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Chairperson's Corner: First Quarter

By Jim Hawke

The Council had a very productive face-to-face meeting during the SOA Annual Meeting & Exhibit in October. Our slate of officers was completed with Bob Leach as vice chair, Jason Kehrberg as secretary, and David Ruiz continuing as treasurer. Some of our specific assignments for 2017 are as follows:

- Webcasts—Jason Kehrberg, Katie Cantor, and Simpa Baiye
- 2017 Life & Annuity Symposium—Len Mangini and David Ruiz
- Valuation Actuary Symposium—Bob Leach, David Ruiz and Katie Cantor
- 2017 Annual Meeting—Ashwini Vaidya, Steve Finn and Simpa Baiye
- Economic Balance Sheet Seminar—Jim Hawke
- GAAP Seminar—David Ruiz and Katie Cantor
- Podcasts—Len Mangini
- Research—Jim Hawke
- Section Outreach—Ashwini Vaidya and Steve Finn
- Volunteer Liaison—Simpa Baiye
- Regulatory Change Web Resource—Bob Leach
- IFRS Textbook—Jim Hawke
- GAAP Textbook revision—Bob Leach

I should mention that these are leadership/coordination assignments. Other council members and many volunteers outside the council will aid those listed above in the work.



At this writing a preliminary slotting of sessions that we will sponsor at the 2017 Life & Annuity Symposium has been completed. This meeting will be held May 8–9 in Seattle. We will have PBR related sessions on “ask the experts,” VM-20 mortality, VM-31 actuarial reports, pricing assumptions, simplified methods, a fixed annuity update, and a presentation on the research project concerning modern deterministic scenarios. We plan to co-host a professionalism session on the activities of the AAA Life Practice Council. We will also put on a statutory and GAAP update session and will co-host a breakfast with the Smaller Insurance Company Section. These plans could change as we recruit moderators and speakers.

As always, I encourage you to let us know if you see under-served areas which might need more attention from the council. First quarter is always a very busy time for actuaries involved in financial reporting, and I wish you success and smooth sailing. ■



Jim Hawke, FSA, MAAA, is chairperson of the Financial Reporting Section. He can be contacted at jamesshawke@gmail.com.

Letter to the Editor: Question from a Reader

Dear editor,

I question the accuracy of the following comment from the December 2016 issue of *The Financial Reporter* article titled “Negative GAAP Term Insurance Reserves—to Floor or Not to Floor?”

“These proposed changes do not affect the development of negative reserves, nor do they explicitly address the issue of negative reserves.”

I believe that FASB ASC Exposure Draft 944-40-30-7A and 944-40-35-7A directly addresses negative reserves by stating, “In no event shall the liability for future policy benefits balance be less than zero.”

Sincerely, Adam Williams, FSA

RESPONSE FROM BOB CROMPTON:

Adam,

Thanks for your note.

You are indeed correct.

The problem is that some guys just aren't very good at reading—I read right over that section.

I regret any misunderstanding my error may have caused.

Best regards,

Bob Crompton

Henry is Mostly Right about IFRS for Insurance

By Jim Milholland

Henry Siegel makes a number of good points in his article *10 Things I Think About the New Insurance Contracts IFRS* in the December, 2016 issue of *The Financial Reporter*. I agree with most of what he says and I appreciate his efforts to help actuaries not get lost as they address the new standard.

On one point I disagree with Siegel. That is the first part of his point #6, which says.

“The new definition of revenue will prove to be of little value, but a pain to calculate. Use of a gains-by-source approach for analysis will make the exact revenue number irrelevant except for short-duration contracts. It might be a better indicator of a company’s size, I suppose, but it isn’t useful for things like loss ratios or expected profits.”

The new definition of revenue has value. The value comes from understanding how an insurer makes a profit. Keep in mind that the statement of profit and loss will show underwriting profit separately from financial profit. The underwriting profit is the amount that insurance revenue exceeds insurance benefits and expense and the financial profit is the amount that the investment income exceeds the interest credited to the liability. The presentation allows users of the financial statement to see how much the revenue exceeds expenses, the same as for any company. Insurers try to make money by having a margin (or margins, if one wants to distinguish risk margin from contractual service margin) above the amount that they expect to need to cover benefits and expenses. The presentation proposed in the new standard makes clear if the revenue does in fact cover benefits and expenses and leave a margin for profit.

Gains by source short-cuts the presentation. Summarized margins lack the quantitative information found in the financial statements of all other businesses. An expanded analysis of margins is just a different presentation of the information the standard requires, so why not present it in an intuitive way.

Revenue is not a pain to calculate. Keep in mind that all the information comes from information required in the disclosures, namely the reconciliation of the beginning and ending liabilities. The disclosure requirements have been part of the anticipated standard for a long time, and, to my memory, no one has objected to them. Siegel likes them! (See his point #4.) No

one has said that they are not appropriate or not practicable. It’s no great difficulty to take what will be existing information and to make the entries to show revenue, benefits, and expenses in the way that the new standard requires. Moreover, the presentation will be very useful for loss ratios. For the first time ever, the ratio of benefits and expenses to revenue will be meaningful.

Siegel does not say what he would prefer for revenue recognition. Perhaps there should be no revenue, only a margin analysis. As already said, this approach leaves out a lot of useful quantitative information.

Many people involved in the discussion about the presentation of profit and loss would prefer premiums as revenue. In fact, the FASB has recommitted itself to premiums as revenue, except for universal-life type contracts. The problem with premiums as revenue is that the collection of premiums bears no necessary relationship to the service provided. What’s worse, recognizing premiums as revenue permits companies to record as revenue amounts that contribute to deposit features and to recognize an expense for money that is returned to policyholders. Taking money for deposits is not revenue and returning money is not an expense for other deposit-taking institutions, and they should not be for insurers either.

When premiums are revenue, generally there is an expense for the change in reserve. This creates a conundrum. If there is an expense when the insurer provides for future benefits, what is the treatment of benefits when they are incurred? Traditionally benefits are an expense when incurred and the change in reserve contains an offsetting amount, a release of liability, for the expected benefits. The benefits are in effect expensed twice, the first time when the provision is made, and the second when the benefit is incurred. To stay in balance the company makes the offsetting adjustment. Although common, this treatment is irrational, especially so if, as is usual, the offsetting amount is not explicit.

One alternative is to have only an expense when claims are provided for. When claims are incurred, they would not affect profit and loss. The change in reserve would be limited to the increase in the reserve. While more correct than expensing claims twice, there is little rationale for having an expense for benefits except when they are incurred.

The new accounting will be more informative (Siegel’s point #1) and analysts and others will benefit from the presentation (so I disagree as well with Siegel’s point #2). Actuaries will not find revenue recognition to be a pain, but will find that it helps to explain the results, a task that often falls to them. ■



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Dynamic Assumption-Setting for Variable and Non-Variable Annuities—Part 2

By Marianne Purushotham and Mark Birdsall

This article is the second of a three-part discussion that proposes an approach to develop dynamic assumptions for living benefits using a combination of available experience data and predictive modeling techniques.¹ In this article, we will provide an update of the modeling work with respect to full surrenders for variable annuities with guaranteed lifetime withdrawal benefits (VAs with GLWBs) since the publication of Part 1. We will then propose a methodology for applying these results to similar product types with more limited historical data, such as fixed indexed annuities with guaranteed lifetime income benefits (FIAs with GLIBs).

In a future Part 3 article, we plan to use the approaches developed in Parts 1 and 2 to examine FIA with GLIB data and apply the methods to determine a full surrender function for FIAs with GLIBs. We will also discuss possible applications to living benefit utilization assumptions for VAs with GLWBs and FIAs with GLIBs.

PART 1 MODELING ANALYSIS UPDATE

In Part 1, we defined three contract benefit utilization statuses for VAs with GLWBs as shown in Table 1 (below).

In that article, we demonstrated that each of these three contract statuses has full surrender experience significantly different from the other two statuses, as well as being distinct from the full surrender experience for VAs without GLWBs.

In the Part 1 article, a process developing a logistic regression dynamic surrender function was suggested for Statuses A and B. For Status A, using industry data, the resulting logistic regression dynamic surrender function had a “Concordance Statistic” (c statistic) of 0.77, while for Status B, the corresponding value was 0.75. The c statistic represents the percentage of the time the dynamic surrender function correctly predicted a surrender/non-surrender event allowing for an understanding of trade-off between model specificity and sensitivity.

Due to the overall low rates of surrender and minor variation by policy year for Status C, a model was deemed unnecessary at that point.

One goal in developing dynamic surrender functions in Part 1 was simplicity. Here we would also like to present the results of additional modeling that primarily emphasizes improving prediction accuracy with simplicity as a secondary consideration.

As background for the discussion, about 25 years ago researchers discovered that combining results from different predictive algorithms by employing averaging, “voting,” and other techniques (now collectively referred to as ensemble modeling) produced significantly better results than any of the individual algorithms independently.²

Table 1
VAs with GLWBs Defined Contract Statuses

Benefit Utilization Category	Description	2013 Study Exposure	Comments
Status A	The contract holder has taken no withdrawals to date.	72%	
Status B	The contract holder has taken withdrawals, but the GLWB has not yet been utilized.	11%	This status includes withdrawals taken outside of 90% to 110% of the contractual maximum GLWB with no apparent pattern associated with GLWB utilization.
Status C	The contract holder is utilizing the GLWB benefit.	17%	Both Ruark Consulting and LIMRA consider that a contract is utilizing its GLWB benefit if the contract holder is taking regular withdrawals in the range of 90% to 110% of the contractual maximum GLWB and on a systematic basis.

For our purposes, an ensemble random forest model with 100 decision tree sub-models was built for Status A. Combining the sub-model results using a voting procedure developed a c statistic of 0.91. For Status B, a similar ensemble random forest model, in this case consisting of 1000 decision tree sub-models and a voting procedure, was built resulting in a c statistic of 0.81. While the simpler models are more intuitive, easier to explain, and have faster computer processing time, an ensemble model that incorporates several sub-models may provide the best results when accuracy is at a premium.

Table 2 (below) compares the c statistic and model validation results for the different models.

As mentioned above, although the full surrender rates for Status C were generally near 1 percent or less by policy year with little variation when measured from the contract issue date, we continue to measure experience by different factors as more historical data becomes available. Below we present an examination for contract status C that considers full surrender rates measured from the point of benefit election rather than from the contract issue date. As more data on Contract Status C policies becomes available we believe we should explore the potential advantages of using a modeling approach for this group.

Table 3 (below, right) shows the results measured from the duration of GLWB election based on LIMRA data for 2007 issues during calendar years 2007 through 2013 using the definition of utilization in Table 1.

ADJUSTING VA WITH GLWB RESULTS FOR FIAs WITH GLIBs

In Part 1, we proposed a three-step methodology for developing surrender assumptions for VAs with GLWBs: (1) Develop a set of

Table 2
Model Statistics: Ensemble Model versus Logistic Regression

	Status A		Status B	
	Logistic Regression*	Ensemble Model	Logistic Regression*	Ensemble Model
c statistic**	0.77	0.91	0.75	0.81
% observations predicted correctly	74%	83%	72%	78%

*Logistic regression cut off value = .6

**c statistic measures the concordance coefficient/statistic

An ensemble model that incorporates several sub-models may provide the best results when accuracy is at a premium.

base surrender assumptions, including unraveling the experience into three contract statuses (A, B and C, as defined above), and identify candidates for key predictors; (2) Construct a predictive model to estimate the impact of changes to base surrenders due to changes in these key predictors; and (3) Build dynamic surrender functions for contracts in each benefit utilization status.

In this section, we propose a methodology for using the more limited available experience for FIAs with GLIBs, plus other considerations, to adjust the VA with GLWB surrender experience in setting full surrender assumptions for FIAs with GLIBs.

First, we narrow the analysis by assuming that the surrender experience for Status C contracts following VA GLWB/FIA GLIB benefit utilization would be similar. We also assume that FIA with GLIB contracts in Status B are not material, due to the low expected percentage of these contracts in the VA with GLWB experience. The lower growth potential in the account value for an FIA contract with GLIB rider than in a VA contract with GLWB also may make it less likely that policyholders would make withdrawals prior to exercising the GLIB. Therefore, we will focus our analysis on contracts in Status A for this discussion, those contracts that have not begun to utilize the GLWB/GLIB benefit.

Table 3
VAs with GLWBs Contract Status C (Utilizing Benefit) Issue Year 2007

Duration from Benefit Election	Surrender Rate	% Exposure
1	0.20%	10%
2	0.30%	12%
3	0.50%	15%
4	0.80%	16%
5	0.92%	7%
6	1.10%	18%
7	1.50%	22%
Total	.72%	100%



Step 1—Develop base surrender assumptions for FIAs with and without GLIBs for Status A. Using predictive modeling tools, determine key predictors for Status A FIA with GLIB full surrenders. Compare these key predictors and base surrender assumptions with the corresponding results for VAs with GLWBs. These comparisons may assist in applying professional judgment in Step 8 below.

Step 2—Use cluster analysis to identify customer clusters with respect to Status A full surrenders in the VA with GLWB data and in the FIA with GLIB data. Cluster analysis includes algorithms and methods for finding structure in data by creating groups or “clusters” that maximize the associations among members of the group while minimizing the association with other data points.³

Step 3—Compare the customer clusters between the VA with GLWB and FIA with GLIB data. For each of the customer clusters that are similar between the two sets of data, stratify the full surrender experience by customer cluster for both the VA with GLWB and FIA with GLIB Status A blocks of business. For any clusters that are unique to the FIA with GLIB Status A data, develop base surrender experience for those clusters as well.

Step 4—For similar Status A customer clusters between VAs with GLWBs and FIAs with GLIBs, test hypotheses about the relative level of Status A full surrenders by customer cluster.

Step 5—If the level of full surrenders is significantly different for similar clusters, develop measures of benefit prominence and consider to what extent these measures account for the differences. With account values of FIAs with GLIBs being flatter than account values of FIAs alone due to the extra charges for the GLIBs, the annual reporting of the account value roll-forward provides a regular reminder of this benefit to the annuity owner. The larger the extra charges, the more prominent the GLIB will

be for the FIA with GLIB owner. In contrast, the account value of a VA with GLWB has more potential volatility and more different types of charges which could reduce the prominence of the GLWB and thereby reduce the efficiency of the owner’s use of the benefit. Such measures of benefit prominence might include:

- a. The number of other riders on the VA or FIA contract.
- b. The rider charge for the GLWB/GLIB as a percent of total contract charges.
- c. The ratio of the current account value to the sum of the premiums paid less withdrawals.
- d. The max withdrawal percentage for the given age and gender for the policy relative to newer policies offered in the marketplace post product de-risking.

Step 6—For similar Status A customer clusters between VAs with GLWBs and FIAs with GLIBs, combine the experience data for all those clusters and develop dynamic full surrender functions using the identified key predictors. Add new predictors for customer cluster ID, product type, and measures of benefit prominence where applicable.

Step 7—Calibrate the dynamic functions of Status A full surrenders against the experience for each product type and customer cluster. Optimize the model fit for each product type and customer cluster by testing different predictive model types, including ensemble models.

Step 8—For dissimilar FIAs with GLIBs customer clusters, use the stratified base surrender experience for FIAs with GLIBs. Include other factors derived from the other cluster analyses to apply judgment in setting the dynamic functions of Status A full surrenders, including a margin for greater uncertainty if appropriate to the purpose of the analysis.

FINAL THOUGHTS

While the methods proposed are intended to be used to develop anticipated experience (current or best estimate) assumptions, including margins may be appropriate in some cases.

For example, Actuarial Guideline 43 (AG 43) requires additional margins for uncertainty. Prudent Estimate Assumptions are to be set at the conservative end of the actuary’s confidence interval based on the availability of relevant experience and its degree of credibility, as defined in Section 3.B.8 of AG 43. A margin for uncertainty is to be applied to the anticipated experience (without margins) that provides for both estimation error and a margin for adverse deviation. The larger the uncertainty, the larger the margin should be.

Appendix 9 of AG 43 applies these principles to contract holder behavior specifically. In the absence of relevant and fully credible experience, the actuary should define a plausible

spectrum for each contract holder behavior assumption and set the Prudent Estimate Assumption at the conservative end of the plausible spectrum. The plausible spectrum need not be constrained by outcomes of historical experience. Appendix 9 includes additional guidance that should be referenced as well in setting assumptions and margins.

The use of targeted sensitivity testing and evaluation of trends should be considered in the actuary's analysis underlying assumption-setting. Several Actuarial Standards of Practice (ASOPs) refer to these methods in different contexts, such as ASOPs 2, 7, 10, 15, 18, 19, 24, 37, 40, 42 and 48. Targeted sensitivity testing should be undertaken to identify the degree of risk associated with possible variations in the surrender assumptions. The richer the guaranteed benefits, the more likely the benefits are to be lapse-supported, with higher sensitivities in profit projections and reserve and capital calculations. Though they're based on historical experience, the assumptions developed are estimates of future experience. Recognition of trends in the historical data of the assumptions may be particularly important for assumptions that are material to the results.

While AG 43 may have been the first implementation of principle-based reserves, the 2017 effective date of the Valuation Manual places a premium on setting assumptions as accurately as possible in the calculation of reserves. In the past, simply listing the assumptions used may have been deemed sufficient, but in the near future greater disclosure of the sources and analyses underlying particular assumptions will be expected. More focused experience studies are needed, as illustrated in this article in looking at contracts in Statuses A, B and C. Additional insights in looking at experience from benefit utilization date and not just issue date may be useful. Including distribution channel, product design features, and customer

clusters as predictors may be important to more fully understand past experience. Studying the interactions of key factors using predictive models may be vital to measuring the risks of more complex products. With the development of new benefits, new methodologies are needed to develop assumptions where credible historical experience does not yet exist. In Part 3, we will apply the methods described in this article to develop FIA with GLIB Status A full surrender assumptions, test the relative computer run times of ensemble models versus single method models, and examine GLWB/GLIB utilization experience for both VAs and FIAs. ■



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ENDNOTES

- 1 Part 1 appeared in the September, 2015 issue of *The Financial Reporter*
- 2 "Ensemble Methods in Data Mining: Improving Accuracy by Combining Predictions" by Giovanni Seni and John F. Elder, *Synthesis Lectures on Data Mining and Knowledge Discovery* published by Morgan & Claypool Publishers, 2010, Chapter 1.
- 3 *Electronic Statistics Textbook* provided by Dell Statistica at www.statsoft.com/textbook/cluster-analysis. See also "Cluster Analysis" by Marianne Purushotham, *The Actuary*, June/July 2016 issue, Society of Actuaries.

Exposure Draft of Targeted Improvements to Accounting for Long-Duration Insurance Contracts

By Leonard Reback

The Financial Accounting Standards Board (FASB) issued its exposure draft, or proposed US GAAP accounting standards update, on targeted improvements to accounting for long-duration insurance contracts on Sept. 29, 2016.¹ The exposure draft had about a 75-day comment period, so comments were due by Dec. 15. Organizations that submitted a comment letter by the due date would be eligible to participate in a roundtable discussion with FASB on the topic on March 15, 2017. The American Academy of Actuaries Financial Reporting Committee submitted a comment letter that was largely supportive of the proposed targeted improvements, but pointed out some problems that needed to be fixed as well as suggestions to improve the proposal further.

EXPOSURE DRAFT FORMAT

This exposure draft had a somewhat different format than proposed insurance accounting changes in the past. In the past, new accounting standards were developed to address particular issues and the exposure drafts and final standards basically provided the (proposed) accounting approach for the issue(s) in question. This was the format of such standards as FAS 97 and FAS 113 and also guidance put out by the AICPA, such as SOP 03-1.

In 2009, FASB completed their project to codify US GAAP. Under this project all relevant accounting guidance was consolidated into one document, which was organized into topics, such as insurance, revenue and fair value. The guidance from previous FASB standards, as well as other guidance that was to be retained, such as SOPs, was absorbed into this document. Insurance accounting guidance was now considered to be Topic 944 within Accounting Standards Codification. Statements such as FAS 60 FAS 97, SOP 03-1 became obsolete, but their guidance was now consolidated within Topic 944.



This had an impact on the format of subsequent exposure drafts and new accounting standards. Subsequent to codification, exposure drafts and new accounting standards were essentially red-lined or track changes versions of the accounting codification topic in question. The 2013 insurance contracts exposure draft was an exception because the proposal was to scrap Topic 944 entirely and replace it with a brand new topic. But because FASB decided to pursue targeted improvements, the 2016 exposure draft followed the typical new format of showing the relevant portions of Topic 944, crossing out portions to be deleted and underlining new language to be inserted.

EXPOSURE DRAFT PROPOSALS

The main proposals of the exposure draft would probably not be a surprise to those who have been following this project for the past two years. The main proposals were to:

1. Unlock reserve assumptions for traditional contract liabilities, including non-participating limited-payment and participating contracts. Assumptions would be reviewed at least annually and the net premium ratio would be unlocked retrospectively to account for changes in projected cash flows, subject to a cap of 100 percent. Provisions for adverse deviation, loss recognition testing and profits-followed-by-losses testing would be eliminated for these contracts.
2. Update the discount rate for traditional contract liabilities, including non-participating limited-payment and participating contracts each reporting period using a current market “high-quality fixed-income instrument rate.” The effect of changes in discount rate would be reported in other comprehensive income (OCI).
3. Simplify DAC amortization, either in proportion to in force or straight-line. There would be no DAC impairment test.

This amortization approach would also apply to other items that amortize like DAC, such as unearned revenue liabilities and deferred sales inducements.

4. Market risk benefits, which are essentially guarantees on variable contracts, would be reported at fair value. Changes in fair value would be reported in net income, except for changes due to changes in own credit which would be reported in OCI.
5. In lieu of profits-followed-by-losses testing for account balance products, there would need to be determination of whether an additional liability for annuitization, death or other insurance benefits (i.e., an SOP 03-1 liability) is needed subsequent to issue. Currently such determination is made only at issue. If an SOP 03-1 liability is needed subsequent to issue, it would be accrued retrospectively (i.e., the balance that would have accrued since issue would be reported as of the date the determination was made that an SOP 03-1 liability was needed).
6. Many additional disclosures would be required, such as roll-forwards of liabilities and information about assumptions and inputs.

There were a few details that I was surprised about when reading the exposure draft. I was surprised that FASB retained the option to lock-in the discount rate used for calculating SOP 03-1 liabilities at contract inception. I had assumed that we would be required to update this discount rate each reporting period, similar to traditional contract liabilities, even though the discount rate used for SOP 03-1 liabilities is different than that for traditional contract liabilities.

I was also surprised that there was a provision stating that reinsurance of market risk benefits would be fair valued, consistent with the direct benefit. I think this makes sense in most situations, since it avoids an accounting mismatch between the direct benefit and the ceded benefit, but I don't think that was clear from the original deliberations.

AMERICAN ACADEMY OF ACTUARIES COMMENT LETTER

The Financial Reporting Committee of the American Academy of Actuaries submitted a comment letter on Dec. 15.² The letter was largely supportive of the FASB proposals for targeted improvements. The letter did note that the committee would have preferred a more comprehensive approach to improving accounting for long-duration insurance contracts, along the lines proposed in 2013, and expressed hope that FASB would be willing to consider such an approach in the future. But the committee agreed that given the direction of the project to provide targeted improvements to existing GAAP, FASB addressed the

most important issues and that their proposals were generally beneficial.

The committee agreed that updating assumptions and discount rates for traditional contracts and reporting market risk benefits at fair value would make the reported information more relevant. The committee agreed that simplified DAC amortization would be easier for users to understand and reduce costs for preparers. And the committee agreed that most of the enhanced disclosures would be beneficial to financial statement users.

FASB retained the option to lock-in the discount rate used for calculating SOP 03-1 liabilities at contract inception.

The committee did point out two significant flaws with the proposal. One of the flaws related to participating contracts. Under the proposal, participating contracts would use the same liability valuation model as non-participating contracts. This would be a problem because the non-participating contracts model assumes a locked-in credited rate, and so doesn't take into account the fact that the credited rate of participating contracts varies as expected investment experience changes. Addressing this would require several changes to the proposed model for participating contracts. The proposed model also does not seem to account well for the fact that expected dividends on participating contracts sold by mutual companies may include expected future profits from non-participating businesses.

The other significant flaw noted by the committee related to retrospectively accruing an SOP 03-1 liability subsequent to issue in lieu of existing profits-followed-by-losses testing. The main concern was that the retrospective accrual would not only accrue for the present value of future losses, but would also retroactively change the profit recognition pattern. An example in the letter demonstrated that this can produce an SOP 03-1 liability accrual that is larger than the expected future losses, which the committee did not believe would be appropriate. The committee was also concerned that requiring such retrospective accruals would mean that a company would always have to be prepared to put up such a reserve on any universal life-type contract. Since the SOP 03-1 calculation is very similar to the current universal life DAC calculation, this would minimize the practical benefit of simplifying DAC amortization.

The committee also made a number of suggestions to improve the proposal further. A key suggestion was to unlock the net premium ratio prospectively rather than retrospectively when

assumptions were changed for traditional or SOP 03-1 liabilities. The committee suggested that retrospective unlocking, which is the approach used when updating universal life DAC assumptions today, would be difficult for users to understand and would be operationally burdensome. The committee noted that prospective unlocking would be consistent with the approach the International Accounting Standards Board (IASB) is taking towards updating assumptions and would thus enhance convergence.

The committee also suggested revising the language used to determine the discount rate for traditional contracts. The committee’s concern was that “high-quality fixed-income instrument rate” is used in other areas of US GAAP, such as pension accounting, and has been interpreted as requiring a AA rate or better. The committee was concerned that this would not provide an adequate illiquidity premium for most insurance contracts.

Another suggestion was that for closed blocks formed on demutualization, a simplified valuation would be less burdensome for preparers and more reflective of the economics of the contracts. This would recognize that all closed block asset returns would eventually be passed through to the closed block policyholders. So the liability could simply be equal to the asset book value, plus an additional liability in the event the assets are expected to be insufficient to cover liability guarantees.

The committee also suggested that FASB consider changes to the definition of a market risk benefit to increase consistency among similar benefits. For example, some equity indexed contracts could provide very similar cash flows to variable contracts, but guarantees on such equity indexed contracts would not be considered market risk benefits, and thus not necessarily be reported at fair value. The committee also suggested possibly reconsidering whether death benefits should be considered market risk benefits.

Another suggestion was to consider amortizing unearned revenue liabilities on universal life-type contracts consistent with deferred profit liabilities on limited payment contracts, rather than like DAC. This is because both unearned revenue and deferred profits represent deferred revenue, and so it may be appropriate to account for them consistently. The committee also suggested possible simplifications to the disclosure and transition requirements.

NEXT STEPS

As of Dec. 20, 2016, FASB had received 38 comment letters on the exposure draft. This included comments from insurance companies and accounting firms, as well as organizations such as the Academy, the ACLI and the AICPA. The next official step in this process is likely to be a roundtable discussion at the FASB offices on March 15 in which preparers, auditors and investors will discuss their positions on the proposals with FASB board members and staff. FASB is likely to have several meetings in 2017 to redeliberate aspects of the proposal that drew concerns or suggestions in either comment letters or the roundtable discussion. My understanding is that FASB would like to complete this project and issue a final standard by the end of 2017. ■



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ENDNOTES

- 1 http://www.fasb.org/jsp/FASB/Document_C/DocumentPage?cid=1176168477111&acceptedDisclaimer=true
- 2 http://www.actuary.org/files/publications/Academy_FASB_Long_Duration_Contracts_Comments_12142016.pdf

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Unlocking of Traditional Contract Assumptions

By Steve Malerich

S ometime this year, we expect to see significant revisions to Generally Accepted Accounting Principles (GAAP) for long-duration insurance contracts. Among the more significant changes seen in the exposure draft are a requirement to regularly update assumptions used in the valuation of the traditional contract liability for future policy benefits (reserve) and a simpler method of amortizing deferred acquisition costs (DAC). Reserve valuation and DAC amortization will no longer be integrated.

In this article, we'll look at key liability calculations for assumption changes. The focus here is entirely on liabilities—the contract reserve and, for limited-pay contracts, the deferred profit liability.

The exposure draft calls for retrospective revision of the liabilities—recalculation of current balances as if actual experience to-date and current assumptions about future experience were known at issue.

In light of past difficulties with retrospective unlocking of universal life DAC and additional liabilities, most comment letters argue for changing to a prospective assumption update method, where the net premium ratio is recalculated so that an assumption change has no immediate effect on the reserve (subject to a 100 percent cap on the net premium ratio).

A third alternative was considered by FASB during their deliberations, what they've called the immediate method. Under the immediate method, the net premium ratio is fixed at issue and the reserve is restated by applying that ratio to updated cash flow projections. Though no comment letters advocate this method, it was the second most preferred method among board members during their earlier deliberations and cannot yet be dismissed.

All three methods start with some common measurements, and their differing effects can easily be compared in relation to those measurements.

NOTATION

In the following formulas, accumulated values of actual cash flows are presented as “AV(Cash Flow)” and discounted present

values of expected cash flows, projected from the valuation date, are presented as “PV(Cash Flow)”.

The subscripts “prior” and “new” are used to represent values before and after assumption changes. Since assumption changes have no effect on actual cash flows, accumulated values need no subscript.

When applied to projected cash flows and ratios, the prefix Δ represents the difference between new and prior values. For example:

$$\Delta PV(\text{Benefits}) = PV_{\text{New}}(\text{Benefits}) - PV_{\text{Prior}}(\text{Benefits})$$

BENEFIT RESERVE

For all three methods, understanding the effect of an assumption change begins with measuring its effect on the net present value of cash flows (ΔNPV) assuming no change in the net premium ratio (b_{prior}):

$$\Delta NPV = \Delta PV(\text{Benefits}) - b_{\text{prior}} \times \Delta PV(\text{Premiums})$$

Note the similarity to a basic reserve formula. In fact, if we substitute new and prior present values for the deltas and then rearrange the terms, we can see that the change in NPV as defined here is the amount the reserve would change if the net premium ratio were held constant.

This change translates into two effects—an immediate change in the reserve (ΔV) and a change in the net premium ratio (Δb) for future valuations. The amounts of change depend on the method used as shown in Table 1 (pg. 15, top).

In the absence of constraints (not considered in this short article), we can see in Table 1 the fundamental characteristics of the prospective method (no immediate change in the reserve) and the immediate method (no change in the net premium ratio). We can also see that the immediate method adjusts the reserve for the full change in net present value. To fully fund remaining benefits without any immediate reserve change, the prospective method must charge the change in net present value against future gross premiums, dividing ΔNPV by $PV_{\text{New}}(\text{Premium})$.

The retrospective method, by design, applies the same net premium ratio to past and future premiums. To preserve that relationship after an assumption change, a portion of the change in net present value is charged immediately to the reserve. That portion is the ratio of accumulated actual gross premiums to the present value of total lifetime expected gross premium, shown here as the historical ratio:

$$h_{\text{New}}(\text{Premium}) = \frac{AV(\text{Premium})}{AV(\text{Premium}) + PV_{\text{New}}(\text{Premium})}$$

Table 1
Benefit Reserve

Method	Immediate Change	Change in Amortization Rate
Prospective	$\Delta V = 0$	$\Delta b = \frac{\Delta NPV}{PV_{New}(Premium)}$
Retrospective	$\Delta V = \Delta NPV \times h_{New}(Premium)$	$\Delta b = \frac{\Delta NPV}{AV(Premium) + PV_{New}(Premium)}$
Immediate	$\Delta V = \Delta NPV$	$\Delta b = 0$

The change in the net premium ratio under the retrospective method is similar to prospective, except the denominator is lifetime expected premium rather than projected premium.

LIMITED-PAY CONTRACTS

Limited-pay contracts defer the profit margin $(1 - b)$ to be amortized over the expected amount of insurance in force. (For products that have no specified in force measure, another amortization basis is needed and that basis replaces amount in force in these formulas.)

Understanding the effect of an assumption change begins with measuring its effect on an adjusted present value of cash flows (ΔAPV) assuming no change in the deferred profit amortization ratio (k_{prior}):

$$\Delta APV = \Delta PV(Benefits) - \Delta PV(Premiums) + k_{prior} \times \Delta PV(in Force)$$

Note that the adjusted present value is independent of the net premium ratio. That's because the portion of gross premium not applied to reserve accrual $(1 - b)$ goes into the deferred profit liability. Together, 100 percent of gross premium is applied to the liabilities.

Though not as obvious, this again resembles a liability formula. Splitting the premium term into multiples of b and $1 - b$,

gives us the sum of ΔNPV and the corresponding formula for deferred profit. If we substitute new and prior present values for the deltas and then rearrange the terms, we can see that the change in adjusted present value equals the sum of the changes in the two liabilities before updating the net premium ratio and the amortization rate.

This change in adjusted present value translates into two effects—an immediate change in the combined liability (ΔL) and a change in the deferred profit amortization rate (Δk). The change in the net premium ratio has no effect on the total liability or on future changes in total liability.

Again, the amounts of change depend on the method used. The structure of the formulas in Table 2 (below) is identical to those in Table 1. Only the variables change; adjusted present value replaces net present value and amounts in force replace gross premiums.

MEASURING EFFECTS ON NET INCOME

In these two small tables, we have most of the key measurements that will be needed to explain the effects of assumption changes on GAAP earnings for all three methods.

Table 2
Total Liability (Benefit Reserve plus Deferred Profit)

Method	Immediate Change	Change in Amortization Rate
Prospective	$\Delta L = 0$	$\Delta k = \frac{-\Delta APV}{PV_{New}(in Force)}$
Retrospective	$\Delta L = \Delta APV \times h_{New}(in Force)$	$\Delta k = \frac{-\Delta APV}{AV(in Force) + PV_{New}(in Force)}$
Immediate	$\Delta L = \Delta APV$	$\Delta k = 0$

An assumption change alters the current liability by a multiple of the change in the net present value of expected cash flows or, for limited-pay contracts, the adjusted present value. The multiple depends on the update method—0 percent or 100 percent for the prospective and immediate methods, respectively, or the appropriate historical ratio for the retrospective method.

For example, if $\Delta NPV = \$1,000$ under all three methods for a fairly new book of business, ΔV will be \$0, \$300, or \$1,000 under the prospective, retrospective, or immediate methods. [With a historical ratio of 30 percent, that portion of the change in NPV is matched with past premium and charged immediately when using the retrospective method.]

Recognizing that assumption changes do not alter actual cash flows, the effect of the change on near-term reserve accruals can be estimated by applying the change in the net premium ratio to the run-rate of gross premiums or, for limited-pay contracts, applying the change in the amortization rate to the current amount in force.

Continuing the example, if $PV_{New}(\text{Premium}) = \$28,000$, then Δb will be 3.6 percent, 2.5 percent, or 0 percent under the prospective, retrospective, or immediate methods. [If the historical ratio is 30 percent and $PV_{New}(\text{Premium})$ is \$28,000, then $AV(\text{Premium})$ must be \$12,000.] If premiums are running about \$1,200 per quarter, the quarterly reserve accrual will increase by about \$43, \$30, or \$0, respectively.

Updating of reserve assumptions will also change the size of experience variances. If the assumption change reasonably approximates recent actual experience, the average difference

between actual and expected claims will decline to approximately zero after the assumption change.

If, in our example, claims have been running \$40 per quarter higher than expected, that amount will be absorbed into the reserve calculation and will no longer fall to the bottom line.

SUMMARY OF ILLUSTRATED RESULTS

In total, for our simple example:

- Prospective unlocking would see no immediate change in the liability but subsequent earnings would be reduced at the rate of about \$3 per quarter (3.6 percent of 1,200, minus \$40).
- Retrospective unlocking would see an immediate \$300 increase in the reserve and subsequent earnings would be reduced at the rate of about \$18 per quarter (2.5 percent of \$1,200, minus 30 percent of \$40—since the retrospective method’s true up for actual experience would have been deferring all but 30 percent of the quarterly variances before the assumption change).
- Immediate unlocking would see an immediate \$1,000 increase in the reserve and subsequent earnings would be increased at the rate of about \$40 per quarter (no change in reserve accrual rate, but the higher claims would now be offset by a reserve release). ■



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Data Visualization for Model Controls

By Bob Crompton

One of the critical components of model risk management is effective model controls. The Committee of Sponsoring Organizations of the Treadway Commission (COSO) defines a control as follows:

“Internal control is broadly defined as a process, effected by an entity’s board of directors, management and other personnel, designed to provide reasonable assurance regarding the achievement of objectives relating to operations, reporting and compliance.”¹

Examples of controls commonly used in model risk management include the following:

- Formalized approvals for model changes and updates
- Reconciliation of data
- Review and sign-off of model results
- Trending
- Ratios
- Roll-forward of accounts

Although actuaries are familiar with these types of controls, as a profession we have spent significantly more time thinking

about constructing models than controlling them. Controls for actuarial models are currently full of “low hanging fruit”—that is, items that can quickly and easily be improved for a significant benefit to model risk management. One way in which we can harvest this fruit is by adding visualization to the controls we currently use.²

THE PROBLEM WITH CONTROLS

Many controls provide extensive numeric results from a model. These numeric results contain the potential for effective controls, but this potential is not always realized. Many controls fail to distinguish exceptions from anticipated results. They give no indication of the bounds of reasonableness and fail to provide the reviewer with indicators of where the model might be out of control.

They rely on the reviewer to make judgments regarding which items are exceptions and which are normal. Actuarial judgment is a fine thing, but it is not uniformly distributed throughout the profession. The model reviewer may not have developed sufficient actuarial judgment, or the reviewer might not be an actuary.

Furthermore, controls are often formatted in such a way that it is difficult to read and interpret the data, and even more difficult to maintain sufficient focus to apply the necessary judgments. Some controls need their own controls!

To illustrate this, a specimen control is shown in Table 1 (below).

This is from a roll-forward of universal life account values in which each of the components is shown as a change from the prior period. Even though just looking at this makes my eyes start to cross, it’s clear that there is a lot of good information here, but it is difficult to tell what is what.

Table 1

Plan Code	Change COI	Change Load	Change Interest	Change AV on Surrender	Change AV on Death	Change Premium	Unallocated as % of Fund
1001	0.006	0.012	0.019	0.093	0.067	0.115	0.009
1002	0.015	0.013	0.024	0.077	0.000	0.050	0.007
1003	0.014	0.040	0.042	0.062	0.036	0.081	0.007
1004	0.022	0.039	0.027	0.006	0.060	0.017	0.017
1005	0.013	0.012	0.038	0.016	0.004	0.093	0.006
1006	0.004	0.023	0.034	0.013	0.072	0.009	0.015
1007	0.014	0.051	0.046	0.072	0.042	0.008	0.008
1008	0.004	0.051	0.039	0.086	0.033	0.032	0.008

Can we do better than subject model reviewers to such a painful exercise?

DATA VISUALIZATION ADDRESSES THE PROBLEM

The best controls provide immediate and effective feedback on potential model exceptions. Table 2 (below, top) is based on the data in Table 1. However, it presents the data in a binary manner—green for Exception and gray for No Exception.

Usually the simpler a control is, the more effective it becomes. Compare the ease of scanning the control in Table 2 with a more nuanced control similar in format, but with a *Consumer Reports*-style ranking shown in Table 3 (below, bottom).

Although this format provides more information than the green/gray format, it underperforms as a control because it is not as easy nor as efficient to scan.

The key to making such controls effective is understanding the normal range of results as well as what typically causes outliers. The model owner will need to articulate this understanding in such a way that the quantification of the range of normal results is possible. As an example, the model owner for the roll-forward model shown above may have determined through experience

that any unallocated amount of fund change greater than ± 2 percent of the fund is indicative of an outlier. On the green/gray control above, any unallocated amount more than ± 2 percent would show up as a green light.

Both the green/gray control and the *Consumer Reports*-style control were created in Excel, using conditional formatting.

SOME GENERAL RULES FOR VISUALIZATION IN CONTROLS

The difference in the efficiency between the two ranking controls above points us to some of the rules for data visualization controls. Since visualization is more of an art than a science, these rules are stated in general form. The practitioner must decide how these are best applied in any situation.

- Make controls as simple as possible, but as complex as necessary
 - Controls should provide only the information needed to determine the control decision
- Provide immediate indications of actuals versus expectations
- Emphasize the critical data
- Changes in output values are often more informative than either the beginning or ending values

Table 2

Plan Code	Overall Rank	Change COI	Change Load	Change Interest	Change AV on Surrender	Change AV on Death	Change Premium	Unallocated as % of Fund
1001	●	●	●	●	●	●	●	●
1002	●	●	●	●	●	●	●	●
1003	●	●	●	●	●	●	●	●
1004	●	●	●	●	●	●	●	●
1005	●	●	●	●	●	●	●	●
1006	●	●	●	●	●	●	●	●
1007	●	●	●	●	●	●	●	●
1008	●	●	●	●	●	●	●	●

Table 3

Plan Code	Overall Rank	Change COI	Change Load	Change Interest	Change AV on Surrender	Change AV on Death	Change Premium	Unallocated as % of Fund
1001	●	●	●	●	●	●	●	●
1002	●	●	●	●	●	●	●	●
1003	●	●	●	●	●	●	●	●
1004	●	●	●	●	●	●	●	●
1005	●	●	●	●	●	●	●	●

- Orient the data in the most user-friendly way
- Color draws the eye quicker than black and white
- Use a visualization style suitable to the purpose—for example:
 - Line graphs work well for trends
 - Bar charts work well for rankings
 - Maps work well for geographical data

The goal is to make the data visualization work as a process control chart—a tool that quickly tells the model reviewer whether results are outside of the boundaries of reasonableness.

Make controls as simple as possible, but as complex as necessary.

WHEN REASONABLENESS BOUNDS CANNOT BE EASILY ARTICULATED

In some instances, the modeler will have difficulty articulating what the bounds of reasonableness are for modeled items. This may be due to the multifactorial nature of the item, or it may be due to the nonlinearity of the item. It could be due to both the multifactorial nature and nonlinearity.

Whatever the reason for the difficulty, the modeler will usually only have a rough sense of how modeled values will emerge from the model.

A typical example of this sort of model item is the reserve per \$1,000 of in force that is often used as a control for valuation models. There are various forces that affect the reserve/\$1,000 for any particular valuation cell, including:

- Number of policies in the cell
- Amount of in force in the cell
- Type of benefit
- Premium paying pattern

So this is definitely a multifactorial item. In addition, the slope of reserves is usually nonlinear, adding to the difficulties in determining the bounds of reasonableness.

Not only is it hard for the model owner, it is also difficult for the auditor. The PCAOB has come down very hard on auditors for not giving sufficient scrutiny to this sort of control, and for not documenting their analysis of the effectiveness of the control. The following quote from Helen Munter, director of the Division of Registration and Inspections of the PCAOB emphasizes this point:

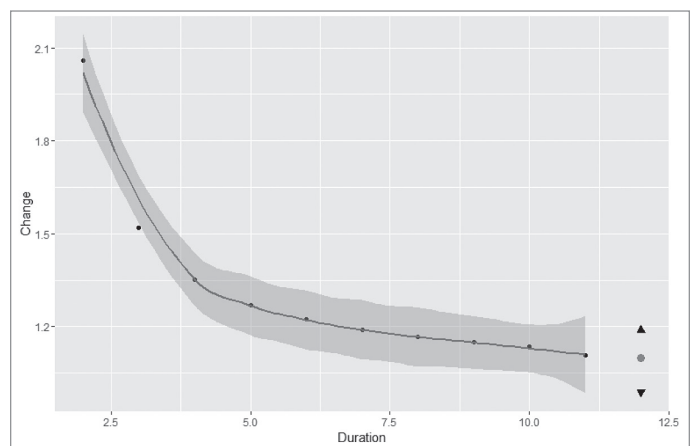
“Over the last few years, the audit of internal control has topped the list of deficiencies in the audit work we have reviewed.”³

When the required articulation is not possible, it is still possible to develop visualizations for the bounds of reasonableness. We require a general fitting method combined with predictions of the model item in question. Figure 1 shows one such approach.

In Figure 1, the dots in and around the shaded area are historical actual reserve change ratios. The line inside the shaded area is the curve fitted to the data. The shaded area is the fitted curve plus/minus one standard error.

This approach used loess regression (a nonlinear approach in which a series of polynomials is fitted to the data) for the first 11 policy durations, and a prediction interval for the 12th duration is given as the point estimate \pm one standard error. These bounds of reasonableness are shown as triangles, while the actual result is shown as a circle. In this example, we see that the actual result falls comfortably within the bounds of reasonableness.

Figure 1



It is possible to programmatically chart a series of such reserve progressions. It is also possible to export the results into a Red/Green indicator type spreadsheet in addition to (or in place of) charting the results as in Figure 1.

REVIEW AND SIGN-OFF CONTROLS

Review and sign-off controls are subject to several difficulties. Sometimes the sign-off form merely states that the model has been reviewed for reasonableness. (Occasionally there will be sign-off forms that merely assert that a review has been performed, but most companies seem to have realized the true value of this assertion.)

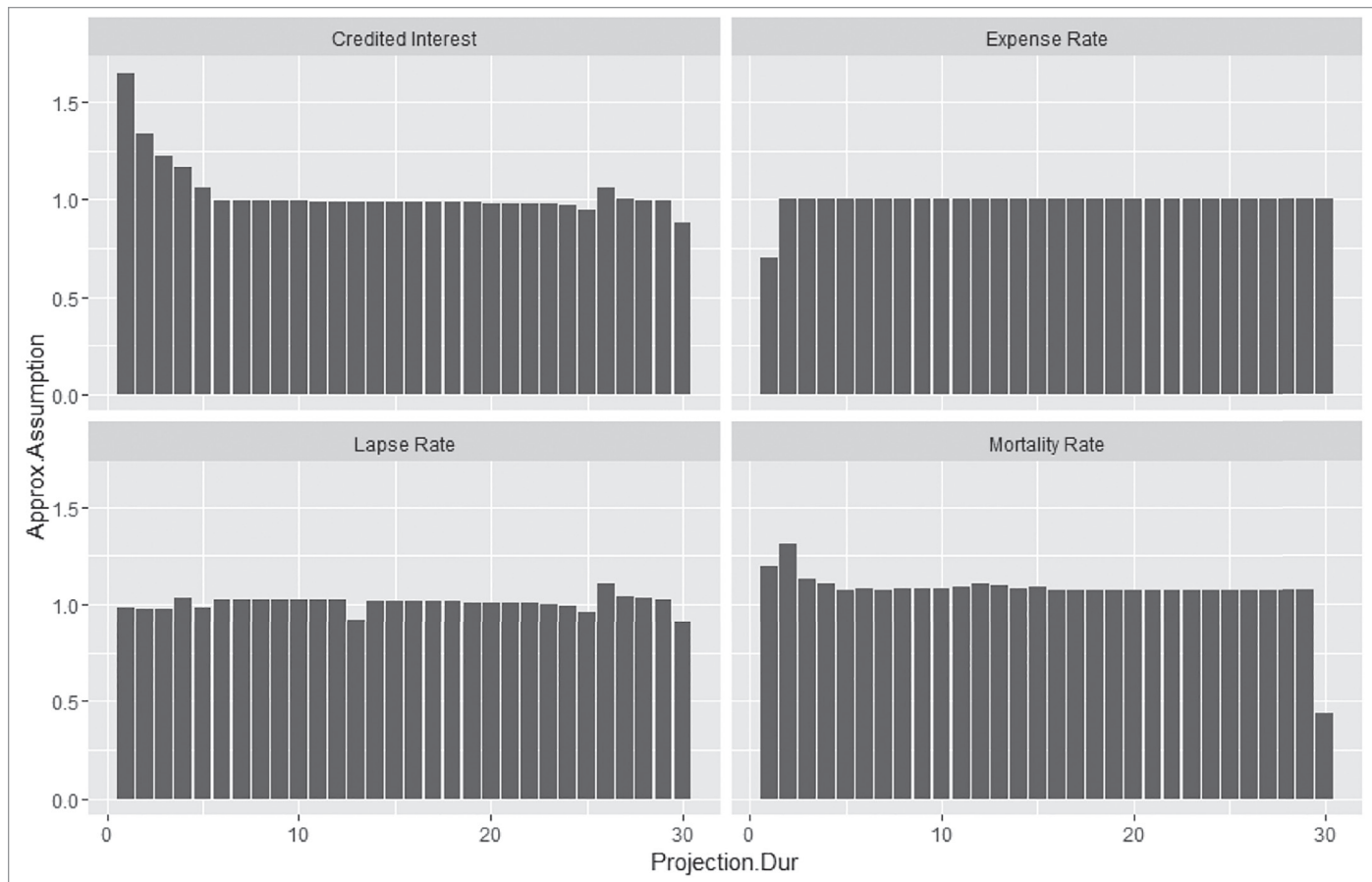
A simple assertion of reasonableness is troublesome from several aspects. The first is that it might not be clear precisely what model output has been scrutinized for reasonableness. It is possible that several items could be effectively reviewed for reasonableness, yet a critical model output might not be

Data visualization is limited mostly by our imaginations rather than our software capabilities.

scrutinized. Such an oversight could easily go undetected until there is a material model problem.

Another troubling aspect of such a review is that there is no definition of what constitutes reasonableness or of where the boundaries of reasonableness lie. If the reviewer has different judgments on reasonableness compared to the model designer or the model owner, then we should expect either false model exceptions or missed model exceptions.

Figure 2



A final difficulty with such a simple assertion is that if it is time sensitive, the depth and extent of the review could be subject to variability.

In order for a sign-off control to work uniformly, there needs to be a structure provided in which the review takes place. Often what is wanted in a reasonableness review is a review of the directional changes in model output compared to the directional changes in model assumptions. One way to address this is to put a visualization of the ratio of stated directional changes versus approximated directional changes into a quickly and easily assimilated visualization. The example in Figure 2 (pg. 21) shows the ratio of the documented assumption versus the approximation of the assumption calculated from model output.

In this visualization, the significant drivers of model output are shown together in order to ease the reviewer’s job. The reviewer

would need to decide if the early-duration and late-duration variations are true exceptions or if they are artifacts of the approximation methodology.

Another item that may be of interest is model composition such as in force by issue age or underwriting category. One way to quickly display such information is in an ordered bar chart such as Figure 3 (below).

For model control visualization, we can put together a historical series of charts for some selected number of past model cycles in order to provide an additional dimension to the visualization.

WHEN VISUALIZATIONS GO WRONG

One of the more popular forms of visualization found on many websites is the “mosaic plot.” A mosaic plot display of the information in the In Force Composition from above is shown as an example.

Figure 3

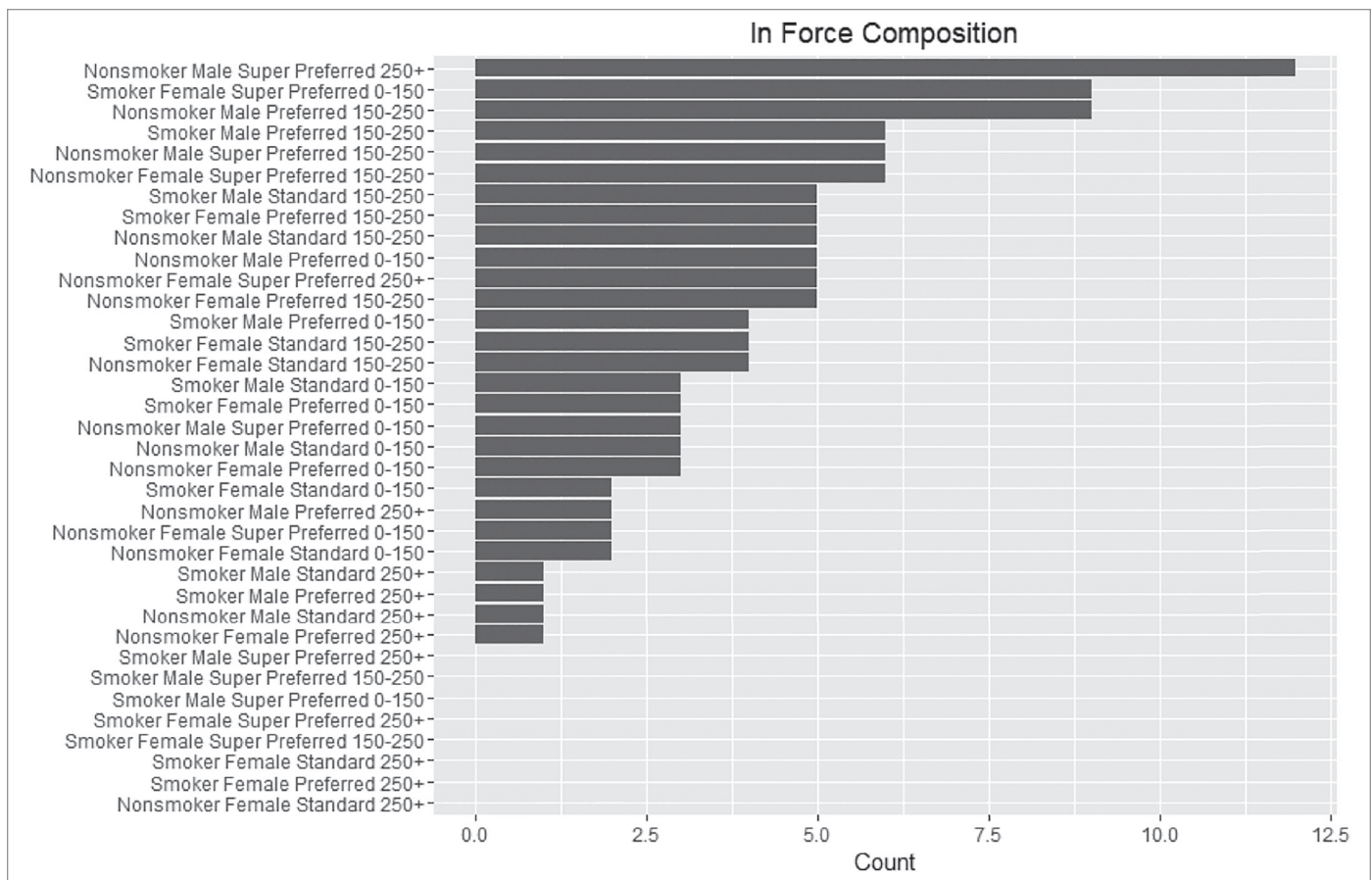
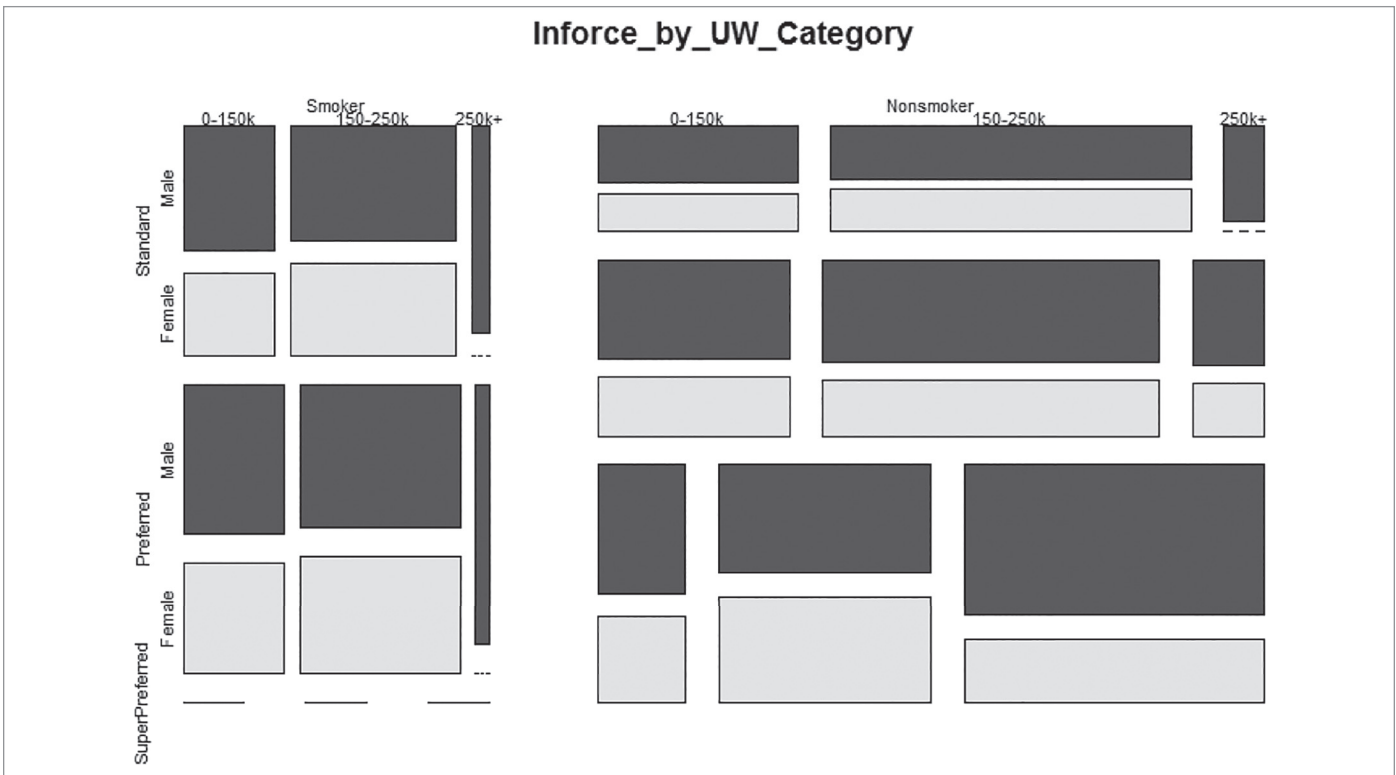


Figure 4



Mosaic plots are interesting and fun to look at, but they don't work as control visualizations. A brief scan of the visualization in Figure 4 shows that it is difficult to make quantitative comparisons between different segments, or even to quickly determine the largest segments of in force.

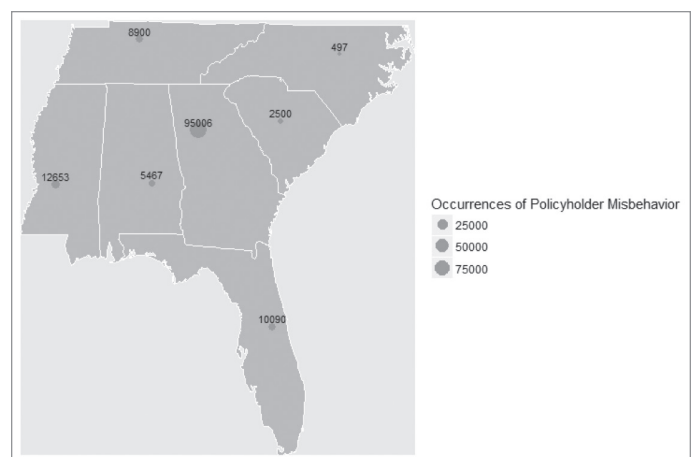
Cells with similar areas sometimes have markedly different dimensions—this issue is so profoundly non-intuitive that it is difficult to conceive of any situation in which a mosaic plot would make an effective visualization for a model control.

Just because we can create a visualization doesn't mean that we should create a visualization.

GEOGRAPHICAL DATA

Whenever a model creates output with a geographical component, maps become an option as a control item. A well designed map provides more information per pixel than almost any other visualization. In the hypothetical example given in Figure 5, I have shown a projection by state of the number of policyholder misbehaviors. Policyholder misbehavior is any activity that results in adverse results for the insurer. The visualization provides a quick relative comparison as well as providing precise information regarding the number of projected occurrences.

Figure 5



CONTROLS FOR WHEN THERE ARE NO BRIGHT LINES

In situations where we are not circumscribed by prescribed methodologies or assumptions, we might be interested in a "better/worse" comparison rather than "reasonable/unreasonable" comparison. Appraisal models and planning/budgeting models might fall into this category.

For such better/worse comparisons, a heat map might provide quick information regarding the relative performance of model output compared to some standard of expectation. Heat maps highlight worse results with “uncomfortable” colors while highlighting better results with “comfortable” colors.

In Table 4, a heat map is used to show how model output compares to projected historical trends.

Table 4

Item	2017	2018	2019
Premiums	3.3%	6.0%	9.3%
Death Benefits	-5.1%	-7.2%	-8.0%
Lapse Benefits	-6.2%	-8.7%	-11.7%
Expenses	20.8%	37.5%	61.5%

- Differs from trend by \pm 5%
- Differs from trend by \geq 5%, $<$ 10% absolute change
- Differs from trend by \geq 10% absolute change

This heat map was created in Excel, where conditional formatting makes such visualization easy.

There is an interesting issue hidden in the implicitness of numbers used to construct the heat map. The standard for Better and Worse was a linear trend line. Why did I choose a linear trend? Mainly for illustrative purposes. In real life, some nonlinear form of trending might be more appropriate, and might be a better reflection of what is reasonable.

In all of these examples, experience and a firm grasp on reality are important in setting the bounds of reasonableness. As Salvador Dali, the great surrealist, might have said:

“One person’s reasonableness is another person’s melting watch.”

CONCLUSION

Actuarial model controls are ripe for improvement. One way to greatly enhance the effectiveness of many controls is to include some form of visualization. Visualization can be done with spreadsheets, with R or with some form of commercial data visualization package. Data visualization is limited mostly by our imaginations rather than our software capabilities. Many other forms of visualization are possible and will no doubt come into practice as actuaries focus more on controls. ■



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ENDNOTES

- 1 From the document “Internal Control—Integrated Framework” on COSO’s website at http://www.coso.org/documents/990025P_Executive_Summary_final_may20_e.pdf.
- 2 The visualizations shown in this article were created using R software, except where noted differently.
- 3 <https://pcaobus.org/News/Speech/Pages/Munter-Audits-Internal-Control-IAG-09092015.aspx>

No-See-Ums (Part 2)

By Henry Siegel

In my September, 2015, article in *The Financial Reporter* I wrote about my problems with bugs you don't see until they bite you. It was based on my experiences in Belize. This November, prior to the International Actuarial Association (IAA) meeting in Capetown, South Africa, I visited Zimbabwe and Namibia. Namibia is a desert and so there were few bugs; Zimbabwe, on the other hand, had lots of them. I again spent three nights trying to sleep while bugs crawled on and bit me despite layers of mosquito netting over the bed. Ironically, at the same time the International Accounting Standards Board (IASB or the board), was making what it hoped to be a final attempt to remove some of the no-see-ums from their insurance contracts standard.

In my earlier article, I mentioned that the board had then settled on the variable fee approach for participating contracts. I predicted that once the industry had had a chance to review the proposal, it was likely that problems would emerge, particularly with respect to the scope of the policies to which the approach would apply. While that was one of the issues discussed at November's board meeting, the only meeting this quarter where it discussed insurance contracts, it was not the most significant. Other issues had emerged as the board worked with insurers to perform field tests of the proposed standard.

NOVEMBER IASB MEETING

Level of Aggregation

Problems with the level of allowable aggregation of contracts was one of the most important issues raised by the industry in the course of field testing the proposed standard. The Board had tentatively decided that you could only group contracts with similar profitability and similar risks, among other issues. The problem with such criteria is that there were many differing ideas as to what "similar" meant. Furthermore, the criteria were so different from current groupings that companies feared that they could have to measure liabilities based on hundreds, if not thousands, of newly defined groupings with separate assumptions for each.

The board's concern has been that companies would hide contracts issued at a loss by combining them with contracts with profits. A prime example of this would be issuing immediate annuities based on unisex pricing and not recognizing the loss



Zimbabwe at dusk

on females from such an approach. The board feels that the proper accounting for those annuities would be to recognize the loss (if there is one) on females immediately on issue while amortizing the profits on males over time.

While this situation was clear and could perhaps be justified, the vagueness of "similar" profitability made it possible that many more groupings could be required. For instance, if a product has a 2 percent profitability (measured somehow) at issue age 25 and a 5 percent profitability at issue age 50, are they similar enough to be combined?

After considerable discussion both prior to and during the meeting, the board tentatively decided to keep their definition of portfolio, i.e., that "a portfolio is a group of contracts subject to similar risks and managed together as a single pool."¹ Staff agreed to develop guidance stating that contracts within a product line, such as annuities or whole-life, would be expected to have similar risks, but that different product lines would not be expected in the same portfolio.

To deal with the problem of proliferating groupings, the board agreed that groups of contracts could be divided into three sub-groups: those expected to have a loss at issue, those that are at a material risk of producing losses if things develop unfavorably and those that have no such significant risk. It's not entirely clear how that distinction would be made, but staff is no doubt working on guidance. It's entirely possible that entities will decide to have only one or possibly two (if there is a subset that shows a loss at issue) such groupings for a product. For instance, the company may decide that all policies are at risk of becoming loss making and therefore group all of them together.

The board also agreed that issues of more than a single calendar year should not be grouped together.

These decisions, while a definite improvement on the previous positions, still are likely to cause a material increase in the number of groupings an entity will need to keep track of. There is still considerable vagueness in the requirements and actuarial practice will need to develop over time to produce a reasonable process.

Experience Adjustments

Another problem that became evident during field testing is how to handle the effects of changes in assumptions under the general model. The board had previously decided that part of the effect should be recognized in the contractual service margin (CSM) and part in profit and loss. To simplify the adjustment, the board concluded that all the direct effects of the change should be recognized in profit and loss rather than in the CSM. Staff will draft guidance on the precise meaning of “direct effect.”

For contracts accounted for using the variable fee approach, the board decided that experience adjustments from non-financial risks should also be shown in profit and loss.



Flying high over the desert

Transition Issues

The industry expects transition to be a major undertaking costing many millions of dollars. In particular, the board’s preference for a retrospective approach could in many cases cause significant issues having to do with data availability and reliability. Since the groupings of contracts is likely to be much finer than under previous standards, even after the board’s improvements discussed above, the required historical data may often not be available. This is particularly true for contracts issued more than seven or eight years previously.

Recognizing this, the board had allowed an alternative simplified retrospective approach to be used, but it appeared that entities would have to prove that a full retrospective approach was impractical before moving to the simplified approach. Even this approach might be impractical in some situations so the board allowed a fair value approach, again, requiring proof that it was necessary.

After discussing the issue further, the board allowed that the entity could decide to move to either a modified retro approach or a fair value approach without necessarily demonstrating that the modified approach was impossible in order to use the fair value approach.

For the fair value approach, the board agreed that the calculation could be at the inception of the contract or at the beginning of the first year presented. They also agreed that, for transition, contracts could be grouped over more than one year and could use an initial discount rate from the beginning of the period being shown rather than going all the way back to the initial issue.

Despite these changes, transition will still be a difficult and expensive process, but probably unavoidably so.

Transition Disclosures

The board decided that disclosures relating to the contractual service margin, insurance contract revenue, and insurance finance income or expense should be shown separately for insurance contracts that existed at the beginning of the earliest period presented and insurance contracts written after the beginning of the earliest period presented. This would allow users to better understand where the effects of transition estimates might have had an effect on the starting values.

Risk Mitigation

The board agreed to permit an entity that uses a derivative to mitigate financial risks arising from an insurance contract accounted for using the variable fee approach, such as an annuity with a Guaranteed Minimum Withdrawal Benefit or other types of benefit guarantees, to offset the movement in the derivative against the movement in the guaranteed benefits in profit



It's not easy being tall

and loss. This should produce a more meaningful result in the accounting.

Other Issues

There were a number of other sweep issues raised during the meeting. Most of these were clarifications to wording in the draft standard, but a few could be important to certain contracts. Details can be found in Board Paper 2G.² The recommendations in this paper were adopted without change at the meeting.

Mandatory Adoption Date

The board decided that the mandatory adoption for International Financial Reporting Standard (IFRS) 17 on Insurance Contracts should be for **annual periods beginning on or after Jan. 1, 2021**, assuming IFRS 17 is issued in the first half of 2017.

They did not state what would happen if the issue date is after the first half of 2017. Entities can adopt earlier if they also adopt IFRS 9 (Financial Instruments) and IFRS 15 (Revenue) at the same time.

Overall, I think all these changes are a big help, but I'm not convinced that all the bugs have been found. As was true with our bed in the jungle, just because you eliminate the bugs one night, others have a way of finding their way in the next night.

My hope is that the board will now recognize the need for a transition advisory group to help with issues that have not been identified during the field testing process. The membership of the group should be at least one-third actuaries (plus one-third accountants and one-third financial statement users) from many different jurisdictions. Given the actuarial nature of most of the calculations that are required, this only makes sense. Remember,

Insurance Accounting is too important to be left to the accountants!



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ENDNOTES

- 1 IASB Update, November 2016, <https://s3.amazonaws.com/ifrswebcontent/2016/IASB/November/IASB-November-Update-2016.html#6>
- 2 The board paper can be found at: <http://www.ifrs.org/Meetings/MeetingDocs/IASB/2016/November/AP02G-Insurance-Contracts.pdf>

PBA Corner

By Karen Rudolph

The views expressed in this article are those of the author and do not necessarily reflect the views of Milliman nor are they intended as methods of regulatory or tax compliance.

MORTALITY AND PRINCIPLE-BASED RESERVING SURVEY

In October 2016, the Society of Actuaries published a report highlighting the results of a survey on mortality and other implications of principle-based reserves (PBR). This report was the second of a survey initially conducted and published in June 2015. The survey was the work product of the following two committees, which are referred to in this article as the joint committee:

- The Society of Actuaries’ Committee on Life Insurance Mortality and Underwriting Surveys; and
- The National Association of Insurance Commissioners (NAIC) Principle-Based Reserving Implementation (EX) Task Force

The survey was conducted in July of 2016, with results published in the October 2016 report. This report provides an overview of the industry’s plans for mortality table and PBR implementation. This article highlights some of the key observations and findings of the survey. The reader is directed to the survey report¹ for additional details of the survey outcomes.

CHARACTERISTICS OF THE RESPONDING COMPANIES AND IMPLEMENTATION PLANS

The joint committee initially preformed an outreach to companies known to be currently selling either term or universal life with secondary guarantee (ULSG) products. The initial outreach resulted in 72 companies identifying themselves as potential survey candidates. Of these 72 companies, 15 confirmed they would be valuing one or more policies issued during calendar year 2017 under VM-20. The VM-20 specific questions of the survey were then completed by these 15 companies.

The most frequent reason given for *not* implementing VM-20 valuations for 2017 issues was the company’s use of the three-year transition period. Tied for second place: the company-wide exemption and the uncertainty surrounding the impact to tax basis reserves.

Within the 15 company group we fast-forward to year-end 2017. Companies were asked what product types they will be valuing under VM-20. The answers are summarized in Table 1.

Table 1

	Number of Companies
Only Term Insurance	10
Only ULSG	1
Only Universal Life	1
ULSG & Universal Life	2
Both Term & ULSG	1
Total	15

As a point of reference, companies were asked to estimate the average in force policy amount for policies within these product types. For companies intending to value policies under PBR beginning in 2017, there is an even distribution of estimated policy sizes ranging from under \$200,000 to more than \$500,000.

2017 CSO IMPLEMENTATION PLANS

For this aspect of the survey, responses from the larger set of 72 companies is provided. Companies were asked, “given the availability of the 2017 CSO for issues beginning in 2017, what are their implementation plans for valuation and nonforfeiture?” The responses are summarized in Table 2.

Table 2

	Policies Issued in 2017 to Use the 2017 CSO Mortality Table		
	For Statutory Valuation	For Minimum Cash values	Develop and file updated forms and policy values with the IIPRC in 2017
Yes	32 (44%)	19 (26%)	24 (33%)
No	27 (38%)	39 (54%)	34 (47%)
Don’t Know	13 (18%)	14 (19%)	14 (19%)
Total	72 (100%)	72 (100%)	72 (100%)

Companies answering “No” or “Don’t Know” to these questions will eventually need to move newly issued policies to the 2017 CSO valuation basis for issues of 2020 and later.

USE OF CAPTIVE REINSURANCE AGREEMENTS

Continued use of captive reinsurance arrangements was the subject of one survey question. Fifteen companies indicated



plans to cede life business of any type on or after Jan. 1, 2017, under an existing or a new captive. Most of this business will be term insurance where the policies are valued under formulaic or Model Regulation 830 (XXX) statutory methods, and only a small portion valued under VM-20. For ULSG, there was a similar outcome, but smaller numbers of respondents: three companies in total with 2017 captive arrangements with only one of these valuing according to VM-20.

COMPANY EXPERIENCE STUDIES AND USE OF COMPANY MORTALITY EXPERIENCE

This portion of the survey was completed by the 15 companies indicating their implementation of VM-20 for at least some 2017 issues.

Not surprisingly, responses were nearly unanimous with respect to regularly updated experience studies. All 15 companies reported having mortality, lapse without cash value, and company expense studies periodically updated. The category of “surrender with cash value” was available for 12 of the 15 companies. It is possible that for the three companies falling short on this type of experience study, the product being moved to VM-20 valuations is term insurance and would have no need for a surrender with cash value assumption.

With respect to mortality experience in particular, the survey queried respondents on three additional topics:

- i. Reflecting company experience in modeled reserve calculations per VM-20;
- ii. Credibility of mortality experience; and
- iii. Use of the Relative Risk Tool (RR Tool).

Within the 15 companies that will be valuing products under VM-20 beginning in calendar year 2017, all companies expect to use credible company mortality experience in developing the prudent estimate mortality assumption. For these companies,

the mortality experience analysis is performed no less frequently than every three years, and annually for most respondents. Where an industry experience table is needed, the 2015 VBT will be used. This table selection is consistent with the requirements of VM-20 for policies valued as of 2017.

Of the two credibility methods, Bühlmann and Limited Fluctuation, neither was heavily favored over the other for companies expecting to value products under VM-20 in 2017. For term, the split was 11 companies using Limited Fluctuation versus eight companies using Bühlmann. For ULSG, the split was one company using Limited Fluctuation and two companies using Bühlmann.

Surprisingly, there was a very broad range in the number of mortality segments being considered. This is summarized in Table 3.

Table 3

Product Category	Number of Mortality Segments					Number Responding
	1	2	4	10	12	
Term	1	0	3	1	3	8
ULSG	0	1	0	1	0	2

The process of mapping a company’s risk classes to industry mortality tables can be facilitated by the Underwriting Criteria Score Calculator, now referred to as the RR Tool. The survey asked how companies plan to use the RR Tool. Responses came from 13 of the 15 companies as follows:

- three will exclusively use the RR Tool;
- one will use an alternative *partly* based on the RR Tool; and
- nine will use an alternative method *not* based on the RR Tool.

The RR Tool has been improved and updated recently, but it may be that underwriting advances are simply outpacing the ability of such a tool to keep up.

USE OF EXCLUSION TESTS

This portion of the survey was complicated by the timing of the requirement for calculating the Deterministic Reserve for all policies in the term product group. The revision was inserted to VM-20 shortly before the survey was distributed to companies. The survey asked for company expectations with respect to exclusion testing for the products being valued under VM-20 for 2017 issues—both deterministic exclusion test (DET) and stochastic exclusion test (SET). Of 24 responses for term insurance, 17 of these would expect the product group to pass the DET if such test were allowed for that product type. Only two responded that the product group would pass the SET. And

no company expected to pass both tests. This seems unbalanced since the first gatekeeper is the SET. The report later asks for the type of SET expected to be utilized. For term insurance, the demonstration test is most popular with the ratio and certification test options being next.

For ULSG, of the four companies valuing 2017 issues under VM-20, none expect to pass the SET, and ULSG is not a candidate for the DET, unless the secondary guarantee provision meets the definition of non-material secondary guarantee. Only one company responded with the type of test they expect to use: the demonstration test. It is likely that a company not expecting to pass the SET would not go to the trouble of applying any of the tests, but rather move to a comprehensive calculation of principle-based reserves for the ULSG product group.

REINSURANCE; SIMPLIFICATIONS; SCENARIOS; AGGREGATION

Reinsurance will be a part of the VM-20 valuation for these companies. Most companies moving to VM-20 for 2017 issues have (or plan to have) at least one reinsurance agreement in place and some have several agreements. This is true for both term and ULSG.

About half of the companies valuing products under VM-20 for 2017 issues will use simplifications, approximations and modeling efficiency techniques in their valuations.

Responses to the question regarding the number of scenarios a company expects to use for the stochastic reserves for each product type were provided by seven of the 15 companies with plans to value under VM-20 in 2017. For term insurance of all types, the responses were either one scenario or 1000 scenarios. Since there was no follow-up taken on survey responses, it is difficult to know how a single scenario set will be used for determining stochastic reserves.

For ULSG, three of the four companies responded to this question; one expects to use a 200 scenario set, and the other two companies expect to use 1000 scenarios for the stochastic reserve. Clearly, scenario reduction techniques will play a part in VM-20 valuations.

At the outset of the survey in 2016, aggregation across product groups was still an option, but weeks before the survey was distributed, VM-20 was revised to prohibit aggregation of term and ULSG product groups. Responses to the aggregation question are influenced by this development as well as the fact that most companies plan to value only one product type under VM-20 initially. Given the timelines of companies with respect to moving products to VM-20, the three-year transition period, and the prohibition in VM-20 on aggregating across the three

KEY OBSERVATIONS

Of 72 companies issuing product types falling into the term and ULSG product groups, 15 companies (21 percent) anticipate valuing the 2017 issues of these policies under VM-20.

Early implementers of VM-20 valuations are doing so primarily for term insurance with a broad range of face amounts.

For policies issued in 2017, far more companies are adopting the 2017 CSO valuation mortality table as a result of its availability through the Valuation Manual than are implementing VM-20 valuations. The use of the 2017 CSO for nonforfeiture value determination will lag.

At least for 2017, captive reinsurance arrangements will continue to be a part of some company's strategic plans.

Companies planning to implement VM-20 for 2017 issues appear to be adequately prepared with experience study data to facilitate assumption-setting.

Companies planning to implement VM-20 for 2017 issues will be using credible company mortality experience from studies updated on a regular basis. Where industry tables are required, most of these companies intend to use a method other than the RR Tool for mapping underwriting classes to industry tables.

Of companies planning to value 2017 issues under VM-20, term product groups would be expected to pass the DET, if allowed. ULSG product groups would not be expected to pass either the SET or DET. The demonstration test is favored by these companies over the ratio test or certification test options.

product groups of term, ULSG, and all other, the impacts of aggregation will not be observable for many years from the Valuation Manual operative date. ■



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ENDNOTES

- <https://www.soa.org/Research/Experience-Study/Bus-Practice-Surveys/2016-mortality-implications-pbr-survey-part2.aspx>

Financial Reporting Research Update

By Jim Hawke and Ronora Stryker

Research is a primary mission of the Financial Reporting Section and a significant use of our section dues revenue. Here is an update, as of Dec. 19, 2016, on projects in process, on the horizon, and recently completed.

ON THE HORIZON

Impact of Targeted Changes to US GAAP—In 2017 the council expects to move forward with a project to look at how companies will address the various new requirements.

Expansion of the 2015 report on Earnings Emergence Under Multiple Financial Reporting Bases to examine additional products is still being considered. The original report looked at deferred annuities and term life insurance.

CURRENTLY IN PROCESS

PBA Change Attribution Analysis—This project will study the drivers of change in principle-based reserves. The project oversight group has selected a researcher and work is in the early project stage.

Simplified methods for principle-based reserve calculations—The project oversight group has selected the researcher and work is in the middle project stage.

Modern Deterministic Scenarios—A review of possible deterministic scenario sets which could be useful to company management, regulators, and rating agencies under PBA. This project is in the late stages and we anticipate publication very soon.

Nested Modeling—A company survey on the use of nested stochastic modeling and an analysis of techniques to reduce run time and improve the efficiency of nested simulations has been

completed and is in the publication stages now. A session at the Annual Meeting was devoted to this and we anticipate publication very soon.

COMPLETED IN 2015 AND 2016

PBA Implementation Guide Update and PBA Beginning Tales: <https://www.soa.org/Research/Research-Projects/Life-Insurance/research-2013-pba-implementation-guide.aspx>

Retention Management: <https://www.soa.org/Research/Research-Projects/Life-Insurance/research-quantitative-retention.aspx>

Predictive Analytics Call for Papers: <https://www.soa.org/News-and-Publications/Publications/Essays/2016-predictive-analytics.aspx>

Transition from Low to High Interest Rates: <http://www.soa.org/Research/Research-Projects/Life-Insurance/research-2015-rising-interest-rate.aspx>

Multiple Measurement Bases: <http://www.soa.org/Research/Research-Projects/Life-Insurance/2015-earnings-emergence.aspx>

VBT/CSO Impact Study: <http://www.soa.org/Research/Research-Projects/Life-Insurance/research-cso-impact-study.aspx>

Tail risk/correlation of risk primer: <http://www.soa.org/Research/Research-Projects/Life-Insurance/2015-extreme-events-for-insurers.aspx>

Many of these projects were co-sponsored with other sections and organizations. Please visit the SOA research website for more information, or contact Jim Hawke or Ronora Stryker. ■



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