
# Session 051 PD - Redefining the Role of Reinsurance in a PBR World


## Moderator:

Richard H. Daillak, FSA, MAAA

## Presenters:

Bryan Neil Amburn, FSA, MAAA

Alijawad M. Hasham, ASA, MAAA

Ye (Olivia) Yang, FSA, CERA, MAAA

# Session 51: Redefining the Role of Reinsurance in a PBR World

Monday, October 16, 2017  1:45pm – 3:00pm

**Richard Daillak, FSA, MAAA**
**Alijawad Hasham, FSA, MAAA**
**Bryan Amburn, FSA, MAAA, CLU**
**Olivia Yang, FSA, CERA, MAAA**

SOCIETY OF ACTUARIES®

## Richard Daillak, FSA, MAAA

- Rich has over thirty years of experience in the industry, first with a large direct writer and since 2005 with Swiss Re. He is CRO, Swiss Re Life & Health America, and he supports Swiss Re's efforts in the Americas on life actuarial and solvency modernization issues
- Rich represents Swiss Re on a number of ACLI working groups. For the profession, Rich serves on American Academy of Actuaries committees including the Academy's Life Practice Council, he is chair of the Academy's Life Reinsurance Workgroup, and he is a member of the Academy's board of directors.
- Rich received a bachelor's degree in mathematics from the University of California, Berkeley, and a Ph.D. in educational research methods and program evaluation from UCLA. He is a Fellow of the Society of Actuaries and a Member of the American Academy of Actuaries.

## Alijawad Hasham, FSA, MAAA

- Alijawad has over eight years of (re)insurance experience with a focus on financial reporting, modeling and reinsurance. He is currently at Swiss Re leading the Principle-Based Reporting implementation team tasked with ensuring readiness from a pricing, valuation, financial reporting, governance and systems point of view.
- Alijawad has served various roles in actuarial transformation, model validation and corporate modeling teams where he converted legacy platforms to AXIS, validated models and built tools thereof, and analyzed business portfolios. Prior to joining Swiss Re, Alijawad was with a large actuarial consultancy and audit firm.
- Alijawad holds a bachelor's degree in economics with a concentration in actuarial science and finance from The Wharton School at the University of Pennsylvania. He is a Fellow of the Society of Actuaries and a Member of the American Academy of Actuaries.

## Bryan Amburn, FSA, MAAA, CLU

- Bryan Amburn is the Chief Life Actuary for Farm Bureau Life Insurance Company of Michigan. In that role Bryan oversees the actuarial functions related to valuation, cash flow testing, asset liability management, enterprise risk management, pricing, and customer support for all life insurance and annuity products offered by Farm Bureau. He has been in that role for a little over a year and with Farm Bureau Insurance for 3 years.
- Prior to that Bryan was with Erie Family Life for 8 years doing a variety of actuarial tasks similar to the current responsibilities he oversees. Before joining Erie, Bryan worked for Minnesota Life right out of college.
- Bryan graduated from St. Mary's University (Winona, MN) with a BA in Mathematics in 2001. He is a Fellow of the Society of Actuaries and a Member of the America Academy of Actuaries.

## Olivia Yang, FSA, CERA, MAAA

- Olivia has over sixteen years of actuarial experience, with ten years in structured reinsurance and since 2016 with Oliver Wyman. She is a Senior Consultant based in Philadelphia and provides actuarial services to a wide array of clients, including life insurers, reinsurers, and investment banks.
- Olivia is a friend of the Society of Actuaries Reinsurance section council, and a member of the Actuaries Club of Philadelphia.
- Olivia received a bachelor's degree in economics from Peking University, and a master's degree in economics from University of Maryland, College Park. She is a Fellow of the Society of Actuaries, a Member of the American Academy of Actuaries, and a Chartered Enterprise Risk Analyst.

# SOCIETY OF ACTUARIES
# Antitrust Compliance Guidelines

Active participation in the Society of Actuaries is an important aspect of membership. While the positive contributions of professional societies and associations are well-recognized and encouraged, association activities are vulnerable to close antitrust scrutiny. By their very nature, associations bring together industry competitors and other market participants.

The United States antitrust laws aim to protect consumers by preserving the free economy and prohibiting anti-competitive business practices; they promote competition. There are both state and federal antitrust laws, although state antitrust laws closely follow federal law. The Sherman Act, is the primary U.S. antitrust law pertaining to association activities. The Sherman Act prohibits every contract, combination or conspiracy that places an unreasonable restraint on trade. There are, however, some activities that are illegal under all circumstances, such as price fixing, market allocation and collusive bidding.

There is no safe harbor under the antitrust law for professional association activities. Therefore, association meeting participants should refrain from discussing any activity that could potentially be construed as having an anti-competitive effect. Discussions relating to product or service pricing, market allocations, membership restrictions, product standardization or other conditions on trade could arguably be perceived as a restraint on trade and may expose the SOA and its members to antitrust enforcement procedures.

While participating in all SOA in person meetings, webinars, teleconferences or side discussions, you should avoid discussing competitively sensitive information with competitors and follow these guidelines:

- **Do not** discuss prices for services or products or anything else that might affect prices
- **Do not** discuss what you or other entities plan to do in a particular geographic or product markets or with particular customers.
- **Do not** speak on behalf of the SOA or any of its committees unless specifically authorized to do so.
- **Do** leave a meeting where any anticompetitive pricing or market allocation discussion occurs.
- **Do** alert SOA staff and/or legal counsel to any concerning discussions
- **Do** consult with legal counsel before raising any matter or making a statement that may involve competitively sensitive information.

Adherence to these guidelines involves not only avoidance of antitrust violations, but avoidance of behavior which might be so construed. These guidelines only provide an overview of prohibited activities. SOA legal counsel reviews meeting agenda and materials as deemed appropriate and any discussion that departs from the formal agenda should be scrutinized carefully. Antitrust compliance is everyone's responsibility; however, please seek legal counsel if you have any questions or concerns.

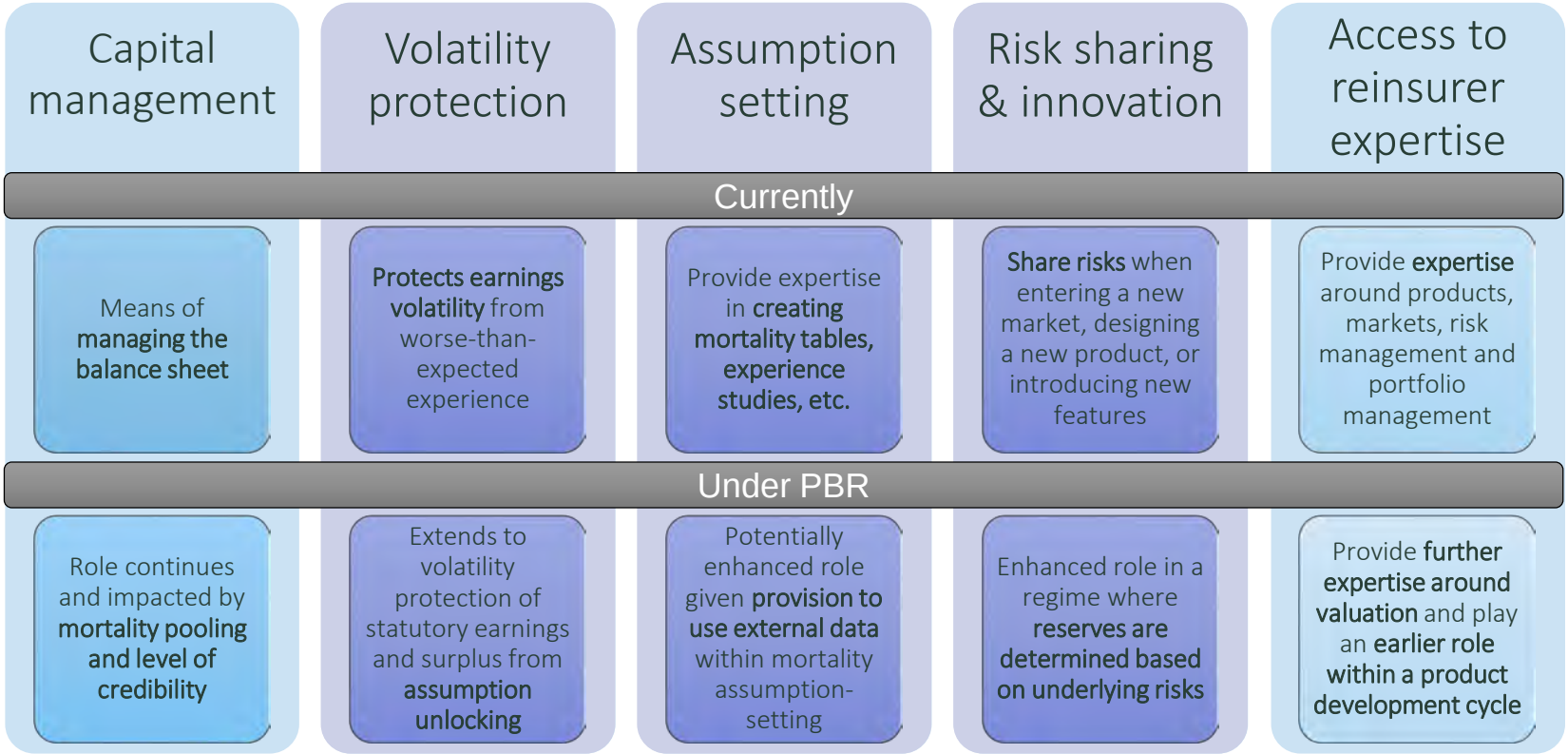
# Presentation Disclaimer

*Presentations are intended for educational purposes only and do not replace independent professional judgment. Statements of fact and opinions expressed are those of the participants individually and, unless expressly stated to the contrary, are not the opinion or position of the Society of Actuaries, its cosponsors or its committees. The Society of Actuaries does not endorse or approve, and assumes no responsibility for, the content, accuracy or completeness of the information presented. Attendees should note that the sessions are audio-recorded and may be published in various media, including print, audio and video formats without further notice.*

# Role of reinsurance in a PBR world

**ALIJAWAD HASHAM, FSA, MAAA**

# Role of reinsurance in a PBR world



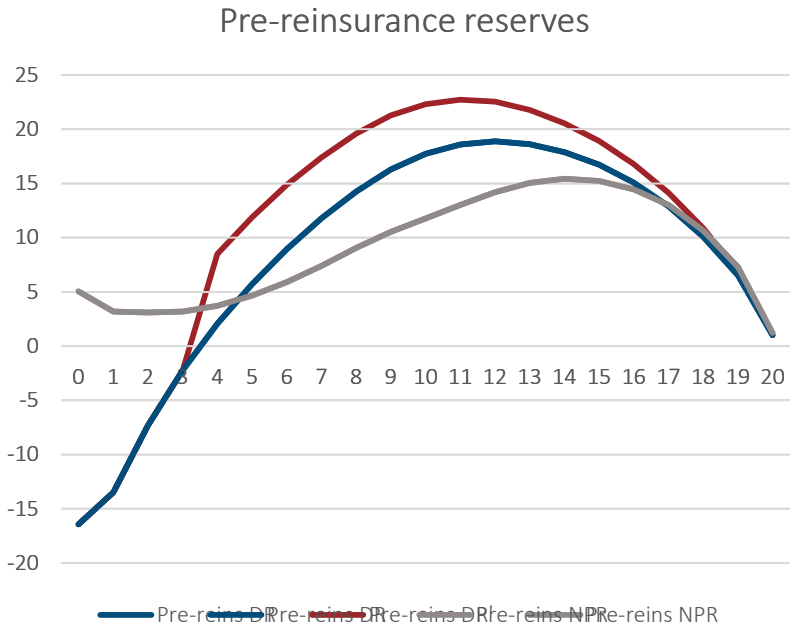
# Volatility protection

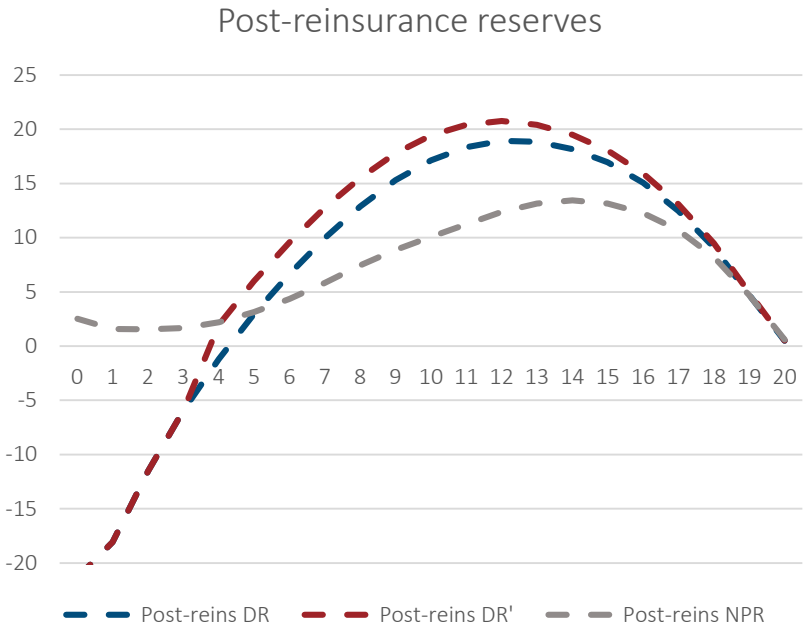
## *Role of reinsurance*

- Statutory reserves, earnings and surplus become more volatile under PBR
  - Assumption unlocking when experience deviates from expectation
  - Interest rate movements
- Reinsurance mitigates
  - Volatility from worse-than-expected experience
  - Impact from assumption unlocking
  - ‘Volatility measure’ in amount-based credibility

# Volatility protection

## *Impact from assumption unlocking*




**Product:** 20-year term | **Mortality:** 50% credibility, 7 year of sufficient data | **Reinsurance:** 50% YRT reinsurance
**Scenario:** DR' increases the company's prudent estimate of mortality by 10% in year 4

# Volatility protection

## *Impact on amount-based credibility*

- Scenario A
  - Equal number of policies of each face amount
  - Largest face set to $1.9 million with symmetry around an average face of $1 million
- Results

| | Scenario A |
|---|---|
| Average Face: | 1,000,000 |
| Std Deviation: | 734,847 |
| LFC: | **56%** |
| Buhlmann: | **90%** |

| LFC Details | Scenario A |
|---|---|
| LFC m (assume actual claims = expected): | 100.0% |
| LFC sigma: | **0.0453** |
| LFC r: | 0.05 |
| LFC z: | 1.96 |

# Volatility protection

## *Impact on amount-based credibility*

❑ Scenario B

- Largest amount increased to $10 million
- Policy counts set to produce same counts and average as Scenario A

❑ Results

| | Scenario B | Scenario A |
|---|---|---|
| Average Face: | 1,000,000 | 1,000,000 |
| Std Deviation: | 2,437,212 | 734,847 |
| LFC: | 27% | 56% |
| Buhlmann: | 66% | 90% |

| LFC Details | Scenario B | Scenario A |
|---|---|---|
| LFC m (assume actual claims = expected): | 100.0% | 100.0% |
| LFC sigma: | 0.0961 | 0.0453 |
| LFC r: | 0.05 | 0.05 |
| LFC z: | 1.96 | 1.96 |

# Volatility protection

## *Impact on amount-based credibility*

- ❑ Scenario B, with retention limit
  - Introducing a $1 million retention limit on scenario B

- ❑ Results

| | With limit | Without limit |
|---|---|---|
| Average Face: | 400,000 | 1,000,000 |
| Std Deviation: | 424,264 | 2,437,212 |
| LFC: | 48% | 27% |
| Buhlmann: | 86% | 66% |

| LFC Details | With limit | Without limit |
|---|---|---|
| LFC m (assume actual claims = expected): | 100.0% | 100.0% |
| LFC sigma: | 0.0532 | 0.0961 |
| LFC r: | 0.05 | 0.05 |
| LFC z: | 1.96 | 1.96 |

# Mortality assumption setting

## *Basis for use of external data*

### *VM-20 Section 9.A.6.a*

- For risk factors (such as mortality) to which statistical credibility theory may be appropriately applied, the company shall establish anticipated experience assumptions for the risk factor by combining relevant company experience with industry experience data, tables, or other applicable data in a manner that is consistent with credibility theory and accepted actuarial practice.

# Mortality assumption setting
## *Requirements*

### *VM-20 Section 9.C.2*

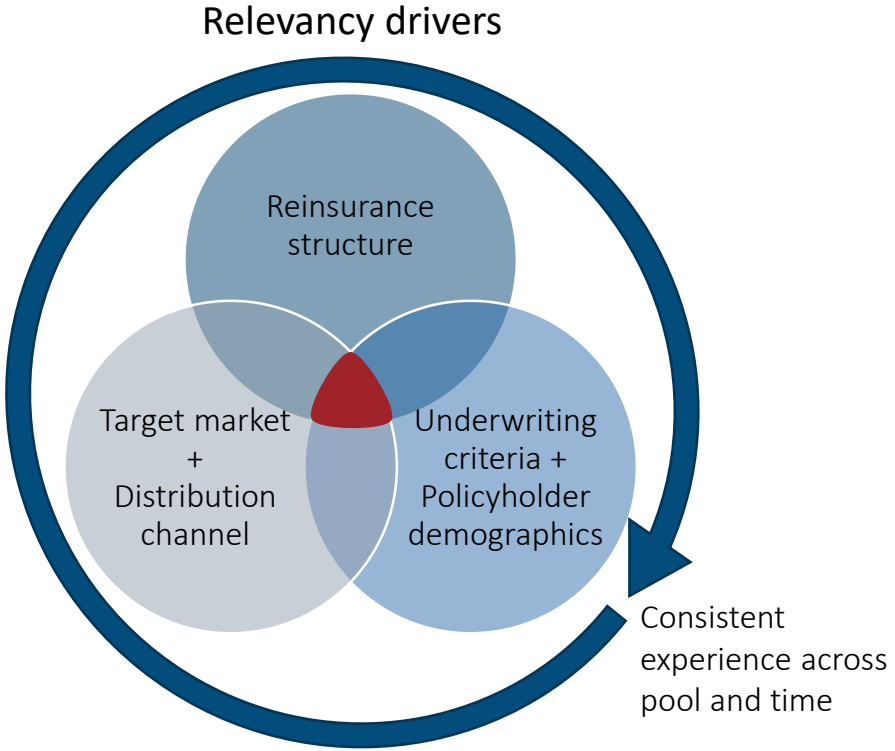
- Requires companies to derive its experience mortality rates from experience data
- Experience data shall be based on
  i. Actual company experience for mortality segment
  ii. Experience from other books with similar underwriting
  iii. Experience data from other sources, if available and appropriate
    - Includes actual experience data of one or more mortality pools in which the policies participate under the term of a reinsurance agreement
    - Data from other sources is appropriate if the source has underwriting and expected mortality experience characteristics that are similar to policies in the mortality segment

# Mortality assumption setting

*Key considerations*

## 1. Relevancy

- Similar underwriting and expected mortality characteristics
- Reinsurance experience is a blend that may not be fully representative of ceding company



# Mortality assumption setting

*Key considerations*

## 2. Confidentiality

- ❑ Non-disclosure and/or product development agreements may limit reinsurers' ability
- ❑ Other reasons to avoid sharing

# Mortality assumption setting

*Key considerations*

## 3. Burden of justification

- ❑ The relevancy and appropriateness of the reinsurance data needs to be demonstrated
- ❑ Who, and how does one justify?
  - VM-31 requirements
  - Reliance statements

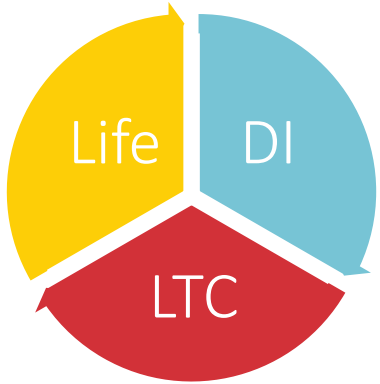
# Mortality assumption setting
## *Additional margin*

### *VM-20 Section 9.B.2*

- Requires a larger margin where there is greater uncertainty in the anticipated experience assumption
- For example, the company shall use a larger margin when:
  a. Experience data has less relevance or lower credibility
  b. Experience data is of lower quality
     - Example: incomplete, internally inconsistent, or not current
  c. There is doubt about the reliability of the anticipated experience assumption
  d. Modeling constraints limit an effective reflection of the risk factor

# Risk sharing and innovation

- Principle-Based Approach to valuation will serve as an enabler of product innovation
  - Right-sizes reserves based on underlying risk
  - Provides new ways to combine risks
- Reinsurers are ideal partners when
  - Entering new markets
  - Launching new products with limited actual experience
  - Introducing new product features



# A Direct Company's Perspective

**BRYAN AMBURN, FSA, MAAA, CLU**

SOCIETY OF ACTUARIES®

# Topics from a Direct Writer

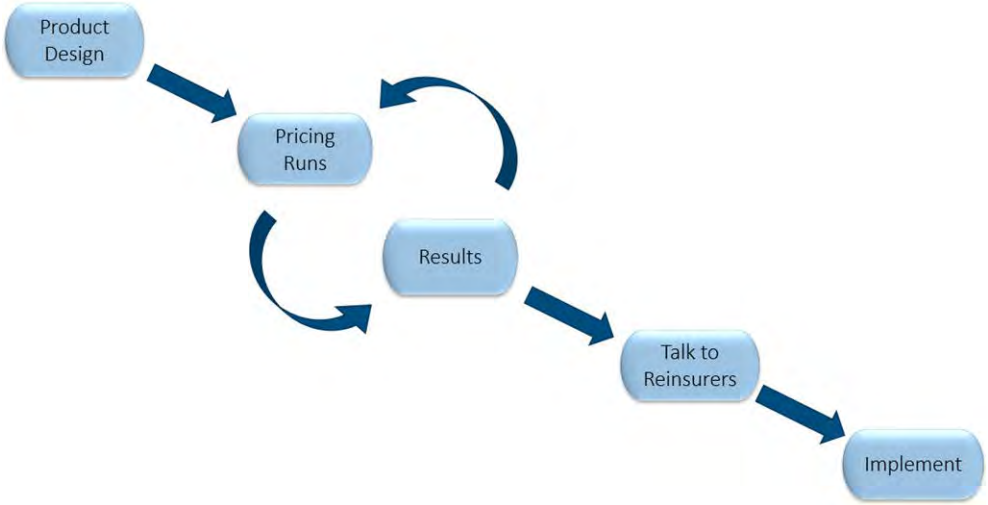
- Pricing Process under a PBR Regime
- Assumption Setting
  - Mortality Credibility
  - Post level term mortality/lapses
- Accelerated Underwriting

# Company Profile

- $2.39 billion in Assets under management
- $1.97 billion in Liabilities
  - $376.5 million – WL
  - $  76.3 million – Term
  - $237.1 million – UL (closed block)
- approx. $84 million Life Insurance Premium ($17.5 million first year)
- Captive field force
  - Multi-line Captive Agents
  - All fixed products
- Small Actuarial Staff

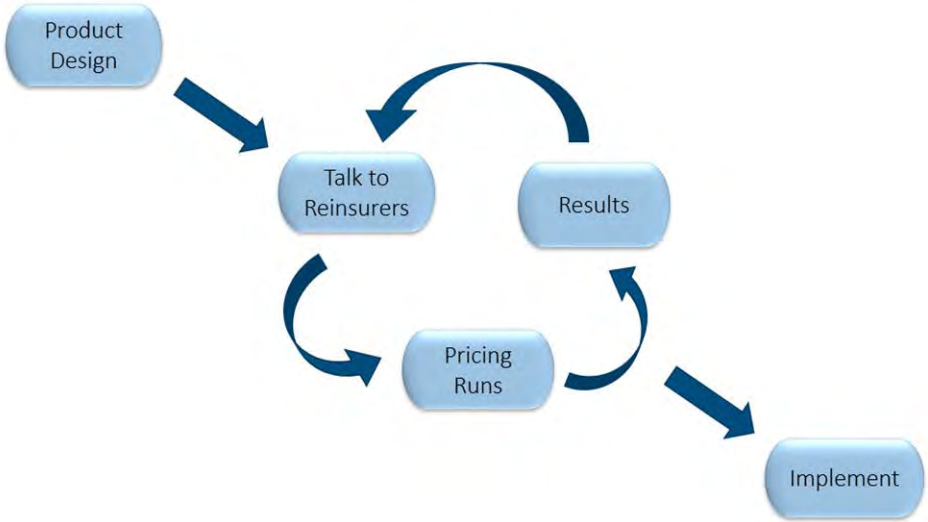
# Pricing Process

## Old Regime



# Pricing Process

## New Regime



# PBR Pricing

PreTaxSolvEarn(t) = Prem(t) + InvIncome(t) – Ben(t) – Exp(t) -SolvResIncr(t)*

*Atkinson and Dallas. *Life Insurance Products and Finance*. The Society of Actuaries, 2000, pp. 501

# Case Study

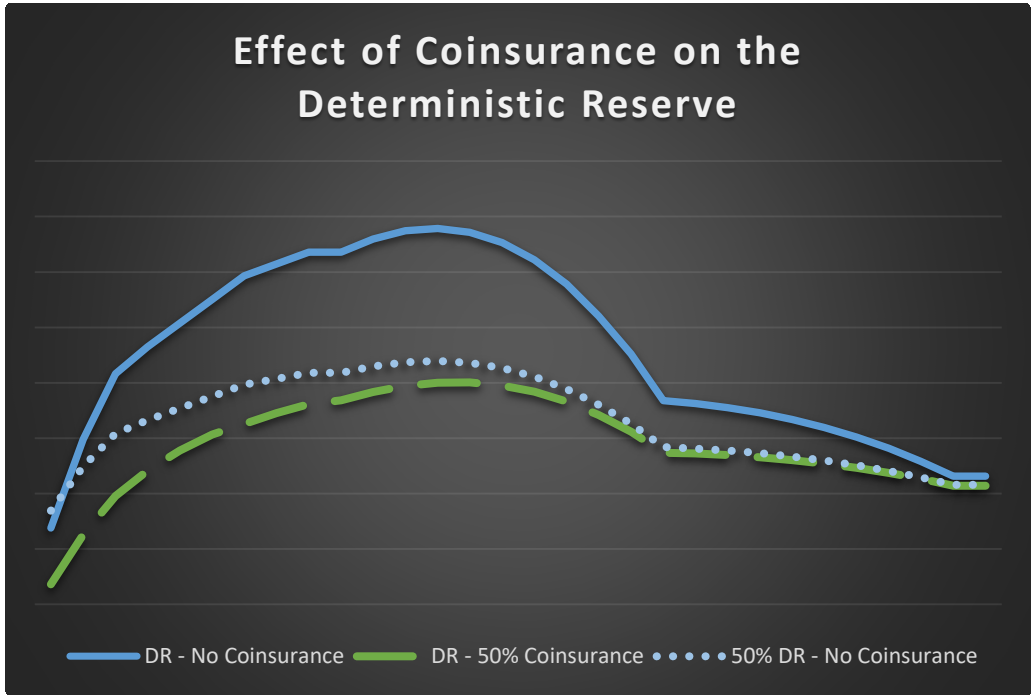
- 10-,20-, and 30-year Level Term products
- Fully Underwritten with 5 UC (3 Nonsmoker, 2 Smoker)
- Middle Market Focused
- PBR compliant
- 50% First Dollar Coinsurance

# PBR Pricing

*"The company shall include the effect of projected cash flows received from or paid to assuming companies under the terms of ceded reinsurance agreements in the cash flows used in calculating the deterministic reserve in Section 4 and the stochastic reserve in Section 5."* VM20-8.C.3.a

"*The minimum reserve pursuant to Section 2 is the post-reinsurance ceded minimum reserve. The company shall also calculate a pre-reinsurance-ceded reserve . . . the credit for reinsurance ceded shall be the excess, if any, of the pre-reinsurance-ceded minimum reserve over the post-reinsurance-ceded minimum reserve*" VM20-8.D.1

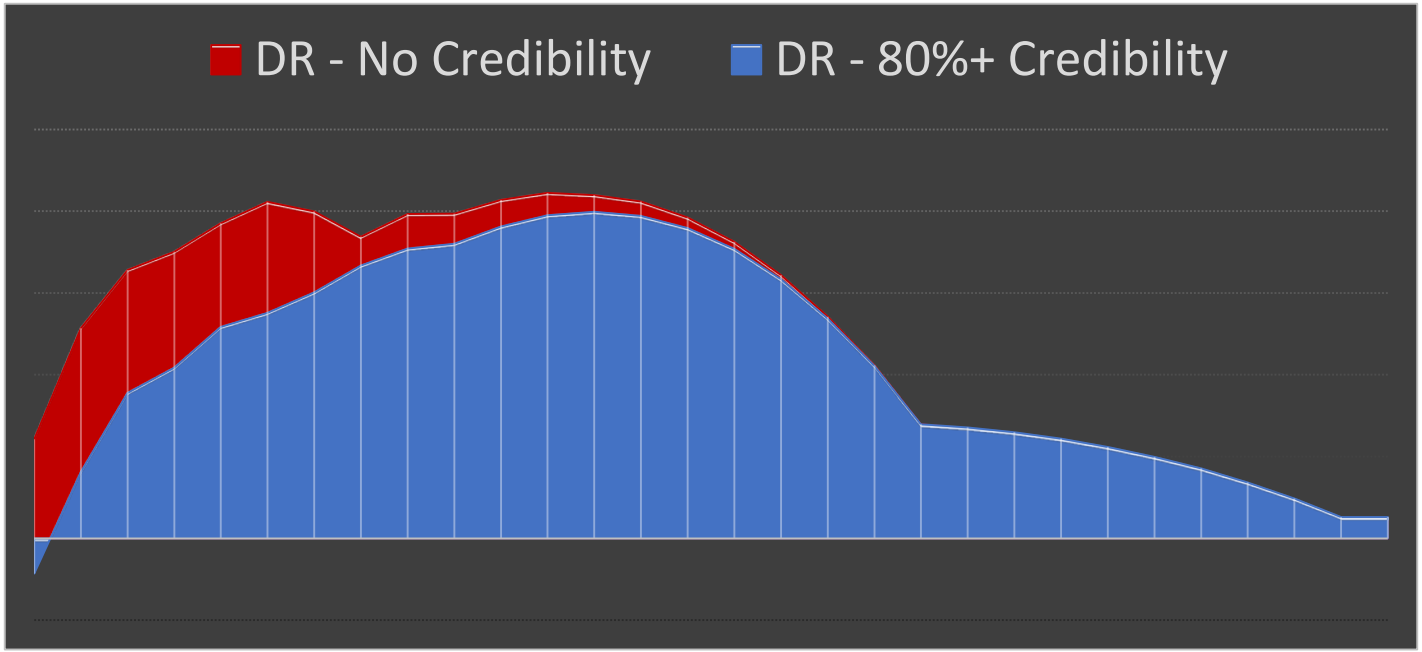
# Pricing Process



# Assumption Setting – Mortality Credibility

*"Company experience data shall be based on experience from the following sources: . . . Experience data from other sources, if available and appropriate, such as actual experience data from one or more mortality pools in which the policies participate under the term of the reinsurance agreement."* VM20-9.C.b.iii

# Assumption Setting – Mortality Credibility



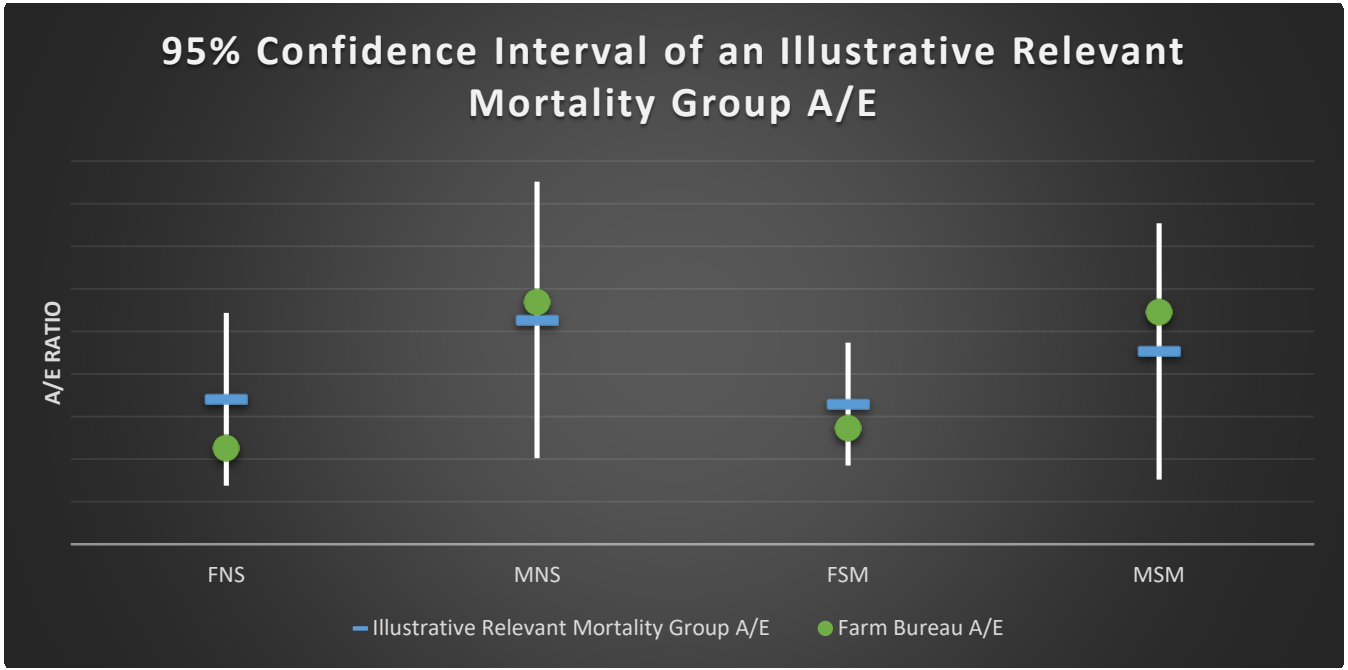
# Assumption Setting – Mortality Credibility

## Relevance

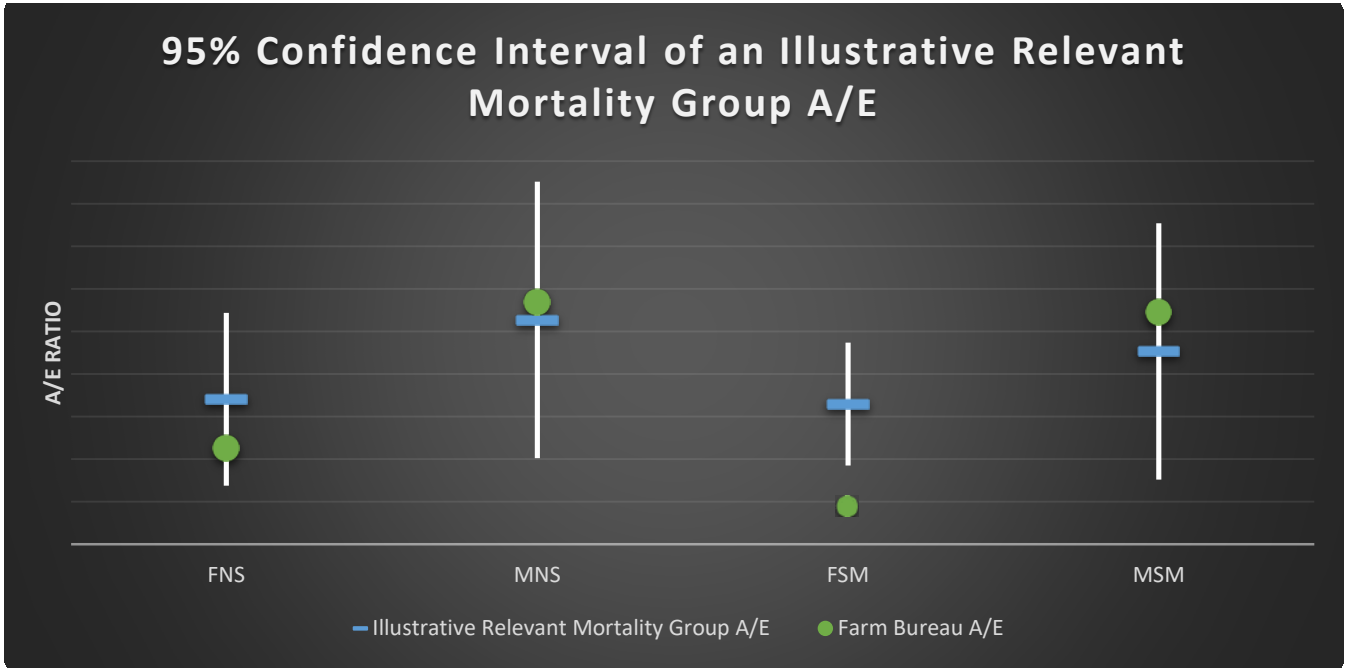
- High Level Screening
  - Distribution Channel
  - Face Amount
  - Target Market

- Statistical Testing
  - Panjer Analysis
  - Volatility Analysis

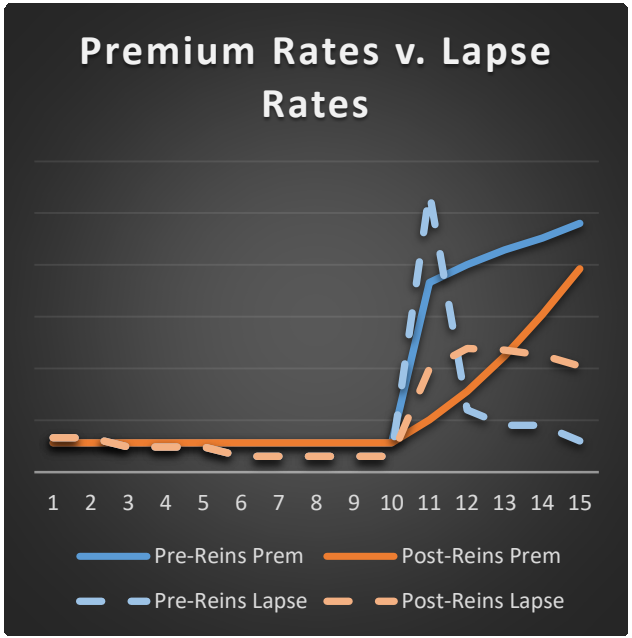
# Assumption Setting – Mortality Credibility

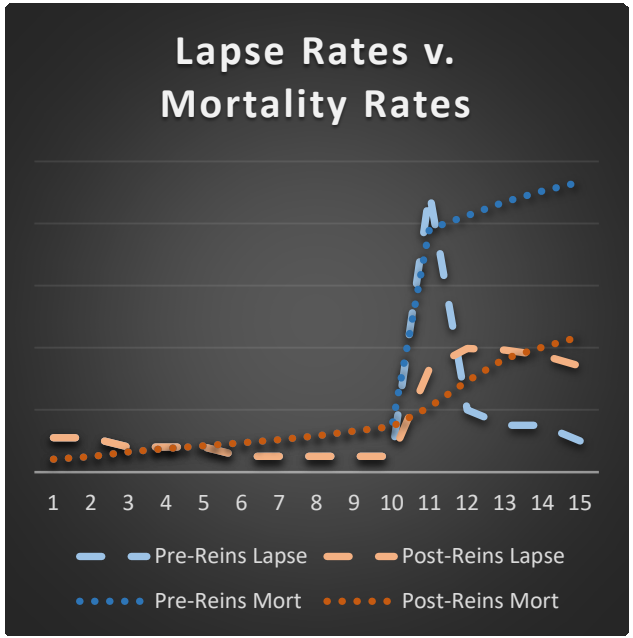


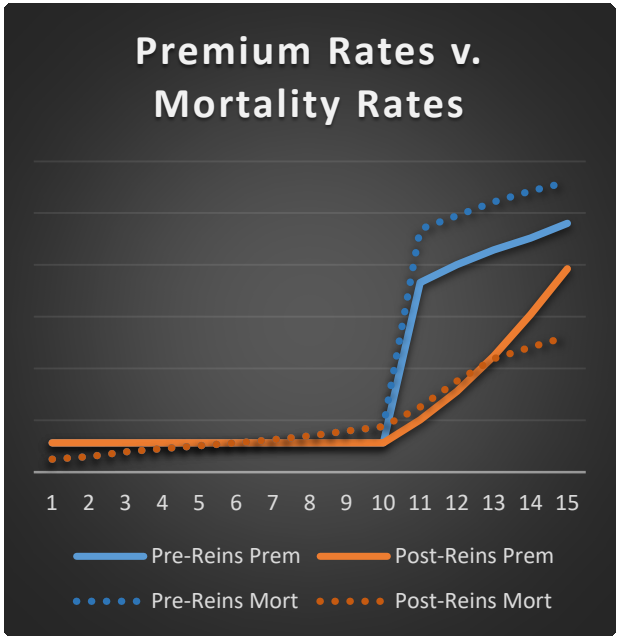
# Assumption Setting – Mortality Credibility



# Assumption Setting – Post Level Term Mortality/Lapses

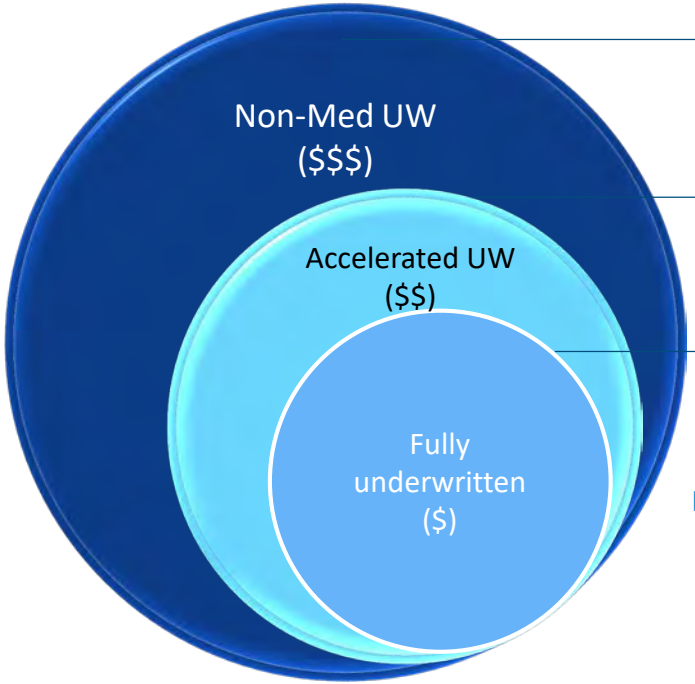


# Accelerated Underwriting

**New accelerated approaches can bring mortality cost much closer to fully underwritten pricing**




**Non-medical Underwriting**
- No blood/urine
- Rx, MVR, MIB
- *Higher Price to account for no fluids*

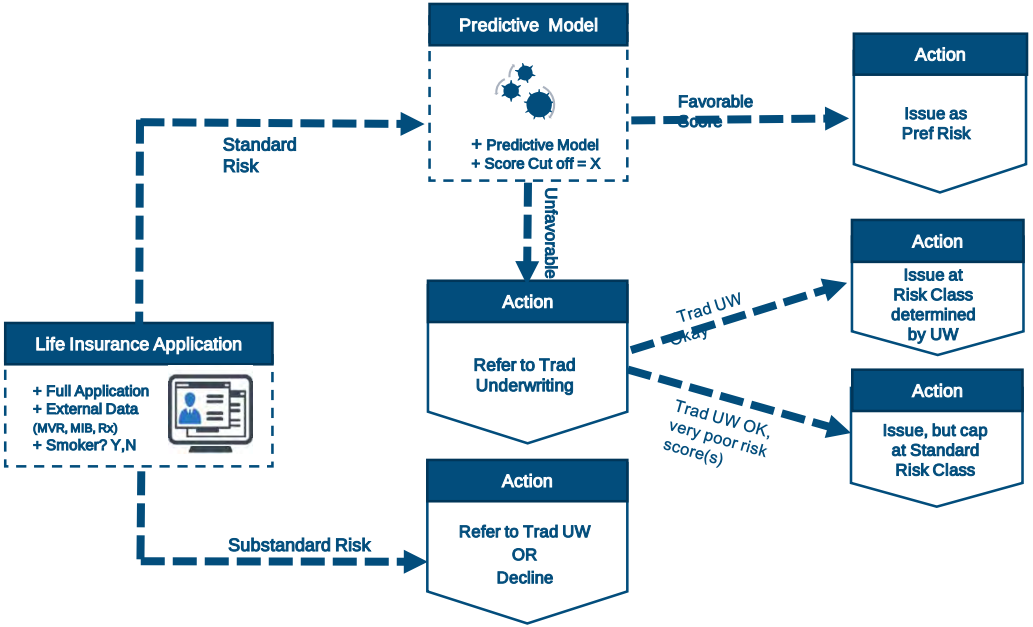
**Accelerated Underwriting**
- No blood/urine
- Rx, MVR, MIB
- Predictive model triage approach
- *Prices closer to Fully UW due to P.M.*

**Full Underwriting**
- Paramed with blood/urine
- Rx, MVR, MIB
- *Lowest Price*

New underwriting tools are starting to enable a 'best of both worlds' consumer offerings

- Less invasive tools providing additional data
- Models can address specific data shortcomings
- Pricing gap starts to close dramatically

# Accelerated Underwriting



# Reinsurance under PBR

**OLIVIA YE YANG, FSA, CERA, MAAA**

SOCIETY OF ACTUARIES®

# Reinsurance under PBR

1 **Background**

2 **Case study**

3 **Potential impacts on product development and pricing**

# Section 8 of VM-20 pertains to the impact of reinsurance on the components of reserves under PBR

Maximum

| Component | Considerations in determining reinsurance impact |
|---|---|
| **Net premium reserve** | ▪ No change as compared to pre-PBR<br>▪ Coinsurance: The NPR is reduced by the percentage coinsured<br>▪ Yearly Renewable Term (YRT): The NPR is reduced by the unearned cost of insurance that is reinsured |
| **Deterministic and stochastic reserve** | ▪ Requires two separate calculations, pre- and post-reinsurance<br>▪ Exclusion testing, if elected, must be performed on a pre- and post-reinsurance basis |
| **Final PBR reserve** | ▪ The starting asset collar does not apply to pre-reinsurance reserves<br>▪ Credit = $Max(NPR_{Gross}, DR_{Gross}, SR_{Gross}) - Max(NPR_{Net}, DR_{Net}, SR_{Net})$ |

The reserve credit for reinsurance under PBR is significantly different from the formulaic approach that insurers have become accustomed to.

# Several sources of guidance exist for the modeling of reinsurance cash flows

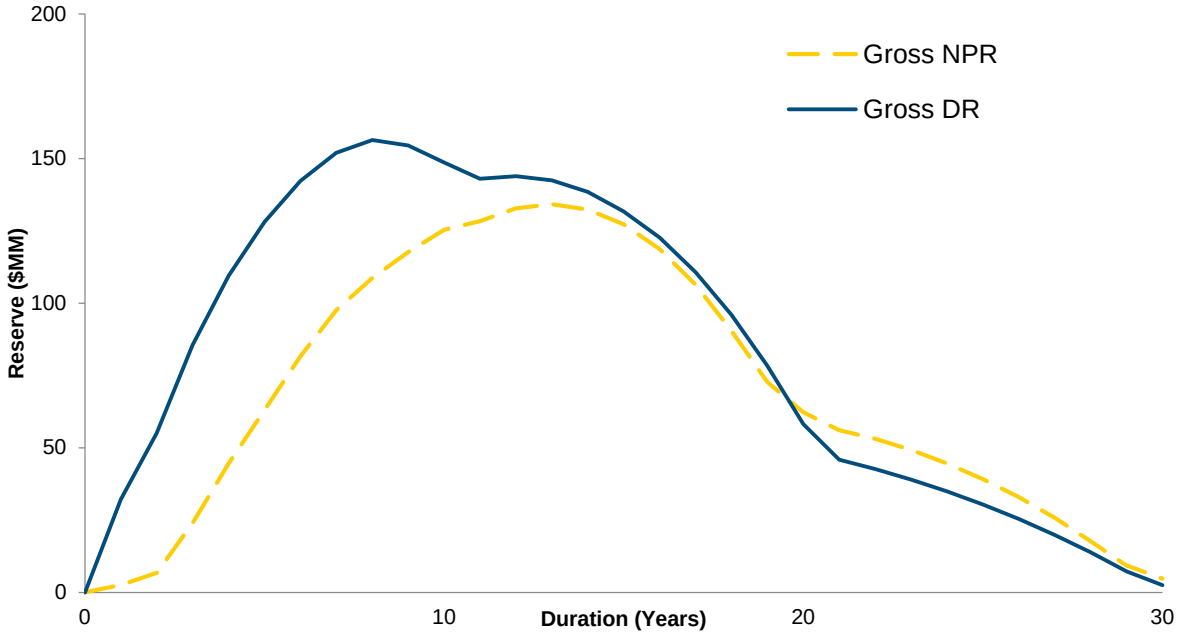
| Source | Guidance |
|---|---|
| **VM-20** | ▪ The actuary should assume that the counterparty is likely to act efficiently<br>▪ The assumptions used may differ between the ceding and assuming company<br>▪ Additional (outside the cash flow model) stochastic analysis may be required for certain types of reinsurance (i.e. stop-loss)<br>▪ Considerations are similar to those for liability modeling |
| **VM-31** | ▪ Requires a description of assumptions and methodology used to model reinsurance cash flows |
| **PBR ASOP** | ▪ Recommends consistency between reinsurance assumptions and other assumptions<br>▪ Margins should consider the guarantees in the arrangements, past practices of the reinsurer and how the company might respond to different actions the reinsurer could take |
| **AAA Practice note** | ▪ States that “some actuaries will assume less than 100% selection against the company”<br>▪ Recommends analyzing the financial impact on the reinsurer and assuming more selection if the financial impact is significant |

# A cohort of new business with $50MM of first year premium consisting of 10-, 20- and 30-year term products was projected for 30 years

| | |
|---|---|
| **Model** | ▪ 30 year projection horizon<br>▪ Reserve revalued annually |
| **Best estimate assumptions** | ▪ Mortality follows 100% of 2015 VBT<br>▪ Mortality experience is 30% credible with 10 years of sufficient data<br>▪ Expenses, commissions and lapses set at industry averages |
| **Prudent estimate assumptions** | ▪ Mortality is improved up to each valuation date at 1% per year<br>▪ 100% shock lapse at end of level term period |
| **Reserve assumptions** | ▪ The NPR uses the 2017 CSO and a valuation interest rate of 4.5%<br>▪ DR scenarios are re-generated at each valuation date<br>▪ Starting assets at each valuation date use the ‘direct iteration’ approach<br>▪ The cohort is assumed to pass the Stochastic Exclusion Test (SET) |

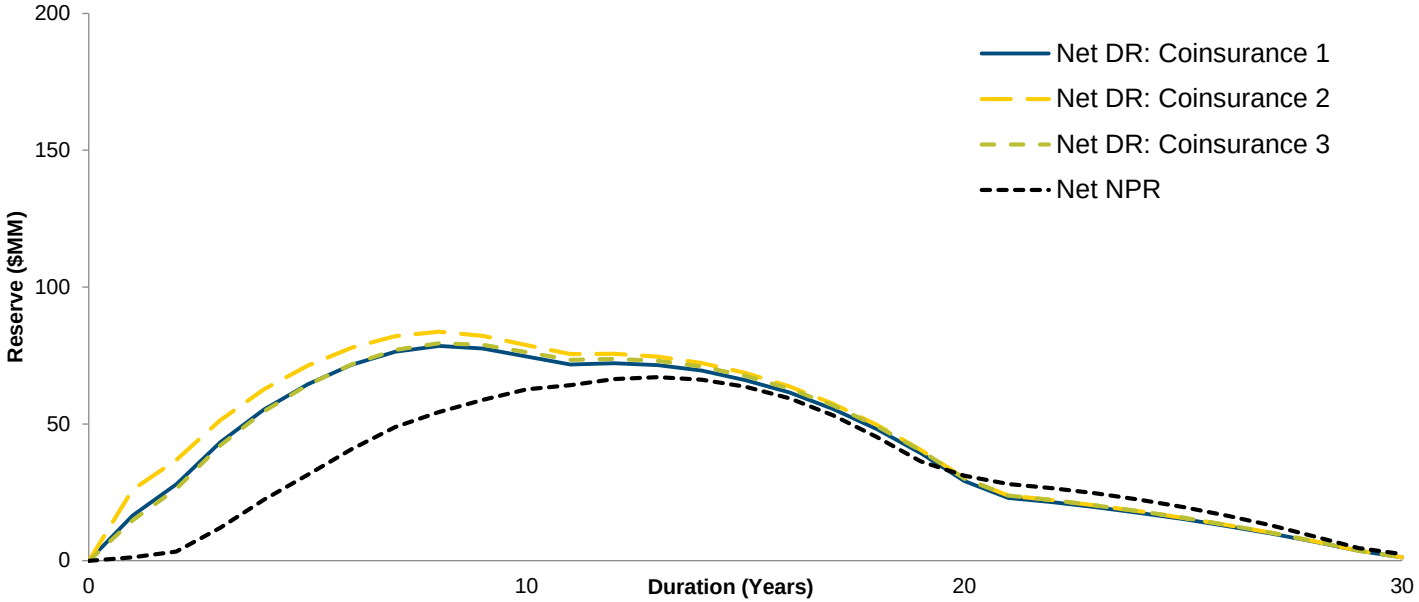
Assumptions used and products modeled are for an illustrative term portfolio intended to be reasonably representative of products offered in the market today.

# The gross NPR and DR for this cohort of new business are shown below




The DR starts much higher than the NPR, but the gap closes over time, partially because mortality improvement to date is reflected at future valuation dates.

# Three 50 percent first dollar coinsurance agreements were modeled. The coinsurance allowances were assumed to be guaranteed.

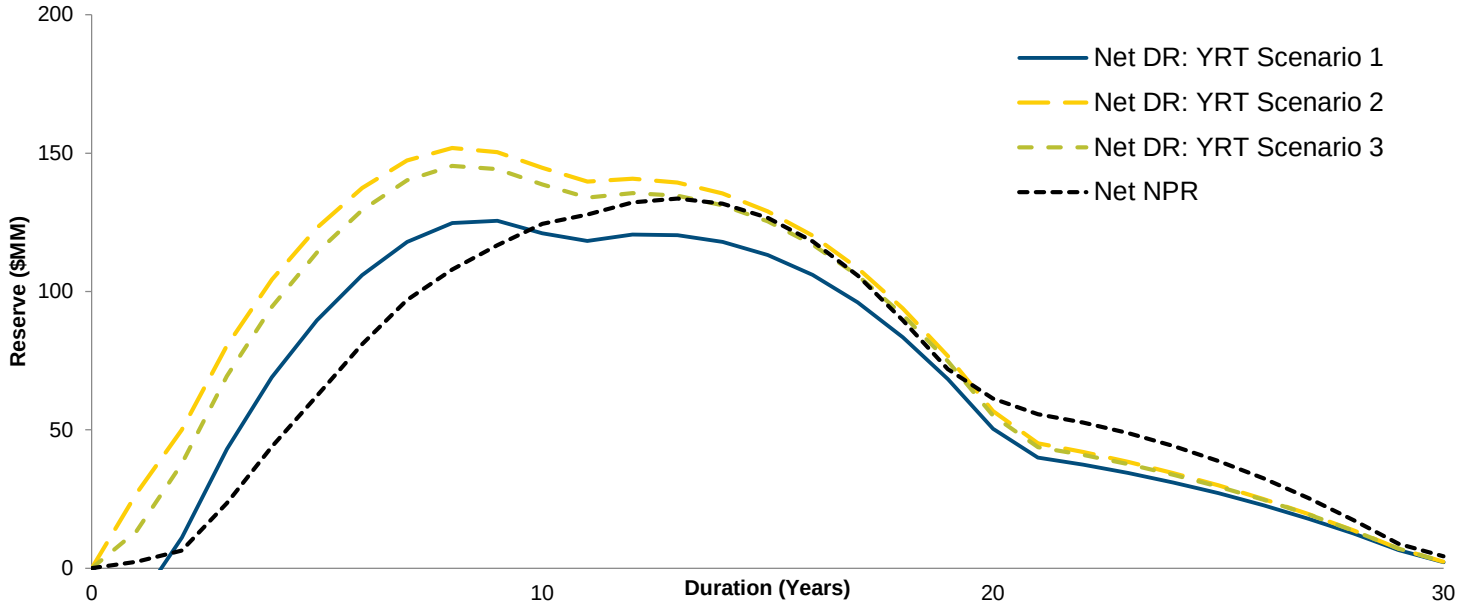



**Coinsurance 1:** Reimburse proportion of VM-20 prudent expenses and commissions

**Coinsurance 2:** Reimburse proportion of best estimate expenses and commissions

**Coinsurance 3:** Reimburse best estimate expenses and commissions, level % of premium

# A 50 percent first dollar YRT reinsurance arrangement with the current premium scale set equal to 100 percent of the best estimate mortality assumption was modeled



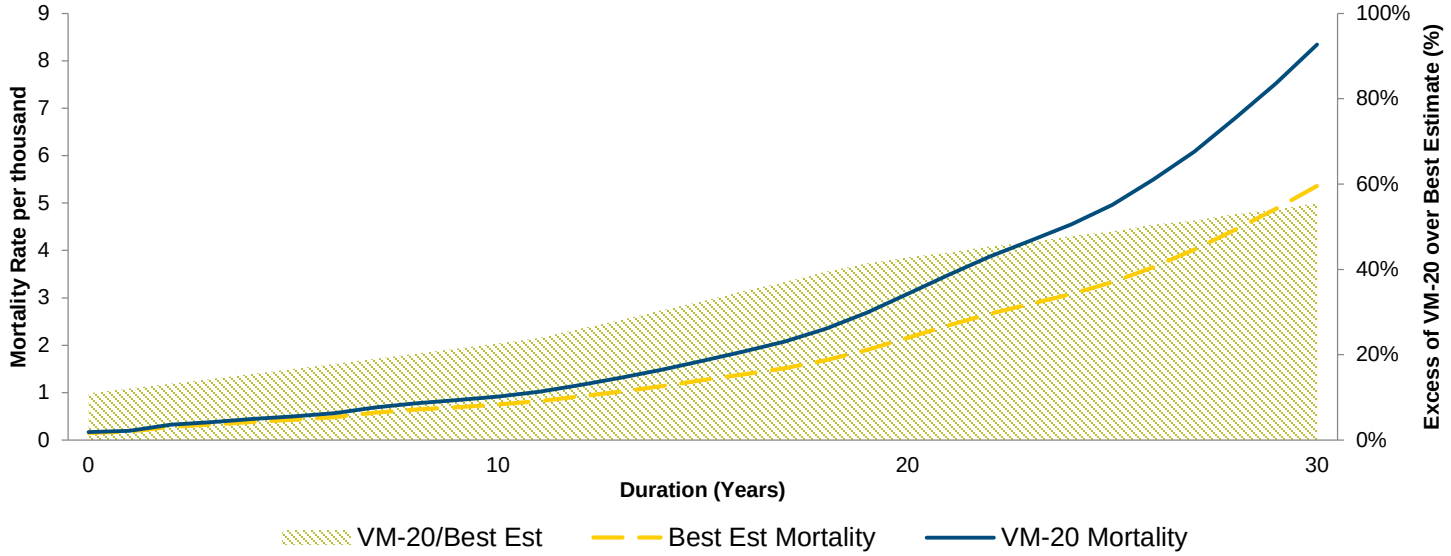

**YRT Scenario 1:** No change in rates

**YRT Scenario 2:** Change rates to eliminate any gain/loss from reinsurance

**YRT Scenario 3:** Increase rates by 15%

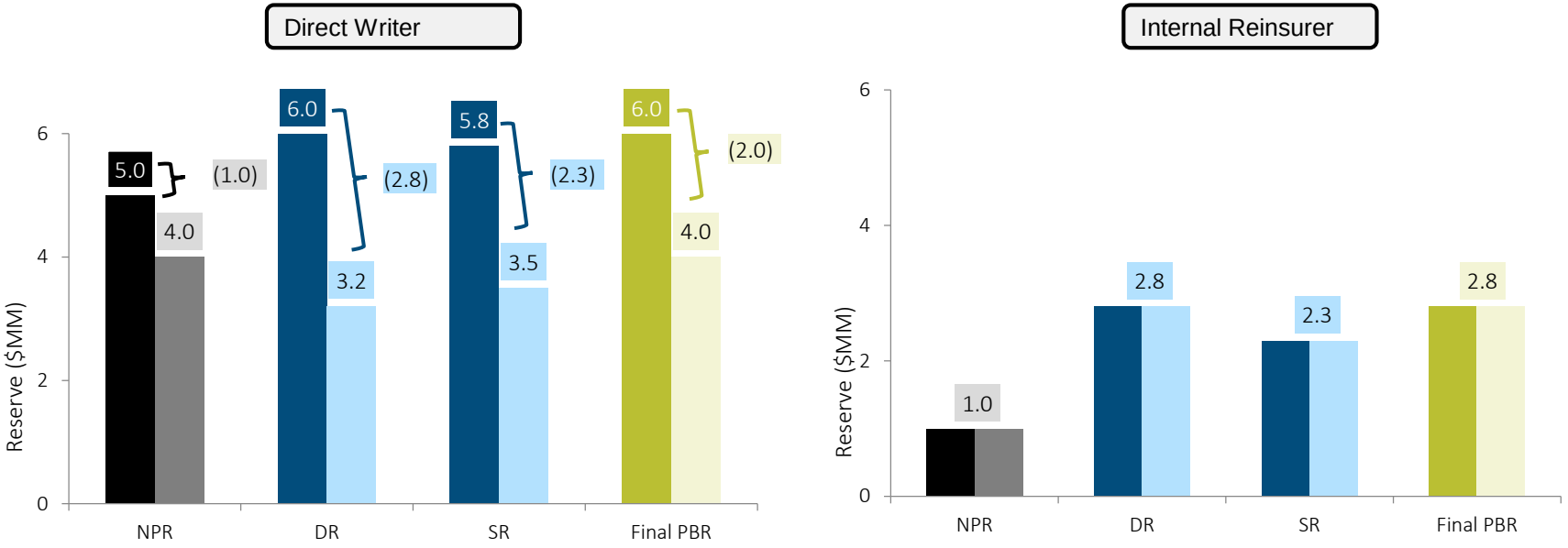
# The difference in net reserves under the YRT scenarios modeled is driven by the level of margin in the VM-20 mortality assumption

The result below is for 35-year-old male, preferred non-tobacco, time 1 valuation




The mortality assumption under VM-20 contains no future mortality improvement and is based on a company-specific prudent assumption grading to a prudent industry table when sufficient data no longer exists.

# The gross and net reserves resulting from a hypothetical internal YRT arrangement are shown below for illustrative purposes




The internal reinsurance arrangement increases net reserves by 13%. Total reserves increased from $6MM to $6.8MM because of the arrangement.

# The following are potential impacts because of PBR and the associated reinsurance considerations

| Reinsurance type | Impact |
|---|---|
| **YRT** | ▪ Reviewable YRT: VM-31 documentation of how the reviewable scales have been projected, with clear rationale<br>▪ Market interest in quotes for rate scale guarantees or for lower caps<br>▪ Industry convergence on level of prudence to assume |
| **Coinsurance** | ▪ Underlying company's level of mortality and credibility have a significant impact on reserves<br>▪ Restructuring allowances or expense assumptions |
| **Internal** | ▪ An important consideration will be the aggregate reserve impact<br>▪ Use depends on the aggregate reserve and capital impact |
| **Financial** | ▪ Carriers realizing a tax benefits may defer PBR election<br>▪ Less attractive due to lower tax reserves and uncertainty in AG 48 financing solutions |


SOCIETY OF
ACTUARIES®