

## FINANCIAL SERVICES

## THE FUTURE OF FINANCIAL MODELING IN INSURANCE

Competitive pressures along with regulatory and rating agency demands for more comprehensive risk analysis are leading to more sophisticated financial modeling, using advanced technologies.

*By Mark Schneider*

Insurers are facing continuing pressure to develop ever more sophisticated financial models of their businesses and to produce the results in shorter time frames. This pressure, coming from regulators and a competitive marketplace, is fueling demand for stochastic modeling and creating a need to price and reserve for guarantees more explicitly (*Emphasis* 2006/1, “The Mounting Pressures on Financial Modeling”).

These demands and other drivers of change will soon require companies to use financial models that will be fundamentally different from those in place today.

### DRIVERS OF FUTURE MODELING REQUIREMENTS

Through mechanisms such as Solvency II and the work of the International Association of Insurance Supervisors, regulators and rating agencies around the world are pressing for insurance company managers to better understand and more fully address the risks inherent in their business. One of the mechanisms regulators will be — and in some cases already are — utilizing is to permit the required capital to be reduced if the company’s management can demonstrate (using a suitably representative model of their business) a clear picture of its economic capital — one reflective of its full array of risks.

Additionally, innovative companies are embracing an increasing array of complex risks in new product designs, such as in variable annuities. In doing so, they seek to maximize profits from underwriting these risks rather than shying away from

them or paying others to take them on. A prerequisite for taking on and retaining these risks is that companies must both price adequately for the risks taken and establish comprehensive risk management processes. These processes may include an overnight assessment of hedge strategies that need to be put in place or modified for these risks.

By taking on risks that other companies avoid, coupled with an effective program to manage the risks, leading companies are able to differentiate themselves from many others in the market and make significant profits.

We are therefore seeing an evolution of two broad approaches impacting financial modeling in insurance companies. The first is a more reactive approach motivated mainly by changes in regulations and audit requirements. The second, more proactive approach, is driven not only by regulatory and audit changes, but also by the desire for a competitive edge and reductions in capital requirements to drive increased profitability (see *Exhibit 1*).

### TWO BROAD APPROACHES TO FINANCIAL MODELING ARE EMERGING

Looking at the risks of a business in a holistic fashion is the domain of enterprise risk management (ERM), which is seen by a growing number of companies as a key enabler of competitive advantage. A sophisticated, timely and accurate financial model is an integral part of ERM. This holistic approach is also reflected in the decisions made by many companies to set up central risk management functions and

appoint a chief risk officer with the same or similar seniority as the chief financial officer.

More complex risk management requires longer run times and added computing power. However, there are also those — analysts, the CEO, shareholders, auditors and regulators — who are pushing to get results that are faster and cheaper to produce, easier to check and with fewer errors.

Naturally, there is a cost to putting in place accurate models that are integrated into the business and can be run frequently, quickly and reliably. This includes the up-front cost of appropriate software, computer hardware and implementation resources as well as the ongoing cost of maintaining and supporting the systems and processes. These costs need to be compared to the benefits obtained by implementing a suitable approach (see *Exhibit 2*).

### WHAT DO LEADING COMPANIES WANT?

In late 2005 and early 2006, Tillinghast, with the assistance of an external marketing advisory firm, conducted a number of interviews with 10 major insurers and reinsurers located in Europe and the U.S. From those interviews and our wider work with many other firms, we have developed a picture of what many of these leading firms are doing, and plan to do, over the next three to five years.

Most of these companies are setting themselves new goals such as moving from quarterly to monthly valuations or, in some cases, even more frequently — or they’re



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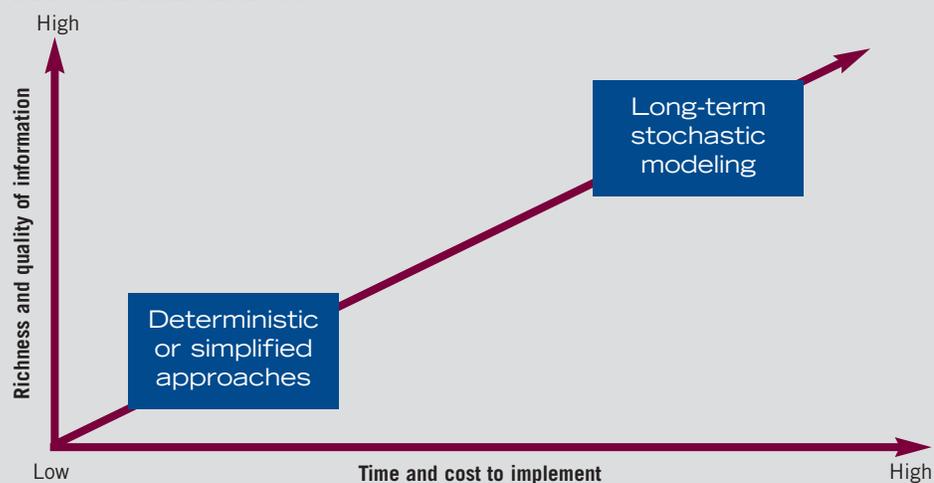
#### EXHIBIT 1

#### Two broad approaches to financial modeling are emerging

Approach 1	Approach 2
Reactive	Proactive
Avoid risk	Embrace risk
Formulaic or high-level approach to capital and risk measurement	Sophisticated capital and risk management models
Infrequent measurement of risk and capital (e.g., quarterly or half-yearly)	Frequent measurement of risk (e.g., monthly, weekly or even daily for some purposes)
Ad hoc risk management approach	Comprehensive enterprise-wide risk management approach

#### EXHIBIT 2

#### Trade-off in financial models



seeking to move from using approximations between quarters to full redeterminations each month. Another goal is assessing aggregate results in many different ways to better understand profit drivers or sources of risk. Other objectives include delving more deeply into financial results, creating more detailed plans and budgets, and utilizing scenarios more frequently to better

understand the potential impact of extraneous influences on the business.

Given that the quarterly or half-yearly valuation process in some companies currently takes well in excess of a month to complete, simply making the change from quarterly to monthly valuations will be no easy feat. Layered upon this challenge,

companies must manage the pressures that come from stochastic modeling and the ongoing efforts to reduce staffing levels and costs. They also have to make sure they provide sufficient information to increasingly demanding auditors and demonstrate appropriate levels of control.

Many companies currently use hundreds or even thousands of spreadsheets as a supplement to their financial models at various stages of the valuation and associated analyses. The calculations performed by companies have also become much more complex. Typically, manual interventions are often required to correct errors or introduce management judgment into the process.

This profusion of spreadsheets and manual intervention will become less acceptable to senior management, auditors and regulators in the future due to the heightened risk of human error, the risks inherent in the use of spreadsheets, the difficulty of aggregating results and, in many cases, dependency on one or two key people who maintain these tools.

In the study, we delved further into the needs of the firms surveyed and then condensed these into three broad categories: power modeling, corporate compliance, and automation and integration.

#### POWER MODELING

Power modeling can help companies meet requirements to:

- run projections for tens of thousands of model points (or cells), both deterministically and stochastically

Innovative companies are seeking to maximize profits by underwriting more complex risks, coupled with effective programs to manage the risks.

- run these projections over multiple valuation bases or regimes, possibly in parallel
- run these thousands of model points over multiple scenarios — some companies are targeting up to 50,000 scenarios — in acceptable time frames
- run stochastic-on-stochastic projections
- aggregate results at various levels, sometimes dynamically, within projection runs (e.g., to determine appropriate overall policyholder distributions based on the results from a portfolio in a previous time period)
- aggregate results after calculation in many different dimensions (such as distribution channel, geographic region or by customer)
- do runs much more frequently than is done currently (e.g., monthly, weekly or, for some purposes, even daily)
- minimize run failures and assure the ability to recover easily and quickly from failures in order to meet demanding time frames
- use lots of cheap processors efficiently.

### CORPORATE COMPLIANCE

Compliance with Sarbanes-Oxley and other regulatory regimes requires companies to trace who did what and when. Other tasks include being able to track, audit, review and reproduce results (referred to as “auditability”) in a timely manner; understand where assumptions were sourced and where they have been

used; and control access or “lock” parts of the system to reduce the likelihood of human error (otherwise known as “change control”).

These processes bring financial modeling under the same controls as other main-stream IT and accounting systems in the organization.

### AUTOMATION AND INTEGRATION

This is the mechanism by which insurers will be able to link the first two groups of requirements and accomplish the following:

- manage information in areas such as the profitability of the new business with greater accuracy and speed
- rapidly recalculate the exposures to various risks as the data and economic environment change, permitting more active risk management
- respond quickly to client requests (e.g., for reinsurance quotes or new product lines) to gain a better understanding of the cost of the risks being undertaken
- take data feeds from multiple internal and external sources and in multiple formats
- allow for peaks in demand at certain times of the year
- schedule high-volume runs at convenient times (e.g., perform runs at night) or on otherwise idle desktop PCs to minimize the additional IT hardware required
- consolidate results with other financial information in reports, data warehouses or management dashboards

- break large models into modules and apply standard IT version control techniques and tools
- allow for multiuser capabilities.

A number of insurers in many parts of the world are moving in this direction and setting themselves challenging goals. For example, they are working to reduce the time taken to do valuations from five or six weeks to as little as three or four days, while at the same time adding the new stochastic runs required for regulatory compliance and for new integrated ERM systems. In addition, once the initial development and implementation work has been completed, many insurers would like to be doing all of this with fewer actuaries than today.

As they begin to take initial steps toward these goals, particularly those involving power modeling, some companies are purchasing more powerful computer hardware. This typically involves buying large numbers of PCs, each with multiple processors (multiple CPU chips) and, more recently, multiple cores (essentially multiple processors on each CPU chip). They are also linking these computers together in high-speed networks controlled by specialized Grid software.

However, adding computing power is not enough to meet the desired goals. For example, in many companies it takes several days simply to collect and scrub the policy information required to perform the

Once successfully implemented, more sophisticated financial models will bring significant competitive advantages through more timely and accurate information on the risks taken.

### Ever-Increasing Computing Power

Over the past couple of years, computing power has been taken to another level of performance through the advent of grid computing and, more recently, through the development of dual-core processors.

#### Grid Computing

Grid computing, an industry in its own right, has a range of software providers vying to provide smarter, faster, more resilient tools to allow users of high-intensity calculation engines to spread the work across a grid of computers, either in-house or, potentially, across the Internet.

#### Multi-Core Chips, Multi-Processor PCs

More recently, the trend toward multi-core, multi-processor PCs has accelerated. The first quad-core processor has just been launched and octuple-core processors are rumored for release by the end of 2007. Combined with multiple processors on a single PC motherboard, capacity many times greater than that previously available in a single PC is now available for easily divisible processes, such as ALM simulations.

projections from the multiple administration systems in the organization. Working on the fringes with technology improvements will only take the organization a small part of the way. Technology may also, for some purposes, be a somewhat blunt instrument. There may be more efficient ways of obtaining some of the desired results, for example, through the use of Tillinghast Smart Modeling™.

### **WARNING: CULTURE CHANGE AHEAD!**

Besides investing in more computing power and applying the required compliance controls, insurance companies will also have to make organizational and human behavioral changes. For example, actuaries will need to share control of modeling systems as they are linked more closely with other key enterprise IT systems. This will, in many cases, involve a major shift in the mind-set of some actuaries who have traditionally owned this process.

This also leads to a more centralized and controlled mainstream IT approach to the development, testing and maintenance of models and their assumptions or parameters. IT programmers, project managers, testers and business analysts need to work cooperatively with the actuaries in this new environment to reengineer many of their valuation and financial modeling processes — both system-related and people-related.

Multinationals will need to adopt a more global approach to the selection, development and rollout of modeling systems, adapting them to the special needs of national markets. Modeling systems will be linked to data warehouses and integrated with other enterprise systems such as those for job scheduling, reporting and dashboard systems to distribute timely results.

These will be major undertakings for firms that have such goals. They will take several years to put into place and will cost millions of dollars. However, once successfully implemented, they can bring significant benefits to companies by providing competitive advantage through more timely and more accurate information on the risks they take on and how and where the business is performing well or poorly, thereby broadening the potential range of managed risks and sources of available profit.

There are other important capabilities that companies can expect to acquire from more advanced financial modeling processes. One major enhancement of real value to the business will be a reduction in both the economic capital and regulatory capital required. Another will be an enhanced ability to demonstrate regulatory compliance and reduce audit costs. Companies will also be able to reduce the risk of error and longer-term staff costs.

Finally, it's useful to keep in mind that when it comes to advanced technologies, there is no standing still. By embracing new technology, accompanied by the necessary changes in culture within the organization, companies will be positioning themselves to take advantage of the next generation of modeling developments, which are sure to come.

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