SOCIETY OF ACTUARIES

2019 ANNUAL MEETING & EXHIBIT

October 27-30
Toronto, Canada

Session 151: Products Across the Valuation Manual: Comparing PBR to PBR

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DYLAN STROTHER, REANNA NICHOLSEN, JASON KEHRBERG

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Products Across the Valuation Manual: The VM, VM-20 and VM-21

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The Valuation Manual ("VM") and shift to PBR

- VM was adopted by the NAIC in 2016 and has now been adopted by all 50 states
- Contains the NAIC's valuation requirements for life and health products
- An important (and expected) theme of the NAIC's annual updates to the VM has been more products shifting from formulaic to principle-based reserves and an ongoing effort to improve existing PBR requirements.

CRVM	PBR
Limited consideration of product risk factors	Designed to better reflect product risk factors and company risk practices
Fully prescribed industry-wide assumptions	Companies can use their own experience where relevant and credible
All assumptions are deterministic	Stochastic interest and equity
All assumptions are locked in	Assumptions are regularly reviewed and unlocked
Annual asset adequacy testing	Annual asset adequacy testing

What sections are in the VM?

Sec. I	**Introduction**	VM-25	Reserve Requirements - Health Insurance
Sec. II	**Reserve Requirements**	VM-26	Reserve Requirements - Credit Life & Dis.
Sec. III	**AOM Requirements**	VM-30	AOM Requirements
Sec. IV	**Experience Reporting Requirements**	VM-31	PBR Report Requirements
Sec. V	**VM Minimum Standards**	VM-50	Experience Reporting Requirements
VM-01	Definitions	VM-51	Experience Reporting Formats
VM-02	Min NF Mortality & Interest	VM-A	Reserve Requirements (existing model regs)
VM-05	NAIC Model SVL	VM-C	Reserve Requirements (existing guidelines)
VM-20	Reserve Requirements - Life	VM-G	Corporate Governance Guidance for PBR
VM-21	Reserve Requirements - VA	VM-M	Mortality Tables

- Requirements for reserves and minimum NF mortality and interest apply to covered business issued after 12/31/2016.
- Requirements for AOM, PBR Reporting, Experience Reporting, and Governance apply to covered business regardless of issue date.

Not all reserve requirements are principle-based

Product category	Section	Principle-based?
Life Insurance	VM-20 *(not incl. credit, preneed, industrial)*	Yes[1]
Credit Life & Dis.	VM-26	No
Preneed, Industrial	VM-A/C	No
VA	VM-21 *(major revisions effective 1/1/2020)*	Yes[1]
Non-VA	VM-A/C *(VM-22 contains valuation interest rates for SPIAs)*	No
Health Insurance	VM-25	No
Claim Reserves	Not subject to PBR requirements	N

- Not all aspects of PBR requirements are truly principle-based, e.g., the NPR in VM-20, the alternative method in VM-21.
- Elements of PBR requirements may contain varying levels of prescription, e.g. default and mortality assumptions

1. PBR treatment for life depends on whether a company is eligible and successfully applies for the Life PBR exemption.

Comparison of VM-20 and VM-21

Component	VM-20	VM-21
Effective Date	1/1/17 with optional 3-year implementation period	Implement for 1/1/20 (option to phase in recognition impact over 3 years)
Exemption	Can apply for Life PBR Exemption for non-ULSG business if meet certain requirements	No exemption, but simpler Alt Methodology permissible for VAs with no VAGLBs
Final Reserve	NPR for groups that pass both exclusion tests + Max (NPR, DR) for groups that pass SET and fail DET + Max (NPR, DR, SR) for groups that fail the DET **Note: Ignores DDPA adjustment. Term and ULSG always fail DET. Groups with CDHS always fail SET.*	Aggregate Reserve = Stochastic Reserve + Additional Standard Projection Amount + reserve for any contracts determined using the Alternative Methodology **Note: Subtract any applicable PIMR for all contracts not valued under the Alternative Methodology*
Exclusion Tests	DET and SET	No
DDPA Adjustment	Yes	No
PIMR Adjustment	Yes	Yes

Comparison of VM-20 and VM-21

Component	VM-20	VM-21
Reinsurance	Both pre- and post- reinsurance	Both pre- and post- reinsurance
Stochastic Reserve	CTE70 of scenario reserves	Also CTE 70 of scenario reserves, but using a weighted average of CTE 70 (best efforts) and CTE70 (adjusted)
Scenario Reserve	Estimated Starting Assets + GPVAD	Estimated Starting Assets + GPVAD, or Starting Assets if determined using DIM
Discount Rates	NAER for DR; 1.05*1yr Treasury for SR	NAER for Stochastic Reserve and Additional Std Proj Amt
Asset Collar Test	Yes	No
Deterministic Reserve	PV of Net Insurance CF at NAER, or Starting Assets determined using DIM	n/a
Additional Std Projection Amt	n/a	Methodology similar to Stochastic Reserve, but uses prescribed instead of prudent estimate assumptions

Comparison of VM-20 and VM-21

Component	VM-20	VM-21
Prudent Estimate Assumptions	• Used for most non-stochastic assumptions in DR and SR other than credit spreads and defaults • Mortality for DR and SR contains a relatively high amount of prescription	Used for most non-stochastic assumptions in stochastic reserve other than credit spreads and defaults
Prescribed aspects	• Aspects of mortality, some lapse components • Credit spreads and defaults in DR and SR	• Additional Standard Projection Amount • Alternative Methodology • Credit spreads and defaults in stochastic reserve
Reserving Categories	• Term, ULSG, other • More granular model segments can be used	N/a, although assumptions for the Additional Standard Projection Amount are broken out by defined common benefit types (e.g., GMDB, GMIB, GMWB) and the prudent estimate mortality assumption for the stochastic reserve must at least be broken out by VAGLB and no-VAGLB segments

Comparison of VM-20 and VM-21

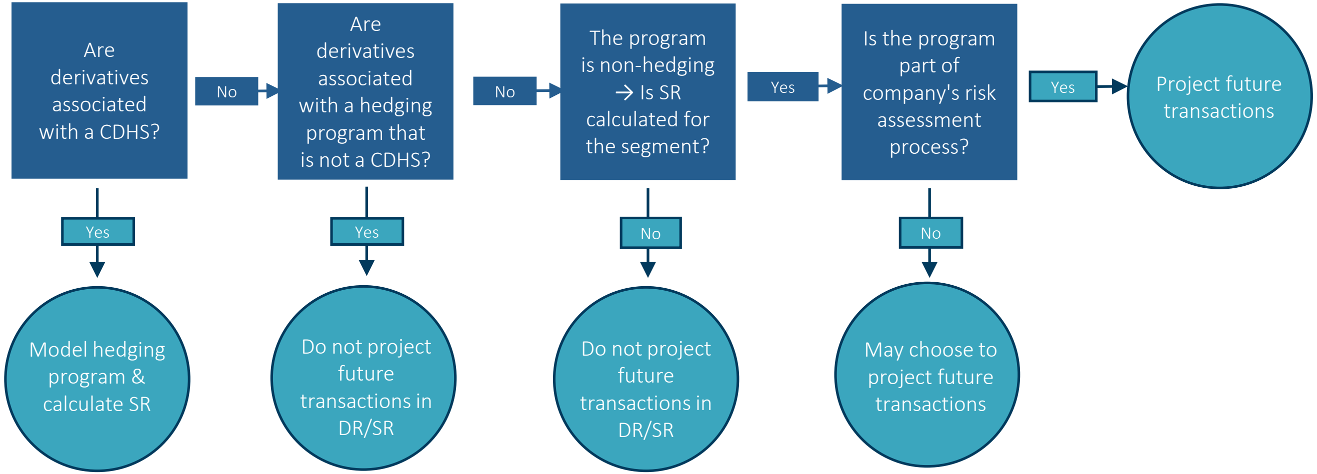
Component	VM-20	VM-21
Formulaic-like components	NPR • Similar to CRVM, but considers lapses	Alternative Methodology • If no guaranteed benefits, AG33 • If only GMDB, CSV + amount for each contract based on applying factors to contract
Stochastic assumptions	• Interest (NAIC prescribed ESG) • Equity (NAIC prescribed ESG)	• Interest (NAIC prescribed or proprietary ESG*) • Equity (NAIC prescribed or proprietary ESG*) • Implied Volatility (proprietary ESG) **Use of proprietary ESG cannot materially understate the reserve*
Spreads and defaults	Same prescribed tables and methodology for both VM-20 and VM-21	Same prescribed tables and methodology for both VM-20 and VM-21
Reinvestment guardrail	Yes, fixed income reinvestment into 50/50 AA/A non-callable public corporate bonds	Yes, fixed income reinvestment into 50/50 AA/A non-callable public corporate bonds
Simplifications	Generally allowed if doesn’t lower reserve	Generally allowed if doesn’t lower reserve

Comparison of VM-20 and VM-21

Component	VM-20	VM-21
Cell compression allowed	• NPR – no • DR and SR – yes	• Stochastic Reserve – yes • Additional Standard Projection Amount • No for CSMP method, yes for CTEPA method • Alternative Methodology – Yes
Seriatim allocation	Based on NPR	Based on measure of risk defined by company
Currently held derivatives	*See next slide*	• No CDHS – Include market value in starting assets. Model contractual hedge cashflows or replace MV with BV and model as general account assets • CDHS – Include costs and benefits of hedging instruments in the projection
Future derivatives	*See next slide*	• No CDHS – Do not consider the cash flows from any future hedge purchases or any rebalancing of existing hedges • CDHS – Model the appropriate costs and benefits of hedge positions expected to be held in the future through the execution of the CDHS

Modeling Derivative Programs (VM-20)

- **Currently held derivatives –** Required to model
- **Future derivative transactions –** Requirements vary by type of program (see below for summary of VM-20 treatment)



Products Across the Valuation Manual: Common Methods and Techniques

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Common Methods & Techniques

Despite differences in products and calculations, many techniques can be shared:

1. Assumption and Margin Setting
2. Projected Reserves
3. Pricing

Assumptions & Margins

VM-31 requires a listing of the assumptions and margins, including a discussion of the rational for each

- Margins must:
  - Account for estimation error and adverse deviation
  - Assume policyholder behavior becomes more efficient over time
  - Increase for uncertainty if data not fully relevant or credible, even if prescribed
  - Be set independently unless appropriate method to determine aggregate margin demonstrated
- Potential margin methods
  - Sensitivity testing
  - Statistical-based methods
- Elements to consider for determining materiality
  - Materiality to the underlying reserve
  - Statistical variability and materiality criteria used in other frameworks

Margin Example

Real-world example of margin framework in PBR Assumptions Resource Manual

Quantile method applied to a sample 10-year level term product that has been issued for many years

- Step 1. Establish company margin-setting policy
- Step 2. Calculate standard deviation of historical experience at each duration
- Step 3. Determine appropriate direction of margin at each duration
- Step 4. Calculate impact of applying margin at set % of standard deviation
- Step 5. Solve for simplified margin that replicates financial impact
- Step 6. Reasonability Check & Qualitative Analysis

For further details, refer to PBR Assumptions Resource Manual published by American Academy of Actuaries

Margin Example

Step 1. Establish company margin-setting policy

- Criteria for determining if assumption or risk is material
  - Relative to size of reserve, not total company financial statements
  - Ex: Assumption is material if impact to modeled reserve is greater than 2% or $5M
- Margin Methods
  - Use quantile method if credible historical experience available
  - Target margin approximately equal to one standard deviation for desired conservatism
  - Apply sensitivity testing if credible experience unavailable

Margin Example

Step 2. Calculate standard deviation of historical experience at each duration

Pol Dur	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	$\bar{X}$	SD_X
1	8.00%	7.80%	6.50%	7.20%	8.20%	7.10%	7.70%	6.60%	6.90%	6.10%	7.20%	0.70%
2	4.00%	6.00%	4.50%	6.20%	5.30%	5.40%	5.10%	4.60%	4.90%	5.00%	5.10%	0.70%
3	3.40%	3.00%	2.50%	3.50%	2.90%	3.00%	5.00%	2.10%	2.00%	3.60%	3.10%	0.90%
4	2.50%	2.00%	2.10%	2.00%	2.00%	2.80%	2.30%	2.00%	1.60%	1.90%	2.10%	0.30%
5	1.50%	1.00%	1.30%	1.00%	0.90%	1.40%	1.10%	0.90%	1.10%	0.80%	1.10%	0.20%
6	1.40%	0.90%	0.80%	1.10%	1.10%	1.00%	0.70%	1.10%	0.50%	1.60%	1.00%	0.30%
7	1.80%	1.20%	0.70%	0.90%	1.00%	0.90%	1.00%	1.00%	1.10%	1.00%	1.10%	0.30%
8	1.00%	1.30%	0.90%	1.50%	0.90%	0.80%	1.10%	0.60%	1.00%	1.20%	1.00%	0.30%
9	1.20%	1.10%	1.10%	1.00%	1.00%	1.30%	0.80%	1.50%	0.60%	1.40%	1.10%	0.30%
10	84.00%	87.00%	79.10%	92.00%	86.30%	88.90%	82.70%	87.90%	79.50%	86.10%	85.40%	4.10%
11-15	8.20%	7.10%	7.70%	6.60%	6.90%	6.10%	7.00%	7.20%	7.10%	8.00%	7.20%	1.00%

Margin Example

Step 3. Determine appropriate direction of margin at each duration

Duration	Δ in DR (Positive Margin)	Sign of Margin to Increase DR
1	1.03%	Positive
2	0.87%	Positive
3	0.52%	Positive
4	0.28%	Positive
5	0.06%	Positive
6	-0.07%	Negative
7	-0.18%	Negative
8	-0.21%	Negative
9	-0.21%	Negative
10	1.50%	Positive
11-15	2.00%	Positive

Margin Example

Step 4. Calculate impact of applying margin at set % of standard deviation

Duration	Sign of Margin	Delta (%)	Delta ($)
Baseline	Zero Margin		
1	Positive	1.03%	1,030,000
2	Positive	0.87%	870,000
3	Positive	0.52%	520,000
4	Positive	0.28%	280,000
5	Positive	0.06%	60,000
6	Negative	0.07%	70,000
7	Negative	0.18%	180,000
8	Negative	0.21%	210,000
9	Negative	0.21%	210,000
10	Positive	1.50%	1,500,000
11-15	Positive	2.00%	2,000,000
Aggregate		6.9%	6,930,000

Margin Example

Step 5. Solve for simplified margin that replicates financial impact

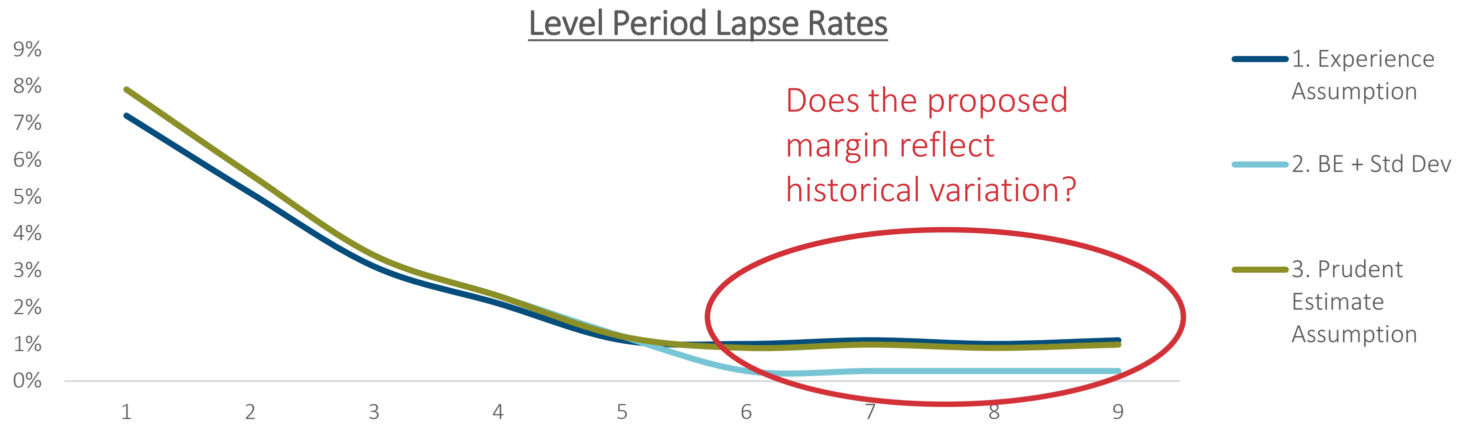
- Margin provides conservatism for uncertainty and adverse deviation
- Should be relatively stable over time
- Can monitor as part of assumption setting process

Margin	Delta (%)	Delta ($)
Target Impact	6.93%	6,930,000
2%	1.65%	1,650,000
5%	3.25%	3,250,000
10%	6.85%	6,850,000
20%	13.65%	13,650,000

Margin Example

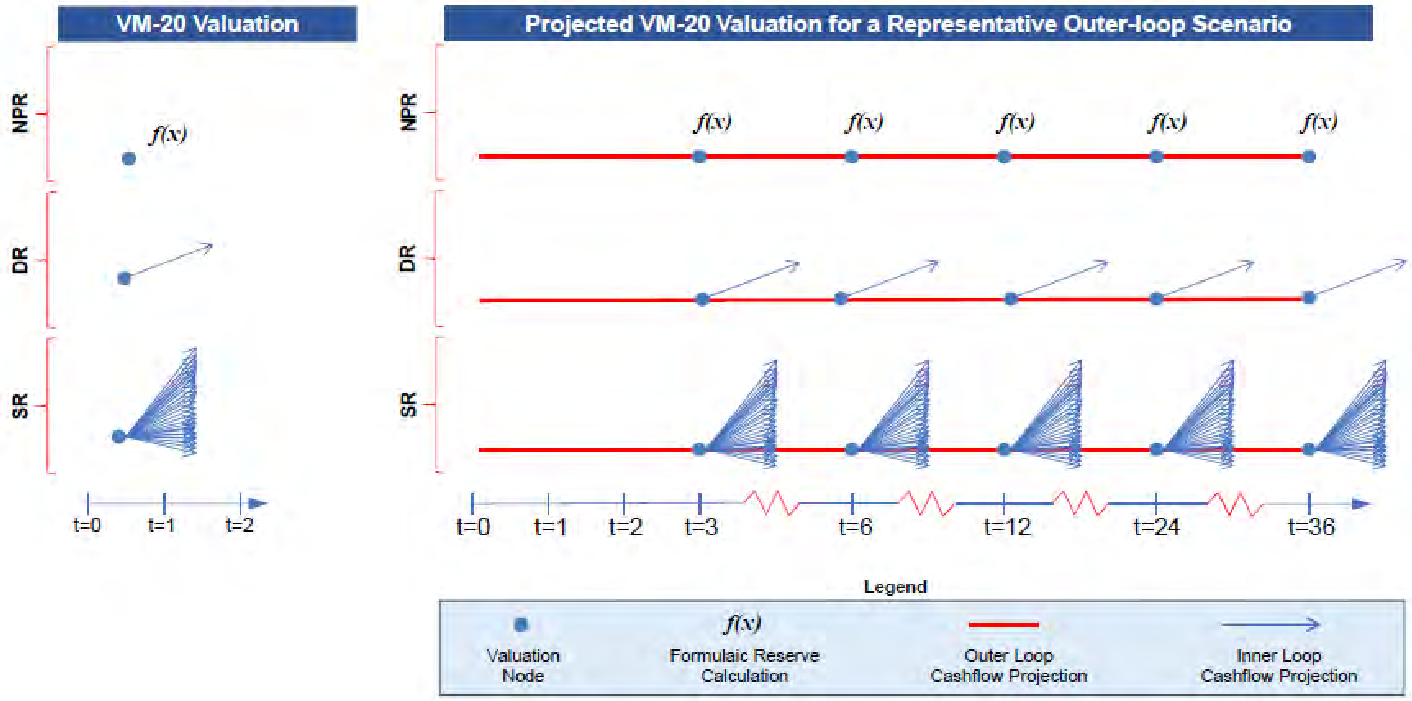
Step 6. Reasonability Check & Qualitative Analysis

- Does the simplified margin appropriately reflect the risk and historical experience? Is additional granularity needed?
- Are there additional risks or sources of uncertainty that should be reflected, i.e., changes to the product design, distribution channel or economic environment?
- Are there trends in the experience that should be reflected?



Projected Reserves

Project future reserves for other company projections

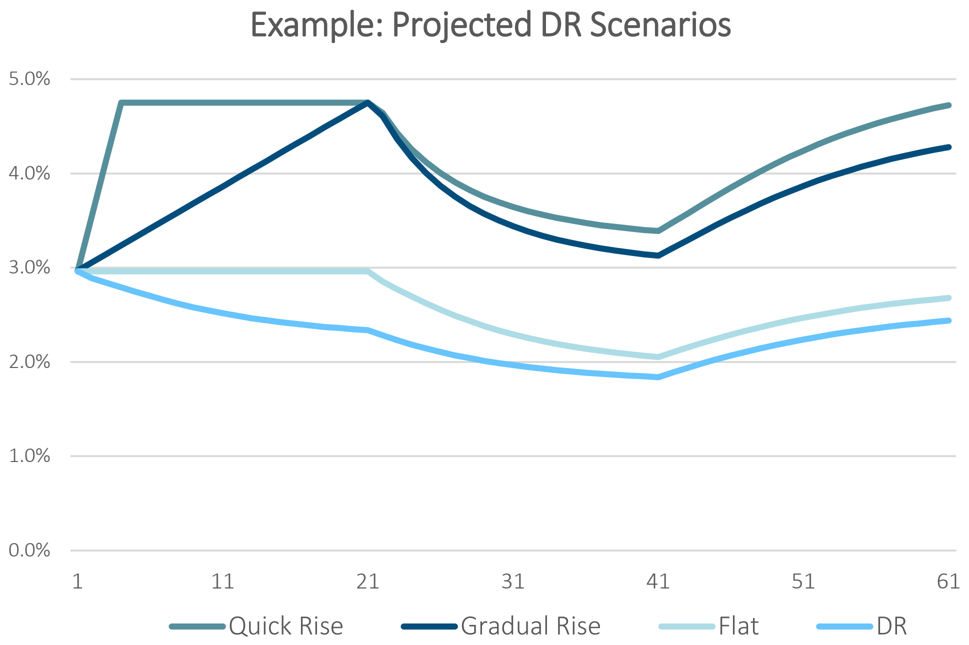


Projected Valuation Assumptions

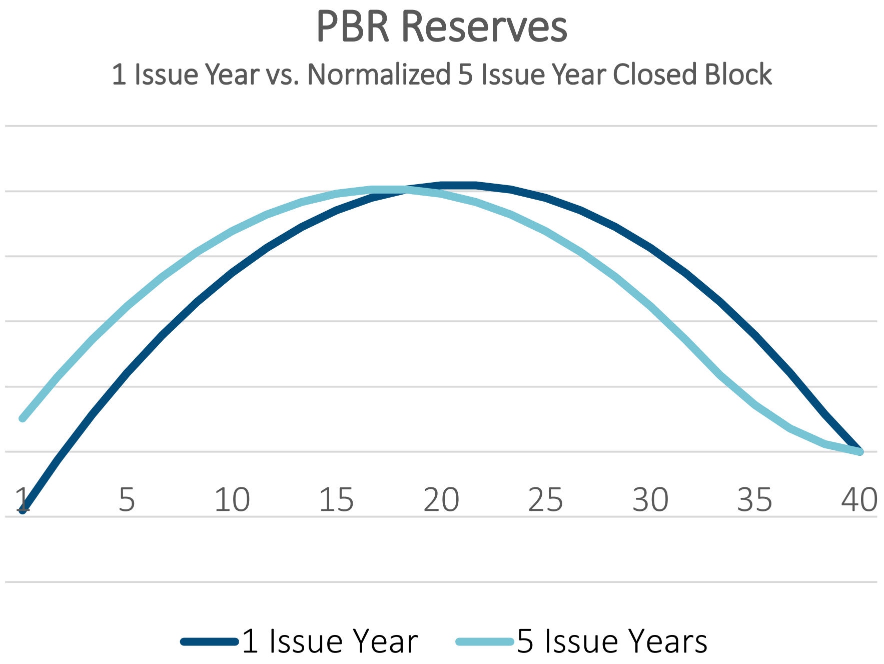
Asset and liability assumptions may require nested modeling

- **Asset Assumptions:**
  - Interest and equity scenarios
  - Spreads and defaults
  - Reinvestment strategy

- **Liability Assumptions:**
  - Credibility
  - Mortality improvement
  - Expense efficiencies / inflation



Pricing Considerations



- **Periodically check which PBR component prevails**
  - Consider modeling dominant reserve, but tricky if components switch
  - Note segments carrying largest impacts (e.g., longer level periods on term)
- **Consider how many issue years to reflect**
  - Pricing single year of new business vs. cohort approach
  - Product design changes will influence aggregate reserves over time
- **Cell-level pricing methods**
  - Model aggregate reserves
  - Economic and run-time considerations

Products Across the Valuation Manual: New York, VM-31, VM-G

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Journey Down the Boardwalk: NY PBR Development

2015 and prior: NY not adopting VM-20

June 2016: NAIC meets adoption threshold for VM-20

July 2016: NY announces intentions to adopt PBR with deviations

July 2018: NAIC Financial Condition (E) Committee adopts VM-21 Framework

December 2018: Governor signs bill authorizing NY adoption of NAIC Valuation Manual, with deviations (TBD)

Fall 2019: NY expected to expose proposal of NAIC VM-20, VM-21, VM-22 deviations

NY floor Differences: VM-20, VM-21, VM-22

NAIC requirements plus an additional floor for New York for VM-20, VM-21, and VM-22 (with NY still meeting NAIC accreditation standards)

VM-20

- VM-20 NY Floor potentially to be based on pre-PBR reserves

VM-21

- VM-21 NY Floor methodology under development

VM-22

- VM-22 NY Floor expected to focus on discount rates for fixed payout annuities (as VM-22 only covers discount rates)

NY has still not publicly announced or exposed reserve requirements at the time of developing these slides

Tax Reserves - Tax Cuts and Jobs Act (TCJA)

- **Tax reserves are based on the statutory reserves under the NAIC prescribed methodology**
  - Apply 92.81% factor to the NAIC statutory reserves
  - Do not include additional reserves held in excess of NAIC statutory reserves
    - Asset adequacy reserves
    - Reserves attributable to deferred and uncollected (D&U) premiums
    - State-specific reserve requirements (e.g., excess reserves held under New York State requirements)
  - Aligns more with PBR methodology than prior tax reserve requirements
    - Previously had to adjust NAIC statutory reserves for mortality and interest rate adjustments
    - Now can apply a factor to the total reserve, whether based on prescribed or company-specific assumptions (e.g., deterministic reserve under VM-20 or stochastic reserve under VM-20/VM-21)

- **Greater consistency across life insurance and annuities valued under PBR**
  - Apply factor to PBR reserve for both VM-20 and VM-21
  - Same methodology could apply to future fixed annuity PBR methodology
    - o Exceptions exist for certain product types (e.g., annuity certains)

VM-31: Life vs. Variable Annuity Requirements

VM-20		VM-21
Summary: Table, assumption list, materiality, rationale, description of change in reserves	Largely Similar	Summary: Table, assumption list, materiality, rationale, description of change in reserves
Modeling: Systems, segments, validation, simplifications	Largely Similar	Modeling: Systems, segments, validation, simplifications
Liability: Mortality (e.g., credibility & underwriting), lapses, expense allocation, margins, experience studies	Similar Mortality & Exp Studies	Liability: Mortality (e.g., plus/minus segments), lapses, guarantee utilization, expense allocation, experience studies
Assets: Description, allocation, reinvestment strategy, NAER, fund mapping, some hedging/scenario disclosures	Differences for hedging & scenarios	Assets: Description, allocation, reinvestment strategy, NAER, fund mapping, detailed scenario/CDHS disclosures, error factors
Reinsurance and Revenue-Sharing: Agreements, assumptions, modeling, pre-reinsurance reserve	Same	Reinsurance and Revenue-Sharing: Agreements, assumptions, modeling, pre-reinsurance reserve
NGE section and margin sensitivity testing	Completely Different	Alternative Methodology and RBC Sections
Exclusion Testing	Completely Different	Standard Projection Amount requirements and decrement analysis
Reliances, certifications, and closing paragraph	Nearly Identical	Reliances, certifications, and closing paragraph

****VM-31 Executive Summary Covers Both Reports****

VM-G: Applicability Across the VM

VM-G contains governance requirements for modeled reserves

- Specifically outlines responsibilities for the qualified actuary, senior management, and board of directors
- Covers oversight of controls, model validation, assumptions, and other governance measures

VM-G applies to both VM-20 and VM-21 modeled reserves

- Starting in 2017, VM-G requirements applied to VM-21 business issued 2017 and later → also applied to inforce business if aggregated with VM-21 business issued in 2017 and later
- Applies to VM-20 business as of company implementation date
- Not applicable to VM-22 or rules-based reserves

Leveraging opportunities for VM-G compliance between life and variable annuities

- Can use the same type of format and timing for presentations of VM-20 and VM-21 to senior management and the board of directors
- Similar documentation opportunities: minutes and materials from board meeting, VM-31 certifications, and additional internal documentation

Fixed Annuity PBR: The Next Frontier…

- **Fixed annuity PBR currently being worked on by the Academy Annuity Reserves Work Group**
  - Large focus on fixed indexed annuities (FIAs) and fixed deferred annuities (FDAs) with guarantees (e.g., guaranteed living benefits or "GLBs")
  - Actuarial Guideline 33 requires holding reserves to fund the largest accumulated policyholder benefit after projecting all combinations of optionality and surrender timing, even if low probability or not to the policyholder's advantage

- **Opportunity for PBR standards applicable across life and annuity products**
  - NAIC requirements for VM-20 and VM-21 have started to stabilize after recent adoption, which allows for greater focus towards laying the foundation for fixed annuity PBR
  - Targeting adoption of general framework within next 2 years and implementation in 3 years
    - Presentation made at the Summer NAIC National Meeting to target adoption with 1/1/2022 effective date
    - Target a proposed methodology framework deck for early/mid 2020 and drafted language for 2021
    - Many potential obstacles related to field testing, drafting, and regulatory approval process still to be worked out

Fixed Annuity PBR: The Next Frontier…

- <u>Methodology Topics to be Considered</u>
  - VM-21 Methodology: Focus on recently adopted VM-21 general account methodology and make targeted deviations as needed.
  - Exclusion Test: Can products with limited policyholder optionality or interest rate risk be excluded? May consider possible stochastic exclusion ratio test or certification method, similar to VM-20 requirements.
  - Scope: Focus has been on fixed deferred annuities and fixed indexed annuities (especially those with living guaranteed benefits). Also consider whether to include Single Premium Immediate Annuities (SPIAs), Guaranteed Investment Contracts (GICs), and other products in the fixed annuity PBR methodology.
  - Hedging: VM-21 recently introduced greater potential hedge effectiveness within the stochastic reserve if such can be demonstrated through back-testing. Consider whether to propose similar requirements for hedges covering indexed-credits on fixed indexed annuities.
  - Asset Requirements: Investment spread on the general account tends to be a proportionately greater source of profit margin for fixed annuities than for life insurance and variable annuities. Include similar reinvestment guardrails requirements to VM-20/VM-21 or VM-22?
  - Floors: VM-21 has a standard projection amount and VM-20 has the net premium reserve. What is the floor for fixed annuity PBR?

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