NAIC's Center for Insurance Policy and Research Summit: Exploring Insurers' Liabilities

Session 3: Life Panel
Issues with Internal Modeling

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Overview of PBR

- Insurers set aside funds, or reserves, to pay insurance claims when due.
- Currently, one-size-fits-all formulas are used to determine statutory reserves, as prescribed by state law and regulations.
- Principle-based Reserving, or PBR, replaces the current statutory formulaic approach with an approach that better aligns policy reserves with product risks and the risk practices of the company.
  - To improve accuracy of reserves, PBR reserve assumptions move away from using industry-wide averages to using a company's own experience for risks such as mortality, policyholder behavior, and expenses.
  - Also reflects the impact on the reserves under a variety of future economic conditions, such as interest rate movements, equity returns and asset defaults.
  - **Requires the use of a robust asset and liability cash flow model.**

Why is PBR Needed?

- Reserve requirements need to evolve to keep pace with new product designs. The formulaic approach prescribed by state laws and regulations needs to be updated as new designs are introduced.
- Current formulas do not always accurately reflect the liabilities held on policies. For some products this leads to excessive conservatism in reserve calculations and for others it results in inadequate reserves.
  - Reserves higher than necessary results in higher costs to consumers.
  - Reserves that are too low can put companies at greater risk of future insolvency, with lower protection to consumers.
- The current system locks in certain assumptions, not adjusting as experience and economic conditions change.
- The improved alignment is expected to reduce redundant reserves for some products and increase inadequate reserves for products where significant product risks are not captured by the current reserve valuation methodology.

Importance of Cash Flow Models

- For some risks, modeling the range of outcomes under multiple possible economic conditions is the only way to appropriately reflect the risk in the reserve.
- A credible and robust cash flow model is an essential element for PBR.
- Many companies will use their cash flow testing model for PBR; some modifications may be needed to fully comply with PBR.

Cash Flow Models

Types of models

- Company-developed models versus commercial models (i.e., vendor)
- Grouped versus seriatim models
- Asset versus liability models

Basic elements

- Listing of inforce policies
- Listing of asset holdings backing the inforce policies
- Modeling assumptions
- Customization to vendor software to reflect unique product features

Reserve Valuation Assumptions

Under PBR, valuation assumptions will fall into one of two categories:

- Prescribed Assumptions
  - Includes stochastically generated assumptions for interest rate movements and equity returns.
- Prudent Estimate Assumptions

Prescribed Assumptions

- **Prescribed assumptions** are used for risks where the company has very little or no influence or control over the outcome.
- For these types of risks, all companies will be required to use the same assumptions.
- Examples:
  - Interest rate movements
  - Equity movements
  - Asset default experience
  - Spreads on new asset purchases

Prudent Estimate Assumptions

- **Prudent estimate assumptions** are used where the company practice has some degree of influence on the outcome of the risk factor.
- The resulting valuation assumptions for this category could differ by company, reflecting the different risk profiles of the company.
- Equals the actuary's best estimate of the future (i.e., "Anticipated Experience") plus a margin that includes a provision for adverse deviation and estimation error.
- Examples:
  - Mortality
  - Lapse
  - Partial Surrender
  - Expenses
  - Premium funding patterns

Minimum Reserve under VM-20

- Three components:
  - Net Premium Reserve (NPR) - calculated seriatim and summed
  - Deterministic Reserve (DR) - calculated in the aggregate
  - Stochastic Reserve (SR) - calculated in the aggregate
- The Minimum Reserve equals the greater of the three, compared in the aggregate, with an adjustment for any deferred premium asset.
- The adjustment for the deferred premium asset grosses up the SR or the DR if the SR or DR is greater than the NPR.
- The company may elect to exclude one or more groups of policies from the SR and/or the DR requirements if prescribed exclusion tests are passed.

Net Premium Reserve

- Serves as a minimum floor.
- Uses only prescribed assumptions (not company experience assumptions).
- Conforms the reserve methodology to comply with the tax code.
- A seriatim calculation.
- Comparison is made to the Cash Surrender Value.

The Deterministic Reserve

- Based on a Gross Premium Valuation methodology (present value of benefits and expenses less the present value of premium and other inflows).
- Uses cash flow model to project revenue, benefits, and expenses.
- Was initially a seriatim (policy by policy) calculation, with a comparison to the cash surrender value for each policy.
- Is now an aggregate reserve, and the company can group policies into modeling cells to project future cash flows.
- Cash flows are projected in compliance with the requirements of VM-20.

Deterministic Reserve Calculation

- Cash flows are projected under a single prescribed economic scenario (interest rate movements and equity returns).
- Present Values are calculated using discount rates that equal the path of projected Net Asset Earned Rates (i.e., the company's projected portfolio rate).
- Different Net Asset Earned Rates are determined for each "model segment" that reflect the company's investment strategies for different products.
- Net Investment Income is not included in the cash flows; investment earnings are reflected in the reserve via the discount rate.

The Stochastic Reserve

- Similarities to the Deterministic Reserve:
  - Both use cash flow models
  - Both use the same assumptions for non-economic assumption (mortality, policyholder behavior, expenses) with a few exceptions
- Differences from the Deterministic Reserve:
  - Focus is on risks that have high impact but low probability
  - Based on the outcomes under multiple economic scenarios, not just one
  - Uses a GPVAD (Greatest Present Value of Accumulated Deficiencies) method, not a Gross Premium Reserve
  - Discount rate, not the company's projected portfolio rates, is prescribed

Stochastic Reserve Calculation

- Cash flows are projected under multiple economic scenarios from a prescribed stochastic generator that projects a range of future interest rate movements and equity returns.
- The process starts with an estimated value of the final reserve (i.e., starting assets) and then adjusts it for the amount of the greatest asset deficiency over the lifetime of the product.
- For each scenario, the **Scenario Reserve** is determined as follows:
  - Project the accumulated value of assets (may be positive or negative) at the end of each future projection year.
  - Accumulated deficiency = the negative of the accumulated assets.
  - Discount the accumulated deficiency at each future year to the valuation date.
  - Rank the discounted deficiencies in the prior step.
  - Scenario Reserve = the largest of discounted values, plus the starting asset amount.
- **Stochastic Reserve** = average of highest 30% of Scenario reserves (70 CTE).

Challenges of Stochastic Modeling

- Stochastic component of the reserve calculation creates its own set of challenges
  - Need stochastic economic generator
  - Stochastic calculations require extensive computing time
  - Judgment is needed in building the model, including determining the number of scenarios
  - Stochastic calculation require robust, credible models, whose functionality and results are reviewed and validated

Approval of Cash Flow Model

- Should states require pre-approval of the cash flow model?
  - Example: states provide company with a standard asset and liability portfolio that they would require a company to run and report on results.
  - Problem: standard asset and liability portfolio may not adequately test company-specific benefits and policy provisions.
- Model Validation
  - Rather than pre-approve of the model, states may decide to rely primarily on validating the model as part of their process of reviewing the reserve results (see next slide).
- Validation of assumptions
  - Under PBR, companies are required to submit experience data (mortality, lapse, etc).
  - Regulators can use that experience data to validate the policyholder experience assumptions used in the model.

Model Validation

- Static Validation
  - Checking key starting points of the model against inforce balances
  - Account values, policy counts, statutory reserves, etc.
- Dynamic Validation
  - Does trend of projected values line up with historical trends? Are projected values reasonable?
  - Premiums, claims, investment income, etc.
- Back-testing
  - Model past events to see how accurately model tracks actual outcome. Based on perfect hindsight, how do the projected results compare to actual results?
  - Compare actual results to model projections by inputting valuation assumptions that equal actual experience
- Single cell validation
  - Run the model for various and representative individual policies, one at a time
  - Check modeled results against actual policy values, policy illustrations, etc.
  - Include outliners in sample set of policies

Independent Peer Review

Initially, the Valuation Manual required an independent external peer review to accompany the company's filing (at company's expense) to opine on the appropriateness of the resulting reserve. The peer review would answer:

- Are assumptions reasonable, compared to actual company experience?
- Are methodologies implemented by the company reasonable?
- Has the company followed the requirements of the reserve calculation?

While no longer mandated, individual states could still decide to utilize an external peer reviewer

- States could include the validation of the cash flow testing model in the scope of the peer review.