



BERMUDA MONETARY AUTHORITY

DISCUSSION PAPER

ON A

CAPITAL AND SOLVENCY FRAMEWORK

FOR

LONG-TERM INSURANCE

DECEMBER 2009

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FOREWORD

The Bermuda Monetary Authority (“the Authority”) is continuing its programme of regulatory development for the Bermuda market place. This paper sets out the Authority’s vision for a capital and solvency framework for long-term insurance¹ companies that is appropriate for the Bermuda market and recognised as meeting international regulatory standards.

Bermuda’s long-term insurance market continues to grow, and has been innovative in the development of techniques for modelling the assumption of risk and management of capital. The regulatory framework set out in this paper builds regulatory reporting requirements around companies’ internal modelling capabilities. This is aligned with the internal management information system guidelines set out in the Authority’s paper on the Own Risk And Solvency Assessment (“ORSA”) process released in the third quarter of 2009².

Significant effort is currently aimed at developing consistent international regulatory and accounting standards, and the capital and solvency framework suggested in this paper anticipates functioning effectively and efficiently with these initiatives.

The actuarial profession and economic capital modelling have historically been more central to long-term insurance than is the case for general insurance, and the capital and solvency framework set out in this paper acknowledges this by making risk and capital modelling central to regulatory reporting requirements, with reliance on actuarial reporting of capital requirements.

Consideration must be given to qualification standards for actuaries, development of standards of practice, requirements and resources for model approval and a peer review process providing independent verification by an external consultant. A Bermuda actuarial board which issues professional standards may be a necessary development.

The Authority will work with industry to develop a capital and solvency framework which meets international regulatory requirements and reflects the unique characteristics of the Bermuda market, with the aim of releasing a consultation paper with accompanying draft legislation during the third quarter of 2010.

¹ Long-term insurance is also referred to as life insurance. In this paper, insurance also includes reinsurance.

² The interested reader is referred to the Authority’s web-site www.bma.bm

0. PURPOSE AND EXECUTIVE SUMMARY

1. This paper provides an overview of the Authority's proposals for a capital and solvency framework for the Bermuda long-term insurance industry. It is the intention of this paper to initiate discussion rather than prescribe requirements. Following discussion prompted by this paper, a consultation paper with accompanying legislation will be developed in the third quarter of 2010.
2. The capital and solvency framework put forward in this paper requires companies to obtain actuarial certification that total assets are sufficient to meet policyholder obligations to a specified degree of confidence. A capital requirement must be determined either via an economic capital model or using a factor-based approach. The proposed framework incorporates scenario testing to augment and validate the determined capital requirement.
3. In anticipation of converging accounting standards, the Authority's capital and solvency requirement is intended to complement rather than duplicate general purpose financial and other reporting requirements. The proposed approach is intended to function effectively within the financial reporting standards in place and those under development internationally.
4. Regulatory capital and solvency principles will be accompanied by governance requirements as set out in the Authority's Own Risk and Solvency Assessment (ORSA) paper and other instruments. A list of relevant documents is presented in Section 5. The Authority's intent is to use the development of an appropriate capital and solvency framework to encourage sound risk management practices within the Bermuda market.
5. To date, Bermuda has permitted companies to be issued with composite or dual licences. These companies write both general insurance and long-term insurance. While the Authority intends to close this practice going forward, existing companies will be grandfathered.
6. The Authority intends to recognise proportionality in applying the capital and solvency requirements to long-term insurers. Composite and dual license companies may have no retained risk or minimal long-term business in force. The Authority anticipates that companies with no long-term insurance risk or less than \$25 million in long-term insurance liabilities will be subject to a simplified capital standard.
7. It is expected that the existing management information systems of many long-term insurers will have established metrics and procedures to monitor risk exposure and aggregation, with appropriate controls and governance processes. Other insurers with less developed programmes may need to implement additional risk management tools or apply a simpler formulaic capital determination process that estimates typical risk and capital requirements. The Authority has reviewed formulaic processes from other jurisdictions and believes an approach similar to Canada's Minimum Continuing Capital and Surplus Requirements (MCCSR) process to be an appropriate framework for Bermuda.

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8. The Authority will consult with industry to develop capital adequacy standards that represent international best practice and are suitable for the Bermuda market. Comments are welcome on all matters covered in this paper and should be sent to the Authority via e-mail addressed to Richard May at rmay@bma.bm, or by phone at 441 278 0203, no later than February 28th, 2010.

1. INTRODUCTION

9. The long-term insurance business conducted through nearly 100 dedicated Bermuda licensed long-term insurers exceeded more than \$30 billion of premium in 2008 and is supported by more than \$100 billion in assets. In addition, long-term insurance is written by approximately 100 general insurance companies that are also licensed to conduct long-term insurance operations.
10. The long-term sector has been growing steadily over recent years and is expected to continue to expand. Bermuda's current solvency framework needs to be updated. A framework needs to be developed that:
- (a) reflects international standards and changes in risk management practices;
 - (b) responds to the recent economic crisis; and
 - (c) recognises the unique characteristics of the Bermuda business environment.
11. The Authority's objective is to develop a capital and solvency framework for long-term insurance which is appropriate for the Bermuda market as well as reflecting international regulatory standards. The aim is to implement a framework that is able to respond to future developments locally and internationally; for example, the proposed structure is built on principles rather than rules. It must also satisfy Bermuda's commitment to achieve equivalence with key jurisdictions where Bermuda long-term insurers have operations, including the European Union.
12. The capital and solvency framework proposed in this paper is conceptually consistent with the Bermuda Solvency Capital Requirement (BSCR) process for Bermuda general insurance.

2. SUMMARY OF OTHER REGIMES

13. The table below summarises the solvency standards for long-term insurance in a number of other jurisdictions. This is expanded on in Attachment 1. The information contained in this summary assists in:

- (a) understanding the current and future direction of solvency requirements globally;
- (b) laying out a framework to ensure consistency of developments in Bermuda.

Summary of Solvency Standards in Other Jurisdictions

Relevant governing body	Rules or principles based	Relevant documentation and time frame	Summary of regulations	Risks covered	Models	Confidence level/measure
1. Bermuda						
Bermuda Monetary Authority (BMA)	Rules	Life Insurance Act 1978 Insurance Act 1978 Insurance Accounts Regulation 1980 Insurance Returns and Solvency Regulations 1980	Fixed minimum	Insurance Risk	n/a	n/a
2. Australia						
Australian Prudential Regulation Authority (APRA) since Jan 2008. Previously the Life Insurance Actuarial Standards Board (dissolved in Jan 2008.)	Principles	Life Insurance Regulations 1995 and 3 main standards: • Policy liabilities (Margin on Services) • Capital • Solvency Implemented in 2008	• Policy liabilities: Best estimate (Margin on Services) • Solvency: Conservative valuation assuming run off scenario • Capital: more conservative, going concern basis	Credit risk Asset risk Market risk Underwriting risk Operational risk		• Solvency standard designed to cover “a one in 200 years” event. • Capital adequacy designed to cover “a one in 400 years” event.
3. Canada						
• Office of the Superintendent of Financial Institutions (OSFI) • Autorité des Marchés Financiers (AMF) • Assuris	Principles	“Framework for a New Standard Approach to Setting Capital Requirements”. Also MCCSR “Vision” paper Implementation coincident with Phase II IFRS. (Partial implementation commences Jan 1 2012.)	Target asset requirement approach	Credit risk Market risk Underwriting risk Operational risk	Can use Advanced Approach for TAR with prior approval, i.e. scenario modelling, etc.	99% Conditional Tail Expectation ³ (CTE) over 1 year

³ Conditional Tail Expectation (CTE) is also called Tail Variance at Risk (TVaR). TVaR at x% is the expected loss given the xth percentile loss is breached. A 99.0% TVaR level therefore corresponds to the average of the largest 1% of modelled outcomes. Variance at Risk (VaR) at x% is the loss at the xth percentile level.

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Relevant governing body	Rules or principles based	Relevant documentation and time frame	Summary of regulations	Risks covered	Models	Confidence level/measure
4. Europe: Solvency II						
EU Commission advised by the Committee of European Insurance and Occupational Pensions Supervisors CEIOPS	Principles	To be implemented October 2012. Regulations enacted by each member state on basis of agreed EU wide requirements.	Market-consistent: • Pillar 1: Capital Charges and technical provisions • Pillar 2: Supervisory Review (RTS report)	Asset risk Counterparty risks Underwriting risk Default risk Operational risk Catastrophe risk	Pillar 1: Standard Solvency Capital Requirement (SCR) model or Internal Regulatory Approved Model or combination of both.	99.5% VaR (over one year)
4.1 Switzerland						
FINMA	Principles	Currently SST moving towards Solvency II.	Swiss Solvency Test – anticipating SII - already started to implement risk-based regulatory requirements similar to Solvency II.	Market risk Insurance risk Credit risk	Swiss regulator offers a standard SST model, but companies are required to use internal models if the standard model is not adequate.	99% TVaR (over one year)
4.2 UK						
Financial Services Authority (FSA)	Principles	Individual Capital Adequacy Standards fore-runner to Solvency II implementation (replaced formulaic approach).	Realistic fair value of liabilities Self-assessment: Individual Capital Adequacy Standards (ICAS)	Market risk Insurance risk Credit risk	Internal models for ICAS	99.5% VaR (over one year)
5. USA						
National Association of Insurance Commissioners (NAIC)	Currently all rules-based with the exception of Variable Annuities, which has been principles based since 2005. Now under review, with combined rules/principles a possible outcome.	NAIC Solvency Modernization Initiative announced in June 2008 covers 5 key initiatives: capital requirements, international accounting, insurance valuation, reinsurance, and group solvency. In addition, the Financial Condition (E) Committee is to be the central forum and coordinator of solvency-related considerations of the NAIC.	Currently formulaic RBC, evolved over several years.	The Life RBC capital formula includes: C0 Asset risk (Affiliates) C1 Asset risk (Other) C2 Insurance risk C3 Interest Rate risk, Health Credit risk & Market risk C4 Business risk	RBC approach includes stochastic modelling. Internal models have been introduced gradually over recent years. No significant external review of models.	Applies a Conditional Tail Expectation approach without a specific confidence level.

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14. In the above table, all of the jurisdictions specifically address insurance and credit risk. Other risks are also addressed, but to varying degrees. The table clearly shows that capital standards have consistently progressed towards a modelled approach with 99% TVaR and 99.5% VaR being among the common confidence levels. However each jurisdiction is developing its own approach that address the needs and characteristics of the business it regulates.

15. The approach proposed for Bermuda is an adaptation of that employed and envisioned by Canada, embracing risk modelling techniques for those companies with the capacity to do so and utilising a factor-based method for companies that are not yet capable of the modelling method. The Canadian approach was selected because:

- (a) its confidence level (99% CTE) is the same as our 99% TVaR objective (i.e. that used for the BSCR);
- (b) it is internationally recognised; and
- (c) it is used with minor modifications by other jurisdictions.

The Authority may also combine elements of its BSCR and the MCCR.

16. The framework proposed in this paper is generally consistent with best practice international regulatory developments. We are recognising the modelling sophistication that is prevalent in the Bermuda market, and providing an alternative method for companies that are not yet ready to determine their capital requirements from a modelling approach.

3. PROPOSED CAPITAL AND SOLVENCY FRAMEWORK

17. The proposed capital and solvency framework requires long-term insurers to maintain regulatory capital to ensure, to a specified degree of confidence, that there is sufficient capital to withstand adversity emerging within a defined period. Capital is intended to be at a level such that at the end of that period there are sufficient assets to provide for the transfer (to another insurer) or run-off of remaining obligations.
18. The principles-based framework is intended to integrate with the financial statement reporting requirements of long-term insurers and be consistent with the reporting requirements applying to general insurers in Bermuda.

Regulatory Requirements

19. Bermuda has granted dual and composite licenses to companies allowing them to issue both general and long-term insurance. This practice puts the assets supporting long-term policyholder obligations at additional risk, should the general insurance operations suffer exceptional losses and vice versa. The Authority intends to close the licensing of these arrangements going forward. Existing dual and composite licensed companies would be grandfathered.
20. The current capital requirement for life insurers requires a minimum of \$250,000. The capital structure needs to reflect the ongoing solvency needs of the company. In practice, many companies maintain capital significantly in excess of the \$250,000 minimum.
21. The Authority intends to recognize proportionality in applying the capital and solvency requirements to long-term insurers. For companies with less than \$25 million in policy liabilities, the Authority proposes to apply the greater of \$250,000 or 5% of policy liabilities as a capital requirement.
22. Long-term insurers holding greater than \$25 million in policy liabilities will be required to determine two additional levels of regulatory capital, an Enhanced Capital Requirement (ECR) and a Target Capital Level (TCL) similar to that required of general insurers as identified in the Authority's Papers on BSCR, ORSA and Capital Add Ons and Reductions.
23. A Minimum Asset Requirement (MAR) is to be determined at a degree of confidence equivalent to 99% TVaR over a one year time horizon. At the end of the year, the company must maintain sufficient assets to transfer or run-off the remaining obligations. The ECR will be the MAR less the reported policy liabilities. As identified in the Authority's Capital Add On and Reduction Consultation Paper, the Authority may impose an increase or allow a reduction for companies whose risk profile is non-standard. This approach is consistent with the requirements for general insurance.
24. The TCL will be determined as some multiple greater than unity, say 120%, of the ECR.

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25. When a company's available capital is below the TCL, the Authority will require the company to take corrective action. When available capital is below the ECR or the \$250,000 minimum, the Authority shall take additional actions consistent with its intervention tools.
26. Each company will be required to develop adverse scenarios that generate asset requirements at 99% (VaR). The scenarios will reflect adverse developments in the major risk components (mortality, morbidity, lapse risk and interest rate risks). The adverse scenarios will:
- (a) help inform management of the degree of risk supported by the capital requirement;
 - (b) provide information to the Authority for comparison purposes; and
 - (c) validate the results of the modelling process.

Stress tests at the 99% VaR level will always produce capital needs that are less than the ECR (99% TVaR). These tests are for validation purposes. Companies will also be required to identify scenarios that would cause the company to not meet its TCL. Where capital impairment can be significant under extreme, but not inconceivable, stress scenario tests, the Authority may consider it appropriate for insurers to hold additional capital.

Determining the Regulatory Capital

27. Two approaches will be available to determine the regulatory capital, a modelled approach and a factor-based approach. Companies with robust modelling processes may wish to avail themselves of the modelling approach. Larger, more sophisticated companies may find this preferable to more closely match their capital requirements to their actual business risks. Companies with simpler products or a smaller business in force may find that the rigours of an advanced modelling regime provide insufficient benefit and choose to use the factor-based method.

a. Modelled Approach

28. The modelled approach will determine regulatory capital using a company's internal capital model (ICM).
29. The ICM will need to consider all material, foreseeable, quantifiable risks, the relationships between these risks, and be integrated into the company's risk management framework. In particular, the company will need to address the risk of loss, or adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of its insurance risks (mortality rates, morbidity rates, expenses incurred in servicing contracts, lapsation/persistency rates), market risks (interest rates, spreads, equity and currency) and credit risks (potential defaults in loans, debt instruments, derivatives and reinsurance). For each of these components of the modelling process, documentation will be necessary supporting the development of the assumptions and the associated risk parameters. The approach to each of these risks will need to be addressed by the standards-setting process (see Section 4).
30. The Authority has developed an extensive process to review the ICMs of general insurers who wish to use ICMs to determine regulatory capital. The principles apply to long-term

insurers as well. The reader is referred to the Authority's Standards and Application Framework for the use of Internal Capital Models for Regulatory Capital purposes (see Attachment 2).

31. Bermuda general insurance companies are required to have regulatory approval of their ICM for it to be used to determine regulatory capital. Long-term insurance companies will require regulatory approval and also actuarial certification of the required capital level. Standards, guidelines and reporting requirements will need to be developed for actuaries working in this area.

32. The Authority will establish a process to periodically review the governance processes around a company's ICM if it is being used to determine regulatory capital. In particular, it is expected that an ICM used to determine regulatory capital is embedded in the company's processes and central to its strategic decision-making. Attachment 2 to this paper summarises the modelling criteria used by the Authority when considering if a company's ICM is suitable for determining regulatory capital requirements.

b. Factor-based Approach

33. A factor-based method will be developed for use by companies that do not have the capacity to develop an approved ICM. The Authority proposes adopting an approach similar to Canada's current MCCR. The process will be expected to produce capital needs at the 99% TVaR level. Factors will be applied to the amounts of exposure within various risk classes of the assets and liabilities. The sum of the factors multiplied by the amounts of exposure will produce the ECR.

34. For credit (default) risk and market risk, assets will be split into investment classes. A smaller capital requirement would apply to those assets with the best credit ratings. Higher capital requirements would apply to assets with a greater credit risk. Sample material from Canada's MCCR demonstrating the application to asset default risk is shown in Attachment 3.

35. For insurance risks (mortality, morbidity and lapse risks, etc.) the process will consider both volatility and catastrophic risk elements. The insurance risk components will reflect claims volatility and catastrophic risk, less appropriate credit for risk control arrangements such as reinsurance.

36. The risk of change in the interest rate environment may cause asset values to depreciate. Benefits, guarantees and options available to policyholders may expose the company to adverse experience when this occurs. Capital requirements for this risk can be determined by applying factors reflecting the risk characteristics of the product guarantee types to the amount of the liabilities for each product type.

37. Capital requirements for guarantees embedded in variable investment products can be determined by a similar but somewhat more complex process. The asset classes will need to reflect the current position of the fund values relative to the minimum guarantee values and the degree of volatility expected in the investment funds. Credit would be available for risk management arrangements and reserves held.

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38. The capital requirement for foreign exchange risk will cover the risk of loss arising from fluctuations in currency exchange rates. A factor will be applied to the greater of the net open long positions or net open short positions of each currency.
39. As with the modelled approach to determine regulatory capital requirements, actuarial certification of the required capital level will be required.

Reporting

40. All companies will need actuarial certification that assets meet or exceed the required regulatory level. Where the modelled approach is used, an actuarial report setting out the development of the assumptions and parameters, methodology and results of the modelling underlying the determination of regulatory capital requirements will be required. The relationship between held capital, economic capital and regulatory capital (99% TVaR) will be discussed in the actuarial report. The actuarial report will also relate the capital impact of the adverse stress testing scenarios to the regulatory requirement.
41. An effective process to develop, implement and periodically refine appropriate standards of practice and documentation requirements, appropriate qualification requirements for actuaries and possibly peer review will be an important component for this regulatory process. Consideration must be given to the development of a Bermuda Actuarial Standards Board to address these needs. This is discussed further in Section 4 below.

Refining and Calibrating

42. When the new framework is in place, a review process will be required with the expectation of implementing periodic refinements to both the methods and the calibration of the methods. For the modelled approach, the Authority would expect each company to perform recalibration on a regular basis. The Authority would expect to implement refinements to the factor-based approach at periodic intervals.

Available Capital

43. Assets available to meet regulatory capital requirements will be determined by the tiering approach set out in the Authority's Consultation Paper on Eligible Capital. For example, impaired and/or encumbered assets will need to be adjusted to reflect their ability to meet the capital requirement. Such matters can be provided for directly in the ICM.

Application to Groups

44. Upon the implementation of the Authority's group-wide supervision regime, where the Authority is Group-wide Supervisor, the regulatory solvency requirements will be applied on both the Bermuda legal entity and at the group level.
45. Where the Authority is not Group-wide Supervisor, the regulatory solvency requirements will be applied for the Bermuda legal entity only.

Reliance on Other Regulators

46. The Authority recognises the need to avoid unnecessary duplication in fulfilling its supervisory responsibilities. Where international groups are subject to equivalent consolidated supervision elsewhere, the Authority's approach will be to liaise and share relevant information with other supervisors⁴ and seek to co-ordinate supervisory actions as much as possible.
47. Where appropriate, the Authority may rely upon reports prepared for other regulators in considering the regulatory solvency requirements and associated supervisory actions.

⁴ The Authority is developing relationships with other regulators to facilitate the exchange of information, and participates in international supervisory colleges as it progresses toward group-wide supervision.

4. ACTUARIAL STANDARDS BOARD

48. The capital and solvency framework proposed in this paper requires actuarial certification of regulatory capital. A process will need to be established to develop and promulgate appropriate actuarial standards, guidance and documentation requirements. The Authority believes that this will necessitate the formation of an actuarial body that is independent of Bermuda's financial services regulator.
49. The envisaged Bermuda Actuarial Standards Board would also issue standards and guidance in other relevant areas, such as general insurance. For example, international best practice is moving toward peer review being required for certain actuarial work, and the envisaged Board would be the appropriate entity to consider such matters.
50. The Authority's Director, Actuarial Services was approached by the International Association of Actuaries ("IAA") to discuss the development of an actuarial body in Bermuda. The IAA's letter is included in Attachment 4. The Authority is seeking feedback in order to prepare an appropriate response.

5. SUMMARY OF OTHER RELEVANT PAPERS RELEASED BY THE BERMUDA MONETARY AUTHORITY

Discussion Paper on the Own Risk and Solvency Assessment Process September, 2009

Consultation Paper on the Insurance Code of Conduct **September, 2009**

Consultation Paper on Eligible Capital September, 2009

Consultation Paper on Disclosure and Transparency **June, 2009**

Standards and Application Framework for the Use of Internal Capital Models for Regulatory Capital Purposes (See Attachment 2) **May, 2009**

Capital Add-On and Reduction Consultation Paper **June, 2008**

Insurance - BSCR Paper July, 2007

6. PROPOSED TIME TABLE

- 51. The Authority proposes to apply the regulatory solvency requirements to long-term insurers for reporting dates on and after December 31st 2011.
- 52. Comments and views are invited on all matters covered in this paper by February 28th 2010.
- 53. A consultation paper is planned for release in the third quarter of 2010. This timing allows the Authority to incorporate both market feedback and international developments.

ATTACHMENTS

- 1. Life Insurance Solvency Standards**
- 2. Standards and Application Framework for the use of Internal Capital Models for Regulatory Capital purposes.**
- 3. Sample Capital Requirements for Assets (from Canada's Minimum Continuing Capital and Surplus Requirements (MCCSR))**
- 4. Letter from International Association of Actuaries**

Life Insurance Solvency Standards

1. Introduction

This document summarises the solvency frameworks for life insurance business of a number of different territories. The purpose of this document is to provide a comprehensive reference document which will help facilitate the impending review of solvency standards for life business locally, which ultimately aims to ensure mutual recognition with other global jurisdictions.

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2. Summary

Relevant governing body	Rules or principles based	Relevant documentation and time frame	Summary of regulations	Risks covered	Models	Confidence level/measure
1. Bermuda						
Bermuda Monetary Authority (BMA)	Rules	Life Insurance Act 1978 Insurance Act 1978 Insurance Accounts Regulation 1980 Insurance Returns and Solvency Regulations 1980	Fixed minimum	Insurance Risk	n/a	n/a
2. Australia						
Australian Prudential Regulation Authority (APRA) since Jan 2008. Previously the Life Insurance Actuarial Standards Board (dissolved in Jan 2008.)	Principles	Life Insurance Regulations 1995 and 3 main standards: • Policy liabilities (Margin on Services) • Capital • Solvency Implemented in 2008	• Policy liabilities: Best estimate (Margin on Services) • Solvency: Conservative valuation assuming run off scenario • Capital: more conservative, going concern basis	Credit risk Asset risk Market risk Underwriting risk Operational risk		• Solvency standard designed to cover “a one in 200 years” event. • Capital adequacy designed to cover “a one in 400 years” event.
3. Canada						
• Office of the Superintendent of Financial Institutions (OSFI) • Autorité des Marchés Financiers (AMF) • Assuris	Principles	“Framework for a New Standard Approach to Setting Capital Requirements”. Also MCCSR “Vision” paper Implementation coincident with Phase II IFRS. (Partial implementation commences Jan 1 2012.)	Target asset requirement approach	Credit risk Market risk Underwriting risk Operational risk	Can use Advanced Approach for TAR with prior approval, i.e. scenario modelling, etc.	99% Conditional Tail Expectation (CTE) over 1 year

Relevant governing body	Rules or principles based	Relevant documentation and time frame	Summary of regulations	Risks covered	Models	Confidence level/measure
4. Europe: Solvency II						
EU Commission advised by the Committee of European Insurance and Occupational Pensions Supervisors CEIOPS	Principles	To be implemented October 2012. Regulations enacted by each member state on basis of agreed EU wide requirements.	Market-consistent, 3 pillar approach: • Pillar 1: Capital Charges and technical provisions • Pillar 2: Supervisory Review (RTS report) • Pillar 3: Risk Transparency	Asset risk Counterparty risks Underwriting risk Default risk Operational risk Catastrophe risk	Pillar 1: Standard Solvency Capital Requirement (SCR) model or Internal Regulatory Approved Model or combination of both.	99.5% VaR (over one year)
4.1 Switzerland						
FINMA	Principles	Currently SST moving towards Solvency II.	Swiss Solvency Test – anticipating SII - already started to implement risk-based regulatory requirements similar to Solvency II.	Market risk Insurance risk Credit risk	Swiss regulator offers a standard SST model, but companies are required to use internal models if the standard model is not adequate.	99% Expected Shortfall (over one year)
4.2 UK						
Financial Services Authority (FSA)	Principles	Individual Capital Adequacy Standards fore-runner to Solvency II implementation (replaced formulaic approach).	Realistic fair value of liabilities Self-assessment: Individual Capital Adequacy Standards (ICAS)	Market risk Insurance risk Credit risk	Internal models for ICAS	99.5% VaR (over one year)
5. USA						
National Association of Insurance Commissioners (NAIC)	Currently all rules-based with the exception of Variable Annuities, which has been principles based since 2005. Now under review, with combined rules/principles a possible outcome.	NAIC Solvency Modernization Initiative announced in June 2008 covers 5 key initiatives: capital requirements, international accounting, insurance valuation, reinsurance, and group solvency. In addition, the Financial Condition (E) Committee is to be the central forum and coordinator of solvency-related considerations of the NAIC.	Currently formulaic RBC, evolved over several years.	The Life RBC capital formula includes: C0 Asset risk (Affiliates) C1 Asset risk (Other) C2 Insurance risk C3 Interest Rate risk, Health Credit risk & Market risk C4 Business risk	RBC approach includes stochastic modelling. Internal models have been introduced gradually over recent years. No significant external review of models.	Conditional Tail Expectation

3. Solvency and capital regimes around the globe

3.1 Australia

Actuarial Standards in Australia were regulated by the Life Insurance Actuarial Standards Board (LIASB) until January 2008. LIASB was then dissolved and these standards were taken over by Australian Prudential Regulation Authority (APRA) and called Life Prudential Standards.

On 1 January 2008, APRA introduced new, amended and reissued prudential standards for life insurers and friendly societies. Life insurance had previously been reformed in 1995, the first major overhaul since national legislation was first introduced some 50 years ago.

Actuarial standards set the regulatory capital requirements for life business. The actuarial standards have the force of law; they are not simply professional standards of the Institute of Actuaries of Australia, however there is a strong reliance on actuaries to determine or provide expert advice on the valuation of policy liabilities or technical provisions.

APRA prudential standards establish a two-tier capital requirement for the statutory funds of life companies.

Tier 1 (Solvency Requirement) requires a minimum capital requirement to ensure the solvency of the company. More specifically, to ensure that under a range of adverse circumstances, the company would be expected to be in a position to meet obligations to policyholders and other creditors in the context of a fund closed to new business, and which is either operating in a run-off situation or is to be transferred to another insurer.

Tier 2 (Capital Adequacy Requirement) is intended to secure the financial strength of the company to ensure that the obligations to, and reasonable expectations of, policyholders and creditors are able to be met under a range of adverse circumstances in the context of a viable ongoing operation.

There are three main standards which are integrated and together these lay down the specific requirements for valuing policy liabilities for profit reporting purposes and the determination of separate Solvency and Capital Adequacy requirements.

- **The Valuation of Policy Liabilities Standard** requires that insurance companies value liabilities on a "best estimate" or "market value" set of assumptions. This provides consistency with the valuation of assets which are on a net realisable market value basis. The actuarial methodology laid down in this standard is commonly referred to as Margin on Services or MoS because the expected future profits thrown up by using best estimate assumptions are then expressed as a profit margin on the services delivered under each type of contract and these future profits are re-spread back over the future life of the contracts and included as part of the policy liabilities. In this way these expected future profits are only released as they are actually earned year by year as the policy valuation process unwinds over the life of contracts.
- **The Solvency Standard** lays down how policy liabilities are re-valued for solvency purposes and other reserves are required to be held so that the existing liabilities of a life insurer can be run off with a sufficient financial buffer to withstand a range of adverse scenarios. It is based on a scenario of a company not writing new business and running off its liabilities so it contains elements of a wind-up situation.
- **The Capital Adequacy Standard** is based on a scenario of a company being an ongoing viable operation open to accepting new business, but remaining strong enough to withstand a range of scenarios somewhat more adverse than those in the Solvency Standard.

Looking at the Solvency Standard in a little more detail, it contains the following main elements to essentially re-evaluate a company's balance sheet and then show the company still has positive net assets after the re-evaluation.

- Solvency Liability requires that the liabilities be valued conservatively - discounting the future liabilities at the policy liability discount rate but subject to a maximum rate of the Mid Swap Rate (instead of at the expected

rate of return on the investments), using mortality, morbidity, lapse and expense assumptions which have adverse deviation margins in them.

- The liabilities to creditors other than policyholders (e.g. tax and suppliers) are also included, but approved subordinated debt arrangements are excluded as these funds can be used like equity to pay obligations to policyholders.
- Expense reserve requires an entity to assess its solvency requirement and must provide for a reserve against the risk of an overrun in acquisition expenses as the company moves into run-off.
- The Inadmissible Assets Reserve is a reserve against the risks associated with assets where their value may well reduce in a run-off situation, may not be fully available or involve undue concentration of exposure to individual counterparties. This includes assets such as loans to directors and agents; holdings in associated financial entities; and individual asset exposures above certain percentages total assets.
- The Resilience Reserve is a reserve against adverse economic shocks. Its determination considers the mismatch of changes to the assets and/or liabilities in the case of specified adverse market movements. It is the component of the Australian regime which is closest to dynamic solvency testing.

In the case of solvency the regulator is primarily interested in the ability of the insurer which is put into run-off because it has breached the solvency requirement to be able to run-off its policy liabilities in an orderly fashion. The solvency risk criterion is designed to provide a level of reserves which is broadly able to cover a combination of adverse circumstances that would be expected to arise once every 200 years.

In the case of capital adequacy the regulator is primarily interested in the ability of an insurer to continue to meet the solvency requirements at future balance dates. So the capital adequacy risk criterion was set at the solvency is designed to provide a level of reserves which is broadly able to cover a combination of adverse circumstances that would be expected to arise once every 400 years.

Yield changes are used as the driver, rather than percentage drops in asset values, because using yield changes produces dynamic reserves as the market moves above or below its historically average levels. So if the stock market is historically high, current yields will be low and the prescribed yield changes will lead to large drops in asset values, possibly as much as 40%. Whereas if the market is low yields would be high and the prescribed yield changes will lead to smaller drops in asset values, may be around 15-20%.

Capital Adequacy vs. Solvency

The Capital Adequacy reserves are structured in the same way as the Solvency reserves, but they are generally more conservative with higher margins for adverse, mortality, morbidity lapse and expense assumptions and larger economic shocks for the resilience reserves. Because Capital Adequacy is based on a going concern philosophy some of the inadmissible asset requirements are less than those for Solvency. As Solvency requirements are based on a run-off or wind-up philosophy assets which will reduce in value in such a situation are not counted or counted for reduced value for Solvency purposes.

The Capital Adequacy requirements do contain an extra reserve for new business which is not contained in the Solvency requirements. The approach to calculating this reserve is that the Appointed Actuary must project the insurer's balance sheet for the next 3 years assuming the insurer meets its new business plans and be able to demonstrate that at the end of that period the insurer will be able to meet the Solvency requirement. So a company which is growing rapidly selling life products which require significant amounts of new capital will have a high new business reserve, while a mature company may have no new business reserve even though it is still selling new business because the next 3 years profits coming from existing business will be adequate to fund the new business capital requirements.

This 2-tiered capital approach leads to the following supervisory responses to differing situations.

If an insurer meets capital adequacy requirements it is regarded as adequately capitalised and it has relative flexibility to go about its business. Its financial position will be monitored and it would need to advise us of any major deals or restructuring.

If an insurer is below capital adequacy, but above the solvency requirements it is not regarded as financially healthy enough and so is required to develop a detailed business plan to restore a satisfactory capital adequacy position again within a reasonable time frame. Distributions to shareholders are not allowed until capital adequacy is again reached.

If an insurer is below the solvency requirement regarded as being strong enough to continue writing new business, a Judicial Manager would be appointed who would report to the Court about the affairs of the company and its future prospects. When this happens it is very unlikely a company would recommence writing new business and more likely it would move into run-off, sell its business or move to be wound up.

3.2 Canada

Background

In November 2008, the joint Committee of Office of the Superintendent of Financial Institutions (OSFI), the Autorité des Marchés Financiers (AMF) and Assuris¹ published a paper entitled **“Framework for a New Standard Approach to Setting Capital Requirements”**. Work is continuing on this initiative and so the latest position (as at December 2009) is detailed below.

The proposals in the 2008 paper were consistent with those previously presented in the **“Canadian Vision for Life Insurer Solvency Assessment”** paper of November 2007, prepared by the Minimum Continuing Capital and Surplus Requirements (MCCSR) Advisory Committee (or MAC) to outline a vision for new principles-based solvency financial requirements for Canadian life insurers.

MAC’s proposals outlined a framework that future Canadian life insurer solvency financial requirements should:

- take into account all credit, market, underwriting and operational risks
- recognize all of the cash flows from all of the assets and liabilities
- value the cash flows consistently and realistically
- reflect the risk mitigation strategies used by the insurer
- consider the dependencies within risks and between risks and recognize when appropriate and measurable
- ensure that insurer assets are sufficient, with a high degree of confidence, to withstand adversity emerging over a defined regulatory control time horizon (e.g. a one year time frame)
- ensure that there are sufficient assets at the end of the defined time horizon to provide for the:
 - o transfer of the remaining obligations to another insurer or;
 - o run-off of the remaining obligations.

Minimum Continuing Capital and Surplus Requirements (MCCSR)

The MCCSR system was first introduced in 1992 and has been continually improved and updated. However, advances in actuarial and economic theory, increased complexity of insurance products and impending accounting changes combine to require an update to the MCCSR approach. For example, MCCSR does not adequately account for risk diversification or risk concentration.

The new framework for market and credit risk is intended to be implemented on January 1 2012. The remaining components of the framework are planned to coincide with the implementation of IFRS Phase II.

The New Standard Approach

The new approach will use a target asset requirement approach. This requires a company to hold assets equal to the best estimate of insurance obligations plus a solvency buffer.

When available capital falls below the target required capital, the regulator will intervene and require that the company take corrective action. Should the available capital fall below the minimum required capital, the regulator will have the power to take further action.

¹ Note that OSFI is the federal regulatory body created to contribute to public confidence in the Canadian financial system. AMF is a regulatory authority for Quebec’s financial sector, and Assuris is a not-for-profit organization that protects Canadian policyholders in the event that their life insurance company should fail. All life insurance companies authorized to sell insurance policies in Canada are required, by the federal, provincial and territorial regulators, to become members of Assuris.

Risks covered and the solvency buffer

Insurance risk is the risk of adverse future experience in mortality, morbidity, and policyholder behaviour, including lapse rates. The solvency buffer for insurance risk will be calculated using either a formula or an integrated combination of shocks to the mortality, morbidity and lapse assumptions used in calculating best-estimate insurance obligations. A one year time horizon will apply to the calculation of the solvency buffer.

Market risk is the risk that changes in the financial markets will affect the value of assets and liabilities. This includes interest rate, spread, equity, and currency risks. The solvency buffer for market risk will use deterministic shock calculations for interest rate, equity, real estate, and currency risks.

Credit risk is the risk of default by counterparties on loans, debt instruments, derivatives, and reinsurance. The solvency buffer for credit risk will use factors developed from the best available information, and be similar to the method currently used in the MCCR.

Operational risk is the risk that the company's business processes will fail, or that the company will fail to comply with laws and regulations. The financial impact of loss of reputation is also included in operational risk. The solvency buffer for operational risk will be calculated by applying a factor. In addition, the solvency buffer will also contain a margin for future expenses that exceed those assumed in the calculation of the best-estimate insurance obligations.

The solvency buffer is intended to ensure companies are able to withstand adverse conditions "with a very high degree of confidence", and have enough assets to sell or run-off the business. The confidence level for a one year time horizon will be set at a level equivalent to the 99% Conditional Tail Expectation (CTE) level.

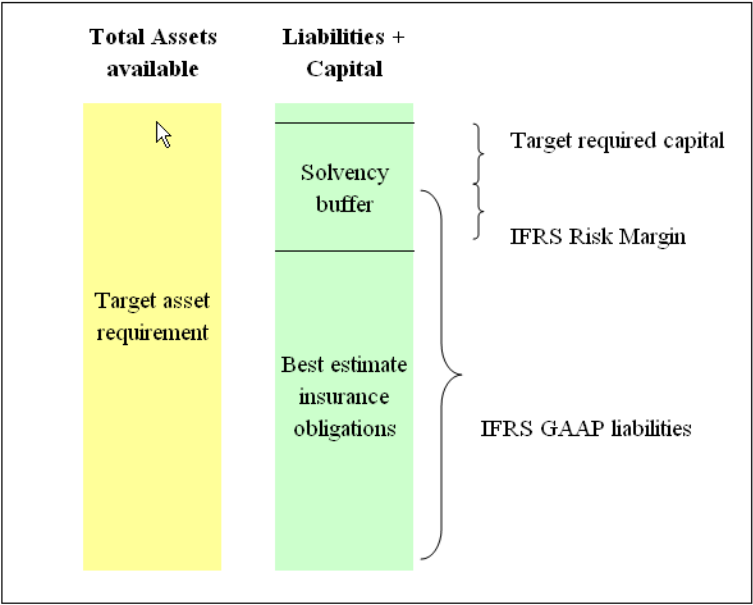
IFRS GAAP

It is anticipated that the best estimate approach will be consistent with the IFRS GAAP liabilities, the key difference being that the IFRS GAAP liability will be best estimate plus a risk margin (rather than best estimate plus a solvency buffer).

Available capital is the difference between total assets available and IFRS GAAP liabilities. Target required capital is the difference between the target asset requirement and assets required for IFRS GAAP liabilities.

Minimum required capital will be periodically set by the regulator as a percentage of target required capital. The initial percentage may be set at 80%.

The following diagram shows the relationship between IFRS GAAP and the IFRS risk margin, the solvency buffer, minimum required capital and target required capital.



3.3 Europe: Solvency II

Solvency II is the name given to European Union legislation that will modernise the regulation of Europe's insurers and reinsurers and will apply to all 27 EU member states. It is the biggest regulatory change in the European Union for 30 years, replacing the old "Solvency I" regime, a relatively simplistic yet robust approach to the supervision of insurers' capital.

Due to come into force in 2012, Solvency II will bring a more sophisticated "risk-based" form of supervision that will be much the same across all EU countries. It applies at both the level of the group as well as each and every solo insurer within a group. It brings not just a move to risk-based regulatory capital but also a root and branch reform of the recognition of insurance liabilities for regulatory purposes. These "technical provisions" are being moved to a market consistent basis underpinned by standards around the supporting data and analysis to reach such an assessment. The potential gap between these technical provisions and the outcome of current negotiations over the recognition of insurance liabilities under international accounting standards is a serious issue for EU insurers.

Other countries—notably Switzerland and Australia—have already switched to risk-based regimes, while insurance supervisors in some of the world's largest insurance markets, including Japan, have indicated that they will do so also.

Solvency II will apply to all life and non-life insurers and reinsurers, including mutual insurers and captives, in the European Union, that underwrite gross premiums exceeding €5m.

Insurers that do not have an approved internal model will be required to use the "standard model," a risk-based formulaic method for calculating capital requirements under the Solvency II Framework Directive. The EU is to consult on the pre-application process for such approval in February 2010, but some EU Members have already initiated a "Dry Run" process to avoid a log jam of applications in the run up to October 2012. Over 100 groups have indicated a desire for model approval in the UK, but this is seen as higher than other territories due to particular UK circumstances.

Member States will be responsible for implementation of Solvency II in their national law, following the agreed EU wide legislation.

The basic premise of Solvency II is that undertakings themselves are responsible for the correct and adequate assessment of their own Solvency Capital Requirements. However, in order that regulatory supervision may be appropriately applied and in a manner that is proportionate to the level, scale and complexity of the business risks of the undertaking, the Directive sets out the principles and processes by which the adequacy of the solvency of an undertaking will be assessed.

Solvency II is based on a three-pillar structure, where each pillar has equal importance and relates to and links with the other pillars:

- Pillar 1 (technical provisions and capital charges) – establishes market consistent technical provisions and a risk-based Solvency Capital Requirement (SCR). The SCR is calculated through a standard Model, an Internal Regulatory Approved Model or a combination of both (Partial). The Solvency II standard model sets an undertaking's SCR based on a series of risk stresses applied to financial and accounting data – i.e. the change in both assets and technical provisions in response to a particular risk event – which are then aggregated on the basis of pre-defined co-dependencies between risks. Whereas Solvency I considered only a small part of the financial aspects of an undertaking, and on a formulaic basis, the new model considers the various aspects of Asset Risks, Counterparty Risks, Underwriting Risks, Default Risks and Operational Risks using a methodology similar to that used for modern economic capital assessments. The model is both retrospective and prospective, considering past variations and future possibilities. Solvency II allows an undertaking to establish its SCR via its own risk-based capital model, but it will have to prove that its model is as robust as the SCR Model and crucially that its model is embedded within the firm's operations and risk management.
- Pillar 2 (supervisory review) – the relevant regulator will verify and approve any calculated capital charges and ascertain how well an undertaking meets all the compliance requirements set out in the Directive. These requirements include prudential and good governance requirements and extend to verifying the active integration of the SCR model in daily management processes. The regulator will verify that the Directive requirements for internal audit, internal control, risk management and actuarial functions are met. The

undertaking will be required to prepare for the regulator a Report for Supervisors (RTS) that is extensive and includes the firm's own risk and business planning tool – its Own Risk and Solvency Assessment report (ORSA), which will consider all risks, including those set out in the Standard SCR model and wider business risks that might affect the undertaking.

- Pillar 3 (risk transparency) – aims to harmonise reporting to the wider market to induce market discipline. This includes more extensive information, including that not normally in the public domain that includes considerable detail of any Internal Model approved to calculate the SCR. Market transparency will be increased to provide better insight into the actual risk and return profile of each undertaking. All undertakings will be required to prepare a Solvency and Financial Condition report that will summarise and detail many of the aspects considered and reported on in Pillar 1 and Pillar 2.

Solvency II latest position

September 2009 saw the submission of over 20,000 comments from 105 stakeholders on the 26 CEIOPS consultation papers issued in July and the last main batch in early November have also generated large volumes of comments – particularly as the November batch significantly increased the standard formula SCR for most insurers. Many voices in the industry have reacted strongly to the strengthening of some aspects of the SII model set out in these consultations and debates continue with the quantitative impact study in 2010 (QIS5) being the last major test of impact. The final consultation will be by the EU Commission across the summer of 2010, which will be heavily driven by the CEIOPS consultation papers exposed over 2009.

Interim measures

A number of European countries, including the UK, Netherlands and Switzerland, have implemented interim measures, adopted in the knowledge that Solvency II would take some time to put into practice.

The 2006 reforms in Switzerland and the Netherlands have a great deal in common with the FSA's reforms. Unsurprisingly, all three regimes emphasise the principle that firms are responsible for sound financial risk management and proper capital funding of asset risks and liabilities. They also take similar approaches to prudential regulation in three major areas: technical provisions, capital requirements and the supervisory review process.

All three countries have developed risk-based capital requirements which include:

- a minimum capital requirement that captures market, credit and underwriting risks (although the Swiss regime regards this calculation as part of its Pillar 2 approach);
- standardised approaches to estimating capital requirements, which rely to some extent on stress and scenario tests; in the Netherlands, this is supplemented with a simplified solvency test subject to regulatory approval;
- the possibility of using firms' internal models to calculate the solvency requirements;
- a non-zero failure approach to the capital requirement, using a Value-at-Risk concept for calibration: a confidence level of 99 per cent (Switzerland) or 99.5 per cent (the UK and the Netherlands) and a time horizon of one year.

All three jurisdictions have developed standards for technical provisions which aim at realistic valuations of assets and liabilities. The Netherlands and Switzerland also apply similar approaches to estimating prudential margins. In Switzerland the margin is based on the cost of regulatory capital necessary to run off the liabilities. In the Netherlands the supervisor has proposed a comparable approach where the margin is based on the amount that a firm buying the portfolio would require as compensation to bear the risks in the liabilities.

3.3.1 Switzerland

FINMA (Swiss Financial Market Supervisory Authority) is the Swiss state regulatory body responsible for authorising banks, insurance companies, stock exchanges, securities dealers and collective investment schemes.

The Swiss Solvency Test (SST)

The risk-based solvency system in Switzerland is known as the Swiss Solvency Test (SST). The SST is a principle-based framework aiming to assess an insurance company's financial soundness in order to ensure the fulfilment of its (long-term) obligations towards the policyholders by taking into account the true risks to which the company is exposed.

Development of the SST was initiated in 2003 with the aim of defining basic principles of a future system for determining solvency. This was done in cooperation with the insurance industry, consulting companies and academia. The first prototype of the SST was tested in a field test during 2004 with 10 of Switzerland's large insurers. Further field tests took place in 2005 (involving 45 insurers: approximately 90% of the market), 2006 and 2007 (mandatory for all large life and non-life companies).

As of 2008, the SST now is mandatory for all insurance companies domiciled in Switzerland together with their branches.

The SST answers the question: How much capital (on average) is required at the beginning of the year in order to be able to cover the liabilities at the end of the year, even in the 1% worst possible cases?

This capital amount is the target capital and has to be compared with the available, so-called, risk bearing capital.

The key characteristics of the SST are:

- the SST is based on a market-consistent valuation of the assets and the liabilities;
- the risks that are quantified are market, insurance and credit risk;
- the expected shortfall of the market-consistent one year profit & loss statement is used as the risk measure;
- the Swiss regulator offers a standard SST model, but the companies are required to use internal models if the standard model is not adequate;
- extreme scenarios have to be evaluated and the impact on the target capital has to be estimated;
- a risk margin, based on the cost of capital approach has to be added to the target capital;
- a comprehensive yearly SST report has to be sent to the Swiss regulator.

Principles defining the SST

1. All assets and liabilities are valued market consistently.
2. Risks quantified are market, credit and insurance risks.
3. Risk-bearing capital is defined as the difference of the market consistent value of assets less the market consistent value of liabilities, plus the risk margin.
4. Target capital is defined as the sum of the Expected Shortfall of change of risk-bearing capital within one year at the 99% confidence level plus the risk margin.
5. Under the SST, an insurer's capital adequacy is defined if its target capital is less than its risk bearing capital.
6. The scope of SST is legal entity and group / conglomerate level domiciled in Switzerland
7. Scenarios defined by the regulator as well as company specific scenarios have to be evaluated and, if relevant, aggregated within the target capital calculation.
8. All relevant probabilistic states have to be modeled probabilistically.
9. Partial and full internal models can and should be used.
10. The internal model has to be integrated into the core processes within the company.
11. SST Report to supervisor such that a knowledgeable 3rd party can understand the results.
12. Disclosure of methodology of internal model such that a knowledgeable 3rd party can get a reasonably good impression on methodology and design decisions.
13. Senior Management is responsible for adherence to principles.

3.3.2 United Kingdom

Recognising the limitations of the current directives and that the Solvency II framework would not be implemented for a number of years, the FSA introduced new risk-based solvency capital requirements from 1 January 2005.

In brief, the regime introduced:

- more realistic valuations for with-profits life insurance liabilities;
- a more risk-sensitive approach to regulatory capital; and
- a clear shift in responsibility with firms assessing the quantity and quality of capital appropriate for their business along with the opportunity to do this using their own internal models.

The FSA's risk-based prudential framework

There are three complementary elements to the FSA's solvency regime:

- **Realistic valuation and risk-sensitive capital requirements**
Life insurance firms are required to calculate realistic valuations of their liabilities which require fair valuation of discretionary benefits, guarantees and options.

For with-profits liabilities the Risk Capital Margin (RCM) is based on the firm's net assets under a prescribed set of adverse asset price, credit and persistency scenarios.

- **Firms' self-assessment of their capital needs**
Any formula for required capital has to fit 'typical' firms and make some simplifying and standardising assumptions. The FSA therefore requires firms to assess their own capital needs - the Individual Capital Adequacy Standards (ICAS).

Firms may use internal models to calculate their capital requirements under ICAS. To encourage integration of modelling regulatory capital requirements with firms' capital management processes ICAS avoids undue restrictions on how firms approach their capital assessment:

"The guidance.....does not include any mandatory stress tests or quantitative factors to be adopted by firms....if we were to provide prescriptive approaches for particular risks, we would detract from the main purpose of the ICAS objectives, which is for the capital assessment to be tailored to each individual firm's particular risks" (FSA 2004).

- **Dialogue between firms and the FSA**
The ICAS forms the basis of a dialogue between the firm and the FSA which may lead to Individual Capital Guidance (ICG) which sets out the FSA's view of the appropriate capital requirement. Although this more sophisticated approach to solvency assessment increases demands both on firms and the regulator, the FSA is clear that: *"these assessments are the only sensible way to incorporate a firm's future business plans, strategies and capital adequacy planning into our prudential regime"* (FSA 2003).

Solvency II transition

UK insurers are currently working with the Financial Services Authority on their preparations. According to the FSA, UK insurers are well-placed to move to the Solvency II regime. The FSA is expecting about 100 applications for internal model approval for Solvency II, having written to the 630 UK insurers it regulates in 2008 asking if they intended to apply for model approval.

3.4 USA

Background

Formed in 1871, National Association of Insurance Commissioners (NAIC) is a technically voluntary organization (although all states are accredited) of the chief insurance regulatory officials of the 50 states, the District of Columbia and five US territories.

In the early 1990s, the NAIC's Solvency Policing Agenda resulted in a number of major changes to financial regulation. Risk-based capital requirements and the use of a detailed risk-based formula, as maintained by the NAIC, were adopted into state insurance laws by all states. Statutory accounting principles (SAP) were codified into a comprehensive guide (called "The Accounting Practices and Procedures Manual"). A centralized financial analysis unit (called the "Financial Analysis Working Group") was formed to perform comprehensive analysis on nationally significant insurers which were identified as potentially troubled. Extensive financial solvency tools (FAST system) and automated analytical routines (I-Site) were created for regulatory use.

Regulators have continued to modify the system over the past 20 years, which has resulted in many improvements. The RBC formula now includes stochastic modelling and trend tests. SAP has been updated annually. The NAIC adopted best practices from Sarbanes-Oxley in the form of changes to the Model Audit Rule, which will become effective in 2010. The NAIC also adopted an enhanced risk-focused approach to examinations which incorporates new risk assessments in the areas of governance, ERM and other types of prospective risk, also effective in 2010.

The Solvency Modernization Initiative

The NAIC's **Solvency Modernization Initiative** (SMI) began in June 2008. The SMI is a critical self-examination of the United States' existing insurance solvency regulation framework and includes a review of international developments regarding insurance supervision, banking supervision, and international accounting standards and their potential use in US insurance regulation. While the US insurance solvency regulation is updated on a continuous basis, the SMI will focus on five key solvency areas:

- capital requirements;
- international accounting;
- insurance valuation;
- reinsurance;
- group regulatory issues.

The workplan of the SMI includes the following:

- documentation of the US solvency framework and principles;
- study of other sectors' and other countries' solvency and accounting initiatives and the tools that are used and proposed;
- improved tools for risk-focused examinations;
- creation of a new reinsurance regulatory framework;
- movement to principles-based reserving for life insurance products;
- consideration of possible change to group supervisory methods;
- implementation of new ideas to incorporate into the US solvency system.

The SMI will include articulation of the US solvency framework and key principles in one cohesive document to convey foundational concepts underlying the US regulatory system and their interrelationships. The key principles would serve as a basis for further dialogue with other jurisdictions and institutions and allow for a comparison of US solvency principles with solvency principles from other regimes. The principles would also provide a foundation from which to establish goals, priorities and long-term modernization plans for a more robust US solvency regulation framework.

The SMI includes analysis of other financial supervisory modernization initiatives, to the extent appropriate. Analysis includes the following:

- the Basel II international capital framework for banks and implementation in the US;
- solvency work by the International Association of Insurance Supervisors (IAIS);
- solvency proposals in place or under development in other jurisdictions, including Australia, Bermuda, Canada, Switzerland and the EU; and
- accounting standards being developed by the International Accounting Standards Board (IASB).

US regulators are currently studying issues relating to the uses of economic capital, enterprise risk management, and more extensive internal models (with appropriate approvals and safeguards) in the Risk-Based Capital (RBC) system. RBC will be evaluated to determine how to incorporate risks that are not currently included in the RBC calculation as well as issues related to re-calibration. There are numerous group issues under consideration including modification to the current Insurance Holding Company System Regulatory Act, discussion of non-regulated and federally-regulated entities within a group, continued implementation of group supervisory colleges, and discussion of potential group capital requirements. Other ideas encompass reinsurance, insurance valuation, corporate governance, systemic risk, and accounting.

Comparing Solvency II and US Financial Regulation

There are some noteworthy differences between how the system of financial regulation is evolving in the US and Europe. Differences include the role of internal models and other differences.

The Role of Internal Models

Key differences between the US and Europe in the use of internal models are the following:

- The US is introducing internal models in an incremental way and maintaining a number of controls as they are introduced. These include focussing on life insurance and annuities, applying some models to new business only (consistent with the existing approach of applying principles-based reserving to new business only), and requiring the use of deterministic scenarios to serve as floors. In contrast, Solvency II is a “big bang” approach, under which the entire framework of capital regulation will undergo change, internal models are encouraged and can be expected to result in lower capital charges, and there is no explicit floor other than the MCR.
- In the European Union, it is expected that supervisors will review internal models before granting permission to use the models. Permission would be granted only if the company complies with certain standards. In the United States, regulators have largely relied upon the company’s actuaries to attest to the appropriateness of the models and its results. However, regulators have discussed the possibility of creating a centralized review office to review internal models on behalf of state insurance regulators. They are also considering the creation of a statistical agent to collect industry wide data that could be used as a benchmark for examining individual company data and model inputs.
- The metrics for Solvency II and US internal models are different. In Solvency II, capital requirements are targeted at a 99.5% VaR. In the United States, reserving and capital requirements using internal models are generally calibrated based on a Tail VaR (TVaR) or Conditional Tail Expectation, which accounts for the magnitude of the potential loss in excess of the VaR threshold.
- In the United States, a company is required to use internal models to establish its capital requirements if it engages in certain types of business. The internal models are used to address a risk that is not otherwise well-captured in the standard factor-based formula, and thus tend to increase capital requirements. In Solvency II, internal models are seen as generally superior to the standard approach because they better align the relationship between risk and capital. Accordingly, companies are encouraged, but not required, to use internal models, and the use of internal models tends to reduce overall capital required. Supervisors can require the use of internal models if they believe the standard scenario does not adequately capture the insurer’s risk profile.

Other Differences

Beyond the differences in their application of internal models, there are a number of other noteworthy differences between the US system and Solvency II.

- Solvency II attempts to frame its capital requirements around a consistent standard – the 99.5% VaR. This standard applies even in the construction of the standard formula, including the selection of correlation factors. While the results of the fourth Quantitative Impact Study (QIS 4) suggest the framers of Solvency II continue to have challenges designing and calibrating the formula to achieve its objective, the objective remains consistent throughout the capital regime, unlike the US system. In the United States, the standard formula is not calibrated to a VaR or TVaR target.
- There are some differences in the risks that are captured. Most notably, Solvency II includes catastrophe risk for both life and non-life and a charge for operational risk. Catastrophe risk is not explicitly modelling under the US RBC calculation, whilst operational risk is covered by the C4 Business Risk. In the US, the RBC charges for mortgages and bonds reflect only credit default risk, and not the risk of spread widening.
- In setting technical provisions or policy reserves, Solvency II favours using a “market-consistent approach” with a one-year time horizon for risk elements. The US principles-based approach calculates the greatest present value of the deficit under each of the stochastic scenarios, and then applies a conditional tail expectation (or Tail VaR) to determine the required reserves, subject to a floor that is based on a deterministic scenario.
- In Solvency II, Europe is relaxing its investment restrictions in favour of a prudent person approach to investment regulation. In the United States, investment regulations vary across the states. In general, states maintain a blend of rules-based and prudent person approaches to investment regulation, with most assets required to be invested in high quality instruments, but a small amount (the basket) permitted to be invested outside those restrictions (per the basket clause).
- US insurance regulators have nothing comparable to the Own Solvency and Risk Assessment (ORSA) report of Solvency II. While the new Risk-Focused Supervisory system is intended to increase regulatory oversight of a company’s risk management, there is no explicit requirement for the company to provide the supervisor with a document that includes its internal assessment of its risks, risk management systems, and risk profile.

Latest Developments

The following NAIC Committees are currently active on this topic:

- Solvency Modernization Initiative Task Force
- Group Solvency Issues Working Group
- International Solvency and Accounting Working Group
- Principles-Based Reserving Working Group
- Corporate Governance Subgroup
- Reinsurance Task Force
- Capital Adequacy Task Force
- Statutory Accounting Principles Working Group

Further details of the activities of the committees is beyond the scope of this document but can be found at

http://www.naic.org/topics/topic_solvency_modernization_initiative.htm

Progress to date against the five key areas of the SMI listed above is as follows.

Capital Requirements

Regulators are considering whether the action and control levels in the Risk-based Capital (RBC) are established at appropriate levels, whether the RBC should be expanded beyond its current determination of a minimum capital requirement, and whether to require regulatory reporting of a company's economic capital level and information about the development of the company's target capital. A company's target economic capital amount is an indicator to a regulator of how the company's management sees their business, including their level of conservative. Thus, a regulator could benefit by knowing both how a company calculates, interprets, and uses an economic capital amount, as well as what that amount is. In doing so, regulators could learn more about the risks faced by a company and how those risks interact and change.

Regulators are also discussing whether additional tools could be useful, such as the use of internal models within or as a replacement to RBC and the requirement of enterprise risk management (ERM) reporting. Partial internal modelling already exists for certain products in the life RBC formula, and the use of internal modelling could be expanded to develop an explicit property/casualty catastrophe risk charge. In addition, there is consideration of the use of full internal modelling by a company, with some restrictions and deterministic elements, to replace the RBC calculation. For ERM, regulators might consider requiring insurers to perform their own risk and solvency assessment, including assessment of their risk management and evaluation of the potential impact of risks on their solvency position. While the US does not require companies to implement enterprise risk management ERM systems, it does require companies to analyze the risks they face.

International Accounting

For insurance contract accounting, the US Financial Accounting Standards Board (FASB) entered into a joint project with the International Accounting Standards Board (IASB). The two groups will work to establish International Financial Reporting Standards (IFRS), which then will become US generally accepted accounting principles (GAAP). The insurance regulators' accounting system, statutory accounting, requires regulators to review any changes to GAAP accounting and determine what changes should be made to statutory accounting. US regulators are already reviewing and commenting to the IASB on international accounting proposals.

Insurance Valuation

The valuation aspect of this initiative is mainly focused on life insurance reserves, given that property/casualty reserves are already principles-based. However, the life insurance principles-based reserving project could influence property/casualty regulation, especially relating to governance and actuarial requirements. Because economic conditions are more volatile now (for both assets and liabilities) than they were decades ago, a company should hold more capital today to provide the same level of safety as then. It is also true that variations in individual company risk characteristics are wider now than in previous decades. Thus, capital requirements today need to be more company-specific, reflect the interdependence among assets, liabilities, regulatory capital requirements and capital resources, and ensure that risks are appropriately recognized.

Reinsurance

In 2008, the NAIC adopted a Reinsurance Regulatory Modernization Framework Proposal that includes a design to create a modernized system for the regulation of reinsurance in the US. The NAIC has now begun its work to implement the framework. The first step is to draft proposed federal legislation to implement the legal framework. Next will be structural development of a Reinsurance Supervision Review Department that will assess non-U.S. regulatory regimes, as well as facilitate the evaluation of states wishing to become home state or port of entry supervisors.

Group Solvency Issues

At present, the NAIC has the Holding Company Model Act, which requires disclosure of pertinent information relating to changes in control of an insurer and disclosure by an insurer of material transactions and relationships between the insurer and its affiliates, including certain dividends to shareholders paid by the insurer. The act also provides standards governing material transactions between an insurer and its affiliates.

The NAIC has created the Group Solvency Issues Working Group to study potential revisions to the Holding Company Model Act, the use and potential improvement of Supervisory Colleges with regulators from around the world, and group-wide supervision requirements, which may include group-wide capital requirements.

A personal view from NAIC's CEO

In March 2009, Therese Vaughan, NAIC's Chief Executive Officer, authored a paper entitled "The Implications of Solvency II for US Insurance Regulation" which was presented at the Networks Financial Institute (NFI) 6th Annual Insurance Reform Summit , includes:. In this document she summarises as follows:

"The optimal structure of insurance supervision is likely to be a combination of a rules-based and a principles-based approach. That is, internal models should be an adjunct to a rules-based capital requirement that establishes a floor for regulatory capital. The current environment has also demonstrated the value of some regulatory oversight of other activities of financial institutions, including, for example, the regulation of investments. Capital regulation is a necessary, but not sufficient, requirement for effective financial regulation. Onsite examinations, offsite analysis of financial performance and trends, and frequent interaction with the regulated entity are equally important. These are long-standing features of the U.S. insurance regulatory system. Finally, current developments have demonstrated that market discipline cannot be relied on as a substitute for regulation and supervision. The optimal regulatory structure is one that encourages supervisors to take action when it is appropriate, and a system that incorporates duplicative regulatory oversight may advance that objective."

Appendix A: German insurance chief warns CEIOPS on Solvency II

Thomas Schubert, head of the risk management department at the German Insurance Association (GDV), has warned the Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS) that it must change the proposals laid out in the second wave of Solvency II consultation papers or risk damaging the competitiveness of the European insurance industry.

In an opinion piece published in October 2009, he says that it is the united view of the European insurance associations that CEIOPS has not stuck to the principles of the Solvency II directive.

"The problem is not just the supervisors being conservative - it is that they have made changes without giving any justification or evidence for their need.

I am concerned that the supervisors have not stuck to the principles of the Solvency II level one directive in the second wave of consultation papers. The GDV fully supports the framework directive, as does the whole industry, but it is the united view among the insurance associations that CEIOPS has moved away from the principles set by the European Parliament.

There are two main problems. First there is the calibration. The problem is not just the supervisors being conservative -- it is that they have made changes without giving any justification or evidence for their need. CEIOPS has doubled factors, for example for operational risk or life underwriting risk, without considering correlations and without giving any reasoning.

We approve of a critical review of the planned measures against the background of the financial crisis, but we nevertheless expected CEIOPS to stick to the main principles of Solvency II. If they need to change the data and parameters they used in QIS 4, for instance, then they must give an explanation for their changes.

The second problem is the "own funds" where CEIOPS has developed very rigid requirements. One example is hybrid capital. These requirements are not consistent with market usage and would make it nearly impossible to raise the kind of capital CEIOPS is envisaging. In doing this, CEIOPS is moving away from the total balance sheet approach and it means that all sorts of risk buffers should be accepted.

It is difficult to say how much more capital the industry would need to raise under the current proposals. But the suggestions CEIOPS is making are very rigid, so we are not talking about marginal numbers. The numbers we are talking about will affect the whole industry and not just individual companies. So very quickly we are talking about billions and not millions.

This will have a major impact on the competitiveness of the European insurance market -- the premiums might rise and the customer might be less interested in buying its insurance products.

We are discussing our views constantly with all stakeholders and there is a continuous dialogue between the national associations and the national supervisors as well. The European Commission is keen to stick to what has been agreed in the Solvency II framework directive -- which means a risk-based and balance-sheet approach with market value.

My hope is that we will hold on to the overall principles of Solvency II. This is very important if we want to develop risk-based supervision. Indeed, it is crucial for the industry."

Published in: Insurance ERM: Sept 2009

Appendix B: References

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Attachment 2

Summary of Modelling Criteria

Affirmation Statements

This attachment set out the affirmations required in a self-assessment process to see of a company's capital models suitable for regulatory reporting,

Use Test

The ICM is an essential component in the development and evaluation of the insurer's strategies.
--

The ICM is relied upon for key management and tactical operating decisions.

The ICM is an integral part of the insurer's risk and capital management functions.

Statistical Test

The ICM has been developed with due regard to generally accepted actuarial techniques and statistical theory.

Modelling techniques are appropriate to the nature, scale and complexity of the risks to which the insurer is exposed.
--

All material assumptions have been assessed for veracity and suitability.

Rigorous data validation procedures are in place.

The ICM has a rigorous approach to modelling dependency structures.

Calibration Test

The ICM is calibrated such that the RCR is determined using the Tail Value-at-Risk¹ (“TVaR”) metric subject to a confidence level of 99.0% over a one year period with run-off to extinction of all liabilities. (An alternative metric may be used as long as it can be demonstrated that it provides for at least an equivalent level of capital.)

Validation

The ICM is subject to a regular cycle of validation, which includes the monitoring of performance, review of the ongoing appropriateness of model specifications, and testing of forecast results against experience.

The validation process demonstrates that the ICM remains suitable for the purpose intended during changing conditions.

Documentation

Documentation of the ICM provides a detailed description of the structure, design, theory, operational details, input assumptions, parameters, governance process and controls of the ICM.

The documentation is sufficiently comprehensive and instructive such that the ICM can be utilised and maintained by newly assigned qualified personnel or qualified personnel with limited user experience.

¹ Tail Value at Risk, or TVaR, at x% is the expected loss given the xth percentile loss is breached. A 99.0% TVaR level therefore corresponds to the average of the largest 1% of modelled outcomes.

Model Governance

The Board of Directors (“the Board”) and senior management of the insurer have overall responsibility for the placement of proper management and controls around the ICM and ensuring its use in an insurer’s risk management function.

There is sufficient understanding of the ICM at the appropriate levels within the insurer, including the implications of ICM outputs and its limitations for risk and capital management decisions.

The insurer’s risk management unit² has responsibility for the ongoing maintenance, use, application and validation of the ICM.

Internal Controls

There are sufficient internal controls in place to monitor and evaluate the ICM’s efficient operation and maintenance.

Strict protocols are in place restricting those persons who have access to the ICM and the ability to make adjustments thereto.

Risk Categories

The ICM adequately captures all the material risks facing the insurer, including, but not limited to, catastrophe risk, underwriting risk, reserving risk, market risk, liquidity risk, credit risk and operational risk.

² In this guidance note, “risk management unit” shall mean the group of employees responsible for the development, maintenance and operation of the ICM.

Guidance for Affirmation Statements

Use Test

A.2.1. The Authority will not approve an ICM unless it is satisfied that the model is central to the insurer's decision-making process and is embedded in its operations. This is referred to as the "Use test" and requires that an ICM be widely used throughout an insurer's organisation and serves a critical role in the development, implementation and monitoring of management strategies.

A.2.2. The ICM should assist in the measurement and management of material sources of risk and be used to evaluate potential actions to ameliorate unsatisfactory risk exposures. The ICM should also be used by the insurer to better understand the alignment of exposures across different risk drivers.

A.2.3. In addition to the evaluation of capital adequacy, the Authority will also consider whether an ICM is used for some of the following business purposes:

- allocation of capital to business segments and lines of business;
- determination of hurdle rates of return for pricing and underwriting guidelines;
- determination of marginal capital or hurdle rates of return for large or special accounts;
- evaluation of risk appetite;
- management of risk limits and portfolio composition;
- assessment of outward reinsurance strategies;
- development and evaluation of business plans, including new lines of business or new areas of risk;
- capital management;
- determination of investment policies and strategies; and
- performance assessment.

A.2.4. The ICM should contain processes and reporting that enables the insurer to monitor, manage and report on the individual and aggregate risks, to which the insurer is or could be exposed, as well as the dependencies between risks.

A.2.5. The ICM should also serve a central role in terms of corporate governance, particularly as it relates to the risk management function and decision-making processes.

- A.2.6. A broad involvement of a range of business functions should exist in the use of the ICM, including executive management, actuarial science, risk management, finance, underwriting, claims and human resources, particularly for performance-based compensation. Each business function should understand how its areas of responsibility are reflected in the ICM and how past experience will impact capital requirements.
- A.2.7. There should be an adequate recognition of the limitations of modelling processes, given the range of factors considered in management's decision-making process and the inherent limitations of ICMs. The Authority would expect the ICM to be used as an input into, rather than the sole determinant of, key management decisions.
- A.2.8. The frequency of determination of the RCR using the ICM should be consistent with the insurer's needs, but should be assessed at least annually.
- A.2.9. The use of and reliance upon the ICM should be extensive enough to result in continuous feedback on the reasonableness of its results and the validity of the model's inputs and critical assumptions.

Statistical Test

- A.2.10. The methodologies used in the ICM should be based on rigorous actuarial and statistical techniques, be consistent with the methods used to calculate technical provisions and use current and credible data as well as realistic assumptions. The modelling techniques used in the ICM are appropriate to the nature, scale and complexity of the risks to which the insurer is exposed. Certain drivers of risk may be modelled independently and at different levels of complexity in an insurer's ICM.
- A.2.11. Processes should be in place to review all ICM inputs and assumptions for reasonableness and consistency, and implicit assumptions should be made explicit where possible. In addition to considering process risk, the model's assumptions and parameters should be determined taking into consideration parameter risk and data quality. Where practicable, goodness of fit testing of the ICM with historical observations should be conducted to assess the model's efficacy.
- A.2.12. The data used both as inputs to the ICM and to determine parameters for the ICM, including exposure data from insurer and broker submissions and industry data from which loss frequency or severity assumptions are derived, should be updated frequently and tested for accuracy, completeness, consistency and predictive propensity.
- A.2.13. Dependencies within and among risk categories should be adequately considered in the ICM. The insurer should be able to justify diversification benefits between risk categories and provide comprehensive descriptions of the material assumptions and methodologies underlying dependency structures in the ICM. Additionally, an insurer should be able to demonstrate that the ICM adequately captures dependencies between risks during stress testing. Due to the importance of this subject, the Authority will seek to research the topic of dependency structures and discuss theory and practice with industry on an ongoing basis.
- A.2.14. The interdependency between natural or man-made catastrophes and capital markets should also be considered, as more extreme catastrophes may induce stress on financial markets.

Calibration Test

- A.2.15. Where practicable, the ICM should be calibrated such that the RCR is determined using the TVaR metric subject to a confidence level of 99.0% over a one year period with a complete run-off to extinction of all liabilities.
- A.2.16. A time period other than one year or risk measure different from the 99.0% TVaR may be used, provided the selected metric can be demonstrated to be at least as effective as a 99.0% TVaR over a one year time horizon in determining the RCR.
- A.2.17. If an alternative risk measure is selected, the insurer should give due consideration to its statistical properties. For the purpose of capital requirements, an insurer is encouraged to use theoretically supportable models and coherent risk measures³, keeping in mind that Value at Risk measures are coherent only in limited circumstances.
- A.2.19. Ideally, the ICM should be based on an economic balance sheet that reconciles to the insurer's balance sheet used for statutory reporting purposes.

³ A coherent risk measure is sub-additive, monotonic, homogeneous and translationally invariant.

Validation

- A.2.21. The ICM should be subject to a periodic validation process, which should be completed by senior management of the insurer. This should include a review of its predictive performance, an ongoing assessment of the appropriateness of material assumptions and methodologies, and a review of model output for reasonableness.
- A.2.22. The completion of an independent internal or external review of the development, operation and interpretation of the ICM is encouraged prior to an insurer's ICM application. A review by an independent external third party is considered best practice.
- A.2.23. The validation process should also include an examination of the sensitivity of ICM results to changes in key underlying assumptions, an assessment of the accuracy, completeness and predictive propensity of the data used by the ICM, and a statistically valid comparison of results to historical data to assess the robustness of the ICM.
- A.2.24. The ICM should be subjected to a range of scenario and stress tests in order to assess the reliability of the ICM indications and to test the robustness of the model in the evaluation of extreme but plausible events.
- A.2.25. Stress scenarios may be insurer specific (e.g. concerns with the financial condition of the insurer or claims concentration), industry-specific (e.g. price levels or catastrophic claims) or reflective of market conditions in general (e.g. impaired capital markets). Scenarios considered should also include combinations of interdependent events, such as adverse policyholder behaviour, catastrophic claims and impaired capital markets.
- A.2.26. The validation process should demonstrate that the ICM remains fit for the purposes intended under changing conditions and continues to satisfy the criteria outlined in the use test, statistical test, calibration test and risk categories sections of this guidance.

Documentation

- A.2.27. Comprehensive documentation should be maintained by the insurer describing the ICM's processes, theory, parameterisation, material assumptions and operational details.
- A.2.28. The documentation should be sufficiently comprehensive and instructive so as to support an independent review of the ICM as well as its use and maintenance by newly assigned qualified personnel or qualified personnel with limited ICM experience.
- A.2.29. Documentation should include a detailed outline of the ICM's structure, including a schematic diagram of its main components, the flow of data between those components, linkages between technical and non-technical elements and the theory underlying its design and function.
- A.2.30. An insurer should also be able to provide details regarding key inputs and the assumptions used to determine those inputs as well as the relevant outputs and how those outputs are used in the day-to-day operations and management of the insurer. Documentation should also include details relating to the ICM's governance and internal control procedures.
- A.2.31. Documentation should describe the validation procedures applied to any components of the ICM, and an insurer should document the findings from each validation exercise.
- A.2.32. Material changes made to the ICM should be documented, and the Authority should be notified of these changes along with any significant policy changes affecting the ICM. A summary of ICM revisions will need to be filed on an annual basis with the Authority, and a catalogue of minor or routine changes should be maintained by the insurer and be available for inspection.
- A.2.33. The documentation should identify any weaknesses of the ICM or conditions for which it may not adequately determine the insurer's RCR.

Model Governance

- A.2.34. The Board of the insurer should ultimately be responsible for the integrity of the ICM, the placement of proper management and controls around the development and use of the ICM and ensuring that the ICM plays a key role in the insurer's risk management function. An insurer should be able to evidence an appropriate level of discussion relating to the ICM and its outputs at Board level.
- A.2.35. The insurer's Board and senior management should have a sufficient understanding of the ICM's key elements, including the implications of its outputs and its limitations for risk and capital management decisions, and ensure that an adequate understanding of the ICM exists at appropriate levels within the insurer's organisational structure.⁴
- A.2.36. The day-to-day responsibilities relating to the ICM may be delegated to the Chief Risk Officer, or the person with responsibilities normally assumed by the Chief Risk Officer, as head of the insurer's risk management unit.
- A.2.37. The insurer's risk management unit should be responsible for ensuring the ongoing appropriateness of the design and application of the ICM, and that processes are in place to amend and refine the ICM as an insurer's risk profile changes.
- A.2.38. The risk management unit of the insurer should have sufficient resources, technical ability and authority to operate and maintain the ICM effectively and securely. The insurer's emergency management and business continuity plans should include specific provisions for the backup and recovery of all critical systems needed for the continued operation and maintenance of the ICM.
- A.2.39. The risk management unit should test and validate the ICM on a periodic basis. This unit should also document any subsequent changes made to the ICM, inform senior management and the Board of the insurer about the performance of the ICM, and recommend areas needing improvement.
- A.2.40. An insurer should decide on the appropriate balance of in-house versus external expertise relied upon in relation to the ICM, given the nature, scale and complexity of the risks they bear. Any outsourced work should meet the insurer's own quality requirements and should be appropriate to the nature of the insurer's business.
- A.2.41. The insurer should maintain written documentation of all ICM governance policies and procedures, including organisational risk limits and tolerances, internal control, internal audit and, where relevant, outsourcing of ICM activities. The insurer should further be able to demonstrate that these policies have been periodically reviewed and adhered to in all material respects.

⁴ IAIS *Standard on the Use of Internal Models for Regulatory Capital Purposes*, October 2008, Paragraph 11.

A.2.42. An insurer should also be able to demonstrate the ICM's degree of integration into the governance process by providing evidence of links between the risk management function and the model. These linkages should clearly illustrate the involvement of the risk management function in the construction and design of the model, and the ICM's role in supporting key risk management decisions, including those relating to risk-based capital assessment and allocation.

Internal Controls

A.2.43. An insurer should clearly demonstrate that adequate and effective controls are in place in relation to the operation and maintenance of the ICM, including strict protocols identifying those parties who have the authority to use and make amendments to the model.

Clearly documented procedures for independent review of the ICM should be developed by the insurer. This process may be completed by an internal audit unit, an external audit service or a combination of both.

A.2.44. The scope of the internal control process should include administrative and accounting procedures, testing and control procedures, reporting requirements and compliance procedures.

A.2.45. The audit function should include procedures designed to verify that the ICM is current, uses reliable and relevant data and is operated and maintained by personnel with adequate expertise and experience.

A.2.46. A specific control policy should also be in effect ensuring that an appropriate segregation of duties is maintained between those who are responsible for building, operating and maintaining the ICM and those who are responsible for making decisions based on the ICM's output.

A.2.47. The internal control process should also include provisions for the routine review and challenge of material assumptions and parameters in the ICM.

Risk Categories

A.2.47. The ICM should consider all material risks facing an insurer on a consistent and coherent basis. The risks considered should include the following:

- Credit Risk is the risk of default by counterparties on loans, debt instruments, derivatives, and reinsurance. The solvency buffer for credit risk will use factors developed from the best available information. The method will be consistent with the approach in other principles based regulatory regimes.
- Market Risk is the risk that changes in the financial markets will affect the value of assets and liabilities. This includes interest rate, spread, equity, and currency risks. The solvency buffer for market risk will use deterministic shock calculation for interest rate, equity, real estate, and currency risks.
- Insurance Risk is the risk of adverse future experience in mortality, morbidity, and policyholder behaviour, including lapse rates. The solvency buffer for insurance risk will be calculated using either a formula or an integrated combination of shocks to the mortality, morbidity and lapse assumptions used in calculating best estimate insurance obligations.
- Operational Risk is the risk that the company's business processes will fail, or that the company will fail to comply with laws and regulations. The financial impact of loss of reputation is also included in operational risks.

Market Risk

A.2.48. Market risk is defined as the risk that an event or series of economic events will impact the value of an insurer's assets or liabilities. The most common source of this risk type relates to interest rate changes, market price changes, exchange rate movements and counterparty default (excluding reinsurance and intermediary creditors).

A.2.49. An insurer should be able to provide a description of all material market risks to which its assets or liabilities may be exposed and the manner by which they are assessed in the ICM. The following items, among others, should be considered in this description:

- determination of market rate scenarios (e.g. investment asset returns, foreign exchange rates, etc.);
- details relating to any market scenario generators used by the insurer;
- consideration of adverse economic scenarios on both assets and liabilities simultaneously;
- currency units used for all indicators of inflation;
- simulated foreign exchange rates applied to assets and liabilities;
- whether the credit risk for fixed income securities are modelled separately or as part of market risk;
- details of any material dependency considerations (e.g. dependency between market returns and other risks such as credit default losses, dependency between asset classes, etc.);
- additional risks from active investment management; and
- credit risk associated with any assets for which this risk is not typically addressed in the credit risk module of the ICM.

Liquidity Risk

A.2.50. Liquidity risk is defined as the risk that sources of cash will be insufficient to meet cash needs under current or future conditions. This risk pertains specifically to the circumstances where a given security or asset cannot be bought or sold when needed at the value carried by the insurer in order to fund an obligation or expense. When considering liquidity risk, it is important to seek to match the sources of liquidity within the asset portfolio to the liquidity needs of the insurer's liabilities.

A.2.51. An insurer should consider whether its risk management function adequately identifies the potential for liquidity issues. Any risk so identified should be considered in the ICM, either in the market risk module or separately.

A.2.52. An insurer is typically cash flow positive and liquidity issues are rare. However, an ICM should consider events that require an insurer to commit assets in support of related-party guarantees, letters of credit, or other agreements requiring some form of security, which may lead to a lack of liquidity.

A.2.53. Although the standard approach to economic capital modelling tends to treat legal entity boundaries as largely irrelevant and considers aggregate enterprise risk in relation to aggregate capital resources, an insurer's ICM should consider scenarios where capital may not be transferable across legal entities.

A.2.54. An insurer should be able to provide a description detailing the treatment of liquidity risk in the ICM. The following are examples of possible scenarios that should be considered in this description:

- large claims resulting from a single event or a series of contagion events;
- extreme catastrophic event(s) combined with related financial market stress;
- insurer financial strength ratings downgrade (e.g. full "letter" downgrade or downgrade to non-investment grade levels, etc.);
- impact of the requirement to post collateral to counterparties (e.g. as a result of a ratings downgrade, a single large loss or series of losses or a reduction in surplus, etc.);
- unexpected termination of a material agreement or relationship (e.g. significant reinsurance programme, credit facility, etc.);
- liquidity needs arising from a large operational loss event;
- loss of a key distribution channel; and
- impairment of capital markets.

Credit Risk

A.2.55. Credit risk is defined as the risk of loss arising from the inability to realise amounts due from creditors, including reinsurers and intermediaries. Certain credit risks, such as those relating to publicly traded assets, may be captured in the market risk module, in which case they do not need to be addressed as part of the credit risk module.

A.2.56. An insurer should be able to provide a description of the manner by which its ICM considers credit risk, which includes, but is not limited to, the following:

- main sources of credit risk, including premium debtors, financial agreement counterparties, non-tradable assets, related-party exposures and reinsurance receivables;
- capture of assets or any other relevant items, including off balance sheet items not included in the market risk module;
- residual credit risks that are only partially covered in the market risk module;
- method for assessing extreme credit risk events;
- evaluation of credit risk exposures over the entire holding period of each asset;
- consideration of reinsurance receivables;
- dependency assumptions (e.g. between defaults on different asset classes, between insurer defaults and claims levels, etc.); and
- assessment of mark-to-market credit risk impacts, including both the impact of widening credit spreads and ratings migration.

Operational Risk

A.2.57. Operational risk is defined as the risk of loss resulting from failed or inadequate internal processes, personnel, systems, or external events.

A.2.58. Operational risk is a key component of an insurer's risk profile. The Authority recognises that quantification of operational risk is a developing discipline. Accordingly, the operational risk module may be developed and operated separately from the other risk modules and differ from those modules in its level of complexity.

A.2.59. The risk management function of an insurer should be able to identify, measure, respond to, monitor and report on all material operational risks, and these risks should be considered in the ICM.

A.2.60. Ideally, an insurer should consider risks arising from each of the following factors, which are described in the Authority's Commercial Insurer Risk Assessment ("CIRA") framework, when assessing its operational risk:

- **Business Process Risk** which includes data entry and data processing errors arising from application design misspecifications;
- **Business Continuity Risk** which includes risks that threaten or disrupt an insurer's continuous operations, such as risks arising from natural and man-made hazards;
- **Compliance Risk** which includes legal and regulatory breaches;
- **Information Systems Risk** which includes unauthorised access to systems and data, data loss, utility disruptions, software and hardware failures, and inability to access information systems;
- **Distribution Channels Risk** which includes inexperienced or incapable brokers/agents;
- **Fraud Risk** which includes intentional misconduct or unauthorised activities such as misappropriation of assets, information theft, forgery, and fraudulent claims;
- **Human Resources Risk** which includes key person risk, unethical staff (not including fraud), inexperienced or incapable staff, training, retention, and communication failures; and
- **Outsourcing Risk** which includes communication failures, and incapable outsourcing partners.

A.2.61.If operational risk is explicitly modelled using historical data, an insurer should be able to describe the sources of data used for the assessment of operational risk, including:

- internal loss and event data;
- external loss and event data with details of any external data providers; and
- scenario analysis.

A.2.62.There may be an overlap between operational risk and other risk categories. If the losses are considered elsewhere in the ICM, the insurer should be able to provide sufficient documentation to evidence this.

A.2.63.Where significant losses have occurred as a result of prior operational events, the insurer should describe practices put in place to mitigate against similar losses in the future.

Insurer

Year

Asset Default (C-1) Risk - Assets Backing Non-Par, Surplus and Non-Qualifying Participating

(thousands of dollars)

1 of 4

Reference Guideline Chapter 3	01	02	03	04	05	Ref
	Balance	Redistribution of exposure for Collateral/ Guarantee	Net Exposure	Factor	Capital Required	
Assets						
Cash held on the company's own premises				0%		001
Receivables: regulated insurers and approved reinsurers				0%		004
Goodwill				0%		005
Miscellaneous items:						
Agents' debit balances (net of provisions)				8%		010
Outstanding premiums				8%		011
Other receivables				8%		012
Furniture and fixtures				8%		013
Prepaid expenses				8%		014
Future income tax assets				8%		015
Receivables from other insurers				8%		016
Intangible assets not deducted from capital				8%		019
Other				8%		025
Subtotal Miscellaneous Items						029
Short term obligations:						
Entities eligible for a 0% factor				0%		030
Demand deposits, checks, acceptances, and similar obligations of regulated DTIs				0.25%		032
Commercial paper: A-1, R-1 or equivalent				0.25%		033
A-2, R-2 or equivalent				0.50%		034
A-3, R-3 or equivalent				2%		035
All other ratings				8%		090
Subtotal Short term obligations						039
Bonds / Loans / Leases / Mortgages						
Entities eligible for a 0% factor				0%		100
Obligations eligible for a factor based on an external rating:						
AAA				0.25%		040
AA				0.50%		041
A				1%		042
BBB				2%		043
BB				4%		044
B				8%		045
Lower Than B				16%		046
Unrated obligations (performing):						
Bonds				varies		110
Loans:						
Policy loans qualifying for a 0% factor (reference section 3.2.1)				0%		003
All other loans				8%		210
Leases:						
Secured only by specific assets				4%		220
Secured by credit of lessee				varies		230
Mortgages:						
Qualifying residential mortgages				2%		240
All other residential mortgages				4%		245
Commercial mortgages				4%		250
Undeveloped land				8%		260
Impaired and restructured obligations ¹				16%		270
Subtotal Bonds / Loans / Leases / Mortgages						069
Memo Item:						
Write-downs and allowances on obligations reported on line 270						300

¹ Report the balance in column 1 net of write-downs and individual allowances

Insurer

Year

Asset Default (C-1) Risk - Assets Backing Non-Par, Surplus and Non-Qualifying Participating

(thousands of dollars)

2 of 4

Reference Guideline Chapter 3	01	04	05	
	Balance	Factor	Capital Required	Ref
Assets				
Real Estate¹:				
Used by company or a consolidated subsidiary		4%		050
Income producing		7%		051
Oil and gas properties		35%		052
Other		15%		058
Limited partnerships ²		varies		060
Subtotal Real Estate				069
Asset-backed Securities and Securitizations				
Guaranteed by CMHC or another entity eligible for a 0% factor (reference section 3.1.5)		0%		130
Rated: AAA		0.25%		132
AA		0.50%		134
A		1%		136
BBB		2%		138
Lower than BBB		8%		140
Unrated : Satisfy SPV ³ with prorata share of loss		varies		150
Satisfy SPV ³ with more than prorata share of loss		8%		152
Satisfy SPV ³ : impaired portions		16%		154
Other		8%		156
Subtotal real estate and asset-backed securities				199

¹ Including capital leases² Attach detailed schedule of calculations and factor used.³ Meeting all of the conditions in section 3.4.3

Insurer

Year

Asset Default (C-1) Risk - Assets Backing Non-Par, Surplus and Non-Qualifying Participating

(thousands of dollars)

3 of 4

Reference Guideline Manual 3-1 and 3-7	01	04	05
	Balance	Factor	Capital Required

Assets**Equity investments and options¹:**

Preferred stocks: PFD-1		1%	
PFD-2		2%	
PFD-3		4%	
PFD-4		6%	
PFD-5 or Unrated		15%	

Ref

020

021

022

023

024

Mutual funds, segregated funds & similar investments		varies	
--	--	--------	--

035

Gross long positions in common equities			
Less: offsetting short positions in identical equities			
Less: net long positions included in the option scenario table calculation			
Net long positions in common equities		15%	

050

051

052

059

Gross short positions in common equities			
Less: offsetting long positions in identical equities			
Less: net short positions included in the option scenario table calculation			
Net short positions in common equities		15%	

070

071

072

079

Scenario table charge for options (and underlying equities, if applicable)		varies	
--	--	--------	--

090

Subtotal Equity Investments			
-----------------------------	--	--	--

099

Memo item: Options included in scenario table calculation by remaining time to maturity, at fair value	11	12
	Purchased	Sold
Less than 3 months		
Between 3 months and 1 year		
Over 1 year		

210

220

230

¹ Including synthetic and other off-balance sheet positions

Insurer

Year

Asset Default (C-1) Risk - Assets Backing Non-Par, Surplus and Non-Qualifying Participating

(thousands of dollars)

4 of 4

01	06	11	16	21	26
Exposure (Credit Equivalent or Current Exposure Amount)	Adjustment of exposure for collateral (capital markets transactions)	Redistribution of exposure for Collateral/ Guarantee ¹	Net Exposure	Factor	Capital Required

Ref

OTC Derivatives (reference sections 7.2, 7.3 and 3.2.4)

				0%	
				0.25%	
				0.5%	
				1%	
				2%	
				4%	
				8%	
				16%	

010
020
030
040
050
060
070
080**Repo-Style Transactions² (reference sections 3.5 and 3.2.4)**

				0%	
				0.25%	
				0.5%	
				1%	
				2%	
				4%	
				8%	
				16%	

210
220
230
240
250
260
270
280**Commitments (reference section 7.5)**

				0%	
				0.25%	
				0.5%	
				1%	
				2%	
				4%	
				8%	
				16%	

410
420
430
440
450
460
470
480**Direct Credit Substitutes and Other Off-Balance Sheet³ (reference section 7.4)**

				0%	
				0.25%	
				0.5%	
				1%	
				2%	
				4%	
				8%	
				16%	

610
620
630
640
650
660
670
680

Subtotal off-balance sheet exposures

699

Memo Item: Securities pledged or lent under repo-style transactions for which the capital charge is higher than the capital charge for the exposure to the counterparty⁴

Total amount and capital requirement for underlying securities

--	--	--	--	--	--

710

Exposure and capital requirement for counterparties to these transactions

--	--	--	--	--	--

720

¹ For derivatives and repo-style transactions, this column may only be used to reflect guarantees² Requirements for counterparties only. Exclude exposures for which the capital requirement on the instruments pledged or lent is higher than the capital requirement for the counterparty.³ Includes credit protection provided (reference section 3.7.1)⁴ These securities should be included in the requirements calculated on pages 31.010 to 31.021



ASSOCIATION ACTUARIELLE INTERNATIONALE INTERNATIONAL ACTUARIAL ASSOCIATION

November 30, 2009

Rick Shaw
Director, Actuarial Services
The Bermuda Monetary Authority
43 Victoria Street, Hamilton BM 12

Re: Creating an actuarial association in Bermuda

Dear Rick:

Very belatedly, I am following up on our useful and productive discussions in Tallinn regarding the potential roles of an actuarial association in Bermuda. It was particularly helpful to have the benefit of the multiple perspectives that you bring from your actuarial work in several countries and from your current position as an insurance regulator in the Bermuda Monetary Authority (BMA).

Based on our discussions, the key roles for an actuarial association in Bermuda would likely be:

- Providing continuing education opportunities pertinent to the actuaries working in Bermuda, perhaps in collaboration with other entities such as the large actuarial associations, BMA, local insurance companies, consulting firms, or business clubs such as CABER,
- Issuing qualification standards and actuarial standards applicable to the work performed for Bermuda companies or related to Bermuda business,
- Acting as a liaison between the Bermuda actuarial profession and the local regulator, accountancy profession, and insurance industry,
- Handling actuarial discipline cases that may arise in respect of Bermuda-based work, and
- Providing a voice at the International Actuarial Association (IAA) for Bermuda issues and Bermuda actuaries.

These are important roles for an actuarial association, and represent areas that do not appear to be fully and consistently addressed by the other actuarial organizations to which Bermuda actuaries belong. This gap is particularly pronounced due to the importance of Bermuda in the world insurance market.

Financial regulatory authorities around the globe are sensitized to the need to assure that the principles, requirements, professional resources, and processes that they are applying are adequate to the important role of overseeing the marketplace and its participants, and encouraging transparency. A strong actuarial profession can serve in important ways to support the goals of assuring the sound financial condition and disciplined behavior of the marketplace participants.

In light of the public interest that is served by qualification standards and actuarial standards, we discussed the possibility that a key step in the evolution of the actuarial profession in Bermuda might be that the BMA would promote and encourage the statutory creation of a local “actuarial standards board.” From country to country, there are variations in the degree to which such functions are independent of the local actuarial associations, with the trend being towards a greater degree of independence.

You described a conceptual approach to a Bermuda actuarial association that might handle other typical actuarial association roles in a derivative fashion. For example:

- Such an association would rely primarily on the basic education and qualification processes of other actuarial associations. Currently, most actuaries in Bermuda are members of the Casualty Actuarial Society, the Canadian Institute of Actuaries, the Institute of Actuaries, the Institute of Actuaries of Australia, or the Society of Actuaries. Given the prevalence of these credentials, the flow of actuaries on and off the island, the size of the profession in Bermuda and the university infrastructure in Bermuda, we discussed that it is unlikely to be feasible or necessary to create a separate basic education process in Bermuda. However, the primary reliance on the education processes of other organizations certainly would not preclude the opportunity to introduce some additional local education and/or experience requirements for actuaries to be considered qualified to perform specialized types of work.
- A code of conduct in Bermuda might rely primarily on the codes of conducts of the major actuarial associations, to which the Bermuda actuaries belong, with perhaps a default code of conduct incorporated by reference in the (uncommon) case of an actuary who is not covered by one of these other codes of conduct. While this approach might be feasible, we suggest that it would be preferable to have a code of conduct specific to Bermuda that would apply uniformly to all actuarial work performed for Bermuda, rather than having the code vary depending on the “home” country of the actuary. The IAA standards expect that each actuarial organization will have a code of conduct, though of course it could be substantially (or fully) copied from the code of conduct used by another actuarial association.

The creation of a new actuarial association in a geographic region sometimes is led by actuaries practicing in the region, other insurance professionals, or interested academicians. In other cases, the regulator uses its influence and network of connections to take the lead. From your description of the ambivalence of many actuaries in Bermuda, it seems that there may be an opportunity for the regulator to take some key initiative in this case. Of course, the Bermuda Monetary Authority already is playing a role in the profession by requiring regulatory approval of individual actuaries to work in some specific roles defined by statute (particularly, loss reserve work). But we believe it would be better if the regulator were not expanding this role to the

point of the regulator setting the standards for actuarial work. Rather, perhaps there is a key role for BMA in encouraging and facilitating various stakeholders in the actuarial profession and the insurance industry to begin discussions and actions towards formalizing the actuarial profession in Bermuda. In the long run, we believe it would be preferable for Bermuda to have an active actuarial professional body (perhaps independent of the actuarial association) that sets actuarial standards.

One specific area in which the Bermuda Regulatory Authority may be helpful is in using its influence to get laws enacted that would hold harmless the association or other body for its role in a discipline case.

The International Actuarial Association, through its Advice and Assistance Committee, stands ready to provide informational resources and perspectives in support of local initiatives to form an actuarial association in Bermuda. In particular, we can assist interested parties in tapping the experiences accumulated in other geographical areas, the organizational documents of other associations, and information about the expectations that apply to associations seeking to be full member associations in the IAA.

We look forward to continuing our conversation, and to learning more about how we can assist local discussions and efforts to move forward. Please feel free to contact me or the IAA Secretariat at any time.

Sincerely



Robert F. Conger
Chair, IAA Advice & Assistance Committee

Cc: Chris Lewis, Chair, Accreditation Committee
Katsumi Hikasa, President, International Actuarial Association
Yves Guerard, Secretary-General, International Actuarial Association