

# Life PBR and the treatment of reinsurance Update and insider perspectives

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September 1, 2020



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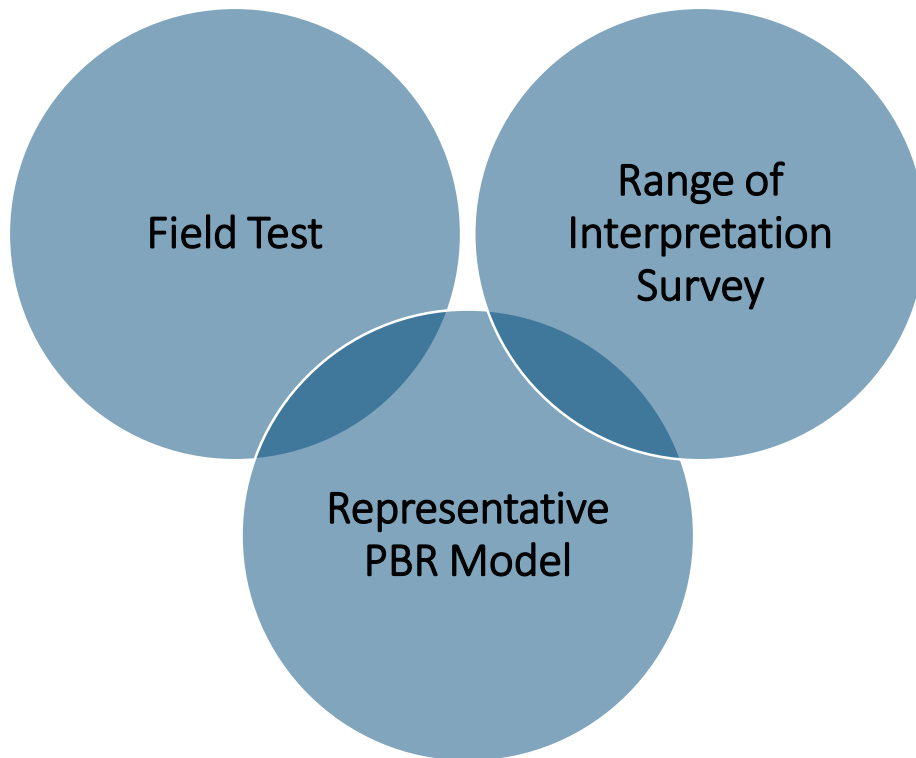
# Agenda

1. Background
2. Field Study
3. Range of Interpretation Survey
4. Key Takeaways
5. Current Status and Additional Resources

Scott O'Neal, FSA, MAAA

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# Project Overview



## Field Test

- Participants provide projected results under different APFs and scenarios

## Range of Interpretation Survey

- Poll participants to describe how they would implement each of the proposed solutions (APFs)

## Representative PBR Model

- Validate and interpret Field Test and Survey output
- Utilize Representative PBR Model to extend understanding of results

# Introduction to Proposed Solutions

## “Principles”

APF 2019-40

- Model YRT premiums using anticipated experience with margins based on clarified modeling principles/guidance and actuarial judgment

## “Best Estimate”

APF 2019-41

- Premiums determined using current YRT premium scale with projected adjustments based on what the company actually expects will occur
- Claims determined using the company’s anticipated experience mortality assumptions including mortality improvement

## “Prescribed Margin”

APF 2019-42

- Non-guaranteed reinsurance premiums are modeled as the current scale plus a margin, which is developed based on prescribed inputs, with some flexibility to make adjustments to reflect contract provisions

# Field Study Overview

## Submission requirements

Compute point-in-time and projected reserves for Term and/or ULSG products, using the 2020 Valuation Manual with modifications to the treatment of non-guaranteed reinsurance

Produce modeled results and detailed disclosures for two baseline runs and each proposed solution with modification per testing scenarios

## Participation

187	Entities invited to participate
11	Participating entities
0	Participating reinsurers
7	Submissions for Term
8	Submissions for ULSG

## Representative PBR Model Key Dimensions

### YRT Rate Scale Analysis

- **Baseline YRT Scale:** YRT scale in line with anticipated mortality excluding future mortality improvement (FMI)
- **Lower YRT Scale:** YRT scale reflective of future mortality improvement
- **Higher YRT Scale:** YRT scale greater than anticipated mortality without FMI

### Credibility Levels

- **High Credibility Scenario** (100% Credibility)
- **Low Credibility Scenario** (50% Credibility)

# Field Test Scenarios

## Baseline

- Interim solution (1/2 Cx)
- No Change to current YRT rates

## 2019-40

- Action A – No change in YRT rates and counterparty actions
- Action B – Prudent estimate YRT rates and counterparty actions
- Action C – Prudent estimate YRT rates after reaching a Loss Trigger
- Action D – Prudent estimate YRT rates after consecutive years of Loss Trigger

## 2019-41

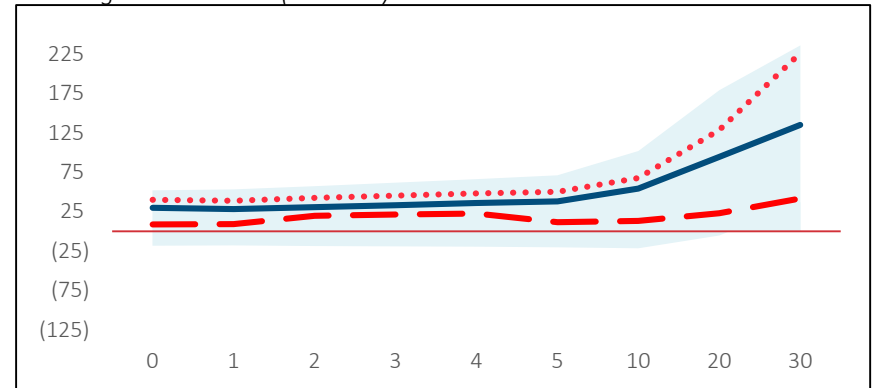
- Anticipated experience mortality includes 15 years of future mortality improvement at rates of 0%, 0.5% and 1.0%

## 2019-42

- Anticipated experience mortality includes future mortality improvement for a specified number of years (5, 10, 15 and 20 years)

### 3.1 ULSG Gross DR – Net DR (per 1000 of projected ceded NAAR)

No change to YRT rates (Baseline)



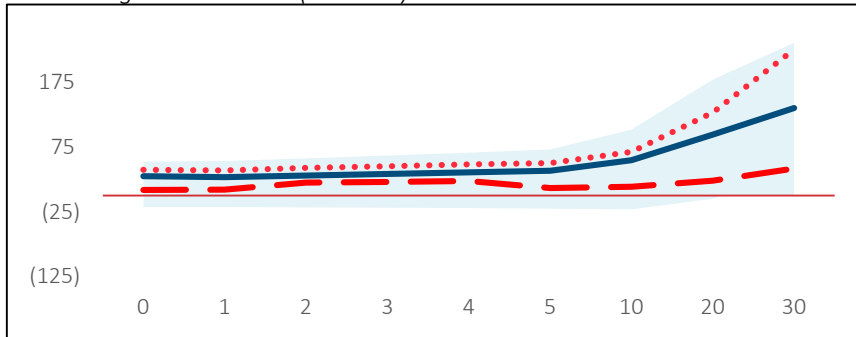
## Field Test Results Legend

- 25<sup>th</sup> percentile (Field test)
- - - 75<sup>th</sup> percentile (Field test)
- Coverage range (Representative PBR model)
- “Baseline YRT scale” with high credibility

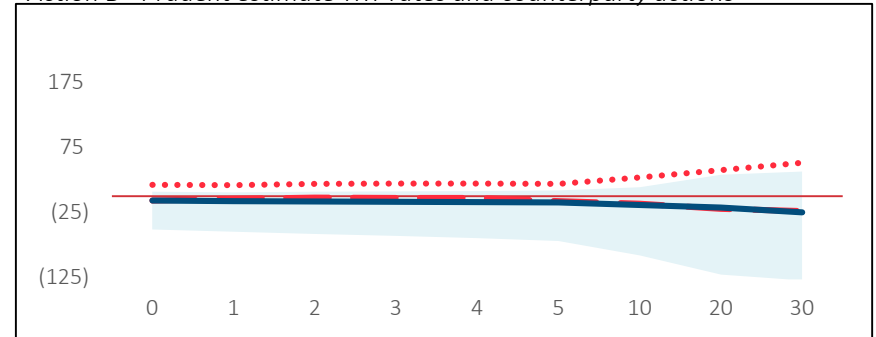


# APF 2019-40 Field Test Results

**3.1** ULSG Gross DR – Net DR (per 1000 of projected ceded NAAR)  
*No change to YRT rates (Baseline)*



**3.6** ULSG Gross DR – Net DR (per 1000 of projected ceded NAAR)  
*Action B - Prudent estimate YRT rates and counterparty actions*

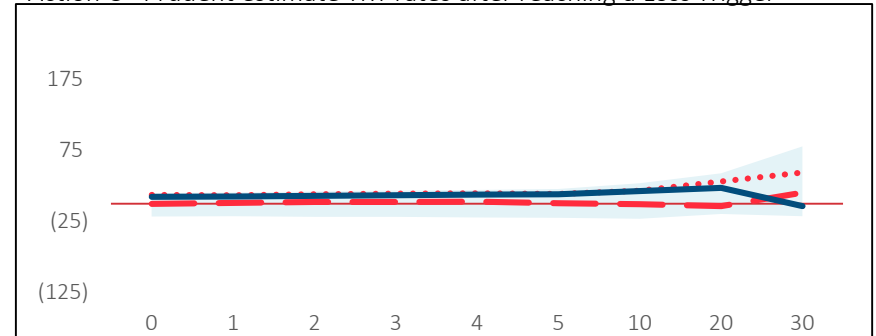


## Commentary

- Both Action B and Action C reduced the overall range of modeled “DR Reserve Credits” seen in field test participant results
- Action B saw large reductions to the upper end of the “DR Reserve Credit” range, but saw an increase to the lower end of the range – particularly as shown by the PBR Representative Model results
- The loss ratio mechanism of Action C greatly reduced the high and low end of the range of field test and PBR Representative Model results

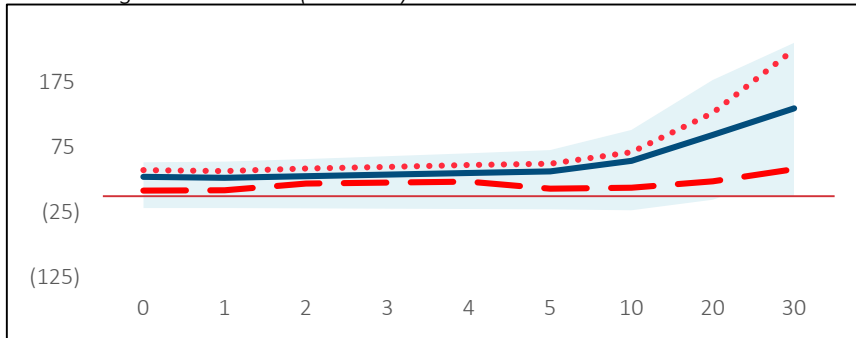
..... 25<sup>th</sup> percentile (Field test)     Coverage range (Representative model)  
- - - - - 75<sup>th</sup> percentile (Field test)    — “Baseline YRT scale” with high credibility

**3.8** ULSG Gross DR – Net DR (per 1000 of projected ceded NAAR)  
*Action C - Prudent estimate YRT rates after reaching a Loss Trigger*

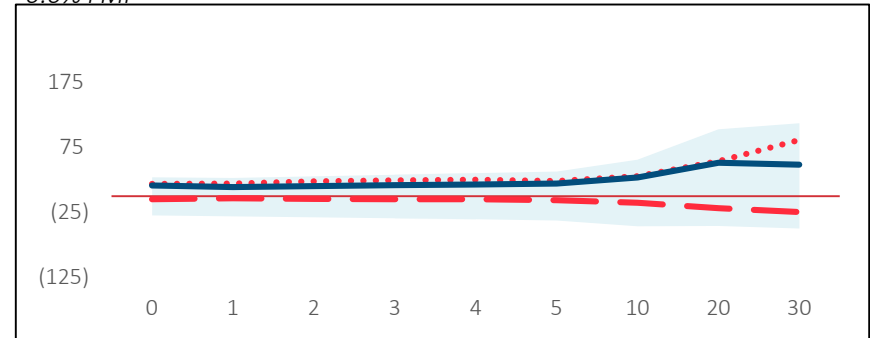


# APF 2019-41 Field Test Results

**3.1** ULSG Gross DR – Net DR (per 1000 of projected ceded NAAR)  
*No change to YRT rates (Baseline)*



**3.11** ULSG Gross DR – Net DR (per 1000 of projected ceded NAAR)  
*0.0% FMI*

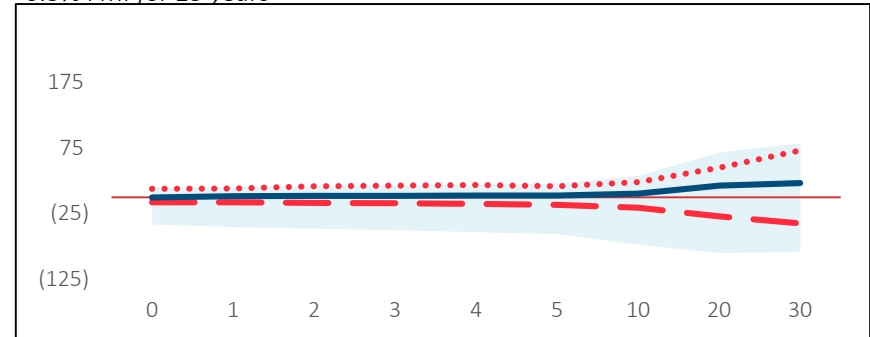


## Commentary

- Field test instructions asked participants to model different levels of future mortality improvement applied to reinsurance claim settlements only
- The representative PBR model included margins in addition to YRT premiums as a modeling simplification rather than a pure interpretation of the APF
- 50bps of incremental mortality improvement reduces the DR “reserve credit” to close to zero in initial projection years for the “Baseline YRT scale”

..... 25<sup>th</sup> percentile (Field test)     Coverage range (Representative model)  
- - - - - 75<sup>th</sup> percentile (Field test)    — “Baseline YRT scale” with high credibility

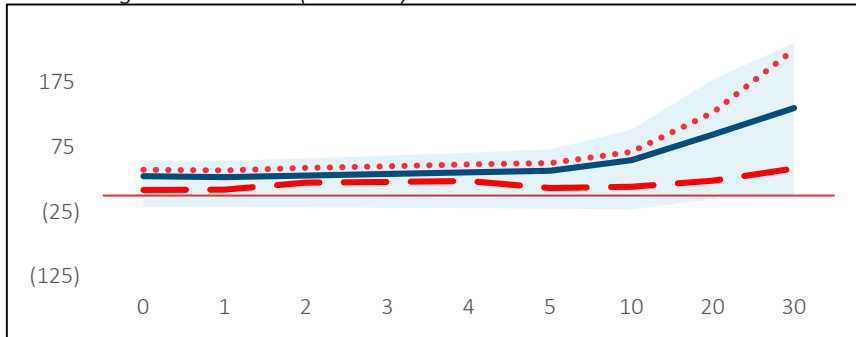
**3.12** ULSG Gross DR – Net DR (per 1000 of projected ceded NAAR)  
*0.5% FMI for 15 years*



# APF 2019-42 Field Test Results

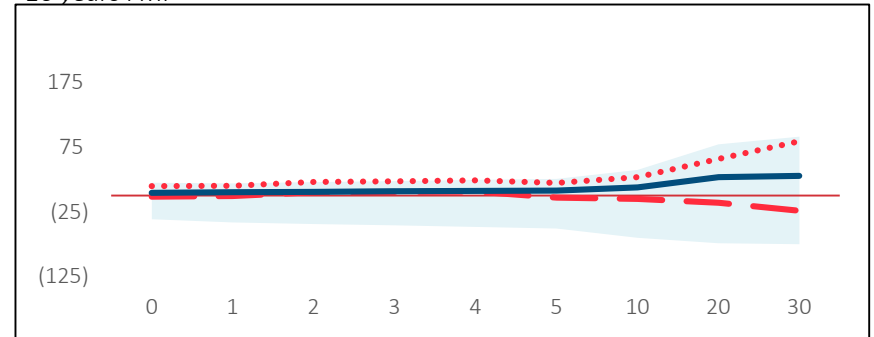
## 3.1 ULSG Gross DR – Net DR (per 1000 of projected ceded NAAR)

*No change to YRT rates (Baseline)*



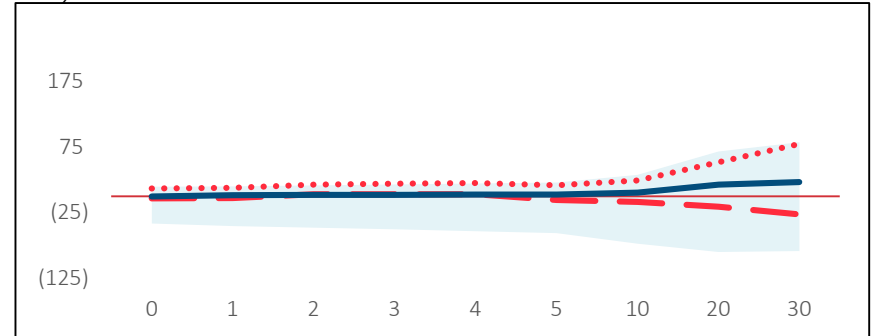
## 3.14 ULSG Gross DR – Net DR (per 1000 of projected ceded NAAR)

*10 years FMI*



## 3.16 ULSG Gross DR – Net DR (per 1000 of projected ceded NAAR)

*15 years FMI*



### Commentary

- APF 2019-41 and APF 2019-42 produce similar results, with main variations driven by the application of mortality improvement (magnitude and length)
- 5-years of incremental mortality improvement reduces the DR “reserve credit” by roughly 50%
- When a margin is defined as the relationship between anticipated experience and best estimate mortality, “Higher YRT rate scales” lead to negative reserve credits

..... 25<sup>th</sup> percentile (Field test)     Coverage range (Representative model)  
- - - - 75<sup>th</sup> percentile (Field test)    — “Baseline YRT scale” with high credibility

# Range of Interpretation Survey Introduction

51 legal entity responses to survey

36 separate direct writers and reinsurers

55% of industry by new business face amount

## Survey Purpose

- Poll companies on the modeling approach they would use to implement APFs
- Supplement and broaden range of practice outside of the participation of field test responses
- Collect separate responses for different treatment by treaty type

## Survey Response Choices

- **None** – Maintain the current scale throughout the projection
- **Reactive** – Increase by a percent of the prescribed margin after X years
- **Breakeven** – Increase by percent of difference between PBR mortality and current scale of YRT rates

The Representative PBR Model was utilized to analyze surveyed approaches for each APF. To focus on the impact of different approaches, the Baseline YRT scale and High Credibility was used in the model.

# APF 2019-40 | Survey Results

Reinsurer Reaction	Survey %
None	19%
Reactive	40%
Break-even	25%
Other	16%

## Modeling Details

- No change to YRT premiums

## Increase YRT premiums by

- 100% of prescribed mortality margin after 1 year and **every year thereafter**
- Includes implicit margin assuming future mortality improvement in all years

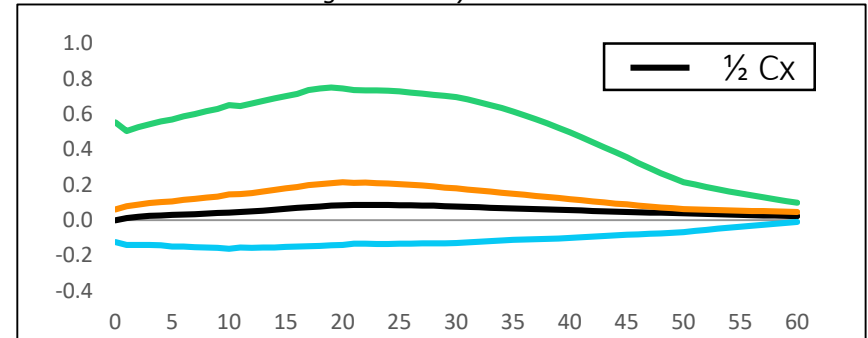
## Increase YRT premiums by

- 100% of the difference between current YRT premium and prescribed mortality immediately and **every year thereafter**

## Commentary

- APF 2019-40 had the most variation in survey responses
- Responses ranged from straightforward (reactive or break-even) to complex
- The largest “DR Reserve Credit” produced by the representative model was from the “None” reinsurer reaction
- The reactive scenario with the implicit margin including all years of FMI creates a negative “DR Reserve Credit”

4.3 ULSG Pre-reinsurance DR – Post-reinsurance DR (projected reserves)  
“Baseline YRT scale” and high credibility



# APF 2019-41 | Survey Results

Reinsurer Reaction	Survey %
None	55%
Reactive	17%
Break-even	18%
Other	10%

## Modeling Details

- No change to YRT premiums

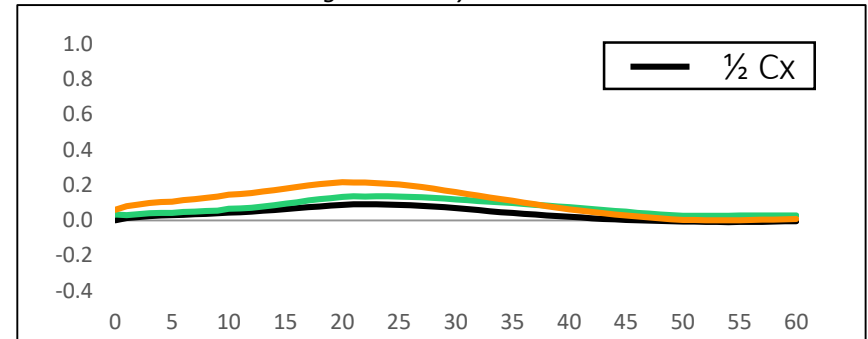
Increase YRT premiums by

- 100% of the difference between current YRT premium and prescribed mortality immediately and **every year thereafter**

## Commentary

- Most responses were either None or Break-even
- Many responses indicated the need for multiple models or runs to apply this APF to reflect best estimate mortality for reinsurance cash flows and VM-20 mortality for all other cash flows
- The smallest range in modeled “DR Reserve Credits” was due to high alignment between the YRT scale w/ margin and the mortality used for reinsurance claim settlements

4.9 ULSG Pre-reinsurance DR – Post-reinsurance DR (projected reserves)  
“Baseline YRT scale” and high credibility



# APF 2019-42 | Survey Results

Reinsurer Reaction	Survey %
None	1%
Reactive	64%
Break-even	29%
Other	6%

Increase YRT premiums by

- 100% of prescribed mortality margin after 1 year and annually thereafter
- Includes 10 years of future mortality improvement in implicit margin

Increase YRT premiums by

- 100% of prescribed mortality margin after 1 year and every year thereafter
- Include implicit future mortality improvement margin

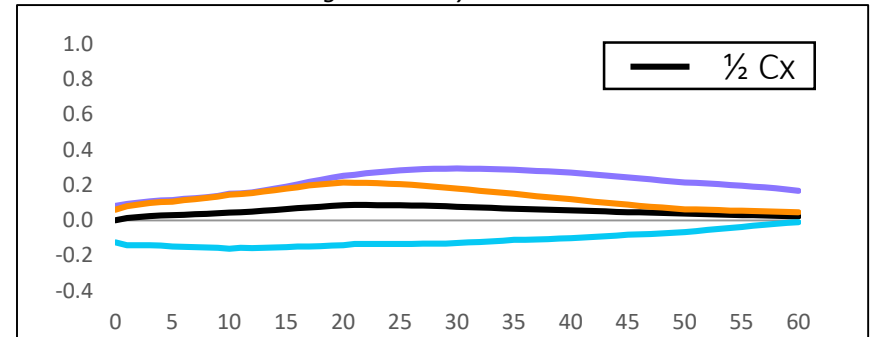
Increase YRT premiums by

- 100% of the difference between current YRT premium and prescribed mortality immediately and **every year thereafter**

## Commentary

- Most responses were reactive and incorporate 100% of the prescribed margin
- Variation in reactive responses was the number of years of mortality improvement included in the margin
- The choice of number of years of future mortality improvement to include in the margin is critical, as

4.15 ULSG Pre-reinsurance DR – Post-reinsurance DR (projected reserves) “Baseline YRT scale” and high credibility



# Select Takeaways from YRT Field Test Analysis

## 4. Differences in modeled reserves are primarily driven by the relationship between the current scale of YRT premiums and PBR mortality (anticipated experience and the level of margin)

- Observed differences in the relationship between the current scale of reinsurance premiums and anticipated mortality as well as the level of mortality margin explain the degree of variability in impacts of reinsurance on modeled reserves across field test participants
- The prescription of triggers (APF 2019-40) and levels of future mortality improvement (APF 2019-41 and 2019-42) reduce differences between the scale of reinsurance premiums and mortality and can be thought of as mechanisms which can be used to define the level of risk shared between parties in the modeled reserve

## 5. Variation in surveyed approaches points to several considerations including level of prescription, modeling complexity, variation in results and others in a long-term solution

- APF 2019-42 has the highest level of prescription. APF 2019-40 allows for more flexibility; however, measures to reduce the variation in results (e.g., “loss ratio” trigger) add additional prescription.
- APF 2019-41 has the most complexity (modeling and theoretical) as it requires projecting YRT premium and claim settlement cashflows using a separate mortality assumption
- APF 2019-40 has the widest variation in modeled range of interpretation “reserve credits” primarily due to survey respondents modeling no change to their current scale. APF 2019-41 has the smallest variation in modeled “reserve credits” but could have larger variations in practice due differences in model implementation.



# Current Status and Additional Resources

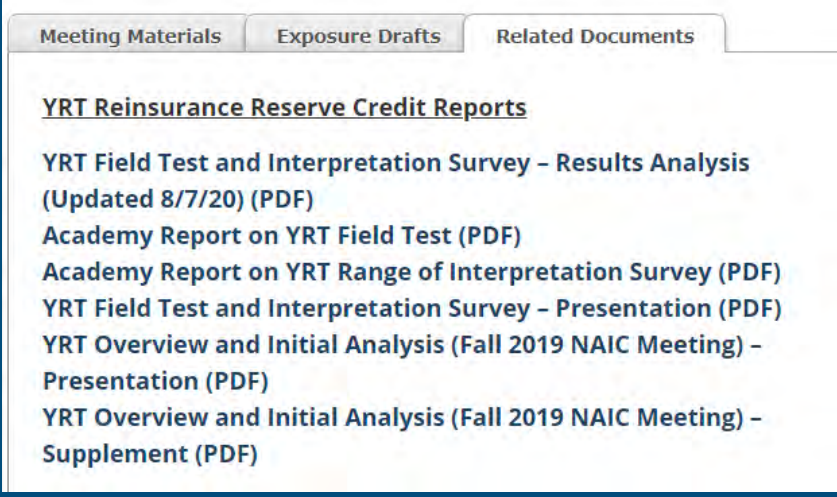
## Current Status

- Questions and comments regarding the YRT presentations at the Summer NAIC National Meeting are still being accepted by Reggie Mazyck  
**RMazyck@naic.org**
- Additional LATF meetings will be scheduled to address any questions from regulators or interested parties

## Additional Resources

Life Actuarial (A) Task Force Webpage  
Related Documents Tab

[https://content.naic.org/cmte\\_a\\_latf.htm](https://content.naic.org/cmte_a_latf.htm)



Meeting Materials Exposure Drafts **Related Documents**

YRT Reinsurance Reserve Credit Reports

- YRT Field Test and Interpretation Survey – Results Analysis (Updated 8/7/20) (PDF)
- Academy Report on YRT Field Test (PDF)
- Academy Report on YRT Range of Interpretation Survey (PDF)
- YRT Field Test and Interpretation Survey – Presentation (PDF)
- YRT Overview and Initial Analysis (Fall 2019 NAIC Meeting) – Presentation (PDF)
- YRT Overview and Initial Analysis (Fall 2019 NAIC Meeting) – Supplement (PDF)



# Life PBR and the treatment of reinsurance

## Update and insider perspectives

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**September 1, 2020**



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- **DON'T** stay at a meeting where any such price talk occurs.
- **DON'T** make public announcements or statements about your own or your firm's prices or fees, or those of competitors, at any SOA meeting or activity.
- **DON'T** talk about what other entities or their members or employees plan to do in particular geographic or product markets or with particular customers.
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# LIFE PBR AND THE TREATMENT OF REINSURANCE UPDATE AND INSIDER PERSPECTIVES

Valuation Actuary Symposium | Virtual Session

Chris Whitney, FSA, MAAA  
September 1, 2020



# AGENDA

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**01** Background



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**02** Case study



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**03** Industry field test



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**04** Key takeaways





# 1 LIFE PBR IS NOW EFFECTIVE FOR ALL INDIVIDUAL LIFE INSURANCE POLICIES (AND ASSOCIATED REINSURANCE) THAT ARE ISSUED 1/1/2020 OR LATER

## Timing and implementation

- Life PBR became effective 1/1/2017 with an optional three-year implementation period
- PBR implementations are heavily back-loaded and only 23 companies moved a product to PBR in 2017

## Applicability

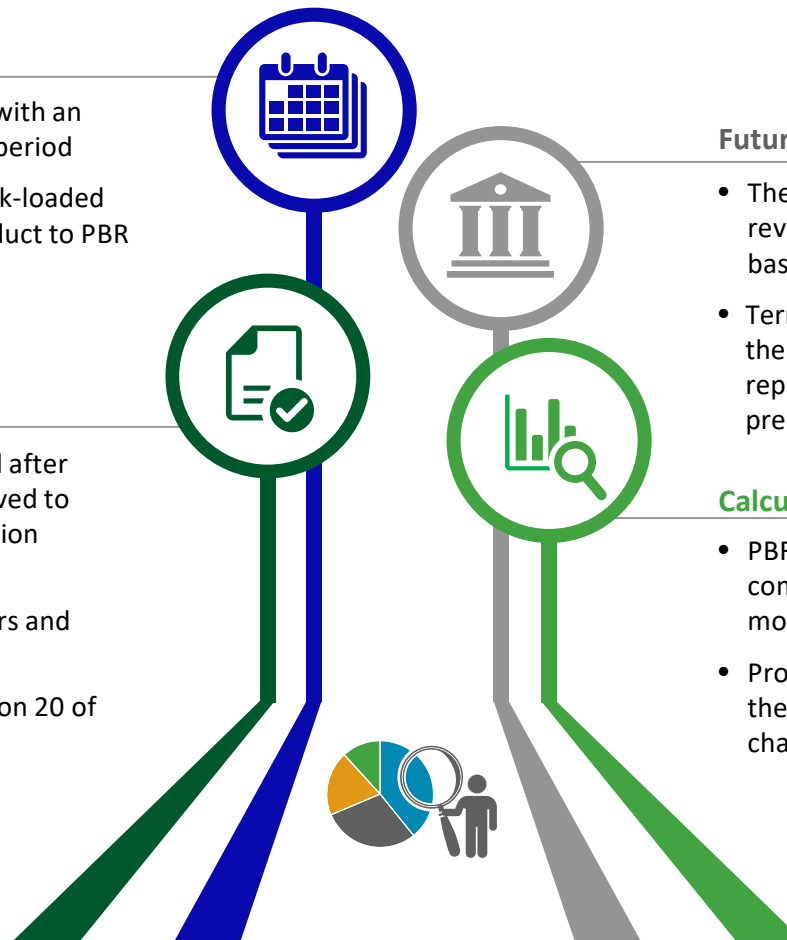
- Applies to all life new business issued after 1/1/2020 as well as any business moved to PBR during the optional implementation period
- Requirements apply to both reinsurers and direct writers
- Requirements are prescribed in Section 20 of the new valuation manual (VM-20)

## Future changes

- The valuation manual is a living document with revised requirements released on an annual basis
- Terms for adoption are the same as those for the VM itself (requires 42 states/ territories representing 75% of total US life insurance premium)

## Calculations

- PBR is the maximum of three reserve components; a formulaic floor and two modeled reserve components
- Products may be exempt from components of the requirements if they are not sensitive to changes in interest rates







# 1 BACKGROUND

Several sources of guidance exist for the modeling of reinsurance cash flows. Prior to recent changes, the guidance was non-prescriptive and took the form of considerations and required disclosures.

Source	Details
<b>VM-20</b>	<ul style="list-style-type: none"><li>• The actuary should assume that the counterparty is likely to act efficiently</li><li>• The assumptions used may differ between the ceding and assuming company</li><li>• Additional (outside the cash flow model) stochastic analysis may be required for certain types of reinsurance (i.e. stop-loss)</li></ul>
<b>VM-31</b>	<ul style="list-style-type: none"><li>• Requires a description of assumptions and methodology used to model reinsurance cash flows</li></ul>
<b>PBR ASOP</b>	<ul style="list-style-type: none"><li>• Recommends consistency between reinsurance assumptions and other assumptions</li><li>• 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</li></ul>
<b>AAA Practice note</b>	<ul style="list-style-type: none"><li>• States that “some actuaries will assume less than 100% selection against the company”</li><li>• Recommends analyzing the financial impact on the reinsurer and assuming more selection if the financial impact is significant</li></ul>



# 1 RANGE OF PRACTICE

A wide range of practice was observed from early adopters of PBR in regards to the treatment of non-guaranteed reinsurance; regulators began discussing changes to requirements in 2019

*Reported reserves were higher post-reinsurance than pre-reinsurance for some companies, and in some cases, the highest reserve changed between reserve methods pre- and post-reinsurance (e.g. DR highest pre-reinsurance, NPR highest post-reinsurance)*

– NAIC Valuation Analysis (E) Working Group

*A ceding insurer might use one set of assumptions to manufacture a large reserve credit, while the reinsurer uses a different set of assumptions to calculate a much smaller reserve... We recommend that LATF explore improvements to the Valuation Manual that could mitigate the risk of this type of gaming.*

– NAIC Reinsurance (E) Task Force





# 2 CASE STUDY #1

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

Category	Details
<b>Model</b>	<ul style="list-style-type: none"><li>▪ 30 year projection horizon</li><li>▪ Reserve revalued annually</li></ul>
<b>Best estimate assumptions</b>	<ul style="list-style-type: none"><li>▪ Mortality follows 100% of 2015 VBT</li><li>▪ Mortality experience is 30% credible with 10 years of sufficient data</li><li>▪ Expenses, commissions and lapses set at industry averages</li></ul>
<b>Prudent estimate assumptions</b>	<ul style="list-style-type: none"><li>▪ Mortality is improved up to each valuation date at 1% per year</li><li>▪ 100% shock lapse at end of level term period</li></ul>
<b>Reserve assumptions</b>	<ul style="list-style-type: none"><li>▪ The NPR uses the 2017 CSO and a valuation interest rate of 4.5%</li><li>▪ DR scenarios are re-generated at each valuation date</li><li>▪ Starting assets at each valuation date use the 'direct iteration' approach</li><li>▪ The cohort is assumed to pass the Stochastic Exclusion Test (SET)</li></ul>

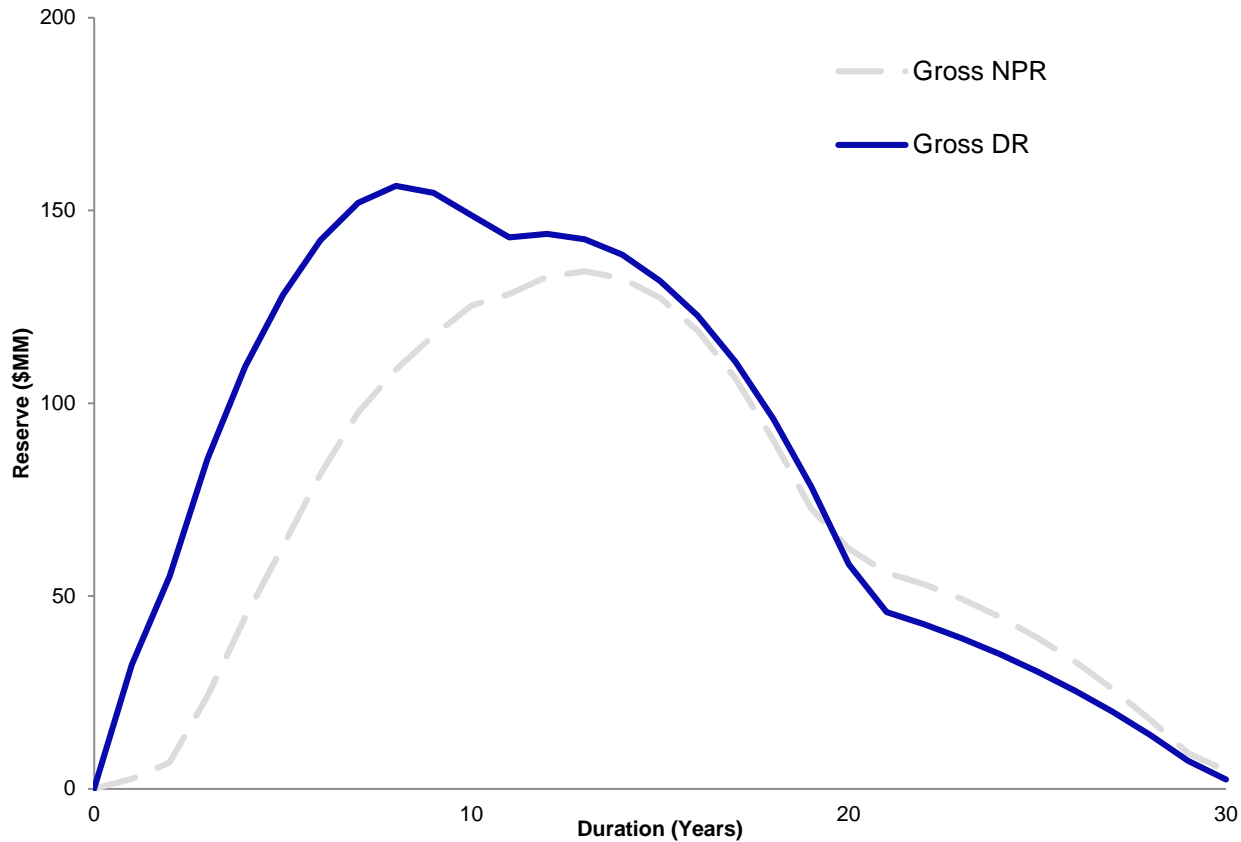
Assumptions used and products modeled are for an illustrative term portfolio intended to be reasonably representative of products offered in the market today



# 2

## CASE STUDY #1

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



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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

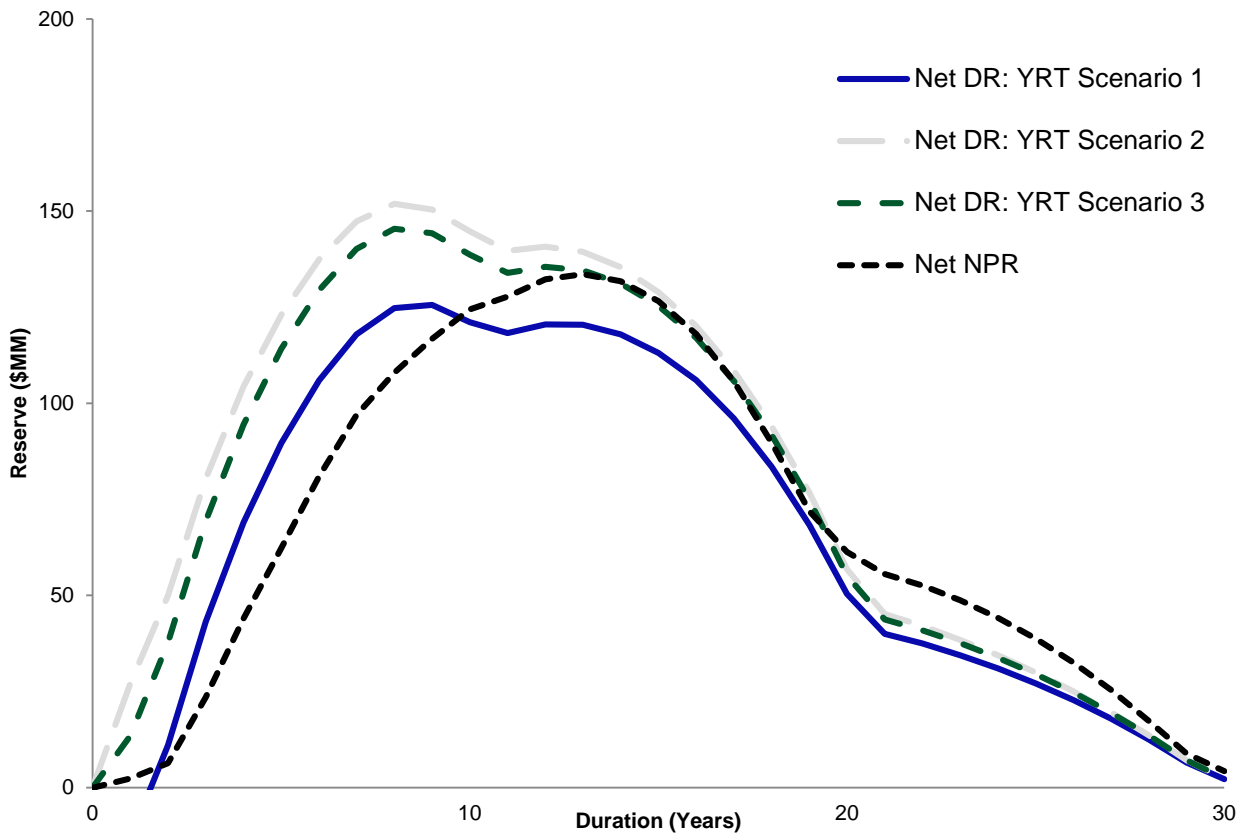
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# 2

## CASE STUDY #1

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

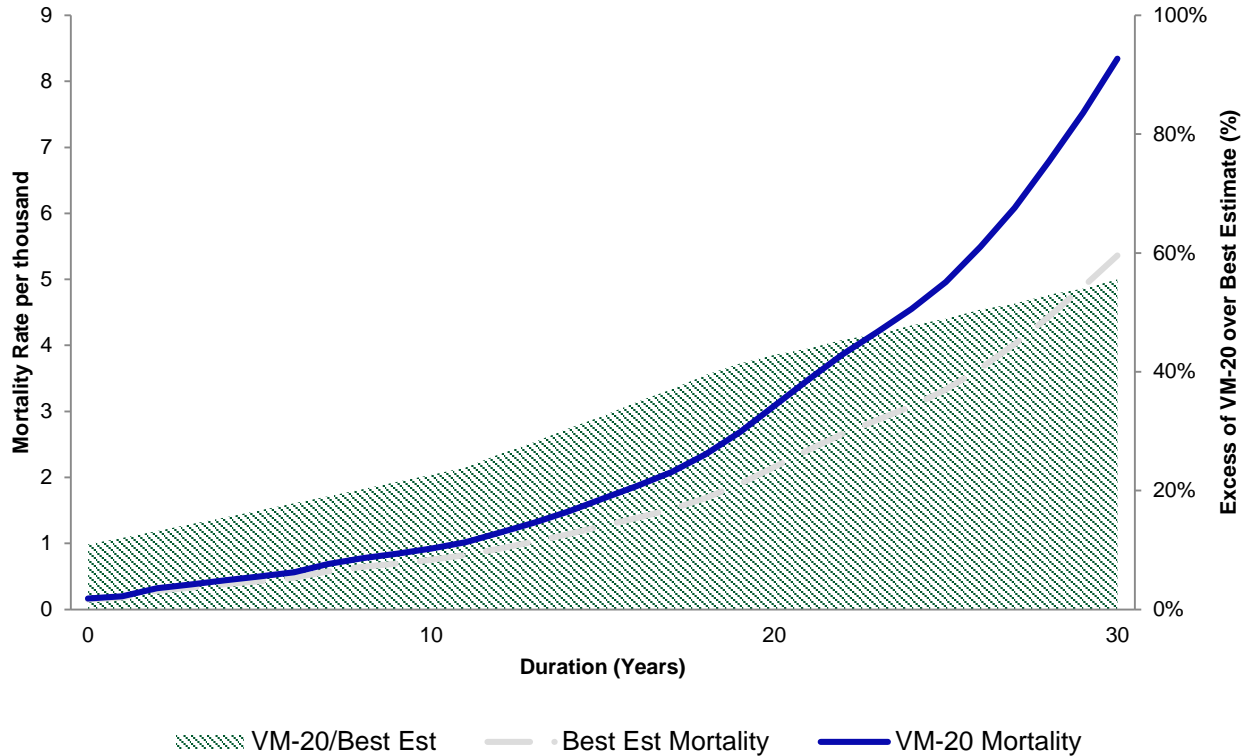
**YRT Scenario 3:** Increase rates by 15%



# 2 CASE STUDY #1

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

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



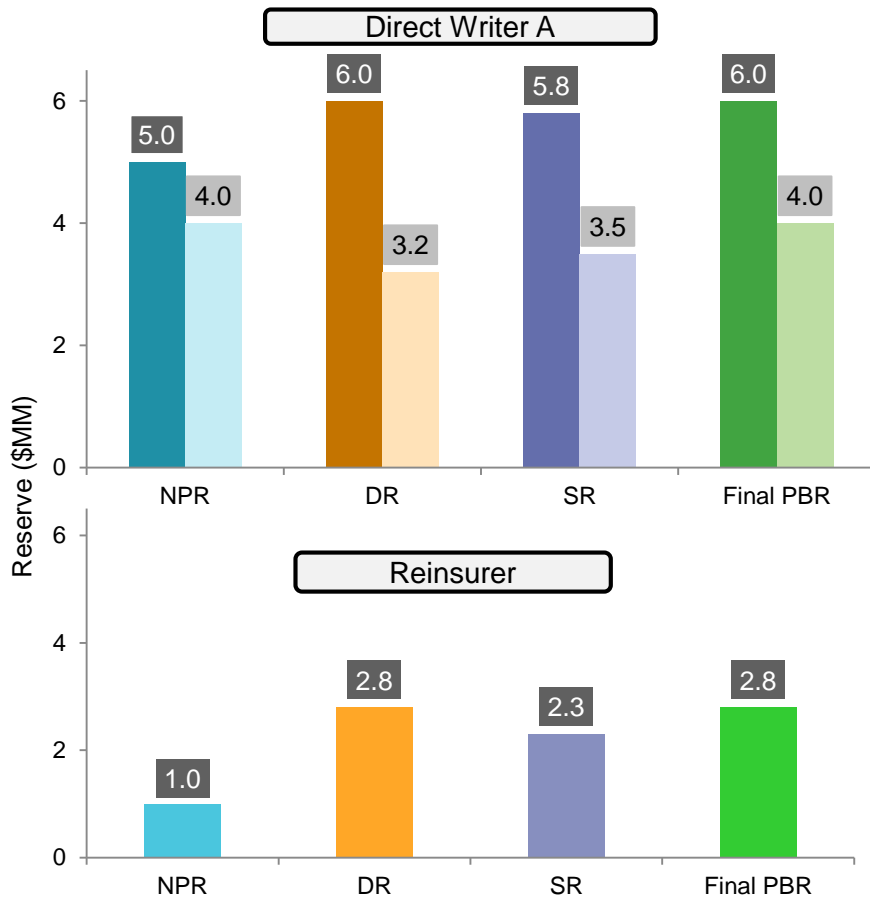
The mortality assumption under VM-20 contains no future mortality improvement and is based on a company-specific prudent assumption grading to a prudent industry table when sufficient data no longer exists



# 2

## CASE STUDY #2

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



### Detailed commentary

- Assume that valuation assumptions are exactly the same between Direct Writer A and Reinsurer
- Final PBR reserve for Direct Writer A is 4.0, the max of NPR, DR and SR on a net of reinsurance basis

	NPR	DR	SR	Final PBR
Gross	5.0	6.0	5.8	6.0
Net	4.0	3.2	3.5	4.0
Ceded	1.0	2.8	2.3	2.0

- Direct Writer A's ceded reserves are equal to 2.0
- Reinsurer's final PBR reserve is calculated using the max of the gross less net components for NPR, DR, and SR and equals 2.8

	NPR	DR	SR	Final PBR
Assumed	1.0	2.8	2.3	2.8

Even with the exact same assumptions, the mechanics of the PBR calculation can result in a difference in ceded reserves and assumed reserves



# 3

## INTERIM SOLUTION AND INDUSTRY FIELD TEST

The Life Actuarial (A) Task Force (“LATF”) implemented an “interim solution” for the 2020 Valuation Manual, and requested additional analysis be performed to aid in the selection of a longer-term solution

### Solution

### Guidance

#### Interim solution

- Applies to business issued in 2020+; optional to business on PBR that was issued in 2017-2019
- Non-guaranteed reinsurance is not required to be modeled and the reserve credit for ceded reinsurance (reserve for assumed reinsurance) is equal to the formulaic  $\frac{1}{2} Cx$

#### Longer-term solutions

- The scope of the industry field test is limited to three of the proposed amendments that LATF had been discussing prior to the adoption of the “interim solution” (see below) along with two baselines (no change in premiums and  $\frac{1}{2} Cx$ )

<p><b>APF 2019-40</b></p> <p><b>YRT premiums</b></p> <ul style="list-style-type: none"> <li>• Model YRT premiums using anticipated experience with margins based on clarified modeling principles/guidance and actuarial judgment</li> </ul>	<p><b>APF 2019-42</b></p> <p><b>YRT premiums</b></p> <ul style="list-style-type: none"> <li>• Use current YRT premium rates, plus a prescribed margin for non-guaranteed rates based on the difference between “baseline credibility” prudent estimate mortality and company experience mortality</li> <li>• Baseline credibility assumes a minimum level of credibility<sup>2</sup> and sufficient data period to avoid bias against small companies</li> </ul>
<p><b>Representative language</b></p> <p><i>The company shall base its company and counterparty action assumptions relating consistent with the moderately adverse environment as applicable to the valuation (APF 2019-40, Section 8.5)</i></p> <p><i>The assuming company shall not be assumed to incur indefinite losses if treaty terms underlying economics (APF 2019-40, Section 8.7)</i></p> <p><i>The company shall base its company and counterparty action assumptions relating changes reflecting that, in general, there is no relevant company or industry experience upon which to base the anticipated experience assumption. (APF 2019-40, Section 8.7)</i></p> <p><small>Note: VM-20 Section 9.B.2 applies such that greater uncertainty in the anticipated experience re</small></p>	<p><b>APF 2019-41</b></p> <p><b>YRT premiums and claims</b></p> <ul style="list-style-type: none"> <li>• Premiums determined using <b>current YRT premium scale with projected</b> the company actually expects will occur</li> <li>• Claims determined using the <b>company’s anticipated experience mortality</b> and YRT reinsurance Claim settlements received, using the following</li> </ul> <p><b>Representative language (APF 2019-41 section 8.C.8)</b></p> <p><i>The company shall use best estimate assumptions with no implicit or explicit to Section 8.C.16 through Section 8.C.18, as the prudent estimate assumption for YRT reinsurance Claim settlements received, using the following</i></p> <ol style="list-style-type: none"> <li><i>Use the reinsurance rates and provisions from the relevant reinsurance estimate assumption for YRT reinsurance premiums paid, and project recaptures using what the company actually expects will occur, base rate increase experience, and ongoing relationship with the reinsurer</i></li> <li><i>The mortality rates used to determine the prudent estimate assumption settlements shall equal the company’s anticipated experience assumptions adjusted to reflect the company’s best estimate of mortality improvement.</i></li> </ol>
<p>Companies are responsible for developing their own margin used in the projected non-guaranteed reinsurance premiums</p>	<p><b>Reinsurance premium margin development</b></p> <p>The formula for the prescribed margin (additive to current rates) from APF 2019-42 is summarized below:</p> $= \lambda * (\text{anticipated experience assumption for YRT premium rates})$ $= \frac{(i - ii)}{ii} * (\text{current YRT rate})$ <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><small><math>i</math> = prudent estimate mortality calculated using a minimum of 80% credibility and a sufficient data period of at least 10 years</small></p> <p><small><math>ii</math> = company experience mortality reflecting industry mortality improvement beyond the valuation date</small></p> </div> <p>Non-guaranteed reinsurance premiums are modeled as the current scale plus a margin, which is developed based on prescribed inputs, with some flexibility to make adjustments to reflect contract provisions</p> <p><small>Companies that have greater than the minimum credibility/SDP will use their own credibility, but companies with lower credibility/SDP will use the minimum</small></p> <p>Non-guaranteed reinsurance premiums are based on the relationship between the current premium scale and the company’s anticipated experience mortality, with consideration for treaty provisions, historical rate increases and/or relationship with reinsurer</p>



# 3 INITIAL ANALYSIS AND FIELD TEST RESULTS

A representative PBR model was used for initial analysis while the industry field test was conducted (December 2019 – March 2020)

## Initial analysis

Shared at Fall 2019 NAIC Meeting and subsequent LATF calls

**LONG-TERM SOLUTION (YRT & VM-20) OVERVIEW AND INITIAL ANALYSIS**  
DECEMBER 5, 2019  
NAIC 2019 FALL NATIONAL MEETING LIFE ACTUARIAL (A) TASK FORCE

**Mortality and PBR prescribed margin**  
Level of margin by VM-20 mortality assumption component is illustrated below

Male, 40 year old, preferred non smoker, 2019 valuation

PBR mortality components	Applicable duration	Assumption structure	Margin type
100% business experience phase	Duration = full/years date period + inspection period before graded phase	Substantially improved	Explicit
Grading to industry phase	Duration between 1 and 6	Linearly grade from 100% of Company (1) to 100% of industry (2)	Explicit
100% industry experience phase	Duration = sufficient data period + minimum end of point for grading	2019 rate (3) if + industry insured	Explicit
Lack of future mortality improvement	All durations	No mortality improvement allowed beyond the valuation date	Implicit

The mortality assumption under VM-20 contains both direct sources of margin and an indirect source of margin (lack of future mortality improvement)

**LONG-TERM SOLUTION (YRT & VM-20) SUPPLEMENT**  
JANUARY 30, 2020  
NAIC 2019 FALL NATIONAL MEETING LIFE ACTUARIAL (A) TASK FORCE

**Conceptual example (1 of 2)**  
As illustrated below, applying the PBR methodology under the same assumptions can produce differences in reserves between the cedant and assuming reinsurer

Component	Direct Writer A	Reinsurer
Final PBR	4.0	2.8
Net	4.0	3.2
Ceded	0.0	0.4

**Detailed commentary**

- Assume that valuation assumptions are exactly the same between Direct Writer A and Reinsurer
- Final PBR reserve for Direct Writer A is 4.0, the max of NPR, DR and SR on a net of reinsurance basis
 

NPR	DR	SR	Final PBR
5.0	3.0	5.8	6.0
4.0	3.2	3.5	4.0
Ceded	1.0	2.8	2.3
Assumed	1.0	2.8	2.2
- Direct Writer A's ceded reserves are equal to 2.0
- Reinsurer's final PBR reserve is calculated using the max of the gross less net components for NPR, DR, and SR and equals 2.8

Even with the exact same assumptions, the mechanics of the PBR calculation can result in a difference in ceded reserves and assumed reserves

## Industry field test

Results from industry field test

**AMERICAN ACADEMY of ACTUARIES**  
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**PBR: Reserve Credits for YRT Reinsurance A Field Test of Three Amendment Proposal Forms (APFs), Time Zero and Projected Reserves**  
May 8, 2020  
A Report to Jason Kehrerberg, Life Valuation Committee, American Academy of Actuaries  
by Steve Jackson, Ph.D., Assistant Director for Research, American Academy of Actuaries

2019-41 w/ 0% Future Mortality Improvement (FMI)					Reserve Credits: Dollars per Thousand Dollars of projected ceded NAAR
Year	25th PCT	75th PCT	Median	Mean	
0	(1.0)	0.3	(0.3)	(0.3)	
1	(0.6)	0.4	(0.1)	(0.2)	
2	(0.7)	0.3	(0.3)	(0.3)	
3	(0.7)	0.4	(0.5)	(0.3)	
4	(0.8)	0.5	(0.7)	(0.2)	
5	(0.8)	1.4	(0.1)	0.2	
10	(1.2)	2.4	0.3	0.8	
20	(1.9)	3.7	2.8	0.5	
30	(0.7)	1.1	(0.6)	0.4	

2019-41 w/ 0.5% FMI				
Year	25th PCT	75th PCT	Median	Mean
0	(0.2)	0.7	0.0	0.3
1	0.1	0.9	0.4	0.4
2	(0.0)	0.6	0.3	0.4
3	(0.0)	0.5	0.3	0.5
4	(0.0)	0.3	0.3	0.5
5	0.0	1.7	0.3	0.9
10	0.1	2.5	0.6	1.5
20	(0.2)	4.0	0.6	0.6
30	(0.7)	1.5	(0.6)	0.8

2019-41 w/ 1.0% FMI				
Year	25th PCT	75th PCT	Median	Mean
0	0.0	1.2	0.4	0.8
1	0.2	1.4	1.1	0.9
2	(0.2)	1.2	1.1	0.9
3	(0.2)	1.3	1.1	1.1
4	0.3	1.3	0.9	1.1
5	0.8	2.3	1.2	1.5
10	(0.5)	3.2	2.1	2.1
20	(3.0)	4.2	1.4	0.6
30	(0.6)	1.9	(0.6)	1.0

In its 2017 reviews of Life PBR Actuarial Group (VAWG) found that modeling of year varied significantly across companies. The differences in the reinsurance reserve credit alternative Amendment Proposal Forms in this area. The NAIC's Life Actuarial (A) test of these APFs to support its decision.

Between December 2019 and April 2020, asked participating companies to model interim solution adopted by the NAIC in 2019 consideration by LATF at the NAIC. The by the Life Valuation Committee jointly with representatives of state and regulators from the NAIC, as well as staff and members from the American Council of Life Insurers (ACLI). The field test was supported by Oliver Wyman under an agreement with the Academy, Oliver Wyman is also doing analytical work to complement the field test results under agreements with the NAIC and the ACLI. A copy of the instructions for the field test are attached to this report as Appendix A.

In August 2019, 187 companies (for the purposes of this report, "companies" refer to legal entities unless otherwise specified), identified by the NAIC staff as those likely to be subject to PBR when it becomes mandatory, were invited to join a field test of three APFs: 2019-40, 2019-41 and 2019-42. Some companies responded that they did not believe they would be subject to PBR either because they had ceased selling new policies or because they met the conditions of one of the exemptions available for PBR. Many indicated that they could not participate due to lack of time and resources. Sixteen companies indicated that they would participate. For various reasons, five of the 16 withdrew without submitting results, leaving us with 11 entities participating. Within the universe of companies subject to PBR, our participants include both smaller and larger companies; all are direct insurers, none are reinsurers.

This report presents results from submissions by 11 participating companies. The set of results presented here include results from seven companies reporting on term policies, and eight reporting on universal life with secondary guarantee (ULSG) policies (four companies reported separately for both policy types). For both term and ULSG policies, one company provided time zero but not projected reserves. While all results have been examined for consistency, only those

The remainder of this section focuses on the report developed at the conclusion of the field test which contains results as well as related analysis performed with the representative PBR model



# 3

## FIELD TEST REPORT

A report was delivered to LATF in mid-June which covers results of the industry field test and associated survey as well as additional analysis performed using the representative PBR model in light of the results

**OLIVER WYMAN**

**NATC** **ACLI**

# LONG-TERM SOLUTION (YRT & ...)

Results and analysis for

June 2020

### CONTENTS

<b>01</b>	Background and overview	
<b>02</b>	Review of proposed solutions	
<b>03</b>	Field test	
<b>04</b>	Interpretation survey and representative analysis	
Appendix A: Supporting reports and presentations		<b>42</b>
A.1: Academy reports		
A.2: Prior presentations		
Appendix B: Model design and analysis		
Appendix C: Supplemental results		
C.1: Field test		
C.2: Interpretation survey and analysis		
Appendix D: Project team		

### BACKGROUND AND PURPOSE

The interpretation survey asked participants to detail how they would implement each of the proposed solutions

**Survey purpose**

- Poll companies on the modeling approach they would use to implement APFC: 2019-40, 2019-41, and 2019-42
- Supplement and broaden range of practice outside of the participation of field test responses

**High level description of questions**

- Several options were provided for projecting changes to YRT rates. Participants were asked to select the option that best fits their intended approach. Options included:
  - No change to YRT premiums
  - Increasing rates by a specified amount over a specified period of time and eventually mortality improvement
  - Increasing rates by the difference (i.e. PBR) mortality, with specific assumptions
- Collected separate responses for direct writers and reinsurers

**Survey usage**

- We used the results of the survey to:
  - Refer to slide 41 for additional details

Survey covered approximately 23 companies

**51 RESPONSES**

From legal entities spanning 36 separate direct writers and reinsurers

### FIELD TEST SOLUTIONS

Comparison of potential long-term solutions based on results of the field test and interpretation survey

	IS Cx	2019-40 (Action A)	2019-40 (Action B)	2019-40 (Action C)	2019-40 (Action D)	2019-42 <sup>1</sup>	2019-42 <sup>2</sup>
Level of prescription	Dark Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Modeling complexity	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Variation in results	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Potential for asymmetry between assumed and actual interest interpretation	Dark Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Outlook lowest risk/sharing	Dark Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Potential APFC revisions	Dark Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue

### BASELINE | ULSG RESULTS

The representative PBR model explains the variance in impacts of reinsurance on modeled reserves observed in test submissions

**3.1 Gross DR – Net DR (per 1000 of projected ceded NAAR)**  
No change to YRT rates

**3.2 Gross DR – Net DR (per 1000 of projected ceded NAAR) / 1/2 Cx**

**Commentary**

- Shaded blue range represents the range combinations of rate scales and levels of credibility (all else equal)
- Upper bound of results (largest "reserve credit") from representative PBR model is "Lower YRT scale" with low credibility; lower bound is "Higher YRT scale" with high credibility (negative "reserve credit")
- Mid-point of results from representative PBR model is "Baseline YRT scale" with high credibility (dark blue line)

**Field test results legend**

- ..... 25<sup>th</sup> percentile (Field test)
- 75<sup>th</sup> percentile (Field test)
- Light Blue Coverage range (representative PBR model)
- Dark Blue "Baseline YRT scale" with high credibility

Derivations of the utilized reduction to DR can be found in Appendix A

### KEY TAKEAWAYS

Additional key takeaways from analysis of field test results are shown below in addition to those previously established

Takeaway	Details
<b>1</b> Minimum reduction to reserves can produce reserve credits in terms of % Cx	<ul style="list-style-type: none"> <li>% Cx represents risk size of reinsurance that corresponds to the scaled for which the reinsurance premium has been paid, but not yet needed by the reinsurer, with no provision for reserve growth beyond the paid to date</li> <li>Full reinsurance reaction scenarios tested allow for:                             <ul style="list-style-type: none"> <li>Differences between evaluation of mortality and reinsurance premium payment dates, contractual provisions, around return in unlimited reinsurance premiums and other contractual differences due to VM-20 (reinsurance), e.g. differences in starting asset and resulting earned rate</li> </ul> </li> </ul>
<b>2</b> It is important to look at long-term projections of reserves when evaluating the impact of reinsurance modeling approaches	<ul style="list-style-type: none"> <li>The level of margin in mortality as compared to best estimate changes at future valuation dates, due to smoothing of mortality improvement and extending the full-term asset period</li> <li>As the business ages, higher mortality and shorter protection horizons will change the impact of reinsurance on reserves in future valuation dates</li> </ul>
<b>3</b> Differences in reserve credits and assumed reserves under PBR are likely to occur for multiple reasons	<ul style="list-style-type: none"> <li>Differences between direct writers and reinsurers will not be mirrored, primarily due to differences in valuation assumptions (including changes to risk guarantees YRT premiums)</li> <li>Other drivers include the mechanics of computing final PBR reserves, and reinsurers aggregating results across multiple entities and multiple cedants</li> <li>Differences between actual and assumed reserves are reduced when reinsurance is by YRT premiums (not based on the level of mortality margin specific to each party)</li> </ul>
<b>4</b> Differences in modeled reserves are primarily driven by the relationship between the current scale of YRT premiums and PBR mortality (including experience and the level of margin)	<ul style="list-style-type: none"> <li>Observed differences in the relationship between the current scale of reinsurance premiums and associated mortality as well as the level of mortality margin within the degree of variability in impacts of reinsurance on modeled reserves under test participants</li> <li>The present group (APF 2019-40) and levels of future mortality improvements (APF 2019-41, and 2019-42) remove differences between the scale of reinsurance premiums and mortality and can be thought of as mechanisms which can be used to define the level of risk margin between parties in the modeled reserve</li> </ul>
<b>5</b> Variations in surveyed approximation points, in several considerations including level of prescription, modeling complexity, and variation in results in a long-term solution	<ul style="list-style-type: none"> <li>APF 2019-40 has the highest level of prescription, APF 2019-40 allowed for more flexibility; however, measures to reduce the variation in results (e.g., loss ratio trigger) adds additional prescription</li> <li>APF 2019-41 has the most complex (modeling and reinsurance) as it requires assessing YRT premium and associated assumptions using a separate mortality assumption</li> <li>APF 2019-42 has the widest variation in modeled range of variation "reserve credit" primarily due to survey respondents modeling no change to their current scale APF 2019-41 has the smallest variation in modeled "reserve credit" but could have larger variations in practice due to differences in model implementation</li> </ul>
<b>6</b> Differences in coded "reserve credit" and assumed reserves are minimized when a mechanical approach to reinsurance is used by both parties	<ul style="list-style-type: none"> <li>When open coding complexity and assumed conditions have the same assumptions and methodologies, a vectors approach under APF 2019-42 can result in reserves determined "reserve credit"</li> <li>Other solutions allow for more differences between coded and assumed reserves as through reinsurance premium modeling, outside of variance driven by assumption differences and PBR methodology</li> </ul>



# 4

## KEY TAKEAWAYS

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**01** PBR continues to evolve, with a potential for changes to be retroactive

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**02** There is a precedent for regulatory intervention in areas where a significant range of practice and/or interpretation exists

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**03** The complexity of principles-based reserve calculations and interplay of assumptions requires significant effort, planning and coordination to evaluate the impact of potential changes

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