



SOCIETY OF ACTUARIES

Article from:

Small Talk

September 2013 – Issue 62

Actuarial System Implications of VM-20

By Robert Hrischenko

Actuarial software used by insurance companies in the United States has typically been application specific. This has commonly resulted in totally different software being used for valuation vs. projections and other ALM-based applications.

Valuation software has addressed static, formulaic-based valuation requirements, often relying on factor-based approaches, and is locked down or strictly limits the user's ability to modify the calculation engine for reason of model integrity and control.

Modeling software capable of integrated asset-liability projections has evolved independently from valuation software and is used more for research or less formal reporting purposes. Accordingly, it frequently has relied on business data compression (model points) to perform required analysis on a timely basis. Further, most modeling software systems are "open" to the extent that any user can modify the underlying code, generally to support perceived flexibility requirements but at the potential expense of increased model risk and reduced control.

Model-based valuation (MBV) approaches in the United States such as VACARVM and C3 Phase II already exist. Emerging approaches to MBV such as VM-20 and International Financial Reporting Standards (IFRS) will require a significant effort to develop and operate new valuation processes and supporting activities, putting strain on actuarial resources and new demands on software for all actuarial functions.

Under these MBV techniques a fragmented approach to software such as described above will present significant challenges for the actuary in the future. For many smaller

insurance companies, with limited software budgets and actuarial staff, the software implications of VM-20 may be hardest felt.

Overview of the VM-20 Minimum Reserve

The National Association of Insurance Commissioners (NAIC) has adopted the new principle-based approach (PBA) for reserves of life insurance products in section VM-20 of the new Valuation Manual. While the NAIC will continue to discuss and improve elements of VM-20 and the other sections of the Valuation Manual, the general structure and approach to the new valuation method described in the latest version appears well established. VM-20 provides for minimum reserves to be based on three distinct reserve calculations, plus two exclusion tests. The three reserve calculations are as follows:

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- Net premium reserve—A formulaic, seriatim net premium calculation using prescribed assumptions subject to a cash surrender value (CSV) floor, thus defaulting to current CRVM for many products.
- Deterministic reserve—A gross premium valuation over a prescribed deterministic interest rate scenario, discounted at future earned rates consistent with that scenario.
- Stochastic reserve—A full ALM model calculation with reserve set equal to the CTE(70) of greatest present value of accumulated deficiency (GPVAD) over a set of stochastically generated economic scenarios.

Smaller insurance companies selling more traditional products may be able to default to the net premium reserve floor

and rely on legacy valuation systems to perform this calculation but only after passing the exclusion tests. The deterministic and stochastic reserve calculations, if required, will require the use of an asset/liability cash flow model based on policies in force and allocated assets, projected with assumptions reflecting anticipated experience with prudent margins, subject to prescribed limitations and rules.

Implications for Financial Reporting

Multiple reserve calculations of varying complexity will be required to address all requirements under VM-20.

- Existing formulaic reserve calculations must be continued for existing business at the operative date of VM-20. Will the same valuation system be used to calculate the new net premium reserve for policies issued after the operative date of VM-20?
- The stochastic exclusion ratio test requires the use of a cash flow model to develop the components of the ratio.
- Newly issued business subject to VM-20 may require three separate calculations to determine minimum reserves. If net premium reserves are calculated in legacy valuation systems and the deterministic and stochastic reserves are performed using separate modeling software, then convenient and reliable processes will be needed to consolidate results from multiple systems.
- Production financial reporting systems will now require cash-flow-based projection models in addition to more traditional formulaic reserve calculations.
 - Tools to support stochastic scenario generation, cash flow projection and analysis will be needed to produce and analyze regularly reported results under production reporting timelines.
 - Assumptions will need to be determined and justified based on the appropriate combination of industry and company experience including an additional margin of conservatism to provide for the risk of misestimation.
 - The disclosure of the impact of margins will require an annual investigation and comparative analysis of alternatives, including sensitivity analysis on each assumption.
- Cash flow models will need to run more efficiently with increased flexibility, transparency and controls.
- Powerful analytical tools will need to be developed to

allow volumes of stochastic projection data to be easily retained and analyzed to support the development and explanation of financial reporting results.

Implications for Pricing and Internal Planning

The new valuation framework will be inherently more volatile, and future impacts on total reserves, capital and reported profits will be more difficult to predict or explain to management. Calculating reserves at the valuation date will be challenging enough for many companies, but projection of reserves for pricing and planning will place new demands on models.

- Reserve requirements for new business may be based on three distinct components, including stochastic ALM projections.
- Pricing and corporate planning must be able to project total aggregate reserves based on all three reserve components to understand future profitability and capital requirements.
- For products for which the stochastic reserve is required, realistic projection of reserves may require tools to manage data and analyze results from thousands of nested stochastic projections branching off of the primary projection path.
- Existing models will have to be substantially enhanced to allow nested stochastic simulation, optimize processing methods, and provide model efficiency solutions.
- Ideally, to assure consistency and reduce costs of model maintenance and reconciliation, the same models used for pricing and business planning will be used for valuation, subject to the use of appropriate assumptions for each application.

Implications for Model Management and Control

In December 2012, Deloitte Consulting LLP published a research paper, “Actuarial Modeling Controls: A Survey of Actuarial Modeling Controls in the Context of a Model-Based Valuation Framework” sponsored by the Society of Actuaries (SOA) Financial Reporting Section, Committee on Life Insurance Research and Committee on Finance Research. The paper is available on the SOA website at <http://www.soa.org/Files/Research/Projects/research-2012-act-mod-contr.pdf>.

The research included a survey of the current state of actuarial modeling controls at insurance companies to establish a benchmark consensus of leading industry practice. The

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controls expected to be in place upon adoption of MBV approaches were measured relative to this benchmark. The paper identified the following key steps to move toward industry best practices for MBV solutions:

1. Establish a formal and documented governance policy for actuarial modeling processes.
2. Regularly review models and the modeling process against the governance policy.
3. Develop a corporate culture that values and aligns with the governance policy.
4. Consolidate models to a single platform or a single modeling system where feasible. Where this is not feasible, implement additional controls to ensure model integrity across all modeling platforms.
5. Establish a model steward with clearly defined responsibilities for ensuring adherence to the model governance standards.
6. Implement a formal change management process for governing model code changes and model updates.
7. Determine the calendar for internal model releases to ensure consistency of the model of record across the organization.
8. Automate the input of assumptions into the models.
9. Implement a formal sign-off process for the setting of model assumptions.
10. Analyze and document the impact of each significant assumption change.
11. Obtain model input data feeds automatically from a centralized data warehouse.
12. Automate and standardize a set of test analytics performed to test model input.
13. Automate and standardize model output used for reporting and analysis.
14. Store model output in a data warehouse that can be

queried to allow for additional analysis and evaluation of model results.

Implications for IT Infrastructure

Principle-based reserving will place new demands on companies' data and IT infrastructure.

- The combination of deterministic and seriatim reserve calculations and stochastic analysis will increase data and processing demands by an order of magnitude or more.
- Running multiple, separate software platforms to handle the components of VM-20 reserves and managing the communications and consistency between these multiple platforms may be inefficient and costly for actuarial and IT resources.
- Data and scenario compression tools will have to be developed to effectively compress models and stochastic scenario sets to enable generation of financial results in reasonable time frames.
- Hardware solutions will continue to be an attractive method of addressing run-time concerns as technology prices fall and actuarial staffing costs increase.

Looking Forward

The fundamental concepts and implications of VM-20 for U.S. statutory reporting are well-defined today. Selection and planning of software solutions to support financial reporting and analysis under VM-20 should begin as soon as possible. The considerations outlined in the SOA research paper, "Actuarial Modeling Controls: A Survey of Actuarial Modeling Controls in the Context of a Model-Based Valuation Framework," offer an excellent starting point for the evaluation of systems to support MBV and should be on every small company actuary's reading list. ●



Robert W. Hrischenko, FSA, MAAA, is vice president, sales at GGY AXIS in Asheville, N.C. He can be reached at Robert.Hrischenko@ggyaxis.com.