Session 102 PD - Impact of VM-20 on Life Insurance Pricing

Moderator:
Trevor D. Huseman, FSA, MAAA

Presenters:
Carrie Lee Kelley, FSA, MAAA
William Gus Mehilos, FSA, MAAA
2017 SOA Annual Meeting & Exhibit

Session 102 – Impact of VM-20 on Life Insurance Pricing

Moderator: Trevor Huseman, FSA, MAAA
Presenters: Bill Mehilos, FSA, MAAA
            Carrie Kelley, FSA, MAAA

October 17, 2017
Active participation in the Society of Actuaries is an important aspect of membership. While the positive contributions of professional societies and associations are well-recognized and encouraged, association activities are vulnerable to close antitrust scrutiny. By their very nature, associations bring together industry competitors and other market participants.

The United States antitrust laws aim to protect consumers by preserving the free economy and prohibiting anti-competitive business practices; they promote competition. There are both state and federal antitrust laws, although state antitrust laws closely follow federal law. The Sherman Act, is the primary U.S. antitrust law pertaining to association activities. The Sherman Act prohibits every contract, combination or conspiracy that places an unreasonable restraint on trade. There are, however, some activities that are illegal under all circumstances, such as price fixing, market allocation and collusive bidding.

There is no safe harbor under the antitrust law for professional association activities. Therefore, association meeting participants should refrain from discussing any activity that could potentially be construed as having an anti-competitive effect. Discussions relating to product or service pricing, market allocations, membership restrictions, product standardization or other conditions on trade could arguably be perceived as a restraint on trade and may expose the SOA and its members to antitrust enforcement procedures.

While participating in all SOA in person meetings, webinars, teleconferences or side discussions, you should avoid discussing competitively sensitive information with competitors and follow these guidelines:

- **Do not** discuss prices for services or products or anything else that might affect prices
- **Do not** discuss what you or other entities plan to do in a particular geographic or product markets or with particular customers.
- **Do not** speak on behalf of the SOA or any of its committees unless specifically authorized to do so.
- **Do** leave a meeting where any anticompetitive pricing or market allocation discussion occurs.
- **Do** alert SOA staff and/or legal counsel to any concerning discussions.
- **Do** consult with legal counsel before raising any matter or making a statement that may involve competitively sensitive information.

Adherence to these guidelines involves not only avoidance of antitrust violations, but avoidance of behavior which might be so construed. These guidelines only provide an overview of prohibited activities. SOA legal counsel reviews meeting agenda and materials as deemed appropriate and any discussion that departs from the formal agenda should be scrutinized carefully. Antitrust compliance is everyone’s responsibility; however, please seek legal counsel if you have any questions or concerns.
Presentation Disclaimer

Presentations are intended for educational purposes only and do not replace independent professional judgment. Statements of fact and opinions expressed are those of the participants individually and, unless expressly stated to the contrary, are not the opinion or position of the Society of Actuaries, its cosponsors or its committees. The Society of Actuaries does not endorse or approve, and assumes no responsibility for, the content, accuracy or completeness of the information presented. Attendees should note that the sessions are audio-recorded and may be published in various media, including print, audio and video formats without further notice.
Agenda

- Intro to Assumption Setting
- Setting Your Prudent Estimate Assumptions
- Miscellaneous Pricing Considerations
- Modeling
Intro to Assumption Setting
# Introduction to PBR assumptions

Focus on two assumption sets

<table>
<thead>
<tr>
<th>Prescribed assumptions include mortality, lapse, and discount rates</th>
<th>Methods consistent with prior formulaic reserve calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prudent estimate assumption methodology provides some guidance but leaves a lot of room for judgment</td>
<td>Assumptions are company experience plus a margin</td>
</tr>
<tr>
<td></td>
<td>Some aspects of the mortality assumption include a fair amount of prescription</td>
</tr>
<tr>
<td></td>
<td>Other liability assumptions are less prescribed</td>
</tr>
</tbody>
</table>
NPR prescribed components
Little change to what you already know

- **Mortality**
  - 2017 CSO and 2017 CSO Preferred Structure (2001 CSO tables are available during transition)
  - GI/SI: 2017 table in development for use

- **Interest Rates**
  - Interest rates are calendar year rates that are not unlocked for issue year blocks
  - Interest rates remain unchanged if they do not differ from prior year calculated interest rates by 0.50%

- **Lapse Rates**
  - ULSG lapse rates are determined based on the expected funding level of secondary guarantees
  - Lapse rates for the UL w/o SG reserve floor is 0%
  - Term product lapse rates are prescribed and vary by guarantee duration and premium jump
Setting Your Prudent Estimate Assumptions
What is a prudent estimate assumption

- Section 9 of VM-20 covers prudent estimate assumptions
- Risk factor that is not prescribed or stochastically modeled
- Anticipated experience plus a margin
- Relevant and credible company experience should be used where available
- Combine relevant less credible data with other data using accepted credibility methods
- Where credibility theory is of limited use rely on other accepted actuarial practices
  - Premium patterns do not lend themselves well to credibility methods
  - Lack of industry data may prevent the use of credibility blending
Who sets prudent estimate assumptions?

Overlap in responsibilities

- For liability assumptions the Prudent Estimate = Company Experience + Margin
- Other caveats may apply e.g., mortality
- Company experience may be reasonably consistent with best estimate assumptions
- Companies may wish to minimize assumption sets by combining best estimate and company experience where it makes sense to do so
- May need some modifications from how best estimate is calculated now to comply with company experience
  - Mortality may not be a good fit for combining
  - Minor changes for non-mortality

Who is currently responsible for best estimate assumptions? May be natural for ownership of company experience assumptions

- Margins, mortality grading, and application of judgment, may be more heavily developed with the valuation team
How to set assumptions

General guidance

- Reflect expectations with variations by appropriate characteristics (gender, age, level of account, etc.)
- Reflect the likelihood that policyholder behavior will be affected by any significant increase in value of product options
- Dynamic modeling should be used where appropriate
- Appropriate margins
  - Should increase reserves
  - Assume independent variables, some adjustments for correlation allowed
  - Level of uncertainty should impact margin
  - Not required if variations in the assumption do not have a material impact
- Sensitivity testing
  - Confirm assumptions are set at the conservative end of a plausible range
  - Understand the materiality of prudent estimate assumptions on modeled reserve
- Annual review
Prudent estimate mortality assumptions
Step by step process

**Step 1:** Determine Company Mortality Segments

**Step 2:** Determine Own Company Experience

**Step 3:** Determine margins based on credibility

**Step 4:** Applicable industry mortality table
- *Add margins for industry table*

**Step 5:** Grade to industry table based upon credibility & sufficient data period

Prudent Estimate Mortality
## Other Assumptions

Additional considerations by product

<table>
<thead>
<tr>
<th>Category</th>
<th>Assumption Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term</td>
<td>Lapses, post level profits, conversions</td>
</tr>
<tr>
<td>ULSG</td>
<td>Lapse, premiums, withdrawals/surrenders</td>
</tr>
<tr>
<td>Corporate Assumptions</td>
<td>Expenses and taxes</td>
</tr>
<tr>
<td>Non Guaranteed Elements</td>
<td>COIs, crediting spreads, etc.</td>
</tr>
<tr>
<td>Reinsurance</td>
<td>Counterparty actions</td>
</tr>
<tr>
<td>Assets</td>
<td>Interest rate spread, default cost</td>
</tr>
</tbody>
</table>
Miscellaneous Pricing Considerations
Assumption unlocking
Pricing for volatility

- Assumptions for the modeled reserve may change at each valuation date
- This increases the volatility of earnings for products
- Pricing sensitivities will be more complex to model
- Changes in the best estimate assumption likely mean changes in your prudent estimate assumptions
- Pricing actuaries will need to be comfortable with wider ranges of pricing results
- May initially need more sensitivities to understand how reserves change
- Companies will need to be comfortable with modeling VM-20 sensitivities and outer loop projections
Modeling
How do I model PBR over time?

- Projecting VM-20 modeled reserves will add complexity to models
- How to account for inforce aging at best estimate assumptions with prudent estimate reserves?
- Should increased credibility and other items that may impact prudent estimate assumptions be factored into the model?
- How are sensitivity runs impacted?
- What simplifications can be made?
Modeling complexities

- Stochastic Models
  - How many scenarios are adequate for pricing?
  - Who owns the stochastic exclusion tests?
- Inner and outer loops
  - Inforce ages at best estimate assumption
  - VM-20 is run with prudent estimate assumptions
  - Future mortality improvement may be applicable to the inforce but is not allowed for projecting modeled reserves
  - Historical mortality improvement may be applied to the assumption
- How many issue years are modeled? Does aggregating across multiple issue years impact results?
- Should you price/model different products together? What impact does aggregation have?
- Are your models setup for multiple issue years or products? If not how to estimate?
Modeling assumptions

- Where to capture complex methodology such as mortality?
- Projecting prudent best estimate assumptions?
  - Do you capture improvements to credibility and improved margins?
  - What would you assume?
  - How frequently do you change these items in the projection?
- How do sensitivities impact the projected reserve?
  - An immediate change to prudent best estimate assumptions?
  - An adjustment over time?
Modeling simplifications

- How is pricing different from valuation?
  - How are your goals different?
  - If you can create a product where the NPR governs is life is easier?
  - How do you determine how many scenarios? System constraints or first principles?
  - How is your final answer impacted?

- How precise does the reserve component need to be to reasonably capture profitability?

- What nuances of VM-20 can be simplified for the pricing model?
  - What is the impact of these simplifications?

- How frequently should you run stochastic models? Can you live with approximations for some iterative steps?
Model governance

- Principle Based Reserve Model Governance Practice Note
- How are pricing and valuation models different?
- Who owns the models? How much consistency should they have?
- How are the models and assumptions governed?
- How do the pricing models fit and stay consistent with valuation models?
- If the pricing actuary is making changes do those impact valuation?
## Summary

- Two assumption Sets
- NPR - prescribed
- Prudent – requires judgment
- Special pricing considerations
- Modeling simplifications
Conclusions

- Companies need to begin analyzing their profitability under VM-20
- VM-20 will add additional complexity to the pricing process
- More communication will be necessary between valuation and pricing
- Assumption and model governance will be critical
- Modeling simplifications can be considered for pricing
- Start now!
Contact

Carrie Kelley, FSA, MAAA
Consultant
One Alliance Center, 3500 Lenox Road, Suite 900, Atlanta, GA 30326-4238

T  +1 678 684 0613
E  Carrie.Kelley@willistowerswatson.com
Impact of VM-20 on Life Insurance Pricing

(SOA Annual Meeting: Session 102)

Bill Mehilos, FSA, MAAA

October 17, 2017
Limitations

- The content of this presentation represents the views of the presenter and not those of Milliman.
- These slides have been prepared for the 2017 SOA Annual Meeting for the educational use of meeting participants. There are no intended beneficiaries of this work.
- This presentation may not be distributed, disclosed, copied or otherwise furnished to any additional party without our prior written consent. Any distribution of this presentation must be in its entirety.
- The presented information is intended to be valid as of the date it has been prepared. Its future validity depends on the further development of market events, regulations, and standards of practice.
- This presentation is not intended to contain material that represents an actuarial opinion. The professionals responsible for preparing this report are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries.
VM-20 Background
VM-20 is here!!!

- Effective January 1, 2017
- 3 year transition period (January 1, 2020)
- Principle-based reserves
- 2017 CSO Table

References
- Valuation Manual (NAIC adoptions through 8/29/2016)
- 2017 CSO Tables
  https://www.soa.org/experience-studies/2015/2017-cso-tables/
Reserves under VM-20

Reserve conceptually is the max of NPR, DR, SR

- Net Premium Reserve (NPR)
- Deterministic Exclusion Test
- Deterministic Reserve (DR)
- Stochastic Exclusion Test
- Stochastic Reserve (SR)
Companywide Exemption

- **Premium threshold**
  - Ordinary life premiums for each legal entity must be less than $300M
  - Ordinary life premiums for associated group must be less than $600M

- **RBC threshold**
  - RBC must be at least 450% Authorized Control Level

- **No “material” ULSGs**
  - Must be a specified premium design (not shadow account)
  - “short” duration of secondary guaranteed based on issue age
  - $\text{PV}(\text{specified premiums})$ must be greater than $\text{PV}(\text{net premiums})$ over the maximum duration of secondary guarantee
NPR Considerations
NPR for Term: Section 3.B.4

- Similar to CRVM
  \[ \text{NPR} = \text{PV(Ben)} - \text{PV(NP)} \]
- Net premium based Adjusted Gross Premiums
- Prescribed mortality and lapses
- Shock lapse adjustments
NPR for ULSG

NPR for ULSG is greater of* reserve under Section 3.B.5 and reserve under Section 3.B.6

**Section 3.B.5**
- Ignores secondary guarantee
- Reserve = Funding Ratio * \[ PV(Ben) – PV(NP) – UnamortEA \]

**Section 3.B.6**
- Focuses secondary guarantee
- Reserve = Funding Ratio * PV(Ben) – UnamortEA

*floored at max of cash value and amount to cover charges until next period
ULSG NPR Funding Ratio under Section 3.B.6

Funding Ratio
= Actual Secondary Guar / Fully Funded Secondary Guar

Specified Premium designs
- Actual Secondary Guarantee
- Fully Funded Guarantee
- AG38 funding ratio is based on excess premiums
- Causes Funding Ratio under VM-20 to be higher than under AG38
- NAIC working group is reviewing
ULSG NPR Funding Ratio: Specified Premium Example

Generic Policy with Hypothetical Unitized Values
Issued as 65 year-old female, currently in policy year 10
Accumulated Minimum Premium at t=10: $250

Fully Funded basis at t=10
  Accumulated Premium: $600
  Accumulated Excess Premium: $600 - $250 = $350

Actuals at t=10
  Accumulated Premium: $450
  Accumulated Excess Premium: $450 - $250 = $200

Funding Ratios
  AG38 ➔ 200 / 350 = 57.1%
  VM-20 ➔ 450 / 600 = 75.0%
Example: ULSG NPR Funding Ratio under Section 3.B.6

NPR/unit by policy year

- Blue line: VM20 Funding Ratio
- Orange line: AG38 Funding Ratio
Deterministic / Stochastic Reserve Considerations
Deterministic Reserve

- Aggregate reserve
- Present value of liability cash flows discounted at investment portfolio rate
- Ability to use prudent best estimate
- Uses projection model that is dependent on assets
Deterministic Reserve Implementation

- **Step 1:** GPV
- **Step 2:** Valuation Date DR without Margins
- **Step 3:** Projection of DR without Margins
- **Step 4:** Valuation Date DR with Margins
- **Step 5:** Projection of DR with Margins
Stochastic Reserve

- Similar methodology as DR, but with Academy prescribed scenarios
- CTE70 of greatest present value of accumulated deficiencies under those scenarios
- Number of scenarios is enough such that adding more scenarios doesn’t materially change results
- Stochastic Exclusion Test (SET) should be considered
- Run time concerns
Other Considerations
Reinsurance

- Under CRVM, reserve credit for ceding company is equal to reserve held by reinsurer
- Under VM-20, ceding company and reinsurer have their own projection of cash flows based on their own experience and credibility
- How does this impact pricing for ceding company?
- What if margin impact causes non-intuitive results?
Sensitivity

- Companies anticipate increasing sensitivity analysis
- Clarity around goal of sensitivities
  - Stress Test of reserves and cash flows
  - Understand impact of various scenarios on reserves
- Alternative Profit Measures
Pricing/Implementation

- Within a company, who is taking the lead?
- Integration of inforce models
- Potential Simplifications
- Pricing assumptions around exclusion tests
- Impact on Tax Reserves
- Potential product impacts
  - NPR funding ratio
  - Post level term period
  - Term vs. ULSG
Thank you for your time!

Bill Mehilos, FSA, MAAA
Consulting Actuary
Indianapolis, IN, USA
bill.mehilos@milliman.com
+1 317.524.3639