# Convergence of Measurement Models

Models for non-life insurers have never been more complex but, as David Lightfoot and Phillip Martin explain, understanding the systems and the changes taking place can put a company in a ready position.

Insurance companies are evaluated by regulators and ratings agencies with respect to the adequacy of their capital. In general, regulatory systems tend to determine capital adequacy in absolute terms whereas rating agencies generally evaluate capital relative to certain thresholds as part of their determination of the company's rating or credit-worthiness. With changes in accounting and regulatory issues imminent, this chapter examines the various systems being offered and offers some counsel on potential steps to manage in an environment of change.

## COMPARING SYSTEMS

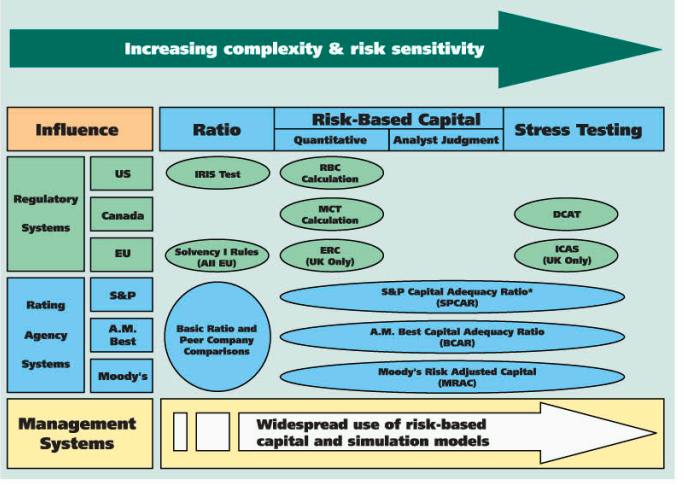
Solvency measurement tools used by regulatory systems and other interested parties can be seen as a continuum of approaches from simple ratio measures to more complex risk-based capital and stress testing systems (*see chart below*). In this context, stress testing models usually encompass projections of capital adequacy under different possible future events such as natural peril catastrophes or a sudden drop in investment portfolio values.

The following regulatory and ratings agency systems can be compared:

### 1. US: The NAIC System

The NAIC (National Association of Insurance Commissioners)

INCREASING COMPLEXITY & RISK SENSITIVITY




**Source**: *S&P performs stress testing on a discretionary basis

uses the Insurance Regulatory Information System (IRIS) to aid in monitoring insurance companies for potential insolvencies by reviewing 12 ratios calculated from reported balances in the statutory annual statement. If an insurer has an unusual value for four or more of the tests, the company will be designated as needing further financial analysis and potentially identified for more frequent or robust insurance department examinations.

The NAIC's Risk-Based Capital (RBC) replaced the former minimum capital thresholds with a capital adequacy formula applied to values found in an insurer's statutory annual statement. RBC is compared to the insurer's adjusted capital. The insurer's domiciliary state has certain regulatory responsibilities if the insurer's adjusted capital falls below specified RBC values including the ability to assume control of the insurance company.

**2. Canada: Dynamic Capital Adequacy Testing**

Canada's Dynamic Capital Adequacy Testing (DCAT) is a stress testing model that utilises the risk-based capital formula developed by the Canadian regulators. This risk-based capital formula is called the Minimum Capital Test (MCT). Therefore, the DCAT standard for minimum capital is based upon the MCT. In the mid-1990s, Canadian regulators supplemented their traditional risk-based capital methodology with stress testing for property and casualty insurers. The DCAT analysis includes a base scenario, as well as several adverse scenarios which stress the insurer's capital. Risk categories that are the most detrimental to the insurer's financial condition are expected to be reported in detail and supported by an actuarial opinion of the insurer's capital level and its ability to meet future obligations under plausible adverse scenarios.

**3. European Union: Solvency I**

In the European Union, various Directives known as Solvency I were adopted in March 2002 and became effective in member countries in 2004. Most EU Directives under Solvency I represented modest changes to existing regulations. Minimum capital amounts are generally calculated by applying a ratio to gross premium and adjusting that amount by the fraction of net incurred to gross incurred losses with a maximum reduction of 50%.

**4. UK: Individual Capital Assessment Standards**

In July 2004 the FSA incorporated its much debated Consultation Paper 190 (CP 190), Enhanced Capital Requirements and Individual Capital Assessments for Non-Life Insurers into the Prudential Sourcebook (PSB). The new regulation includes a risk-based capital formula, known as the Enhanced Capital Requirements (ECR) and a stress testing requirement, known as the Individual Capital Adequacy Standards (ICAS). It also includes regulatory reviews of each insurer's ICAS.

The FSA reduced the impact of the ECR by making the less onerous Solvency I requirement the minimum capital requirement (MCR) and making the ECR a privately reported capital requirement, or a 'soft test.' The PSB requires insurers to perform stress testing to determine whether ICA needs to

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be increased. The stress testing includes the following risks:

- Credit risk
- Market risk (as related to the value and credit risk of invested assets)
- Liquidity risk
- Operational risk from inadequate systems and controls
- Insurance risk, including catastrophes, claim reserves and loss ratio volatility
- Business risk factors, including interest rate risk, securitisation risk, residual risk, concentration risk, high impact, low probability events and cyclicality and capital planning

The PSB provides guidance regarding which factors to consider in modelling these risks, but not the parameters or models themselves. The FSA plans to review companies' ECR calculations and ICA analyses as part of its regularly scheduled supervisory visits with insurers. Insurers are expected to have completed the ECR calculations based on financial statements published on or after December 31 2003. Companies should be in a position to prepare their ICA analyses in 2005.

The FSA plans to monitor developments leading to Solvency II before deciding whether to make its new rule hard tests.

**5. AM Best: Capital Adequacy Ratio (BCAR)**

AM Best utilises a capital adequacy ratio, known as Best's Capital Adequacy Ratio (BCAR), to support its analysis of a company's balance sheet strength in addition to its qualitative tests. The agency allows its analysts to apply their judgment in determining the capital factors and to make adjustments to certain aspects of the calculation to reflect the specifics of each insurer.

The BCAR calculation applies capital factors to figures reported in the statutory annual statement (adjusted to AM Best's estimate and for economic value) and in its Supplemental Rating Questionnaire. Best categorises risks into investment risk, interest rate risk, credit risk, reserve risk, premium risk and business risk.

The required capital from all risk categories is summed and a covariance calculation is applied to arrive at the net required capital. Reported policyholder surplus is adjusted to an economic basis, including a reduction by the greater of the 100 year probable maximum loss (PML) for wind exposure or the 250 year PML for earthquake exposure on a net of reinsurance basis. BCAR is the ratio of adjusted surplus to required capital.

**6. Standard & Poor's: Capital Adequacy Ratio**

Standard & Poor's (S&P) considers the insurer's financial condition through its capital adequacy ratio (SPCAR), as well as qualitative issues. The S&P framework allows for analyst adjustments in many parts of the SPCAR calculation. The components of SPCAR are almost identical to those found in the NAIC's RBC formula and Best's BCAR. S&P's approach, however, includes the inclusion of a risk charge for guarantee fund assessments and generally no adjustment for catastrophe exposure or equity in the unearned premium. Similar to BCAR, S&P adjusts surplus to an economic basis.

## SOLVENCY II POTENTIAL

When implemented, Solvency II regulation will likely be based in

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part on the principles followed by European banking regulators as set forth under the Basel Committee on Banking Supervision. The Basel Accord would suggest a three part regulatory system comprised of a risk-based capital review, individual capital adequacy assessment by the insurance companies and appropriate public disclosure of regulatory findings.

This approach is consistent with other regulatory regimes. In fact, it is consistent with what is already in place in the UK. It is not unreasonable to assume that Solvency II will follow an approach that combines a risk-based capital element with stress testing.

## RISK-BASED CAPITAL MODELS

Risk-based capital models are widely used by regulators as they reflect a broader array of risk exposures than ratio-based systems. Regulators appreciate their simplicity in that they can produce an amount that can be quantitatively compared to actual capital. Most risk-based capital models generally incorporate the same two basic sources of risk:

- Underwriting: the risk that reserves will develop unfavourably or that current business is inadequately priced. Capital need for this portion of the overall risk is generally calculated by applying a factor to net premium and net reserves by underwriting line.
- Asset realisation: the risk that assets will not be realised at their recorded values. Capital need for this portion of the overall risk is generally calculated by applying factors to the different asset categories (including reinsurance recoverables).

To provide anecdotal evidence of the convergence of risk-based capital models, we calculated risk-based capital amounts using hypothetical insurance companies financial statements created specifically for this purpose. The key financial statistics for these hypothetical companies are listed below.

[Note: invested assets were assumed to be in high quality, investment grade bonds.]

The graph on page 25 shows a comparison of the risk-based capital calculated for each of these companies on a net of reinsurance basis, that is, the calculated amounts for Solvency I, ECR, RBC, SPCAR and BCAR are based on the assumptions provided applied to our understanding of the quantitative model.

For the regulatory tools, these amounts represent capital thresholds for the least invasive regulatory action, and for the rating agency tools this generally represents the threshold between stable and vulnerable ratings (i.e., AM Best's rating of B+, and BBB for Standard & Poor's).

For most of the sample companies, the ECR and RBC capital amounts are reasonably similar. The exception is medical professional liability for which the RBC requirement for capital in the US has much higher premium and reserve factors than the UK.

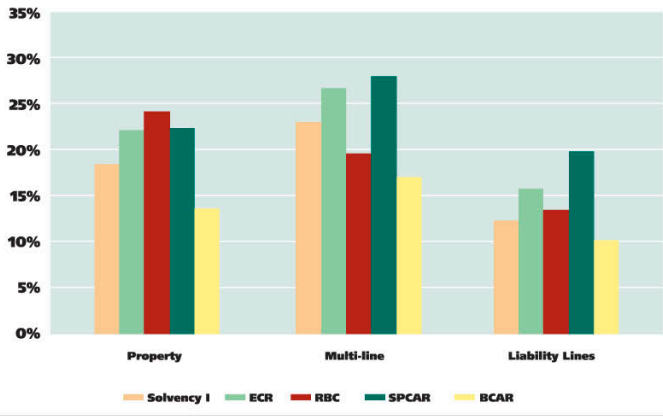
As expected, the ratings agency capital requirements for a stable rating are higher than the regulatory requirements for minimum capital. In all cases, AM Best's threshold is higher than Standard & Poor's

INSURER TYPE

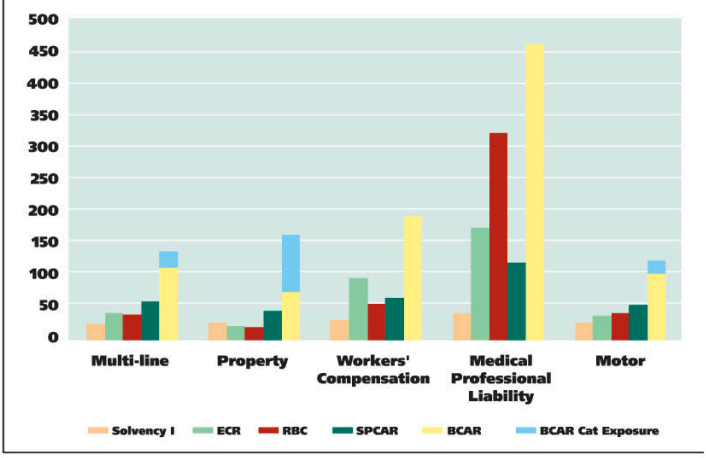
| Insurer Type | GWP | Combined Ratio | Year 1 Payout | Quota Share % | Gross Cat PML/GWP | Net Cat PML/Gross Cat PML | Average Cat ROL | % of Reserves from Current AY |
|---|---|---|---|---|---|---|---|---|
| Multi-line | 200 | 95% | 55% | 40% | 40% | 50% | 15% | 60% |
| Property | 200 | 90% | 90% | 40% | 100% | 50% | 15% | 90% |
| Workers' Compensation | 200 | 105% | 25% | 40% | 0% | 0% | 15% | 60% |
| Medical Professional Liability | 200 | 110% | 10% | 40% | 0% | 0% | 0% | 20% |
| Motor | 200 | 90% | 50% | 40% | 20% | 65% | 10% | 75% |

threshold. A large part of this difference can be attributed to the BCAR amount where we included the net 100 year probable maximum loss (PML) for wind exposure or the 250 year PML for earthquake exposure in the amounts presented. In actuality, this amount is deducted from the insurance company's actual capital for purposes of determining the numerator in the capital adequacy ratio previously described. Keep in mind that rating agencies use their risk-based capital calculations as just one element of many in determining insurance company ratings.

IMPACT OF QUOTA SHARE REINSURANCE ON MODELLED RISK-BASED CAPITAL AMOUNTS




COMPARISON OF MODELLED RISK-BASED CAPITAL AMOUNTS




## IMPACT OF REINSURANCE

Most of the solvency monitoring and capital adequacy tools rely directly on values reported in financial statements. Tempered against concentration risk issues, reinsurance tends to lower modelled risk-based capital scores as the reduction in underwriting risk due to lower net premium and net reserve values is greater than the increased asset realisation risk due to higher reinsurance recoverables.

AM Best makes refined adjustments to the BCAR calculation depending on the type of reinsurance and the terms of the contract. For example, catastrophe reinsurance would increase adjusted capital (the numerator in the capital adequacy ratio), as it would reduce the net catastrophe PML. A quota share contract with a contingent commission or loss corridor would show less benefit than a similar contract without these features because AM Best adds the risk retained on ceded premium and reserves from these features to its retained premium and reserve risk calculations.

The graph left shows a comparison of the impact of a 40% quota share reinsurance cession on the four risk-based capital formulas. The reduction in required capital is measured assuming that the sample insurers already have a catastrophe reinsurance structure in place. We assumed a sliding scale commission that allows the ceding commission to decrease by 10 percentage points from the provisional commission.

As evidenced by the graph, the quota share cessions lead to reductions in required capital. The BCAR model shows the

smallest reduction in required capital due to an adjustment AM Best would, based on our experience, make for the sliding scale commission.

There does appear to be some convergence in terms of methodology and ultimate capital adequacy amounts among the regulatory and rating agency models. Accordingly, companies under the Solvency I system may calculate capital benchmarks under alternative systems to compare how their capital might look against Solvency II standards.

## PREPARING FOR SOLVENCY II

Estimate actual capital against anticipated regulatory capital threshold – now and over the next few years. If your company will be subject to Solvency II requirements (and is not regulated by the UK's FSA), consider estimating what the regulatory capital benchmarks would be under the Enhanced Capital Requirement or other regulatory based RBC rules.

Review net catastrophe retentions at different loss probability levels in relation to the company's estimated regulatory capital adequacy. This will assist with scenario assessment which will form part of the anticipated Solvency II regime.

Consider dynamic financial modelling to perform stress tests on capital and how your reinsurance responds to those stress tests. The FSA is suggesting the protection of capital against the 1 in 200 year event (or presumably series of events).

Develop an understanding of the value at risk in the tail of the probability distribution to facilitate identification and mitigation of the critical exposures.

If regulatory capital adequacy is a concern, consider reducing net premium and subsequent net retained reserves in lines with a high capital charge (generally higher tail lines). This can be achieved through changes in business portfolio mix or the use of reinsurance. It is noteworthy that the value of lower layer excess of loss contracts can have a disproportionately favourable impact on risk-based capital calculations due to the capital charge trade-off between net reserves and reinsurance recoverables.

Avoid credit concentrations of ceded reinsurance. Under current FSA rules, which may be somewhat replicated under Solvency II, cessions that exceed 20% of direct premium to such a counterparty may not attract full capital relief unless accompanied by some form of credit enhancement. High exposure of reinsurance recoverables (i.e. excess of 100%) to capital may also restrict capital relief, regardless of the spread of counterparties.

## INTERNATIONAL ACCOUNTING DEVELOPMENTS

With the adoption of International Financial Reporting Standard (IFRS) 4 – Insurance Contracts in March 2004, the International Accounting Standards Board (IASB) took another step toward its goal of converging formerly disparate methods of accounting for insurance contracts to a common principles-based system. IFRS 4 is effective for annual periods beginning January 1 2005 and is mandatory for all public companies in the European Union, Australia and several other countries.

**If regulatory capital adequacy is a concern, consider reducing net premium and subsequent net retained reserves in lines with a high capital charge**

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There are countries that do not permit companies to use IFRS standards without reconciliation to their local generally accepted accounting principles, notably Hong Kong, Japan and the US. The US Financial Accounting Standards Board (FASB) will consider a modified joint approach for new standards. Under this approach, discussion papers would be published jointly (between the FASB and IASB) and both boards would undertake a joint project to issue identical or substantially similar standards. If adopted, the intention by both boards is to have the insurance contract accounting project be managed in this fashion.

In issuing IFRS 4, the IASB's stated intent was to "make limited improvements to accounting for insurance contracts until the Board completes the second phase of its project on insurance contracts."

IFRS 4 is important because it establishes a foundational for consistency and in doing so:

- Provides the definition of an insurance contract
- Resolves certain well-known insurance liability measurement and recognition inconsistencies
- Increases the level of required disclosure on insurance contracts.

The second phase of the project pertains to measuring assets and liabilities arising out of insurance contracts at their fair values and is controversial. As stated in IFRS 4, an insurance contract is a "contract where one party accepts significant insurance risk from another party by agreeing to compensate the policyholder if a specified uncertain future event adversely affects the policyholder." A key element of the definition includes reference to significant insurance risk, which may lead to more scrutiny of limited risk transfer reinsurance or insurance contracts.

IFRS 4 resolves one important income recognition inconsistency in that an insurer shall not recognise a reserve for claims not in existence at the balance sheet date. Accordingly, equalisation and pre-funded catastrophe reserves are not allowed. Countries that allow or require such reserves include Belgium, France, Germany and the UK, as well as several Asian countries such as Japan, Korea and Taiwan. Companies within these countries are evaluating the impact of this change on their solvency requirements, taxes and potential future income volatility.

Increased disclosure requirements are viewed by analysts as one of the most important aspects of IFRS 4 and are consistent with the global trend toward increased transparency of a company's financial condition and results to interested parties.

Principally, companies are required to disclose information that identifies and explains the amounts in its financial statements arising from insurance contracts.

These requirements relate to relevant accounting policies, assumptions and effect of changes in assumptions, among others. These are similar to requirements under US GAAP and do not appear to be controversial. Also required is information to assist in the understanding of the amount, timing and uncertainty of cash flows.

**Accounting and actuarial firms, as well as ratings agencies, are providing views and research related to potential methodologies for arriving at fair market valuations of insurance liabilities and potential impact to reported financial results**

These requirements diverge somewhat from US GAAP and essentially require disclosure that will help users evaluate key elements of a company's insurance risk profile such as:

- Risk management objectives
- Significant insurance contract terms and conditions
- Profit sensitivity to changes in material variables
- Concentration risks
- Historical claims development
- Interest rate and credit risk.

## MARKET VALUE APPROACH

Although the IASB reached tentative conclusions for Phase II, in regard of market value approach to recognising assets and liabilities arising from insurance contracts, in January 2003, the project has been dormant since then, but is expected to begin again in the second half of 2004. The IASB has stated that it will regard the past work as a useful resource, but will not be bound by it. The commonly shared view is that Phase II will not be completed until 2007 at the earliest.

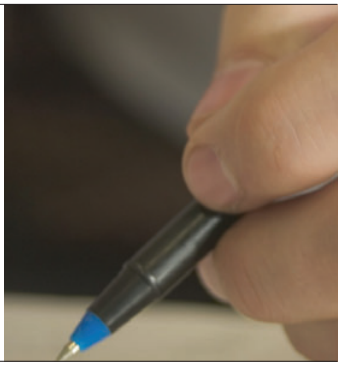
Significant controversy remains with respect to the overall desirability of Phase II as set forth in the IASB's 'past work'. Given this lack of consensus, the IASB formed a European Consultative Group on Accounting Issues Affecting Financial Institutions. This group comprises International Accounting Standards Committee – Foundation Committee chair Paul Volcker (former Chairman of the Governors of the US Federal Reserve System), and senior regulators and industry leaders, and advises the IASB through consensus building on the appropriate application and extent of fair value accounting for regulated financial institutions.

Accounting and actuarial firms, as well as ratings agencies, are providing views and research related to potential methodologies for arriving at fair market valuations of insurance liabilities and potential impact to reported financial results. If fair value reporting is adopted, there appears to be some consensus that premiums and expenses will be recognised at contract inception and deferred expenses and premiums will be eliminated

Also, reserve estimations will start with a present value of expected cash flows and will add some form of a margin (some say a Market Value Margin – MVM) to cover the additional amount a third party would require for volatility risk and profit.

Under this approach, the

**The debate about how insurance company contracts are recorded in financial statements continues**



profit at the inception of the insurance contract would be:

+ NPV of premiums
– NPV of expected claims and expenses
– MVM on expected claims
– Acquisition expenses
= Profit on insurance contract.

There does not appear to be widespread agreement as to whether the MVM will be, or should be, higher or lower than the discount inherent in the expected reserve values, or what actuarial methodology should be used in calculating the MVM.

Additionally, not much has been written regarding what discount rate to use in the various NPV calculations (current rates, rates throughout the yield curve or risk-adjusted rates) and whether or not the company's credit standing should be a factor in determining the discount rate.

The debate about how insurance company contracts are recorded in financial statements continues, though it is still too early to tell what the final principles will contain and how significant the changes are likely to be in the end.

## PREPARING FOR IFRS 4

Evaluate reinsurance contracts to ensure that the "significant insurance risk" requirement exists. According to IFRS 4, insurance risk exists when at least one of the following is uncertain at the inception of an insurance contract:

- whether an insured event will occur
- when it will occur
- how much the insurer will need to pay if it occurs.

Review accounting for contractual features such as 'funds withheld' with parties knowledgeable about IFRS 4. Depending upon how the feature is structured and viewed by the company and its accountants, 'funds withheld' balances may be unbundled from the insurance component and accounted for as a deposit under the rules of IAS 39.

Work with accountants and other knowledgeable party with respect to disclosure requirements of the company's insurance risk profile. Understand the impact of your reinsurance program on disclosure requirements such as:

- Risk management objectives
- Profit sensitivity to changes in material variables
- Concentration risk

Follow Phase II of the insurance accounting project and begin to develop plans should fair market value accounting be adopted for assets and liabilities arising out of insurance contracts. In this context, be aware that the EU has indicated that the outcome of this issue may impact the final Solvency II regulations.