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LESSONS LEARNED BY VM-21 EARLY ADOPTERS

Valuation Actuary Virtual Symposium

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September 2, 2020

KEY QUESTIONS

1   **What was the prevalence of early adoption?**

2   **What was the motivation for early adoption?**

3   **What are the financial impacts?**

4   **How does this interact with LDTI and IFRS 17?**

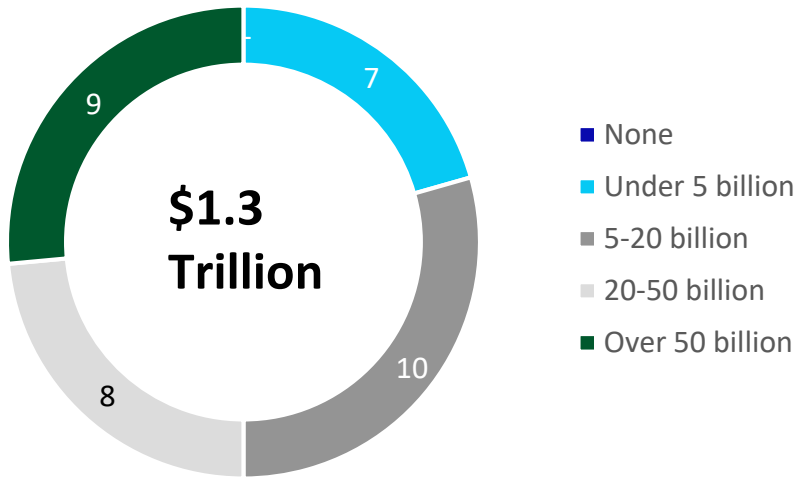5   **What are opportunities for variable annuity writers?**

To aid answering these questions, we refer to select results from a recent Oliver Wyman VM-21 survey
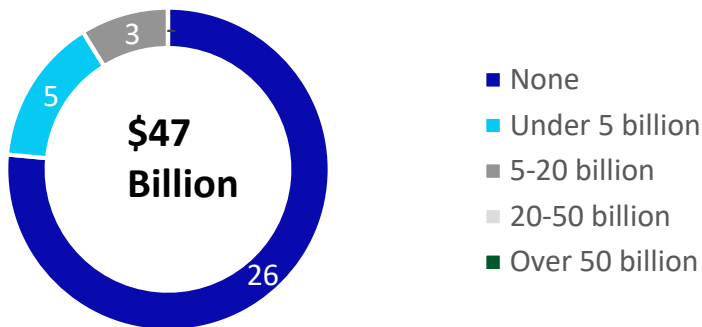
BACKGROUND ON RECENT VM-21 SURVEY

Total of $1.3 trillion VA account value covered by the survey, with 72%/28% split in open vs. closed blocks
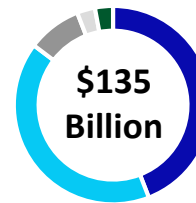
# of survey participants by account value under VM-21

Traditional VAs

$1.3 Trillion

- None
- Under 5 billion
- 5-20 billion
- 20-50 billion
- Over 50 billion

No GMDB/GLB

$135 Billion

With GMDB/no GLB

$338 Billion

Traditional GMIB

$85 Billion

Hybrid GMIB

$93 Billion

Indexed variable annuities

$47 Billion

- None
- Under 5 billion
- 5-20 billion
- 20-50 billion
- Over 50 billion

GMWB/GLWB

$595 Billion

GMAB

$21 Billion
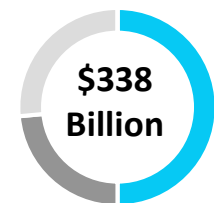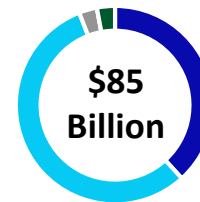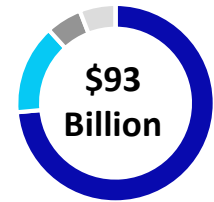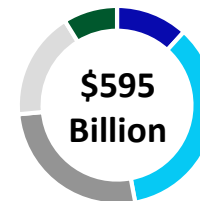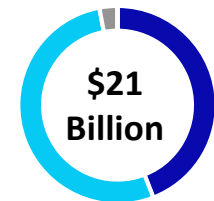
PREVALENCE AND MOTIVATION FOR EARLY ADOPTION

Five participants indicated early adoption, primarily driven by mitigation of non-economic volatility in statutory balance sheet

Did your company elect to early adopt in 2019?

■ Yes ■ No

Pie chart: Yes = 5, No = 29

Motivation for early adoption

Bar chart categories:
- Mitigate inherent non-economic volatility of statutory balance sheet
- Better alignment with hedging/other accounting bases
- Front loading change in hedge sensitivity (vs. transitioning in uncertain…
- Unwinding of captive solution
- Favorable impact on reserves
- Favorable impact on total asset requirement (TAR)
- Favorable impact on RBC ratio
- Other

■ Primary ■ Secondary

0% 20% 40% 60% 80% 100%

CDHS ADOPTION IS BROADLY UNCHANGED BY VM-21

47% of participants reflect CDHS under VM-21

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

- Yes, reflected CDHS under prior framework and continue to reflect under VM-21
- Yes, did not reflect CDHS under prior framework but are reflecting under VM-21
- No, have hedge but no CDHS
- No, do not hedge
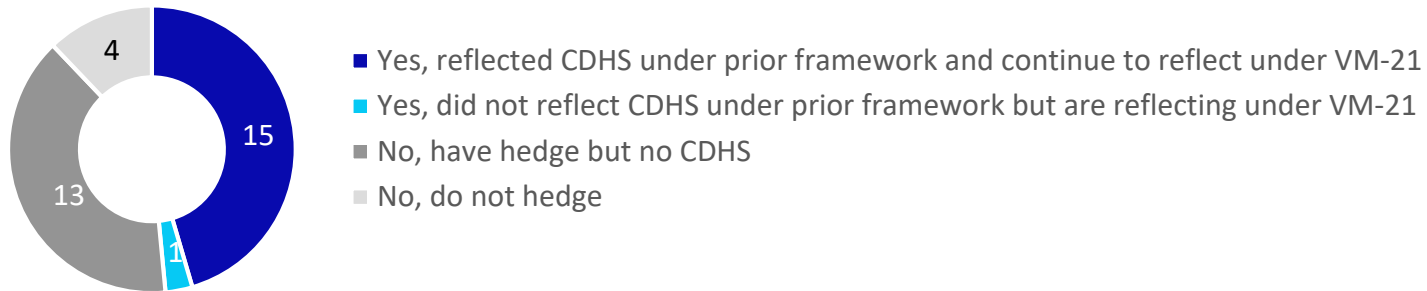
Among those who reflect CDHS, 63% include all living benefits under the CDHS; 37% have adopted SSAP 108

Are all your living benefits covered under the CDHS?

- Yes ■ No
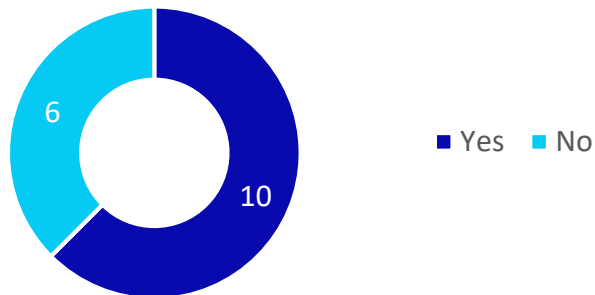
Have you adopted SSAP 108?

- Yes ■ No
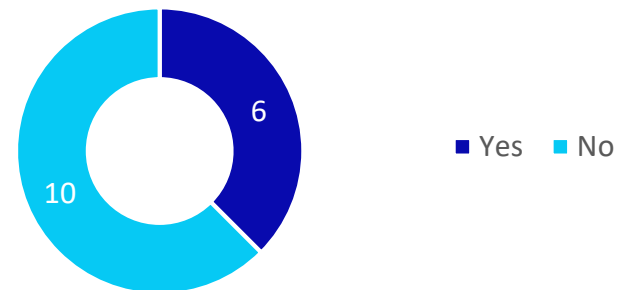
VM-21 FINANCIAL IMPACT DRIVERS

Results varied greatly by participant; prescribed GA asset modeling mostly hurt whereas removing working reserve mostly helped

How did each of the following changes from AG 43/C3P2 to VM-21 impact your statutory reserves / TAR and capital?

Impact to statutory reserves — Impact to CTE 98

Categories (left to right):
- Removal of standard scenario
- Switch from Proprietary ESG to Academy ESG
- Prescribed MRP in Academy ESG
- Prescribed GA asset defaults / spreads / capping
- Removal of working reserve
- Revenue sharing margin
- Other

Legend:
- Decrease >=50%
- Decrease 25-50%
- Decrease 10-25%
- Decrease 5-10%
- Decrease <5%
- No change
- Increase <5%
- Increase 5-10%
- Increase 10-25%
- Increase 25-50%
- Increase >=50%
- N/A

VM-21 FINANCIAL IMPACTS

The most common impact is small decrease in reserve, small increase in CTE 98 (relative to 400% RBC TAR) and large increase in C3 RBC

Based on your analysis to date, what is the impact of VM-21 on your statutory reserve/TAR and C3 RBC compared to the prior AG 43/C3P2 framework[1]?
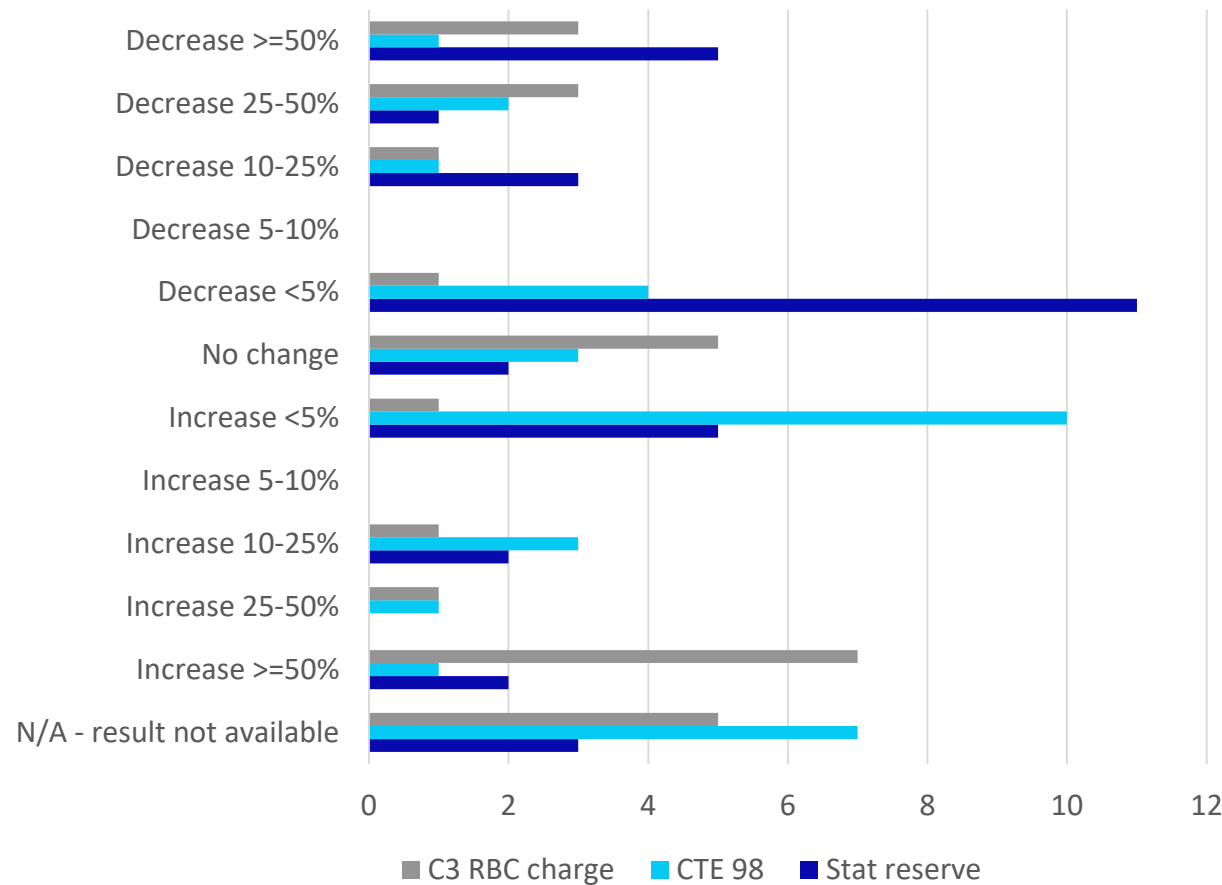
"As of" date of impact
- 9/30/2019
- 12/31/2019
- 3/31/2020
- 1/1/2020

The most common impact is small decrease in reserve, small increase in CTE 98 and large increase in C3 RBC

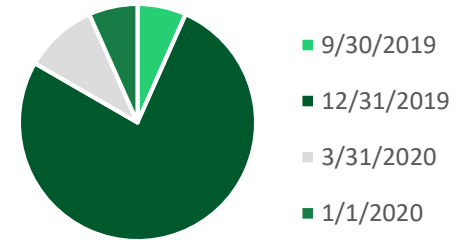**Largest decreases in reserve** are most commonly driven by removal of voluntary reserve and previously dominating standard scenario floor

Large increases in RBC are primarily driven by removal of voluntary reserve

Chart categories: Decrease >=50%, Decrease 25-50%, Decrease 10-25%, Decrease 5-10%, Decrease <5%, No change, Increase <5%, Increase 5-10%, Increase 10-25%, Increase 25-50%, Increase >=50%, N/A - result not available

Legend: C3 RBC charge, CTE 98, Stat reserve

1. Statutory reserve is the general account portion of reserve. CTE 98 is the VM-21 TAR at 400% RBC. For the prior equivalent TAR, use AG 43 reserves + voluntary reserves + 400% * any C3 RBC charge.

HOW DOES VM-21 INTERACT WITH LDTI AND IFRS 17?

Market sensitivity of liability valuation
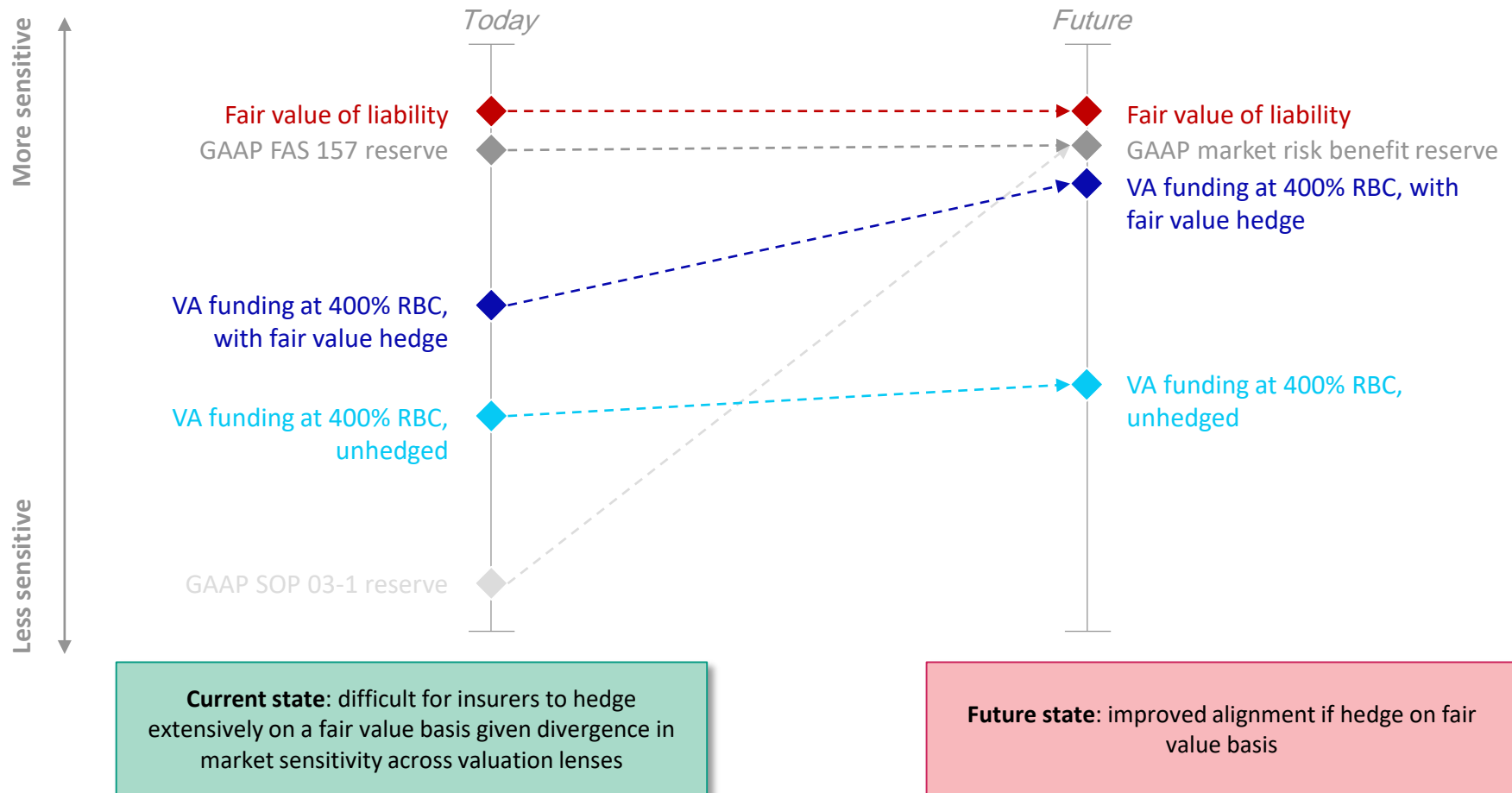
KEY OBSERVATIONS

- Industry appears to be ready; quantifications are largely available

- Five companies early adopted, primarily motivated by mitigation of non-economic volatility

- VM-21 has not resulted in major changes in total asset requirements for the industry.

- Only one participant expects to adopt a CDHS as a result of VM-21

- VM-21 has increased the likelihood of recapturing captive reinsurance for a few participants, but most reported no impact on their appetite for retaining their captive

AREAS WHERE WORK REMAINS

- VM-31 disclosures (materiality, seriatim allocation, fair value)

- New York floor (implementation, methodology, quantification)

AREAS OF OPPORTUNITY

- Reflection of hedge costs (implicit vs. explicit, liquidity premium within implicit) and hedge effectiveness

- Integration with LDTI / IFRS 17 (assumptions, hedging and ALM practices)

- Reinsurance and M&A

Lessons Learned by VM-21 Early Adopters

VM-21 STANDARD PROJECTION

ACADEMY INTEREST RATE GENERATOR

PRELIMINARY REGULATOR FEEDBACK

2020 VALUATION ACTUARY SYMPOSIUM

Zohair Motiwalla, FSA, MAAA
Principal and Consulting Actuary

Milliman

Agenda

- Standard Projection

- Academy Interest Rate Generator

- Preliminary regulator feedback on early adoption

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Standard Projection – overview

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

AG 43 Standard Scenario

- Standard Scenario Reserve = Max(Cash Value, BAR + GPV(-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 ≤ 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)

Standard Projection – lessons learned

- Products that do not fit the Standard Projection construct
  - Should consider materiality of the specific feature

- Foreknowledge of policyholder actions for the Withdrawal Delay Cohort Method (WDCM)
  - Treatment of doublers and/or bonuses that presuppose no historical partial withdrawals have been taken
  - WDCM designed to be a one-time approach for policies with the same issue age, gender, benefit, tax status

- Technical challenges with respect to the developing the weights under the WDCM
  - Rescaling all weights (including the never-elect cohort weight) each valuation date
  - Product design (e.g. rollup rate is a function of Treasury rates, joint policies)
  - Developing weights within the production model removes a layer of validation and/or the need to modify more than one process

- Computational tractability for the WDCM
  - Regulation allows discarding cohorts but any simplification needs to be calibrated against the full blown approach
  - Can opt to randomly choose one (or more) cohorts
  - To preserve independence between unique policyholder decisions and to reduce overall bias, random seeds should be unique to each policyholder (and potentially, each economic scenario)
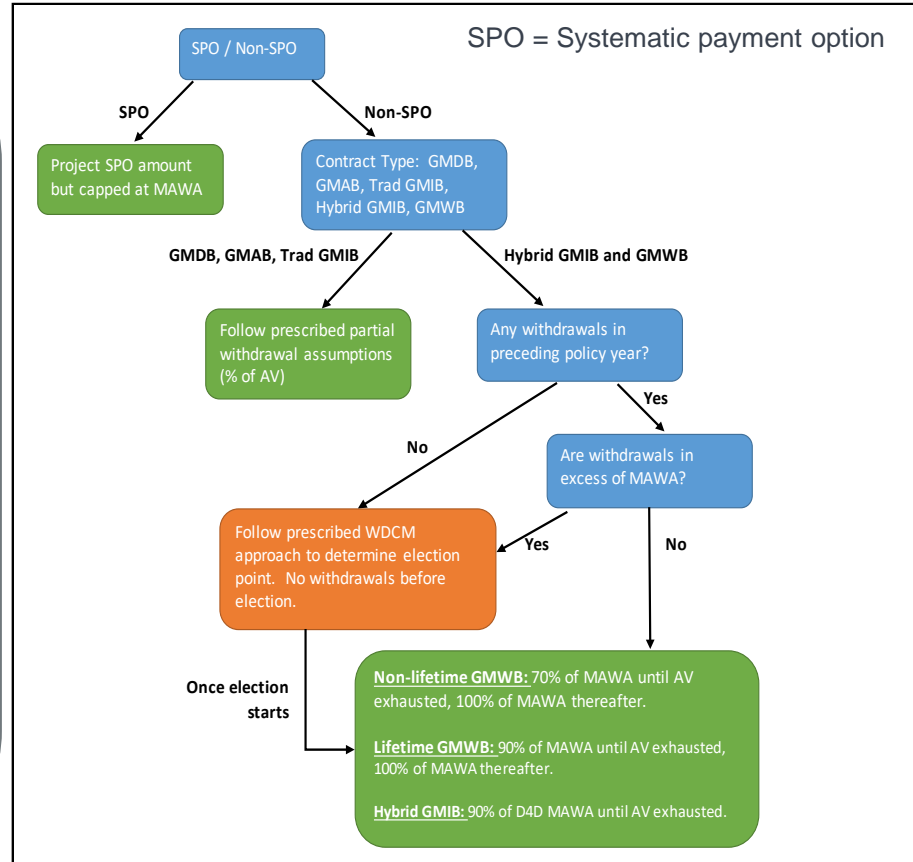
Standard Projection – lessons learned

- External replication and control processes for the GAPV and WDCM
  - Satisfies internal model validation function and external auditors
  - Benefit design should be modeled consistently when developing the weights and the Standard Projection run

- Required minimum distribution age (SECURE Act)
  - For qualified policies, change the WDCM rollup/bonus shock age from 71 to 72?

- Standard Projection assumptions may still be unfavorable relative to company assumptions.
  - Indefinite mortality improvement can be punitive for living benefit riders
  - Potentially lower effective lapse rates on ITM GMxBs
  - Potentially higher lapse rates on no/weak GMxB business limits subsidization from IOVAs and OTM DBs

- Data limitations around 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? (i.e. was it a conforming withdrawal?)
  - Development of reasonable simplifications should such data not be available

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
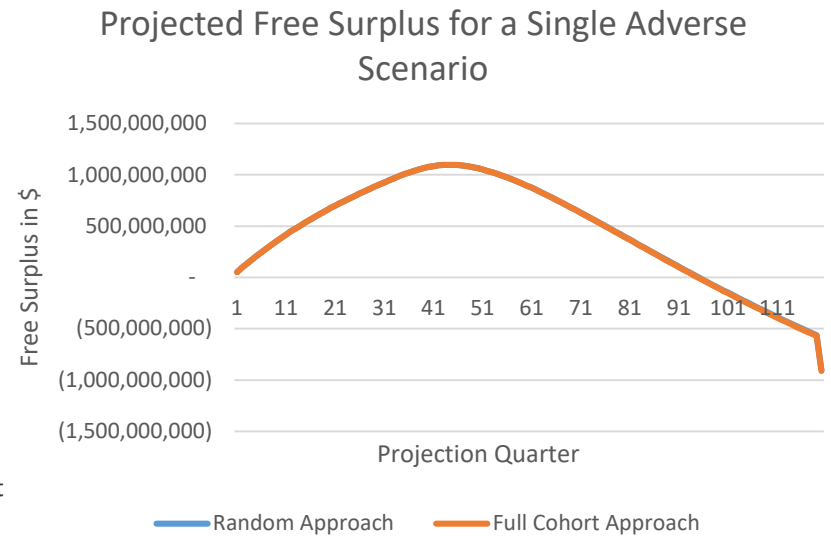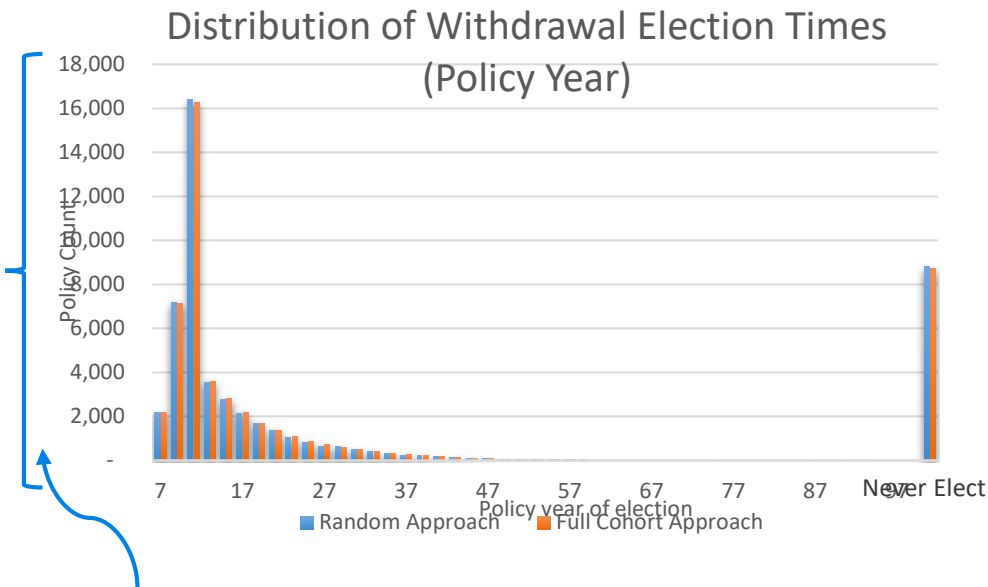
SPO = Systematic payment option

SPO / Non-SPO

SPO → Project SPO amount but capped at MAWA

Non-SPO → Contract Type: GMDB, GMAB, Trad GMIB, Hybrid GMIB, GMWB

GMDB, GMAB, Trad GMIB → Follow prescribed partial withdrawal assumptions (% of AV)

Hybrid GMIB and GMWB → Any withdrawals in preceding policy year?

No → Follow prescribed WDCM approach to determine election point. No withdrawals before election.

Yes → Are withdrawals in excess of MAWA?

Yes → Follow prescribed WDCM approach to determine election point. No withdrawals before election.

No →

Once election starts →

Non-lifetime GMWB: 70% of MAWA until AV exhausted, 100% of MAWA thereafter.

Lifetime GMWB: 90% of MAWA until AV exhausted, 100% of MAWA thereafter.

Hybrid GMIB: 90% of D4D MAWA until AV exhausted.

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Standard Projection – WDCM 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

Standard Projection – WDCM case study

- Comparison of Random Sampling approach to Full Cohort approach:

Distribution of Withdrawal Election Times (Policy Year)

Projected Free Surplus for a Single Adverse Scenario

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

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 <u>towards</u> 1.15%, reserves will increase (normal behavior)
    - As actual interest rates fall <u>below</u> 1.15%, the generated average rates at any tenor start to increase, reserves will start to decrease (not normal behavior)
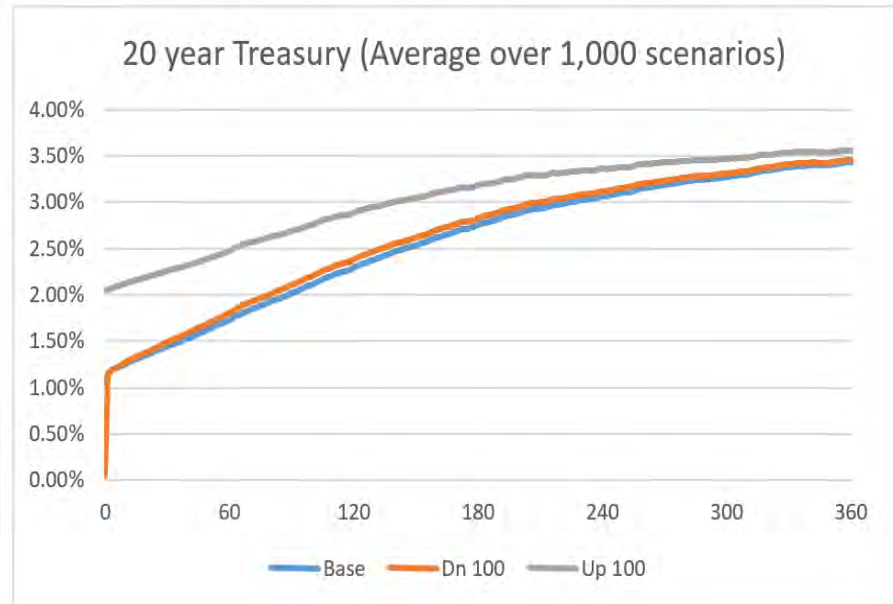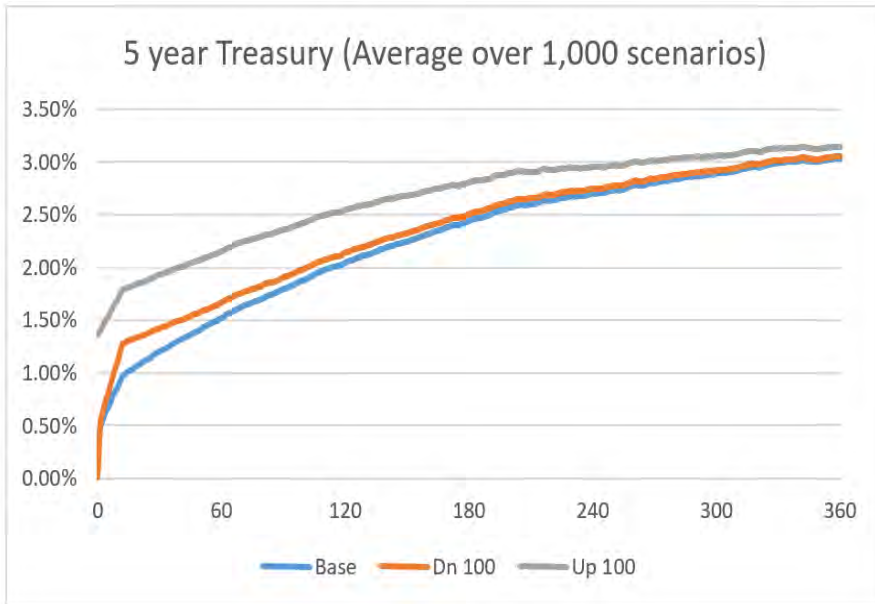
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Academy Interest Rate Generator

- 12/31/2019 AIRG scenarios:
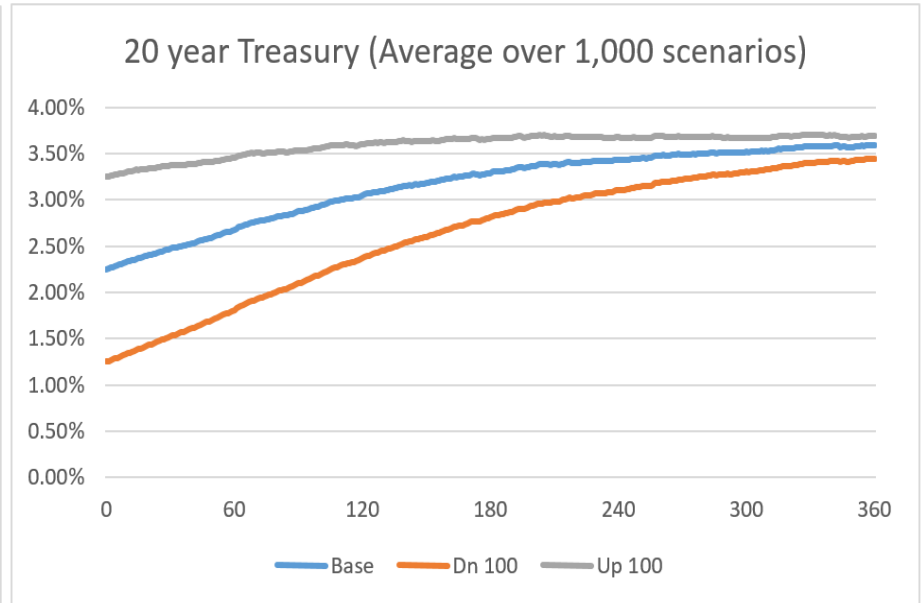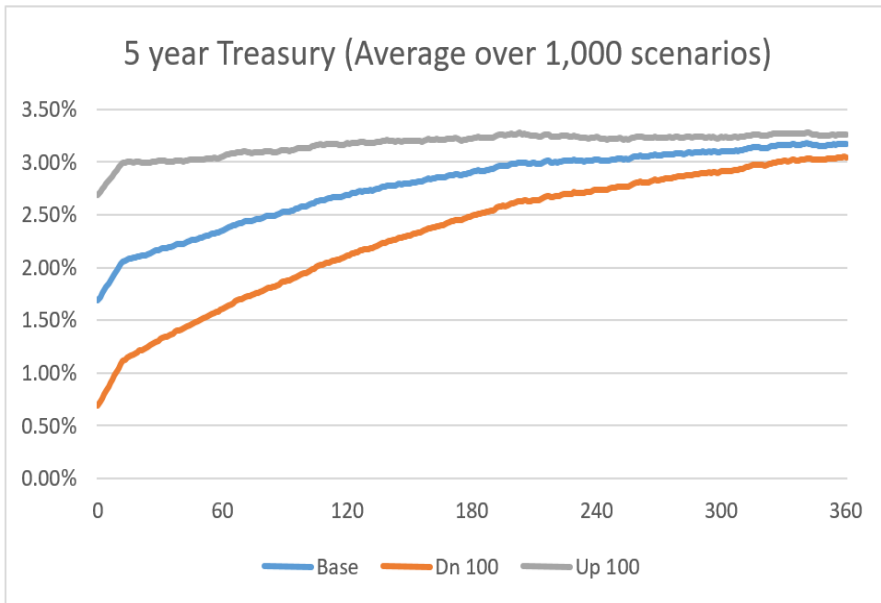
Academy Interest Rate Generator

- 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

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VM-21 Preliminary Regulator Feedback

- Insufficient documentation (e.g. support for CDHS)

- No discussion of materiality standard (and derivation of such)

- Repetitive sections

- Incomplete assumption justification, particularly with respect to A/E analysis

- Lack of support for the sufficiency of the number of economic scenarios used
  - Must demonstrate that the number of economic scenarios used does not materially understate the CTE 70 metric for reserves
  - May need to have more than 1,000 scenarios to get adequate CTE 98 metric convergence for capital

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Thank you!

Lessons Learned by VM-21 Early Adopters

John Brady, Chief Actuary

September 2, 2020

Initial thoughts

Implementing VM-21 requires numerous important decisions

Key aspects of implementation	Significantly greater documentation requirements
- Model - Assumptions - Hedging - Valuation & Forecasting - Controls - Communication	- VM-G - VM-31

Talcott Resolution's decision to early adopt VM-21

Financial considerations

- Reserve reduction - primarily from removal of Standard Scenario Floor
- Required capital increase - primarily from moving to CTE98
- Allowed for analysis of existing block and M&A opportunities to be on one basis

Operational considerations

- Updated models and tools as VM-21 evolved and communicated results
- Accelerated the transition to new documentation and reporting requirements
- Accelerated implementation freed resources for M&A work
- Avoided supporting two calculation regimes concurrently

Decisions worth revisiting when implementing VM-21

- Alternative method
- Captive
- Modeling platform
- Scenarios
    - Generator
    - How many scenarios
    - Reduction techniques
- Compression
- Capital
    - Smoothing
    - Allocation between interest risk vs market risk
- Allocation of reinsurance reserve credit
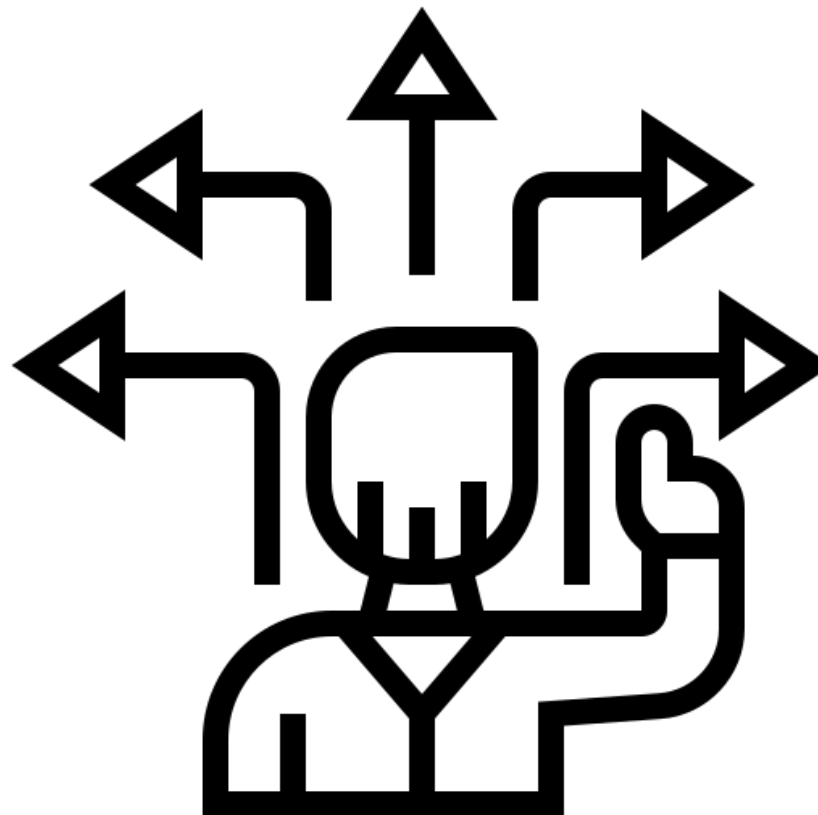
Decisions worth revisiting when implementing VM-21

Hedging

- Change hedging approach given VM-21 is less punitive

- CDHS

- Hedge ineffectiveness
    - E Factor pertains only to projected future purchases
    - Projection of in-force assets and any simplifications – is margin appropriate?
    - Relies primarily upon the Actuary making their case which can vary by company

- Explicit / Implicit Method

# Decisions worth revisiting when implementing VM-21

Assumptions

- Additional attention given to margins, individually and aggregate
  - Individual assumption's margin contribution relative to others
  - Aggregate margin across various market conditions
  - Increased use of statistical measures such as predictive analytics and credibility
  - Consideration of both assumption parameter misestimation and random deviations in the aggregate
- Impact from revenue sharing margin will vary by company depending on relative level of revenue sharing considered not guaranteed
- Analyzing the impact of both unfloored as well as floored CTEs across the spectrum of market conditions
- Swap spreads – NAIC vs other sources
- How to model complex benefit features, managed vol funds

New decisions required by VM-21

- Phase-in
- Discount rate for accumulated deficiencies & how to define additional asset amount
- Hedging - CTE(adjusted): immediate liquidation vs runoff
- Standard Projection
  - CTEPA vs CSMP
  - Withdrawal delay cohort method – suggested or simplified? If simplified, how?
- Capital - Macro tax adjustment vs Specific Tax Recognition
- Allocation of policy level reserves
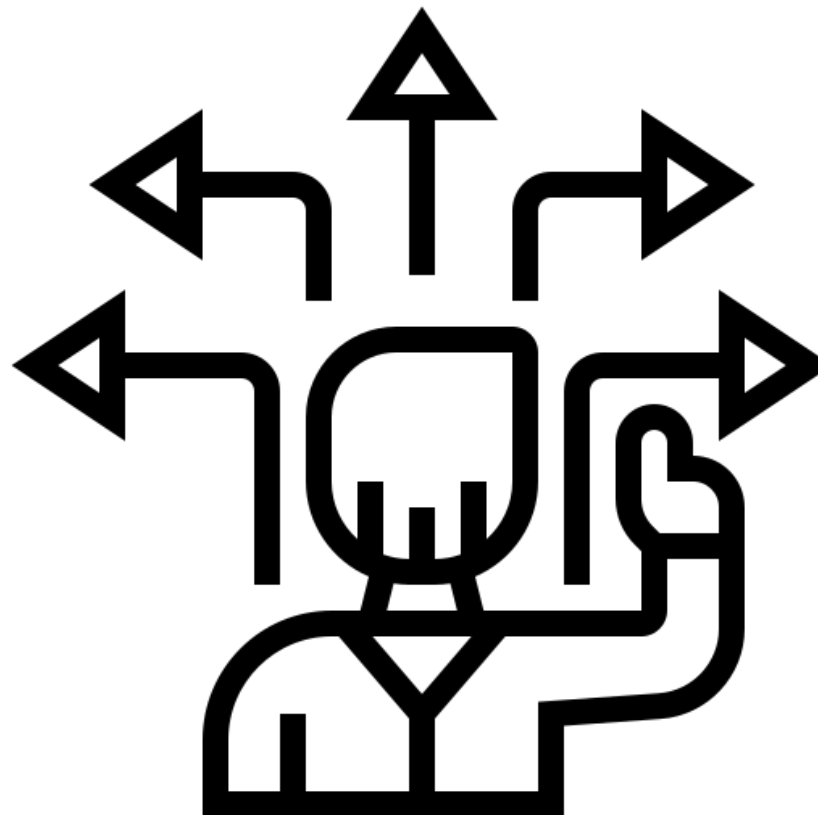
New documentation and disclosures: VM-G

Governance has taken a more prominent and formal role

Corporate Governance Guidance for Principle-Based Reserve (PBR) defines duties for three parties

Board of Directors	Senior Management	Qualified Actuary
• Oversight of persons and infrastructure related to PBR • Recipient of required reports and certifications	• Directs the implementation and ongoing PBR process • Ensures appropriate resources, processes, and controls are in place	• Ensures assumptions, methods, and models reflect VM requirements • Prepares summary report to the board and senior management • Prepares VM-31 (PBR Actuarial Report)

New documentation and disclosures: VM-G

Summary report requires disclosure of:

Valuation processes used to determine and test PBR:
Models (platforms, controls); Assumptions (process, controls)

PBR results

Materiality of PBR relative to the company's overall liabilities

Any significant and unusual issues

General level of conservatism in the company's PBR

New documentation and disclosures: VM-31

- VM-31: A formal step forward for the "Actuarial Memorandum" support document

- New/updated disclosures/calculations to decide upon and perform:
  - Materiality threshold for PBR
  - Methodology for estimating the aggregation benefit within the CTEPA run
  - Methodology for allocating the aggregate reserve to the contract level
  - Methodology used for standard projection
  - Assumption documentation
  - CTE (adjusted) and CTE(best efforts) comparison to Fair Value
  - Implied volatility
  - Method for allocating RBC between equity and interest rate risk
  - Methodology for determining the ceded reserve by reinsurer
  - Methodology for taxes in RBC

Not an exhaustive list!

Closing thoughts

(1) Get an early start

(2) Talcott anticipates a detailed review by the NAIC as an early adopter, but all companies should be prepared for additional scrutiny on their first annuity PBR reporting

(3) NY Floor – new requirement for year-end 2020
- Modified version of prior method standard scenario
- Rules vary by pre/post 2019
- Calculation of option value
- Grade-in period
- LICONY providing feedback

(4) Additional resources: ACLI PBR users group and Practice Note

THANK YOU