

THE LAST WORD

INNOVATION IN FINANCIAL MODELING



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By Peter D. Needleman

In “The Mounting Pressure on Financial Modeling” (2006/1) and “A Principles-Based Reserves and Capital Standard” in this issue, we highlight the pressures life insurers are facing to develop ever more sophisticated financial models. The increasing use of stochastic modeling to determine regulatory reserves and capital, and other new demands, adds significant modeling complexity and computing requirements. These new demands have been met in part by technological advances in modeling methods, but are still beyond all but the most sophisticated modeling systems and most powerful computer hardware.

All that is about to change, due to some innovative modeling techniques that dramatically simplify the calculations required and reduce the time taken to carry out these complex calculations from many hours to a few minutes.

MANAGING GUARANTEES

Guarantees offered in many life insurance contracts today require complex, dynamic management by the insurers in response to changing conditions and policyholder choices. Life insurers run thousands of stochastic simulations through financial models to calculate regulatory reserves and capital requirements. Even with the best modeling systems such as MoSes, and the enormous computer power available today, these models can take many hours to run.

Companies have had to invest heavily in hardware, and in expensive human resources, simply to meet emerging regulatory requirements. Even so, they have struggled to produce key management information essential to the effective financial and risk management of the business.

For example, measuring exposure to interest rates and other risk factors, and updating these on a regular basis as market conditions change, is an extremely time-consuming and costly exercise. Often the information is out of date before it is available. Other requirements, such as the ability to incorporate risk-based capital (RBC) in financial projections, are beyond current capabilities.

TILLINGHAST SMART MODELLING™ TO THE RESCUE

Innovation evolves sometimes from a moment of inspiration, sometimes from years of hard work, and sometimes by applying a tried-and-tested concept to a new problem. Tillinghast Smart Modelling™ reflects elements of each of these.

Our techniques are based on well-established mathematical methods used in the wider finance industry that we have specifically tailored and successfully applied to the financial and risk reporting requirements of life insurance business.

The approach is based on the development of a high-quality “replicating portfolio” or “hedge portfolio” of assets that closely approximates the economic liabilities of a life insurance business through a portfolio of tradable assets (or, more correctly, assets for which a reliable price can readily be established even if the assets are not themselves directly tradable).

This approach enables liability values to be assessed accurately under different financial conditions in dramatically shorter timescales than would normally be possible by:

- using the value of the replicating portfolio, which can be calculated very quickly, as a proxy for the value of the liabilities

- running significantly fewer scenarios in the asset/liability model, and using the replicating portfolio to enhance the accuracy of the simulation.

The choice between these two approaches will depend upon the complexity of the business being modeled and the level of accuracy required.

Tillinghast Smart Modelling™ tools can also be used to improve the calibration of economic scenarios to target data and thereby achieve significantly greater accuracy.

THE BENEFITS

The potential benefits are huge:

- more accurate and timely results for market-consistent liability assessment
- risk “dashboards” that can be updated daily as financial conditions change
- faster calculation of RBC requirements in much shorter timescales and the ability to incorporate RBC into financial projections.

Within a few years, I expect these techniques will be used in most stochastic modeling.

Insurance companies will be able to implement a comprehensive risk and capital management framework that has real-time information when it is needed, and they will be able to do this with a fraction of the resources they currently need.

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