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SECTION**

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## Chairperson's Corner

# Busy Times

By Jim Hawke

**M**y first two years serving on the section council have been very busy and appropriately rewarding. I am pleased to step in as chairperson this year following the very able leadership of Leonard Mangini. The green jacket passes on again ...

This quarter we have three council members whose terms are ending, and those of us carrying on want to thank them for their contributions over the years 2013–2016. David Weinsier, Michael McDonald, and Michael Schmuker are leaving the council and we welcome our three newly elected members: Katie Cantor, Steve Finn and Simpa Baiye. From their biographies in the election materials you will have seen the strengths they bring to the council. Congratulations to these three, and welcome! I am really excited about the contributions they will make over the coming years.

We will decide who will work on what at our face-to-face meeting during the SOA Annual Meeting in October; however, based on conversations I have had with continuing and incoming council members I believe the council transition will be seamless and our service to you will be uninterrupted!

Michael Fruchter continues as the very capable editor of this newsletter and many thanks to him and his Associate Editors Marc Whinston and Aisling Metcalfe for their continuing service. I have always valued *The Financial Reporter* as one of the key

sources of information for an actuary practicing in the financial reporting arena. I hope you enjoy the content again this quarter. Kerry Krantz has also agreed to continue as our website coordinator and we thank him as well.

This quarter the section has completed its series of 2016 webcasts (focus on PBR), hosted many sessions at the annual meeting in Las Vegas, and sponsored several research projects which we hope you find useful. In the coming year we plan to continue all these activities. We revived the GAAP seminar this year with a very well-received event following the Life and Annuity Symposium, and are considering making this an annual event. We also co-sponsored the Economic Balance Sheet seminar, which will continue in 2017. Work continues on the new IFRS textbook, with likely publication early in 2018. Many thanks to co-editors Tom Herget and Jim Milholland for their untiring work on bringing this to fruition! A new edition of the GAAP textbook will also soon be in order and planning will begin for that. I hope you are pleased with our work, and encourage you to let us know if you see under-served areas which might need our attention. ■



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# PBR: What will Regulators be Looking for?

By Andy Rarus, Leslie Jones, Tim Cardinal and Len Mangini

**P**rinciple-based reserving (PBR) has finally arrived, at least for life products. As of June 2016, 45 states, representing 79.5 percent of premium, had adopted the revisions to the Standard Valuation Law (SVL) that are “substantially similar” to the revisions to the SVL adopted by the NAIC making Jan. 1, 2017 the operative date of the Valuation Manual. Are you and your company ready for all the new PBR reporting requirements? Do you know in which areas regulators will be concentrating? In this article, Tim Cardinal and Len Mangini discuss regulatory oversight of PBR with two former regulators, Andy Rarus and Leslie Jones, in the hopes that this may give you some insight into areas in which your company should be preparing for these new requirements.

**Tim: We have heard a lot of talk about centralized review of PBR submissions. What has happened with that? Will the NAIC or states be responsible for monitoring compliance with PBR?**

**Andy:** As it currently stands, an insurer’s domestic state regulator will have primary responsibility for monitoring compliance with PBR requirements. However, the NAIC is developing a variety of resources to help states in this effort.

**Tim: How will states monitor compliance with PBR?**

**Leslie:** States monitor compliance with reserving standards, including PBR, via annual and quarterly reporting, ongoing analysis and periodic examinations.

**Tim: What new reporting standards are applicable to PBR?**

**Andy:** New reporting standards applicable to PBR include: 1) the PBR actuarial report required by Valuation Manual chapter 31 (VM-31), which documents the deterministic and stochastic exclusion tests, all company experience assumptions and margins, as well as the procedures and processes used to calculate the reserves; 2) several new reporting items in the annual statement blank, including a new supplement referred to as the VM-20 Reserve Supplement, which breaks out the principle-based reserve into its various components on a pre-reinsurance and

post reinsurance basis; 3) new experience reporting requirements and formats set forth in VM-50 and VM-51; and 4) reports under VM-G related to corporate governance, including the certification of the effectiveness of internal controls with respect to the principle-based calculation.

**Tim: What will states be looking for in performing analyses of PBR?**

**Leslie:** Analysis standards are still under development by the NAIC via the PBR Review Procedures Subgroup. However, analysts will be reviewing the VM-31 actuarial report and the VM-20 Reserve Supplement to assess whether the reserves appear to be valued in accordance with the requirements of VM-20. The analyst may seek the assistance of actuarial staff at the NAIC related to any verification of exclusion test calculations as well as validation of principle-based reserves for a small random sample of policies and contracts subject to a principle-based valuation methodology.

It is reasonable to expect that regulators will be focused on the methods used to determine anticipated experience assumptions and margins for each major risk factor, including how the risk factors were determined to be material, the degree to which assumptions are based on experience versus actuarial judgment or other factors, the results of actual to expected analyses, any sensitivity testing, the individual and aggregate impact of margins on the deterministic reserve, and how the assumptions and methods compare to the company’s overall risk assessment process. Regulators will also likely be focused on required information related to the cash flow models used by the company, including validation of those models. It is important to note that VM-31 contains many detailed disclosure requirements which are peppered with the words rationale, description, support, and justification. The more adequate the documentation, the less likely it is that regulators will have questions. Here is a link to the Valuation Manual that will be in effect on Jan. 1, 2017, which includes VM-31: [http://www.naic.org/documents/committees\\_a\\_latf\\_related\\_valuation\\_manual\\_noapf\\_160829.pdf](http://www.naic.org/documents/committees_a_latf_related_valuation_manual_noapf_160829.pdf)

**Tim: Is “adequate” in the eye of the beholder? How do I know if a regulator will accept my documentation as adequate?**

**Leslie:** I think the regulatory view of what is adequate will evolve over time. In the meantime, the actuary should be guided by the requirements in VM-31 and the pending PBR Actuarial Standard of Practice (ASOP). VM-31 states that the PBR Actuarial Report must include documentation and disclosure sufficient for another actuary qualified in the same practice area to evaluate the work. It requires the report to include descriptions of all material decisions made and information used by the company in complying with the minimum reserve

requirements. Transparency beyond disclosure, is evident throughout the requirements. VM-31 emphasizes this in requiring the summary to include any considerations helpful or necessary to understanding the rationale behind the development of assumptions and margins even if such considerations are not explicitly mentioned in the Valuation Manual. The PBR ASOP adds that “the actuary should include the rationale for all significant decisions made and information used by the insurer in complying with the minimum reserve requirements and in compliance with the minimum documentation and reporting requirements set forth in the Valuation Manual with respect to the PBR actuarial report.”

**Tim: What will states be looking for with respect to PBR during examinations?**

**Andy:** Examination standards are also under development by the NAIC via the PBR Review Procedures Subgroup. However, it is reasonable to expect that the standards developed will be consistent with a risk focused approach and will focus on areas where the residual risk is deemed to be material after the company’s controls have been taken into account. Initially, states will likely be focused on an insurer’s readiness to implement PBR. Examiners will be reviewing plans, procedures, systems, enterprise risk management and corporate governance around PBR development. The SOA published a revised version of the *PBA Implementation Guide* to assist companies in this effort. Even if a company has decided to delay implementation, it is important for a company to perform a “gap analysis” and construct a “road map” to implement PBR.<sup>1</sup>

Here are some areas from this PBA Implementation Guide that you may want to consider:

- Has your company made any changes to current processes to enable tracking of all assumption changes, other than mortality and lapses?
- Has your company created controls to aid with the auditability of all following processes: assumption and margin setting, exclusion tests, sensitivity testing, and disclosures?
- Do you have audit procedures and tools to identify areas of material risk and potential weak spots in your company’s models and assumptions?
- Given the volatile nature of the stochastic and deterministic reserves, has your company revised the breadth and depth of output to support analysis to validate, interpret, explain, and evaluate results?

Once companies have implemented PBR, areas where residual risks will likely be deemed material include the company’s end-to-end process for monitoring experience, setting assump-

tions and margins, and the modeling performed by the company, including data input, projection system, model validation, sensitivity testing, model documentation and change control procedures. Examiners will likely perform a detailed analysis of deterministic and stochastic reserve calculations as a part of the model validation process. Corporate governance is also generally reviewed during examinations. VM-G describes the procedures you should have in place with respect to corporate governance and oversight of PBR valuations, including assumption oversight and model risk controls.

**Tim: How much detail regarding validation needs to be provided in the Report?**

**Andy:** VM-31 requires a description of the approach used to validate model calculations within each model segment for both the deterministic and stochastic models, including how the model was evaluated for appropriateness and applicability, how the model results compare with actual historical experience, what (if any) risks are not included in the model, the extent to which correlation of different risks is reflected in the margins, and any material limitations of the model.

**Len: I haven’t heard you mention professional standards in this discussion. How do states take applicable Actuarial Standards of Practice into account in the regulatory oversight process?**

**Leslie:** As a general rule, regulators expect actuaries to comply with applicable Actuarial Standards of Practice (ASOPs). In the case of PBR, the VM includes several specific references to compliance with ASOPs. For example, VM-20 requires companies to design and use a cash flow model that complies with applicable ASOPs. And, of course, the SVL requires the actuarial opinion and memorandum to be based on standards developed by the Actuarial Standards Board. So, the regulators have specific statutory authority to enforce the actuarial standards. It is my experience that regulators look to the profession to self-police. However, in the case of PBR, I would expect to see additional regulatory scrutiny with respect to compliance with applicable ASOPs. I would therefore encourage actuaries to review existing standards that may be applicable to PBR and to become familiar with the new standards that will be applicable to PBR, such as the new PBR ASOP that is expected to become effective contemporaneously with the operative date of the VM and the new modeling ASOP, which has been exposed for a third time. Here are the links to the latest drafts of the PBR ASOP, the related practice note and the modeling ASOP:

- PBR ASOP: <http://www.actuarialstandardsboard.org/drafts/pending-drafts-2/>
- VM-20 Practice Note: [https://www.actuary.org/files/VM-20\\_Practice\\_Note\\_Exposure\\_Draft\\_2-24-14.pdf](https://www.actuary.org/files/VM-20_Practice_Note_Exposure_Draft_2-24-14.pdf)

- Modeling ASOP: <http://www.actuarialstandardsboard.org/asops/modeling-2/>

**Len:** The ACLI and the Academy Work Group on the Role of the Actuary presented separate Amendment Proposal Forms (APFs) to clarify the role of the qualified actuary in VM-G. Could you describe what was actually passed?

**Leslie:** The various APFs were debated by the NAIC's Life Actuarial Task Force (LATF), combined into one APF that passed and is now part of the Valuation Manual. A short synopsis of how VM-G defines the role of various parties in PBR governance is:

- Company: Ultimately responsible for assumptions, margins, and adequate reserves;
- Board: Establishes processes and oversight;
- Senior management: Responsible for implementation, maintaining adequate infrastructure (resources, staffing, training, budget), and quality (controls, assumptions and models, reserve adequacy);
- Qualified actuary: Responsible for overseeing the PBR reserve calculations for assigned groups of policies; verifies appropriateness of assumptions, methods, models; certifies (VM-31) that assumptions are prudent best estimates; and
- Appointed actuary (per VM-30): Opines on adequacy of reserves produced.

**Len:** You also mentioned new experience reporting requirements and formats set forth in VM-50 and VM-51. How do these fit into the regulatory oversight of PBR?

**Andy:** One of the primary differences between the current statutory reserving framework and PBR is that a company may establish assumptions (that are not prescribed) using the company's available experience to the extent it is relevant and statistically credible, or, to the extent it is not, other relevant statistically credible experience. Thus, the regulatory need to collect experience data is at least two-fold. First, the data will be used to verify and validate the assumptions used by the company, and second it will be used to construct industry experience tables to assist companies who do not have sufficient relevant statistically credible experience on which to base assumptions. The NAIC is actively working on a regulatory data collection system so that it can perform this function on behalf of the states. It is important to note that even if a company decides to delay implementation of PBR, the experience reporting requirements are not delayed. So, companies that do not meet the standards for exemption set forth in VM-50 need to be prepared to submit experience data in the format required by VM-51.

**Tim:** You noted that the NAIC is developing a variety of resources to help states. It appears that acting as the statistical agent is one of these. Will the NAIC also be assisting states in monitoring compliance with PBR? And, if so, how will it assist?

**Leslie:** The NAIC has undertaken the following tasks related to creating a reporting and regulatory review process under direction of the NAIC PBR Implementation (EX) Task Force (PBRITF):

- A "PBR Pilot Project" where participating companies calculate PBR reserves for their product(s), complete the VM-20 Reserve Supplement and complete a VM-31 Actuarial Report. State regulators and LATF will review all of the results of the pilot project and determine if any modifications or clarifications need to be made to VM-20, the VM-20 Supplement and the VM-31 Actuarial Reporting requirements. Regulator-only calls will be conducted to aid in training regulators, honing review procedures, and identifying needs to clarify communication between regulators and insurers.
- The PBR Review (EX) Working Group is coordinating the development of financial analysis, examination and actuarial review procedures and evaluating NAIC and state insurance department actuarial staff resource requirements.
- Peer and quality reviews of PBR will be conducted by the new Valuation Analysis (E) Working Group (VAWG). The VAWG will operate in a manner similar to the Financial Analysis (E) Working Group, working collaboratively with state insurance regulators, responding to issues and questions, and recommending PBR requirements and interpretations.
- To assist states in reviewing company PBR reserve calculations, the NAIC has purchased a modeling software package and is in the process of hiring two additional actuaries.

**Tim:** It appears that the standards related to regulatory oversight are still under development and, of course, the valuation manual is a "living document" and is expected to change over time. How can insurers keep up with the developing standards?

**Andy:** Here are links to the home pages of the NAIC groups actively involved with PBR implementation that may help:

- PBRITF: [http://www.naic.org/cmte\\_ex\\_pbr\\_implementation\\_tf.htm](http://www.naic.org/cmte_ex_pbr_implementation_tf.htm)
- PBR Review Working Group: [http://www.naic.org/cmte\\_ex\\_pbr\\_rev\\_wg.htm](http://www.naic.org/cmte_ex_pbr_rev_wg.htm)

- PBR Review Procedures Subgroup: [http://www.naic.org/cmte\\_ex\\_pbr\\_review\\_procedures\\_sg.htm](http://www.naic.org/cmte_ex_pbr_review_procedures_sg.htm)
- LATF: [http://www.naic.org/cmte\\_a\\_latf.htm](http://www.naic.org/cmte_a_latf.htm)

**Tim: VM gives regulators authority to “push back” in a number of areas—how might that be exercised? For example, what if assumptions/margins are deemed aggressive?**

**Leslie:** The SVL provides that the commissioner may engage a qualified actuary to perform an actuarial examination of the company and opine on the appropriateness of any reserve method or assumption used by the company. The commissioner may require a company to change any assumption or method that in the opinion of the commissioner is necessary to comply with the VM or the SVL. The commissioner may take other disciplinary action as permitted pursuant to applicable statutes. ■

#### ENDNOTES

- 1 *PBA Implementation Guide, Steps to Construct a High-Level Implementation Plan, October 2013, revised June 2016, Society of Actuaries.* <https://www.soa.org/Research/Research-Projects/Life-Insurance/research-2013-pba-implementation-guide.aspx>



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# A New Method to Derive PBA Prudent Estimate Assumptions from Company Experience

By Kai Kaufhold

With the introduction of a principle-based approach (PBA) to valuation, actuaries in a financial reporting role have inadvertently also become risk managers. PBA valuation is based on the premise that reserves have to reflect the riskiness of the business. What might appear to be a scary proposition also bears within it the potential to open up a whole new and exciting field of work and the ability to integrate the tools used in finance, risk management and even product development into a holistic view of life insurance business. The level of detail which NAIC's Valuation Manual 20 prescribes in the derivation of PBA "prudent estimate assumptions" may not be suggestive of such an innovative view, but if we take a small step back and ask a couple of fundamental questions, a wide field of potential innovations opens itself up to us.

## PBA VALUATION REQUIREMENTS

Let's take a look at Valuation Manual 5. According to the NAIC's Model Standard Valuation Law (Section 12 A), a principle-based valuation must be probabilistic, must be "consistent with a company's overall risk assessment process," must "be established using a company's own available experience" where possible and must include explicit "margins for uncertainty, including adverse deviation and estimation error." So, we have a blueprint for building a PBA prudent estimate assumption right there, assuming we can figure out how to quantify estimation error and stochastic uncertainty. This blueprint was exactly the starting point for the case study, "Optimizing Risk Retention,"<sup>1</sup> which Werner Lennartz and I carried out for the SOA's Financial Reporting and Reinsurance Sections. The goal was to develop a method for deriving best-estimate assumptions which allows us to explicitly quantify margins for uncertainty. Knowing these margins accurately would then allow us to study the impact of reinsurance on reserves and capital. The method in question is a statistical tool called Survival Models. For decades this technique has been applied successfully by engineers and statisticians. Currently, it is widely used in the United Kingdom by actuaries working on large longevity risk transfer deals and within pension valuation. Importing this method to the life insurance practice area, we were interested

in finding out how useful it would be for life insurance valuation and capital management.

## SURVIVAL MODELS

We started off with the mortality experience of one company's term life business and built a survival model for the mortality behavior within this portfolio from seriatim claims experience data as follows.

1. Pick a parametric mortality law<sup>2</sup> in continuous time which matches the general shape of the mortality experience in aggregate;
2. Estimate the parameters of the mortality law by maximum likelihood method; and
3. Use the baseline survival model to identify different risk factors and quantify their impact.

## MULTI-DECREMENT ANALYSIS

Early on, we realized that if we wanted to calculate life reserves on a realistic basis, we would have to model lapse hazard rates at the same time as mortality, because lapse has an important impact on the overall present value of claims. Luckily, survival models lend themselves naturally to multi-decrement analysis. You can model any decrement which might affect survival (or better: remaining time within the portfolio) and also combine the models for multiple decrements by simply adding their hazard rates. This is the beauty of continuous time models: you don't have to worry about when someone dies or lapses, or which happened first, because you are modeling both simultaneously moment by moment. At any given moment, the policyholder might (randomly) decide to lapse or surrender the policy, or the life insured might die. So, we completed the first three steps above for lapse<sup>3</sup> as well as mortality. Figure 1 (see page 9) illustrates the results for one individual.

## IDENTIFYING RISK FACTORS

Note that for both the force of mortality and the lapse hazard model, we have to include a number of different risk factors which influence the mortality or lapse outcomes. One obvious candidate is sex, as we know that females typically have lower mortality rates than males. It is important that we include as many statistically significant risk factors as possible to ensure that we do not underestimate estimation error. Keeping within our simple example, fitting a model for aggregate unisex mortality likely gives a seemingly more accurate fit and smaller estimation error than if we fit curves for males and females separately. The apparently better fit in aggregate, however, is useless because it introduces distribution risk. While the unisex table might work for the exact business mix of policies within the experience data, the sex distribution may shift due to different new business sales or simply because the men lapse and

die at higher rates than the insured women. The same problem arises with any set of risk factors which have a significant impact on mortality. For our case study, we found that we had to differentiate between gender, duration, smoking status, underwriting class, product type (10-year term, 20-year term, etc.), face amount band, and whether a policy was rated at issue or was accepted as standard.

The ability to identify different risk factors and quantify their impact is why survival models are so popular for clinical studies. This aspect of our multi-decrement survival model is especially important for PBA valuation, because mapping the different risk groups gives us a grasp on the business mix and how variable the claims for the portfolio will be. The most important source of variability is the fact that different insureds have different financial impacts due to their different policy face amounts.

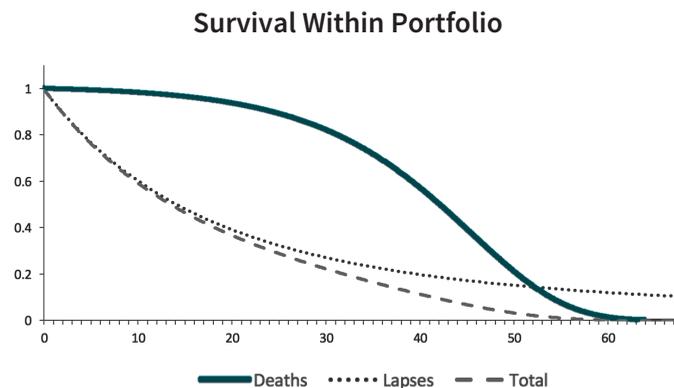
## MEASURING UNCERTAINTY

We capture the variability of results by applying a stochastic Monte-Carlo simulation in two steps. First, we take the parametric model which describes the best-estimate mortality and lapse behavior of the portfolio and give the parameters a little “jolt.” In other words, we randomly perturb the parameter set in a way which is consistent with the experience data. The perturbed parameters then describe mortality and lapse behavior which is a little different from the best-estimate, but which also could have materialized. So, we have created an alternative scenario consistent with the experience data.

Within this perturbed scenario, we know the survival curves as well. We can then use these to go through the list of in-force lives and stochastically determine whether they survived until the end of the level term period, whether they died or whether their policy lapsed. To do so, we simply draw a random number between 0 and 1, and then use the survival curve to check which remaining life-time this randomly drawn probability corresponds to. Since it’s a two-decrement model, we need two random probabilities and the corresponding times until death and until lapse. If both are longer than the remaining time until the end of the level term period, we have a survivor. Otherwise, we count the event as a lapse or a death, whichever happened first. By going through the entire list of lives, and letting them randomly survive, lapse or die, we can add up what the total present value of claims would have been in our first perturbed scenario.

These two steps are then repeated many times to get a probabilistic distribution of total claims which reflects both the estimation error, which is covered by the perturbations, plus random deviations via the life-time simulations.

Figure 1: Remaining time within portfolio for multiple decrements.



Source: Kaufhold and Lennartz (2016). Sample survival curves for a male non-smoker aged 52. Median remaining lifetime 42 years, median remaining time until lapse 15.5 years. End of level term period 10 years.

Ultimately, we have achieved what PBA valuation requires of us: we have a set of best-estimate assumptions to calculate best-estimate liabilities, and we can quantify exactly by how much we have to increase reserves to allow for uncertainty for any given level of confidence required. If you want to express the margin for uncertainty as padded prudent estimate assumptions, you can also back-solve for the margin by which you have to increase mortality and decrease lapses to get the prudent reserve.

## OVERALL RESULTS

Applying the method described above to our term life portfolio in the case study, we found out a number of interesting things:

1. The margin required for reserves at a certain confidence level depended on the business mix. It was different for the different products, with 10-year term requiring the greatest mark-up and longer-term products requiring a lower mark-up.
2. Different portfolio sizes required different levels of prudential provisions with smaller blocks needing a greater reserve buffer. This is totally unsurprising, but a good check that the method makes sense.
3. What did surprise us at first was that reserve margins were hardly affected by reinsurance. We expected to see that reinsuring large policies and thereby reducing the risk would change the risk profile of the business so much that the reserve margin percentage on the retained portion would be a lot lower than on the portion without reinsurance. As it turns out, excess reinsurance has a very strong impact on the level of volatility of annual earnings, and therefore affects solvency capital requirements. However, benefit re-

serves which reflect the present value of claims and premiums over an extended period of time are a lot less sensitive to the life insurer's level of retention, because volatile annual results are smoothed over time. This result also very much depends on business mix. With a greater portion of short-term business, the reserve margins will be greater and will be more sensitive to reinsurance, too.

## CONCLUSION

The original intention of the research project was to investigate the impact of reinsurance under modern reserving and solvency capital regimes. In this respect, the key result was that reinsurance has a greater influence on capital levels than on reserve levels, and that reinsurance can actually be used to optimize the return on economic capital which properly reflects the riskiness of the business. An important byproduct of this project is that we had to develop a method for setting reserves which truly reflects the uncertainty associated with setting the mortality and lapse assumptions (estimation error), and the volatility of the business itself (adverse deviation). Our results showed that reserve levels will vary depending on the business mix of the company, and that it is therefore important for life insurers to carry out their own analysis to derive company-specific mortality and lapse assumptions and quantify explicit margins for uncertainty. The method is applicable for small- to

medium-sized life companies, just as it is to large life insurers, and can be applied to any kind of insurance risk.

To find out more, please check out the report. If you have any questions or comments, please feel free to contact me. I would be delighted to discuss them with you, because challenge will only make our method better. ■

## ENDNOTE

- 1 <https://www.soa.org/Files/Research/Projects/research-2016-quantitative-retention.pdf>.
- 2 The method is called Survival Model, because we estimate the parameters of the mortality law by maximizing the likelihood of future lifetimes  ${}_t p_{x_i} (\mu_{x_i+t_i})^{d_i}$  for each individual  $i$ , where  ${}_t p_{x_i}$  is the probability of an individual aged  $x_i$  surviving  $t_i$  years,  $\mu_{x_i}$  is the individual's force of mortality (a.k.a. mortality hazard rate) and  $d_i$  is a status variable which equals 1 if the individual has experienced death (or whichever decrement is being analyzed) and 0 otherwise.
- 3 For this study, we excluded post level-term experience in order to focus on the regular impact of mortality and lapse. Post level-term lapses and mortality will be the subject of another case study.



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# Reinsurance Considerations in the Determination of PBR Reserves

By Chris Whitney and Greg MacKenzie

*This article first appeared in the November issue of Reinsurance News. It is reprinted here with permission.*

**W**ith the adoption of Valuation Manual 20 (VM-20) on June 10, 2016, principle-based reserves (PBR) will become effective on Jan. 1, 2017 with an optional three year phase-in period.

The reserve credit for reinsurance under PBR is significantly different than the formulaic approach that insurers have become accustomed to and will require them to take a discerning look at their reinsurance arrangements as well as the assumptions used to model reinsurance cash flows.

This article highlights key PBR reinsurance considerations through a case study focused on the reserving impact of alternative reinsurance structures and assumptions.

## BACKGROUND

### Reserves Under PBR

U.S. Statutory reserves under PBR are calculated as the maximum of the following three components, as specified under VM-20:

1. Net Premium Reserve (NPR)
2. Deterministic Reserve (DR)
3. Stochastic Reserve (SR)

Section 8 of VM-20 pertains to the impact that reinsurance has on these components.

The gross reserve and net reserve are each calculated using a separate PBR calculation. Put another way, the reserve credit is the difference between the gross and net PBR amounts:

$$\text{Max}(NPR_{Gross}, DR_{Gross}, SR_{Gross}) - \text{Max}(NPR_{Net}, DR_{Net}, SR_{Net})$$

### Actuarial Guideline XLVIII

Under Actuarial Guideline XLVIII (AG 48), Term and Universal



Life writers that utilize XXX or AXXX captive reinsurance arrangements have been required to perform PBR calculations to determine the amount of Primary Security to be held.

Prior to the effective date of VM-20, the AG 48 calculation is performed gross of reinsurance and the Primary Security requirement is reduced by the portion of the business retained by the direct writer.

After VM-20 becomes effective, AG 48 calculations must include reinsurance. This applies retrospectively to all business subject to AG 48.

## PBR REINSURANCE CONSIDERATIONS

### Net Premium Reserve

The NPR is calculated formulaically at the policy level using prescribed assumptions. The approach to calculating the NPR

net of reinsurance is the same as that used for formulaic reserves prior to PBR:

- Coinsurance: The NPR is reduced by the percentage coinsured.
- Yearly Renewable Term (YRT): The NPR is reduced by the unearned cost of insurance that is reinsured.

#### Deterministic and Stochastic Reserves

The DR and SR are calculated using an asset-liability model for an aggregate segment of policies using prudent estimate assumptions. The DR and SR gross of reinsurance are calculated by excluding reinsurance cash flows from the model. The net DR and SR are calculated using the same approach, but including reinsurance cash flows.

VM-20 provides general guidance on the modeling of reinsurance cash flows, stating, “The company shall assume that the counterparties to a reinsurance agreement are knowledgeable about the contingencies involved in the agreement and likely to exercise the terms of the agreement to their respective advantage, taking into account the context of the agreement in the entire economic relationship between the parties.”

The proposed ASOP for VM-20 provides substantially the same guidance for the actuary.

### CASE STUDY

#### Modeling Overview

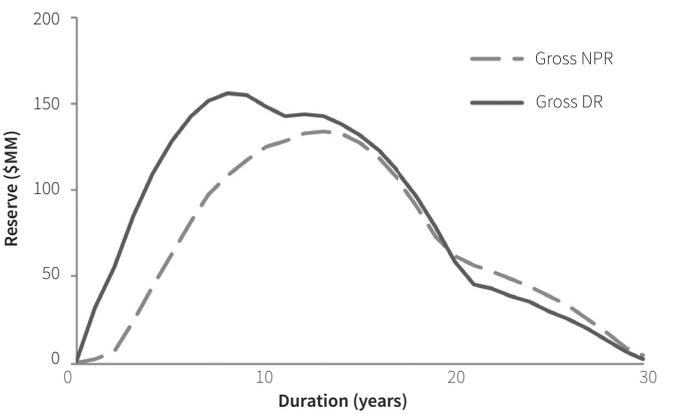
A cohort of new business with \$50MM of first year premium consisting of 10-, 20- and 30-year term products was projected for 30 years. In the projection, the NPR and DR were revalued annually using the terms of VM-20 and the following specifications:

- The prudent estimate DR mortality assumption was improved at a rate of 1 percent per year up to each valuation date.
- Valuation scenarios were regenerated at each valuation date in order to reflect the impact of changes in the yield curve on the scenario generator and mean reversion parameter.
- At each valuation date, starting assets used in the DR were solved for using the ‘Direct Iteration’ approach under VM-20.
- The NPR was calculated using the 2017 CSO table and a valuation interest rate of 4.5 percent.
- Mortality experience was assumed to be 30 percent credible with 10 years of sufficient data.
- The cohort is assumed to pass the Stochastic Exclusion Test (SET).
- Assumptions used and products modeled are for an illustrative term portfolio intended to be reasonably representative of products offered in the market today.

The DR and SR are calculated using an asset-liability model for an aggregate segment of policies using prudent estimate assumptions.

The gross NPR and DR for this cohort of new business are shown in Figure 1.

Figure 1: Reserves Gross of Reinsurance



As shown, the DR starts much higher than the NPR, but the gap closes over time and there is a crossover in year 19. The primary driver of this pattern is that the DR mortality assumption is unlocked for mortality improvement up to each valuation date, whereas the NPR mortality is not.

#### Coinsurance

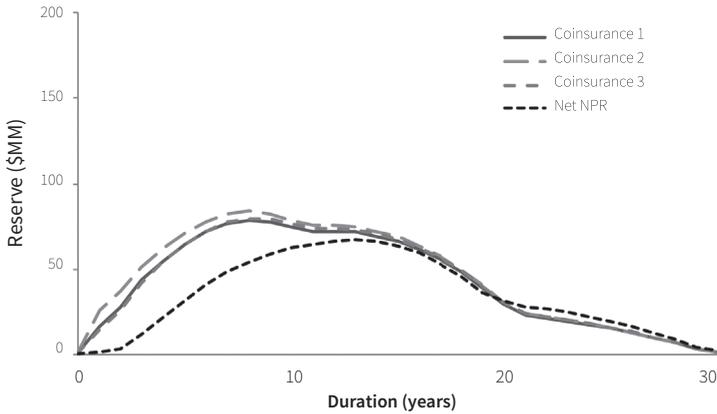
Three 50 percent first dollar coinsurance agreements were modeled and are summarized in Table 1. As is typically the case, the coinsurance allowances were assumed to be guaranteed, requiring no additional assumptions to calculate the DR.

Table 1: Coinsurance Agreements

Coinsurance	Description
Agreement 1	Reimburse proportion of VM-20 prudent expenses and commissions
Agreement 2	Reimburse proportion of best estimate expenses and commissions
Agreement 3	Prudent expense and commission allowance expressed as level percentage of premium

The projected NPR and DR net of reinsurance are shown in Figure 2 for these arrangements.

Figure 2: Net Reserves with 50% Coinsurance



Because the reserves above reflect 50 percent coinsurance, all values are decreased significantly relative to the gross reserves from Figure 1.

The net NPR is shown as the black dotted line and is the same under all three agreements. It is calculated using a proportionate reduction to the gross NPR based on the 50 percent of the business coinsured and therefore follows the exact same pattern as the gross NPR from Figure 1.

In contrast, Figure 2 shows that the three DR curves visibly vary in the first 10 years. Table 2 below illustrates this by expressing the net reserve as a proportion of the gross reserve:

Table 2: Net/Gross Reserve by Coinsurance Agreement

Year 1	Year 5	Year 10	Year 20
50% (DR)	50% (DR)	50% (DR)	50% (NPR)
67% (DR)	55% (DR)	53% (DR)	50% (NPR)
47% (DR)	50% (DR)	51% (DR)	50% (NPR)

Once the reserve reaches the NPR floor in year 20, the ceding company will see a proportionate reserve reduction under all coinsurance arrangements.

Under Agreement 1, the DR is reduced proportionately because the agreement terms were set to reimburse prudent estimate expenses, which is uncommon in coinsurance transactions.

Under Agreement 2, the DR is higher than Agreement 1 because it is only set to reimburse best estimate expenses. Under this arrangement, the ceding company will not realize a proportionate reduction in the DR.

Under Agreement 3, the DR starts off slightly lower than under Agreement 1 but ends up slightly higher. The slight variation relative to Agreement 1 is due to a higher expense allowance in Agreement 3 in the early years and a lower expense allowance in the later years.

Once the reserve reaches the NPR floor in year 20, the ceding company will see a proportionate reserve reduction under all coinsurance arrangements.

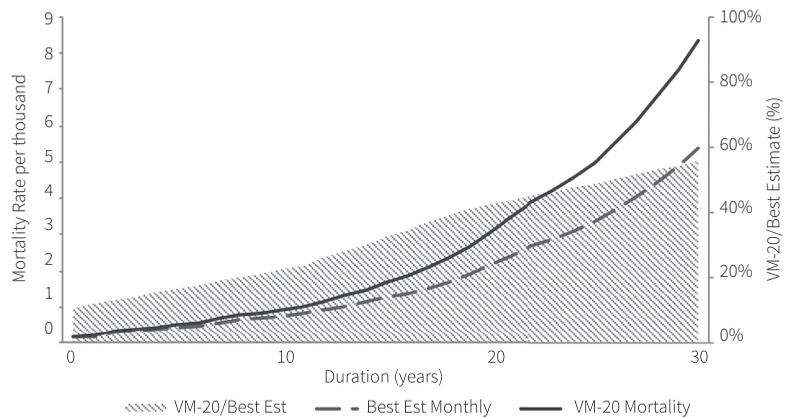
YRT Reinsurance

A 50 percent first dollar YRT reinsurance arrangement with the current premium scale set equal to 100 percent of the best estimate mortality assumption was modeled.

VM-20 mortality is based on a prudent company-specific mortality assumption grading to a prudent industry table when sufficient data no longer exists. The margin applied to set the company-specific prudent assumption is a function of the credibility of the underlying experience.

A comparison of the VM-20 mortality and best estimate mortality is shown in Figure 3 for a 35-year-old male, preferred non-tobacco:

Figure 3: Best Estimate vs. VM-20 Mortality



The shaded area shows that the total effective margin starts at 10 percent and grades to 54 percent over 30 years due to the absence of mortality improvement and the grading to the prudent industry table.

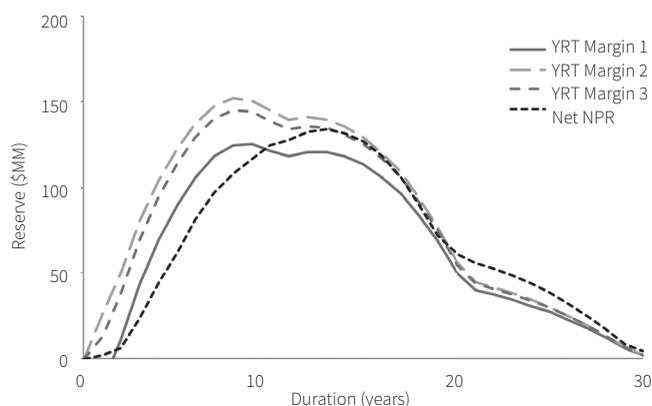
Under this adverse mortality scenario relative to best estimate, we examined the YRT rate change scenarios shown in Table 3.

Table 3: VM-20 YRT Rate Change

Scenario	Description
1	No change in rates
2	Increase rates to remove reinsurance gain
3	Increase rates by 15%

The projected net NPR and DR for the cohort of new business under the three scenarios are shown in Figure 4.

Figure 4: VM-20 YRT Rate Change Scenarios



The net NPR is shown as the black dotted line and is calculated by reducing the gross NPR by the unearned cost of insurance for the 50 percent of the business reinsured. This NPR is only slightly lower than the NPR from Figure 1.

Under Scenario 1, it is assumed that no change is made to the scale of YRT rates and that the reinsurer absorbs losses due to mortality emerging adversely as compared to the current YRT scale. The net DR is significantly reduced as compared to the gross DR and becomes lower than the net NPR in years nine and beyond.

Scenarios 2 and 3 assume that the reinsurer will exercise their option to raise YRT rates to make up for the adverse mortality variance.

In Scenario 2, it is assumed that YRT rates will be reset for the reinsurance treaty to break even at all times (i.e., no gains or loss from reinsurance). In this situation, the only reduction in the PBR reserve realized by the ceding insurer will be due to a difference in cash flow timing (return of unearned premium). The difference between the gross and net DR is similar to the difference in gross and net NPR under this scenario.

Scenario 3 with a 15 percent across-the-board increase in YRT premium is intended to represent a situation where the direct

writer and the reinsurer are ultimately sharing losses due to mortality emerging adversely relative to expected. The Scenario 3 DR falls somewhere between the Scenario 1 DR and the Scenario 2 DR, as shown in the table below.

Table 4: Net/Gross Reserves by Year and YRT Scenario

Scenario	Year 1	Year 5	Year 10	Year 20
1	20% (DR)	74% (DR)	89% (NPR)	99% (NPR)
2	91% (DR)	97% (DR)	98% (DR)	99% (NPR)
3	68% (DR)	91% (DR)	94% (DR)	99% (NPR)

## CONCLUSION

Life writers with AG 48 experience may have a head start with PBR calculations, but the inclusion of reinsurance in the calculations is a new aspect of PBR methodology for everyone.

1. From a pricing perspective, it will become important to not only understand the impact of reinsurance on pricing cash flows, but to also understand the impact on projected reserves and the emergence of distributable earnings.
2. From a valuation and forecasting perspective, financial models will require a sufficient level of granularity to reflect the nuances of the reinsurance structures, which was not a significant consideration in the past.
3. Finally, understanding the implications of reinsurance treaty design and related prudent estimate assumptions under PBR is a critical undertaking for carriers and may drive a need to refine both pricing models and reinsurance strategy. ■

*The views expressed in this article are those of the authors and not representative of Oliver Wyman's.*



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# Negative GAAP Term Insurance Reserves—to Floor or Not to Floor?

By Bob Crompton

A question that comes up with a certain regularity is, “Should I floor negative GAAP reserves at zero?” Although this is a common problem, there is little guidance on the issue. The FASB does not address this issue and other guidance is limited. There is no definitive answer to this question. In practice, some companies have chosen to floor these reserves, while others have chosen to allow negative reserves as they occur. This article discusses some of the material considerations in reaching a conclusion to this question.

## SOME GENERAL CONSIDERATIONS

There are some general considerations to keep in mind when considering the question of whether to floor reserves.

- Flooring reserves will change the emergence of GAAP profits, but will not affect the total lifetime undiscounted profits. The cash flows of term insurance (or any insurance product) are unaffected by the choice of reserve basis or by any adjustments to the existing reserve basis.
- However, timing of profit emergence may have important effects on profit measures. Flooring results in deferral of profits, so the effect on profit measures will be adverse and may be material.
- Under current GAAP accounting, term reserves are subject to lock-in. If your term reserves were floored, you cannot willy-nilly decide to unfloor the reserves.
- Modern term insurance benefit and premium designs often result in volatility of results due to shock lapse and anti-select mortality in the post-level term period. Any consideration of flooring should be made in light of these issues.

## ACCOUNTING GUIDANCE

Authoritative guidance on term reserves is found in the FASB’s codification of accounting rules at 944-40-30 which deals with the initial measurement of the reserve. Paragraph 30-7 contains the applicable language:

“The liability for future policy benefits accrued under paragraph 944-40-25-10 shall be the present value of

future benefits to be paid to or on behalf of policyholders and related expenses less the present value of future net premiums (portion of gross premium required to provide for all benefits and expenses). That liability shall be estimated using methods that include assumptions, such as estimates of expected investment yields, mortality, morbidity, terminations, and expenses, applicable at the time the insurance contracts are made. The liability also shall consider other assumptions relating to guaranteed benefits, such as coupons, annual endowments, and conversion privileges. The assumptions shall also include provision for the risk of adverse deviation.”

Note that the language does not address exceptions for negative reserves. It is this lack of guidance that often leaves people scratching their heads when they consider the question of negative reserves. Without specific guidance, we have to fall back on general reasoning and consideration of facts and circumstances.

## BALANCE SHEET VIEW OF FLOORED RESERVES

One approach to reaching a conclusion on negative reserves is to consider the appropriateness of negative reserves as viewed from the balance sheet. As viewed from the balance sheet, reserves are the value of future obligations, and reserves should be presented in such a way as to reasonably reflect those future obligations.

The balance sheet point of view is discussed in the book, *US GAAP for Life Insurers*, published by the Society of Actuaries (page 106 of 2<sup>nd</sup> edition):

“The observer will note that the reserves start positive, then go modestly negative, then become significantly negative. While this phenomenon is entirely consistent with actuarial formulas commonly used for GAAP reserve calculations, these formulas do produce a negative liability. **There is a school of thought that maintains that negative obligations cannot exist. Thus, a reserve so calculated should be floored at zero.**” (Emphasis added)

This is clearly a balance sheet approach since the emphasis is on the function of reserves as a measure of future obligations. If this were the only purpose of reserves, then this view would carry considerable weight. However, reserves also have a purpose in the income statement relating to profit emergence.

## INCOME STATEMENT VIEW OF FLOORED RESERVES

The balance sheet view is not the only way to view negative reserves. There is another school of thought that maintains this issue should be viewed from an income statement perspective. From an income statement perspective, the critical function of

GAAP reserves is to produce an orderly emergence of profits. This perspective was important in the AICPA audit guide issued in 1972 as well as in SFAS 60 issued in 1982.

This concept of orderly emergence of profits is discussed in the SOA publication, *US GAAP for Life Insurers*, on page 10 of the 1<sup>st</sup> edition:

“The accounting rule-makers have attempted to prescribe methods that cause profits to emerge in proportion to the degree of completeness of the earnings process under the contract or in proportion to services rendered.”

The concept is also discussed in the classic book *GAAP: Stock Life Companies* (page 66), published by Ernst & Ernst:

“... the reserve is a kind of balancing account designed to produce a pattern of derivative profits which conform at least roughly to predetermined concepts of services rendered.”

Finally, Richard Horn’s seminal paper, “Life Insurance Earnings and the Release from Risk Policy Reserve System,” *TSA XXIII* (1971), discusses reserves as a timing mechanism for the release of profits in a reasonable way. He makes the following statement:

“Bringing period costs and period revenues together for life insurance means deferring the recognition of some current income to a later period or anticipating in the current period some of the cost which will emerge in later periods. The mechanics of the policy reserve system accomplishes the matching process whether current income is regarded as being deferred or later costs are regarded as being anticipated.”

Clearly the income statement view of reserves is a valid way to consider the question of flooring reserves. This view must be weighed against the balance sheet view of reserves. Both have their merits.

### EFFECT OF FASB’S TENTATIVE TARGETED IMPROVEMENTS

The FASB has published several proposed changes to GAAP for insurance products. Although none of these changes has any direct effect on considerations for flooring negative reserves, there may be some indirect considerations.

These proposed changes are contained in an Exposure Draft dated Sept. 29, 2016. The Exposure Draft is available on FASB’s website.<sup>1</sup> The changes that would affect term insurance are:

- No provision for adverse deviation
- Assumption updates (annual unlocking)
- Discount rates
- DAC amortization
- Loss Recognition rules

The author flunked-out of both of the schools of thought mentioned above. He has instead enrolled in the night-school version of a view of flooring term reserves—the facts and circumstances view.

These proposed changes do not affect the development of negative reserves, nor do they explicitly address the issue of negative reserves. However, there may be an indirect effect from these tentative changes.

These changes are clearly balance sheet oriented rather than income statement oriented. It is possible that adoption of these accounting rules will signal FASB’s view that the balance sheet view of reserves be given stronger consideration than the income statement view of reserves. This is currently speculative, and may be reading too much into the proposed changes.

### THE PRACTICAL VIEW OF FLOORED RESERVES

The author flunked-out of both of the schools of thought mentioned above. He has instead enrolled in the night-school version of a view of flooring term reserves—the facts and circumstances view.

Most blocks of term insurance contain a number of issue years, a number of benefit periods and issues that are spread throughout each calendar year. These items tend to mitigate the effects of any negative reserves. If, on balance, the effects of negative reserves in any reporting period are expected to be immaterial, then a company should choose whichever approach is easiest to implement and manage.

However, some companies will find that the effects of negative term reserves are material, in spite of diversification across issue years, benefit periods and other parameters. When this is the case, the practical view says to choose according to the way the company manages the business. A company that takes a conservative approach to the GAAP balance sheet, and loads-up the provisions for adverse deviation to the fullest extent consistent with GAAP, should choose to floor reserves at zero. This is consistent with the way the company manages its business.

On the other hand, a company that manages its business with an eye on the GAAP income statement—a company that has a very tight feedback loop between pricing and valuation—should choose not to floor reserves. Any distortion introduced into the emergence of profits (including flooring reserves), will

make it more difficult for this company to properly manage its portfolio of liabilities and more difficult to explain profit results.

## CONCLUSION

Negative reserves are an issue that is not explicitly addressed in GAAP guidance. There is no “bright line” that tells us that we should, or should not, floor reserves at zero. There are arguments in favor of flooring reserves and arguments in favor of not flooring reserves. In practice, companies have chosen both.

A reasonable approach to selecting the appropriate approach to this issue is to base the decision on congruence with the company’s approach to managing the business. A company that emphasizes the income statement should consider allowing

negative reserves in order to preserve the orderly release of profits. A company that emphasizes its balance sheet should consider flooring reserves at zero in order to preserve balance sheet conservatism. ■

### ENDNOTE

1 <http://www.fasb.org>



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# Purchase Accounting for Insurance Business Combinations under China-GAAP from an Actuarial Perspective – Part I

By Vincent Tsang and Bonny Fu

**P**urchase GAAP accounting (PGAAP) is a common accounting requirement for both the acquiring and the acquired companies after acquisitions. The preparation of the PGAAP financial statements for the acquired company is a necessary accounting exercise for a publicly traded acquirer. However, a privately-owned acquirer may also want to prepare PGAAP financial statements to aid the monitoring process of the performance of the acquired business.

Before the PGAAP exercise begins, both the acquirer and the acquired would need to co-develop an accounting policy fitting for this PGAAP exercise. For insurers, the common practice is to follow the acquirer's existing accounting policy. On the other hand, if the acquirer is not an insurance entity, the PGAAP accounting policy may begin with the existing accounting policy of the acquired company.

Regardless, the draft PGAAP accounting policy must be designed with input from both the acquirer and the acquired company, with discussions made alongside their respective auditing firms in the early stages. The key decisions made in the PGAAP exercise should be well-supported and the expected outcome should be well-communicated and agreed with by the management of the companies to avoid unfavorable outcome near the end of the exercise.

## PGAAP GUIDANCE

Preparing PGAAP financial statements is a crucial step for business combinations. As actuarial reserves and other related items occupy the majority of the balance sheet, actuaries are heavily involved in the PGAAP process. There are numerous publications<sup>1</sup> available in the market which provide adequate guidance for practitioners. However, businesses in China should only consider these guidance papers as reference material on market practice since the China Insurance Regulatory Commissioner



(CIRC) has adopted China-GAAP which is close to the 2010 Exposure Draft of IFRS4 Phase II for Insurance Contracts (2010 ED). The reference materials outside of China may not be directly applicable.

In this article we will address several key actuarial issues, namely unit of account, book value of China-GAAP actuarial reserve at acquisition date, fair value of liability, goodwill impairment and reinsurance. Besides accounting and actuarial, the PGAAP exercise also involves other disciplines including tax and asset valuation. Nevertheless, these items are beyond the scope of our discussion.

This article is primarily written for long term life insurance businesses, yet the underlying issues are also applicable to other non-life insurance or short term businesses.

## OVERVIEW OF CHINA-GAAP FOR BUSINESS COMBINATIONS

The general practice is that the acquirer and the acquired company must first identify the intangible assets as well as other assets and liabilities of the acquired entity. The acquired company is then able to develop an initial fair value balance sheet at the date of acquisition. Assets are marked to market value while liabilities are measured at fair value, and the acquired company's selected intangible assets such as deferred acquisition cost (DAC), unearned profit liability (UPL) and goodwill are written-off.

Under current China-GAAP accounting standards, actuarial reserves are not reported using fair value. Instead, they are reported as the sum of best estimate liability (BEL), risk adjustment (RA) and residual margin<sup>2</sup> (RM). Although BEL is based on the company's projected cash flows with best estimate assumptions, the discount rate is not the market rate at the valuation date plus liquidity premium. Instead, for traditional non-par business with fixed guaranteed benefits, the discount rate is the sum of the 750-

While it is a widely accepted practice to revise the BEL and RA of the acquired business ... there is limited guidance on whether the RM at the acquisition date should be re-determined.

day average of government bond yield curve and liquidity premium. For other business with benefits depending on investment return, the discount rate is the future best estimate investment return. The RA can be considered as a provision for adverse deviation (PAD) based on BEL. It is common that the RM is locked-in at issue<sup>3</sup> and is not updated after the issuance date.<sup>4</sup>

For short duration contracts,<sup>5</sup> the actuarial reserves are the pre-claims liability and the claims liability. The pre-claims liability is the unearned premium reserve less the unamortized acquisition costs, which is believed to be a reasonable approximation of the present value of fulfillment cash flows (PVFCF, i.e., BEL + RA) and the RM. The claims liability is the sum of the claims reserve and the incurred but not reported reserve (IBNR) and these two quantities are measured as the PVFCF<sup>6</sup> (i.e., BEL + RA).

Please note that the acquired company only needs to prepare a fair value balance sheet at the date of acquisition. Going forward, the acquired company may follow the local GAAP accounting guidance for preparing GAAP reserves for in-force and future new businesses. Thus, the acquirer would need to use the value of business acquired (VOBA) asset as an intangible asset to reconcile the difference between fair value of liability (FVL) and book value of liability (BVL) of the in-force business at the acquisition date.

BVL would then be calculated using existing accounting guidance with updated assumptions at the acquisition date. All previous assumptions are replaced. VOBA may then be amortized using projected revenue streams. For example, future gross premiums or estimated gross margins, after the acquisition date. All previously reported revenue streams and locked-in assumptions are ignored going forward.

### UNIT OF ACCOUNT

The first consideration for PGAAP accounting policy under China-GAAP is the determination of unit of account. This definition may affect the number of VOBA balances for future amortization.

BEL, RA and RM are normally calculated on a cohort basis (or unit of account basis). Before the acquisition, the acquired company may set up units of account on direct business based on combinations of group of contracts and issuance year. Each unit has its own RM for amortization. This categorization is necessary as different products may have different best estimate assumptions (e.g., lapse rates). Additionally, different issuance years may have different discount rates and liquidity assumptions, thus affecting the respective BEL and RA. As RM is the residual determined at the policy inception date, differences in best estimate assumptions and discount rates for determining BEL and RA would also indirectly affect RM.

The acquiring company acquires the entire block of in-force business at the same time. Issuance year of the in-force business may not be a consideration for determining the unit of account. Some companies may use a broad stroke and consider all traditional business as one unit of account and the unit-linked business as another unit of account for determining VOBA amortization.

### DEFINITION OF BOOK VALUE OF LIABILITY AT ACQUISITION DATE

The second issue is the definition of BVL for the acquired business and its effect on RM and VOBA.

Under China-GAAP,  $BVL = BEL + RA + RM$

While it is a widely accepted practice to revise the BEL and RA of the acquired business in accordance with the acquirer's assumptions and parameters at the acquisition date, there is limited guidance on whether the RM at the acquisition date should be re-determined.

One possibility is to use the acquired company's outstanding RM balance before acquisition as the initial RM balance in the initial PGAAP balance sheet. Future amortization of the RM would then follow the original schedule.

The advantage of this approach is to avoid changes in the current financial reporting structure for RM. The disadvantage of holding an RM on the liability side is that it would also inflate the VOBA on the asset side. Given that the amortization schedules of RM and VOBA could be different, the difference may lead to unnecessary noise.

An alternative is to set RM to zero for the in-force business such that the BVL is only the sum of BEL and RA. The advantages of this approach are: (a) simplicity as there would not be any amortization of RM; and (b) VOBA is not inflated and has a reduced risk of not being recoverable. The disadvantage is that VOBA may be negative depending on the relationship between FVL and BVL (i.e., the sum of BEL and RA in this case).

According to 2010 ED paragraph 42:

“An insurer shall measure a portfolio of insurance contracts acquired in a business combination at the higher of the following:

*(a) the fair value of the portfolio. The excess of that fair value over the present value of the fulfilment cash flows establishes the residual margin at initial recognition.*

*(b) the present value of the fulfilment cash flows. If that amount exceeds the fair value of the portfolio, that excess increases the initial carrying amount of goodwill recognized in the business combination.”*

Accordingly, the acquired company should establish RM for the in-force business only if the FVL exceeds the PVFCF (i.e., the sum of BEL and RA). The initial RM is defined as the difference between FVL and PVFCF.

If the sum of BEL and RA is greater than FVL, the acquired company may need to set up an intangible asset, VOBA, on the asset side of the PGAAP balance sheet.

#### FAIR VALUE OF LIABILITY AT ACQUISITION DATE

The third issue is the appropriate method for determining FVL for in-force business.

There are numerous ways to determine the fair value of insurance liabilities at the date of acquisition. Besides the replicating portfolio approach, insurers may use the stochastic simulation method where cash flows are projected under thousands of interest rate and equity scenarios. The sum of risk adjustment and the average of the present values of net cash flows (discounted using risk-free rates plus liquidity premium) is then defined as FVL. As the parameters (such as discount rate) for determining China-GAAP actuarial reserve are not market data oriented, the China-GAAP actuarial reserve is unlikely to be equal to the FVL.

The third method is the price allocation method where the final purchase price is allocated between the net assets, the value of in-force and the value of future new business capacity. Given that the value of the net assets is determined using available market value of backing assets, the allocation of the remaining purchase price is more of an art than science between the value of in-force and the value of new business capacity. This method is appropriate only if the transaction is an orderly normal transaction. It may not be appropriate if the transaction is a distressed or an overly optimistic transaction.

Regardless of the approach, if the FVL is greater than the sum of BEL and RA, the company may initiate an RM in accordance

with paragraph 42 of 2010 ED rather than having a counter-intuitive negative VOBA.

#### GOODWILL IMPAIRMENT

The fourth issue is the reasonableness of the purchase price allocation if it is used to determine FVL.

There was a trendy thought to recognize negative goodwill for “bargain purchase.” Although a negative goodwill may be legitimate, the reporting company must prepare strong arguments and data to justify negative goodwill and be ready for close scrutiny. In light of the recent high profile acquisitions of insurance companies in Asia, the likelihood of recognizing negative goodwill is rare. Instead, goodwill impairment testing is an important item on the audit agenda.

If the acquired company has the means to determine the FVL, goodwill in the initial PGAAP balance sheet should be a balancing item. In essence, the initial goodwill is related to the price allocated to the value of future new business. As goodwill is an intangible asset, the goodwill must be tested for impairment at the transaction date and at least annually thereafter. An overly optimistic allocated price for the value of future new business may endanger the goodwill’s recoverability.

The 2010 ED primarily covers the liability valuation for insurance contracts and related disclosures. It does not provide specific guidance on goodwill impairment. Companies may need to rely on the generally accepted practice for testing goodwill impairment. Other guidance on market practice can be found in literature such as FAS 142 and FAS 143 under US GAAP.

As allocating prices between value of in-force and value of new business is more of an art than science, practitioners may perform a trial-and-error process to strike an adequate balance between the goodwill impairment limit and the return on equity of the in-force business.

#### REINSURANCE

The fifth issue is the proper treatment for existing reinsurance contracts.

In light of the recent high profile acquisitions of insurance companies in Asia, the likelihood of recognizing negative goodwill is rare.

When there is a change in ownership of the acquired company, the reinsurers of the acquired company usually maintain the current status with respect to the existing reinsurance contracts. There are rare occasions that the contractual parties may terminate the existing reinsurance contracts. However, for the moment, let us assume both parties maintain the existing reinsurance contracts.

The China-GAAP reserve for the existing assumed business should be treated the same as the direct issues such that the China-GAAP reserve after acquisition is the greater of PVFCF and FVL. The residual margin of the assumed business for the initial PGAAP balance sheet would be refreshed as either zero or FVL minus PVFCF depending on whether PVFCF is greater or less than FVL.

With respect to the ceded business, the acquired company may need to re-evaluate the reserve credit of the ceded business after the acquisition. The residual margin of the previous reserve credit may need to be written off and be refreshed by parameters such as PVFCF after non-performance risk and the FVL for the ceded business.

Some practitioners may not take into account the non-performance risk when comparing PVFCF with FVL. It may be a practical approach if the degree of reinsurance is immaterial. However, it may lead to a potential understatement of the China-GAAP reserve if the volume of reinsurance is material.

### CONCLUSION

By now we have highlighted a few key issues for practitioners to consider when preparing PGAAP financial statements under China-GAAP. There are other issues, such as reasonableness of the liquidity premium, potential idiosyncrasies between the financial reporting of the acquired block of business versus new

issues, and practical means of allocating VOBA, if any, among major blocks of acquired business. We will address these issues in a future article.

*Disclaimer: The views reflected in this article are the views of the author and do not necessarily reflect the views of the global EY organization or its member firms. ■*

### ENDNOTE

- 1 In the United States, most of the guidance is provided by Financial Accounting Standard Board (FASB) and the American Academy of Actuaries (AAA) for insurance company business combinations.
- 2 Residual margin (RM) is also known as contractual service margin (CSM).
- 3 Please see 2010 ED paragraph BC132 for more details.
- 4 Some companies may use RM to absorb the change in BEL and RA due to a change in estimated cash flows.
- 5 Definition of short duration contract can be found in paragraph 54 of the 2010 ED.
- 6 Please see paragraph 55 of 2010 ED for more details.
- 7 [http://www.ifrs.org/Current-Projects/IASB-Projects/Insurance-Contracts/Exposure-draft-2010/Documents/ED\\_Insurance\\_Contracts\\_Standard\\_WEB.pdf](http://www.ifrs.org/Current-Projects/IASB-Projects/Insurance-Contracts/Exposure-draft-2010/Documents/ED_Insurance_Contracts_Standard_WEB.pdf)



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# 10 Things I Think About the New Insurance Contracts IFRS

By Henry Siegel

I was originally going to title this article “Nothing” since the International Accounting Standards Board (IASB, the board) made no new decisions this quarter about the new insurance contracts standard. I decided, however, that the title would be unfair since the staff and board are, in fact, doing a lot. Just all of it behind the scenes.

They are field testing the most recent versions of the standard in order to get feedback from preparers and users. This takes time and for obvious reasons needs heavy confidentiality. Hopefully, this will result in a better, clearer standard when it finally comes out early (I hope!) next year.

So, having nothing to report on, I decided to try to summarize the major areas where I am happy and where I have concerns about the new standard.

1. The new standard will ultimately be a good one. While there are ongoing problems, some of which I discuss below, the new standard will generally produce reasonable results. The use of current assumptions and the availability of the top-down approach to discount rates are huge steps in the right direction. Most importantly, the beefed up disclosures should allow any user to far better understand what is going on in the financials of the company. Overall, almost all the numbers on the right side of the balance sheet and in the income statement will be produced by actuaries; this can only be good for everyone.
2. If I’m an analyst, I don’t care whether a loss on a contract at issue is subtracted from the equity at issue or reduces the contractual service margin (CSM) and is allowed to flow into earnings over time. When I try to figure out the value of the company, I’m going to take the CSM, subtract the portion of it that is not due to expected profit and then add the current equity. If I’m doing things in a consistent manner, the reduction in the CSM due to contracts with losses at issue will more or less equal whatever the reduction in the equity would have been. Of course, I want to know if the company is selling a product at a loss intentionally, but more so I can understand its strategy than because I think they’re trying to

put one over on me or because it will distort my evaluation of the company.

3. The rules about grouping of contracts had better be fixed in a reasonable way. The current proposals (as of August) would require large companies to keep track of potentially thousands of groups in order to measure loss recognition, DAC recoverability and other items. While computers can handle lots of data, the cost of reviewing and auditing all these groups by people would be excessive; especially since, as I say above, it shouldn’t matter much to users.

The best solution would be a return to the groupings management uses to run the business and to eliminate the “similar profitability” requirement that is in the tentative conclusions. This would give users the same information that management uses to run the business and prevent obscuring the important items by data overload.

4. Users should be very happy about the new disclosure requirements. The only way to really understand insurance company financial statements is to look at earnings by their source. You need to understand, for instance, whether mortality experience is better or worse than expected and what the effect of that difference is on earnings. The new disclosures should allow analysts to calculate that. The same applies to gains from lapsation, morbidity and expenses. Having reserve roll-forwards and showing the effects of assumption changes explicitly should greatly enhance this understanding.

Even more importantly, the difference between investment earnings and interest credited on liabilities should allow a user to understand whether those margins are deteriorating or whether the company has been able to pass along interest risk to the policyholder. Interest rate movements may or may not be important to a company depending on how much of its business is interest sensitive. I don’t really care if interest rates go up 50 basis points if I have to credit all the increase to my policyholders. I will only care about how much it reduces any spread compression or how much I don’t credit to policyholders. Until the post 2008 situation, this has not generally been a huge concern.

If a company I’m analyzing doesn’t provide me enough information in its disclosure to do a full gains-by-source analysis, I’d insist they do so in their management discussion & analysis (MDA).

5. While requiring discounting of claim liabilities makes sense for the balance sheet, I will still want to see the undiscounted values. I am very concerned with whether a company consistently underestimates or overestimates its liability. It’s a lot easier to analyze that without discounting getting in the way.

Fortunately, the disclosure requirements include the undiscounted values.

Of course, the same cannot be said for undiscounted values of liabilities for long-duration contracts; such numbers would be worse than useless. I can't think of a use for the total expected surrender values or death benefits of a block of policies.

6. 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.

Similarly, the risk adjustment will likely be of little value to users on long-duration contracts since the adjustment is generally a small part of the total liability.

7. The accounting for closed blocks of participating business in demutualized companies should finally produce results that make sense. In most cases, this should mean zero earnings and equity for the block every year since the assets are designated as belonging to the designated contracts and no profits can be realized by the entity from that block.
8. Mutual insurance companies have equity. Any company that expects to exist long term must keep a permanent amount of assets in excess of its liabilities. Even when a product is finally extinguished, there will be assets arising from those contracts that will remain with the company (unless they are part of a closed block from a demutualization as mentioned above).

9. Any company that expects to produce results using IFRS should be starting on implementation already. Even those European companies that already do Solvency II and embedded value calculations will find that their reporting systems will require major overhauls to make them auditable and as automated as possible. Other companies will likely have even further to go.

10. The IASB should definitely appoint an implementation working group consisting of actuaries and accountants from preparers and users to help with the transition to the new standard. Unexpected problems will undoubtedly arise and having a knowledgeable resource should help make the transition go as smoothly as possible.

And one extra thought:

11. The IASB should definitely sponsor a party to celebrate the final passage of the new standard. I suggested this to a couple of board members and I got the clear idea they did indeed intend to party; it wasn't clear, however, that others will be invited! I guess I can understand that. There have been a lot of people involved in this project over the decades.

So with all this in mind, I reiterate

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



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# The Art of Asset Adequacy Testing

By Ross Zilber and Jeremy Johns

At the time that this article is expected to appear in print, most actuaries who work on the annual Asset Adequacy Testing (AAT) will be well into the exercise. It is curious how this exercise got its name, the “asset” part, as the testing process is more about testing adequacy of actuarial reserves. At a simplified level, the test is a modeling exercise that starts the actuarial model with the assets equal to formulaic reserves and projects policy cash flows including taxes. Various metrics of the projection are studied, like interim balance sheet on an economic and on an accounting basis, and the present value of market value of surplus. This exercise is intended to compare formulaic reserves to the economic reserve based on the comprehensive projection of assets and liabilities.

Below is a recommended actuarial guidance reading list (by far not exhaustive) for someone starting the AAT exercise. We suggest reviewing ASOPs 23 and 41 in addition to the items on this list.

## Actuarial Opinion and Memorandum (AOM) Regulation

This regulation was adopted in April of 2010. VM-30 has similar information in terms of defining the role of the appointed actuary and recommended language for the AOM. The highlight of the AOM Regulation is Section 7 which describes requirements of the actuarial memorandum. The section is broken out to cover discussion of actuarial reserves, liability assumptions, asset assumptions, and modeling methodology.

## ASOP 7: Analysis of Life, Health, Property/Casualty Insurer Cash Flows

The highlight of ASOP 7 is Section 3.4 which details that the projection of asset cash flows requires consideration of asset characteristics (e.g., sensitivity to economic factors) and investment strategy with regard to reinvestments and disinvestments. Another interesting section is 3.5.1(e), which requires projection of cash flows to consider “the ability of the policyholder or other party to exercise options under the policy that have an effect on policy cash flows.” We understand this section to imply that projections should assume highly efficient policyholder behavior, a principle that will be meaningful later on in this article.

## ASOP 22: Statement of Opinion Based on Asset Adequacy Analysis of Actuaries for Life and Health Insurers

The highlights of this ASOP are in Section 3.3.2 which describes analysis methods, including gross premium valuation and conservatism methods, and Section 3.3.3 which covers assumptions. Section 3.4.2 has important language when describing what “moderately adverse” is **not**: “To hold reserves or other liabilities as great as to withstand any conceivable circumstances, no matter how adverse, would usually imply an excessive level of reserves or liabilities.”

## Asset Adequacy Practice Note—August 2014

This practice note was produced by the American Academy of Actuaries and updated for the results of the SOA survey of 184 companies. The topics of interest discussed in this article will be based on the methodology choices in AAT modeling that are not well prescribed. The practice note will be referenced where relevant.

## IMPORTANT METHODOLOGY CHOICES

### Projection of Taxes

Q45 of the above practice note addresses disinvestment modeling. The guidance covers priority of sales and borrowing. It is acceptable to assume, as long as disinvestment strategy supports this, that sales of more liquid instruments would occur first, without a need to liquidate less liquid assets like real estate. The guidance, however, stops short of discussing tax leverage in the assumption of real estate sales. Assuming a simplified example of a real estate fund growing at 5 percent (from growth and reinvestment of income) and depreciated at 2 percent, there will be a 15 percent difference between MV and Tax BV of that asset in two years, which will grow to a 41 percent difference in five years. This works just like your



401(k) only with leverage from depreciation; the longer you defer the sale of real estate the longer you get to capitalize on tax-free growth and depreciation.

The last paragraph of the response to this question deals with the issue of arbitrage of the borrowing rate and notes that the borrowing rates should be consistent with the market rate. The potential arbitrage occurs when the model borrows at a rate lower than the portfolio rate.

#### Deferred Tax Considerations

In the event that AAT reserves are established or released, the statutory income statement will reflect the movement of AAT reserves. Because the AAT reserves are not tax deductible, there is potential for AAT reserves to impact the tax efficiency of the income statement without recognizing a deferred tax liability or asset (DTL/DTA) to offset this impact. The DTL/DTA serves the purpose of maintaining an effective tax rate of 35 percent. Per NAIC guidance, the DTL/DTA on the balance sheet should not reflect discounting.

#### Margins on Best-Estimate Mortality Assumptions

In the interest of assessing the economics of the formulaic reserve for AAT purposes, it is natural for the company to defer to its best-estimate assumptions which presumably capture the true economic risk of the liabilities. However, best-estimate assumptions are commonly used in AAT along with the corresponding margins used in the economic reserve. This immediately raises a question with regard to the appropriate level of margins to which the actuary must apply judgment.

A company subject to the regulation of two jurisdictions (e.g., United States and Canada) may find itself with conflicting guidance with regard to the establishment of margins on its liability assumptions. For example, the Canadian Institute of Actuaries (CIA) indicates that margins should be defined in terms of the curtate life expectancy within a particular range whereas principle-based reserves (PBR) (most recent guidance on margins for mortality in the United States) will specify margins on the basis of a credibility analysis, with weaker credibility requiring higher margins all else equal.

Per the CIA: “*The low and high margins for adverse deviations for the mortality rate per 1,000 are respectively an addition of 3.75 and 15, each divided by the best estimate curtate expectation of life at the life insured’s projected attained age.*”<sup>1</sup>

In contrast, for new business issued under PBR, the margins on the best-estimate mortality assumptions are determined based on the credibility of the experience data based on attained age only. The actuary may choose between the Buhlmann method and the Limited Fluctuation Credibility Theory (LFCT) with a confidence level of 95 percent and error margin no greater

than 5 percent. Lower credibility driven by higher expected variance in the sample distribution leads to higher margins. Credibility is quantified using a ratio idiosyncratic to the credibility method, but which generally captures the quotient of number of actual observations against the number of observations required for full credibility, not to exceed one.

The margins for the CIA ( $9/e_x$ ) vs. the PBR approach (Buhlmann method with 90 percent credibility) are shown in Table 1 for a 45-year-old male non-smoker at issue.

Table 1

Attained Age	Duration	2015 VBT $q_x$	$e_x$	CIA % Increase	PBR % Increase
45	1	0.35	39.63	64.89%	7.30%
46	2	0.49	38.64	47.53%	7.30%
47	3	0.63	37.66	37.93%	7.30%
48	4	0.77	36.68	31.86%	7.20%
49	5	0.84	35.71	30.00%	7.20%
50	6	0.94	34.74	27.56%	7.10%
51	7	1.10	33.78	24.22%	7.10%
52	8	1.29	32.81	21.26%	7.00%
53	9	1.47	31.86	19.22%	7.00%
54	10	1.65	30.90	17.65%	6.90%
55	11	1.88	29.95	15.98%	6.90%
56	12	2.16	29.01	14.36%	6.80%
57	13	2.49	28.07	12.88%	6.80%
58	14	2.82	27.14	11.76%	6.60%
59	15	3.22	26.22	10.66%	6.60%
60	16	3.74	25.30	9.51%	6.50%
61	17	4.33	24.40	8.52%	6.50%
62	18	4.84	23.51	7.91%	6.40%
63	19	5.25	22.62	7.58%	6.40%
64	20	5.72	21.74	7.24%	6.20%
65	21	6.27	20.86	6.88%	6.20%
66	22	7.15	20.00	6.30%	6.10%
67	23	8.11	19.14	5.80%	6.10%
68	24	9.13	18.30	5.39%	5.90%
69	25	10.21	17.46	5.05%	5.90%
70	26	11.47	16.64	4.71%	5.70%
71	27	12.86	15.84	4.42%	5.70%
72	28	14.52	15.04	4.12%	5.60%
73	29	16.46	14.27	3.83%	5.60%
74	30	18.67	13.50	3.57%	5.40%

There is very little guidance on the choice of starting assets.

### Dynamic Lapse Function

Q71 in the practice note addresses dynamic lapse modeling. The considerations are product, policy duration, level of surrender charges, market and many others. Dynamic lapse functions are required for annuities by New York's Special Consideration Letter. They should be used for life products as well to be conservative, although the actuary has discretion in deciding whether to do so. According to a survey by the Academy, roughly three-quarters of appointed actuaries used dynamic lapse assumptions for at least one of the tested products.

Dynamic lapse assumptions have been studied at length for annuities products, but have a number of specific considerations for life products. Dynamic behavior for life products is reduced to the extent that the block has matured, some of the business has migrated to less preferred risk classes, the new select and ultimate COI structure is of higher cost, and new surrender charges will begin. All of the block will age and therefore will have higher COI charges. Because of all these reasons, a liabilities portfolio would be very unlikely to respond to higher interest rates, even under severe shock. The sensitivity would come from a shock economic scenario (e.g., a recession in which policyholders access cash values or stop paying premiums).

### Starting Assets

There is very little guidance on the choice of starting assets. Q14 describes allocations among lines, with most companies using formal segmentation. The methodology question in application of these techniques is whether the starting assets should be trued-up to the actuarial reserves using pro-rata or with cash. Most actuarial models have a switch that would allow either approach to be modeled. In the current interest rate environment, a model that trues up with cash will most likely have lower yield than the model that trues up pro-rata.

Another methodology question related to starting assets is what assets should be used if the model needs more assets. This could happen because of either a need to set up additional AAT reserves or because the asset segment is managed on an economic basis and holds assets lower than the statutory reserve. The most common approach is to use a pro-rata in-

crease in the portfolio (assuming there are sufficient assets in other segments or surplus). Another approach is to use assets from surplus or other segments directly. Although sounding like first-principles, the latter approach could distort the ALM balance of the portfolio. Another way to think about this issue is what assets your company would actually manage to in that segment if you needed more assets.

### Borrowing in the Model

It is a natural consequence that at least some instances of AAT will produce periods of negative surplus. In these cases, a modeling decision must be made about how to capture the source of funding for the shortfall. For example, if AAT is being performed on one asset segment then it is possible to assume that shortfalls in the projection may be funded by borrowing from another asset segment. The effect, however, should be for the borrowing segment to absorb the impact of the borrowing and to leave any other segments whole. Hence, a borrowing rate must be assumed to compensate the lending segment for the assets borrowed to cover the shortfall.

The purpose of borrowing is not to create leverage. Rather than a primary strategy to take advantage of surplus rates higher than a borrowing rate, borrowing should be seen as a secondary strategy meant to cover negative interim surplus.

### Interim Negative Surplus

The question of interim results is discussed in Q92, with most companies considering interim results important. The Regulatory Asset Adequacy Issues Summary (RAAIS), mandated to be filed in some states, requires commentary on interim negatives. The response to the question in the practice note points to most companies looking at book value surplus in examining interim results. There is a methodology choice on how assets that have significant difference in book value and market value should be considered. For example, real estate funds can develop significant differences in market value that was modeled to grow over time and book value that was projected to depreciate over time. One approach is to assume that in the case of a shortfall in assets, these assets could be liquidated for cash and cash reinvested; in effect this approach transforms market value gains into book value.

## CONCLUSION

This article went through a number of methodology choices that actuaries face when conducting AAT work. The anchor in these decisions is whether the outcome makes sense from first principles. For example, in the example above on interim values and real estate, if the company's investment strategy or the economic scenario would call for borrowing first before sales of real estate then the modeling of trading of real estate would not be appropriate. There are many standards and regulations to guide actuarial work on cash flow testing. Another example

of guidance is the NY Special Considerations Letter. This is the letter from NYDFS that usually comes out at the end of October and prescribes various approaches for cash flow testing in NY domiciled companies. The abundance of guidance still leaves a lot of room for actuaries to make methodology choices. There is only one guidance at the end of the day and that is common sense. ■

#### ENDNOTE

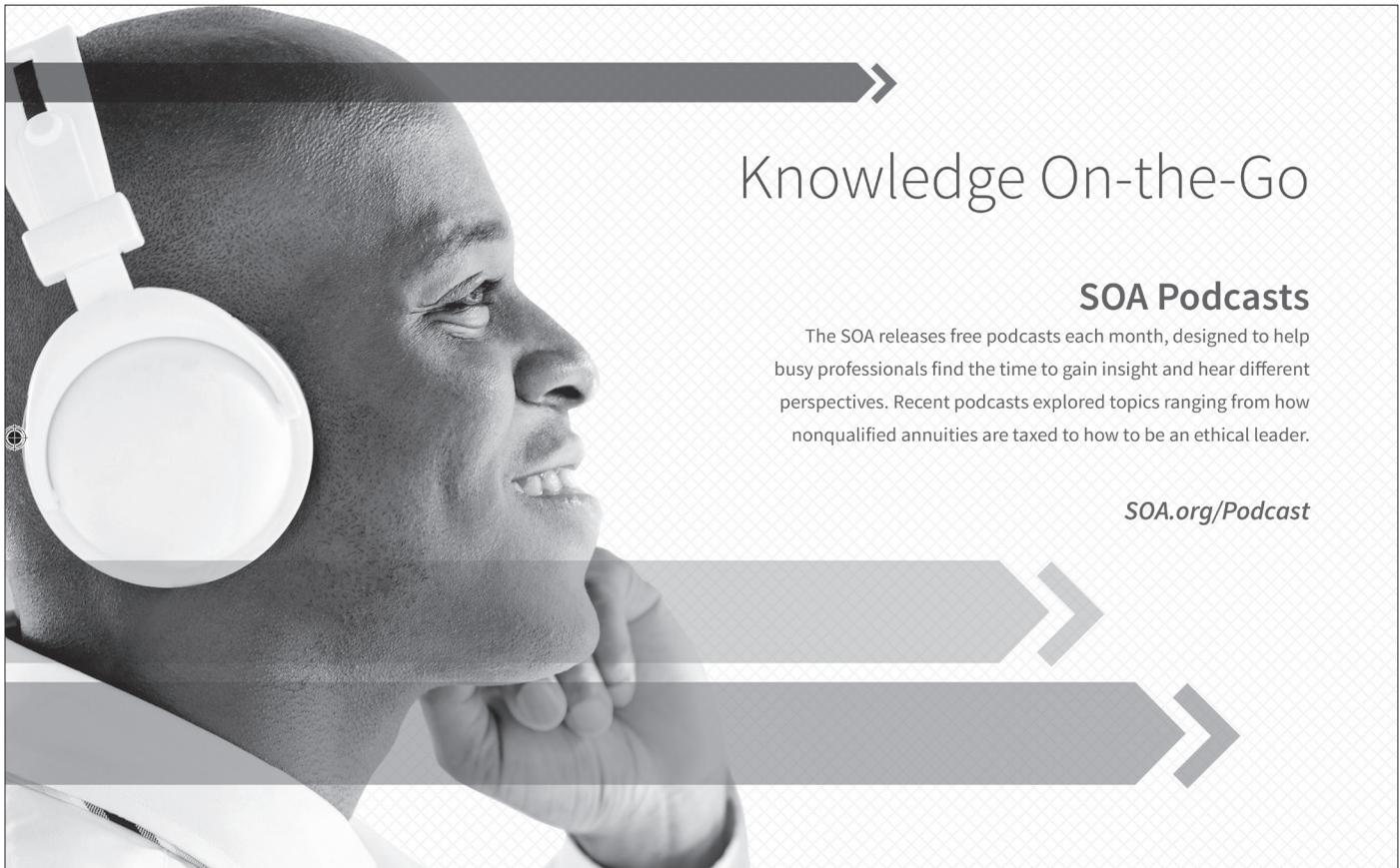
1 <https://www.cia-ica.ca/docs/default-source/2005/205007e.pdf?sfvrsn=0>



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# Financial Reporting Research Update

By Jim Hawke and Ronora Stryker

**R**esearch is a primary mission of the Financial Reporting Section and a significant use of our section dues revenue. Here is an update, as of Sept. 23, 2016, on projects in process, on the horizon, and recently completed.

## ON THE HORIZON ...

**Impact of Targeted Changes to US GAAP**—the council has received a proposal for a project to look at how companies will address the various new requirements. We will likely move forward when FASB's new guidance comes out.

**Expansion of the 2015 report on Earnings Emergence Under Multiple Financial Reporting Bases** to examine additional products is 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 is reviewing bids.

**Simplified methods for principle-based reserve calculations**—the project oversight group has selected the researcher.

**Modern Deterministic Scenarios**—a review of possible deterministic scenario sets that could be useful to company management, regulators, and rating agencies under PBA. The POG has selected the researcher and work is underway. A session was held at the Valuation Actuary Symposium on this.

**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 will be devoted to this.

**PBA Beginning Tales**—A supplement to the PBA Implementation Guide, this report chronicles the experiences of a few companies in implementing VM-20. The report has been completed and is in the publication stage.

## COMPLETED IN 2015 AND 2016 ...

**PBA Implementation Guide Update:** <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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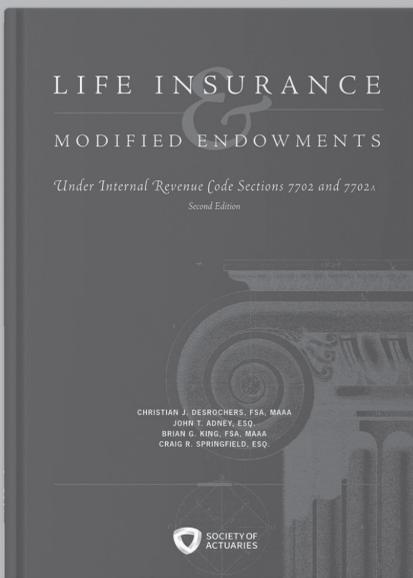


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