the option exercise rates of the relevant options set out in Sections A.126 and A.127, below. However, the resulting decreased option exercise rates (expressed as percentages), following the application of the instantaneous permanent decrease of 50%, shall not be deemed to decrease by more than 20 percentage points. The decrease in option exercise rates shall only apply to those relevant options for which the exercise of the option would result in a decrease of technical provisions without the risk margin.

A.126 The relevant options for the purposes of Sections A.124 and A.125 shall mean all legal or contractual policyholder rights to fully or partly terminate, surrender, decrease, restrict or suspend insurance cover or permit the insurance policy to lapse. Where a right allows the full or partial establishment, renewal, increase, extension or resumption of insurance or reinsurance cover, the change in the option exercise rate referred to in Sections A.124 and A.125 shall be applied to the rate that the right is not exercised.

A.127 In relation to reinsurance contracts the relevant options for the purposes of Sections A.124 and A.125 shall cover:

- the rights set out in Section A.126 of the policyholders of reinsurance contracts
- the rights set out in Section A.126 of the policyholders of the insurance contracts underlying reinsurance contracts
- where the reinsurance contracts covers insurance or reinsurance contracts that will be written in the future, the right of the potential policyholders not to conclude those insurance or reinsurance contracts.

A.128 The capital requirement for mass lapse risk shall be equal to the loss in basic own funds of insurance and reinsurance undertakings that would result from the following combination of instantaneous changes:

A.128.1 the discontinuance of 100% of the insurance policies for which discontinuance would result in an increase of technical provisions without the risk margin and where the policy holder is either:

- not a natural person and discontinuance of the policy is not subject to approval by the beneficiaries of the pension fund; or
- a natural person acting for the benefit of the beneficiaries under those policies, but excluding policies in respect of which there is a family relationship between that natural

person and the beneficiaries, and policies effected for private estate planning or inheritance purposes in circumstances where the number of beneficiaries under the policy does not exceed 20;

A.128.2 the discontinuance of 100% of the insurance policies other than those falling within Section A.128.1 for which discontinuance would result in an increase of technical provisions without the risk margin; and

A.128.3 where reinsurance contracts cover insurance or reinsurance contracts that will be written in the future, the decrease of 40% of the number of those future insurance or reinsurance contracts used in the calculation of technical provisions.

A.129 The stresses referred to in Sections A.128.1 to A.128.3 shall apply uniformly to all insurance and reinsurance contracts concerned. In relation to reinsurance contracts, the stress referred to in Section A.128.1 shall apply to the underlying insurance contracts.

A.130 For the purpose of determining the loss in basic own funds of the insurance or reinsurance undertaking under Sections A.128.1 and A.128.2, the undertaking shall base the stress on the type of discontinuance which most negatively affects the basic own funds of the undertaking on a per policy basis.

Life-Catastrophe Risk Sub-Module[51]

A.131 The capital requirement for life-catastrophe risk shall be equal to the loss in basic own funds of insurance and reinsurance undertakings that would result from an instantaneous increase of 0.15 percentage points to the mortality rates (expressed as percentages) which are used in the calculation of technical provisions to reflect the mortality experience in the following 12 months.

A.132 The increase in mortality rates referred to in Section A.131 shall only apply to those insurance policies for which an increase in mortality rates to reflect the mortality experience in the following 12 months leads to an increase in technical provisions taking into account the following:

- multiple insurance policies in respect of the same insured person may be treated as if they were one insurance policy
- where the calculation of technical provisions is based on groups of policies, the identification of the policies for which technical provisions increase under an increase of mortality rates may also be based on those groups of policies instead of single policies, provided that it would give approximately the same result

A.133 For the avoidance of doubt, any mitigating effect of reinsurance may be recognised.

A.134 With regard to reinsurance policies, the identification of the policies for which technical provisions increase under an increase of mortality rates shall apply to the underlying insurance policies only and shall be carried out in accordance with Section A.132.

[51] *Source: Article 115 LUR8: (Art. 105(3) of Directive 2009/138/EC), Level 2 text*

Market Risk Module

A.135 Details of the calculation of the market risk module are provided in Appendix B : as it is common and applicable to non-life insurance and health insurance companies.

Counterparty Default Risk Module

A.136 Details of the calculation of the counterparty default risk module are provided in Appendix B : as it is common and applicable to non-life insurance and health insurance companies.

Operational Risk Module[52]

A.137 The capital requirement for operational risk shall reflect operational risks to the extent they are not already reflected in the risk modules referred to in Sections A.109 to A.136, above. The requirement shall be calibrated in accordance with Section A.102, above.

A.138 With respect to insurance and reinsurance operations, the calculation of the capital requirement for operational risk shall take account of the volume of those operations, in terms of earned premiums and technical provisions which are held in respect of those insurance and reinsurance obligations.

A.139 The capital requirement for the operational risk module shall be equal to the following[53]:

$$SCR_{Operational} = \min\left(0.3 \cdot BSCR ; Op\right) + 0.25 \cdot Exp_{ul}$$

where

- BSCR denotes the basic solvency capital requirement
- Op denotes the basic capital requirement for operational risk charge
- Exp_{ul} denotes the amount of expenses incurred during the previous 12 months in respect of life insurance contracts where the investment risk is borne by policy holders.

A.140 The basic capital requirement for operational risk shall be determined as follows:

$$Op = \max\left(Op_{premiums} ; Op_{provisions}\right)$$

where

$Op_{premiums}$ denotes the capital requirement for operational risks based on earned premiums

$Op_{provisions}$ denotes the capital requirement for operational risks based on technical provisions.

These terms are defined below.

A.141 The capital requirement for operational risks based on earned premiums shall be calculated as follows:

$$Op_{premiums} = \left\{ \begin{array}{l} x \cdot \left(Earn_{life} - Earn_{life-ul}\right) \\ + \max\left(0; x \cdot \left(Earn_{life} - y \cdot pEarn_{life} - \left(Earn_{life-ul} - 1.2 \cdot pEarn_{life-ul}\right)\right)\right) \end{array} \right\}$$

where

[52] *Source: Article 107, Directive 2009/138/EC*

[53] *Source: Article 183 ORI (Level 2 text)*

$Earn_{life}$ denotes the premiums recognised in the financial statements during the last 12 months for life insurance and reinsurance obligations, without deducting premiums for reinsurance contracts;

$Earn_{life\text{-}ul}$ denotes the premiums recognised in the financial statements during the last 12 months for life insurance obligations and reinsurance where the investment risk is borne by the policy holders without deducting premiums for reinsurance contracts;

$pEarn_{life}$ denotes the premiums recognised in the financial statements during the 12 months prior to the last 12 months for life insurance and reinsurance obligations, without deducting premiums for reinsurance contracts; and

x = 0.04 and y = 1.2. **These values will be regularly reviewed by the Regulator.**

A.142 The capital requirement for operational risk based on technical provisions shall be calculated as follows:

$$Op_{provisions} = 0.0045 \cdot \max(0; TP_{life} - TP_{life\text{-}ul}) + 0.03 \cdot \max(0; TP_{non\text{-}life})$$

where:

TP_{life} denotes the technical provisions for life insurance and reinsurance obligations;

$TP_{life\text{-}ul}$ denotes the technical provisions for life insurance obligations where the investment risk is borne by the policy holders.

TP_{nl} denotes the technical provisions for non-life insurance and reinsurance obligations.

For the purpose of this Section, technical provisions shall not include the risk margin and shall be calculated without deduction of recoverables from reinsurance contracts.

Adjustment for Loss-Absorbing Capacity[54]

A.143 A discussion of the thinking underlying the proposals below is provided in Appendix C :D.

A.144 The adjustment referred to in Section A.108.3 for the loss-absorbing capacity of technical provisions and deferred taxes shall reflect potential compensation of unexpected losses through a simultaneous decrease in technical provisions or deferred taxes or a combination of the two.

A.145 That adjustment shall take account of the risk mitigating effect provided by future discretionary benefits of insurance contracts, to the extent insurance and reinsurance undertakings can establish that a reduction in such benefits may be used to cover unexpected losses when they arise. The risk mitigating effect provided by future discretionary benefits shall be no higher than the sum of technical provisions and deferred taxes relating to those future discretionary benefits.

Avoid Double Counting of Management Actions

A.146 Calculate Gross SCR, based on the modular method, as specified in A.109, above. We note that the Gross SCR should be based on an assumption of no management action during the stresses, though management actions may be assumed following the stresses.

[54] *Source: Article 108, Directive 2009/138/EC*

A.147 Calculate Net SCR, based on modular method, as specified in this chapter, in which the full range of management actions (consistent with PRE) would be permitted.

A.148 We recognise that ideally, we would hold Net SCR, if we were confident that the diminution of liabilities based on management actions implicit in the Net SCR were reasonable and avoided double counting.

A.149 Adopt one of the following approaches:

A. Quantify the value of the future bonus (i.e. future discretionary benefits that can be reduced consistent with PRE) in the base liabilities and specify that these liabilities may be reduced by up to X% under stress, with the Regulator to specify X. We recommend a value a value of 100% for X; or

B. Specify one or more scenarios of combined stress events, with the Regulator to specify the scenarios. In each, estimate future management actions, by way of reduction in bonus, alteration in investment strategy, etc. Given these management actions, calculate the reduction in the value of the liabilities compared with the base scenario.

The result of either (A) or (B) is the maximum credit that may be taken for management actions under stress. Let Max_Credit be this quantity.

A.150 Calculate SCR = Gross SCR – min((Gross SCR – Net SCR), Max_Credit).

A.151 The above approaches would have the benefit of transparency. If approach (B) is taken in Section A.149, the capital requirements would be calibrated to the company's approach to management of participating business, but at the cost of some simplicity. **The Regulator would have to specify the scenarios and also to approve the prospective management actions for which credit was claimed.**

A.152 The deduction in Step (5) is the adjustment in respect of loss absorbency of technical provisions in respect of participating business.

A.153 We note that the approach proposed in A.149 and A.150 should be extended to accommodate any change in the deferred tax liability and in other loss-absorbent liabilities arising from stress events.

Health Risk Module

A.154 This is covered in Appendix C, since it will be common to life, health and general insurance companies.

Appendix B : Report On Market Risk And Counter Party Default Risk

B.1 Introduction

This report contains the recommendations of the Sub-Committee on Market Risk and Counter Party Default Risk constituted by the IRDA vide order no IRDA/F&A/ORD/SOLP/156/07/2012 dated July 09, 2012.

B.1.1 The members of this Sub-Committee are:

Dr K Sriram, Consulting Actuary-Chair Person

Mr A Ramana Rao, Joint Director (Investments), IRDA– Convenor

Mr A K Mittal, DGM, General Insurance Corporation of India

Mr Abiranjan Gupta, CIO HDFC Ergo General Insurance Co, Ltd

Mr Srikant, Head [ERM] ICICI Prudential Life Insurance Co. Ltd

Mr SP Chakraborty, Deputy Director, IRDA

Mr R K Sharma, Deputy Director,IRDA

B.1.2 The terms of reference of this Sub-Committee are:

a. To review the Solvency II framework for calculating the SCR (Solvency Capital Requirement) for the following sources of Market Risk:

- Interest rate risk
- Equity risk
- Property risk
- Spread risk
- Concentration risk
- Currency risk

b. To suggest changes, if any, to the proposed methodologies keeping in view the regulatory framework (IRDA's Investment Regulations, Insurance Act, SEBI Guidelines etc.) pertaining to the investment management of Insurance companies – life and general insurance companies

c. To recommend any alternative methodology for calculating SCR for any of the above sources of risk given the investment setting for the Indian Insurance Companies and the pertinent investment issues.

d. To suggest:

i. Appropriate correlation parameters taking into account any published information/findings of published empirical studies relevant in the Indian context

ii. Suitable data sources (e.g., any of the rating agency's data base) which can be monitored for periodically updating these correlation parameters.

[In this Appendix, we refer to the Sub-Committee as the Committee.]

B.1.3 While formulating its recommendations, this Committee has considered

- The approach and the methodologies under the Solvency II framework
- The New Capital Adequacy Framework for Banks stipulated by the Reserve Bank of India vide its Master Circular covering the Prudential Guidelines on Capital Adequacy and Market Discipline [Circular Ref: RBI/2012-13/95DBOD. NO. BP. BC 16/21.06.001/ 2012-13 DATED JULY 2, 2012]
- The Current Market Practices

B.1.4 The final recommendations of this Committee have been largely guided by the following principles as laid down in Chapter 7 of the Report of the Committee on Road Map for Risk Based Solvency Approach in Insurance Sector.

- Capital requirements arising from different risks should be assessed consistently, to the extent possible. To this end, a uniform measure of risk should be adopted e.g., VaR at a confidence level of 99.5% over a one year outlook.
- Capital requirements should be based on a total balance sheet approach. In other words capital requirements for asset related risks should be assessed taking into account the inter-relationships between assets and liabilities.
- Adapt international principles and best practices.

B.1.5 In the context of this Report, the phrase "Solvency II Framework" refers to the EC (European Commission) Regulations titled "Draft Implementing Measures Solvency II" dated 31st October 2012.

B.1.6 This Report assigns numeric values ranging from 0 to 6 to credit quality which can be related to the credit ratings assigned by CRISIL as shown in the following table:

Credit Quality Step	Credit Rating assigned by CRISIL
0	AAA
1	AA
2	A
3	BBB
4	BB
5	B
6	LOWER THAN B

B.1.7 This Report covers the framework for calculating the Solvency Capital Requirement [SCR] for the following sources of risk

- Market Risk
- Counter Party Default Risk

B.2 SCR for Market Risk

B.2.1.1 The SCR for market risk shall be calculated using the following formula:

SCR (Market Risk) = $\sqrt{\sum_{i,j} Corr(i,j).SCR(i).SCR(j)}$

Where

a. The sum covers all possible combinations (i,j) of the sub modules of the market risk module

b. Corr (i,j) denotes the correlation coefficients for market risk for sub modules i and j

c. SCR(i) and SCR(j) denotes the capital requirements for sub-modules i and j respectively.

The market risk module covers the following sub modules:

- Interest Rate Risk
- Equity Risk
- Property Risk
- Spread Risk
- Concentration Risk
- Currency Risk

The correlation coefficients – Corr (i,j) – can be obtained from the correlation matrix specified by IRDA from time to time.

B.2.1.2 Table 1 provides the correlation matrix specified under Solvency II framework.

Table 1: Correlation Matrix

j \ i	Interest Rate	Equity	Property	Spread	Concentration	Currency
Interest rate	1	A	A	A	0	0.25
Equity	A	1	0.7 5	0.75	0	0.25
Property	A	0.75	1	0.5	0	0.25
Spread	A	0.75	0.5	1	0	0.25
Concentration	0	0	0	0	1	0
Currency	0.25	0.25	0.25	0.25	0	1

The parameter A in the above correlation matrix will be set equal to zero when capital requirement for interest rate risk (see B.2.2, below) is calculated under a scenario of an increase in the term structure of interest rates. Otherwise the parameter A shall be equal to 0.5

B.2.1.3 The correlation matrix provided in Table 1 needs to be validated in the Indian context. For this purpose, the annualized rates of return pertaining to different asset classes – bonds, equities and property – need to be compiled for the last 10 to 15 years – and the correlation coefficients can be computed using this data.

The following sources of investment information can be tapped for this purpose

- CRISIL Bond Indices
- Bloomberg
- NSE and BSE Equity Indices
- NHB property Index

Research monographs made available by institutions like CRISIL Research also provide time series data for calculating the correlation coefficients between returns on different asset classes.

B.2.2 SCR for Interest Rate Risk

B.2.2.1 The capital requirement for interest rate risk shall be equal to the sum of the larger of the following:

a. The capital requirement for the risk of an increase in the term structure of interest rates;

b. The capital requirement for the risk of a decrease in the term structure of interest rates.

B.2.2.2 The capital requirement for the risk of an increase/decrease in the term structure of interest rates [spot rates] shall be equal to the loss in the basic own funds that would result from an instantaneous increase/decrease in the basic risk-free interest rates at different maturities in accordance with the table(s) specified by IRDA from time to time.

B.2.2.3 Table 2 provides the instantaneous increase/decrease in the risk – free interest rates specified under Solvency II framework.

Table 2: Instantaneous Increase/Decrease in Risk – Free Interest Rates [Spot Rates]

Maturity (in years)	Increase	Decrease
1	70%	75%
2	70%	65%
3	64%	56%
4	59%	50%
5	55%	46%
6	52%	42%
7	49%	39%
8	47%	36%
9	44%	33%
10	42%	31%
11	39%	30%
12	37%	29%
13	35%	28%
14	34%	28%
15	33%	27%

Maturity (in years)	Increase	Decrease
16	31%	28%
17	30%	28%
18	29%	28%
19	27%	29%
20	26%	29%
90	20%	20%

Notes to Table 2:

a. For maturities not specified in the above table, the value of the increase/decrease shall be linearly interpolated. For maturities shorter than one year, the increase shall be 70%; and the decrease shall be 75%

For maturities longer than 90 years, the increase/decrease shall be 20%

b. Notwithstanding the percentage changes specified in Table 10.2, the increase/decrease of risk free interest rates at any maturity shall be at least one percentage point

c. Where interest rates after the decrease are negative, it shall be assumed that these interest rates are nil

B.2.2.4 The Committee also considered the capital requirement for interest rate risk stipulated by the RBI. The RBI approach is quite similar to the Solvency II approach in terms of calculating the modified duration of each bond and applying an assumed change in yield to the modified duration of the bond. The assumed change in yield varies between 0.6 and 1.0 percentage points depending on the maturity of the bond.

B.2.2.5 The Committee noted the following fundamental differences between the Solvency II approach and the RBI approach.

a. The instantaneous change in the risk free interest rates specified under the Solvency II framework is a proportional change e.g.; a 70% increase to an interest rate of 5% pa will result in a revised interest rate of 5% + 0.7 * 5% = 8.5%. On the other hand, the instantaneous change specified by RBI is an additive change. For example, an assumed change in yield of 0.6% to an interest rate of 5% pa will result in a revised interest rate of 5% +0.6% = 5.6% pa

b. The assumed changes in yield specified by RBI do not reflect the steep changes in yield which can occur under stressed market conditions

B.2.2.6 On balance, the Committee recommends a "proportional change" approach to risk-free rates. At the same time it is important to ensure that the "stress" changes interest rates are representative of the "extreme" changes witnessed in the Indian gilt securities market, **hence the Committee recommends that IRDA can commission a study on how gilt yields at different durations have changed over the last 15 to 20 years (covering a complete business/economic cycle) to assess the magnitude of the "extreme" changes.** The results of this study can be used to modify the "proportional changes" specified in Table 2.

B.2.3 SCR for Equity Risk:

B.2.3.1 The SCR for Equity Risk will be sum of the SCR for Type 1 Equity Risk and the SCR for Type 2 Equity Risk.

B.2.3.2 Type 1 equities refer to the Equity Investments classified as "Approved Investments" under IRDA (Investment) Regulations. Type 2 Equities refer to the equity investments classified as "Other Investments" under IRDA Investment Regulations

B.2.3.3 The SCR for equity risk shall be calculated using the following formula:

$$SCR\ (Equity\ Risk) = [SCR\ (E1)^2 + SCR\ (E2)^2 + 2 * SCR\ (E1) * SCR\ (E2)]$$

Where

E1 = Type 1 Equities

E2 = Type 2 Equities

Corr (E1,E2) = 1.00

B.2.3.4 The capital requirement for type 1 equities – SCR (E1) – shall be equal to the loss in basic own funds that would result from an instantaneous decrease of

a. X% in the value of type 1 equity investments in related undertakings which are of a strategic nature; and

b. Y% in the value of type 1 equities other than those referred to in (a).

The capital requirement for type 2 equities – SCR (E2) – shall be equal to the loss in basic own funds that would result from an instantaneous decrease of

a. X% in the value of type 2 equity investments in related undertakings which are of a strategic nature; and

b. Z% in the value of type 2 equities other than those referred to in (a).

The values for X, Y and Z will be as specified by IRDA from time to time.

B.2.3.5 Equity investments of a strategic nature will mean equity investments for which the insurance or reinsurance undertaking demonstrates the following:

a. That the value of the equity investment is likely to be materially less volatile for the following 12 months than the value of other equities over the same period as a result of both the nature of the investment and the influence exercised by the participating undertaking in the related undertaking;

b. That the nature of the investment is strategic, taking into account all relevant factors including:

i. The existence of a clear decisive strategy to continue holding the participation for long period;

ii. The consistency of the strategy referred to in point (i) with the main policies guiding or limiting the action of the undertaking;

iii. The participating undertakings' ability to continue holding the participation in the related undertaking;

iv. The existence of a durable link;

v. Where the insurance or reinsurance participating company is part of a group, the consistency of such strategy with the main policies guiding or limiting the actions of the group.

B.2.3.6 The Committee deliberated upon the values of X, Y and Z (referred to in paragraph B.2.3.4) which will be relevant in the Indian context.

B.2.3.7 In this context the Committee reviewed a study done by ICICI Prudential Life Insurance Company on "Stochastic Simulation of Equity Returns". This study uses a GARCH[55] model for determining the equity stress level appropriate for a 99.5% VaR calculation. The study has used the daily Sensex Returns between January 1991 and January 2011 to determine the model parameters. The study reveals that a 60% fall in equity values is an appropriate one in two hundred equity stress which can be used for VaR calculations.

B.2.3.8 The Committee suggests using a value of 60% for Y and Z (an instantaneous decrease of 60% in the value of equities falling under the type 1 and type 2 categories excluding strategic investments). For strategic investments IRDA can consider an instantaneous decrease which is less than 60%. The Solvency II framework considers an instantaneous decrease of 22% in the value of such investments. In other words X is set equal to 22% under the Solvency II framework.

B.2.3.9 **IRDA can commission studies similar to that done by ICICI Prudential to review and revise the values of X, Y and Z from time to time.**

B.2.3.10 The Committee also considered the method for determining the fair market value (FMV) of unquoted equity investments. The Committee is of the view that the valuation methodology used by SEBI (Securities and Exchange Board of India) for valuing Venture Capital Investments can be used for valuing the unquoted equity investments.

B.2.3.11 If intangible assets are recognised under section A.16, or if holdings in a company's own shares or those of its parent come to be permitted, they shall be treated as a separate category of equities. The stress for the purpose of calculating the SCR for equity risk shall be of 100% and they shall be assumed to be perfectly correlated with the two types of equities discussed above.

B.2.4 SCR for Property Risk

B.2.4.1 The SCR for property risk shall be equal to loss in the basic own funds that would result from an instantaneous decrease of x% in the value of real estate. **The value for x will be specified by IRDA from time to time.**

[55] *Generalized Auto Regressive Conditional Heteroskedastic*

B.2.4.2 The Solvency II framework considers an instantaneous decrease of 25% in the value of real estate.

B.2.4.3 The Committee deliberated on the value for x (referred to in paragraph B.2.4.1) which would be appropriate in the Indian context. Anecdotal evidence suggests that market value of residential property investments do not experience significant declines. On the other hand market values of commercial properties are more prone to cyclical changes. The Committee could not find any authentic published empirical study analysing price volatility in the Indian property market.

B.2.4.4 The Committee is of the view that for the purpose of assessing the SCR for property risk IRDA can consider an instantaneous decrease of 25% only with respect to the value of commercial property investments.

B.2.4.5 The Committee also deliberated on an approach for determining the fair market value for property investments. The Committee is of the view that the valuation used by the local authorities (card rates) for determining property tax can be used as a proxy for the fair market value.

B.2.5 SCR for Spread Risk

B.2.5.1 The SCR for spread risk denotes the capital requirement for spread risk on

a. Bonds and loans other than mortgage loans

b. Tradable securities or other financial instruments based on repackaged loans

c. Credit derivatives

B.2.5.2 SCR for Spread Risk on Bonds and Loans (Solvency II Approach):

a. The capital requirement for spread risk on bonds and loans other than mortgage loans shall be equal to the loss in the basic own funds calculated according to the following formula:

FUP(rating i) * D(i) * MV(i)

Where

i. F^{UP}(rating i) is a function of the rating class of the bond or loan, which is calibrated to deliver a shock consistent with VaR 99.5% following a widening of credit spreads. In other words F^{UP}(rating i) denotes the spread risk factors applicable to bonds or loans as specified by the IRDA.

ii. D(i) denotes the modified duration of the bond or loan (i) denominated in years. It shall not be lower than 1 or higher than the maximum modified duration specified by IRDA

iii. MV(i) denotes the market value of the bond or loan i.

Table 3 provides the risk factors – $F^{UP}(i)$ – specified under the QIS 5 Technical Specifications.

Table 3: Spread Risk Factors Applicable to Bonds or Loans

Credit Quality Step	FUP	Duration Floor	Duration Cap
0	0.9%	1	36
1	1.1%	1	29
2	1.4%	1	23
3	2.5%	1	13
4	4.5%	1	10
5 and 6	7.5%	1	8
Unrated	3.0%	1	12

For example, based on the above table, for a AAA rated bond (Credit Quality 0) with a duration of 5 years a loss in value of 4.5% would be assumed under widening of spreads scenario.

B.2.5.3 SCR for Spread Risk on Structured Products(Solvency II Approach):

The capital requirement for spread risk on tradable securities or other financial instruments based on repackaged loans [structured products] will be equal to the loss in the basic own funds calculated according to the formula:

$$F^{UP}(\text{rating i}) * D(i) * MV(i)$$

Where

a. F^{UP}(rating i) is a function of the rating class of the structured products, which is calibrated to deliver a shock consistent with VaR 99.5% following a widening of credit spreads. In other words FUP(rating i) denotes the spread risk factors applicable to structured products as specified by the IRDA

b. D(i) denotes the modified duration of the structured product (i) denominated in years. It shall not be lower than 1 or higher than the maximum modified duration specified by IRDA

c. MV(i) denotes the market value of the structured product i

Table 4 provides the risk factors specified under the QIS 5 Technical Specifications for Structured Products.

Table 4: FUP (i) for Structured Products

Credit Quality Step	FUP	Duration Floor	Duration Cap
0	0.9%	1	36
1	1.1%	1	29
2	1.4%	1	23
3	2.5%	1	13
4	6.75%	1	10
5 and 6	11.25%	1	8
Unrated	3.0%	1	12

B.2.5.4 SCR for Credit Derivatives (Solvency II Approach):

a. The capital requirement for spread risk on credit derivatives other than those specified in B.2.5.4 (b) shall be equal to the higher of the following capital requirements:

   i. the loss in the basic own funds that would result from an instantaneous increase in absolute terms of the credit spread of the instruments underlying the credit derivatives, as set out in B.2.5.4 (c); and

   ii. the loss in the basic own funds that would result from an instantaneous relative decrease of the credit spread of the instruments underlying the credit derivatives by 75%.

b. Credit derivatives which are part of the undertaking's risk mitigation policy shall not be subject to a capital requirement for spread risk, as long as the undertaking holds either the instrument underlying the credit derivative or another exposure with respect to which the basis risk between that exposure and the instrument underlying the credit derivative is not material in any circumstances. Typically an insurance company's exposure to derivatives will fall under this category.

c. As per Solvency II Framework, the instantaneous increase of the credit spread of the instruments underlying the credit derivatives will be calculated as shown in Table 5.

Table 5: Instantaneous Increase of Credit Spread of Credit Derivatives

Credit Quality Step	Instantaneous Increase
0	1.30%
1	1.50%
2	2.60%
3	4.50%
4	8.40%
5	16.20%
6	16.20%

The instantaneous increase of the credit spread of credit derivatives for which credit rating is not available [from an approved credit rating agency] shall be 5 percentage points.

B.2.5.5 The Committee considered the RBI approach of providing a capital charge on corporate bonds which varies by credit quality as shown in Table 6.

Table 6: RBI's Grid for Capital Charge Related to Credit Risk

Credit Quality	Capital Charge as a % of Market Value
AAA Rated Bonds	1.8%
AA Rated Bonds	2.7%
A Rated Bonds	4.5%
BBB Rated Bonds	9.0%
BB Rated Bonds	13.5%
B or lower Rated Bonds	13.5%
Unrated Bonds	9.0%

B.2.5.6 The Committee noted that RBI's grid (Table 6) does not consider the fact that the spread risk also varies directly with the duration of the bond. This is probably due to the fact that the bond portfolios of banks predominantly comprise short term bonds. On the other hand the bond portfolios of the insurance companies – particularly life insurance companies – are tilted towards long term bonds. Therefore both credit quality and duration will impact the spread risk of such bond portfolios.

B.2.5.7 The Committee developed a spread sheet model to calculate the SCR for spread risk using the Solvency II grid risk (Table 3) and the RBI grid (Table 6) at the time of preparing this Report. IRDA is in the process of using the two grids for assessing the impact of "the SCR for spread risk" on the solvency ratios of selected life insurance and general insurance companies.

B.2.5.8 Taking into account the fact that the Solvency II grid considers spread risk as a function of both credit quality and duration, the Committee is in favour of using this grid for calculating the SCR for spread risk.

B.2.5.9 In the context of spread risk the Committee considered the issue of creating a capital charge for non-performing assets (NPAs). In order to be consistent with the fair value approach, it was agreed that these NPAs need to be either marked to market or marked to a market consistent model. At the same time the Committee also recognised the current practice whereby the carrying cost of these NPAs is net of the amount to be written off as per the RBI's provisioning norms. Given that RBIs provisioning norms are quite prudent, the Committee debated whether there is a need to create a SCR for spread risk on NPAs. The Committee felt that mark to market approach or marking to a market consistent model can prove to be difficult. Hence the Committee concluded that the RBI's approach for recognising impairment can be the most pragmatic approach. **However the Committee also recommended that IRDA should specify the stress to be applied to the value of the asset recognised in the balance sheet.**

B.2.6 SCR for Market Risk Concentration

B.2.6.1 The capital requirement for market risk concentration shall be calculated on the basis of single name exposures. For this purpose exposures to undertakings which belong to the same group, or to the same financial conglomerate shall be treated as a single exposure. Similarly, properties which are located in the same building shall be considered as a single property.

B.2.6.2 The net exposure at default to counterparty shall be the sum of the exposures at default to this counterparty considered as a single name exposure.

B.2.6.3 The weighted average credit quality step on a single name exposure shall be equal to the whole number nearest to the average of the credit quality steps of the individual exposures to the individual counterparty, weighted by the net exposure at default in respect of the individual exposure to that individual counterparty.

B.2.6.4 Exposures for which a credit assessment (credit rating) is not available from an approved credit rating agency will be assigned to credit quality step 5.

B.2.6.5 The SCR for market risk concentration is calculated using the formula:

$$\left[\sum_i Conc(i)\text{^}2\right]\text{^}0.5$$

where Conc(i) denotes the capital requirement for market risk concentration on the single name exposure(i).

B.2.6.6 Conc(i) shall be equal to the loss in the basic own funds that would result from an instantaneous relative decrease in the value of the assets corresponding to the single name exposure i of the following amount:

Conc(i) = Xs(i) * g(i)

Where

a. XS(i) is the excess exposure

b. g(i) is the risk factor for market risk concentration

B.2.6.7 The excess exposure on a single name exposure i shall be equal to the following:

$$XS(i) = Max\left(0; \frac{E(i)}{Assets} - CT(i)\right)$$

where:

- E(i) denotes the net exposure at default to the counterparty (i);
- "Assets" denotes the calculation base for the purpose of assessing market risk concentration; and
- CT(i) denotes the excess exposure threshold.

B.2.6.8 **The calculation base of the market risk concentration sub module will be as defined by IRDA**. This calculation base, inter alia, will exclude:

a. assets held in respect of life insurance contracts where the investment risk is fully borne by the policyholder [linked assets]; and

b. assets covered in the counterparty default risk module

B.2.6.9 **The excess exposure threshold on a single name exposure shall be determined by IRDA according to the weighted average credit quality step defined in B.2.6.3.**

While determining the excess exposure threshold, IRDA will keep in view

a. the counterparty exposure limits that are defined in the Insurance Act and Regulations and

b. the excess exposure threshold that would be appropriate under an "extreme event" scenario

B.2.6.10 Table 7 provides the excess exposure thresholds – CT(i) – and the risk factors – g(i) – specified under the Solvency II framework.

Table 7: Excess Exposure Threshold and Risk Factors for Market Risk Concentration

Weighted Average Credit Quality Step	CT(i)	g(i)
0	3%	12%
1	3%	12%
2	3%	21%
3	1.5%	27%
4	1.5%	73%
5	1.5%	73%
6	1.5%	73%

The Committee is of the view that in principle there is a need to create SCR for market concentration risk. **However the Committee suggests that the CT(i) and g(i) values specified under the Solvency II framework (Table 7) need to be validated in the Indian context by IRDA so that the capital requirement for this source of risk is appropriate.**

B.2.7 SCR for Currency Risk[56]

B.2.7.1 The capital requirement for currency risk shall be equal to the sum of the capital requirements for currency risk on each foreign currency. Foreign currencies are currencies other than the Indian Rupee. Investments in equities which are listed shall be assumed to be sensitive to the currency of its main listing. Equities which are non-listed shall be assumed to be sensitive to the currency of the country in which the issuer has its main operations. Property shall be assumed to be sensitive to the currency of the country in which it is located.

[56]*This risk module has been added to the Report of the Sub-Committee on market and counterparty risks by the Committee to develop the road map to risk-based solvency.*

B.2.7.2 For each foreign currency, the capital requirement for currency risk shall be equal to the larger of the following capital requirements:

a. the capital requirement for the risk of an increase in value of the foreign currency against the Indian Rupee;

b. the capital requirement for the risk of a decrease in value of the foreign currency against the Indian Rupee.

B.2.7.3 The capital requirement for the risk of an increase in value of a foreign currency against the Indian Rupee shall be equal to the loss in the basic own funds that would result from an instantaneous increase of 25% **[or a percentage specified by IRDA]** in the value of the foreign currency against the Indian Rupee.

B.2.7.4 The capital requirement for the risk of a decrease in value of a foreign currency against the Indian Rupee shall be equal to the loss in the basic own funds that would result from an instantaneous decrease of 25 % **[or a percentage specified by IRDA]** in the value of the foreign currency against the Indian Rupee.

B.3 SCR for Counterparty Default Risk

B.3.1 Counterparty default risk covers two types of counter party default risk exposures – type 1 exposures and type 2. This module will include all credit or counterparty exposures that have not been affected by the credit spread stress

Type 1 exposures refer to exposures which may not be diversified and where the debt securities issued by the counterparty are likely to be rated. Examples of Type 1 exposures will include **cash at bank, reinsurance arrangements, securitisations** and derivatives.

Type 2 exposures are all exposures which are in the scope of this module and are not of type 1. Typically type 2 exposures will be those exposures which are not diversified and where the counterparty is likely to be unrated. Examples will include receivables from intermediaries and policy holder debtors.

B.3.2 SCR for Type 1 Exposures (Solvency II Approach)

B.3.2.1 The Solvency II framework defines the SCR for Type 1 exposures as:

$SCR(Type\ 1) = k\ \sigma$

where

k = 3 if the standard deviation of the loss distribution of type 1 exposures is less than or equal to 7.05% of the total losses–given–default on all type 1 exposures;

k = 5 if the standard deviation of the loss distribution of type 1 exposures exceeds 7.05% but is less than 20% of the total losses–given-default on all type 1 exposures; and σ denotes the standard deviation of the loss distribution of type 1 exposures

B.3.2.2 Where the standard deviation of the loss distribution of type 1 exposures exceeds 20% of the total losses-given-default on all type 1 exposures, the capital requirement for type 1 exposures is set equal to the total losses- given- default on all type 1 exposures.

B.3.2.3 The standard deviation (σ) of the loss distribution of type 1 exposures is defined as a parameterised function of the Probability of Default (PD) on single name exposures and the loss –given-default (LGD) on single name exposures. The actual parameterised functions specified under the Solvency II framework for calculating σ have not been reproduced in this Report. A complete description of these formulae is provided in the publication titled "Draft Implementing Measures Solvency II" published by the European Commission in October 2011.

B.3.2.4 Where the single name exposure is credit rated, the probabilities of default (over a one-year time frame) will be as specified in Table 8. Unrated banks will be assigned a credit quality step of 3 [equivalent to a credit rating of BBB]

Table 8: Probability of Default (PD)

Credit Quality	Probability of Default (PD)
0	0.002%
1	0.01%
2	0.05%
3	0.24%
4	1.20%
5	4.175%
6	4.175%

Where the single name exposure is an insurance or reinsurance undertaking and a credit rating is not available, then the probability of default will be a function of the solvency ratio as defined in Table 9.

Table 9: Probability of Default where the Single Name Exposure is an Insurance or Reinsurance Undertaking which is not Credit Rated

Solvency Ratio	Probability of Default
196%	0.01%
175%	0.05%
150%	0.10%
125%	0.20%
122%	0.24%
100%	0.50%
95%	1.20%
75%	4.175%

In this context 'solvency ratio' denotes the ratio of the eligible amount of own funds to cover the Solvency Capital Requirement.

Where the solvency ratio falls in between the solvency ratios specified above, the value of the probability of default shall be linearly interpolated from the closest solvency ratios and probabilities of default specified in the table above. For solvency ratio lower than 75% the probability of default shall be 4.175%. For solvency ratios higher than 196% the probability of default shall be 0.01%.

The probability of default on the single name exposures other than those identified above is typically set equal to 4.175%.

B.3.2.5 The loss-given-default on a single name exposure shall be equal to the sum of the loss-given-default on each of the individual exposures to counterparty. The loss-given-default shall be net of the liabilities towards this single name exposure provided that those liabilities and individual exposures can be set off in the case of default. No netting shall be allowed for if the liabilities are expected to be met before the credit exposure is cleared.

B.3.2.6 The loss-given-default on a reinsurance arrangement or insurance securitisation shall be equal to the following:

LGD = max (50 %(Recoverables+RMre)-F.Collateral;0)

where:

a. Recoverable denotes the amounts that are contractually recoverable from the reinsurance arrangement or insurance securitisation and the corresponding debtors,

b. RMre denotes the risk mitigating effect on underwriting risk of the reinsurance arrangement or securitisation measured in terms of the cost of capital.

c. Collateral denotes the risk adjusted value of collateral in relation to reinsurance arrangement or securitisation

d. F denotes a factor to take into account the economic effect of the collateral arrangement in relation to the reinsurance arrangement or securitisation in case of any credit event related to the counterparty. In other words, the factor F denotes the risk adjusted value of the collateral. The publication titled "Draft Implementing Measures Solvency II published by the European Commission [October 2011] provides detailed guidance for calculating this factor. **IRDA needs to examine whether RBI has provided any guidance on the value to be attached to collateral in the case of default.**

B.3.2.7 The risk mitigating effect on underwriting or market risks of a reinsurance arrangement, securitisation or derivative referred to in B.3.2.6 is the difference between the following capital requirements in terms of cost of capital:

a. The cost of the hypothetical capital requirement for underwriting or market risk of the insurance or reinsurance undertaking that would apply if the reinsurance arrangement, securitisation or derivative did not exist;

b. The cost of the capital requirement for underwriting or market risk of the insurance or reinsurance undertaking taking into account the risk mitigating effect of the reinsurance arrangement, securitisation or derivative.

B.3.2.8 The Solvency II framework provides detailed guidelines for calculating the risk adjusted value of collateral referred to in paragraph B.3.2.6.

B.3.3 SCR for Type 2 Exposures (Solvency II Approach)

The capital requirement for counterparty default risk on type 2 exposures shall be equal to the loss in the basic own funds that would result from an instantaneous decrease in value of type 2 exposures, by the following amount:

90%*LGD (Receivables >3 months) + $\sum 15\% * LGD(i)$

Where:

a. LGD (Receivables > 3 months) denotes the total losses-given-default on all receivables from intermediaries which have been due for more than three months

b. The sum is taken on all type 2 exposures other than receivables from intermediaries which have been due for more than three months;

c. LGD(i) denotes the loss given-default on the type 2 exposure i

B.3.3.1 The Committee is of the view that IRDA can adopt a simplified approach similar to the formula provided in paragraph B.3.3 for assessing the SCR on both Type 1 and Type 2 exposures.

Appendix C : SCR for Health Risk

Description

C.1 In India, a practice has developed of life insurance companies writing health insurance business, where typically the claim is for reimbursement of health care costs. We propose a risk module in this Appendix to calculate a capital requirement in respect of such business. We note that Solvency II, in its QIS5 exercise, dealt with the much larger set of health insurance in its entirety. However, since our aim at this stage is to provide enough guidance only conduct a study into the risk-based capital of life insurance companies, we restrict ourselves to dealing only with health insurance designed to reimburse medical costs. Any health insurance where the claim amount is defined as a fixed sum assured or fixed level of income rather than on an indemnity basis would be covered in Appendix A.

C.2 The capital requirement for health underwriting risk is derived by combining the capital requirements for the health sub-modules using a correlation matrix as follows:

	$Health_{SLT}$[57]	$Health_{CAT}$
$Health_{SLT}$	1	0.25
$Health_{CAT}$	0.25	1

The quantification of the sub-modules in respect of $Health_{SLT}$ and $Health_{CAT}$ is defined below.

C.3 Under QIS 5, capital requirements were calculated gross and net of loss absorbent capacity of technical provisions. In our case, where the business is participating, the considerations in Appendix D apply and are not repeated here. Where loss absorbency arises because premium rates are reviewable, we propose that the capital relief on account of loss absorbency be limited to the maximum amount of absorbency that may be justified on the basis of a rate review, given experience at the 99.5% percentile. Of necessity, this will be a matter of judgement and will require some interaction between the company and the Regulator.

C.4 The SCR for the HealthSLT module is calculated by combining risk sub-modules using the following correlation matrix:

	Mortality	Longevity	Disability/morbidity	Lapse	Expense
Mortality	1				
Longevity	-0.25	1			
Disability/morbidity	0.25	0	1		
Lapse	0	0.25	0	1	
Expense	0.25	0.25	0.5	0.5	1

The capital requirements arising from the sub-modules below in respect of mortality, longevity, disability/morbidity, lapse and expenses are combined according to the formula below:

[57]QIS 5 uses the terminology HealthSLT to denote risks arising from the underwriting of health insurance obligations pursued on a similar technical basis to life insurance, and which are associated with both the perils covered and processes used in the conduct of the business. However, since we are dealing here only with business written by life offices, we have assumed that all health business would be HealthSLT, and we do not deal with any other category.

$$Health_{SLT} = \{\Sigma_{i,j} Corr_{i,j} SCR_i SCR_j\}^{1/2}$$

where SCRi denotes the capital requirement for risk module i, below, and Corri,j represents the correlation coefficient from the table above.

$Health_{SLT}$ Mortality Risk

C.5 The $Health_{SLT}$mortalitysub-module covers the risk of loss, or of adverse change in the value of (re)insurance liabilities, resulting from changes in the level, trend, or volatility of mortality rates, where an increase in the mortality rate leads to an increase in the value of (re)insurance liabilities.

C.6 The $Health_{SLT}$mortalitysub-module aims at capturing the increase in general mortality that negatively affects the obligations of the undertaking. For the health products concerned by this risk, mortality risk relates to the general mortality probabilities used in the calculation of the technical provisions. Even if the health product does not insure death risk, there may be a significant mortality risk because the valuation includes profit at inception: if the policyholder dies early he/she will not pay future premiums and the profit of the insurer will be lower than allowed for in the technical provisions. For SLT health (re)insurance this can be a relevant effect.

C.7 The calculation of the capital requirement in respect of mortality for $Health_{SLT}$ shall be made as for mortality risk sub-module of the life insurance risk module. (Please see paragraphs A.113-A.115, above.)

$Health_{SLT}$ Longevity Risk

C.8 The $Health_{SLT}$ longevity risk covers the risk of loss, or of adverse change in the value of (re)insurance liabilities, resulting from the changes in the level, trend, or volatility of mortality rates, where a decrease in the mortality rate leads to an increase in the value of (re)insurance liabilities.

C.9 The calculation of the capital requirement in respect of longevity for $Health_{SLT}$ shall be made as for longevity risk sub-module of the life insurance risk module. (Please see paragraphs A.116-A.118, above.)

$Health_{SLT}$ Disability/Morbidity Risk

C.10 The $Health_{SLT}$ disability/morbidity risk covers the risk of loss, or of adverse change in the value of (re)insurance liabilities, resulting from changes in the level, trend or volatility of the frequency or the initial severity of the claims, due to changes:

- In the disability, sickness and morbidity rates and
- In medical inflation.

C.11 In this Appendix, we consider only medical expense insurance obligations, rather than the wider range of insurance that health and general insurers may offer. Medical expense insurance obligations are obligations which cover the provision of preventive or curative medical treatment or care including medical treatment or care due to illness, accident, disability and infirmity, or financial compensation for such treatment or care.

C.12 For medical expense (re)insurance, the determination of the disability/morbidity capital requirement cannot be based on disability or morbidity probabilities. A large part of the risk in medical expense (re)insurance is independent from the actual health status of insured person. For example, it may be very expensive to find out whether the insured person is ill or to prevent the insured person from becoming ill – these expenses are usually covered by the health policy. If an insured person is ill, the resulting expenses significantly depend on the individual case. It can also happen that an insured person is ill but does not generate significant medical expenses.

C.13 The capital requirement is computed by analysing the scenarios claim shock up and claim shock down defined as follows:

Scenario	Permanent absolute change of claim inflation	Permanent relative change of claims
Claim shock up	+1%	+5%
Claim shock down	-1%	-5%

C.14 The scenario claim shock down needs only to be analysed for policies that include a premium adjustment mechanism which foresees an increase of premiums if claims are higher than expected and a decrease of premiums if claims are lower than expected.Otherwise, undertakings should assume that the result of the scenario claim shock down is zero.

C.15 Subject to C.14, above, the relevant scenario (up and down) is the more adverse scenario taking into account the loss-absorbing capacity of technical provisions.

$Health_{SLT}$ Lapse Risk

C.16 The $Health_{SLT}$ lapse risk covers the risk of loss, or of adverse change in the value of (re)insurance liabilities, resulting from changes in the level or volatility of the rates of policy lapses, terminations, renewals and surrenders.

C.17 The calculation of the capital requirement in respect of expenses for $Health_{SLT}$ shall be made as for lapse risk sub-module of the life insurance risk module. (Please see paragraphs A.123 - A.130, above.)

$Health_{SLT}$ Expense Risk

C.18 The $Health_{SLT}$ expense risk covers the risk of loss, or of adverse change in the value of (re)insurance liabilities, resulting from changes in the level, trend, or volatility of the expenses incurred in servicing insurance or reinsurance contracts. Expense risk arises if the expenses anticipated when pricing a guarantee are insufficient to cover the actual costs accruing in the following years. All expenses incurred have to be taken into account.

C.19 The calculation of the capital requirement in respect of expenses for $Health_{SLT}$ shall be made as for expense risk sub-module of the life insurance risk module. (Please see paragraphs A.121 - A.122, above.)

$Health_{CAT}$ Risk

C.20 The health catastrophe risk capital requirement covers the risk of loss, or of adverse change in the value of insurance liabilities, resulting from the significant uncertainty of pricing and provisioning assumptions related to outbreaks of major epidemics, as well as the unusual accumulation of risks under such extreme circumstances.

C.21 The health catastrophe risk sub-module under the standard formula should be calculated using standardised scenarios.

C.22 The standardised scenarios for health catastrophes considered in this Appendix are:

- Arena disaster
- Concentration scenario
- Pandemic scenario.

C.23 It should be noted that:

- Scenarios are applicable to worldwide exposures.
- Geographical boundaries are recognised where necessary.
- Scenarios should be provided gross of reinsurance and gross of all other mitigation instruments (for example national pool arrangements). Undertakings should take into account reinsurance and other mitigation instruments to estimate their net loss as specified below.
- The scenarios also apply to proportional reinsurance.

C.24 The health catastrophe risk sub-module does currently not capture the health catastrophe risk of all exposures. Circumstances in which the standardised scenarios may not be appropriate are:

- Where an undertaking accepts non-proportional reinsurance of some or all of the products included in the health catastrophe scenarios.
- Where undertakings have exposures which are not captured by the health catastrophe scenarios.

C.25 We define the following:

H_{CAT_Arena}	=	Capital requirement for health catastrophe risk under an Arena scenario net of risk mitigation
$H_{CAT\_Concentration}$	=	Capital requirement for health catastrophe risk under a Concentration scenario net of risk mitigation
$H_{CAT\_Pandemic}$	=	Capital requirement for health catastrophe risk under a Pandemic scenario net of risk mitigation

C.26 Then

$$Health_{CAT} = \{H_{CAT\_Arena}^{2} + H_{CAT\_Concentration}^{2} + H_{CAT\_Pandemic}^{2}\}^{0.5}$$

C.27 Undertakings may estimate the net (of risk mitigation) capital requirement for each of the above three components of HealthCATby applying the following formulae[58]:

Where the XL cover follows a proportional cover:

MAX ((L*MS*QS)-XLC, 0) +MIN ((L*MS*QS), XLF) + REINST

Where a proportional cover follows an XL cover:

MAX ((L*MS)-XLC, 0) *QS +MIN((L*MS), XLF) *QS + REINST

Where

L= the total gross loss amount. **The total gross loss amount of the catastrophe will be provided as part of the information of the scenario.**

MS= the market share. This proportion might be determined with reference toexposure estimates, historical loss experience or the share of total marketpremium income received. **The total market loss amount of the catastrophe will be provided as part of the information of the scenario.**

QS= quota share retention. Allowance must be made for any limitations, e.g. event limits which are frequently applied to QS treaties

XLC= the upper limit of the XL programme that is applicable in case of the scenario event

XLF= the XL retention of the XL programme that is applicable in case of thescenario event

REINST = the reinstatement premium or premiums (in case of scenarios with asuccession of 2 or more identical events).

[58]QIS5 provides for alternative calculations which rely on a considerable element of detailed information relevant to the various countries of the EU, and which has been established by CEIOPS's Catastrophe task Force. We recommend that similarly detailed investigations be taken up when this Appendix is extended to cover specialist health and general insurers.

Appendix D : Loss Absorbency of With Profit Business

D.1 Background

In order to assess the capital requirements of a with profits fund, it is necessary to assess the loss absorbency of with profits business. In Appendix A, paragraph A.108, we noted that the SCR is derived from the basic SCR, the capital requirement for operational risk and an adjustment for the loss-absorbing capacity of technical provisions. In this Appendix, we consider the last of these.

In general, the approach to capital requirements is recommended to be modular, i.e. we calculate capital requirements, using a value-at-risk model wherever possible, for individual risks and then aggregate them using a prescribed correlation matrix. However, where the liabilities are loss absorbent, it is important not to double count any risk mitigating effects.

Examples of loss absorbent business include unit linked business, where market losses are passed to the policyholder through the unit price (albeit, subject to any guarantees), and participating business, where they may be passed to the policyholder through management actions such as cuts in future bonus rates.

In this Appendix, we discuss the proposed approach to the Solvency Capital Requirements (SCR) of a with profits fund that will recognise the loss absorbency arising from future management actions, but will avoid double counting of their effects.

We note that any deferred tax asset or liability would also be affected by a stress event, and should serve to mitigate losses. It would therefore be important for the calculation of capital requirements to recognise this mitigating effect, but without the double counting that may arise from a purely modular approach. However, in this note, we set aside consideration of deferred tax.

D.1.1 Approaches proposed in CEIOPS's Consultation Paper 54 (CP54)

By way of background, we consider the approaches proposed in CP54 and the responses these elicited. We draw heavily on CEIOPS's response to the feedback, as documented in:

Consultation Paper No. 54,

Draft CEIOPS' Advice for Level 2 implementing Measures on Solvency II: SCR standard formula loss-absorbing capacity of technical provisions and deferred taxes, ref: CEIOPS-CP-54/09, dated 2 July 2009.

QIS4 set out two approaches:

a) Default approach: Under this approach, the capital charge for each risk was calculated under the following two scenarios:

- The insurer is not able to vary its assumptions of future bonus rates in response to the shock being tested (gross calculation), i.e. the bonus rates are unchanged

from those used to calculate the best estimate liability as part of the calculation of technical provisions.

- The insurer is able to vary its assumptions on future bonus rates in response to the shock being tested, based on reasonable expectations and having regard to plausible management actions (net calculation)

Both the net and gross capital requirements were then aggregated separately using the relevant correlation matrices. The adjustment to the basic SCR for the loss-absorbing capacity of future discretionary benefits was determined by comparing the gross and net SCRs. This adjustment was limited to a maximum of the total value of future discretionary bonuses. This approach is referred to as the modular approach.

b) Alternative approach: Under the alternative approach, the basic SCR was calculated using a single scenario under which all of the risks covered by the standard formula occurred simultaneously.

The process involved the following steps:

- The capital charge for each risk was calculated under the assumption that the insurer was not able to vary its assumptions on future bonus rates in response to the shock being tested (gross calculation).
- The gross capital charges were used as inputs to determine the single equivalent scenario based on the relative importance of each of the sub-risks to the undertaking. Undertakings had the option to determine the single equivalent scenario using net capital charges as inputs if this was felt to more accurately reflect the relative importance of each risk.
- The undertaking then considered the management actions which would be applied in such a scenario and, in particular, whether their assumptions about future bonus rates would change if such a scenario were to occur. It is to be noted therefore that the management actions which would be applied if all stresses occur simultaneously may not be the same as those which would be applied if the stresses occur individually as in the modular approach.
- The change in the undertaking's net asset value was then calculated on the assumption that all the shocks underlying the single equivalent scenario occurred simultaneously and that the undertaking made an operational loss equal to the capital charge in respect of operational risk.
- The adjustment to the basic SCR for the loss-absorbing capacity of future discretionary benefits was determined by deducting the SCR for operational risk and the SCR calculated under the single equivalent scenario from the gross SCR.
- This approach is referred to as the single equivalent scenario approach.

D.1.2 Management Actions

Concerns were expressed as to the extent of credit which could be taken for future management actions.

CEIOPS's response was to advise:

'Any assumptions regarding future management actions for the assessment of the standard formula SCR must meet the criteria set out in CEIOPS's CP 32.'

Broadly, this requires future management actions to have the following properties:

a) Objectivity
b) Realism
c) Verifiability.

These are discussed in detail in the document:

CEIOPS' Advice for Level 2 Implementing Measures on Solvency II:

Technical Provisions - Assumptions about Future Management Actions (former CP32), reference: CEIOPS-DOC-27/09.

The assumed implementation of management actions was clarified:

'To the extent that the stress under consideration is considered to be an instantaneous stress, no management actions may be assumed to occur during the stress.

'However it may be necessary to reassess the value of the technical provisions after the stress. Assumptions about future management actions may be taken into account at this stage. The approach taken for the recalculation of the best estimate to assess the impact of the stress should be consistent with the approach taken in the initial valuation of the best estimate.

'This advice applies to both the gross and net calculations of the SCR.'

D.1.3 Gross SCR

It was originally proposed that, for the gross calculation, the scenario should be calculated under the condition that the absolute amount of future discretionary benefits cash flows per policy and year remain unchanged before and after the shock being tested, i.e. the absolute amount of cash flows was unchanged from the one used to calculate the best estimate liability as part of the calculation of technical provisions.

One of the practical issues raised by the QIS4 participants was the difficulty in calculating the Gross SCR where technical provisions were calculated using a stochastic model with dynamic bonus rates. In order to improve the practicability of the calculation in this situation, CEIOPS suggested that the gross calculation should be based on the average amount of future discretionary benefits cash flows across all scenarios used in the technical provision calculation.

However, even this would give rise to considerable practical difficulties. In response to this, CEIOPS proposed a somewhat simpler alternative:

'The scenario should be calculated under the condition that the value of future discretionary benefits remains unchanged before and after the shock being tested. Moreover, it may be assumed that the (time) value of options and guarantees in the technical provisions remain unchanged.'

Various advantages of this approach were noted:

- The difference between the Gross SCR and the Net SCR is the change in the value of future discretionary benefits caused by the shock. This is exactly what the adjustment seeks to quantify, namely the potential compensation of unexpected losses through a decrease in future discretionary benefits.

- The calculation of the gross SCR for market risk (except interest rate risk) would not require the recalculation of the technical provisions because these market risk scenarios do not affect the value of the technical provisions for guaranteed benefits. The necessary calculations are identical to those which are necessary to calculate the Net SCR. For the calculation of the gross interest rate risk SCR, only a rediscounting of the cash-flows for guaranteed benefits is necessary.

We note that CEIOPS requires the time value of options and guarantees to remain unchanged, post-stress. This appears inherently unrealistic, since the TVOG would depend on the moneyness of the guarantee, and the moneyness varies will change under stress. However, TVOG arises only to the extent that there is optionality in the liability. If we adopt a working hypothesis that capital requirement arise only from guaranteed benefits, then post-stress, there would be no optionality in the liability, and hence no TVOG.

We note also that these methods require a clear distinction between guaranteed and discretionary benefits. This too had been an area of concern in the feedback, as there was considered to be some scope for ambiguity. In response to this, CEIOPS's reiterated its definitions:

- 'Guaranteed benefits: This represents the value of future cash-flows which does not take into account any future declaration of future discretionary bonuses. The cash flows take into account only those liabilities to policyholders or beneficiaries to which they are entitled at the valuation date.

- 'Conditional discretionary benefits: This is a liability based on declaration of future benefits influenced by legal or contractual declarations and performance of the undertaking/fund. It could be linked with IFRS definition of "discretionary participation features" as additional benefits that are contractually based on:

  a) the performance of a specified pool of contracts or a specified type of contract or a single contract

  b) realised and/or unrealised investment return on a specified pool of assets held by the issuer; or

c) the profit or loss of the company, fund or other entity that issues the contract.

'Pure discretionary benefit: This represents the liability based on the declaration of future benefits which are in discretion of the management. It could be linked with IFRS definition of "discretionary participation features" as additional benefits whose amount or timing is contractually at the discretion of the issuer.

'Both conditional and pure discretionary benefits could potentially be considered to be loss-absorbing and undertakings should consider the extent to which this is the case.'

D.1.4 Single Equivalent Scenario

Much of the feedback was in favour of the single equivalent scenario, on the grounds that it clearly avoided any double counting.

CEIOPS, in its response allowed the scenario to be derived from either gross or net SCR components, thereby giving rise to some inconsistency between companies. Furthermore, CEIOPS stated:

'To facilitate the introduction of the single equivalent scenario, CEIOPS will provide a spreadsheet which determines the single equivalent scenario for each (re)insurance undertaking.'

This suggests that construction of the scenario itself was somewhat problematic. Certainly, it would be difficult, if not impossible, to demonstrate that a single equivalent scenario that would correspond to a 1-in-200 year event. Therefore, it is helpful for the Regulator to prescribe its means of construction.

Below, we give the alternative approach proposed in this Report to address the issue of double counting of risk mitigants.

D.2 Proposal

1. Calculate Gross SCR, based on the modular method, as specified in the chapter, 'Risk Based Capital for Life Insurers'. We note that the Gross SCR should be based on an assumption of no management action during the shocks, though management actions may be assumed following the shocks.

2. Calculate Net SCR, based on modular method, as specified in the chapter, 'Risk Based Capital for Life Insurers', in which the full range of management actions (consistent with PRE) would be permitted.

3. We recognise that ideally, we would hold Net SCR, if we were confident that the diminution of liabilities based on management actions implicit in the Net SCR were reasonable and avoided double counting.

4. IRDA to adopt one of the following approaches:

A.

i. Quantify the value of the future bonus (i.e. future discretionary benefits) that can be reduced consistent with PRE in the base liabilities

ii. Specify that these liabilities may be reduced by up to X% under stress, with the Regulator to specify X

iii We propose a value of 100% for X; or

B.

i. Specify one or more scenarios of combined stress events, with the Regulator to specify the scenarios.

ii. In each, estimate future management actions, by way of reduction in bonus, alteration in investment strategy, etc.

iii. Given these management actions, calculate the reduction in the value of the liabilities compared with the base scenario.

The result of either Step 4(A) or 4(B) is the maximum credit that may be taken for management actions under stress.

Let Max_Credit be this quantity.

5. Calculate SCR = Gross SCR – min((Gross SCR – Net SCR), Max_Credit).

This approach would have the benefit of transparency (unlike, it may be said, the single equivalent scenario). If approach (B) is taken in step (4), the capital requirements would be calibrated to the company's approach to management of participating business, but at the cost of some simplicity. **The Regulator would have to specify the scenarios and also to approve the prospective management actions for which credit was claimed.**

The deduction in Step (5) is the adjustment in respect of loss absorbency of technical provisions.

We note that the approach may easily be extended to accommodate any change in the deferred tax liability arising from stress events, and to other loss-absorbent liabilities.

Appendix E : Treatment of Ring-Fenced participating Funds in a Company's SCR

E.1 Scope

In this Appendix, we consider how to incorporate the capital resources and requirements of a ring-fenced participating fund, in a company's SCR[59] and capital resources. The difficulty to be overcome is that surpluses in the fund would not be fungible since the fund is ring fenced. Hence, limited reliance may be placed on the surplus of the fund for meeting a company's capital requirements. However, we also note that the fund's capital requirements must be met by a combination of capital resources within and, if necessary, without the fund.

E.2 Construction of a participating Fund's Realistic Balance Sheet

The balance sheet of a participating fund should be calculated in accordance with the methods specified in Appendix A :. We note that the assets of a participating fund ($Assets_{WPF}$) would consist of the market value of all assets allocated to the fund, including Burnthrough, where:

Burnthrough is the value of the embedded option that the company may be deemed to have written to the participating fund, in support of its guarantees, minus the value of the shareholder's share of any positive residual estate.

The liabilities ($Liabilities_{WPF}$) would consist of:

1. (+) liabilities to policyholders, including future discretionary benefits and embedded derivatives

2. (+) Value of expected transfers to the shareholder fund by way of appropriations through the 90:10 (or 95:5) gate, in accordance with IRDA (Distribution of Surplus) Regulations, 2002.[60] This is known as the shareholders' in-force transfer (SHIFT).

3. (+) Future expenses allocated to the fund

4. (-) Future expenses allocated to the asset shares

5. (-) Future expected charges on the asset share (to the estate) other than those in respect of (4), above

6. (+) Future tax charges allocated to the fund

The fund's capital requirements (SCR_{WPF}) are discussed in the paper, 'Loss absorbency of participating business.'

The construction may be more complex if the fund benefits from contingent loans, financial reinsurance, or other similar constructs.

[59] *In Appendix C :D we proposed a method of calculating the SCR of a participating fund.*

[60] *Note that this item will be gross of any discount to allow for the likelihood that bonuses will not be declared or that, in extremis, capital injections would be made to meet liabilities, in accordance with Section 49 of Insurance Act, 1938.*
We note that, when we calculate the participating fund's SCR, if we allow any automatic increase in the Burnthrough in case of stress (or, equivalently, any discounting of the liability to make transfers to the shareholder fund) on grounds of increased capital injections, we will artificially reduce the capital requirements. Effectively, we would pre-empt that capital support we seek to quantify. Therefore, the 'Burnthrough' should not be considered when we quantify the fund's SCR.

E.3 Effect on a company's balance sheet

Let Own_Funds_{NPF} be the capital available, i.e. excess of assets over liabilities, calculated in accordance with the Appendix A :, in the non-par business and shareholder fund. The SHIFT is treated as an asset and the Burnthrough as a liability in this calculation.

Let Own_Funds_{WPF} be the own funds of a participating fund, as disclosed by the calculation in the Section above. Here, SHIFT is treated as a liability and Burnthrough as an asset.

Let SCR_{NPF} be the SCR arising from the non-participating and shareholder funds, and ignoring any change in value of both SHIFT and Burnthrough.

Let SCR_{WPF} be the SCR of the participating fund, calculated in accordance with Appendix A : and net of the adjustment specified in the Appendix C : We note that any change in the Burnthrough under stress does not contribute to SCR_{WPF}, for the reasons explained above. Nor do we allow for any change in value of the SHIFT. The purpose is to prevent any double counting of management actions, which could affect the bonus rates and hence the distribution of surplus to shareholders.

We note that SHIFT and Burnthrough represent the value of inter-fund transfers, and as such cannot affect a company's capital requirements. The effect of ring-fencing is seen below, on the company's own funds that are available to meet its capital requirements.

Let SCRCompany be the company's SCR and let Own_FundsCompany be the capital available to the company to cover its capital requirements.

Then

$$SCR_{Company} = SCR_{WPF} + SCR_{NPF}$$

and

$$Own\_Funds_{Company} = Own\_Funds_{NPF} + \min(Own\_Funds_{WPF}, SCR_{WPF})$$

Thus, in quantifying the capital available to the company, we take credit for capital in the participating fund only to the extent it covers the participating fund's capital requirements, since it is not fungible. Furthermore, we allow for the liability of the non-participating and shareholder funds of the company to the participating fund through the Burnthrough, which has been deducted from Own_FundsNPF. Lastly, if the participating fund cannot meet its capital requirements, we require the company to meet them from outside the participating fund. However, there would be no need to inject any such amount unless or until the participating fund's assets failed to meet its liabilities.

We note that the above approach does not take any credit for diversification between the participating fund and the rest of the business.

Appendix F : Current basis of Regulatory Capital

F.1 Solvency margin

The solvency of an insurance company corresponds to its ability to meet its liabilities to policyholders. An insurer is insolvent if its assets are not sufficient to meet its liabilities or cannot be liquidated in time to pay the claims arising. The solvency of insurance company or its financial strength depend chiefly on whether sufficient technical reserves have been set up for the obligations entered into and whether the company has adequate capital to provide security in case of adverse events.

Solvency margin is the amount by which the assets of an insurer exceed its liabilities. The solvency of life and non-life insurance companies is governed by Sections 64 & 64VA of the Insurance Act, 1938 read in conjunction with IRDA (Actuarial Report and Abstract) Regulations, 2000 and IRDA (Assets, Liabilities and Solvency Margin of Insurers) Regulations, 2000. Methods of valuations of assets and liabilities of an insurer are prescribed in the insurance regulations. Regulatory prescriptions on methods for estimating liabilities differ between life and non-life insurance business. However, health insurance business conducted by life insurance companies is valued in accordance with the provisions of IRDA (Assets, Liabilities and Solvency Margin of Insurers) Regulations, 2000, applicable to life insurance business.

Insurers must maintain a stipulated solvency margin prescribed by the regulator. The Indian solvency regime is based on a three factor based formula approach which aims at capturing various risks associated with mathematical reserves and asset risks on non-mandated investments. However, currently, the third factor, which is applicable to such assets, has been set to zero for computation of solvency requirements as sufficient prudence is required in determination of valuation rate of interest, in particular. The regime does not prescribe the methods of identification and quantification of various kinds of risks to which an insurer is exposed, except to the extent that they give rise to margins for adverse deviation in respect of valuation parameters for calculation of liabilities, or for setting aside capital for the risks so identified.

F.2 Insurance Act 1938 and Regulations

Section 64VA (1) of the Insurance Act, 1938 stipulates that Available Solvency Margin (ASM), i.e. the excess of value of assets over the value of liabilities, shall not be less than Required Solvency Margin (RSM). Section 64V prescribes the methods of valuation of assets and amount of liabilities. The regulations mentioned above provide more detailed guidelines on valuation of liabilities. The regulations define Available Solvency Margin and Solvency Ratio as stated below:

- "Available Solvency Margin" means the excess of value of assets (furnished in IRDA-Form AA) over the value of life insurance liabilities (furnished in Form H as specified in Regulation 4 of Insurance Regulatory and Development Authority (Actuarial Report and Abstract) Regulations, 2000) and other liabilities of policyholders' fund and shareholders' funds;

- "Solvency Ratio" means the ratio of the amount of Available Solvency Margin to the amount of Required Solvency Margin.

- (c)Determination of Solvency Margin – Every insurer shall determine the required solvency margin, the available solvency margin and the solvency ratio in Form K as specified under Insurance Regulatory and Development Authority (Actuarial Report and Abstract), Regulations, 2000.

It may be noted that various circulars have also been issued on these matters:

- Circular No. 64 dated 7th March 2008;
- Circular No. 29 dated 1st January 2009;
- Circular No. 48 dated 16th March 2006,
- Circular No.45 dated 31st March 2006; and
- Circular No. 60 dated 11th March, 2008.

F.3 Formulae

The current solvency requirements specify computation of the Required Solvency Margin as under

1. For life insurance, RSM is higher of
   a) Rs. 50 crores (Rs.100 CR., for reinsurers) and
   b) x% of mathematical reserve + y% of sum at risk + z% of value of assets.

where x refers to interest risk; y refers to mortality risk; and z refers to investment risk. For life insurers, z factor has been made zero in the regulations. x and y depend on the category and features of the product in question.

2. For general insurance, RSM is highest of

   a) Rs.50 crores (Rs 100 crores in case of Reinsurer);

   b) RSM – 1 which is determined as 20% of Maximum (Gross Premium * Factor A, Net Premiums), where Factor – A varies from 0.50 to 0.90 depending on lines of business.

   c) RSM – 2 which is determined as 30% of Maximum (Gross Net Incurred Claims * Factor B, Net incurred Claims). Factor B varies from 0.50 to 0.90 depending on lines of business.

Appendix G : Monetary Authority of Singapore: Consultation Paper[61]

G.1 Scope

In this Appendix, we discuss the approach to risk-based capital (RBC) proposed by the Monetary Authority of Singapore (MAS) in the consultation paper (CP) it issued on the subject. The CP was issued in June, 2012 and makes proposals in respect of:

1. Required capital
2. Components of available capital, including negative reserves
3. Solvency intervention levels
4. Valuation of assets and liabilities
5. Enterprise risk management
6. Timelines

We restrict our comments to items number 1, 2 (focusing on the treatment of negative reserves) and 4 from the list, above.

G.2 Background

Singapore already has a risk-based regulatory regime, which captures material risks such as market risk, credit risk, underwriting risk and concentration risk. In its review of risk-based capital, MAS is 'reviewing the risk coverage in line with evolving global regulatory and market developments.'

G.3 Required Capital

Components

MAS has proposed that new components of required capital be defined in respect of certain risks that are not already covered.

1. The CP proposes that credit spread risk be captured as an explicit component of the capital requirement. The risk results from 'the sensitivity of the value of assets and liabilities due to changes in the level or in the volatility of credit spreads over the risk-free rate.'

2. In respect of liquidity, MAS does 'not propose to impose an explicit risk charge for liquidity risk as there is no well-established methodology to quantify capital requirements for liquidity risk. MAS will continue to assess the robustness of insurers' liquidity risk management through supervision.'

3. In respect of operational risk, MAS 'intends to start off with a simplified and pragmatic method to quantify the operational risk charge, and refine its methodology in future as more data becomes available and practices are more established internationally. The proposed method is broadly similar to some of the approaches used in other jurisdictions such as the European Economic Area (under the standardised formula approach of Solvency II) and Australia.' To this end, it has proposed a formula:

[61] *Review on Risk-Based Capital Framework for Insurers in Singapore ('RBC 2 Review')*

'MAS proposes to incorporate an explicit risk charge to capture operational risk within the RBC 2 framework, calculated as:

x% of the higher of the past 3 years' averages of

(a) earned premium income; and

(b) gross policy liabilities,

subject to a maximum of 10% of the total risk requirements.

Where x = 4% (except for investment-linked business, where x = 0.25% given that most of the management of investment-linked fund is outsourced)'

4. In respect of insurance catastrophe risk, an explicit component of required capital is proposed. MAS has considered three options for its calculation:

   a. To require insurers to construct a catastrophe scenario that is most relevant to them and has the greatest impact, benchmarked to some target criteria (e.g. 1 in 200 year event), and work out the capital that has to be set aside to meet that event net of reinsurance arrangements. This is similar to the approach of allowing the use of internal models.

   b. For the regulator to prescribe a number of man-made and natural catastrophe scenarios. An explicit risk charge is then computed accordingly from a combination of these scenarios.

   c. For the insurers to stress test on a number of standardised catastrophe scenarios, and additional capital requirements would only be imposed for the insurers that are more vulnerable. This would, however, be less transparent.

While option (a) above is recognised as an eventual target, MAS recognises that insurers would need time to build there catastrophe modelling capabilities. Therefore option (b) is proposed as a short term measure. 'MAS intends to work with the industry associations, reinsurance brokers and the other risk institutes/academia in Singapore to design relevant standardised catastrophic scenarios. For life business, the explicit insurance catastrophic risk charge can be derived based on a pandemic event.'

G.4 Calibration

MAS has considered two forms of RBC: value at risk (VaR) and conditional tail expectation (or tail-VaR). While recognising the benefits and drawbacks of both, it proposes to adopt a VaR approach. The calibration is intended to be over a one year outlook with a confidence level of 0.5%.

Section 2.20 of the CP outlines the implications:

'There will be a change in the approach in deriving most of the asset-related risk requirements

under RBC 2. Instead of applying a fixed factor on the market value (e.g. 16% on the equity market value for equity risk requirement) as per current approach, we will now apply a shock to the Net Asset (Assets less Liabilities) and measure the impact of the shock. The shock is calibrated at a VaR of 99.5% confidence level over a one year period. The new risk requirement will be equivalent to the amount of change in Net Asset for each respective risk.'

While these proposals are similar to the standard set in in the standard model approach to the SCR under Pillar 1 of Solvency II, one significant difference is that MAS is not proposing to allow any benefit of diversification. Section 2.24 gives MAS's rationale:

'MAS looked into the possibility of recognising diversification benefits when aggregating the risk requirements under RBC 2. However, dependencies between different risks will vary as market conditions change and correlation has been shown to increase significantly during periods of stress or when extreme events occur. In the absence of any conclusive studies to show otherwise, MAS proposes not to take into account diversification effects for the aggregation of risk requirements under RBC 2.'

G.5 Internal Models

While the merits of internal models are recognised, in the first phase of implementation MAS proposes to adopt only a standardised model for the calculation of RBC. Its proposal is:

'to allow the use of partial or internal model in the next phase of the RBC 2 review, after the implementation of the standardised approach. The internal model, which will be subject to approval by MAS, will have to be calibrated at the same level as the standardised approach.'

G.6 Negative Reserves

As in India, the policy liability is derived 'policy-by-policy by discounting the best estimate cash flows of future benefit payments, expense payments and receipts, with allowance for provision for adverse deviation. It is possible for the discounted value to be negative when the expected present value of the future receipts (like premium and charges) exceed the expected present value of the future outgo (such as benefit payments and expense payments), resulting in a negative reserve.' Currently, such negative reserves are generally set to zero.

MAS recognises that its approach is conservative, because it is akin to assuming 100% lapses of such policies, while in practice the lapse rate would not be 100%. 'Therefore, there is scope to reconsider the current position given that under RBC 2, an insurer's net asset value will be shocked for insurance risk, and specifically, lapse risk, at a 1-in-200 year level.'

MAS proposes to allow a part of the negative reserves to be recognised as a form of financial resource, and will consult further on the amount to be recognised.

G.7 Valuation

Under current valuation rules, assets are taken at market value or the net realisable value in the absence of market value. Policy liabilities are valued on best estimate assumptions with provision for adverse deviation (PAD). Liabilities in respect of life insurance are calculated using

a prospective discounted cash flow method. Two areas under review are:

1. Risk Free Discount Rate

Non-participating conventional liabilities, the non-unit element of unit linked liabilities and the minimum condition liability in respect of participating liabilities are required to be valued at a risk-free discount rate. MAS has considered how best this risk free rate should be defined. It has proposed two approaches in its CP, both of them based on observed yields of Singapore Government Securities (SGS).

Approach 1:

- Durations 0 to year 20: Use prevailing yields of SGS
- Durations 30 year and above: 90% of historical average yields (since inception) and 10% of latest 6-month average yield of 30-year SGS
- Durations 20 to year 30: Interpolated yields

Approach 2:

- Durations up to 30 Years: Use prevailing yields of SGS
- Durations 30 year and above: Keep the yield flat at the prevailing yield of 30-year SGS

We note that MAS has considered the use of a swap curve to set the risk free rate, but believes that the SGS yield would be more appropriate, given that the government securities market is deeper and more liquid than the swap market.

2. Provision for Adverse Deviation

Section 5.15 of the CP states:

'Under the current RBC framework, policy liabilities for both life and general insurance business are to be determined using best estimates and a provision for adverse deviation ("PAD") (commonly known as a risk margin).

- 'For general business, the PAD for both claims liability and unexpired risk reserves are to be calculated at the 75% level of sufficiency, as set out in the Insurance (Valuation and Capital) Regulations 2004.
- 'For life business, MAS 319 requires the PAD to be determined using more conservative assumptions so as to buffer against fluctuations of the best estimate experience. The determination of the level of PAD is left to the professional judgment of the appointed actuaries, who are bound by the guidance note20 issued by the Singapore Actuarial Society ("SAS").'

The CP states that internationally, in particular under both Solvency II and the Swiss Solvency Test, a prominent method of deriving any PAD or risk margin is the cost of capital approach. The CP poses the following question:

'Do you agree that the cost-of-capital approach, for computing the provision for adverse deviation for both life and general insurance liabilities, is appropriate? If so, do you agree that it is appropriate to adopt a cost-of-capital rate of 6% per annum? As there is no evidence to suggest that the cost of providing the amount of available capital to support the policy liabilities would be substantially different for life and general insurers, a uniform rate has been proposed for all types of insurers.'