

# LIFE ACTUARIAL INSIGHTS JANUARY 2013

Advisory



# AG 38 revisited: A survey of emerging practices

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#### Background

In recent years, universal life with secondary guarantee products (ULSG) with multiple shadow account structures have grown in prominence in company product portfolios. Some of these products are marketed and illustrated to be alternatives to traditional term products, due to the low cash value to no cash value buildup and competitive premium level. There are often varying tiers of policy charges and credited rates associated with these products depending on whether the shadow account has a positive value. In developing statutory reserves for these plans, some companies applied an interpretation of Actuarial Guideline XXXVIII (The Application of the Valuation of Life Insurance Policies Model

Regulation or AG 38) by which they used higher tier policy charges applicable only when the shadow account is negative to determine the minimum valuation premium, as the minimum valuation premiums are based on the amount of premium needed to carry the account value from zero at the beginning of the policy year to zero at the end of the policy year (the "zero-to-zero" approach). By using the higher policy charges, a higher minimum gross premium was applied resulting in lower deficiency reserves. The Life Actuarial Task Force (LATF) raised the issue of whether higher policy charges were being used as a mechanism to lower reserves below the level intended by AG 38. (For additional details, refer to the January 2012 issue of this newsletter.)

Contents

AG 38 revisited: A survey of emerging practices Page 1

Assumption setting and governance Page 4

Model validation Page 8

# Changes in 2012

Following a period of study and discussion with industry groups and interested parties, the National Association of Insurance Commissioners (NAIC) adopted "Phase 1 Decisions" on February 21, 2012. The Phase 1 Decisions included the concept of a bifurcated approach to reserving for ULSG that would differentiate the reserving treatment for policies issued before and after a specified date. Policies issued before that date would be subject to an asset adequacy test that incorporates moderately adverse scenarios. Policies issued after that date would be reserved for based on the LATF Statement on AG 38 (i.e., that the lowest premium stream should be used for setting reserves). Following additional discussions and debate, the Phase 2 and 3 Decisions with respect to the draft revisions to AG 38 were released for public comment on August 21, 2012 and the final version of AG 38 was voted on and passed by the NAIC Joint A/E Working Group on August 28, 2012.

The new AG 38 requires companies to treat in force business as of December 31, 2012 differently than new business beginning January 1, 2013. Section 8D addresses in force business and, if the ULSG business meets the materiality requirements and contains a multitier charge structure, requires the application of a principles-based reserving (PBR) (VM-20) calculation with modified assumptions. It applies to policies issued on and after July 1, 2005 prior to January 1, 2013. Section 8D applies to a company on December 31, 2012 and on any subsequent valuation date if the in force amount of universal life insurance exceeds 2 percent of the company's face amount of individual permanent life insurance in force or the company's face amount of insurance in force exceeds \$1 billion. It does not apply if the minimum gross premiums for the policies are determined by applying the set of charges and credits that produces the lowest premiums.

Section 8E addresses new business. Two alternative methods, Method 1 and Method 2, are provided in the section. They both call for a nine-step process similar to that found in Section 8C of AG 38, but vary as to the approach to be taken for step 1 (i.e., derivation of the minimum gross premiums). Method 1 is more consistent with the traditional AG 38 approach found in Section 8C while Method 2 is a new and potentially more onerous approach. In order to gualify for Method 1, the policy must be consistent with one of three designs and needs to pass an "Index" test (i.e., maximum interest rate cap). If these conditions are not met, Method 2 must be used, requiring specific premium patterns to be tested to derive the minimum gross premiums that produce the greatest initial deficiency reserve.

### **KPMG survey**

In late 2012, KPMG LLP (KPMG) surveyed many of the largest insurance companies with respect to their emerging practices in light of the revised AG 38. We were especially interested in how companies were approaching certain implementation issues related to Section 8D and the resulting impact on their reserves, impacts of reinsurance, projection implementation issues, mortality considerations, and decisions with respect to interest rate scenarios.

The survey results as summarized below do not necessarily reflect the views of KPMG. Rather, they are solely the views of the survey participants.

# Implementation and impact on reserves

Most of the companies that we surveyed sell ULSG products that have multiple sets of charges and/ or credits. In turn, most of these companies planned to implement the deterministic methodology (i.e., modified VM-20) in Section 8D of AG 38, while some indicated that no changes were necessary since they already valued these products by applying the set of charges and credits that produces the lowest premiums. Of the companies planning on implementing 8D, a few anticipated reserve increases of more than 10 percent, but most anticipated no or little change in their reserves.

### Reinsurance

Some of the surveyed companies plan to use a simplified approach to estimate the impact of reinsurance in the determination of the AG 38 reserve in the stand-alone adequacy analysis while others plan to determine the difference between the gross and net reserves to determine the ceded reserve. If assets held are less than gross reserves (due to reinsurance ceded), companies indicated a range of plans to either gross up existing assets, move assets from a surplus account, use assets owned by a captive, or set model net of reinsurance. About half of the surveyed companies have captives and few of them planned to perform stand-alone Section 8D testing at the captive level on captives that assume ULSG business. Very few of the companies had any applicable reinsurance assumed.

#### Projection implementation issues

As of late 2012, for purposes of performing the stand-alone asset adequacy analysis, most companies will not be specifically segmenting their asset portfolio with respect to its policies subject to Section 8, but will rather allocate assets proportionately based on reserves.

In the event of guarantee periods that are shorter than life of the policy, the projection period will most often be based on the life of the policy, while some companies will use a specified period.

For premiums payable after the end of the secondary guarantee period, several of the surveyed companies assume the continuation of premium payment patterns based on experience to apply to the remainder of the projection period. Other approaches will be to use either zero premium funding, continue the minimum premium funding requirement under AG 38 as determined in the secondary guarantee period, or always assume minimum funding (i.e., so policies are not allowed to naturally lapse).

Most companies indicated that additional reserves determined under AG 38 stand-alone cash flow testing will be included in the starting assets for entity-wide asset adequacy testing. Meanwhile, most companies will assume no additional reserves after the initial date and do not anticipate reflecting additional reserves at interim durations. Companies were split in terms of handling of the interest maintenance reserve amortization, with a majority indicating that they would include it in determining portfolio yield and starting assets.

# Mortality considerations

Under VM-20, the extent to which company experience may be reflected (i.e., as opposed to using industry tables) depends on its credibility. With respect to the degree of segmentation being used to determine the credibility of mortality experience studies, the majority of the surveyed companies use either no segmentation or basic segmentation (e.g., sex, smoker status, and duration). Some companies use more detailed level segmentation, including underwriting status as well. Most of the companies use preferred mortality classes within their mortality assumptions for both general asset adequacy testing and stand-alone AG 38 asset adequacy testing.

#### Interest rate scenario

In terms of the interest rate scenario used to satisfy the VM-20 deterministic economic scenario requirement, several of the surveyed companies planned to use U.S. Treasury interest rate curves following Scenario 12 from the set of prescribed scenarios used in the stochastic exclusion ratio test. Some companies did not feel that use of Scenario 12 is appropriate for this purpose, and will determine an interest rate scenario consistent with the specified reinvestment rate.

#### New business

A majority of the companies surveyed anticipate that they will continue to sell ULSG products but with changes to the product structures and/or guarantees. Under AG 38 Section 8E, for issues starting January 1, 2013, most companies plan to use Method 1 in calculating reserves, while several companies were still reviewing their alternatives. Very few companies surveyed planned to stop selling ULSG completely.

#### **Looking forward**

The focus of this article has mainly been on implementation of Section 8D of the revised AG 38. Companies are likely still making decisions with respect to new issues after January 1, 2013 and it remains to be seen how reserving as well as pricing and product development will be affected.

Perhaps more significantly, implementation of Section 8D will be a "testing ground" for PBR on life products. Life companies, even those without ULSG products, will be interested in monitoring how smoothly the transition proceeds.

Additionally, within PBR, actuarial judgment will play a much more significant role than under traditional statutory reserving. It will therefore likely be under more scrutiny and companies should ensure that appropriate controls, documentation, and validation are in place.



# Assumption setting and governance

By Nicole Kim, FSA, MAAA

The assumption setting process is an integral part of financial and actuarial modeling. In this article, we discuss various components of the assumption setting process including determining margins, monitoring and updating assumptions, and documentation.

What is an assumption within the financial modeling realm? It is an estimate of an uncertain variable input into a model. Assumptions can be estimates for known amounts such as expenses or commissions. Unknown estimates such as mortality rates can be estimated over a large pool of policies. On a more complex level, there are assumptions that are much more uncertain given a lack of credible experience and changing environment such as policyholder behavior.

Assumptions are tied to a specific basis, and because there are multiple bases upon which a company needs to report, the overall process is very complicated. For example, assumptions used for U.S. GAAP reporting are based on best estimate assumptions while statutory reporting also requires the use of prescribed assumptions. Furthermore, there are certain products such as variable annuities that require stochastic projections and will involve their own assumption development. Looking ahead, the move toward principle-based reserves will only increase the number of assumptions and the frequency of updating them.

# **Types of assumptions**

Actuarial assumptions can broadly be grouped into either noneconomic or economic assumptions. Some noneconomic insurance assumptions include demographic, company operations, and policyholder behavior assumptions. Lapses are typically believed to be depended on competitor crediting rates and the value of guarantees at a given time, i.e., "in-the-moneyness." The most challenging part of these assumptions is around establishing a good baseline and back-testing it against experience. Utilization of guaranteed benefits can also be challenging as these rates can depend on multiple variables such as policyholder's age, the type of guarantee (for life vs. nonfor life) and in-the-moneyness of the guarantee. There is not enough experience on dynamic policyholder behavior within the industry to account for every single outcome, which makes this task very daunting for the modeling group. Not only the current market conditions, but the path of the market factors that led to the given present state can have a significant impact on policyholder behavior. A low interest rate by itself may or may not trigger additional lapses in the short term, but a sustained low interest rate environment could have an impact as well.

Mortality improvement has been a focus for payout annuities in the past. However, recent trends in the industry suggests that implementing mortality improvement for products such as variable annuities with living benefits is a key assumption because the mortality has a substantial impact on the payout. There are also a handful of assumptions that reflect company operation strategies. Expense assumptions are usually set around how to allocate expenses for each line of business and on which line to focus. New business assumptions can include the amount of sales, as well as the composition of the sales mix and repricing. Management actions can also be reflected in the assumptions as management can decide to reduce sales, lower crediting rates, change dividends, or modify its capital management and investment strategy.

Examples of economic assumptions are interest rates, equity growth rates, volatility, and inflation. Interest rates have been low since 2008 and will likely stay low in the near term. Determining an appropriate long-term growth rate has been a particularly important topic in the industry. The rationale for using and applying mean reversion techniques should be revisited periodically.

#### Assumption setting process

Assumption setting, like any other action, benefits from an established process. The process includes setting baseline assumptions, determining margins, monitoring and testing, and creating proper documentation.

#### Baseline assumptions

Getting best estimate assumptions starts with gathering data from various sources such as company, industry, or market data. Industry and population experience is available through a variety of sources. Company experience is derived from its own experience studies or information from the pricing department.

Setting assumptions is not merely an updating exercise within the models. Actuarial judgment is often utilized to transform raw data into baseline assumptions that are meaningful and that will represent the population of interest. For some companies, assumptions like mortality rates warrant a change when the actual-to-expected ratio hits a certain threshold. They will compare their own experience to industry data, determine the credibility of their data, and use judgment in applying any assumption changes.

#### Margins

The next level of assumption setting is determining the margins or provisions for adverse deviation (PAD) depending on the framework being used. What type of margins should be included? Will it be a margin on an individual assumption or something in aggregate, such as a cost of capital margin? For lapses, should the margin be an increase or a decrease? This will differ by product.

It is important to understand the impacts of including the margins and determine if they are reasonable. This seems like a simple task on the outset, but companies seldom have adequate documentation of margins, and may even have cases where margins actually decrease their reserves. This may be a result of incorrect margins set at inception, or they may have had margin assumptions for a long time that were not monitored, and over time, the assumption's sensitivity switched from one direction to the other.

The distinction between best estimate and prudent best estimate assumptions should be clear to any reviewer. Best estimates should also tie to other reporting bases and need to be consistent. The level setting process for margins, as well as any exceptions, should be noted. If there are assumptions based on less credible experience, then they should have larger margins attached to account for the uncertainty.

### Monitoring and testing

In addition to setting assumptions appropriately, it is imperative to validate and monitor assumptions periodically and review their limitations. Where there are assumptions that are particularly uncertain or critical, monitoring should take place more frequently. The monitoring process should also evaluate each assumption to determine whether they are uncertain and/or critical, because this can change from time to time and a review of those assumptions should be performed frequently, e.g., quarterly vs. annual. Consistency and reasonableness checks should be conducted periodically. One decision point may be to decide the credibility of your experience and determine if you ought to include any industry data. There are some reporting frameworks that include benchmarking guidance. Benchmarking portfolios and external assumptions can be used for verification.

Testing should include both sensitivity and stress testing. There should be more extensive sensitivity testing of these assumptions beyond the typical plus or minus 10 percent and include more environmentally relevant tests. For example, while we are in a near zero interest rate environment, the risk of a



large shock up is the same probability wise, but would also have a larger relative impact.

It is also important to include stress testing on a large scale. While sensitivity testing typically involves a single assumption on a single product, stress testing at the enterprise level would give the broadest perspective possible. This would be a huge undertaking for businesses that have not done it before and would require extensive coordination between several departments: actuarial, finance, reporting, tax, etc. The stresses should cover only the most severe outcomes. Most companies can already respond to a single assumption sensitivity test with a minimal turnaround. But when it comes to enterprise-wide stresses, their capabilities are not as extensive. It could take several weeks to generate results. By then, they may not only become outdated, but also overlooked. Optimally, you should be able to take the stress results and compare them to the most recent history as a means of back testing.

#### Documentation

Documentation is at the heart of any effective assumption governance. All significant assumptions should be clearly identified, documented, and easy to understand. For all assumptions used, there should be a clear policy in place. This includes any possible management actions.





There should be a complete inventory of assumptions; it should be a list of assumptions by basis, not just those assumptions that have changed in a given period. One example of this is the use of an inventory of assumptions. The documentation should also explain the rationale for any differences between bases and demonstrate that assumptions are consistent with external standards. In addition, any expert judgments utilized should be documented including adequate support and the approximate impact of this assumption.

Implementing a proper change management process to govern changes made to assumptions and assumption setting process is crucial to having a controlled modeling environment. Whenever there is a change in process, the change controls should be in place. These should include a reason for change, documentation of control and impact of change, proper review, and approval. There should be discussion of the reasonableness of impact. Responsibilities of setting and approving assumptions should be clearly defined and set at different levels within the organization (e.g., assumption changes with an impact of more than 5 percent of net income will be reviewed and approved at the assumption committee meetings, impacts greater than 10 percent will be reviewed and approved at the executive board level).

Documentation of the governance procedures itself should be documented. This may sound redundant, but it is crucial to have proper documentation in place to help ensure that the process from start to finish has taken place appropriately. It is not enough just to have minutes from the assumption committee meetings. There should be evidence of reviews, such as a query log and discussion of key decisions. It needs to show evidence of a feedback loop. Each item should have a responsible party and there should be a clear downstream communication plan in place to help ensure that appropriate and accurate information is communicated to all parties affected.

#### **Final words**

The process around setting, monitoring, testing, and reviewing assumptions should be an ongoing exercise that is performed under a proper governance structure. In other words, the assumption governance process should include proper documentation, controls, and close monitoring. It is important to acknowledge that assumption governance is an iterative process that will continuously change as new experience emerges in the future. Companies need to prepare for increased focus and scrutiny of how they determine and use assumptions across the organization.

# **Model validation**

By Nicholas Coleman, FSA, MAAA and Emily Cassidy



As the insurance industry progresses, insurance companies have become more dependent on complex models to manage their business and for use in decision making. Some processes and calculations that are already using complex models include AG 43 and principle-based reserve (PBR) models, C3 Phase 1 and Phase 2 capital models, Solvency II, and internal capital models. As actuarial models expand in scope and complexity, a robust model validation function is increasingly important. Further, the release of the Federal Reserve SR 11-7 letter, Supervisory Guidance on Model Risk Management, in April 2011 has brought model validation to the focus of insurance companies.

A complete model validation can be broken down into four segments: scope of validation, components of validation, sources of model risk, and validation approaches.

# Scope

Before beginning a model validation, the scope of the validation should be determined. Potential items to include in a model validation project are data inputs, parameters and assumptions, model design, systems and IT environment, documentation, expert judgment, governance, and communication protocols. When developing the scope, the particular situation of a company should be considered. Materiality, resource constraints, and timing may all affect the amount and intensity of the areas to validate. A company might also decide to focus on areas that have been problematic in the past. Once the scope is determined, it should be communicated to all participating parties to help ensure a successful project.

In actuarial models, data is often derived from a variety of sources such as administration systems, homegrown databases, or third-party sources. The data gathering and consolidation process is a key risk area to consider as incomplete or incorrect data will lead to unreliable results. A common mistake with data is model users assuming that the data received is correct and appropriate for use in the model; however, that is not an appropriate assumption. All data used in a model should be verified.

Actuarial models use many parameters and assumptions. The variety of assumptions across products and even within generations of a single product brings parameters and assumptions to the forefront of a model validation. Where relevant, experience studies should also be considered and how assumptions are derived for use in the model.

The model design, systems, and IT environment are integral pieces in actuarial models and should be considered when performing a model validation. Some key considerations

are the model development and testing process, model change protocols, and systems access. There also needs to be validation that the model is performing calculations as expected.

Model documentation is important for a robust and reliable model. The documentation of actuarial models is often lacking, which can lead to user errors since they might not fully understand the functionality of the model. Lack of documentation also creates the possibility that users of model output misinterpret the results. Development or expansion of documentation is often a major focus of a model validation.

There are times when actuaries need to use their expert judgment when developing and using models. When evaluating the scope of a model validation, the amount and basis of expert judgment incorporated in the model should be taken into account. Even though it is probably already addressed within other work and processes performed, governance and its controls are another concern for actuarial models. The last item to consider is communication protocols. There should be validation that all users of the model and model output understand how the calculations were performed, along with any limitations of the model process. Effective communication is critical for the successful development and use of complex actuarial models.



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# **Components of model validation**

The purpose of a model validation is to help users:

- Assess the appropriateness of their methodologies in relation to their objectives
- Identify any errors, risks, or limitations in the implementation of their models
- Gain an understanding of the level of comfort they can have with their existing models
- Identify value-added opportunities to achieve business benefits by enhancing their models.

When performing a model validation, the following components of the model should be considered: objectives, methodology, data integrity, parameterization, logical integrity, process and governance, and application to decision making.

Before developing a model, several objectives should be considered: what are the goals and intended use for the model? The purpose of this step is to outline the environment the model will be used in, the types of decisions it will support, and the benefits the model will provide. Building a durable model is a considerable challenge with the ever-changing business and regulatory environment. A complete understanding of the model objectives will help in creating a model suitable for current and future use. After evaluating the objectives, you should be able to capture gaps between the "as-is" state and the desired state.

Due to the complexity of actuarial models, such as economic capital models, structure and methodology should be described and assessed in great detail. This is often done in several iterations of increasing detail and can be a substantial part of the assessment exercise. This step will help users assess whether their methodology is appropriate to achieve the stated objectives. Data integrity is critical in the development and use of models. The output of a model depends just as much on the data it uses and on the modeling methodology that is used. The assessment of data addresses the data gathering process and if the model's methodology interprets the data appropriately. This step should also analyze if the data being used is consistent across functions.

Once the data has been collected, model parameters can be derived. Depending on the availability of data, parameterization will require actuarial judgment as a decisive component. This step will help assess the robustness of the process for selecting parameters.

Logical integrity refers to the physical implementation of the model's logic in a computer program or simulation. This is distinct from the methodology. The purpose of this step is to assess how the approach taken in the implementation matches the intended methodology, i.e., does the model do what you intended it to do?

Modeling and usage of models are extensive processes that require the support of clear governance. The responsibilities related to building and using models are generally distributed across multiple departments and levels so interaction between areas/ departments is critical. This step of a model validation will assess the process and governance covering the models including model build, development, and use.

The last step of a model validation is to analyze the application to decision making. This step can identify potential gaps between the objectives of modeling, the perceived implementation, and the actual use of the model. Models are a key tool used by management in decision making and are fundamental to an insurer's pricing, financing, and capital decisions. It is of upmost importance that models perform their desired objective and are used for their intended purpose.

#### Sources of model risk

The complexity of actuarial models means there are multiple sources of risk that can be introduced into models. Actuarial models often use open systems with customized code, which is a major source of model risk. A robust analysis of sources of model risk can help companies identify areas of weakness and reduce or eliminate model risk. Some things to consider are as follows:

- Governance Are there gaps in the governance around models and direction from management regarding approach, strategy, policies, or procedures?
- Controls Are the control processes around model assumptions, data inputs, model updates, data outputs, and reporting efficient?
- Documentation Is the documentation for model users and support teams sufficient?
- Validation Are there robust ongoing validation and testing procedures in place?
- Data Is the data accurate, i.e., data feeds, manual entries, calibration processes?
- Development Does the model development process have a welldefined structure? This would include adequate program documentation, implementation standards, change processes, and training.

#### Model validation approach

The approach taken in your model validation will depend on the previously defined scope. The areas of concern and knowledge of potential weaknesses will direct the development of the approach. A narrow focus on an item such as data quality or documentation may be appropriate in some situations while a broad focus on the overall model may be a better solution in other cases.

Some activities that can be performed in the model validation are assumption checks, validation of data accuracy, static and dynamic validation, sample recalculations, and calculation of model metrics. Stress testing can also be performed to assess the impact of various assumptions and parameters on the model output. If applicable, a model validation might also include back-testing to verify that the accounting P&L is in line with the model output. The documentation of current and end-state models is critical to ongoing model validation.

# Conclusion

The reliance on complex models by insurance companies for decision making has brought model validation

into the forefront. A robust model validation process, including enhanced documentation, will give insurers increased confidence in their model output and the decisions made using these models. As additional guidance from regulators emerges and frameworks such as Solvency II and PBR develop, model validation will need to become an increasingly robust and ongoing process.



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