Overview of Asset Modeling and Discount Rate Issues in VM-20

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Topics to be Covered

- Background and purpose of asset models in Life PBR
- Major asset model components
- Role of assets and discount rates in the methodology
  - Deterministic reserve
  - Stochastic reserve
- Proposed discount rate amendments for VM-20 and SVL
- Proposals addressing “riskier” asset portfolios
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Background: Use of company asset models in life principle-based reserves (VM-20)

- VM-20 is a natural progression from asset adequacy analysis and RBC cash flow testing (C3 Phase I and II)
- Rooted in the adequacy standard of the Standard Valuation Law and Actuarial Standard of Practice #22
  - Reserves must make adequate provision for the company's obligations "when considered in light of the assets held by the company with respect to the reserves and related actuarial items, including but not limited to the investment earnings on the assets…"
  - Appointed Actuary's opinion must consider whether reserves are adequate under moderately adverse conditions

Purpose: What end results are affected by company asset models in VM-20?

- Deterministic reserve: Calculation of "net asset earned rates" to discount net liability cash flows
- Stochastic reserve: Projection of future accumulated asset balances to determine accumulated deficiencies at each duration (SR discount rates are discussed later)
- Both deterministic and stochastic: Projection of liability cash flows that depend on the future level of the company's investment return
  - Effect of company's non-guaranteed element strategy on policy benefits and related policyholder behavior

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Asset Model: Projects Net Investment Earnings

- Both the deterministic and stochastic reserve require the projection of net investment earnings for each projection interval
  - DR: used to determine net asset earned rates.
  - SR: used to project accumulated assets
- Projected net investment earnings are determined by:
  - Starting assets: projection of **gross** investment earnings under a defined set of economic scenarios, with deductions for default costs and investment expenses based on prudent estimates.
  - Reinvestment Assets (investments of future net cash flows): projection of **net** investment earnings under a defined set of economic scenarios using treasuries plus a prescribed spread.
- Economic scenarios:
  - DR: a single prescribed scenario
  - SR: stochastically generated scenarios

Starting Assets

- Model contractual cash flows (principal and gross investment income) consistent with each scenario
- Incorporate statutory accounting basis in income and balance sheet values
- Deduct prudent estimate default costs and investment expenses
- Model exercise of options along each scenario such as call, put, prepayment, extension
- Model realized gains and losses on any modeled sales
- Requirements for equities and policy loans

Reinvestment Assets

- Purchases
  - Representative of and consistent with the company's investment policy for each model segment.
  - Yield on each new asset is the appropriate scenario Treasury rate plus a prescribed net spread
  - Defaults and expenses are already built into the net return
  - LHATF Life PBR Subgroup has proposed a single spread for all asset types and maturities, expressed as a % of the corresponding Treasury rate
    - The LRWG will be providing our perspective to assist LHATF in defining this requirement
- Disinvestment
  - Reflect cost of borrowing if used to meet negative cash flows
  - Other options available from asset adequacy analysis practice (e.g., asset sales, negative assets)

Economic Scenarios

- Deterministic
  - Prescribed scenario of Treasury rates and equity returns biased toward the low end of returns relative to the Academy Economic Scenario Work Group's (ESWG) stochastic generator
  - It is not "the mean" or "level" scenario
  - LRWG's amendment proposal defines this scenario to be Scenario 12 of the stochastic exclusion test (discussed in more detail later)
- Stochastic
  - Four methods available, but at a minimum, prescribed calibration standards must be met

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Deterministic Reserve (DR) methodology

- Discount rates have different roles within the deterministic reserve (DR) and stochastic reserve (SR) methodologies
- The DR is a present value of net liability cash flows (e.g., benefits, expenses, premiums)
  - Also known as a Gross Premium Valuation (GPV)
- Discount rates for each model segment are equal to the path of portfolio "net asset earned rates" by projection interval from the cash flow model, including starting and reinvestment assets
- Discount rates for each model segment are applied to policy cash flows for the corresponding policies to compute seriatim reserves
- Discount rates are a major factor in the resulting DR level

Why is equivalence of discount rates and accumulation rates critical for the DR?

- The DR approximates the statement value of starting assets needed, together with projected net investment returns, to fund all future net liability cash flows and leave zero assets remaining at the end of the model
- If the net liability cash flows were instead discounted at a lower set of returns than the net asset earned rates, this would result in a higher amount of starting assets needed to back those cash flows. Restarting the model with more assets and projecting forward would result in accumulation of a large surplus of assets after all policies are gone

Stochastic Reserve (SR) methodology

- Stochastic scenario reserve = Statement value of starting assets + Greatest PV of Accumulated Deficiencies (GPVAD)
- Starting asset amount (all scenarios) is the estimated final reserve
  - Regulatory control: For the aggregate business subject to VM-20, total starting assets are required to be between 98% and 102% of the actual final reserve; otherwise additional documentation required to assure that overstatement or understatement of starting assets does not materially understate the reserve
- Accumulated deficiency (AD) at each duration is the negative of the projected statement value of accumulated assets (using former terminology, the "working reserve" is zero)

Stochastic Reserve (SR) methodology

- The GPVAD term is an adjustment to the starting assets
  - Approximates the marginal amount of assets needed to be added to or subtracted from the starting assets so that accumulated assets don't fall below zero at any duration for the scenario
- Discount rates therefore play a different and much less important role for the SR than for the DR.
  - They only impact the GPVAD term in the SR, representing the assumed investment return on only those needed marginal assets
  - By contrast, for the DR, discount rates are applied to all future net liability cash flows, representing a prudent investment return on the entire portfolio, including both starting and reinvestment assets
- Different discount rate proposals for the SR are under discussion

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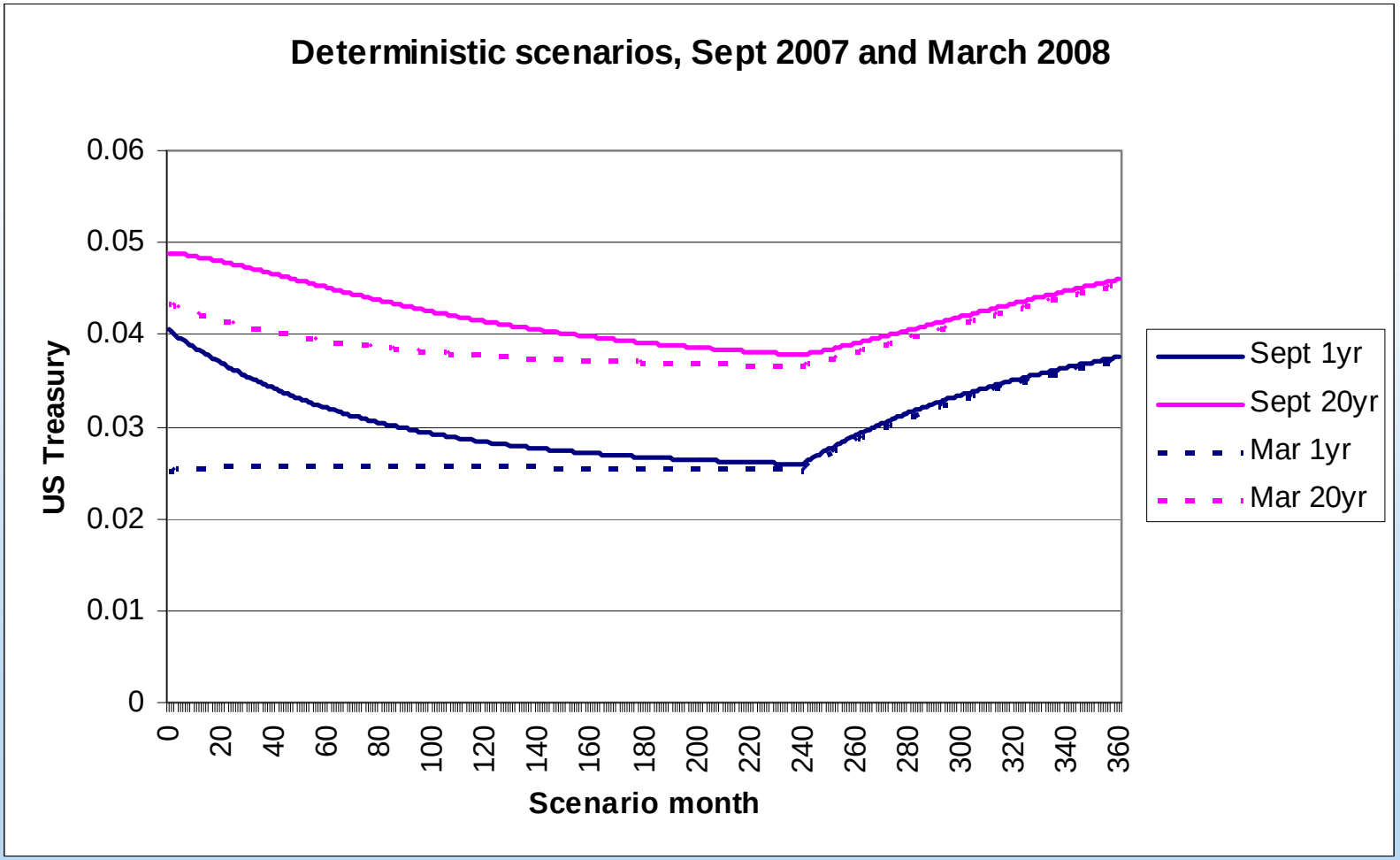
Prescribed Treasury Rate Path for the DR

- In VM-20, the discount rates for DR equal the path of net asset earned rates. A key component of net asset earned rate is the prescribed Treasury interest path for reinvestment assets
- Current VM-20 prescribed path: start with the Treasury curve on the projection start date and grade linearly to an "ultimate" curve over 10 years
- New LRWG proposal: (amendment change form #19, attachment 13 of May mailing)
  - Prescribed Treasury path equals Scenario 12 from stochastic exclusion test
  - Path is readily available and regularly updated
  - Scenario 12 is reasonably consistent with a 65 CTE level
  - Interest rate pattern represents approximately a one standard deviation cumulative shock to the starting yield curve, spread over 20 years (see next slide)

Deterministic Scenario (Scenario 12)

Using starting Treasury curve as of 9/30/07 and 3/28/08



Accumulated Deficiencies for the SR

- Current VM-20: discount rates = net asset earned rates
  - Consistent with idea that assets similar to the starting assets may be available from surplus
  - The PA Insurance Department and Academy Work Groups within the Life Practice Council have since concluded that in tail scenarios, where the scenario reserve could greatly exceed the starting assets, there may not be enough surplus assets available and cash may be a more appropriate presumed asset
  - The above parties have submitted amendments consistent with the idea that cash is assumed to be added to starting assets, and that the discount rate should be a new money rate that is close to a risk-free rate

Accumulated Deficiencies for the SR

- PA proposal (amendment change form #1, attachment 13 of May mailing)
  - If, for the scenario, accumulated assets always stay positive, use discount rates = net asset earned rates
  - If, for the scenario, accumulated assets go negative, use discount rates = some type of risk-free rates defined by NAIC
- Academy work group proposals (amendment change form #23, attachment 13 of May mailing)
  - Always use new money rates, whether accumulated assets are positive or negative, equal to the path of one-year scenario Treasury rates multiplied by 105%. Can be thought of as a standardized estimate of the true return of the marginal assets
  - Incorporates PA concern when additional assets are needed
  - Simplifies the calculations by using common discount rates across all model segments within each scenario
  - Simplifies and enhances the auditability for regulators
  - Consistent with C3 Phase I and recent Academy Work Group thinking for capital

A step outside the box—could reserves be defined without reference to discounting?

- The Academy's Annuity Reserve Work Group (ARWG) has been discussing ways to determine reserves (i.e., adjusted starting assets) without reference to discounting
- Specifically, the group is discussing the following Scenario Reserve definition in the context of non-variable annuities:
  - "The minimum statutory statement value of starting assets that is needed to ensure that the largest accumulated deficiency is equal to zero."
- Neither discount rates nor present values are mentioned
- The ARWG discussions have acknowledged that this computation is difficult and would involve iterative techniques with different sets of starting assets
- The group is preparing Issue Papers that describe potential approximation methods as well as methods to validate those approximations

Should discount rates be addressed in the Standard Valuation Law?

- LHATF is considering an SVL amendment to embed specific discount rate concepts inside the law
- The Academy's PBR Steering Group strongly believes that specific reserve formulas and discount rate requirements should **not** be included in the law but should be defined by the VM
- As we've seen, discounting is a technical issue that has different purposes under different methodologies. It is not even strictly necessary if other ways of incorporating investment return in reserves can be developed (as shown by the ARWG definition under discussion)
- Principle-based reserving methods and techniques will continue to evolve, and the law should allow such evolution without the need for further legislation to tweak technical details

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The concern over riskier assets

- Concern has been expressed by some regulators that investing in riskier assets can result in higher net returns and lower reserves, even if the VM-20 prudent estimate methodology is followed appropriately
- The LRWG and New York regulators have submitted alternative amendment proposals to address this concern
- The LRWG proposal limits the net return on “below investment grade assets” (definition TBD)
- The New York proposal limits the net return on the entire asset portfolio (specifics are being clarified)

LRWG’s Proposal

Proposal is in concept stage - submitted as a drafting note

(amendment change form #11, attachment 13 of May mailing)

- Target “below investment grade assets”
  - Need to determine definition of and method to identify such assets in the portfolio. May include other types besides NAIC classes 3-6
- Prescribe default assumption or method to determine default assumptions on these assets. Intent is to eliminate “credit” for higher spreads on these assets
- Retain prudent estimate requirements on all other fixed income asset classes

Total package of controls proposed by LRWG

1. Prescribed net spread on reinvestment assets
2. Prudent estimate default costs on “investment grade assets”
   - Consistent with specific VM-20 asset default requirements
   - Consistent with overall VM-20 framework for establishing conservatism via margins (see Appendix)
3. Prescribed method for handling defaults on “below investment grade assets”
4. Disclosure of the gross and net embedded spread on the starting assets (see Appendix for brief description)

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Appendix--General VM-20 Framework for Establishing Conservatism in Reserves

- Applies consistently to all assumptions, including those related to investment returns on assets
- The ideal is an appropriate aggregate margin consistent with the objectives of statutory reporting (paragraph C.5.4.2): "Conceptually, the choice of margins should be made so that the final result approximates what would be obtained for the reported reserve at the required CTE level if it were possible to calculate results over the joint distribution of all future outcomes…"
- The reality is that achieving the ideal is difficult. "Therefore, the company shall determine margins for each risk factor independently…unless the company can demonstrate that an appropriate method was used to jointly determine the margin for two or more risk factors in combination."

Appendix--Embedded Spread Description

- Gross embedded spread measures the average option-adjusted spread (OAS) over Treasuries that a buyer would receive if the company sold its entire portfolio at market value on the valuation date
- Can be compared to average market OAS indices for various assets to map the relative riskiness of the aggregate portfolio
- Average annual default cost assumption, net embedded spread, and average maturity must also be disclosed
- Measured and disclosed for each model segment