



SOCIETY OF ACTUARIES

Article from:

# The Financial Reporter

March 2013 – Issue 92

# Implementation Perspectives on Solvency II Internal Model Standards

By Fred Ngan



*Fred Ngan, FSA, MAAA, is a consulting actuary at Ernst & Young LLP in Hong Kong. He can be contacted at fred.ngan@hk.ey.com.*

## INTRODUCTION

Under Solvency II, the alternative to the standard formula is the internal model—but that comes with a price. Companies can calculate their solvency capital requirement using either the more simplistic standard formula or their own internal model (or a partial internal model, which is a combination of the two), subject to supervisory approval. Regulators set a higher expectation and raise the bar for the use of internal models, in an effort to uphold the quality of the calculation of the solvency capital requirement. As a result, the tests and standards for internal model approval are extensive, leading to debates around how the guidance should be interpreted and implemented. Although much progress has been made, what lessons have we learned from an implementation perspective?

This article discusses some implementation considerations European insurers and their U.S. subsidiaries have encountered when applying the tests and standards for internal model approval. In particular, this article focuses on the use test, statistical quality and calibration, and model validation.

## USE TEST

One controversial topic in regard to internal model approval is the use test. The spirit of the Solvency II Directive's Article 120 specifies that an internal model is widely used in and plays an important role in decision making. To comply with the use test, companies must provide evidence of acting on the decisions based on model outputs, meaning that senior management can no longer make significant risk and capital decisions without first looking to the model. Although the concept of the use test makes sense, it is often not easy to implement.

---

In general, companies need to be ready to provide rationale as to how and why the internal model fits the business model.

---

**Models can improve business decisions, but the risk of misusing a model, or relying on an incorrect model, could lead to unanticipated results.** It is important that senior management is fully aware of the key limitations and the expert judgment made within the model. Model governance and risk management are not new topics, but their importance becomes clearer when considering the consequences of relying on a model without appropriate scrutiny. Companies are likely to use a variety of accounting principles such as local statutory, IFRS, GAAP and Solvency II regulatory basis for the valuation of assets and liabilities. This is especially true for subsidiaries of a European parent that are subject to both local statutory and Solvency II regulatory standards. In this case, the market-consistent results are being factored into the thinking but not at the exclusion of all other metrics for financial reporting, pricing and capital. However, valuation on a market-consistent basis may not be favorable for particular lines of business due to the lack of recognition of credit spreads, such as spread-based business with long-term and unhedgeable guarantees that are actively sold in the United States. For instance, fixed annuity writers may question an internal model result due to the unfavorable capital requirement and profitability seen under the pillar 1 risk-neutral calculation. These subsidiaries might question whether the proposed framework is fully appropriate for the U.S. products, and may find it difficult to meet the use test requirement without altering their product and pricing strategies.

In general, companies need to be ready to provide rationale as to how and why the internal model fits the business model. However, it will likely be difficult to convince the regulators in the internal model application process if local management does not buy into the model.

## STATISTICAL QUALITY AND CALIBRATION

Many insurance companies are frustrated with the extensiveness and complexity of the statistical quality and calibration requirements. As set out in Articles

121 and 122 of the Directive, these standards include risk coverage and ranking, data quality, probability distribution forecasts, mitigation techniques, future management actions, guarantees and options, aggregation and calibration of solvency capital requirement. There are several important considerations related to statistical quality and calibration.

The first is the modular approach, which is when the solvency capital requirement for each risk is calculated separately and then aggregated based on correlation matrices. Despite all the effort being put behind developing the internal model, it is noteworthy that companies tend to come up with a stress level (at least for some market risks) that is generally equal to the stress level under the standard formula. This is because justification may be required when the internal model stress levels deviate significantly from those calculated under the standard formula and/or other local solvency capital requirements such as Internal Capital Assessment (ICA). In this case, the standard stress becomes a common target for modelers. For instance, the four common types of equity risk model include stochastic process, times series model, fitted-distribution model and empirical distribution model. Despite the diversity in the choice of an equity risk model, the typical equity shocks in the industry are between 39 and 43 percent, which are close to the 1-in-200 standard shock of 39 percent (the base shock for equities listed in regulated markets in the countries that are members of EEA<sup>1</sup> or the OECD,<sup>2</sup> without any symmetric adjustment/equity dampener). Such consistency can be explained by behavioral bias, as well as the same underlying market data used for model calibration. It is crucial to confirm the calibration, but one may question the value of the additional modeling work.

**When obtaining internal model regulatory approval, a sophisticated model is not always better, or safer, than a simpler one.** Some companies have proposed a risk model that may have seemed too simple, but their sound and prudent selection of data and methodology allowed for it to meet all necessary requirements. In theory, the level

of detail should be proportionate to the nature, scale and complexity of the risks that the companies are exposed to.

Another common issue is the lack of justification in the use of actuarial judgment. Companies tend to focus on analyzing the data and calibrating the model, rather than understanding the risk profile and justifying the judgment and model limitations. Companies sometimes choose a probability distribution forecast without explaining why it is appropriate to their own risk profile, and what the underlying assumptions and limitations are. These qualitative aspects are vital, but can easily be overlooked.

## MODEL VALIDATION

Model validation has been one of the key focuses of regulators. At least annually, companies should test the results and key assumptions of their internal model. Understanding some perspectives on model validation processes with respect to repeatability and auditability is important when using internal models. The commonly known three levels of defense are preparation of results, internal control systems and independent assurance. In practice, both risk owners and risk management functions often have a major responsibility in the model validation process. There are concerns over independence when the model owner also acts as a primary validator. Segregation of duties is of particular importance for proper model governance and model risk management. Moreover, the level of technical challenge and independence will be a key area of focus, despite the differences in regulatory landscapes among the European countries.

With respect to the technical aspects, model validation is not an easy task when there are dynamic decisions and linkages in the stochastic model. Many companies review the basic model projections and analytics (such as implied credited rate and lapse rate), but these alone are not always adequate. It is critical that companies truly understand the secondary impact and the implications of dynamic assumptions and sensitivities. For example, considering

CONTINUED ON PAGE 10

---

Currently, companies tend to summarize and validate the model results manually in a spreadsheet environment.

---

a fixed annuity product in an increasing interest rate environment, its profitability will depend on the interplay of many factors such as the crediting strategy, investment and disinvestment strategies, competitor actions and policyholder behavior. Companies should develop analytics specific to each business segment and environment, and provide commentary that truly explains the value, risk and capital drivers.

From a practical standpoint, companies should make an attempt to streamline the model validation process and use a variety of model validation techniques. Currently, companies tend to summarize and validate the model results manually in a spreadsheet environment. Although companies are generally not satisfied with their model output management, some have already automated this process by building a centralized output repository and using business intelligence tools to aggregate results and populate analytics at the desired level of granularity. Such improvement allows companies to save significant time and effort, and focus on understanding what the model results mean to the organization.

## CONCLUSION

Again, the bar for the use of internal models under Solvency II is high. However, the continuous refinement of internal models has allowed companies to better understand their own risk profile, improve their risk management structure and risk culture, and potentially reduce their capital requirement. But **these commercial benefits cannot be fully realized unless companies embrace the use test in spirit and think beyond regulatory compliance.**

*The views expressed herein are those of the individual authors and do not necessarily reflect the views of Ernst & Young LLP. ■*

## END NOTES

- <sup>1</sup> EEA is the European Economic Area. It comprises the countries of the European Union (EU), plus Iceland, Liechtenstein and Norway.
- <sup>2</sup> OECD is the Organisation for Economic Co-operation and Development. It has 34 country members, and its mission is to promote policies to improve economic and social well-being of people around the world.