

Variable Annuity Reserve and Capital Reforms: Key Implementation and Reporting Issues

September 2, 2020



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Agenda



Background	<i>Parul</i>
Standard Projection	<i>Zohair</i>
Academy Interest Rate Scenario Generator	<i>Zohair</i>
Hedging & Other topics	<i>Parul</i>
VM-G & VM-31	<i>Parul</i>
Stochastic Projections / Hedging – Industry Practices	<i>Yuan</i>
New York Regulation 213	<i>Yuan</i>
Q&A	

Background



VM-21 VA reserve and capital framework effective 1/1/2020. Economic scenario and asset assumption framework aligns with VM-20.



Principle Based Reserve (PBR) Actuarial Report required under VM-31. Guidance for Board and Senior Management provided under VM-G.



Recent market turmoil with historical low interest rate levels has led to discussion around suitability of interest rate generator. Companies continue to further their understanding of VM-21 / RBC ratio volatility versus economic hedge target.

Hedging and Other topics



Hedging

$$\text{Stochastic Reserve} = \text{CTE70}_{(\text{best efforts})} + E \times \text{Max}[0, \text{CTE70}_{(\text{adjusted})} - \text{CTE70}_{(\text{best efforts})}]$$

- *CTE70(adjusted)* reflects only currently held hedges (or simplified as cash reinvested)
 - *CTE70(best efforts)* reflects both current and future hedges.
 - Hedging strategy must be a clearly defined hedging strategy
 - Companies may choose between Implicit and Explicit Hedging
 - *E is the Error Factor*, ranging between 5% to 100%. Greater the ability of the stochastic model to capture all risks and uncertainties, lower the value of E.
 - Formal back testing is required on at least the most recent 12 months
 - E-factor could be temporarily larger for changes to hedge program, methodology or modeling.
-

Clearly Defined Hedging Strategy (CDHS)

A strategy undertaken by a company to manage risks through the future purchase or sale of hedging instruments and the opening and closing of hedging positions that meet the criteria specified in the applicable reserve requirement section of the Valuation Manual. The hedge strategy may be dynamic, static or a combination thereof.

The strategy must identify:

- a) The specific risks being hedged (e.g., delta, rho, vega, etc.).
- b) The hedge objectives.
- c) The risks not being hedged (e.g., variation from expected mortality, withdrawal, and other utilization or decrement rates assumed in the hedging strategy, etc.).
- d) The financial instruments that will be used to hedge the risks.
- e) The hedge trading rules, including the permitted tolerances from hedging objectives.
- f) The metric(s) for measuring hedging effectiveness.
- g) The criteria that will be used to measure hedging effectiveness.
- h) The frequency of measuring hedging effectiveness.
- i) The conditions under which hedging will not take place.
- j) The person or persons responsible for implementing the hedging strategy.

Hedge modeling

Companies may choose between Explicit and Implicit hedge methods to model a CDHS

Explicit Hedging

- Hedging positions and their resulting cash flows are included in the stochastic cash-flow model used to determine the scenario reserve.
- Model approximations may need to be considered based on time and cost considerations. Examples – limiting the number of market paths, compressed seriatim, projection steps.
- *May need to consider allocate hedges to modeled versus macro / overlay segments.*
- Safe harbor provisions for certain hedge instruments (e.g. options) – model as linear instruments.

Back Test to support choice of E-factor:

- Replace the stochastic scenarios with a single scenario representing actual market path over the back-testing period. Compare the projected hedge g/l against the actual hedge g/l – both realized and unrealized.
- Use of regression techniques, e.g. high R-squared.

Implicit Hedging

- The effectiveness of the current hedging strategy on future cash flows is evaluated, outside of the stochastic cash-flow model.
- Reflect fair value of hedge or an option cost. May be based on all product cashflows or specific to rider claims / claims less fee hedged.
- *May need to consider the following:*
 - *Rate hedging in general account*
 - *Prudent margins*
 - *Risk neutral returns and discount rates*

Back Test to support choice of E-factor:

- Calculate coverage ratios for various market risks, e.g. delta, rho etc.
- Coverage ratio: hedge g/l from a movement in a market risk divided by the change in hedged fair value of liability to the movement in that market risk. Coverage ratios close to 100% would support a low E-factor

Other topics

1

Standard Projection

Calculation frequency & analysis
Monitoring comparison to stochastic reserve

2

RBC ratio

Understanding RBC ratio volatility
Allocation to Market risk versus Interest Rate risk
Reduction of non admitted VA deferred tax asset (DTA)

3

Appropriate reserve / capital

Interest Rate Floor
Scenario sub-set selection
Mapping fund/indices to Academy ESG
Prudent Margins

4

Reserve allocation

Different methods could be used
Representative of risk
Reinsurance

VM-G PBR Governance

VM-31 Documentation and Disclosures



VM-G: Corporate Governance Guidance

Board

- Oversee infrastructure in place to implement PBR
- Oversee process and remediation of any material weakness in internal control.
- Receiving and reviewing the reports and certifications
- Document review / actions as part of minutes.

Senior Management

- Direction of the implementation and ongoing operation of PBR including adoption of internal controls
- Review models, methods, assumptions
- Address any significant and unusual issues
- Report to Board at least annually

Qualified PBR actuary

- Oversee the calculation of PBR
- Verify models, methods, assumptions, application of internal controls, consistency with VM
- Summary report to Sr. Mgmt. /Board
- VM31 PBR Actuarial report
- Disclose any unresolved issues to external auditors and regulators

VM-31: PBR Actuarial Report



An Executive Summary, a Life Summary, a Life Report, a VA Summary, and a VA Report, as applicable.

Ex., Life, VA Summaries to be submitted to the company's domiciliary commissioner by April 1 of the following year.



VA Summary – materiality, material risks, results, changes with attributions, risk management (including hedging), governance, and VA supplements.



VA Report – products, data, models, methods, assumptions with rationale, assets, hedging, scenarios, reinsurance, standard projection, RBC, phase-in, reliances and certifications.

Very detailed format mandated with required disclosures. Viewed as a minimum standard.

Disclosures

Standard Projection disclosures

Withdrawal cohort delay method

Aggregation benefit from grouping the policies

Decrement analysis

Other disclosures

Proprietary ESG disclosures

Hedge effectiveness (Back-testing)

Additional disclosures if CDHS used such CTE70 best efforts to CTE70 adjusted and fair value.

RBC impact under Macro Tax approach (if specific tax recognition approach used)

Questions?





SOCIETY OF
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VA Reserve & Capital Changes

VM-21 STANDARD PROJECTION

ACADEMY INTEREST RATE GENERATOR

2020 VALUATION ACTUARY SYMPOSIUM

Zohair Motiwalla, FSA, MAAA
Principal and Consulting Actuary



Agenda

- Standard Projection
- Potential implementation challenges
- Academy Interest Rate Generator

Standard Projection – overview

- AG 43 Standard Scenario is replaced by the VM-21 Standard Projection

AG 43 Standard Scenario

- Standard Scenario Reserve = $\text{Max}(\text{Cash Value}, \text{BAR} + \text{GPV}(-\text{ANR}))$ for each contract
 - BAR = Basic Adjusted Reserve (pseudo-AG 33)
 - ANR = Accumulated Net Revenue (Accumulated prescribed margins less GMxB claims)
 - No aggregation permitted
- Drop/recovery market path (varies by asset class)
- Prescribed assumptions
- Issue year specific statutory valuation rates (Plan Type A with guaranteed duration > 10 years and \leq 20 years)
- Only reflect guaranteed revenue sharing in the margins
- Uneconomic in nature with minimal sensitivity to rates, exacerbating balance sheet mismatches

VM-21 Standard Projection

- Now aligned with the Company CTE 70 (Adjusted)
 - GPVAD and Scenario Reserve calculation
 - All base contract and rider cash flows reflected, prescribed assumptions
 - Aggregation permitted, no dynamic hedging
- Companies can choose one of two approaches:
 - CSMP – Company Specific Market Path
 - CTEPA – Uses a Company CTE 70 (Adjusted) approach but with prescribed assumptions
- More rate sensitivity and therefore less mismatch on the balance sheet
- “Buffer” recognizes there are differences between company and prescribed assumptions (so only outliers will result in an Additional Standard Projection Amount)

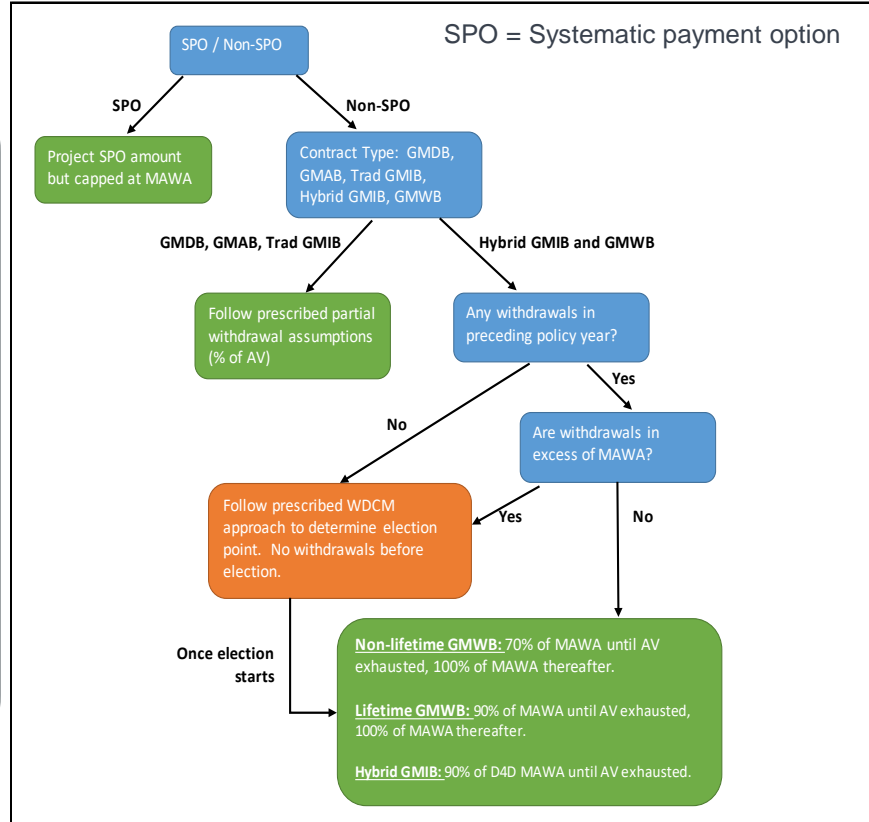
Key prescribed assumptions

- Mortality
 - Follows the 2012 IAM Basic table with indefinite Projection Scale G2 improvement relative to 2012
 - Mortality scalars which vary by presence of VAGLBs and attained age
- Policyholder behavior (PHB) assumptions
 - Refreshed prescribed behavior assumptions to align with industry experience
 - Applied on the basis of GMxB rider type and ITM
 - Hybrid GMIB (\$4\$ PWs up to a threshold and guaranteed growth) vs. Traditional GMIB (all else)
- ITM is the GAPV (Guarantee Actuarial Present Value) of the benefit relative to the account value
 - Needed at each time step to support setting PHB assumptions
 - Similar to Current Value concept in the AG 43 Standard Scenario construct
- A withdrawal delay assumption, if applicable, is prescribed by the Withdrawal Delay Cohort Method (“WDCM”)
 - WDCM process splits existing records into multiple records/cohorts (Σ cohorts = original record)
 - Each cohort has a specified timing of deferral

Prescribed partial withdrawals

VM-21 Construct

- WDCM does not apply to current SPOs
 - Such withdrawals are capped at the MAWA
- WDCM does not apply to policies without a GMWB or Hybrid GMIB
- WDCM may apply to non-SPO's GMWB and Hybrid GMIB policies
 - Applies if policy did not take a withdrawal in the last policy year
 - Applies if policy did take a withdrawal in the last policy year, but it was an excess withdrawal
- Prescribed haircut of 70% (non-lifetime GMWB) and 90% (lifetime GMWB and Hybrid GMIBs) applies for all non-SPOs once withdrawals start



Withdrawal Delay Cohort Method

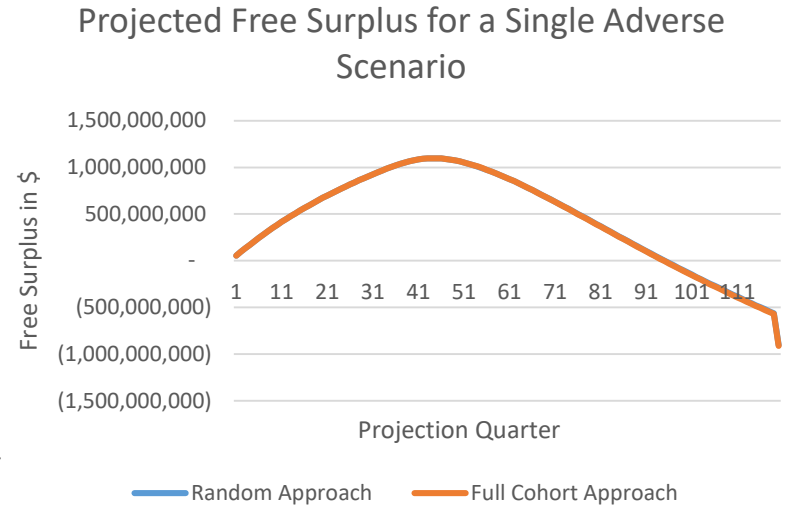
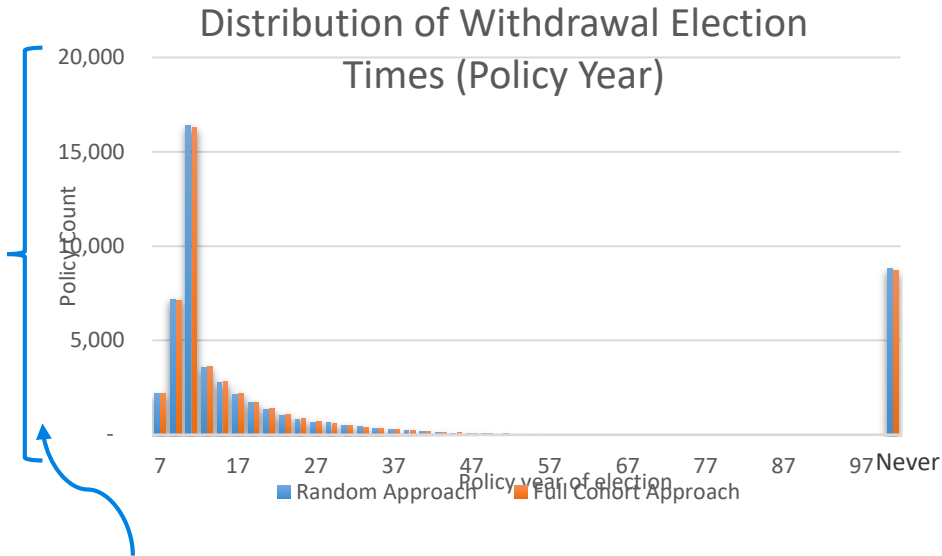
- Applies to GMWB and Hybrid GMIB policies that have either:
 - Not started taking withdrawals (“non-withdrawers”), OR
 - Taken an excess withdrawal in the last policy year (“non-conforming”)
- Prescribed approach, with the purpose of splitting existing in-force records into multiple cohorts (simulating each potential age of starting withdrawals)
 - Calculate a vector of GAPVs from issue (not the age on the valuation date) to age 120 or the end of the projection period, and apply a prescriptive algorithm to determine a withdrawal curve
 - Use the same GAPV approach as for ITM, but with a 3% discount rate
 - Prescribed “shocks” apply if the policy is qualified and/or there is guaranteed growth in the benefit
 - Define a “never withdraw” cohort, whose weight varies by benefit type and tax status
 - Discard weights before the valuation date and rescale the remaining withdrawal curve
- **Designed to be a one-time approach for policies with the same issue age, gender, benefit, tax status**
- At subsequent valuation dates, if a policy begins conforming withdrawals the WDCM no longer applies
- Regulation allows discarding cohorts to improve computational tractability exists but this requires validation

Withdrawal Delay Cohort Method – case study

- Hypothetical VA portfolio
 - 50,000 VA policies with GLWBs, comprising \$6.5 billion in account value
 - Annual ratchet and 5% compound rollup for the first 10 policy years
 - MAWA% varying between 3 and 6% by attained age
- Perform WDCM cohorting process to:
 - Generate the required cohorts for all policies (~ 600,000 cohorts)
 - Store the weights for each cohort from issue
- For production, the actuary can then choose:
 - The full cohort approach
 - A simplified approach, e.g. random sampling
- One potential approach to using random sampling:
 - Use a random roll to collapse all cohorts to a single cohort (and deferral period)
 - Compare the random roll to the adjusted withdrawal curve (i.e. after discarding ages prior to valuation date)
 - Might opt for a stratified sampling approach by randomly selecting more than one cohort per actual record
 - Should test for stability of results

Withdrawal Delay Cohort Method – case study

- Comparison of Random Sampling approach to Full Cohort approach:



For the random sampling approach, the y-axis represents the total policy count for each year of election

For the full cohort approach, the y-axis represents the sum of the probability weights across all cohorts assigned for each election time

Standard Projection - potential implementation challenges

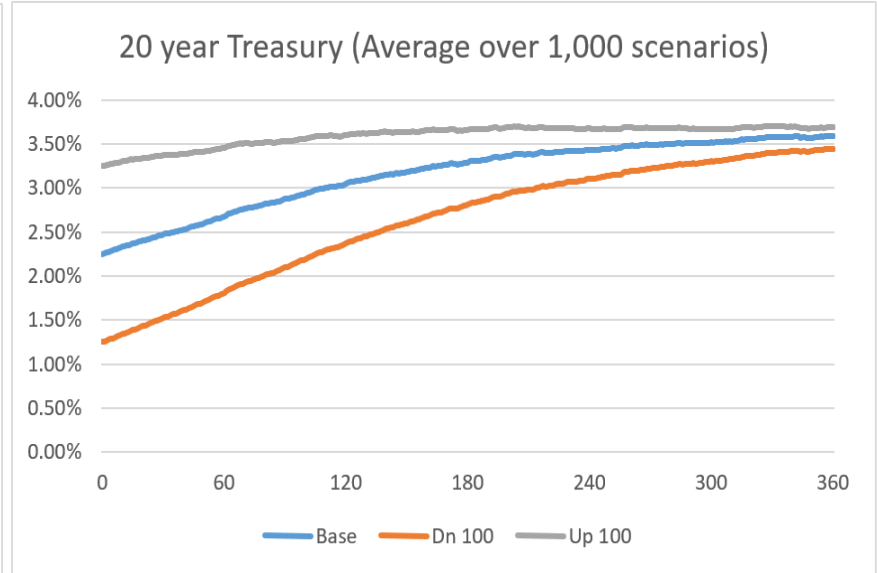
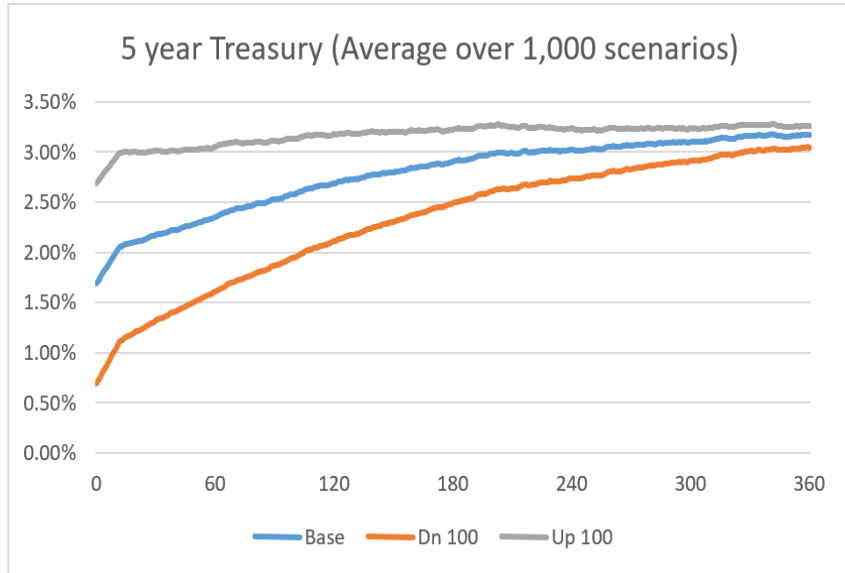
- Choosing which modeling approach to adopt (where a choice is provided)
- Products that do not easily fit the Standard Projection construct
- Complexity and runtime concerns with the Withdrawal Delay Cohort Method
 - Concerns can be mitigated using simplification techniques (e.g. random sampling)
 - Any simplification needs to be calibrated and tested against the full blown approach
 - Important for companies to understand, maintain and easily audit the WDCM and GAPV calculations
 - Need to ensure that benefit design is modeled consistently between the cohort projection that develops the weights and the Standard Projection run
- Technical challenges with respect to developing WDCM weights
 - Foreknowledge of policyholder actions (e.g. doubler's and/or bonuses)
 - Product design (e.g. rollup rate is a function of Treasury rates, joint policies)
- Data limitations for partial withdrawal activity
 - Is the policy on automatic withdrawal?
 - If not, is it known whether or not the policy took a withdrawal in the policy year preceding the valuation date?
 - If so, is the amount of the withdrawal known?
 - Development of reasonable simplifications should such data not be available

Academy Interest Rate Generator

- Pros
 - Using a single generator creates a level playing field, with consistency and comparability
 - Removes the equity calibration criteria (AIRG uses prescribed calibration)
 - Introduces prescribed interest rate parameterization (NAIC MRP)
 - Many companies were already using some form of the AIRG
- Cons
 - No correlation between equity returns and interest rates (for mathematical tractability)
 - Inability to generate negative interest rates
 - Continuous model with no gaps/jumps in the stochastic equity volatility
(No large equity movements that are substantially larger/more common than in a continuous model)
 - Shortcomings in a low interest rate environment
 - Baseline 20 year Treasury rate is in the neighborhood of 1.15% in the current rate environment
 - Default value for the soft floor on the long rate is a 1.15% threshold
 - As actual interest rates fall towards 1.15%, reserves will increase (normal behavior)
 - As actual interest rates fall below 1.15%, the generated average rates at any tenor start to increase, reserves will start to decrease (not normal behavior)

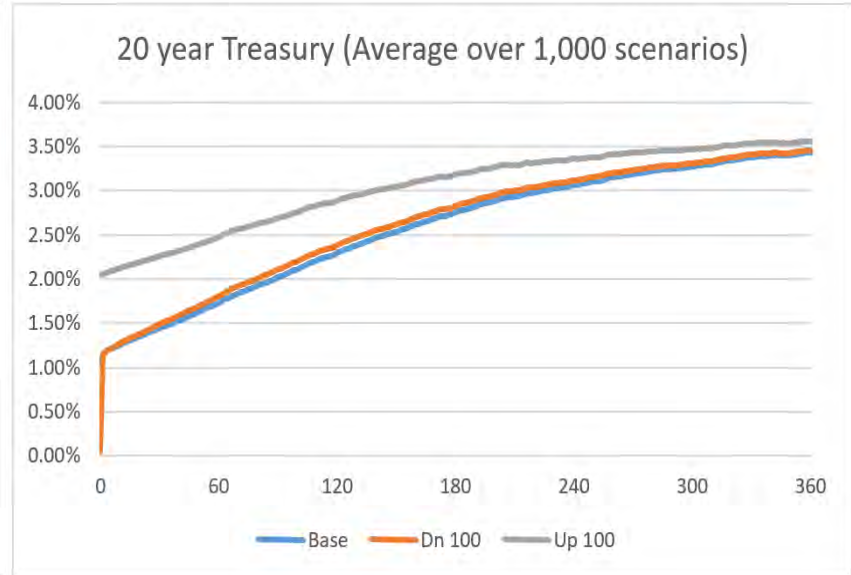
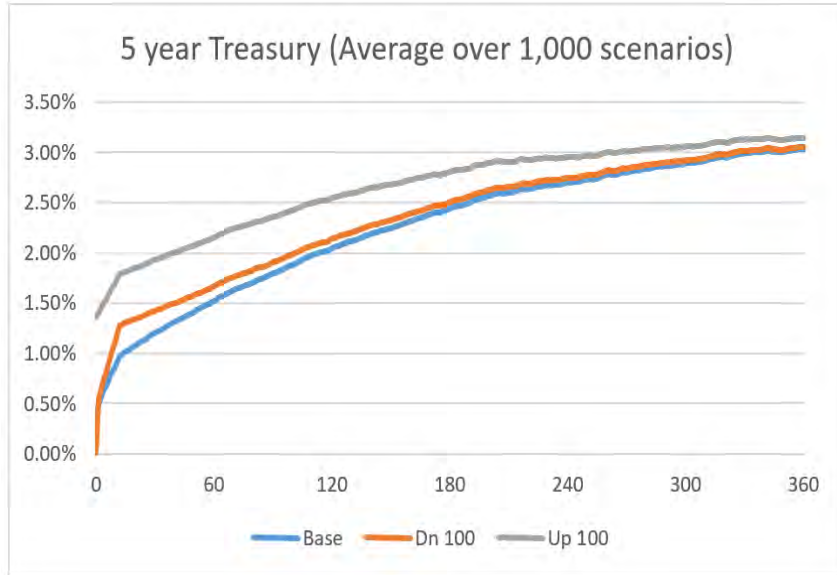
Academy Interest Rate Generator

- 12/31/2019 AIRG scenarios:



Academy Interest Rate Generator

- 4/30/2020 AIRG scenarios:



Potential New PBR Economic Scenario Generator

- The NAIC is soliciting proposals from vendors to provide, maintain and support an economic scenario generator that would replace the existing AIRG
- Presumably will attempt to address some of the limitations associated with the existing AIRG
- Long term replacement process is somewhat on hold due to COVID, however in the short term certain specific revisions may be made to “revamp” the existing AIRG
- May incorporate a tool to generate the VM-21 Company Specific Market Path equity and interest rate scenarios
- Regulators may opine on parameterization settings for any new generator
- Likely to be an industry field study to assess the impact on VM-21 reserves and capital
- Entire replacement process is expected to be completed no sooner than 2022



Thank you!

SESSION 8 - VA RESERVE AND CAPITAL REFORM: KEY IMPLEMENTATION AND REPORTING ISSUES

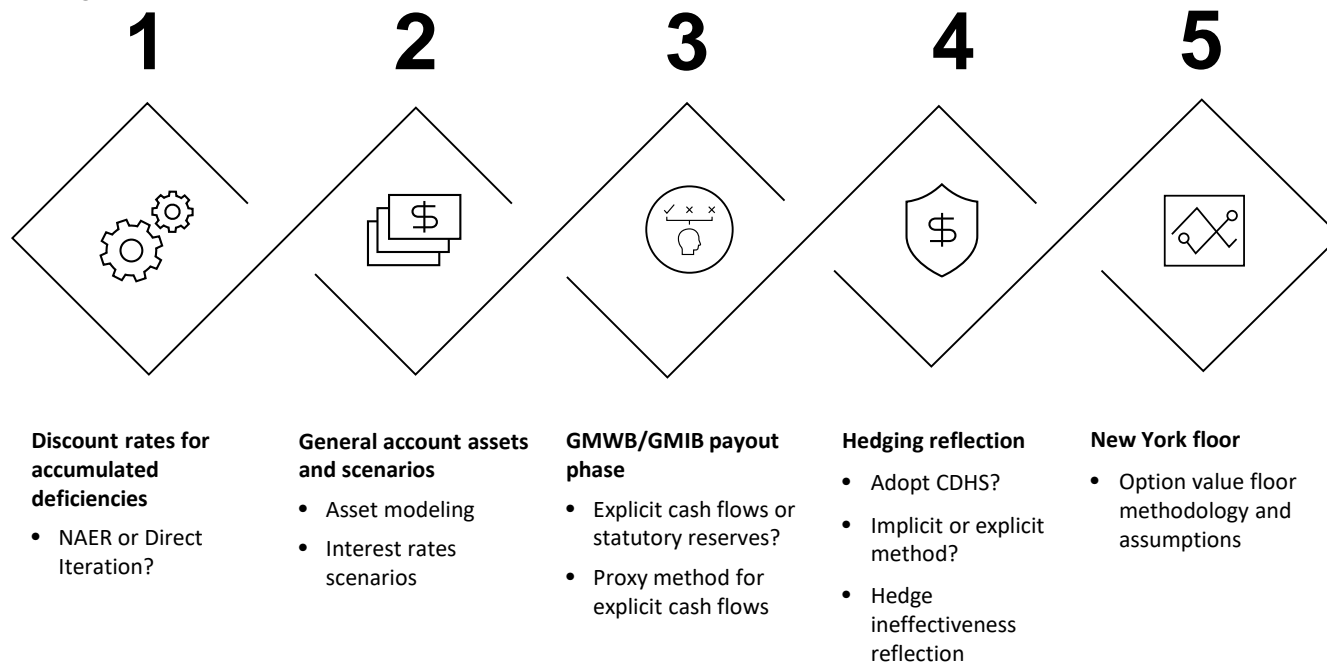
Stochastic modeling considerations and emerging industry practices

September 2, 2020

Yuan Tao, FSA, MAAA, CFA

VM-21 STOCHASTIC MODELING – KEY IMPLEMENTATION CONSIDERATIONS

Companies need to make several significant methodology decisions on stochastic reserve modeling under VM-21 / New York Reg 213



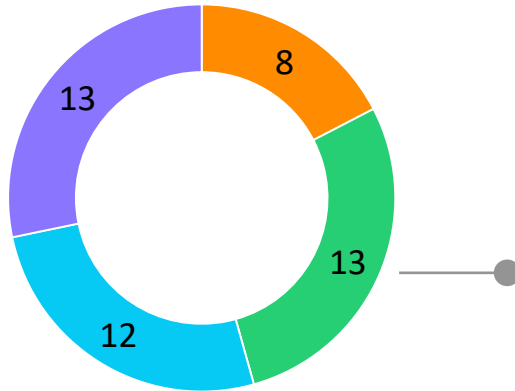
Methodology decisions should consider financial impacts, alignment with other accounting regimes and hedging, and ease of implementation

VM-21 STOCHASTIC MODELING – EMERGING INDUSTRY PRACTICES BACKGROUND

We will discuss relevant findings from the 2020 Oliver Wyman VM-21 Emerging Practices Survey (referred to as the Survey herein)

2020 Oliver Wyman VM-21 Emerging Practices Survey - Background

Survey questions by category



AS OF DATE

Participants were asked to describe their VM-21 practices as of March 2020, if implemented, or current view of future VM-21 implementation otherwise

PARTICIPANTS

34 participants representing \$1.3 trillion of account value

SURVEY QUESTIONS

Distributed across **implementation and analysis**, **economic scenarios**, **stochastic projection**, **standard projection**, **modeling of hedges under CDHS**, **reinsurance**, **C3 RBC**, **VM-31 disclosures** and **New York floor**

RESULTS

Survey report was released to participants on July 31, 2020

1

DISCOUNT RATES FOR ACCUMULATED DEFICIENCIES – IMPLEMENTATION CONSIDERATIONS

VM-21 requirements

- Allow both the Net Asset Earned Rate (NAER) and Direct Iteration approaches
- 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
- NAER provides an approximation of Direct Iteration without requiring explicit asset iterations



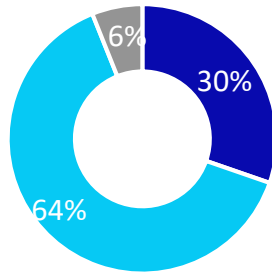
Key implementation considerations	
NAER or Direct Iteration method	<ul style="list-style-type: none">• Built-in model functionality• Run time
Asset portfolio	<ul style="list-style-type: none">• Determine additional assets portfolio available, consistent with company reinvestment strategy

1

DISCOUNT RATES FOR ACCUMULATED DEFICIENCIES – EMERGING INDUSTRY PRACTICES

NAER method is chosen by about 2/3rd of the Survey participants

How do you determine the discount rate for accumulated deficiencies?



- Direct iteration method
- Net Asset Earned Rate (NAER) method
- Other (use reinvestment rate or still finalizing their methodology)

2

GA ASSETS AND SCENARIOS – IMPLEMENTATION CONSIDERATIONS

VM-21 requirements

Interest rate scenarios	<ul style="list-style-type: none"> • Prescribed Academy interest rate generator • Proprietary generator is permitted only if it does not materially lower reserves
Prescribed asset assumptions	<ul style="list-style-type: none"> • Existing GA assets modeled at their expected returns but reflect prescribed defaults • Reinvestment should follow prescribed spreads and defaults, graded from current to long term at year 4 • Derivatives should use prescribed swap spreads, also graded from current to long term at year 4
Alternative investment strategy	<ul style="list-style-type: none"> • Net reinvestment spreads are effectively capped at those of the prescribed “alternative investment strategy” comprised of 50/50 A/AA public non-callable corporate bonds

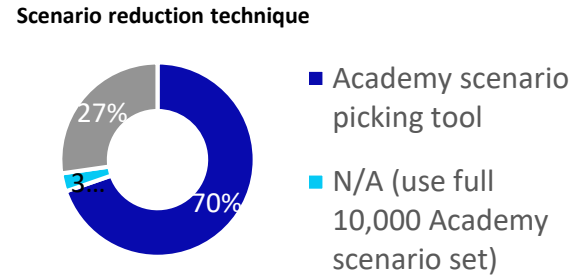
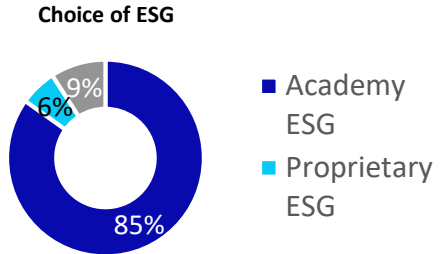


Key implementation considerations	
Interest rate scenarios	<ul style="list-style-type: none"> • Economic scenario generator (ESG): prescribed or proprietary? • Parameterization • Scenario reduction
Prescribed asset assumptions	<ul style="list-style-type: none"> • Timing of published assumptions relative to production timeline
Assets modeling	<ul style="list-style-type: none"> • Selection of starting asset portfolio • Reinvestment strategy • How to reflect the alternative investment strategy

2

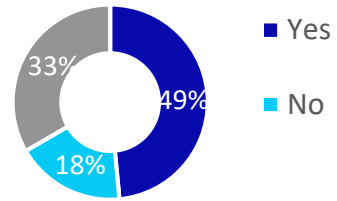
GA ASSETS AND SCENARIOS – EMERGING INDUSTRY PRACTICES

85% chose the Academy ESG. Academy scenario picking tool is widely used; other scenario reduction techniques not uncommon

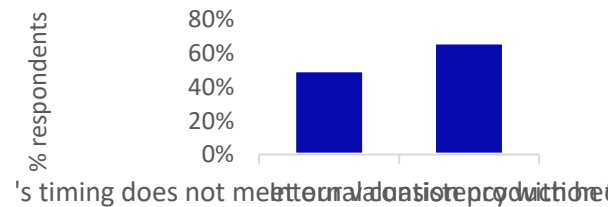


27% of those using current swap spreads do not use NAIC prescribed spreads, either due to timing concern or consistency with hedging

Use of prescribed current swap spreads



For those who responded “no”, motivation for not using the prescribed spreads



3

GMWB/GMIB PAYOUT PHASE – IMPLEMENTATION CONSIDERATIONS

VM-21 requirements

Two options to model the payout phase of GMWB/GMIB, at the company's choice:

1. The contract is treated as if surrendered at an amount equal to the statutory reserve that would be required for a fixed payout annuity benefit
2. The contract is assumed to stay in force and the projected periodic payments are paid.



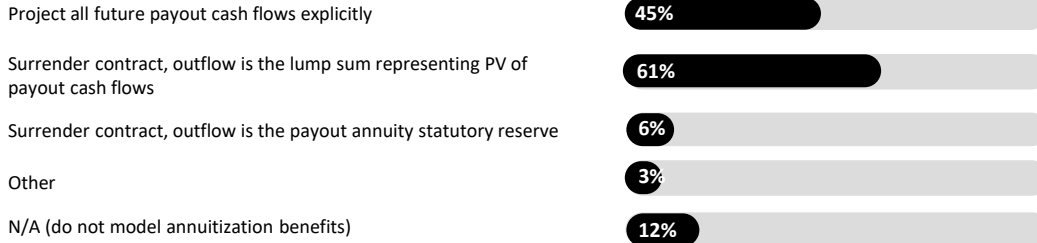
Key implementation considerations	
Option 1 – model stat reserve	<ul style="list-style-type: none">• Follow VM-22?• How to project valuation rate?
Option 2 – explicit cash flows	<ul style="list-style-type: none">• Explicit projection• Commuted value as proxy• Assumptions (e.g. discount rate, mortality, expense)

3

GMWB/GMIB PAYOUT PHASE – EMERGING INDUSTRY PRACTICES

Majority either project payout cash flows explicitly or model PV of payout cash flows, approach often varies by rider type

How do you model projected election of annuitization benefits (including GMIB, GMWB claims or other annuitization options)?



- > **60%** Of participants **model maintenance expenses explicitly**, among those who model payout cash flows either explicitly or through PV
- > Those who model outflow as payout annuity statutory reserves project a proxy valuation rate under SVL instead of VM-22
- > Many participants indicated **different modeling approach by rider type**: typically lump sum for GMIB vs. explicit modeling for GMWB/GLWB

4

HEDGING REFLECTION – IMPLEMENTATION CONSIDERATIONS

VM-21 requirements

- Must have a Clearly Defined Hedge Strategy (CDHS) to reflect any future hedges and rebalancing
- Meet the definition of CDHS
- Permit both the Explicit Method and Implicit Method to reflect CDHS under CTE (best efforts)
- Back-testing required to support the choice of E factor



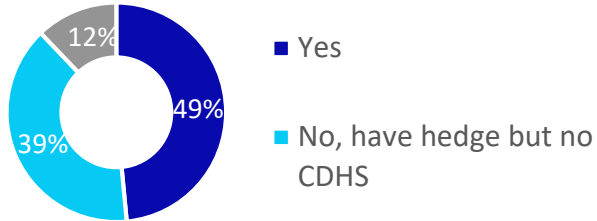
Key implementation considerations	
Elect CDHS?	<ul style="list-style-type: none">• Financial impact (point in time and alignment with other bases)• Implementation cost
Implicit or Explicit Method?	<ul style="list-style-type: none">• Modeling capabilities• Statutory results impact
Reflection of hedge ineffectiveness	<ul style="list-style-type: none">• E factor• Margins
Explicit Method	<ul style="list-style-type: none">• Model simplification techniques
Implicit Method	<ul style="list-style-type: none">• Assumptions and methodology to calculate fair value hedge cost• Reflection of hedge cost and benefits in CTE

4

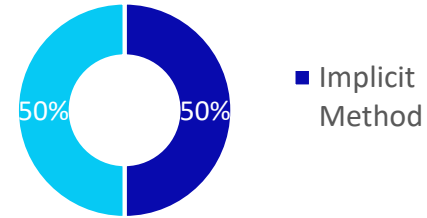
REFLECTION OF CDHS – EMERGING INDUSTRY PRACTICES (1/2)

Nearly half of the Survey participants reflect CDHS under VM-21; even split between choice of Explicit Method and Implicit Method

Do you reflect Clearly Defined Hedging Strategy (CDHS) under VM-21?

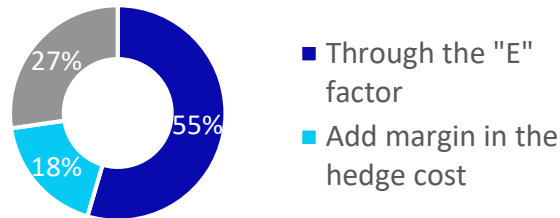


For CTE (best efforts), how do you model hedges?

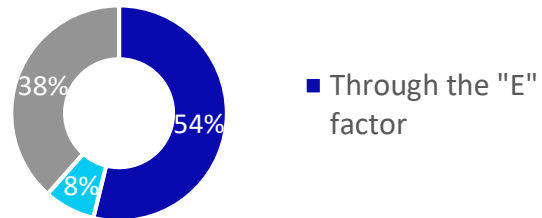


Diverse practices exist in reflecting hedge ineffectiveness, both under the Explicit Method and the Implicit Method

Hedge ineffectiveness reflection under the Explicit Method



Hedge ineffectiveness reflection under the Implicit Method

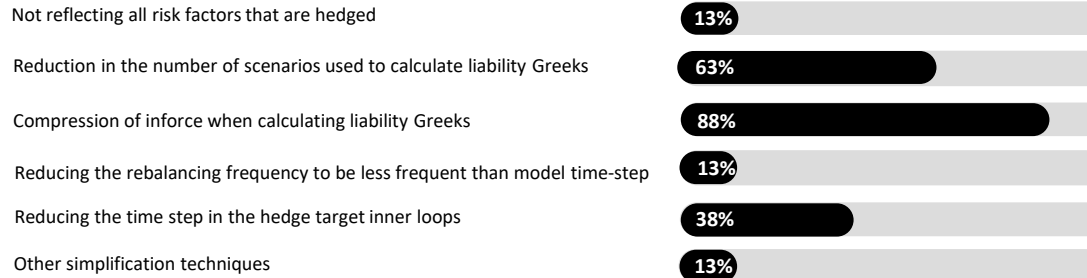


4

REFLECTION OF CDHS – EMERGING INDUSTRY PRACTICES (2/2)

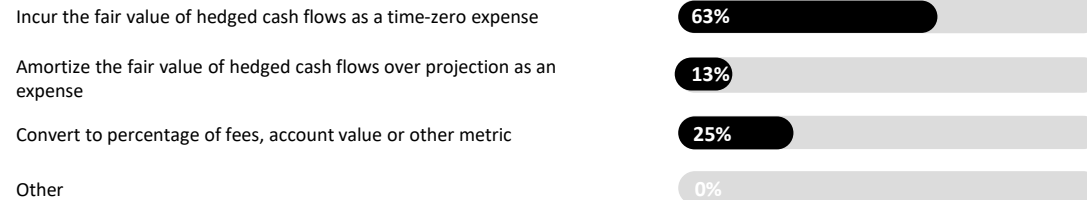
Modeling simplification techniques are commonly used under the Explicit Method, with inforce compression being the most popular

Modeling simplification techniques under the Explicit Method (multiple choices)



Hedge cost under the Implicit Method is most commonly reflected as a time-zero expense equal to fair value of hedged cash flows

How do you reflect hedge cost under the Implicit Method?



5

NEW YORK FLOOR – IMPLEMENTATION CONSIDERATIONS

New York Reg 213

- Reserve equal to the greater of VM-21 reserve and New York floor
- Business issued prior to 1/1/2020: NY floor follows prior AG 43 standard scenario framework with certain modifications to assumptions
- Business issued post 1/1/2020: NY floor is the greater of the standard scenario reserve (defined under Reg 213), the cash surrender value, and the “option value” floor



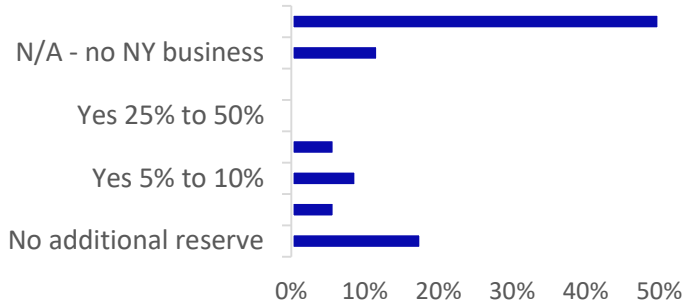
Key implementation considerations	
Modifications to standard scenario	<ul style="list-style-type: none">• Update assumptions• Model limitations (e.g. forward treasury curve)
Option value floor	<ul style="list-style-type: none">• Definition?• Scenarios?• Assumptions?

5

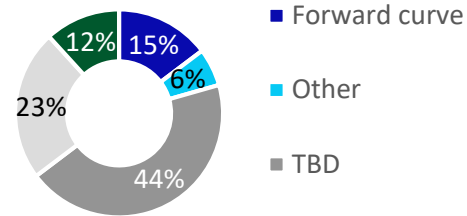
NEW YORK FLOOR – EMERGING INDUSTRY PRACTICES

Half the participants have not yet determined the impact of New York floor or modeling limitations

Does the NY floor result in additional statutory reserves for your business?

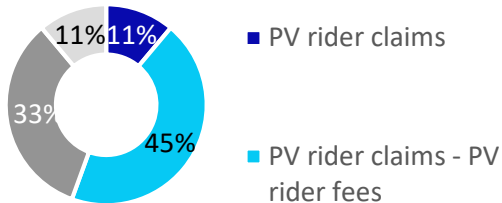


Modeling limitations in calculating NY floor

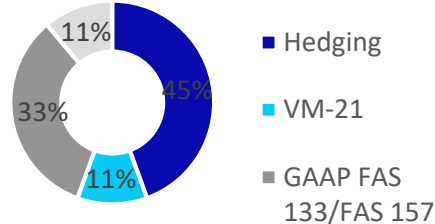


For NY "option value" floor, many are still deciding on the methodology; 9 participants responded with a wide range of practices

Definition of option value



Scenarios



Assumption basis

