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Chicago, IL

Updates on PBR for Annuities (VM-21 and VM-23)

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UPDATES ON PBR FOR ANNUITIES (VM-21 AND VM-23)

EQUITY-BASED INSURANCE GUARANTEES CONFERENCE
CHICAGO, NOVEMBER 11, 2019

Yuan Tao, FSA, MAAA, CFA
Agenda

1 VM-21 overview
2 VM-21 key revisions
3 VM-21 implementation considerations
4 VM-23 updates
Section 1  |  VM-21 overview
VA statutory reform background
Evolution of VA statutory requirements

1. Past
   • Reserves were formulaic (AG 33, AG 34 and AG 39)
   • RBC was factor-based
   • Did not reflect market risks inherent in variable annuities, particularly with regard to GMxBs
   • Did not reflect company-specific portfolio risks, hedging practices and the degree of ALM mismatch

2. Present
   • **C 3 Phase II** enacted in 2006
   • **AG 43** enacted in 2009
   • Both are principle-based approach utilizing stochastic projections, subject to a standard scenario floor
   • Attempts to address equity risk, interest rate risk and expense recovery risk associated with VA’s
   • Key shortcomings in the current framework surfaced over time and caused companies to seek captive solutions
   • NAIC commissioned the initiative in 2015 to identify changes

3. Future
   • Revised statutory reserve and C3 framework, effective 1/1/2020
   • Revisions address key issues in the current framework while largely maintaining the current statutory construct
VA statutory reform timeline
The reform is the result of a multi-year NAIC initiative to improve VA statutory accounting

Prior to 2015
NAIC Subgroups discussions

Mid 2015
NAIC commissioned VA reform initiative

Feb – Sept 2017
NAIC conducted second Quantitative Impact Study

Feb – July 2016
NAIC conducted Quantitative Impact Study

Mid 2018:
VAIWG proposed framework revisions

January 1, 2020
Effective date
optional early adoption YE 2019

August 2019
NAIC adopted revised AG43 and VM-21

The revised AG43 and VM-21 have been formally adopted at the 2019 NAIC Summer National Meeting
Current VA statutory framework

Structural misalignments between the stochastic and standard scenario and between AG 43 and C3 Phase II produce unintended results

- C3 charge is the excess of TAR over reserve, can be zeroed out via the use of voluntary reserves
- A binding Standard Scenario effectively removes all hedge reflection within CTE calculations

Total statutory funding required

Max

- Total Asset Req. (C3 Phase II)
- Reserve (AG 43)

Min. weight: 30% if reflecting hedging explicitly, 70% otherwise

Weighted average #1

Min. weight 5%

- CTE 90 (Best-Efforts)
- CTE 90 (Adjusted)

Min. weight 5%

- CDHS permitted, but with lower hedge effectiveness

Max

CTE Amount

Weighted average #2

Max

CTE 70 (Best-Efforts)

Min. weight 5%

- Reflecting CDHS
- Not reflecting CDHS

CTE 70 (Adjusted)
Revised VA statutory framework
Standard projection is aligned with CTE adjusted; reserve and TAR follow the same stochastic distribution

Revised framework reduces disincentive to hedging and lowers balance sheet volatility with better alignment between asset and liability
Section 2  VM-21 key revisions
## Summary of VM-21 updates

### Stochastic (CTE)

1. Remove working reserves when calculating scenario GPVAD
2. Discount deficiencies at net asset earned rate on additional assets
3. Use VM-20 scenario generator for interest and SA returns; only allow proprietary scenario generator when it does not materially reduce TAR
4. Follow VM-20 guidance on GA asset projections
5. Align AG43/VM-21 SS calculations with CTE "adjusted"

### Standard scenario (SS)

5. Remove C3 Phase II standard scenario
6. Calculate C3 as difference between total statutory reserve and CTE 98 on same distribution

### C3 & other topics

6. Permit smoothing to be conducted on the C3 charge, but not on TAR

### Various disclosure requirement changes

- Use SS construct to govern model choices & actuarial assumptions only
- Refresh prescribed PH behavior assumptions to align with industry
- Project SS on an aggregated basis
- Calculate SS based on company-specific market paths, select from a panel of standardized paths
- Allow SS amount to be calculated as a CTE amount with prescribed assumptions

### Align conservatism margin for reflecting non-guaranteed revenue sharing income with historical experience
1. **Remove Working Reserve (WR) from the GPVAD calculation**
   
   Under the current framework, changes in the market conditions result in B/S volatility as hedge gains and losses are not offset by change in WR.

   **Balance sheet at time 0**
   **Balance sheet at time 1**
   *Favorable market conditions*
   **Balance sheet at time 2**
   *Return to time 0 market conditions*

   **Projected balance sheet under the existing framework**

   - **Assets**
   - **Hedge assets**
   - **Fixed income**
   - **Working Reserve**
   - **MV of liabilities**

   - **Carrying value**

   - **Fixed income**

   - **Hedge assets**

   - **Working Reserve**

   - **MV of liabilities**

   - **Insurer hedges on a FV basis; hedge losses offset decrease in FV of liabilities**
   - **Statutory reserves are less market-sensitive and respond more slowly**
   - **May create a deficiency in market conditions favorable to the liability**

   **Carrying value**

   - **Fixed income**

   - **Hedge assets**

   - **Working Reserve**

   - **MV of liabilities**

   - **Carrying value of assets and liabilities return to levels close to time-0 values**
   - **However, point of greatest accumulated deficiency may have already been reached by previous hedge cash flows**

   **The revision removes the Working Reserve from the projection and aligns more closely with other statutory frameworks such as VM-20 and Cash Flow Testing**
Discount rates for accumulated deficiencies

Net asset earned rate (NAER) on additional assets is used to calculate the greatest present value of accumulated deficiency (GPVAD)

**Current framework**

- Current AG 43 guidance is relatively ambiguous with respect to the starting asset amount and the discount rate for deficiencies
- As a result, two different practices are observed in industry:

<table>
<thead>
<tr>
<th>Approach</th>
<th>Implied assets backing reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Set starting assets as CSV or prior quarter’s reserves, then add the CTE 70 of GPVADs</td>
<td>Starting assets included in projection, plus cash available for immediate reinvestment</td>
</tr>
<tr>
<td>B Iteratively solve for starting assets such that the CTE 70 of GPVADs is zero</td>
<td>Assets modeled in the final iteration of starting assets</td>
</tr>
</tbody>
</table>

**Revised framework**

- Allow both approaches, but require accumulated deficiencies to be discounted at the Net Asset Earned Rate (NAER) on Additional Assets
- NAER is defined as earned rate on a “closed portfolio” of general account assets available on the valuation date that do not constitute a part of starting assets
- Intended to capture reinvestment, in line with the company’s investment policy, of coupon and maturity payments of the initial additional asset portfolio
- NAER provides an approximation of approach B without requiring computationally-intensive starting asset iterations

New methodology promotes more accurate reflection of ALM and yield characteristics of assets, and aligns practices across the industry and with VM-20
## Changes to scenario generation (1/2)

### New framework promotes greater consistency and comparability for market participants

<table>
<thead>
<tr>
<th>Proposed changes</th>
<th>Details</th>
<th>Outcomes / implications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Use VM-20 generator for interest rates</td>
<td>• VM-20 scenario generator (ESG) and mean reversion parameter (MRP) are prescribed</td>
<td>• Interest rate scenarios are not prescribed under the current framework</td>
</tr>
<tr>
<td><strong>2</strong> Use VM-20 generator for separate account returns</td>
<td>• VM-20 scenario generator is prescribed, using the same parameters as those used in VM-20 • Require separate account funds to be mapped to a combination of funds from VM-20 generator</td>
<td>• Long-term interest assumption varied significantly between participants; prescribing an ESG and MRP promotes consistency across companies • The VM-20 MRP is informed by prevailing conditions and reacts to historical changes in interest rates</td>
</tr>
<tr>
<td><strong>3</strong> Allow proprietary ESG if and only if they do not materially reduce TAR</td>
<td>• Proprietary generator allowed if – and only if – on an annual basis, the company can demonstrate that use of the proprietary generator produces a TAR not materially less than that produced using prescribed generator</td>
<td>• Limiting use of other ESGs promotes greater consistency and comparability across companies • Requirement for testing ensures robust funding</td>
</tr>
<tr>
<td><strong>4</strong> Introduce principles to govern implied volatility, with a prescribed “safe harbor” approach</td>
<td>• Projected implied volatility surface must be arbitrage-free • Relationships between implied volatility, realized volatility, and short-term asset performance should be consistent with historical data • TAR should not be reduced by assumptions of any realized “spread” between implied and realized volatility • Prescribe a “safe harbor” approach for CDHS reflection, where modeled hedge assets comprise only linear instruments not sensitive to implied volatility</td>
<td>• Current framework does not provide adequate guidance on projecting implied volatility • New framework prevents inappropriate scenario generation from producing unrealizable hedge benefits in tail scenarios</td>
</tr>
</tbody>
</table>

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VM-21 key revisions

Stochastic CTE
Changes to scenario generation (2/2)
A wide variety of MRP levels are currently used; adopting the MRP calculation logic prescribed under VM-20 promotes consistency across companies.

Historical and projected long (20-year) rate

1. Source: "Revisions to AG 43/VM-21 and C3 Phase II, VIWG Proposal, May 31, 2018"

© Oliver Wyman
### Changes to asset and liability projections (1/2)

<table>
<thead>
<tr>
<th>Proposed changes</th>
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<th>Outcomes / implications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Follow VM-20 guidance on general account assets</td>
<td>• Net investment income on reinvestment assets and defaults on general account invested assets follow assumptions prescribed under VM-20</td>
<td>• Net reinvestment spreads are effectively capped at 50/50 A/AA</td>
</tr>
<tr>
<td><strong>2</strong> Permit simplified reflection of hedging</td>
<td>• Permit immediate liquidation of currently-held hedge assets in the CTE (adjusted) run</td>
<td>• Allowing hedge liquidation in the CTE (adjusted) run mitigates penalty on long-dated hedges</td>
</tr>
<tr>
<td></td>
<td>• Permit non-reflection of hedge accounting and unrealized hedge gains or losses in all projections</td>
<td>• Reduces high computational burden of continuously calculating derivatives fair values</td>
</tr>
<tr>
<td><strong>3</strong> Reduce minimum CDHS “error factor”, but require back-testing to support chosen “error factor”</td>
<td>• Replace the current AG 43 “effectiveness factor” calculation for weighting CTE (best-efforts) and CTE (adjusted) with the C3 Phase II “error factor” calculation</td>
<td>• Allowing a lower “error factor” better aligns Statutory liability with economic, enabling fair value hedging</td>
</tr>
<tr>
<td></td>
<td>• Allow “error factor” to reach as low as 5%</td>
<td>• Avoids “double-counting” hedge ineffectiveness, as many insurers already reflect hedge ineffectiveness within the best-efforts run itself</td>
</tr>
<tr>
<td></td>
<td>• Require formal back-testing to assess how well the model is able to replicate the hedging strategy to support the “error factor”</td>
<td></td>
</tr>
<tr>
<td><strong>4</strong> Align conservatism margin for reflecting non-guaranteed revenue sharing income with historical experience</td>
<td>• Replace current AG43 multipliers with new multipliers that linearly grade from 100% of best-estimate in year 1 to 80% in years 5+</td>
<td>• New margin allows for more revenue sharing to be reflected and is more aligned with historical industry revenue sharing experience</td>
</tr>
<tr>
<td></td>
<td>• Remove the 0.25% cap currently within AG43/VM-21 after the sixth projection year</td>
<td></td>
</tr>
</tbody>
</table>
4 Changes to asset and liability projections (2/2)
Reduce minimum CDHS “error factor”, but require back-testing to support chosen “error factor”

Stochastic Reserves = CTE70(best efforts) + E × max[0, CTE70(adjusted) – CTE70(best efforts)]

- Includes current & future hedges
- Includes only current hedges

Company to specify a value for E (the “error factor”) in the range from 5% to 100%

Higher ability of stochastic model to capture all risks → Lower value of E

Formal back testing is required on at least the most recent 12 months

Explicit method (for companies that model hedge CFs directly)
Implicit method (model hedge implicitly by quantifying the cost/benefit of hedging)

The change eliminates existing misalignment on error factor between reserve and RBC, and allows for more credit from CDHS

1. Allowed to reflect no hedge positions, in which case hedge positions held at valuation date are replaced with cash and invested using company’s investment strategy
Standard Projection – new framework

Standard scenario was replaced with a new “Standard Projection” framework which aligns the calculation logic with the CTE adjusted run.

If assumptions are prudently managed, additional reserves are not required.
Prescribed policyholder behavior assumptions have been refreshed to align with industry experience and are more reflective of product features.

<table>
<thead>
<tr>
<th>Product class</th>
<th>General characteristics of behavior assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standalone GMDBs</td>
<td>No withdrawals and high lapses</td>
</tr>
<tr>
<td>GMABs</td>
<td>No withdrawals and low lapses</td>
</tr>
<tr>
<td>GMIBs</td>
<td>No withdrawals, moderate lapses, high annuitization</td>
</tr>
<tr>
<td>GMWBs</td>
<td>Immediate – or as early as possible – and largely efficient withdrawals; moderate lapses</td>
</tr>
</tbody>
</table>

- Mortality is 70% of 1994 GMDB through age 85 graded to 100% at age 115

<table>
<thead>
<tr>
<th>Product class</th>
<th>General characteristics of revisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-rollup GMDBs</td>
<td>Moderate withdrawals and moneyness-sensitive lapses</td>
</tr>
<tr>
<td>Rollup GMDBs</td>
<td>Lower withdrawals and lapses than non-rollup GMDBs</td>
</tr>
<tr>
<td>GMABs</td>
<td>Moderate withdrawals</td>
</tr>
<tr>
<td>Traditional GMIBs</td>
<td>Moderate withdrawals and lower annuitizations</td>
</tr>
<tr>
<td>Hybrid GMIBs</td>
<td>Overall behavior aligns closely to comparable GMWBs</td>
</tr>
<tr>
<td>GMWBs</td>
<td>Withdrawals reflect incentives, prescribe a <strong>withdrawal delay cohort method</strong>; More sensitive lapses</td>
</tr>
</tbody>
</table>

- Distinct assumptions for 403(b) business
- Mortality is 2012 IAM Basic with scale G2, with multipliers distinct by with and without VAGLB

**Withdrawal delay cohort method imposes implementation challenges**
Standard Projection - prescribed PHB assumptions (2/2)
Withdrawal assumption uses a cohort-based approach that distinguishes between policies with different withdrawal status

Summary of GMWB / hybrid GMIB withdrawal assumptions

Did the policyholder withdraw in the previous policy year?
- Yes
  Did the policyholder take an excess withdrawal in previous policy year?
    - Yes
      Conforming withdrawers
      - Withdraw 70% or 90% of guaranteed maximum annual withdrawal amount until account depletion, then 100% thereafter
      - 70% is applied to non-lifetime GMWB
      - 90% is applied to lifetime GMWB and hybrid GMIB
    - No
      Non-conforming withdrawers and non-withdrawers
      - Use the Withdrawal Delay Cohort Method to construct cohorts with an issue-age based cumulative withdrawal curve
      - The curve is discretized into bi-annual withdrawal cohorts, as illustrated below:

- No

• Model the overall contract cash flows as a weighted average of the cash flows from the cohorts
### RBC C3 charge

**Calculate C3 as the difference between stat reserve and CTE 98 on the same distribution of Scenario GPVADs; permit smoothing on C3 charge but not on TAR**

#### Current framework

- Setting aside voluntary reserve can effectively eliminate C3 charge
- There are numerous differences between the C3 Phase II and AG 43 calculations (tax basis, reflection of hedging, market path in standard scenario)

#### Revised framework

**C3 = \[ \frac{max(CTE\ 90_{C3P2}, SSA_{C3P2}) - Stat\ Reserve}{\text{CTE 98}} \]**

- Modeled cash flows ignore the effect of FIT
- GPVAD for each scenario is the same as that for reserve calculation

**C3 = 25\% \times \left( \frac{(CTE\ 98_{Pre-tax} + Add'l\ Std\ Proj\ Amt - Stat\ Reserve) \times (1 - FIT) - (Stat\ Reserve - Tax\ Reserve) \times FIT}{Stat\ Reserve - Tax\ Reserve} \right)\text{ Capped at amount of non-admitted DTAs attributable to VA portfolio}**

- The effect of FIT is reflected in the projection of Accumulated Deficiencies for each scenario
- Reflect evolution of tax reserves in the projection, taking into account restrictions around the size of tax reserves (e.g. floored at CSV of each contract)

### Using a single stochastic distribution reduces non-economic volatility in RBC ratio; use of CTE 98 and \(\frac{1}{4}\) scalar reduces impact of voluntary reserves on the C3 charge
Section 3  VM-21 implementation considerations
VM-21 implementation considerations - methodology decisions

VM-21 requires companies to make several significant methodology decisions

1. Discount rate methodology
   - Direct iteration method or discount at NEAR?

2. Standard projection method
   - CMSP or CTEPA?

3. Hedging reflection
   - Adopt CDHS?
   - Implicit or explicit method?
   - Greeks to hedge

4. GLWB / GMIB claims modeling
   - Model cash or payout annuity reserve (VM-22)?

5. C3 tax methodology
   - Reflect FIT within or outside the cash flow model?

Methodology decisions should consider financial impacts and balance sheet stability as well as ease of implementation.
VM-21 implementation considerations - Standard Projection

Prescribed assumptions for Standard Projection impose challenges to modeling, assumption setting and governance

**Modeling:**
- Need capability to use alternative set of assumptions
- Accurate calculation of GAPV for various GLB riders
- How to model the withdrawal delay cohort method

**Governance:**
- Complexity of modeling imposes governance challenges
- How to ensure model accuracy

**Assumption setting:**
- How do company assumptions compare to prescribed assumptions
- What to do about the assumption gap
Section 4 | VM-23 updates
Causes of AG 33 redundant reserves and the need for VM-23
Conservative prescribed assumptions lead US statutory reserves to be higher than “economic reserves”

<table>
<thead>
<tr>
<th>AG 33 RESERVES</th>
<th>ECONOMIC RESERVES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policyholder utilization</strong></td>
<td><strong>Policyholder utilization</strong></td>
</tr>
<tr>
<td>• Optimal policyholder utilization</td>
<td>• Based on company pricing assumptions</td>
</tr>
<tr>
<td>• Maximum present value of all benefit streams</td>
<td>• Experience is limited for GLWB benefits (can look to VAGLB)</td>
</tr>
<tr>
<td><strong>Discount rates</strong></td>
<td><strong>Discount rates</strong></td>
</tr>
<tr>
<td>• Prescribed by regulation</td>
<td>• Related to the portfolio earned and expected reinvestment rates</td>
</tr>
<tr>
<td>• No connection to the “actual” portfolio earned rate</td>
<td>• Responsive to current interest rate environment</td>
</tr>
<tr>
<td><strong>Mortality assumption</strong></td>
<td><strong>Mortality assumption</strong></td>
</tr>
<tr>
<td>• Mortality assumption has lower mortality than typical company pricing assumptions</td>
<td>• Based on company experience</td>
</tr>
<tr>
<td></td>
<td>• Typically higher mortality than the Annuity 2012 IAR</td>
</tr>
</tbody>
</table>
History of PBR for fixed annuities

2009 LATF report
Provides interpretation for AG 33 issues and supports a PBR method

March 2012 Academy survey results
Suggesting redundant reserves for FAs with GLBs exist

2013-2015
ARWG pursues Representative Scenario Method (RSM)

VM-20
Meets the NAIC adoption threshold

2013-2015
ARWG pursues Representative Scenario Method (RSM)

VM-22
SPIA discount rate changes
Became effective

Exclusions tests
If passed the company would use CARVM

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ARWG pursues Representative Scenario Method (RSM)

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Meets the NAIC adoption threshold

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1/1/2022
Implementation of Fixed Annuity PBR

AG 43-type approach
explored by the industry

Academy Life Practice Council
Decides to move away from RSM

ARWG refresh
Focus on modeled reserve, while VAIWG revises VM-21

ARWG internal discussions
Proposed developing a detailed methodology

Clarify scope, direction, and process

LATF and Academy
Align on fixed annuity PBR principles

Reaffirm vision and objectives

VM-23 updates
Product inclusion under VM-23

Fixed products with GLWB riders will be part of VM-23, it is not certain if simpler fixed products or structured annuities will be included.

<table>
<thead>
<tr>
<th>Product</th>
<th>VM-23 inclusion</th>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income annuities</td>
<td>Possibly included</td>
<td>Recent addition of liquidity riders makes it more likely to be included in VM-23</td>
</tr>
<tr>
<td>Fixed annuities</td>
<td>Not included</td>
<td>Unlikely to be included in VM-23 given product simplicity</td>
</tr>
<tr>
<td>Fixed index annuities</td>
<td>Not included</td>
<td>Unlikely to be included in VM-23 given product simplicity</td>
</tr>
<tr>
<td>Fixed annuities with GLWB</td>
<td>Included</td>
<td>Key driver of the development of VM-23</td>
</tr>
<tr>
<td>Fixed index annuities with GLWB</td>
<td>Possibly included</td>
<td>Key driver of the development of VM-23</td>
</tr>
<tr>
<td>Structured annuities</td>
<td>Reserved for under VM-21</td>
<td>Feasible to be included in VM-23, many are reserving using VM-21 currently</td>
</tr>
<tr>
<td>Variable annuities</td>
<td>Reserved for under VM-21</td>
<td>Reserved for under VM-21</td>
</tr>
<tr>
<td>Variable annuities with GLWB</td>
<td>Not included</td>
<td></td>
</tr>
</tbody>
</table>
Exclusion test
VM-23 will apply to fixed annuities, there is a planned exclusion test that is to be determined

Proposed LATF VM-23 approach

VM-23 Calculations

Exclusion Test

Passed
Follow Current Actuarial Guidelines (e.g. AG 33, AG 35)

Not Passed
Follow a VM-21–like Framework
Key considerations in development of VM-23

1. Investment spread limitations
2. Actuarial assumption restrictions
3. Hedging
4. Reinsurance modeling
5. NGE rate setting
6. Starting asset value
7. Will there be capital framework review?
8. Will consolidation with VM-21 be allowed?