

Insights

Economic capital for life insurers

Embedding the model

Welcome...

...to the second in our series of papers focusing on economic capital and its role and importance in the life insurance industry.

The first paper, 'Economic Capital for Life Insurers – The 'state of the art' – an overview' (January 2013), examined how approaches to modelling economic capital have evolved and how Solvency II has exerted, and continues to exert, a strong influence on what is considered 'state of the art'.

The investment in state of the art economic capital systems has been significant. Following this investment, insurance companies are looking to demonstrate benefit from the tools they have deployed. Benefit should not just be measured in calculations, but in the ability to take better, more informed, business decisions. A truly embedded and useful economic capital model brings the capital impact to life by making information available to whoever needs it, whenever it is needed.

In this paper, we set out a practical framework for embedding a model and consider a specific example of how solvency monitoring capabilities can be extended to support embedding the risk strategy in the business.



John Rowland

Global Leader – Life Capital Modelling
Towers Watson

Our vision for an internal model is a model that is transforming risk and capital management such that it is a core activity permeating every business function and process.

The catch all phrase for embedding under Solvency II was the 'use test' – internal model approval being contingent on demonstrating that the model was truly used to manage the business. 'Use' is the key word here: 'an internal model is only useful if it is used'. There are many areas where internal models should be providing real value beyond simply measuring capital requirements. These include key business processes such as risk strategy, risk appetite setting and risk limit monitoring; merger and acquisition analysis, restructuring and ALM; product development and pricing; and asset, hedge and reinsurance strategy and analysis.

When considering this goal, the key questions are: Where are insurers on the road towards achieving this goal? Are insurers starting to reap the benefit of their investment?

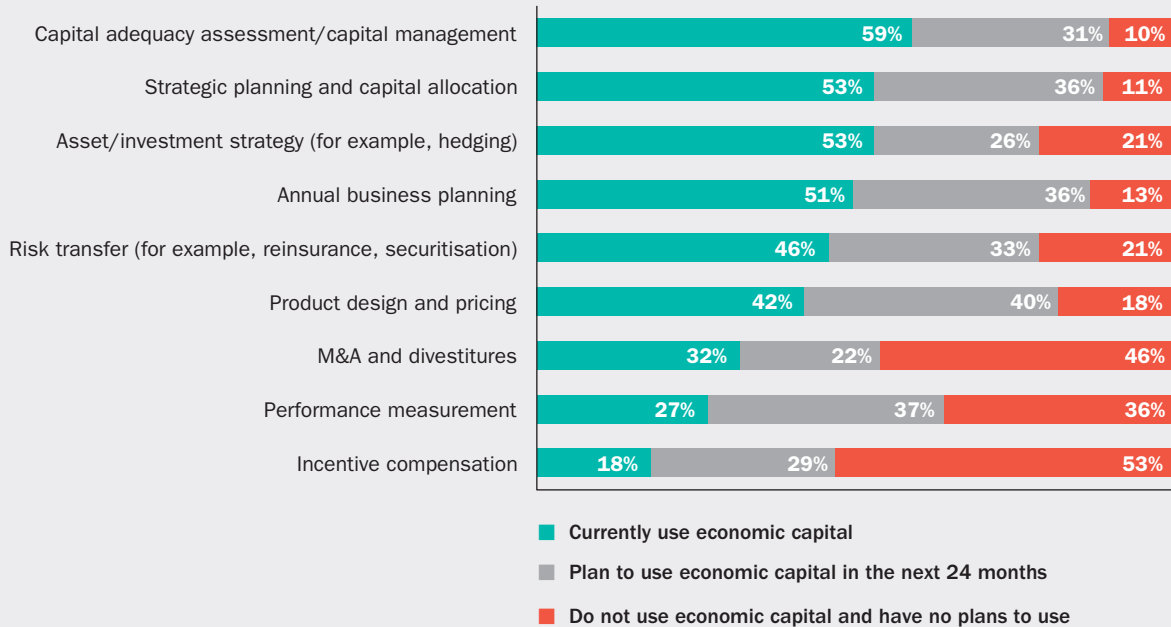
Towers Watson's seventh biennial global ERM Survey provides insights here, considering:

- How insurers are currently using economic capital.
- The challenges faced in embedding in the business.
- The areas where insurers' would like to improve their use of economic capital.

The survey shows that economic capital is used in a broad range of business decisions, as can be seen in **Figure 01** below. For each business decision

listed, participants were asked whether they currently use economic capital in decision-making, or plan to use it in the next 24 months.

Figure 01. Economic capital is currently used in a broad range of business decisions



Base: Those calculating economic capital **n = 347**

In the same survey, creating management buy-in (for example, educating the decision makers on the role and uses of economic capital) and reliability and robustness of results, were identified as the key challenges to making economic capital more widely accepted in the business as a decision tool for risk taking (62% and 61% of respondents respectively). Perhaps key for our discussion in this paper was the fact that producing results in timeframes that allow utilisation in the business was cited as a key challenge by 50% of respondents.

It is not surprising that 96% of insurers responding to our survey said they plan to develop their economic capital calculations and/or framework further. Specific examples highlighted included: improving the controls and governance surrounding the economic capital model; data and calculation processes, and the quality of risk-factor calibration.

Insurers have invested heavily in internal models, but for many the process is incomplete. Much work remains to embed the model in the business and to extract value from the investment. For many insurers the scale of the investment made was very significant; really demonstrating business value from the investment is therefore a priority. Most insurers have made progress but few have completed the comprehensive transformation originally promised.

This article considers steps insurers can take to embed their internal model focusing on practical steps that utilise the more advanced internal models implemented using specialist internal model aggregation software such as Towers Watson's RiskAgility EC that was discussed in the paper, 'Economic capital for life insurers: The 'state of the art' – an overview' in January 2013.

Embedding internal models

Embedding an internal model can appear to be a daunting task, but following a step-by-step process, makes this easier to achieve. One such approach is set out in **Figure 02**.

Figure 02. An embedded capital model should permeate all aspects of the business



We envisage five steps, covering external reporting, internal solvency monitoring, risk strategy, corporate strategy and product strategy. We have set out a sequence and there is an internal logic to this, but it is not necessary to follow all the steps in the order specified. In particular, embedding is often most effective when it is iterative and we would expect each step to be revisited and improved, refined by the fire of practical use.

Step 1 focuses on external reporting. In our experience, in many cases the initial internal model development project incorporates this and perhaps Step 2, internal solvency monitoring. The first real tangible benefit delivered by a modern internal model is solvency monitoring, where monthly or even daily monitoring is now possible. Even

here, though, many insurers are still working on improving the efficiency of processes surrounding their internal model to reduce the costs associated with calibration and to meet timescales required for external reporting. Methods to address these issues will be discussed in a future article.

Steps 3 to 5 move away from reporting and monitoring into active management, starting with risk strategy, moving on to corporate and then product focused activity.

The remainder of the paper considers how solvency monitoring capabilities support the process of developing and embedding risk strategy, risk appetite and risk limits.¹

¹ Please refer to the Towers Watson series 'Another bite at the apple', which presents our latest thinking on risk appetite to help insurers make it a more effective and valuable process.

Developing and embedding risk strategy

Once a solvency monitoring capability is developed, a key question is what and how frequently information is required to assist decision-making. Most internal models allow insurers to model their available economic capital and required economic capital. Having these updated monthly enables management to confirm basic solvency, but does not directly improve risk and capital management – this is where risk strategy comes in.

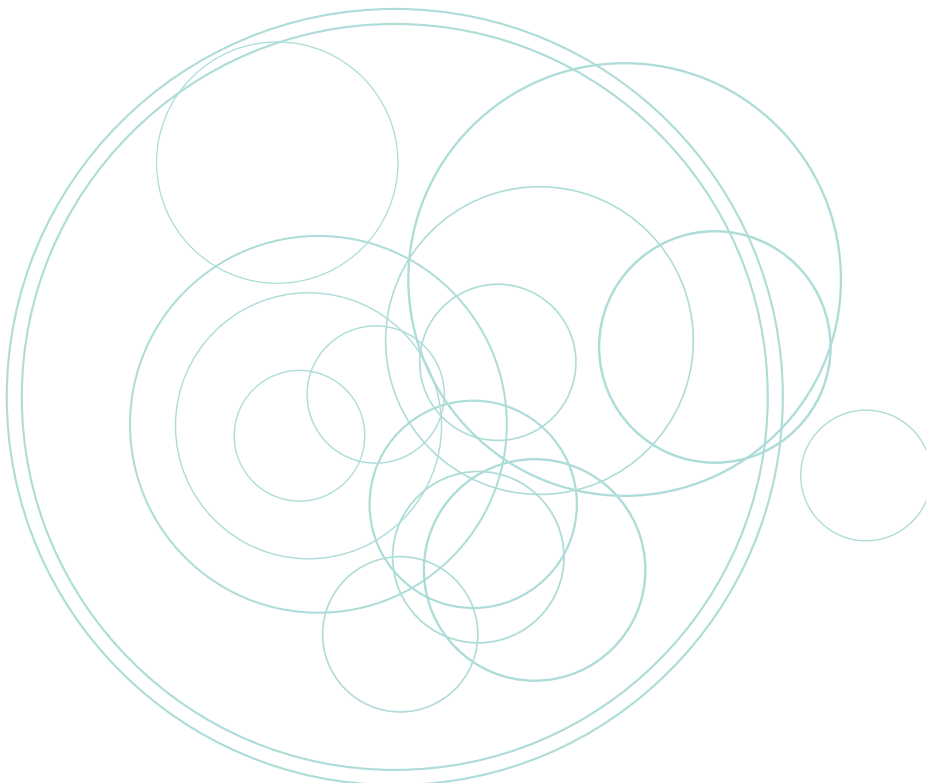
Risk strategy considers what and how much risk a firm wants to take and avoid, and what tolerance the firm has for breaching such considerations. Thus, risk strategy includes setting ‘appetites’, ‘tolerances’ and ‘limits’ for risk and capital. A key step is defining these in terms that are measurable in a manner timely enough to be managed. This is where solvency monitoring with an internal model comes in, covering for example:

- Current solvency on a management/legal entity basis, and allocation of capital by product and risk.
- Whether solvency is breached after predefined sensitivities and stress tests, and consideration of reverse stress tests.
- How available and required capital compare against tolerances and risk limits.
- How solvency has moved since the last time-period and an analysis of movement.

When considering frequency, there are two broad categories of information:

- **Urgent:** A flash report meets an urgent need. Many insurers create a weekly report that can be produced on ‘any given day’. It has been described colloquially as the ‘four o’clock report’ – it responds to a need for immediate information to enable an insurer to respond to a crisis before the financial markets close. This is produced using roll-forward functionality allowing for market movements and focuses on a solvency snapshot position without all the additional detail described above.
- **Timely:** The second category is reports designed for timely management of the business. Alongside the weekly report, a monthly report is made available on the second or third working day of each month. This includes the greater depth of analysis and allows for changes in both the financial markets and product exposures, such as increments, decrements and new business.

“Insurers have invested heavily in internal models, but for many the process is incomplete. Much work remains to embed the model in the business and to extract value from the investment.”



Reporting, data visualisation and dashboards

Simply generating numbers is not enough. Information needs to be presented in a manner that makes it easy to interpret in the context of the risk strategy. Flexible reporting tools provide

powerful ways to visualise and more easily understand the data. These can be provided via web-accessible dashboards viewable via desktops, laptops and other devices, such as tablets and smartphones. **Figure 03** is an example of how information might be presented visually in such a dashboard.

Figure 03. A risk dashboard is used to monitor the risk strategy



Dashboards are easily configurable and can be set up to draw on output from the internal model and other applications to meet standard and tailored reporting requirements. They can highlight the most important data and arrange information in a way that makes the most sense to users. Information can be organised with both high-level and detailed views and be specific to different audiences.

The internal model generates a wealth of detail, hence, thought is required otherwise there is the possibility of data overload. For example, the internal model will generate a complete risk view, a full probability distribution forecast and allow for interactive ad hoc analysis – all of this can be easily exported and made available.

A risk dashboard can be used to help accomplish the following:

- Business performance management to gauge historical and actual risk metrics versus limit thresholds, benchmarks and/or objectives.
- Reporting of detailed risk analysis at all levels and ensure transparency.
- Risk monitoring with notifications and alerts via emails of updated positions, and of warnings when actions are required.
- To map and display an overview of global or regional positions.
- Presentation tool to convey risk or performance indicators to a larger audience.
- Management instrument to query data to determine trends to provide guidance and direction.

Calculating economic capital under roll-forward and projections

The first paper in this series, 'Economic capital for life insurers: The 'state of the art' – an overview' (January 2013), described the economic capital model that is emerging for European life firms, namely, the one-year value at risk modelled using the 'risk factor loss function' paradigm. This paradigm directly models risks ('risk factors'), faced by a firm and values the balance sheet under variations in risk states using a 'loss function', typically a polynomial function of the risk factors.

A significant advantage of this approach is the separation of the capital model from the underlying 'heavy' asset and liability models.

This means reporting can be undertaken without the need to re-run ALM systems and makes roll-forward, stress testing and projection of capital positions possible in a time frame to support decision making. We illustrate how to achieve this using functionality built into Towers Watson's RiskAgility EC, the principles can be applied in any internal model implementing the risk factor loss function paradigm.

To roll forward a capital position from a calibration date to the current date, or to project forward into the future requires estimation of the change in both available capital and required capital since the last calibration of the internal model. There are two changes to consider:

- Changes in the risk factors over the period monitored – yield curves may have moved, equity markets fallen.
- Changes in risk exposures over the period monitored – assets may have been sold, lapses will have occurred.

In practice while the 'state' of all risk factors will have changed, not all will have changed materially. Deciding which risk factors to include in the roll forward is important. Some risk factors may either not be material or just unlikely to change substantially over the period of the projection:

- **Market risks:** The most material state changes are likely to be from these risk factors, for example, equity, credit and interest rates.
- **Non-market risks:** Only include volatile risks that change exposure unless there are exceptional changes: for example, lapse experience over a period will have to be reflected, but lapse assumptions are unlikely to vary.

The next stage is identifying proxies to reflect the exposures. This is necessary even for vanilla asset holdings, as few companies have accurate performance data on actual equity holdings available in the timeframe required. Thus, to carry out the solvency monitoring, it is necessary to find a proxy such as a quoted index that reflects the exposures of the company. Typically many such proxies are already available, having been identified to support updates of other reporting processes.

Estimating the change in available capital

Under the risk factor loss function paradigm, an estimate of the change in available capital from changes in risk factors is very simple, as it involves valuing the loss function at a different risk factor 'state'. However, the impact of changes to the risk exposures needs to be considered:

- **Existing business:** Scale the loss functions to allow for changes in the exposure to risks. To improve accuracy some firms split inforce loss functions into two categories – business that will mature over the next year, and business that will be inforce at the end of the year. Changes in exposure can then be estimated by scaling the two loss functions using scaling factors.
- **New business:** Introduce a new loss function that specifically allows for new business. This could also be useful from a reporting point of view, enabling a clear understanding of the capital impact of new business.

Estimating the change in required capital

Calculation of the change in required capital can be more complex. To calculate capital requirements, the starting point will have to be calculated first, namely today's available capital. Thereafter, assumptions are needed about the distribution of risk factors. It is this second part where complexity starts to arise.

In order to demonstrate this approach, we consider the simple example where roll forward from calibration to today involves a fall in equity prices. After the fall, the expected distribution of equity returns for the company has to be estimated. This is done by considering what the output of the risk factor calibration process would be in these new circumstances. The first step is to consider whether the calibration is depended on the level of the equity market, that is, is the calibration 'point in time' or 'through the cycle'. It is possible to argue that the volatility of equity returns should be higher, lower or the same after a fall. Whilst for equities most insurers are likely to have assumed that the equity return distribution is not dependent on the level of the market, this will not be the case for risk factors such as interest rates.

The next step is to think through whether the distribution should either remain the same in nominal or relative terms. This becomes clearer if we consider the equity example:

- Equity return distribution remains constant in nominal terms: If the start index was 5,000 and the 0.5th point was 3,000, then for a post-shock point of 4,500 the 0.5th point would be 2,500.
- Equity return distribution remains constant in relative terms: If the start index was 5,000 and the 0.5th point was 3,000 (40% fall), then for a post-shock point of 4,500 the 0.5th point would be 2,700 (a 40% fall).

As in the calculation of available capital, the impact of the changes in risk exposures has to be estimated. For required capital, this can be more complicated, as experience can change the exposure to different risk factors in different ways. Here it could be necessary to scale different elements of a loss function separately.

These techniques can form the basis for an internal model, which provides the information that management requires, quickly and efficiently, however, building such a model requires thought to ensure that the results are robust and that the user has a clear understanding of the limitations of the approach.

The approach set out above generates robust estimates of available and required capital, but requires significant assumptions to be inputted by insurers into the internal model. Construction of these assumptions – especially for how a loss function will evolve – can prove a challenge. The good news here is that there are techniques to automate this process. Many firms are experimenting with Least Square Monte Carlo techniques to construct loss functions in the first place. The beauty of such methods is their ability to not only construct loss functions at $t=0$ but also to project them forward for use in roll-forward and projections. This will be discussed in a future article in this series.

Further information

For more information, please contact your usual Towers Watson consultant or:

Peter Murphy

+44 161 833 6275

peter.murphy@towerswatson.com

John Rowland

+44 20 7170 3853

john.rowland@towerswatson.com

Financial life modelling software – global contacts

Clients in more than 30 countries – leading P&C and life insurance companies, multinationals, pension funds, mutual funds and asset managers – use our systems for enhanced risk and capital management.

Towers Watson
RiskAgility



Towers Watson
RiskAgility EC



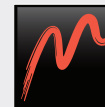
Towers Watson
RiskAgility SF



Towers Watson
Star ESG



Towers Watson
MoSes



UK

John Rowland

+44 20 7170 3853

john.rowland@towerswatson.com

William Machin

+44 20 7170 2157

william.machin@towerswatson.com

Peter Murphy

+44 161 833 6275

peter.murphy@towerswatson.com

Tim Wilkins

+44 1737 274152

tim.wilkins@towerswatson.com

Adam Koursaris

+44 20 7170 2059

adam.koursaris@towerswatson.com

Paris

Makram Ben Dbabis

+33 1 5393 1429

makram.ben.dbabis@towerswatson.com

Guillaume Beneteau

+33 1 53 93 1403

guillaume.beneteau@towerswatson.com

Cologne

Aleksander Rejman

+49 221 8000 3424

aleksander.rejman@towerswatson.com

Alexey Ivanov

+49 221 8000 3474

alexey.ivanov@towerswatson.com

Zurich

Bernhard Gose

+41 43 488 4483

bernhard.gose@towerswatson.com

Stockholm

Simon Stronkhorst

+46 8 506 41785

simon.stronkhorst@towerswatson.com

Spain

Rosa Salas

+34 91 590 30 09

rosa.salas@towerswatson.com

US

Mark Scanlon

+1 212 309 3974

mark.scanlon@towerswatson.com

Asia-Pacific

Penny Fosker

+852 2593 4539

penny.fosker@towerswatson.com

About Towers Watson

Towers Watson is a leading global professional services company that helps organisations improve performance through effective people, risk and financial management. With 14,000 associates around the world, we offer solutions in the areas of benefits, talent management, rewards, and risk and capital management.

Towers Watson is represented in the UK by Towers Watson Limited and Towers Watson Capital Markets Limited.

The information in this publication is of general interest and guidance. Action should not be taken on the basis of any article without seeking specific advice.

To unsubscribe, email eu.unsubscribe@towerswatson.com with the publication name as the subject and include your name, title and company address.

Copyright © 2013 Towers Watson. All rights reserved.
TW-EU-2013-34424. November 2013.

towerswatson.com