OLIVER WYMAN

AMERICAN ACADEMY of ACTUARIES

NAIC National Association of Insurance Commissioners

ACLI

LONG-TERM SOLUTION (YRT & VM-20)

Results and analysis for field test and interpretation survey

August 2020

QUALIFICATIONS, ASSUMPTIONS, AND LIMITING CONDITIONS

Oliver Wyman was engaged by the American Council of Life Insurers, the American Academy of Actuaries and the National Association of Insurance Commissioners to support an industry field test being conducted to aid the NAIC Life Actuarial (A) Task Force in the selection of a long-term solution for the treatment of non-guaranteed reinsurance under PBR.

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01

EXECUTIVE SUMMARY

OVERVIEW

This report contains results and additional analysis for the industry field test and interpretation survey which will aid the NAIC Life Actuarial (A) Task Force ("LATF") in the selection of a longer-term solution for the treatment of non-guaranteed reinsurance under PBR

Initial education and support for industry field test

Focus of report (and upcoming LATF meetings)

Oliver Wyman, NAIC and the Academy have been closely collaborating over the past 3-months to confirm, compile and analyze results of the industry field test and interpretation survey

Education and analysis

- Prepared an initial report which focused on the design of a representative PBR model and initial insights gleaned
- Produced a supplement to the initial report expanding analysis to cover an assuming reinsurer's perspective

Field test and interpretation survey

- Developed and co-administered survey covering interpretation of potential solutions
- Assisted in the compilation and review of results for field test and interpretation survey

Education and analysis

- Refined granularity in representative PBR model informed by responses to the field test
- Performed additional analysis in representative PBR model to better understand results from field test and interpretation survey

Field test and interpretation survey

- Compiled results of field test submissions and identified drivers of variation across companies and potential solutions
- Compiled results of interpretation survey and performed additional analysis in light of the range of responses received

Following the delivery of this report, Oliver Wyman and NAIC staff are available to answer questions and perform additional analysis requested by LATF members to assist in decisions for the long-term treatment of non-guaranteed reinsurance under PBR

REPORT OBJECTIVES

Section	Contents and objectives
02 **Review of proposed solutions**	• **Contains** a description and representative language from the three amendment proposal forms ("APFs") evaluated in the field test and interpretation survey (APF 2019-40, 41 and 42) • **Objective** is to review the key details of the solutions under consideration
03 **Field test results and analysis**	• **Contains** results of industry field test and additional analysis performed using representative PBR model to confirm the integrity of submissions and understand the range of variation in results • **Objectives** are to build understanding of field test scenarios and detail the refinements made to the representative PBR model informed by field test responses
04 **Interpretation survey results and additional analysis**	• **Contains** results of interpretation survey and additional analysis performed using representative PBR model in light of the range of responses received. Analysis includes both direct writers and reinsurers as well as the potential for asymmetries in reserves due to differences in interpretation and application of the APFs • **Objectives** are to provide a broader view of long-term solutions on a consistent basis (e.g., using the representative PBR model) from both a direct writer and assuming reinsurers perspective

KEY TAKEAWAYS

Key takeaways from analysis of field test and interpretation survey results are **highlighted below** in addition to those previously established

	Takeaway	Coverage
1	Reinsurer reaction scenarios can produce reserve credits in excess of ½ Cx	Report from 2019 Fall NAIC meeting and supplemental analysis (See Appendix A.2)
2	It is important to look at long-term projections of reserves when evaluating the impact of reinsurance modeling approaches	
3	Differences in reserve credits and assumed reserves under PBR are likely to occur for multiple reasons	
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)	Section 03 | Field test results and analysis
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	Section 04 | Interpretation survey results and additional analysis
6	Differences in ceded “reserve credits” and assumed reserves are minimized when a mechanical approach to reinsurance is used by both parties	

Additional details for each key takeaway can be found in this report in the sections listed

COMPARISON OF PROPOSED SOLUTIONS

This comparison is informed by results and analysis contained in this report

	½ Cx	**2019-40** ***(Action A)***	**2019-40** ***(Action B)***	**2019-40** ***(Action C)***	**2019-40** ***(Action D)***	**2019-41**[1]	**2019-42**[1]
Level of prescription							
Modeling complexity							
Variation in results							
Potential for asymmetry between assumed and ceded interpretation							
Defined level of risk sharing							
Potential APF revisions							

Less — More

1. Multiple mortality improvement scenarios were included with APF 2019-41 and 42

02

REVIEW OF PROPOSED SOLUTIONS

APF 2019-40

YRT premiums

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

Representative language

The company shall base its company and counterparty action assumptions relating to YRT reinsurance consistent with the moderately adverse environment as applicable to the valuation of all life policyholders (APF 2019-40, Section 8.5)

The assuming company shall not be assumed to incur indefinite losses if treaty terms allow adjustment of the underlying economics (APF 2019-40, Section 8.7)

The company shall base its company and counterparty action assumptions relating to YRT reinsurance treaty changes reflecting that, in general, there is no relevant company or industry experience currently available upon which to base the anticipated experience assumption (APF 2019-40, Section 8.6)

Note: VM-20 Section 9.B.2 applies such that greater uncertainty in the anticipated experience requires a larger margin

Companies are responsible for developing their own margin used in the projection of future non-guaranteed reinsurance premiums

APF 2019-41

YRT premiums and claims

- 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

Representative language *(APF 2019-41 section 8.C.8)*

The company shall use best estimate assumptions with no implicit or explicit margins, except margins pursuant to Section 8.C.16 through Section 8.C.18, as the prudent estimate assumptions for YRT reinsurance premiums paid and YRT reinsurance Claim settlements received, using the following procedure:

a. Use the reinsurance rates and provisions from the relevant reinsurance agreement as the initial prudent estimate assumption for YRT reinsurance premiums paid, and project future reinsurance rate increases and recaptures using what the company actually expects will occur, based on treaty provisions, past reinsurance rate increase experience, and ongoing relationship with the reinsurer

b. The mortality rates used to determine the prudent estimate assumptions for YRT reinsurance claim settlements shall equal the company's anticipated experience assumptions adjusted to reflect the company's best estimate of mortality improvement

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

APF 2019-42

YRT premiums

- 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
- Baseline credibility assumes a minimum level of credibility[1] and sufficient data period to avoid bias against small companies

Reinsurance premium margin development

The formula for the prescribed margin (additive to current rates) from APF 2019-42 is summarized below:

$$= \lambda * (anticipated\ experience\ assumption\ for\ YRT\ premium\ rates)$$

$$= \frac{(i - ii)}{ii} * (current\ YRT\ rate)$$

$i = prudent\ estimate\ mortality\ calculated\ using\ a\ minimum\ of\ 80\%\ credibility\ and\ a\ sufficient\ data\ period\ of\ at\ least\ 10\ years$

$ii = company\ experience\ mortality\ reflecting\ industry\ mortality\ improvement\ beyond\ the\ valuation\ date$

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

1. Companies that have greater than the minimum credibility/SDP will use their own credibility, but companies with lower credibility/SDP will use the minimum

03

FIELD TEST RESULTS AND ANALYSIS

OVERVIEW

Sophisticated modeling, extensive analysis and resource constraints led to low participation in the field test. However, participating companies are broadly distributed as **highlighted below**

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 (see below)

Participation

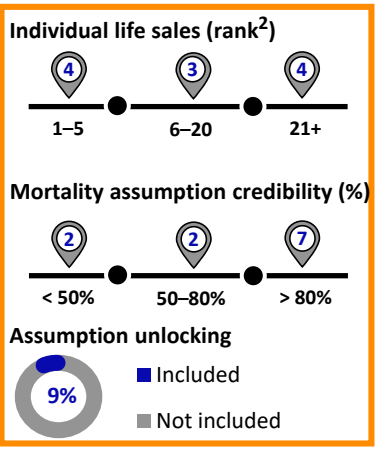
187 entities invited to participate

11 participating entities

0 participating reinsurers

7 submissions for Term[1]

8 submissions for ULSG[1]



Field test scenarios

Baseline
- Interim solution (½ 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%

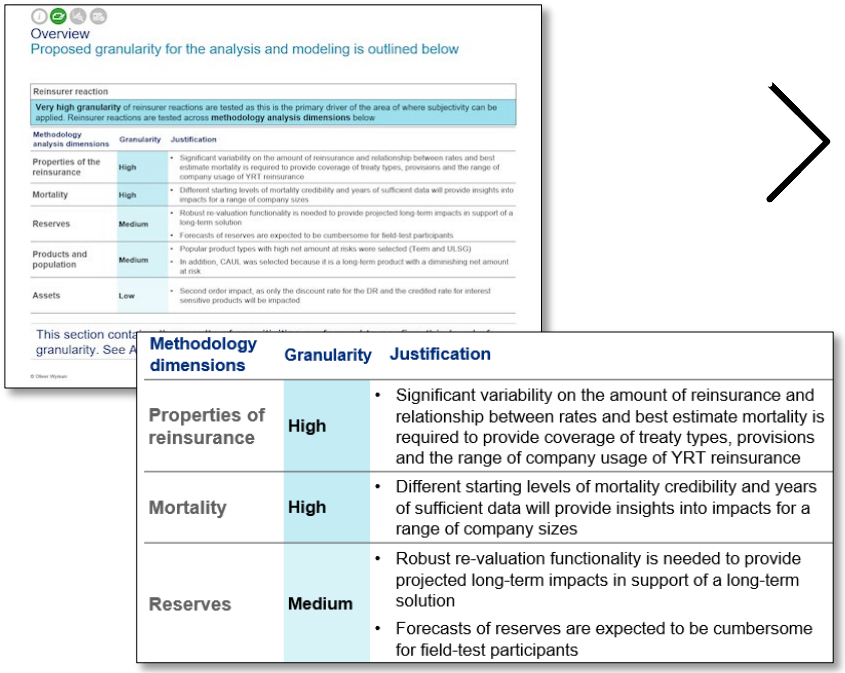
2019-42
- Anticipated experience mortality includes future mortality improvement for a specified number of years:
  - 5, 10, 15 and 20 years

1. One Term submission and one ULSG submission did not include projected reserves
2. Source: 2018 individual life insurance sales

REFINEMENTS TO REPRESENTATIVE PBR MODEL

Field test submissions were used to refine the granularity of certain methodology analysis dimensions in the representative PBR model. The refined model was used to confirm the integrity of submissions and provide insights into the variability in results

Initial model design



Overview

Proposed granularity for the analysis and modeling is outlined below

Reinsurer reaction

Very high granularity of reinsurer reactions are tested as this is the primary driver of the area of where subjectivity can be applied. Reinsurer reactions are tested across **methodology analysis dimensions** below

Methodology analysis dimensions	Granularity	Justification
Properties of the reinsurance	High	• Significant variability on the amount of reinsurance and relationship between rates and best estimate mortality is required to provide coverage of treaty types, provisions and the range of company usage of YRT reinsurance
Mortality	High	• Different starting levels of mortality credibility and years of sufficient data will provide insights into impacts for a range of company sizes
Reserves	Medium	• Robust re-valuation functionality is needed to provide projected long-term impacts in support of a long-term solution • Forecasts of reserves are expected to be cumbersome for field-test participants
Products and population	Medium	• Popular product types with high net amount at risks were selected (Term and ULSG) • In addition, CAUL was selected because it is a long-term product with a diminishing net amount at risk
Assets	Low	• Second order impact, as only the discount rate for the DR and the credited rate for interest sensitive products will be impacted

This section conta
granularity. See A

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Methodology dimensions	Granularity	Justification
Properties of reinsurance	High	• Significant variability on the amount of reinsurance and relationship between rates and best estimate mortality is required to provide coverage of treaty types, provisions and the range of company usage of YRT reinsurance
Mortality	High	• Different starting levels of mortality credibility and years of sufficient data will provide insights into impacts for a range of company sizes
Reserves	Medium	• Robust re-valuation functionality is needed to provide projected long-term impacts in support of a long-term solution • Forecasts of reserves are expected to be cumbersome for field-test participants

01 Properties of reinsurance

Observation: Submissions reflected a range of underlying YRT reinsurance parameters; in particular the portion of business reinsured and the relationship between the current scale of rates and anticipated mortality

Model refinements:

- Normalize reinsurance reserve credits per 1,000 of ceded NAAR
- Adjust YRT rate scales to reflect key relationships observed in participant submissions

02 Mortality

Observation: Submissions reflect a range of anticipated mortality experience assumptions and underlying levels of credibility

Model refinements:

- Model YRT scales based on relationships to anticipated mortality experience observed in field test submissions
- Utilize two credibility scenarios in representative PBR model, reflecting the range in levels of credibility observed in field test submissions

03 Reserves

Observation: A majority of submissions (all but one participant) did not reflect unlocking of mortality up to future valuation dates in their reserve projections

Model refinements:

- Turn off mortality assumption unlocking

REFINEMENTS TO REPRESENTATIVE PBR MODEL

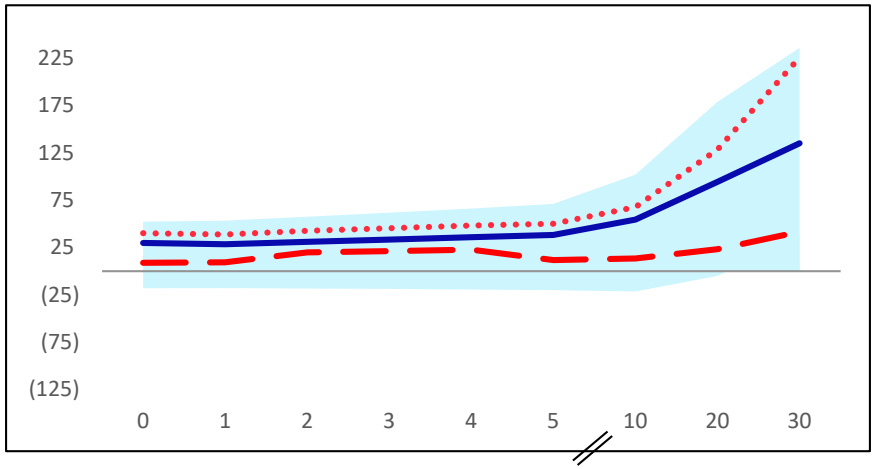
Further details on refinements made to methodology analysis dimensions in the representative PBR model are shown in the following table, along with details on field test submissions used to inform them

Dimension	Field test submissions	Detailed refinements to representative PBR model
Reinsurance (Current YRT scale)	• Utilized own company YRT rate scales • Relationship between current scale of YRT rates and anticipated mortality experience was examined based on information provided in field test submissions	• Developed three separate rate scales for each product based on analysis of field test submissions; the following relationships between the current scale of YRT rates and anticipated mortality experience were developed: – *Baseline YRT scale:* Current scale of YRT rates is in line with anticipated mortality experience excluding FMI – *Lower YRT scale:* Current scale of YRT rates is in line with anticipated mortality experience including FMI (i.e. utilizes declining durational multiples applied to "Baseline YRT scale") – *Higher YRT scale:* Current scale of YRT rates is greater than anticipated mortality experience without FMI
Mortality (Credibility)	• Credibility of underlying mortality assumption ranged between 40–100% (See table on page 14 for further details)	• Developed two credibility scenarios based on analysis of field test responses: – *High Credibility:* 100% credibility (Limited Fluctuation method) – *Low Credibility:* 50% credibility (Limited Fluctuation method)
Reserves (Unlocking)	• Only one participant included unlocking of the mortality assumption (sufficient data period, credibility and improvement) up to future valuation dates	• Turned off dynamic assumption unlocking

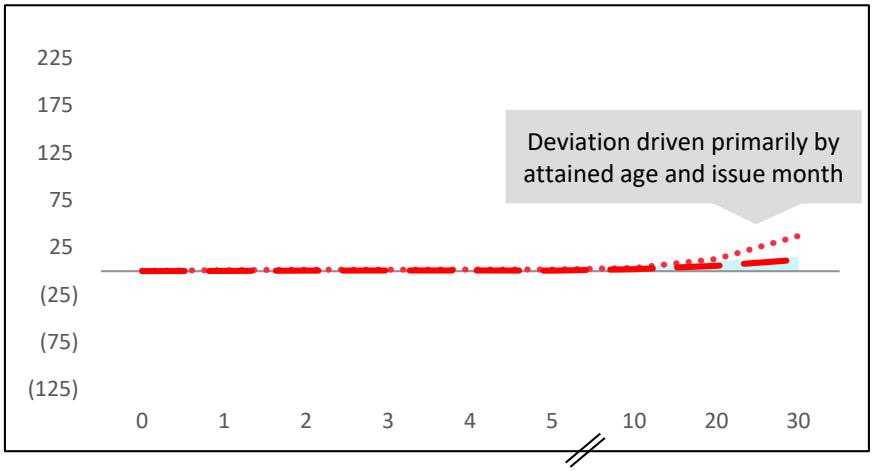
BASELINE | ULSG RESULTS

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

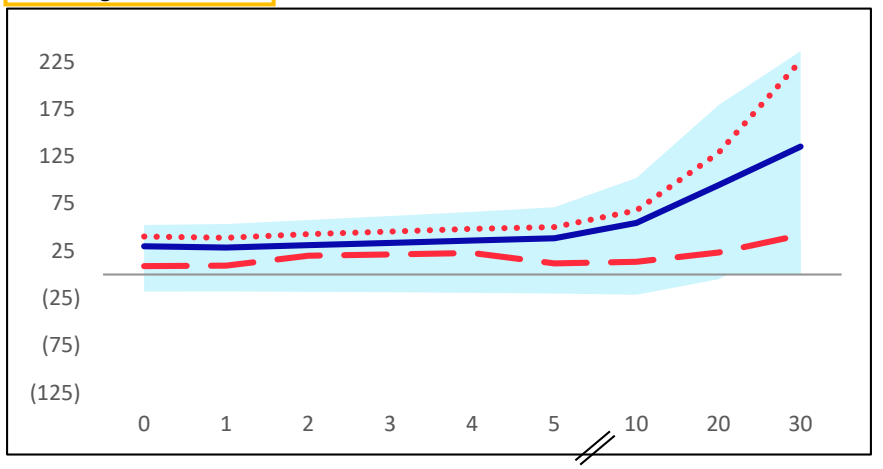
- 25th percentile (Field test)
- 75th percentile (Field test)
- Coverage range (Representative PBR model)
- "Baseline YRT scale" with high credibility

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

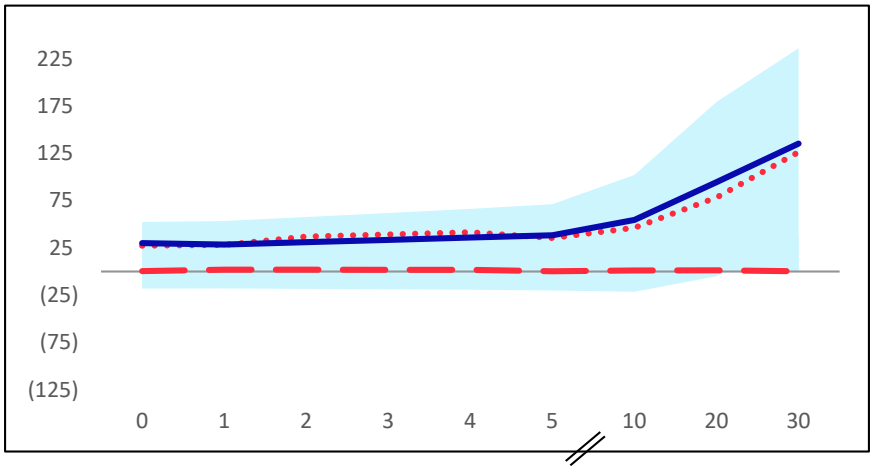
APF 2019-40 (ACTION A) | ULSG RESULTS

Action A produces only a slight shift in the impact of reinsurance on modeled reserves relative to the **baseline**, as it is limited to the inclusion of anticipated counterparty actions such as default, recapture and other terminations

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



3.4 Gross DR – Net DR (per 1000 of projected ceded NAAR)
Action A



25th percentile (Field test)
75th percentile (Field test)
Coverage range (Representative PBR model)
"Baseline YRT scale" with high credibility

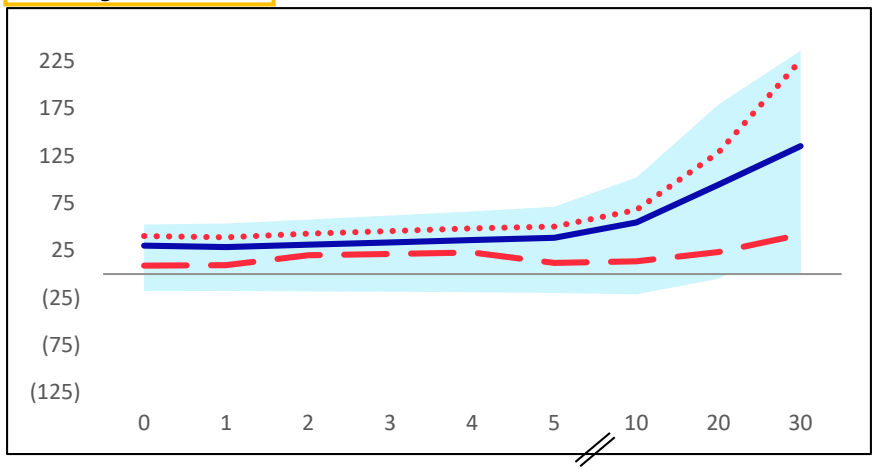
Commentary

- Action A is to model current YRT rates for all projection years; apply the APF only with regards to other counterparty actions such as default, recapture or other terminations
- Range of results is wider compared to other field test scenarios, as there are no adjustments to YRT rates
- Representative PBR model results ("Baseline YRT scale" line and analysis coverage range) assumes no counterparty reactions for Action A and therefore results are the same as the baseline
- Some field test results reflected recapture in later years which reduced reserve credits in later durations

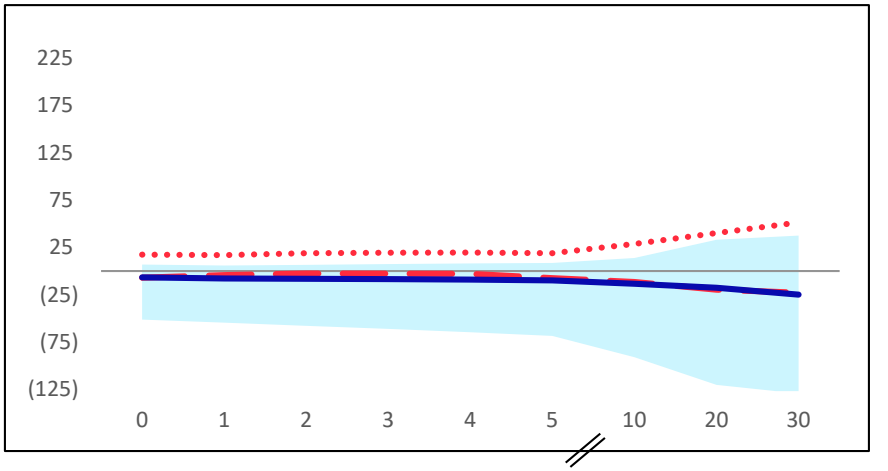
APF 2019-40 (ACTION B) | ULSG RESULTS

The impact of reinsurance on modeled reserves is dependent on the range of participant prudent estimates used in modeling counterparty actions

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



3.6 Gross DR – Net DR (per 1000 of projected ceded NAAR)
Action B



25th percentile (Field test)
75th percentile (Field test)
Coverage range (Representative PBR model)
"Baseline YRT scale" with high credibility

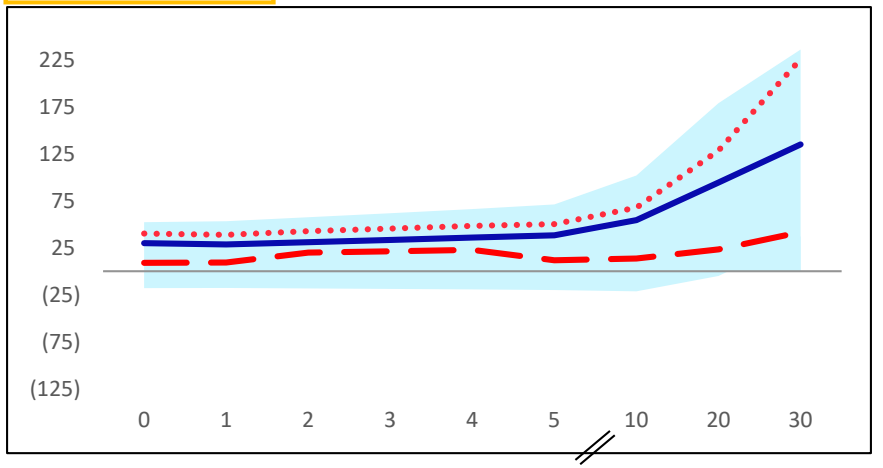
Commentary

- Action B is to model a prudent estimate of all counterparty actions (which includes changes to YRT rates); apply the APF with no additional restrictions or guidance
- The representative PBR model includes a margin to reinsurance premiums equal to the difference between best estimate mortality (including future mortality improvement) and valuation mortality
- Various approaches in field test submissions to incorporate margins to YRT premiums were observed, resulting in higher DR "reserve credits" compared to the representative PBR model. Approaches included grading to an increased premium over time, increasing premiums after a certain duration, and increasing premiums after a loss ratio is triggered

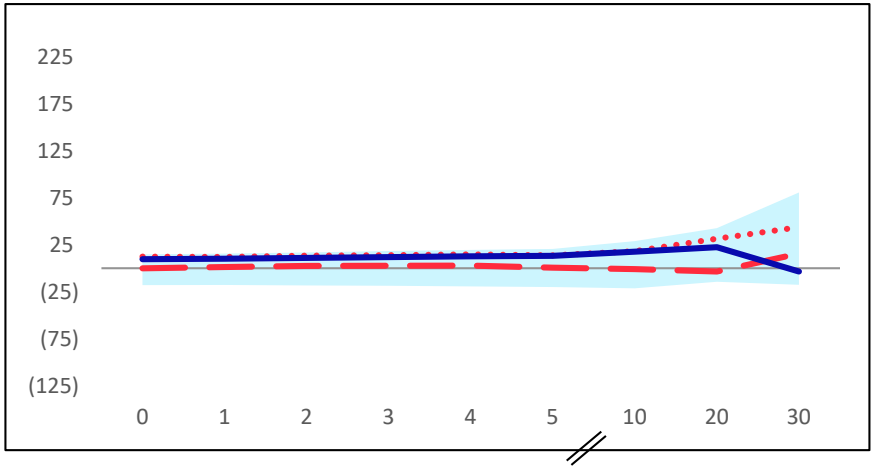
APF 2019-40 (ACTION C) | ULSG RESULTS

Applying a "loss ratio" trigger to determine the timing of reinsurer reaction leads to a narrower range of DR reserve credits relative to the **baseline** but may be inconsistent with contractual terms

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



3.8 Gross DR – Net DR (per 1000 of projected ceded NAAR)
Action C



25th percentile (Field test)
75th percentile (Field test)
Coverage range (Representative PBR model)
"Baseline YRT scale" with high credibility

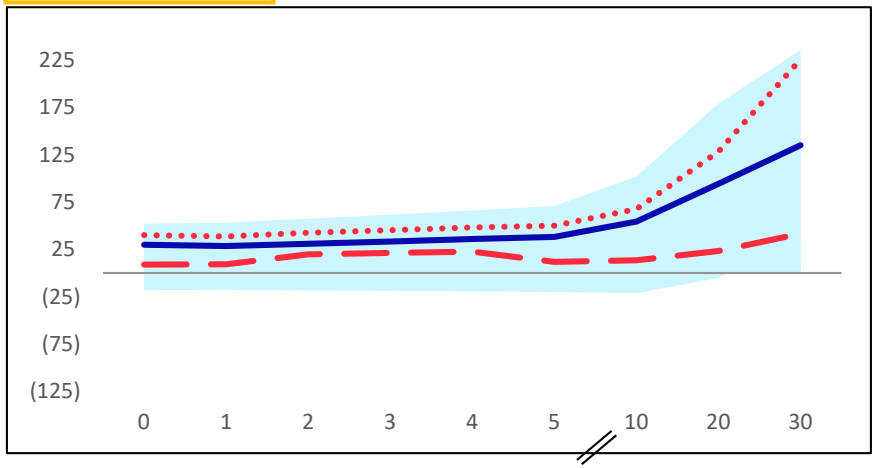
Commentary

- Action C is to model a prudent estimate of rate changes only after reaching a "loss ratio" trigger equal to 115%. The loss ratio is calculated by reviewing cumulative projected reinsurance cash flows from the assuming company perspective
- In the representative PBR model, margins were applied based on the difference between the valuation mortality and best estimate mortality after reaching the loss ratio trigger
- The "loss ratio" trigger is reached earlier in the projection for "Lower YRT scale" (upper bound) compared to "Baseline YRT scale" and the trigger is never reached for the "Higher YRT scale" (lower bound)
- The lower bound of the coverage range is similar compared to the **baseline**, but upper bound is substantially reduced

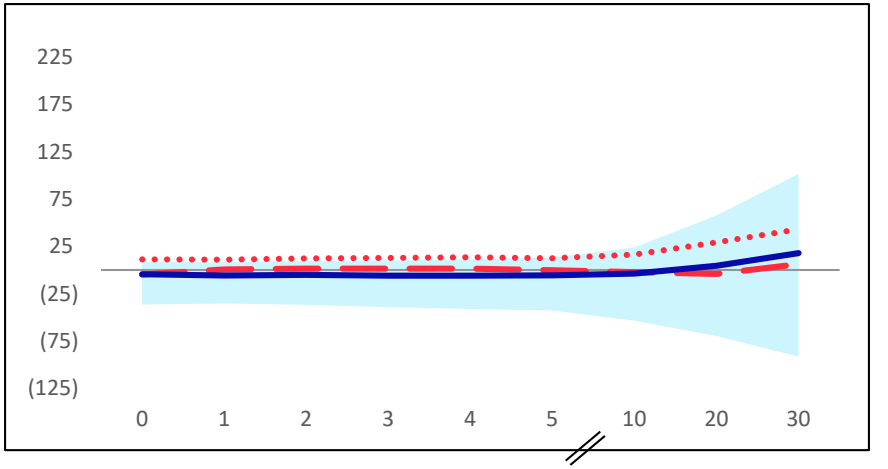
APF 2019-40 (ACTION D) | ULSG RESULTS

Applying a "consecutive losses" approach to determine the timing of reinsurer reaction reduces variability in the impact that reinsurance has on modeled reserves relative to the **baseline**, albeit to a lesser extent than the application of a "loss ratio" trigger

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



3.10 Gross DR – Net DR (per 1000 of projected ceded NAAR)
Action D



25th percentile (Field test)
75th percentile (Field test)
Coverage range (Representative PBR model)
"Baseline YRT scale" with high credibility

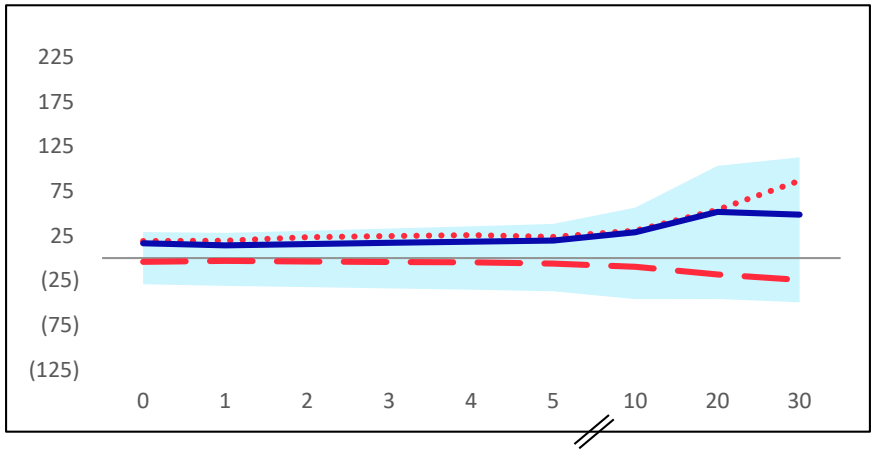
Commentary

- Action D is to model prudent estimate of rate changes only after reaching "consecutive years of loss" trigger equal to 5 years. The Losses are calculated by reviewing annual projected reinsurance cash flows from the assuming company perspective.
- Similar to Action C, application of prudent estimates are driven by the relationship between YRT rates and valuation mortality during the projection
- Prudent estimate margins are not applied ubiquitously, therefore the results are less dependent on the relationship of current YRT rates and valuation mortality compared to other solutions

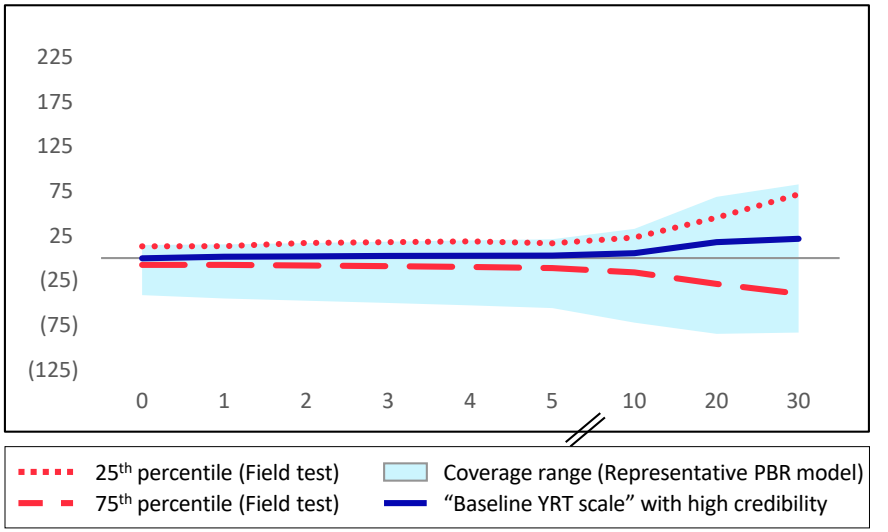
APF 2019-41 | ULSG RESULTS

Introducing future mortality improvement to the projected claims reduces reinsurance gains, given the current scale of reinsurance premiums is held constant

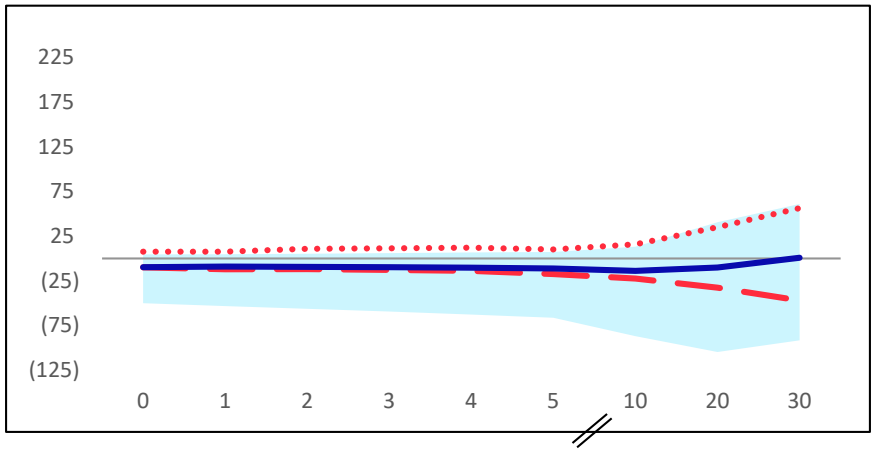
3.11 Gross DR – Net DR (per 1000 of projected ceded NAAR)
0.0% FMI



3.12 Gross DR – Net DR (per 1000 of projected ceded NAAR)
0.5% FMI



3.13 Gross DR – Net DR (per 1000 of projected ceded NAAR)
1.0% FMI



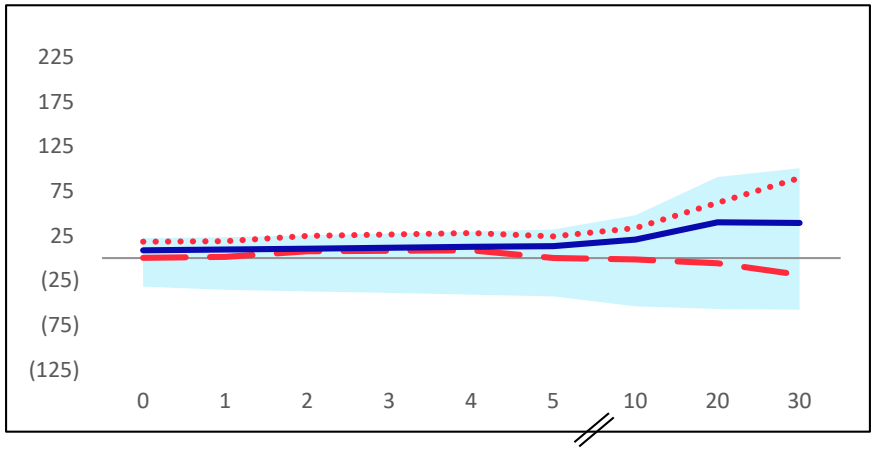
Commentary

- Variation in YRT rate scales and credibility impact results in a similar manner
- Mortality improvement is applied for 15 years
- 50bps of incremental mortality improvement reduces the DR "reserve credit" to close to zero in initial projection years for the "Baseline YRT scale"
- The representative PBR model included margins in addition to YRT premiums as a modeling simplification rather than a pure interpretation of the APF

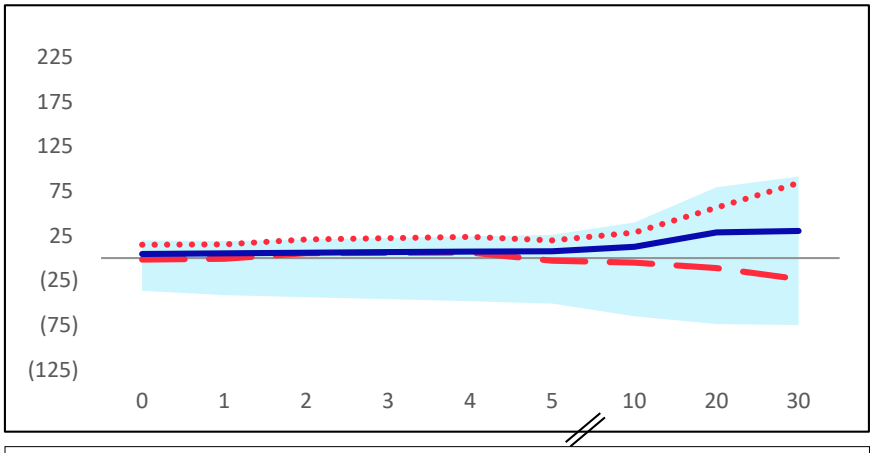
APF 2019-42 | ULSG RESULTS

Similar to APF 2019-41, increasing the level of future mortality improvement decreases reserve credits

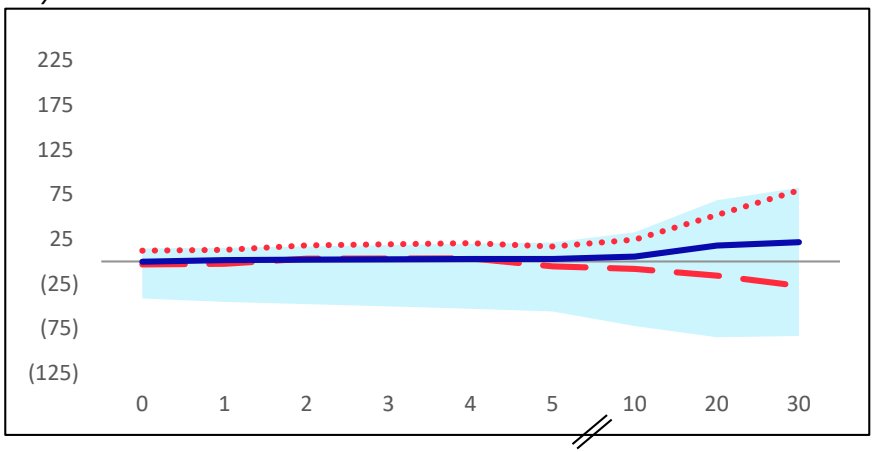
3.14 Gross DR – Net DR (per 1000 of projected ceded NAAR)
5 years FMI



3.15 Gross DR – Net DR (per 1000 of projected ceded NAAR)
10 years FMI



3.16 Gross DR – Net DR (per 1000 of projected ceded NAAR)
15 years FMI



25th percentile (Field test)
75th percentile (Field test)
Coverage range (Representative PBR model)
"Baseline YRT scale" with high credibility

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% (relative to DR "reserve credit" with no future mortality improvement)
- When a margin is defined as the relationship between anticipated experience and best estimate mortality, "Higher YRT rate scales" lead to negative reserve credits

KEY TAKEAWAYS

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

Takeaway		Details
1	**Reinsurer reaction scenarios can produce reserve credits in excess of ½ Cx**	• ½ Cx represents the cost of reinsurance that corresponds to the period for which the reinsurance premium has been paid, but not yet earned by the reinsurer, with no provision for reinsurance beyond the paid to date • Full reinsurer reaction scenarios tested allow for – Differences between evolution of mortality and reinsurance premium payment dates, contractual provisions around return of unearned reinsurance premium and other mechanical differences due to VM-20 requirements (e.g., differences in starting assets and resulting earned rate)
2	**It is important to look at long-term projections of reserves when evaluating the impact of reinsurance modeling approaches**	• The level of margin in mortality as compared to best estimate changes at future valuation dates, due to unlocking of mortality improvement and extending the sufficient data period • As the business ages, higher mortality and shorter projection horizons will change the impact of reinsurance on reserves at future valuation dates
3	**Differences in reserve credits and assumed reserves under PBR are likely to occur for multiple reasons**	• Reserves between direct writers and reinsurers will not be mirrored, primarily due to differences in valuation assumptions (including changes to non-guaranteed YRT premiums) • Other drivers include the mechanics of computing final PBR reserves, and reinsurers aggregating results across multiple treaties and multiple cedants • Differences between ceded and assumed reserves are reduced when adjustments to YRT premiums are based on the level of mortality margin specific to each party
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 – Triggers based on measures of loss to the reinsurer (i.e. “Loss ratio” and “Consecutive years of loss” trigger) serve to align projected reinsurance premiums with mortality, reducing the degree of variability in impacts of reinsurance on modeled reserves across companies – When reinsurance premium margins are based on the level of mortality margin, the application of future mortality improvement to anticipated experience increases the reinsurance premium margin and decreases reinsurance reserve credits – Adjusting the level of risk sharing through triggers or mortality improvement allow potential for deviation from company practice and/or contractual agreements

04

INTERPRETATION SURVEY RESULTS AND ADDITIONAL ANALYSIS

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 APFs 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

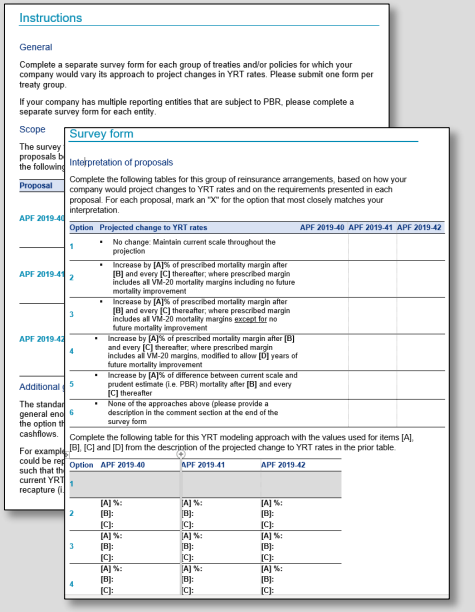
- Several options were provided for projecting changes to YRT rates. Participants were asked to select the option that best fits their intended approach. Options included:
  - No change to YRT premiums
  - Increasing rates by a specified amount of the prescribed mortality margin after a specified period of time and every X years thereafter, with and without future mortality improvement
  - Increasing rates by the difference between current scale and prudent estimate (i.e. PBR) mortality, with specified parameters
- Collected separate responses for different treatment by treaty type

Survey usage

- We used the results of the survey to develop criteria to compare the APFs
  - Refer to slide 41 for additional detail on comparison criteria

51 RESPONSES

from legal entities spanning **36 separate direct writers and reinsurers**



Instructions

General

Complete a separate survey form for each group of treaties and/or policies for which your company would vary its approach to project changes in YRT rates. Please submit one form per treaty group.

If your company has multiple reporting entities that are subject to PBR, please complete a separate survey form for each entity.

Scope

Survey form

Interpretation of proposals

Complete the following tables for this group of reinsurance arrangements, based on how your company would project changes to YRT rates and on the requirements presented in each proposal. For each proposal, mark an "X" for the option that most closely matches your interpretation.

Option	Projected change to YRT rates	APF 2019-40	APF 2019-41	APF 2019-42
1	• No change: Maintain current scale throughout the projection			
2	• Increase by [A]% of prescribed mortality margin after [B] and every [C] thereafter; where prescribed margin includes all VM-20 mortality margins including no future mortality improvement			
3	• Increase by [A]% of prescribed mortality margin after [B] and every [C] thereafter; where prescribed margin includes all VM-20 mortality margins except for no future mortality improvement			
4	• Increase by [A]% of prescribed mortality margin after [B] and every [C] thereafter; where prescribed margin includes all VM-20 margins, modified to allow [D] years of future mortality improvement			
5	• Increase by [A]% of difference between current scale and prudent estimate (i.e. PBR) mortality after [B] and every [C] thereafter			
6	• None of the approaches above (please provide a description in the comment section at the end of the survey form			

Complete the following table for this YRT modeling approach with the values used for items [A], [B], [C] and [D] from the description of the projected change to YRT rates in the prior table.

Option	APF 2019.40	APF 2019.41	APF 2019-42
1			
2	[A] %: [B]: [C]:	[A] %: [B]: [C]:	[A] %: [B]: [C]:
3	[A] %: [B]: [C]:	[A] %: [B]: [C]:	[A] %: [B]: [C]:
4	[A] %: [B]: [C]:	[A] %: [B]: [C]:	[A] %: [B]: [C]:

Survey covered approximately 55% of the industry measured by total face amount on new business

SUMMARY OF OPTIONS

For each group of reinsurance agreements, participants were asked to provide standardized responses on how YRT premium rates would be adjusted based on language presented in each proposal

Survey option	Reinsurer reaction	Assumption for projected YRT premium rate increases	Parameters requested
1	**None**	• Maintain current scale throughout the projection	• N/A
2 3 4	**Reactive**	• Increase by percent of prescribed mortality margin where the prescribed mortality margin is defined as: – Prescribed margins on company and industry mortality – Grading from company to industry experience, and – Future mortality improvement ("FMI"), incorporated as follows: - Including implicit FMI margin (option 2) - Excluding implicit FMI margin (option 3) - Including implicit FMI margin after a specified number of years by applying improvement for an initial period and then no improvement beyond (option 4)	• Frequency of rate changes • Initial trigger • Mortality improvement
5	**Break-even**	• Increase by percent of difference between PBR mortality and current scale of YRT rates	• Frequency of rate changes • Initial trigger
6	**Other**	• Modeling approach not adequately captured by other choices	• Open-ended response

APF 2019-40 | SURVEY RESULTS

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

Modeling approaches illustrated

- No change to YRT premiums

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**

SURVEY COMMENTARY

Range of responses

- APF with largest variance across survey options
- Largest percentage selecting "Other"
  - Examples: recapture at certain periods, utilize a loss trigger to determine when rates are raised, grading into a prudent estimate rate over a period of time

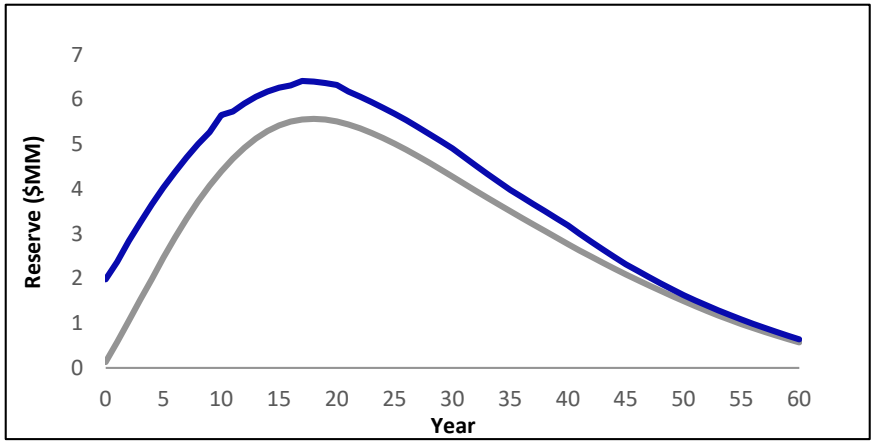
Complexity

- Responses ranged from straightforward (reactive or break-even) to complex
- Complex responses were often associated with None and Other and tended to reflect modeling solutions used for other applications or adjustments to cash flows other than YRT premiums

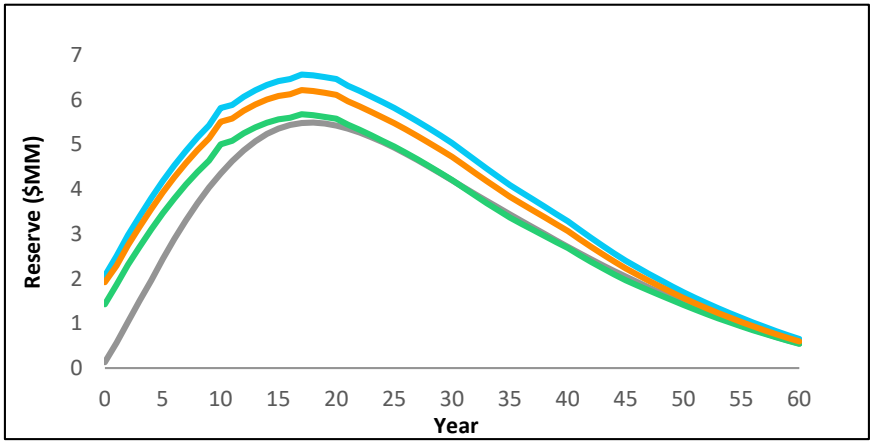
APF 2019-40 | ULSG

A fully reactive reinsurance margin produces the largest post-reinsurance DR relative to other options

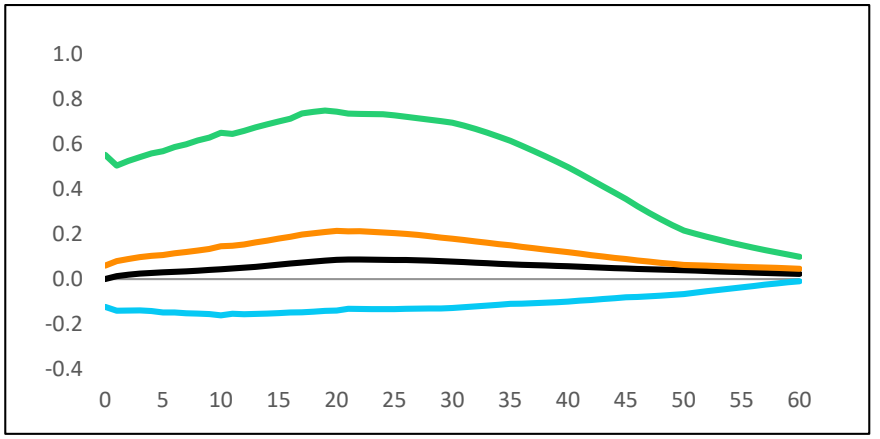
4.1 Pre-reinsurance DR (projected reserve amount)
High credibility



4.2 Post-reinsurance DR (projected reserve amount)
"Baseline YRT scale" and high credibility



4.3 Pre-reinsurance DR – Post-reinsurance DR (projected reserve amount)
"Baseline YRT scale" and high credibility

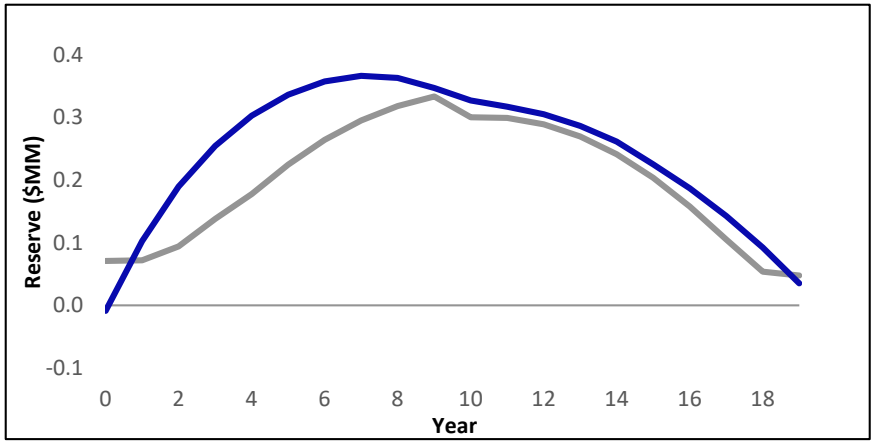


- Pre-reinsurance DR
- NPR (gross and net)
- No change in rates (option 1)
- Fully reactive after 1 year (option 2)
- Break even after 1 year (option 5)
- 1/2 Cx

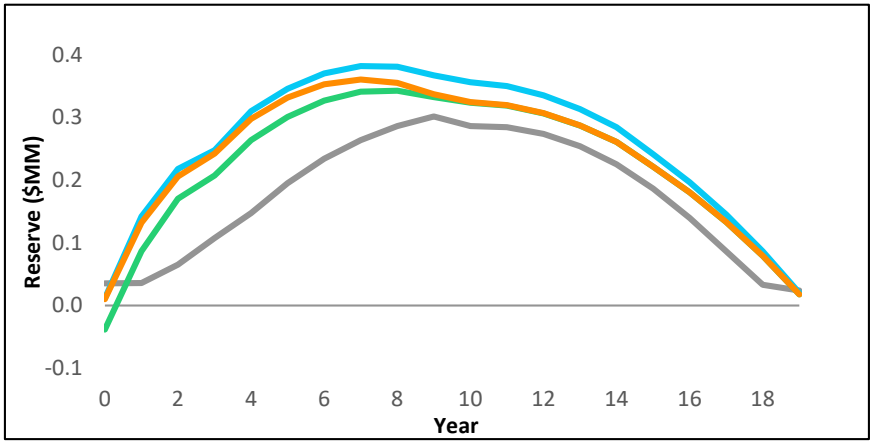
APF 2019-40 | TERM

No change in rates scenario produces the highest modeled "reserve credit" for Term but is smaller than ½ cx for most valuation dates due to a higher baseline YRT scale than ULSG

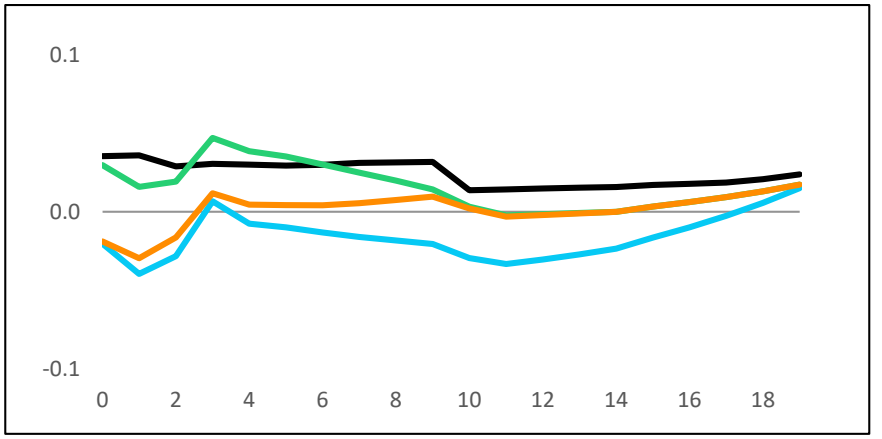
4.4 Pre-reinsurance DR (projected reserve amount)
High credibility



4.5 Post-reinsurance DR (projected reserve amount)
"Baseline YRT scale" and high credibility



4.6 Pre-reinsurance DR – Post-reinsurance DR (projected reserve amount)
"Baseline YRT scale" and high credibility



- Pre-reinsurance DR
- NPR (gross and net)
- No change in rates (option 1)
- Fully reactive after 1 year (option 2)
- Break even after 1 year (option 5)
- 1/2 Cx

APF 2019-41 | SURVEY RESULTS

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

Modeling approaches illustrated

- Reinsurance cash flows (premiums and claims) projected separately using best estimate mortality including future mortality improvement

Increase YRT premiums by

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

SURVEY COMMENTARY

Range of responses

- Most responses were either None or Break-even
- These responses generally included a comment regarding intent to adjust claims in lieu of premiums

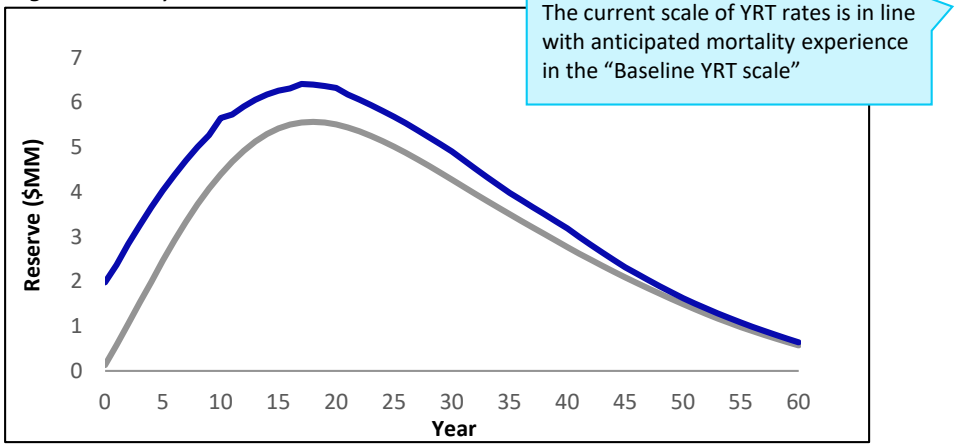
Complexity

- Many responses indicated the need for multiple models or model runs to apply this APF to reflect best estimate mortality for reinsurance cash flows and VM-20 mortality for all other cash flows
- Some respondents expressed concern with consistency between using one projection using prudent estimate assumptions and a separate one using best estimate assumptions

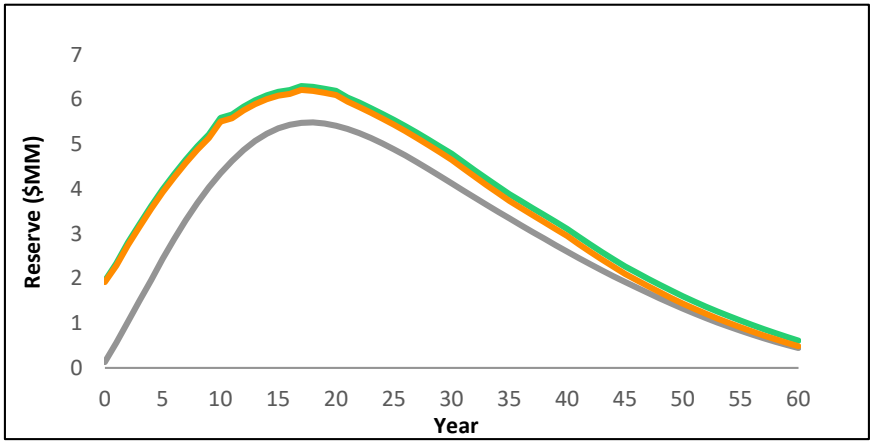
APF 2019-41 | ULSG

The relationship between YRT rates and anticipated mortality minimizes the impact of interpretation differences. This is because Option 1 uses anticipated experience assumptions, and reinsurance premiums are **closely aligned with benefits** (nearly break-even) and reinsurance is break-even under Option 5.

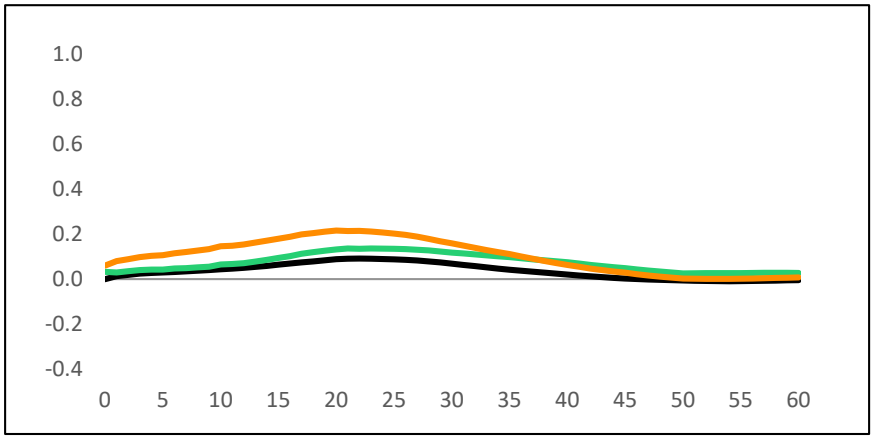
4.7 Pre-reinsurance DR (projected reserve amount)
High credibility



4.8 Post-reinsurance DR (projected reserve amount)
"Baseline YRT scale" and high credibility



4.9 Pre-reinsurance DR – Post-reinsurance DR (projected reserve amount)
"Baseline YRT scale" and high credibility

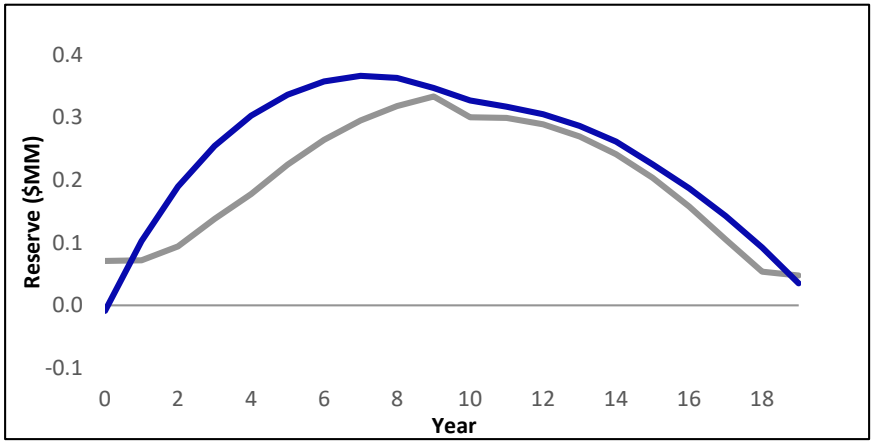


- Pre-reinsurance DR
- NPR (gross and net)
- No change in rates (option 1)
- Break even after 1 year (option 5)
- 1/2 Cx

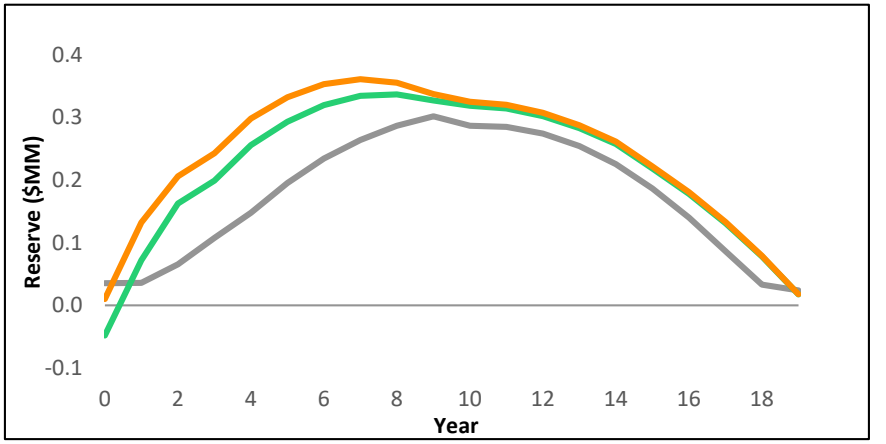
APF 2019-41 | TERM

Similar to ULSG, the no change in rate scenario produces the largest "reserve credit", but it is considerably smaller than for ULSG and ½ Cx

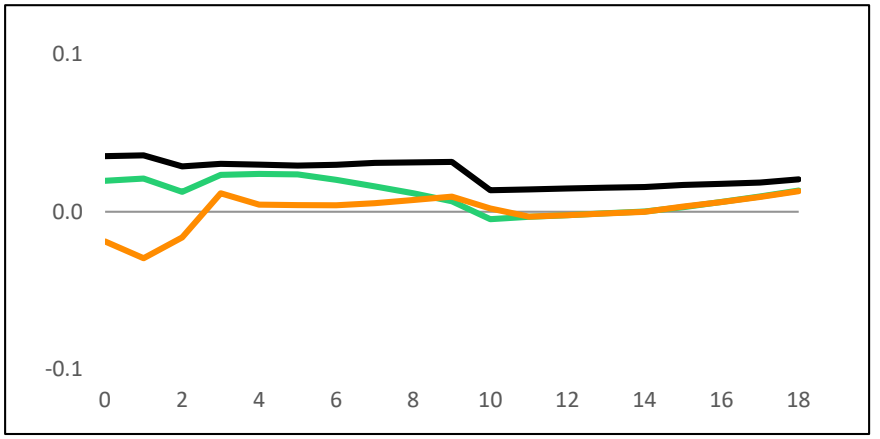
4.10 Pre-reinsurance DR (projected reserve amount)
High credibility



4.11 Post-reinsurance DR (projected reserve amount)
"Baseline YRT scale" and high credibility



4.12 Pre-reinsurance DR – Post-reinsurance DR (projected reserve amount)
"Baseline YRT scale" and high credibility



- Pre-reinsurance DR
- NPR (gross and net)
- No change in rates (option 1)
- Break even after 1 year (option 5)
- 1/2 Cx

APF 2019-42 | SURVEY RESULTS

Reinsurer reaction	
None	1%
Reactive	**64%**
Break-even	**29%**
Other	6%

Modeling approaches illustrated

Increase YRT premiums by

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

- 100% of prescribed mortality margin after 1 year and **every year thereafter**
- Including **10 years of future mortality improvement** in implicit margin

Increase YRT premiums by

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

SURVEY COMMENTARY

Range of responses

- 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

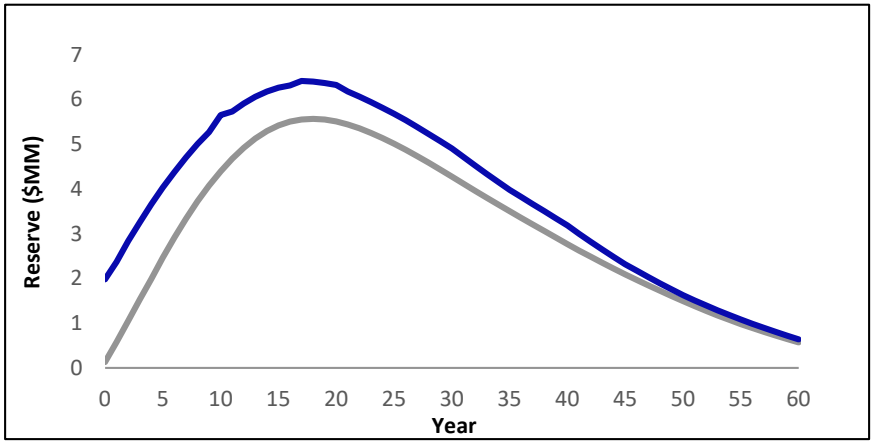
Complexity

- Some responses pointed out that the prescribed solution will require a company to develop multiple sets of mortality assumptions to determine the prescribed margin
- Given that over 35% of responses were something other than a reactive margin, the prescribed margin formula may be difficult to interpret and understand

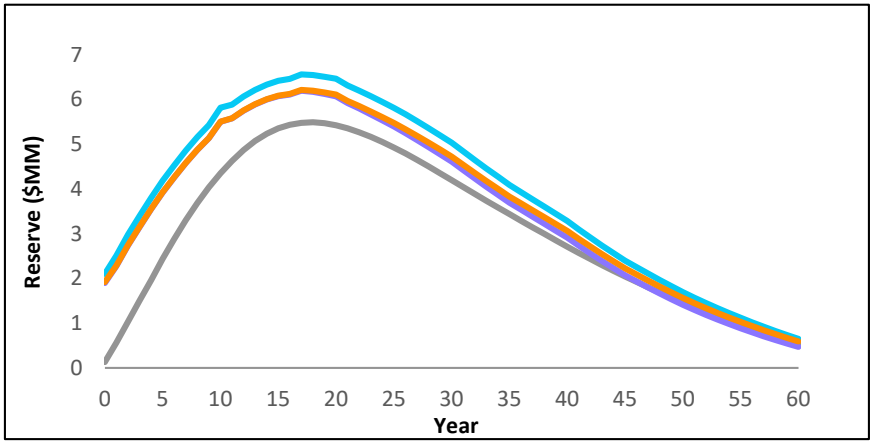
APF 2019-42 | ULSG

Reducing the amount of implicit margin due to **future mortality improvement** in the development of the prescribed mortality margin decreases the net DR and increases the "reserve credit"

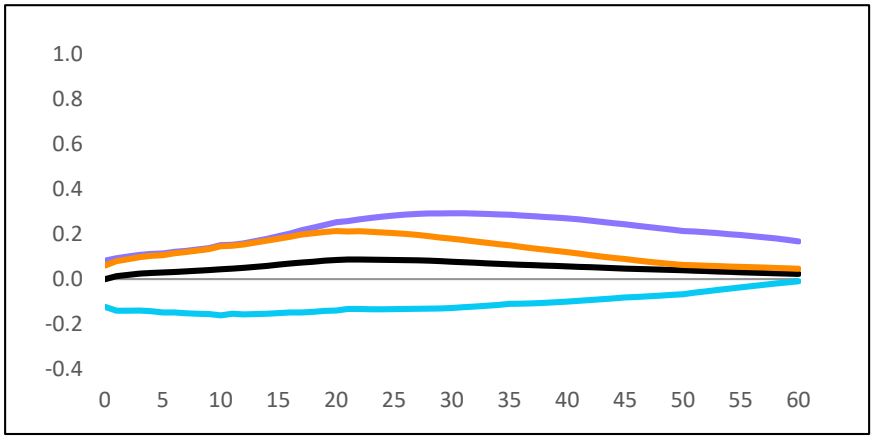
4.13 Pre-reinsurance DR (projected reserve amount)
High credibility



4.14 Post-reinsurance DR (projected reserve amount)
"Baseline YRT scale" and high credibility



4.15 Pre-reinsurance DR – Post-reinsurance DR (projected reserve amount)
"Baseline YRT scale" and high credibility

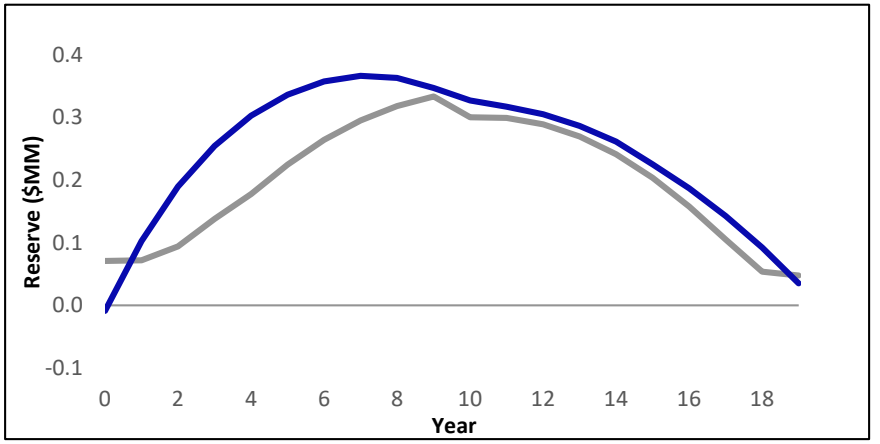


- Pre-reinsurance DR
- NPR (gross and net)
- Fully reactive after 1 year (option 2)
- Fully reactive after 1 year, including 10 yr MI (option 4)
- Break even after 1 year (option 5)
- 1/2 Cx

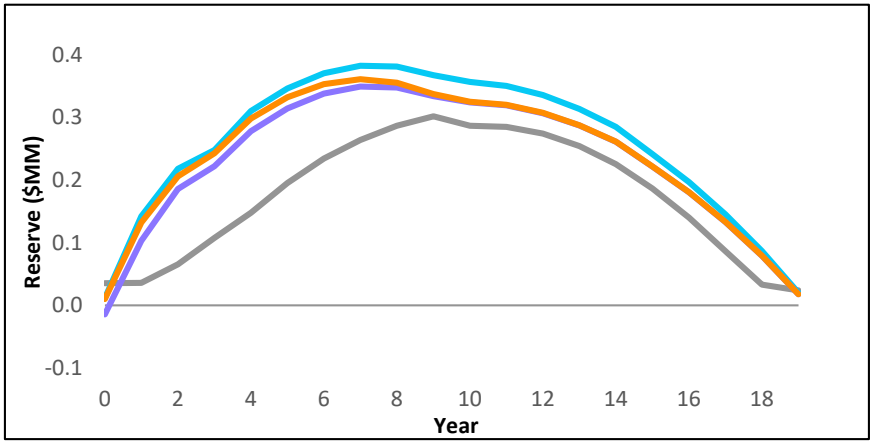
APF 2019-42 | TERM

Reducing the amount of implicit margin due to **future mortality improvement** in the development of the prescribed mortality margin decreases the net DR and increases the "reserve credit"

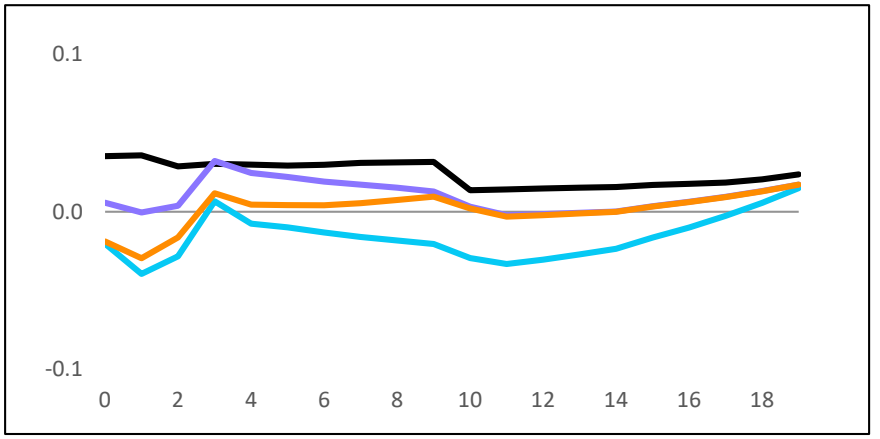
4.16 Pre-reinsurance DR (projected reserve amount)
High credibility



4.17 Post-reinsurance DR (projected reserve amount)
"Baseline YRT scale" and high credibility



4.18 Pre-reinsurance DR – Post-reinsurance DR (projected reserve amount)
"Baseline YRT scale" and high credibility

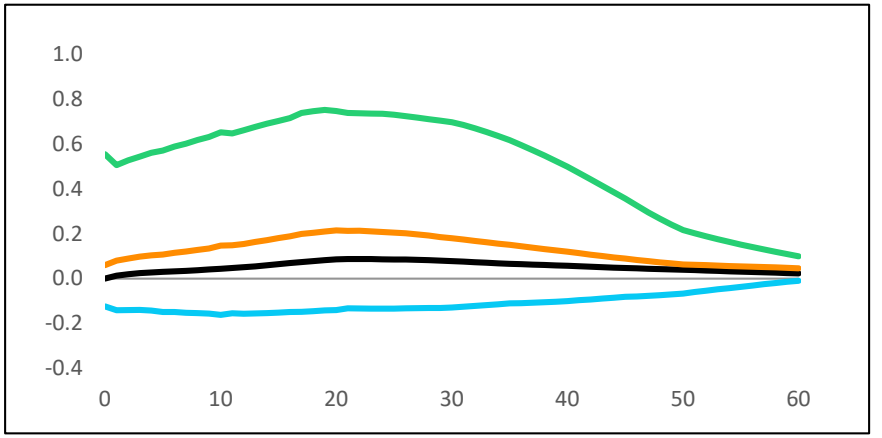


- Pre-reinsurance DR
- NPR (gross and net)
- Fully reactive after 1 year (option 2)
- Fully reactive after 1 year, including 10 yr MI (option 4)
- Break even after 1 year (option 5)
- 1/2 Cx

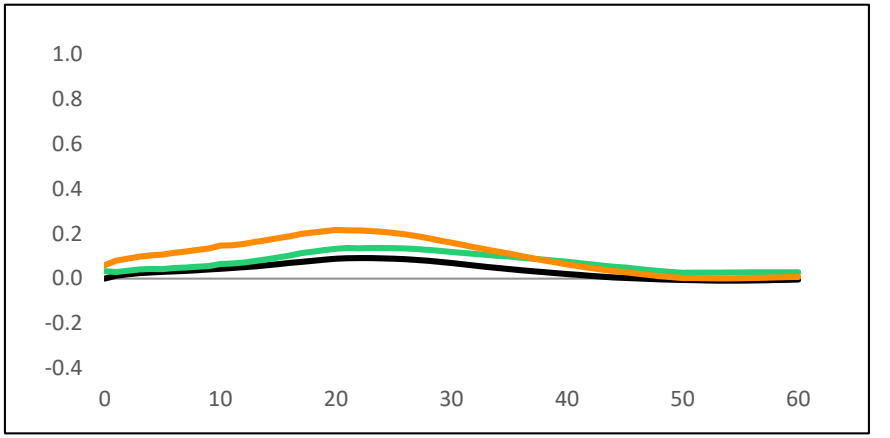
IMPACT ON DR RELATIVE TO INTERIM SOLUTION (ULSG)

DR "reserve credit" from preceding slides with all APFs displayed on the same page

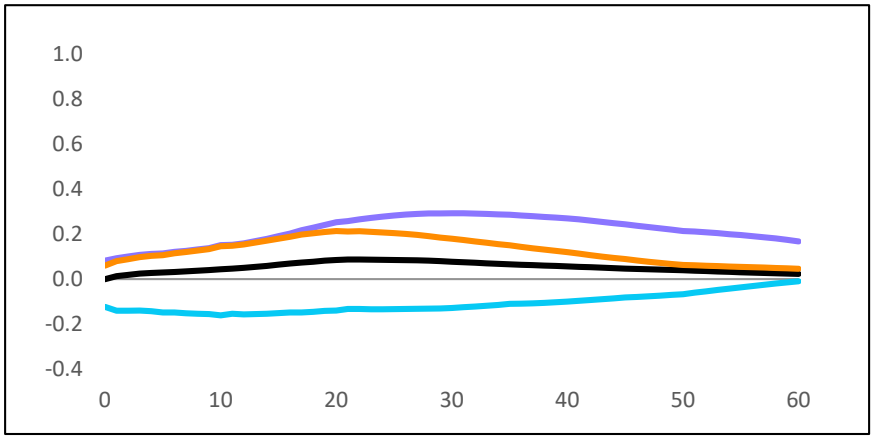
4.19 Pre-reinsurance DR – Post-reinsurance DR (projected reserve amount)
2019-40 "Baseline YRT scale" and high credibility



4.20 Pre-reinsurance DR – Post-reinsurance DR (projected reserve amount)
2019-41 "Baseline YRT scale" and high credibility



4.21 Pre-reinsurance DR – Post-reinsurance DR (projected reserve amount)
2019-42 "Baseline YRT scale" and high credibility

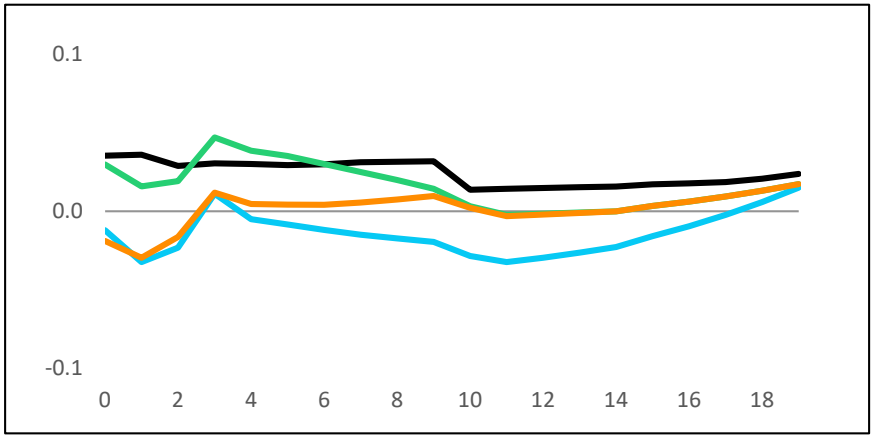


- No change in rates (option 1)
- Fully reactive after 1 year (option 2)
- Fully reactive after 1 year, including 10 yr MI (option 4)
- Break even after 1 year (option 5)
- 1/2 Cx

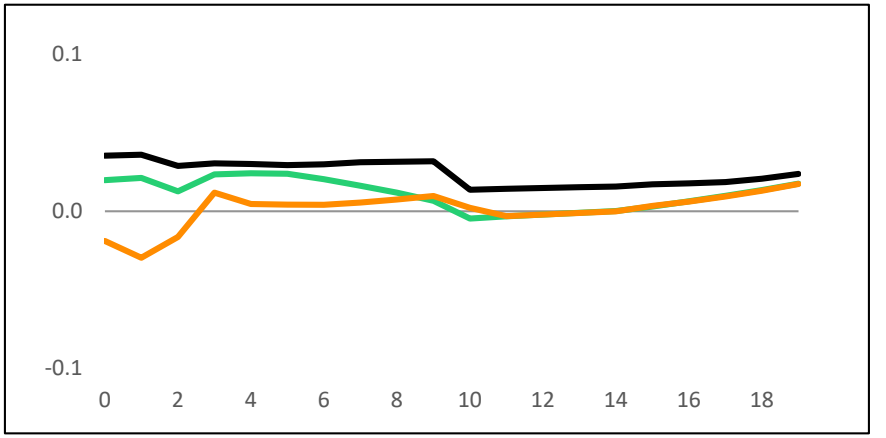
IMPACT ON DR RELATIVE TO INTERIM SOLUTION (TERM)

DR "reserve credit" from preceding slides with all APFs displayed on the same page

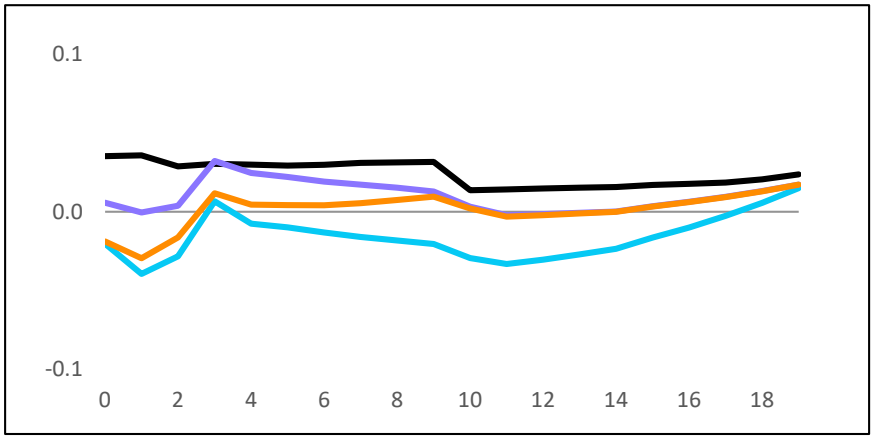
4.22 Pre-reinsurance DR – Post-reinsurance DR
2019-40 "Baseline YRT scale" and high credibility



4.23 Pre-reinsurance DR – Post-reinsurance DR
2019-41 "Baseline YRT scale" and high credibility



4.24 Pre-reinsurance DR – Post-reinsurance DR
2019-42 "Baseline YRT scale" and high credibility



- No change in rates (option 1)
- Fully reactive after 1 year (option 2)
- Fully reactive after 1 year, including 10 yr MI (option 4)
- Break even after 1 year (option 5)
- 1/2 Cx

KEY TAKEAWAYS

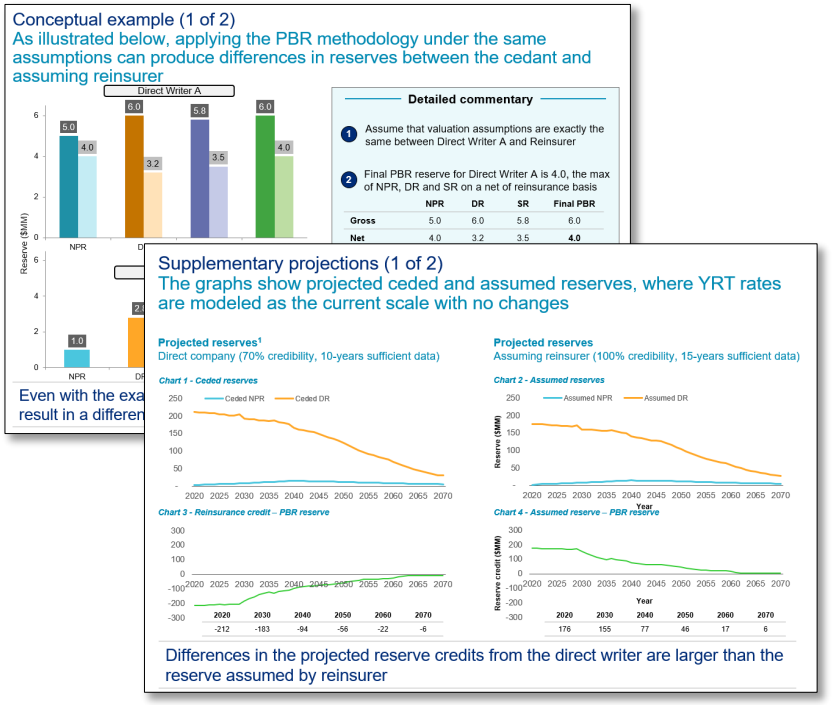
Additional key takeaways from analysis of range of interpretation survey results **are highlighted** below in addition to those previously established

	Takeaway	Details
1	**Reinsurer reaction scenarios can produce reserve credits in excess of ½ Cx**	• ½ Cx represents the cost of reinsurance that corresponds to the period for which the reinsurance premium has been paid, but not yet earned by the reinsurer, with no provision for reinsurance beyond the paid to date • Full reinsurer reaction scenarios tested allow for – Differences between evolution of mortality and reinsurance premium payment dates, contractual provisions around return of unearned reinsurance premium and other mechanical differences due to VM-20 requirements (e.g., differences in starting assets and resulting earned rate)
2	**It is important to look at long-term projections of reserves when evaluating the impact of reinsurance modeling approaches**	• The level of margin in mortality as compared to best estimate changes at future valuation dates, due to unlocking of mortality improvement and extending the sufficient data period • As the business ages, higher mortality and shorter projection horizons will change the impact of reinsurance on reserves at future valuation dates
3	**Differences in reserve credits and assumed reserves under PBR are likely to occur for multiple reasons**	• Reserves between direct writers and reinsurers will not be mirrored, primarily due to differences in valuation assumptions (including changes to non-guaranteed YRT premiums) • Other drivers include the mechanics of computing final PBR reserves, and reinsurers aggregating results across multiple treaties and multiple cedants • Differences between ceded and assumed reserves are reduced when adjustments to YRT premiums are based on the level of mortality margin specific to each party
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.

EVALUATION OF TOTAL IMPACT ON DR (CEDED AND ASSUMED)

Most common responses and responses resulting in the largest reduction in aggregate DR from reinsurers and direct writers were compared, removing impact of ancillary differences between reserve credits and assumed reserves driven by assumptions for modeled reserves and PBR methodology

Drivers of differences in reserve credits and assumed reserves



01 Assumptions

Observation: Differences in assumptions between cedant and assuming perspective for modeled reserves are the primary driver of differences between reserve credits and assumed reserves

Analytical adjustment: Use consistent assumptions for both perspectives to isolate the impact of interpretation in regards to the treatment of non-guaranteed reinsurance

02 PBR calculation methodology

Observation from prior analysis: Differences in assumed reserve compared to reserve credit can be driven by PBR methodology and asymmetries caused by the formulaic floor on reserves (i.e. NPR)

Analytical adjustment: Analysis focused on the impact of reinsurance on the DR to remove potential impacts driven by asymmetries caused by the NPR floor

Assumed reserves in the following slides are developed using the ceded pre and post reinsurance DR, an approach which captures reinsurance cash flows in determining the assumed reserve with some simplification (i.e., excludes reinsurers expenses and uses ceding company asset assumptions)

APF 2019-40 | CEDED AND ASSUMED

Combined impact to DR from both ceding and assuming companies for the most common surveyed reactions is positive; combinations of other surveyed reactions could lead to a reduction in total DR

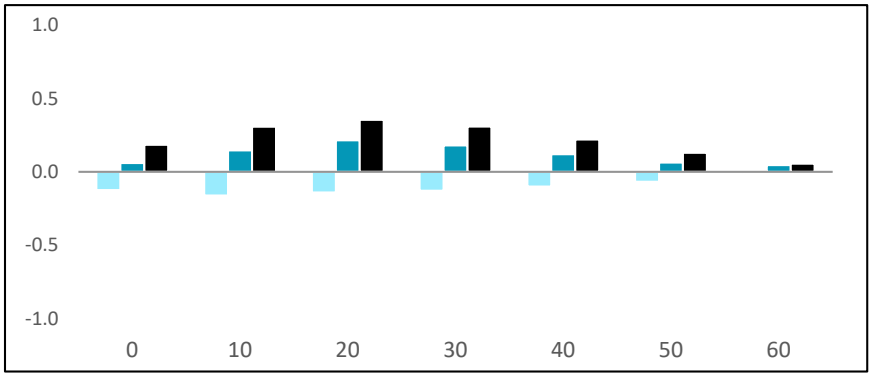
Reinsurer reaction – Ceding company	
None	18%
Reactive	**42%**
Break-even	22%
Other	17%

Reinsurer reaction – Assuming company	
None	20%
Reactive	20%
Break-even	**60%**
Other	0%

Commentary

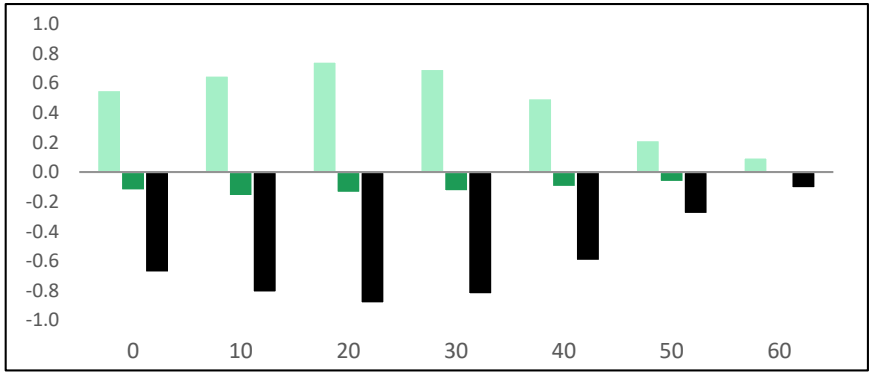
- Differences in modeling approach result in differences between reserve credit and assumed reserve
- Some assuming companies noted that they may raise their rates to more than 100% of difference between current YRT premiums and VM-20 mortality to cover expenses and contribute to profit margin, which decreases the assuming reserves displayed in 4.25 and increases the likelihood that the NPR will dominate (i.e. ½ Cx)
- Largest reduction to aggregate reserves based on responses is driven by direct writers applying no prudence to YRT premiums

4.25 – Impact to total projected deterministic reserves (ULSG)
Most common responses



Most common responses (ceded credit, assumed reserve)
Largest reduction to DR (ceded credit, assumed reserve)
Impact of reinsurance on DR combined (assumed – credit)

4.26 – Impact to total projected deterministic reserves (ULSG)
Largest reduction to DR



APF 2019-41 | CEDED AND ASSUMED

Impact of reinsurance to combined DR based on most common responses is smaller than APF 2019-40

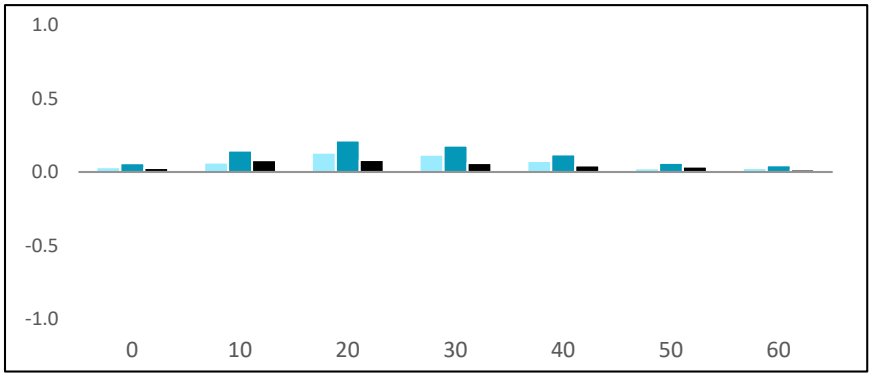
Reinsurer reaction – Ceding insurer	
None	**59%**
Reactive	19%
Break-even	15%
Other	7%

Reinsurer reaction – Assuming reinsurer	
None	20%
Reactive	0%
Break-even	**40%**
Other	40%

Commentary

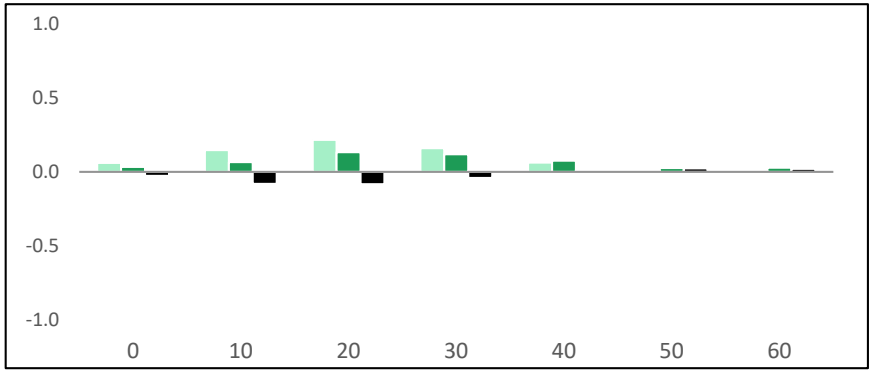
- "None" reaction refers to no adjustments to premium, underlying claims are adjusted to reflect anticipated experience
- Reinsurers had similar comments as direct companies regarding the need to model reinsurance cash flows separately to properly reflect the guidance in the APF
- Largest reduction to DR is smaller than APF 2019-40 since responses did not reflect "no adjustment"
- Differences in modeling approach result in differences between reserve credit and assumed reserve

4.27 – Impact to total projected deterministic reserves (ULSG)
Most common responses



Most common responses (ceded credit, assumed reserve)
Largest reduction to DR (ceded credit, assumed reserve)
Impact of reinsurance on DR combined (assumed – credit)

4.28 – Impact to total projected deterministic reserves (ULSG)
Largest reduction to DR



APF 2019-42 | CEDED AND ASSUMED

Most common reaction for both ceding and assuming companies is reactive which offset in the absence of other differences in calculation methodology and assumptions

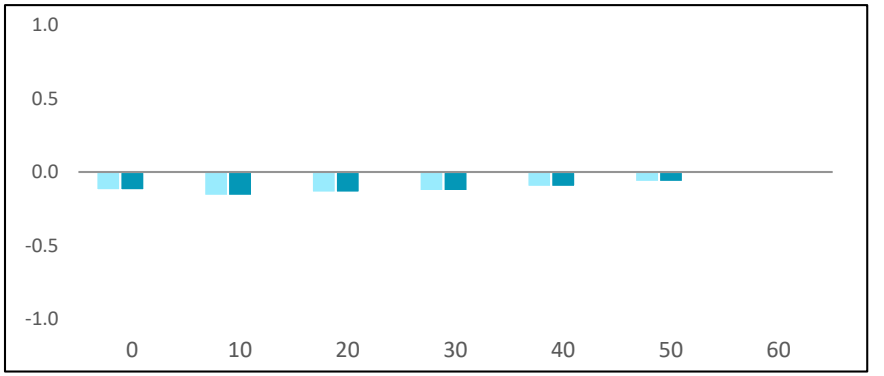
Reinsurer reaction – Ceding insurer	
None	1%
Reactive	**64%**
Break-even	28%
Other	7%

Reinsurer reaction – Assuming reinsurer	
None	0%
Reactive	**60%**
Break-even	40%
Other	0%

Commentary

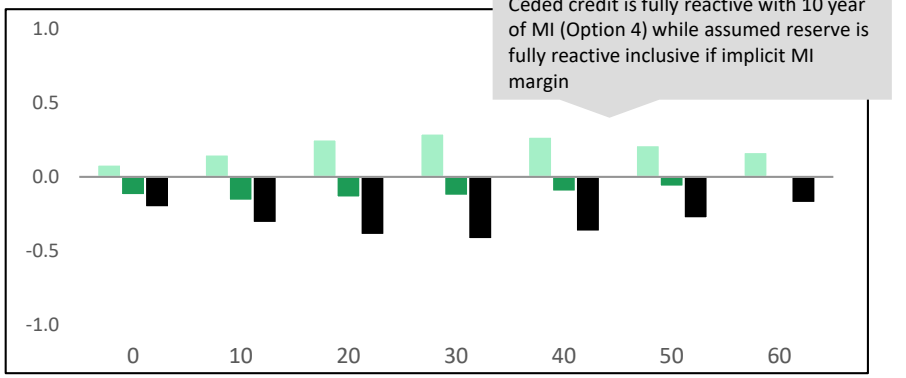
- A reactive approach was the most common for both ceding companies and assuming companies
- "Reserve credits" are exactly opposite assumed reserves in this scenario, resulting in offsetting impacts
- Largest reduction to DR is shown as fully reactive with 10 years of mortality improvement included in the margin, versus fully reactive excluding future mortality improvement for the assuming company

4.29 – Impact to total projected deterministic reserves (ULSG)
Most common responses



Most common responses (ceded credit, assumed reserve)
Largest reduction to DR (ceded credit, assumed reserve)
Impact of reinsurance on DR combined (assumed – credit)

4.30 – Impact to total projected deterministic reserves (ULSG)
Largest reduction to DR



KEY TAKEAWAYS

Additional key takeaways from evaluation of total impact on DR (ceded and assumed) **are highlighted** below in addition to those previously established

	Takeaway	Details
1	**Reinsurer reaction scenarios can produce reserve credits in excess of ½ Cx**	• ½ Cx represents the cost of reinsurance that corresponds to the period for which the reinsurance premium has been paid, but not yet earned by the reinsurer, with no provision for reinsurance beyond the paid to date • Full reinsurer reaction scenarios tested allow for – Differences between evolution of mortality and reinsurance premium payment dates, contractual provisions around return of unearned reinsurance premium and other mechanical differences due to VM-20 requirements (e.g., differences in starting assets and resulting earned rate)
2	**It is important to look at long-term projections of reserves when evaluating the impact of reinsurance modeling approaches**	• The level of margin in mortality as compared to best estimate changes at future valuation dates, due to unlocking of mortality improvement and extending the sufficient data period • As the business ages, higher mortality and shorter projection horizons will change the impact of reinsurance on reserves at future valuation dates
3	**Differences in reserve credits and assumed reserves under PBR are likely to occur for multiple reasons**	• Reserves between direct writers and reinsurers will not be mirrored, primarily due to differences in valuation assumptions (including changes to non-guaranteed YRT premiums) • Other drivers include the mechanics of computing final PBR reserves, and reinsurers aggregating results across multiple treaties and multiple cedants • Differences between ceded and assumed reserves are reduced when adjustments to YRT premiums are based on the level of mortality margin specific to each party
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
6	**Differences in ceded "reserve credits" and assumed reserves are minimized when a mechanical approach to reinsurance is used by both parties**	• When both ceding companies and assuming companies have the same assumptions and methodologies, a reactive approach under APF 2019-42 can result in mirrored deterministic "reserve credits" • Other solutions allow for more differences between ceded and assumed reserves through reinsurance premium modeling, outside of variance driven by assumption differences and PBR methodology

FIELD TEST SOLUTIONS

Dimensions for comparison were established over the course of the project

Dimension	Description and comments	Key supporting analysis
Level of prescription	• Judgement allowed by the potential solution • Prescribed solutions provide more uniformity but may not fully account for the unique contract provisions, relationships, and risks associated with the underlying reinsurance agreements	• Proposed solutions
Modeling complexity	• Complexity of implementing solution in valuation system and process	• Field test • Interpretation survey and representative analysis
Variation in results	• Potential for variability in results given interpretation of requirements • Controlled for other drivers of variation (i.e., variation in reinsurance rates and credibility)	• Field test • Interpretation survey and representative analysis
Potential for asymmetry between assumed and ceded interpretation	• Propensity for variance between reserve credits and assumed reserves • Asymmetries could result in increases **or** decreases to total reserves	• Interpretation survey and representative analysis
Defined level of risk sharing	• Well defined amount of excess mortality experience that is shared with the assuming reinsurer (e.g., prescribed reserve/credit, mortality improvement, "loss ratio" trigger, etc.) • Prescribing a single level of risk sharing between all ceding companies and reinsurers may not account for individual treaty provisions, reinsurer rate increase practices, etc.	• Interpretation survey and representative analysis
Potential APF revisions	• Amount of revisions required to current proposal language before LATF exposure	• "Field tested" APFs

Some dimensions have clear ideal outcomes (e.g., modeling complexity) while other dimensions will need to be weighed

FIELD TEST SOLUTIONS

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

Dimension	***½ Cx***	**2019-40** ***(Action A)***	**2019-40** ***(Action B)***	**2019-40** ***(Action C)***	**2019-40** ***(Action D)***	**2019-41**[1]	**2019-42**[1]
Level of prescription							
Modeling complexity							
Variation in results							
Potential for asymmetry between assumed and ceded interpretation							
Defined level of risk sharing							
Potential APF revisions							

Less — More

1. Multiple mortality improvement scenarios were included with APF 2019-41 and 42

APPENDIX A

Supporting reports and presentations

APPENDIX A.1

ACADEMY REPORTS

FIELD TEST RESULTS

Compiled and documented by the American Academy of Actuaries

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PBR: Reserve Credits for YRT Reinsurance
A Field Test of Three Amendment Proposal Forms (A
Time Zero and Projected Reserves

May 8, 2020

A Report to Jason Kehrberg, Chairperson
Life Valuation Committee
American Academy of Actuaries

by
Steve Jackson, Ph.D.
Assistant Director for Research (Public Policy)
American Academy of Actuaries

With the introduction of principle-based reserving (PBR) by the National Association of Insurance Commissioners (NAIC), insurers will be required to hold the higher of (a) formulaic reserves based on prescribed factors and (b) modeled reserves based on cashflow projections t consider a wide range of future economic conditions and use assumptions that depend on experience and credibility specific to an insurer, such as mortality, policyholder behavior, and expenses. As PBR is implemented, the NAIC is monitoring the PBR Actuarial Reports filed b insurers for evidence of problems that might require changes to the Valuation Manual.

In its 2017 reviews of Life PBR Actuarial Reports, the NAIC's Valuation Analysis (E) Worki Group (VAWG) found that modeling of yearly renewable term (YRT) reinsurance premiums varied significantly across companies. These differences in modeling yielded material differences in the reinsurance reserve credits claimed by companies. As a result, several alternative Amendment Proposal Forms (APFs) have been proposed for additional consistency this area. The NAIC's Life Actuarial (A) Task Force (LATF) would like to see results of a fie test of these APFs to support its decision of which, if any, of the APFs to adopt.

Between December 2019 and April 2020, the Academy administered a field test in which it asked participating companies to model reserves and reinsurance credits for the formulaic interim solution adopted by the NAIC in 2019 and for all of the proposed APFs currently unde consideration by LATF at the NAIC. The specific instructions for the field test were develope by the Life Valuation Committee jointly with representatives of the staff and regulators from t 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 w the NAIC and the ACLI. A copy of the instructions for the field test are attached to this repor 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 t PBR when it becomes mandatory, were invited to join a field test of three APFs: 2019-40, 201 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 o 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 vario 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 issuers, 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 report separately for both policy types). For both term and ULSG policies, one company provided ti zero but not projected reserves. While all results have been examined for consistency, only th

APF 2019-41

2019-41 w/ 0% Future Mortality Impovement (FMI)					
Year	25th PCT	75th PCT	Median	Mean	
0	(1.0)	0.3	(0.3)	(0.3)	**Reserve Credits:**
1	(0.6)	0.4	(0.1)	(0.2)	**Dollars per**
2	(0.7)	0.3	(0.3)	(0.3)	**Thousand Dollars**
3	(0.7)	0.4	(0.5)	(0.3)	**of projected**
4	(0.8)	0.5	(0.7)	(0.2)	**ceded NAAR**
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	

Detailed reports published by the Academy are posted to the NAIC website with this report

INTERPRETATION SURVEY RESULTS

Compiled and documented by the American Academy of Actuaries

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PBR: Reserve Credits for YRT Reinsurance
The Range of Interpretations of Three Amendment Proposal Forms (A
A Survey of Companies

May 8, 2020

A Report to Jason Kehrberg, Chairperson
Life Valuation Committee
American Academy of Actuaries

by
Steve Jackson, Ph.D.
Assistant Director for Research (Public Policy)
American Academy of Actuaries

The distribution of this survey was further restricted so that any person who was responsible for reporting results for more than one company only received the survey for one of the companies. This was designed to limit the imposition on respondents. In all, the survey went to 116 entities. Thirty-six of those responded. For those that responded, we asked how many legal entities their response reflected; the 36 respondents indicated that their responses covered 51 of the original 187 companies.

The survey instrument is attached to this report as Appendix 1. The instructions requested that respondents "complete a separate survey form for each group of treaties and/or policies for which your company would vary its approach to project changes in YRT rates. The survey form asks for your interpretation/intended modelling approach under the same three proposals being evaluated by the industry field test."

The survey requested responses to three questions, with some questions involving multiple responses. The first question, summarized in the attached tables and labeled "Rationale", asks: "Which of the following best describes your rationale for having a separate approach to projecting changes to YRT rates for this group of treaties?" The second question asks respondents to "complete the following tables for this group of reinsurance arrangements, based on how your company would project changes to YRT rates and on the requirements presented in each proposal [APF]." For each APF, there were six possible responses:

- No change: Maintain current scale throughout the projection
- Increase by [A]% of prescribed mortality margin after [B] and every [C] there prescribed margin includes all VM-20 mortality margins including no future i improvement
- Increase by [A]% of prescribed mortality margin after [B] and every [C] there prescribed margin includes all VM-20 mortality margins except for no future improvement
- Increase by [A]% of prescribed mortality margin after [B] and every [C] there prescribed margin includes all VM-20 margins, modified to allow [D] years o improvement
- Increase by [A]% of difference between current scale and prudent estimate (i. [B] and every [C] thereafter
- None of the approaches above (please provide a description in the comment s survey form

These responses are reported in the accompanying tables and labeled "APF Interp Counts indicated in all tables reflect the number of entities covered by a particula

Finally, the third question asks for more details on the method of projecting chan rates indicated in the answer to the second question: "Complete the following tab modeling approach with the values used for items [A], [B], [C] and [D] from the

YRT Projected Reserves
Range of Interpretations
All Companies
APF Interpretation

Number of Companies Responding: 36
Number of Companies Covered: 51

Option	Projected change to YRT rates	APF 2019-40		APF 2019-41		APF 2019-42	
		Count	Proportion	Count	Proportion	Count	Proportion
1	No change: Maintain current scale throughout the projection	9.5	18.63%	28	54.90%	0.5	0.98%
2	Increase by [A]% of prescribed mortality margin after [B] and every [C] thereafter; where prescribed margin includes all VM-20 mortality margins including no future mortality improvement	13.5	26.47%	7	13.73%	7.5	14.71%
3	Increase by [A]% of prescribed mortality margin after [B] and every [C] thereafter; where prescribed margin includes all VM-20 mortality margins except for no future mortality improvement	5	9.80%	0	0.00%	2	3.92%
4	Increase by [A]% of prescribed mortality margin after [B] and every [C] thereafter; where prescribed margin includes all VM-20 margins, modified to allow [D] years of future mortality improvement	2	3.92%	2	3.92%	23	45.10%
5	Increase by [A]% of difference between current scale and prudent estimate (i.e. PBR) mortality after [B] and every [C] thereafter	13	25.49%	9	17.65%	15	29.41%
6	None of the approaches above (please provide a description in the comment section at the end of the survey form	8	15.69%	5	9.80%	3	5.88%

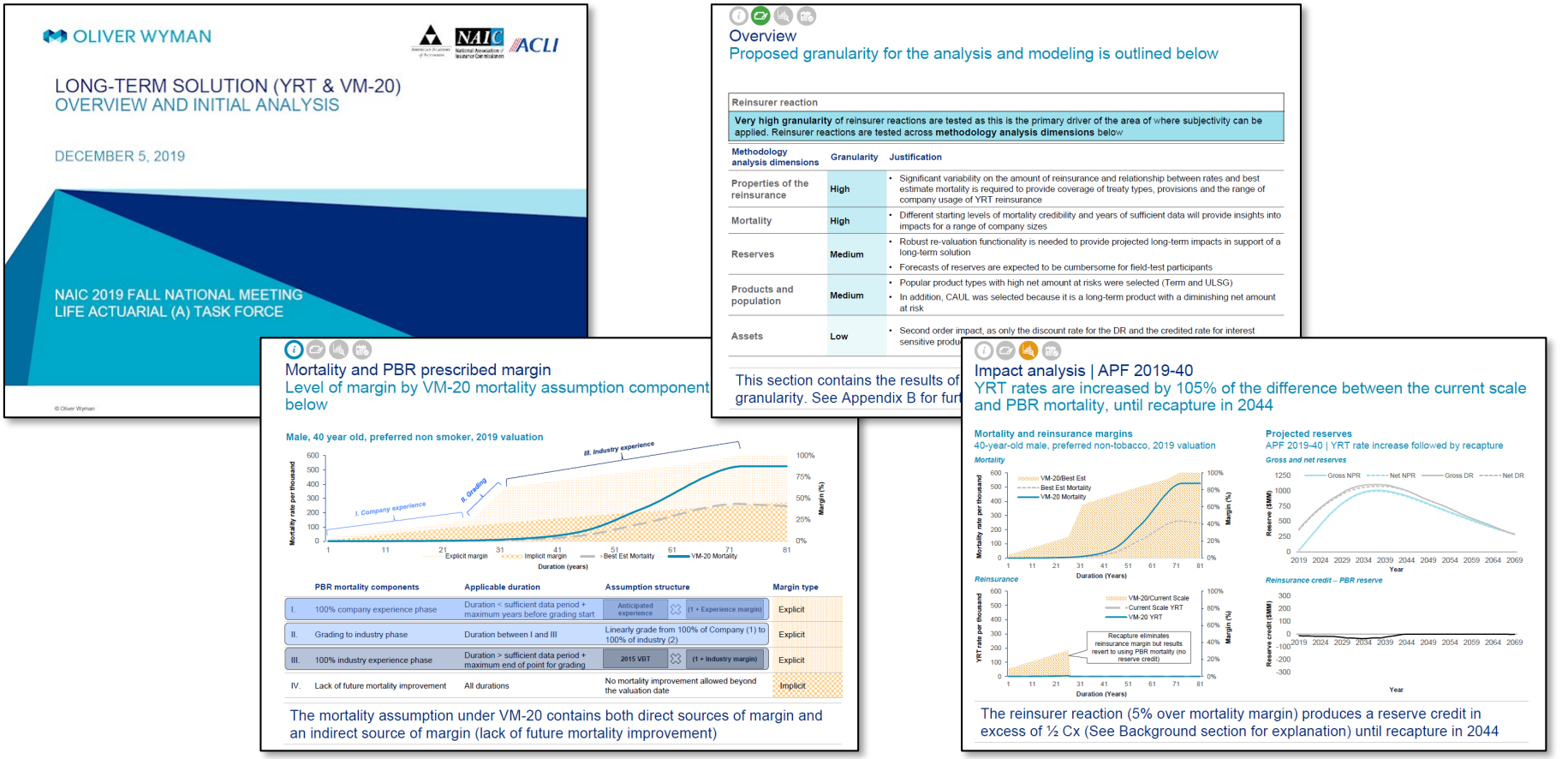
Detailed reports published by the Academy are posted to the NAIC website with this report

APPENDIX A.2

PRIOR REPORTS

2019 NAIC FALL MEETING LATF PRESENTATION (DECEMBER 2019)

Initial presentation focused on education of modeling reinsurance under PBR, initial representative PBR model design and analysis of the APFs



OLIVER WYMAN

LONG-TERM SOLUTION (YRT & VM-20)
OVERVIEW AND INITIAL ANALYSIS

DECEMBER 5, 2019

NAIC 2019 FALL NATIONAL MEETING
LIFE ACTUARIAL (A) TASK FORCE

© Oliver Wyman

Overview
Proposed granularity for the analysis and modeling is outlined below

Reinsurer reaction		
Very high granularity of reinsurer reactions are tested as this is the primary driver of the area of where subjectivity can be applied. Reinsurer reactions are tested across **methodology analysis dimensions** below		
Methodology analysis dimensions	**Granularity**	**Justification**
Properties of the reinsurance	High	• Significant variability on the amount of reinsurance and relationship between rates and best estimate mortality is required to provide coverage of treaty types, provisions and the range of company usage of YRT reinsurance
Mortality	High	• Different starting levels of mortality credibility and years of sufficient data will provide insights into impacts for a range of company sizes
Reserves	Medium	• Robust re-valuation functionality is needed to provide projected long-term impacts in support of a long-term solution • Forecasts of reserves are expected to be cumbersome for field-test participants
Products and population	Medium	• Popular product types with high net amount at risks were selected (Term and ULSG) • In addition, CAUL was selected because it is a long-term product with a diminishing net amount at risk
Assets	Low	• Second order impact, as only the discount rate for the DR and the credited rate for interest sensitive produ

This section contains the results of
granularity. See Appendix B for furt

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

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

	PBR mortality components	Applicable duration	Assumption structure	Margin type
I.	100% company experience phase	Duration < sufficient data period + maximum years before grading start	Anticipated experience ⊠ (1 + Experience margin)	Explicit
II.	Grading to industry phase	Duration between I and III	Linearly grade from 100% of Company (1) to 100% of industry (2)	Explicit
III.	100% industry experience phase	Duration > sufficient data period + maximum end of point for grading	2015 VBT ⊠ (1 + Industry margin)	Explicit
IV.	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)

Impact analysis | APF 2019-40
YRT rates are increased by 105% of the difference between the current scale and PBR mortality, until recapture in 2044

Mortality and reinsurance margins
40-year-old male, preferred non-tobacco, 2019 valuation

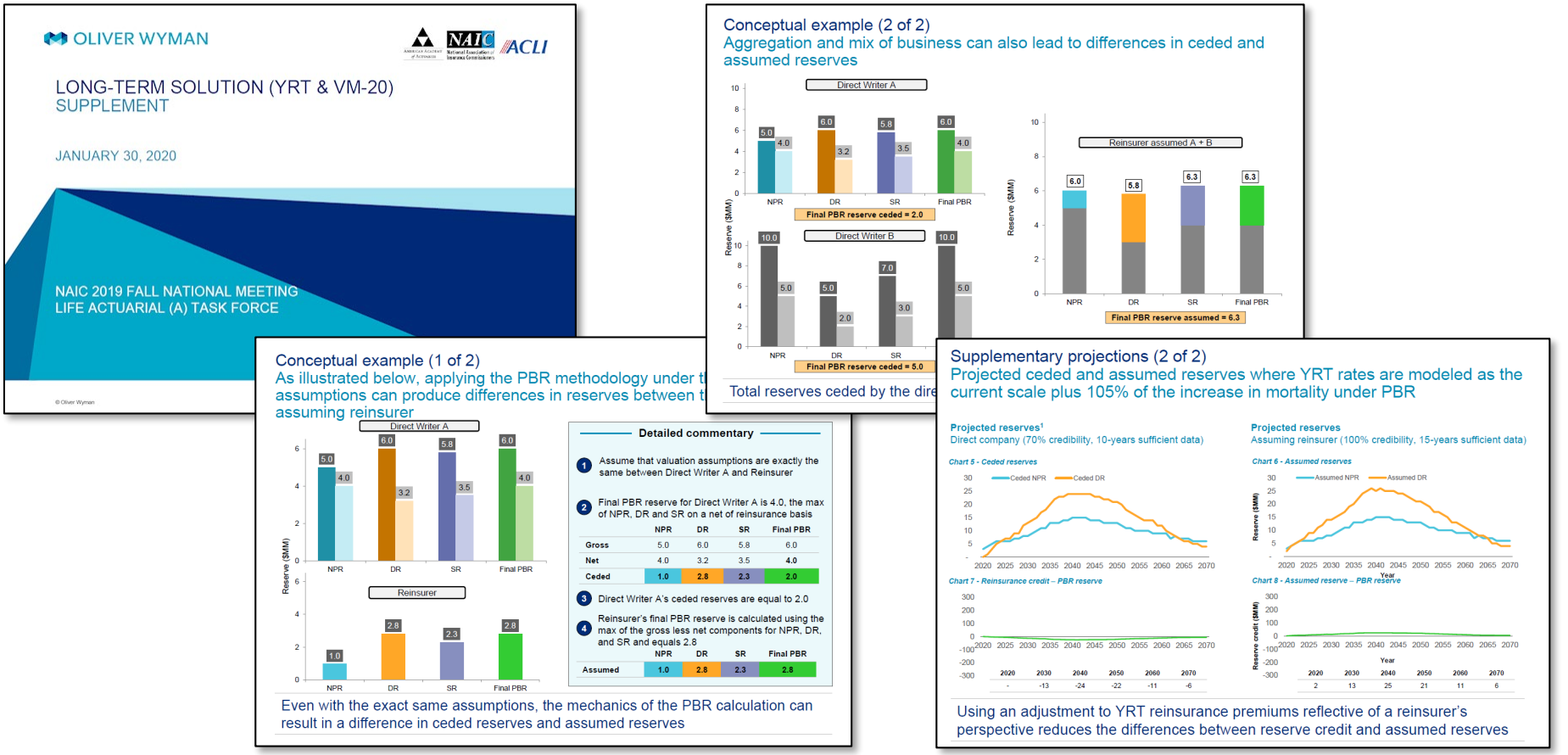
Projected reserves
APF 2019-40 | YRT rate increase followed by recapture

The reinsurer reaction (5% over mortality margin) produces a reserve credit in excess of ½ Cx (See Background section for explanation) until recapture in 2044

Prior presentations are posted to the NAIC website along with Academy reports and this report

REINSURER SUPPLEMENT (JANUARY 2020)

Supplement was focused on reviewing drivers of differences due to PBR which cause asymmetries between a direct company's reserve credit and an reinsurer's assumed reserve



Prior presentations are posted to the NAIC website along with Academy reports and this report

APPENDIX B

Model design and assumptions

LIABILITY ASSUMPTIONS (ULSG)

The assumptions used in the analysis are below, including assumed PBR margins

Assumption	Anticipated experience assumption	Prudent estimate assumption (e.g. margin)
Mortality	• 2015 VBT gender distinct, smoker distinct ANB • Relative Risk varies by risk class • A/E factors vary by high/low band • Future mortality improvement of .50%	• Prescribed margins applied to company mortality • Industry table: 2015 VBT with prescribed margins and mortality improvement scale • Grading and margins assumes 100% Limited Fluctuation method credibility
Lapse	• 3% annual lapse rate	• 2% annual lapse rate • 0% lapse rate when the secondary guarantee is in-the-money (i.e. CSV < 0)
Expenses	• $100 per policy (annual) • 2.5% premium tax • 2% inflation	• 105% margin on expenses • 2.5% inflation

LIABILITY ASSUMPTIONS (TERM)

The assumptions used in the analysis are below, including assumed PBR margins

Assumption	Anticipated experience assumption	Prudent estimate assumption (e.g. margin)
Mortality	• 2015 VBT gender distinct, smoker distinct ANB • Relative Risk varies by risk class • A/E factors vary by high/low band • Future mortality improvement of .50%	• Prescribed margins applied to company mortality • Industry table: 2015 VBT with prescribed margins and mortality improvement scale • Grading and margins assumes 100% Limited Fluctuation method credibility
Lapse	• 6.5% during level term period • 100% shock lapse after level term period	• 95% margin on lapses
Expenses	• $85 per policy (annual) • Additional yr 1 expense $200 per policy and $0.40 per $1000 face • 2.5% premium tax • 2% inflation	• 105% margin on expenses • 2.5% inflation

APPENDIX C

Supplemental results

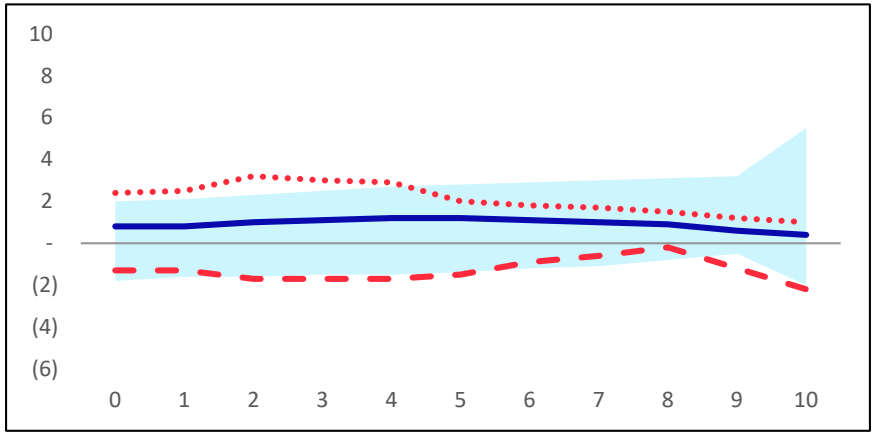
APPENDIX C.1

FIELD TEST RESULTS AND ANALYSIS

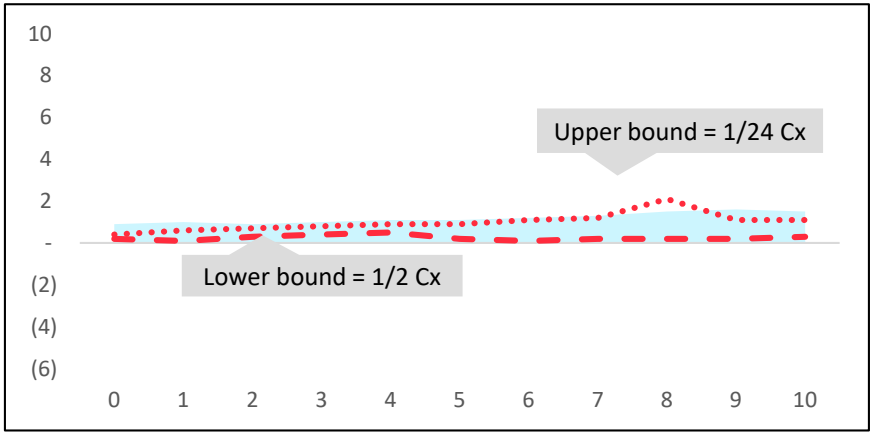
BASELINE | TERM RESULTS

Similar to ULSG, the representative PBR model explains the variance in impacts of reinsurance on modeled reserves observed in field test submissions

C.1 – Gross DR – Net DR (per 1000 of projected ceded NAAR)
No change to YRT rates



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



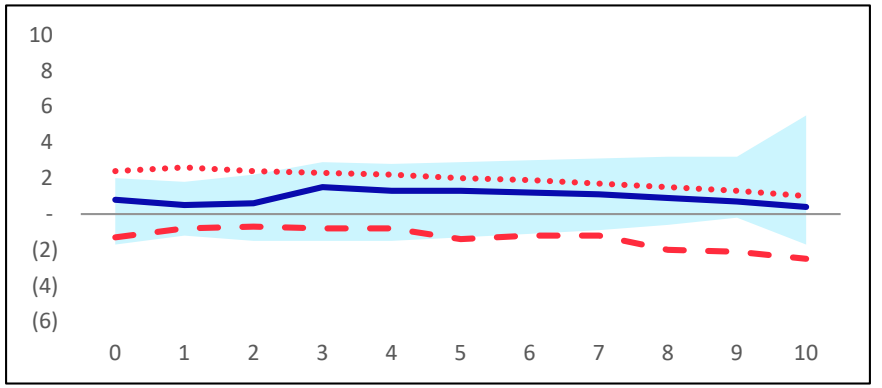
Field test results legend

- 25th percentile (Field test)
- 75th percentile (Field test)
- Coverage range (Representative PBR model)
- "Baseline YRT scale" with high credibility

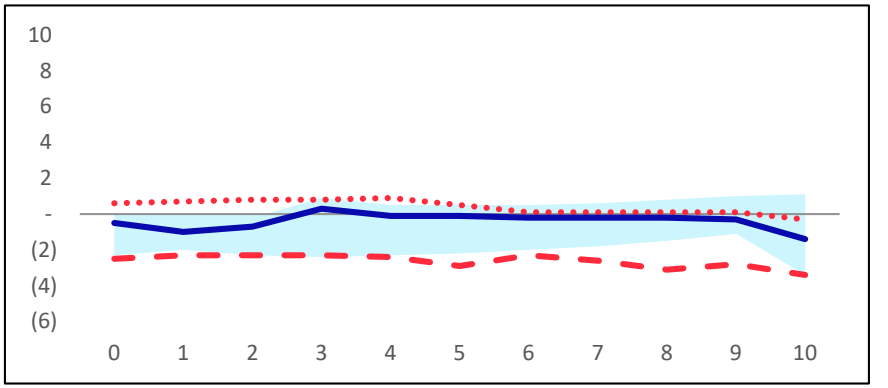
APF 2019-40 | TERM RESULTS

Application of prudent estimate margins in Action B lowers the impact to DR and including additional parameters to determine the application of margins (Action C and Action D) reduces the variation in field test results

C.3 – Gross DR – Net DR (per 1000 of projected ceded NAAR)
Action A

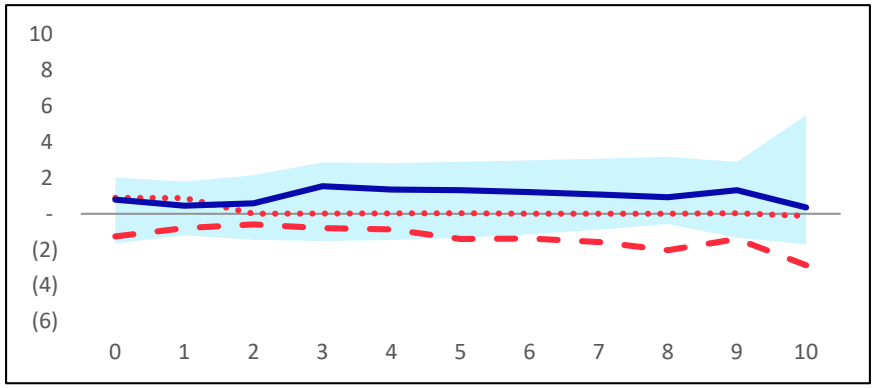


C.4 – Gross DR – Net DR (per 1000 of projected ceded NAAR)
Action B

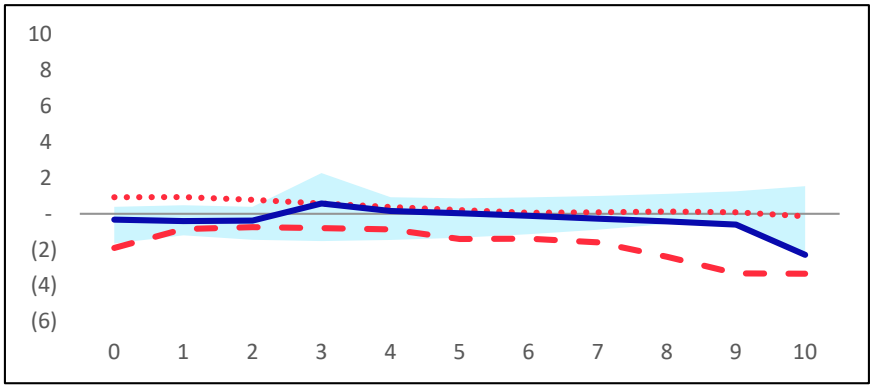


25th percentile (Field test)
75th percentile (Field test)
Coverage range (Representative PBR model)
"Baseline YRT scale" with high credibility

C.5 – Gross DR – Net DR (per 1000 of projected ceded NAAR)
Action C



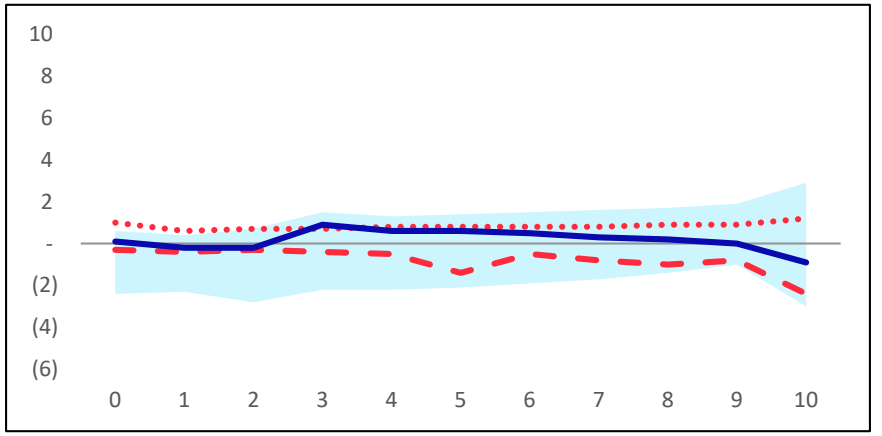
C.6 – Gross DR – Net DR (per 1000 of projected ceded NAAR)
Action D



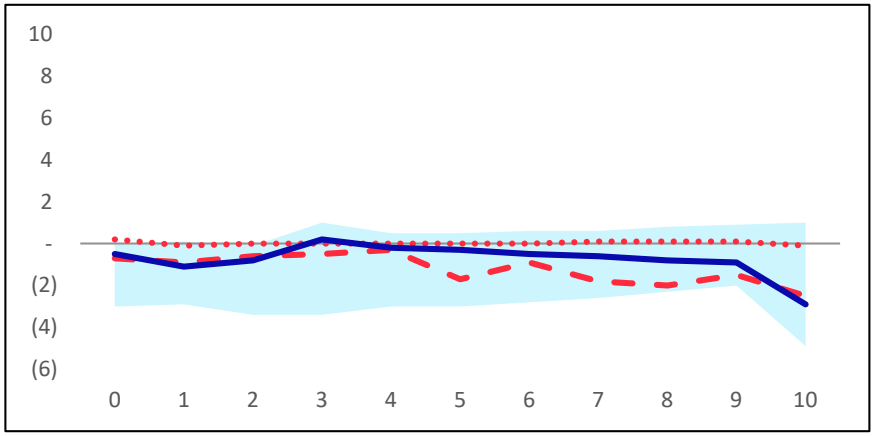
APF 2019-41 | TERM RESULTS

Similar to ULSG, introducing future mortality improvement to the projected claims reduces reinsurance gains, given the current scale of reinsurance premiums is held constant

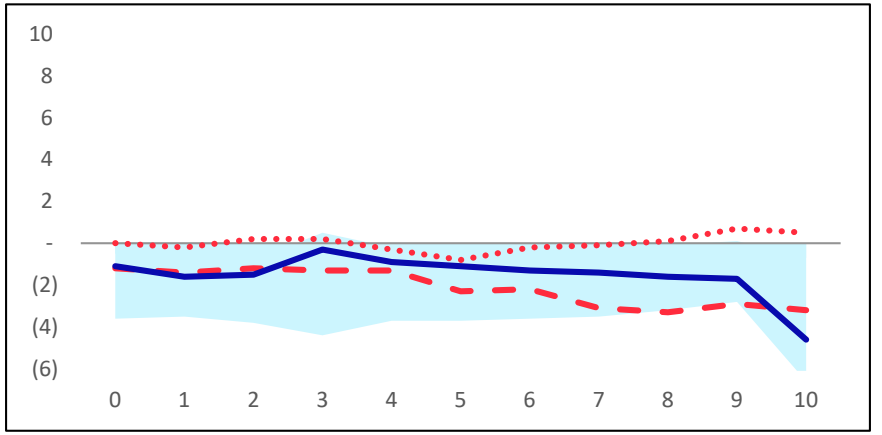
C.7 – Gross DR – Net DR (per 1000 of projected ceded NAAR)
0.0% FMI



C.8 – Gross DR – Net DR (per 1000 of projected ceded NAAR)
0.5% FMI



C.9 – Gross DR – Net DR (per 1000 of projected ceded NAAR)
1.0% FMI



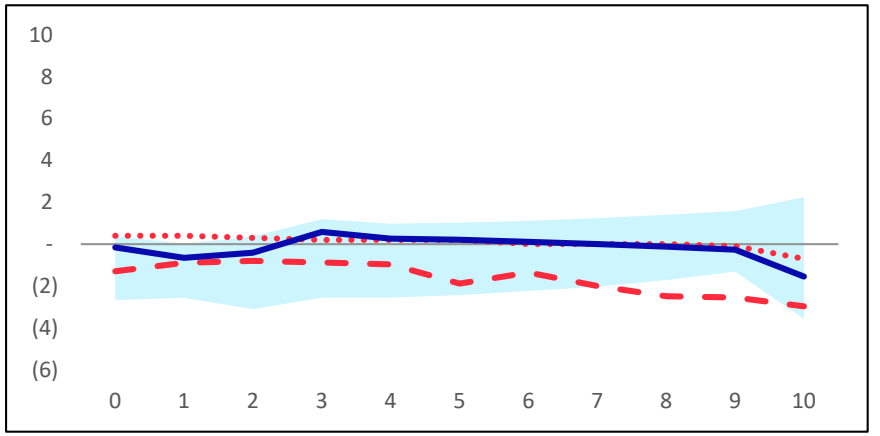
Field test results legend

- 25th percentile (Field test)
- 75th percentile (Field test)
- Coverage range (Representative PBR model)
- "Baseline YRT scale" with high credibility

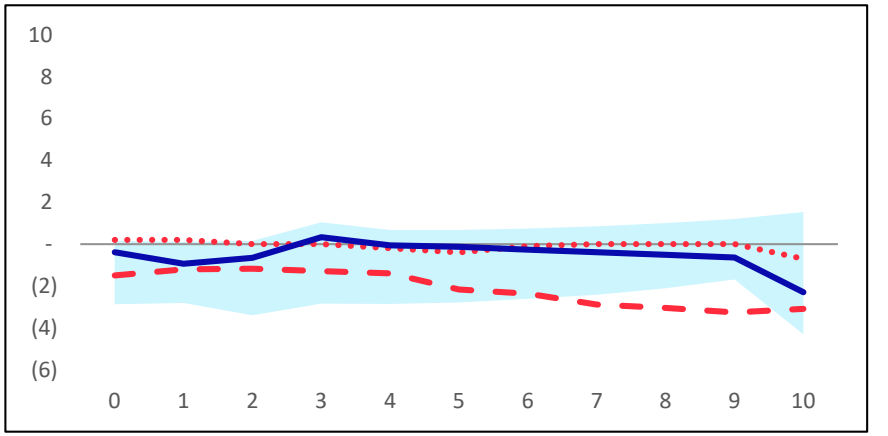
APF 2019-42 | TERM RESULTS

Similar to ULSG, increasing the level of future mortality improvement has a similar impact on both APF 2019-41 and 2019-42

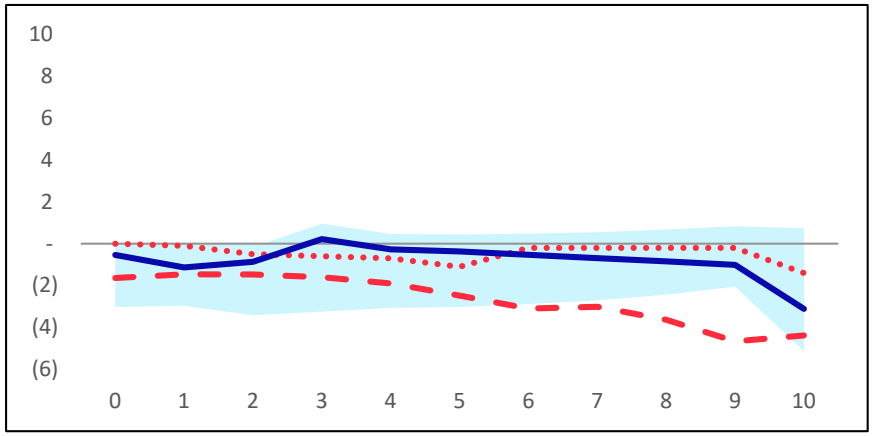
C.10 – Gross DR – Net DR (per 1000 of projected ceded NAAR)
5 years FMI



C.11 – Gross DR – Net DR (per 1000 of projected ceded NAAR)
10 years FMI



C.12 – Gross DR – Net DR (per 1000 of projected ceded NAAR)
20 years FMI



Field test results legend

- 25th percentile (Field test)
- 75th percentile (Field test)
- Coverage range (Representative PBR model)
- "Baseline YRT scale" with high credibility

BASELINE | ULSG RESULTS

Development of unitized impact to DR for baseline YRT Rate scale and high credibility

C.13 – No change to YRT rates

	0	1	5	10	20	30
Pre-reinsurance DR (a)	1,978	2,368	4,031	5,652	6,322	4,903
Post-reinsurance DR (b)	1,425	1,863	3,462	5,001	5,576	4,206
Ceded NAAR (c)	18,530	17,752	14,914	11,961	7,901	5,155
Unitized impact to DR (d)	29.87	28.47	38.21	54.46	94.41	135.09

Notes

- Impact to DR is unitized as per 1000 of Ceded NAAR
- Unitized impact to DR for no changes to YRT rates = [(a) – (b)] / (c) * 1000

APF 2019-40 | ULSG RESULTS

Development of unitized impact to DR for baseline YRT Rate scale and high credibility

C.14 – Action A

	0	1	5	10	20	30
Pre-reinsurance DR (a)	1,978	2,368	4,031	5,652	6,322	4,903
Post-reinsurance DR (b)	1,425	1,863	3,462	5,001	5,576	4,206
Ceded NAAR (c)	18,530	17,752	14,914	11,961	7,901	5,155
Unitized impact to DR (d)	29.87	28.47	38.21	54.46	94.41	135.09

C.15 – Action B

	0	1	5	10	20	30
Pre-reinsurance DR (a)	1,978	2,368	4,031	5,652	6,322	4,903
Post-reinsurance DR (b)	2,102	2,509	4,180	5,814	6,462	5,031
Ceded NAAR (c)	18,530	17,752	14,914	11,961	7,901	5,155
Unitized impact to DR (d)	-6.68	-7.94	-9.96	-13.49	-17.73	-24.94

C.16 – Action C

	0	1	5	10	20	30
Pre-reinsurance DR (a)	1,978	2,368	4,031	5,652	6,322	4,903
Post-reinsurance DR (b)	1,803	2,190	3,836	5,443	6,145	4,921
Ceded NAAR (c)	18,530	17,752	14,914	11,961	7,901	5,155
Unitized impact to DR (d)	9.49	10.01	13.11	17.49	22.40	-3.59

C.17 – Action D

	0	1	5	10	20	30
Pre-reinsurance DR (a)	1,978	2,368	4,031	5,652	6,322	4,903
Post-reinsurance DR (b)	2,062	2,470	4,116	5,697	6,287	4,811
Ceded NAAR (c)	18,530	17,752	14,914	11,961	7,901	5,155
Unitized impact to DR (d)	-4.54	-5.74	-5.65	-3.75	4.43	17.83

Notes

- Impact to DR is unitized as per 1000 of Ceded NAAR
- Unitized impact to DR = [(a) – (b)] / (c) * 1000

APF 2019-41 | ULSG RESULTS

Development of unitized impact to DR for baseline YRT Rate scale and high credibility

C.18 – 0.0% FMI

	0	1	5	10	20	30
Pre-reinsurance DR (a)	1,978	2,368	4,031	5,645	6,239	4,655
Post-reinsurance DR (b)	1,674	2,115	3,740	5,300	5,836	4,417
Ceded NAAR (c)	18,530	17,752	14,911	11,946	7,797	4,894
Unitized impact to DR (d)	16.44	14.27	19.48	28.86	51.65	48.58

C.19 – 0.5% FMI

	0	1	5	10	20	30
Pre-reinsurance DR (a)	1,978	2,368	4,031	5,652	6,313	4,811
Post-reinsurance DR (b)	1,984	2,341	3,991	5,588	6,173	4,702
Ceded NAAR (c)	18,530	17,752	14,914	11,961	7,890	5,058
Unitized impact to DR (d)	-0.29	1.52	2.73	5.41	17.74	21.60

C.20 – 1.0% FMI

	0	1	5	10	20	30
Pre-reinsurance DR (a)	1,978	2,368	4,032	5,659	6,379	4,953
Post-reinsurance DR (b)	2,161	2,530	4,200	5,827	6,460	4,949
Ceded NAAR (c)	18,530	17,752	14,917	11,976	7,972	5,208
Unitized impact to DR (d)	-9.87	-9.12	-11.23	-14.02	-10.15	0.71

Notes

- (c) reflects the outer-loop ceded NAAR used in each scenario which is adjusted to as a modeling technique for reinsurance margins
- (a) is adjusted to be consistent with each post reinsurance run
- Impact to DR is unitized as per 1000 of Ceded NAAR
- Unitized impact to DR = [(a) – (b)] / (c) * 1000

APF 2019-42 | ULSG RESULTS

Development of unitized impact to DR for baseline YRT Rate scale and high credibility

C.21 – 5-years FMI

	0	1	5	10	20	30
Pre-reinsurance DR (a)	1,978	2,368	4,031	5,650	6,268	4,708
Post-reinsurance DR (b)	1,817	2,199	3,832	5,404	5,955	4,514
Ceded NAAR (c)	18,530	17,752	14,914	11,956	7,833	4,950
Unitized impact to DR (d)	8.73	9.51	13.36	20.58	39.95	39.23

C.22 – 10-years FMI

	0	1	5	10	20	30
Pre-reinsurance DR (a)	1,978	2,368	4,031	5,652	6,293	4,761
Post-reinsurance DR (b)	1,896	2,275	3,917	5,501	6,068	4,609
Ceded NAAR (c)	18,530	17,752	14,914	11,961	7,865	5,006
Unitized impact to DR (d)	4.45	5.22	7.66	12.64	28.61	30.25

C.23 – 15-years FMI

	0	1	5	10	20	30
Pre-reinsurance DR (a)	1,978	2,368	4,031	5,652	6,313	4,811
Post-reinsurance DR (b)	1,984	2,341	3,991	5,588	6,173	4,702
Ceded NAAR (c)	18,530	17,752	14,914	11,961	7,890	5,058
Unitized impact to DR (d)	-0.29	1.52	2.73	5.41	17.74	21.60

C.24 – 20-years FMI

	0	1	5	10	20	30
Pre-reinsurance DR (a)	1,978	2,368	4,031	5,652	6,322	4,855
Post-reinsurance DR (b)	1,977	2,394	4,051	5,658	6,262	4,788
Ceded NAAR (c)	18,530	17,752	14,914	11,961	7,901	5,105
Unitized impact to DR (d)	0.08	-1.49	-1.29	-0.48	7.54	13.12

Notes

- (c) reflects the outer-loop ceded NAAR used in each scenario which is adjusted to as a modeling technique for reinsurance margins
- (a) is adjusted to be consistent with each post reinsurance run
- Impact to DR is unitized as per 1000 of Ceded NAAR
- Unitized impact to DR = [(a) – (b)] / (c) * 1000

BASELINE | TERM RESULTS

Development of unitized impact to DR for baseline YRT Rate scale and high credibility

C.25 – No change in rates

	0	1	3	5	10
Pre-reinsurance DR (a)	-9	102	254	336	327
Post-reinsurance DR (b)	-39	73	221	304	324
Ceded NAAR (c)	37,500	35,042	30,571	26,641	9,401
Unitized impact to DR (d)	0.79	0.83	1.11	1.22	0.36

Notes

- Impact to DR is unitized as per 1000 of Ceded NAAR
- Unitized impact to DR = [(a) – (b)] / (c) * 1000

APF 2019-40 | TERM RESULTS

Development of unitized impact to DR for baseline YRT Rate scale and high credibility

C.26 – Action A

	0	1	3	5	10
Pre-reinsurance DR (a)	-9	102	254	336	327
Post-reinsurance DR (b)	-39	87	207	301	324
Ceded NAAR (c)	37,500	35,042	30,572	26,644	9,406
Unitized impact to DR (d)	0.79	0.45	1.54	1.32	0.36

C.27 – Action B

	0	1	3	5	10
Pre-reinsurance DR (a)	-9	102	254	336	327
Post-reinsurance DR (b)	11	137	245	339	341
Ceded NAAR (c)	37,500	35,042	30,572	26,644	9,406
Unitized impact to DR (d)	-0.52	-0.99	0.30	-0.11	-1.43

C.28 – Action C

	0	1	3	5	10
Pre-reinsurance DR (a)	-9	102	254	336	327
Post-reinsurance DR (b)	-39	87	207	301	324
Ceded NAAR (c)	37,500	35,042	30,572	26,644	9,406
Unitized impact to DR (d)	0.79	0.45	1.54	1.32	0.36

C.29 – Action D

	0	1	3	5	10
Pre-reinsurance DR (a)	-9	102	254	335	326
Post-reinsurance DR (b)	3	117	237	335	348
Ceded NAAR (c)	37,500	35,032	30,532	26,581	9,385
Unitized impact to DR (d)	-0.32	-0.41	0.57	0.03	-2.29

Notes

- Impact to DR is unitized as per 1000 of Ceded NAAR
- Unitized impact to DR = [(a) – (b)] / (c) * 1000

APF 2019-41 | TERM RESULTS

Development of unitized impact to DR for baseline YRT Rate scale and high credibility

C.30 – 0.0% FMI

	0	1	3	5	10
Pre-reinsurance DR (a)	-9	102	254	336	327
Post-reinsurance DR (b)	-13	110	228	321	336
Ceded NAAR (c)	37,500	35,042	30,571	26,641	9,401
Unitized impact to DR (d)	0.11	-0.22	0.87	0.56	-0.93

C.31 – 0.5% FMI

	0	1	3	5	10
Pre-reinsurance DR (a)	-9	102	254	336	327
Post-reinsurance DR (b)	10	140	247	344	354
Ceded NAAR (c)	37,500	35,042	30,572	26,644	9,406
Unitized impact to DR (d)	-0.50	-1.08	0.23	-0.31	-2.89

C.32 – 1.0% FMI

	0	1	3	5	10
Pre-reinsurance DR (a)	-9	102	254	336	327
Post-reinsurance DR (b)	31	157	263	365	370
Ceded NAAR (c)	37,500	35,042	30,573	26,646	9,412
Unitized impact to DR (d)	-1.05	-1.56	-0.27	-1.08	-4.58

Notes

- (c) reflects the outer-loop ceded NAAR used in each scenario which is adjusted to as a modeling technique for reinsurance margins
- (a) is adjusted to be consistent with each post reinsurance run
- Impact to DR is unitized as per 1000 of Ceded NAAR
- Unitized impact to DR = [(a) – (b)] / (c) * 1000

APF 2019-42 | TERM RESULTS

Development of unitized impact to DR for baseline YRT Rate scale and high credibility

C.33 – 5-years FMI

	0	1	3	5	10
Pre-reinsurance DR (a)	-9	102	254	336	327
Post-reinsurance DR (b)	-3	125	237	330	342
Ceded NAAR (c)	37,500	35,042	30,572	26,644	9,404
Unitized impact to DR (d)	-0.16	-0.66	0.58	0.21	-1.55

C.34 – 10-years FMI

	0	1	3	5	10
Pre-reinsurance DR (a)	-9	102	254	336	327
Post-reinsurance DR (b)	6	136	244	340	349
Ceded NAAR (c)	37,500	35,042	30,572	26,644	9,406
Unitized impact to DR (d)	-0.39	-0.94	0.33	-0.13	-2.30

C.35 – 15-years FMI

	0	1	3	5	10
Pre-reinsurance DR (a)	-9	102	254	336	327
Post-reinsurance DR (b)	10	140	247	344	354
Ceded NAAR (c)	37,500	35,042	30,572	26,644	9,406
Unitized impact to DR (d)	-0.50	-1.08	0.23	-0.31	-2.89

C.36 – 20-years FMI

	0	1	3	5	10
Pre-reinsurance DR (a)	-9	102	254	336	327
Post-reinsurance DR (b)	11	142	248	346	356
Ceded NAAR (c)	37,500	35,042	30,572	26,644	9,406
Unitized impact to DR (d)	-0.54	-1.13	0.22	-0.37	-3.11

Notes

- Impact to DR is unitized as per 1000 of Ceded NAAR
- Unitized impact to DR = [(a) – (b)] / (c) * 1000

APPENDIX C.2

INTERPRETATION SURVEY RESULTS AND ADDITIONAL ANALYSIS

APF 2019-40 | ULSG RESULTS

Development of Net DR for illustrated interpretation scenarios

C.37 – No change in rates

	0	10	20	30	40	50	60
Pre-reinsurance DR (a)	1,978	5,652	6,322	4,903	3,183	1,627	640
Post-reinsurance DR (b)	1,425	5,001	5,576	4,206	2,685	1,411	541
Impact to DR (c)	554	651	746	696	498	216	99

C.38 – Fully reactive after 1 year

	0	10	20	30	40	50	60
Pre-reinsurance DR (a)	1,978	5,652	6,322	4,903	3,183	1,627	640
Post-reinsurance DR (b)	2,102	5,814	6,462	5,031	3,283	1,694	650
Impact to DR (c)	-124	-161	-140	-129	-100	-67	-10

C.39 – Break even after 1 year

	0	10	20	30	40	50	60
Pre-reinsurance DR (a)	1,978	5,652	6,322	4,903	3,183	1,627	640
Post-reinsurance DR (b)	1,918	5,506	6,107	4,723	3,063	1,564	594
Impact to DR (c)	60	147	214	180	120	63	46

Notes

- Impact to DR is (a) – (b)

APF 2019-40 | TERM RESULTS

Development of Net DR for illustrated interpretation scenarios

C.40 – No change in rates

	0	2	4	6	8	10	15	20
Pre-reinsurance DR (a)	-9	190	303	357	363	327	225	35
Post-reinsurance DR (b)	-39	170	264	327	343	324	222	18
Impact to DR (c)	30	19	38	30	20	3	3	17

C.41 – Fully reactive after 1 years

	0	2	4	6	8	10	15	20
Pre-reinsurance DR (a)	-9	190	303	357	363	327	225	35
Post-reinsurance DR (b)	11	218	310	370	381	356	241	20
Impact to DR (c)	-20	-28	-8	-13	-18	-29	-16	15

C.42 – Break even after 1 year

	0	2	4	6	8	10	15	20
Pre-reinsurance DR (a)	-9	190	303	357	363	327	225	35
Post-reinsurance DR (b)	10	206	298	353	355	325	222	18
Impact to DR (c)	-19	-16	5	4	7	2	3	17

Notes

- Impact to DR is (a) – (b)

APF 2019-41 | ULSG RESULTS

Development of Net DR for illustrated interpretation scenarios

C.43 – No change in rates

	0	10	20	30	40	50	60
Pre-reinsurance DR (a)	1,524	5,210	5,938	4,521	2,852	1,390	500
Post-reinsurance DR (b)	1,491	5,145	5,806	4,405	2,781	1,368	478
Impact to DR (c)	33	65	132	116	71	23	21

C.44 – Break even after 1 year

	0	10	20	30	40	50	60
Pre-reinsurance DR (a)	1,978	5,652	6,313	4,811	3,010	1,440	494
Post-reinsurance DR (b)	1,918	5,506	6,097	4,651	2,947	1,438	487
Impact to DR (c)	60	147	216	159	63	2	7

Notes

- Impact to DR is (a) – (b)

APF 2019-41 | TERM RESULTS

Development of Net DR for illustrated interpretation scenarios

C.45 – No change in rates

	0	2	4	6	8	10	15	20
Pre-reinsurance DR (a)	-9	190	303	357	363	327	225	35
Post-reinsurance DR (b)	-39	170	264	327	343	324	222	18
Impact to DR (c)	30	19	38	30	20	3	3	17

C.46 – Break even in 1 year

	0	2	4	6	8	10	15	20
Pre-reinsurance DR (a)	-9	190	303	357	363	327	225	35
Post-reinsurance DR (b)	10	206	298	353	355	325	222	18
Impact to DR (c)	-19	-16	5	4	7	2	3	17

Notes

- Impact to DR is (a) – (b)

APF 2019-42 | ULSG RESULTS

Development of Net DR for illustrated interpretation scenarios

C.47 – Fully reactive after 1 year

	0	10	20	30	40	50	60
Pre-reinsurance DR (a)	1,978	5,652	6,322	4,903	3,183	1,627	640
Post-reinsurance DR (b)	2,102	5,814	6,462	5,031	3,283	1,694	650
Impact to DR (c)	-124	-161	-140	-129	-100	-67	-10

C.48 – Fully reactive after 1 year, including 10 year MI

	0	10	20	30	40	50	60
Pre-reinsurance DR (a)	1,978	5,652	6,293	4,761	2,962	1,407	476
Post-reinsurance DR (b)	1,896	5,501	6,068	4,609	2,912	1,413	473
Impact to DR (c)	82	151	225	151	50	-6	4

C.49 – Break even after 1 year

	0	10	20	30	40	50	60
Pre-reinsurance DR (a)	1,978	5,652	6,322	4,903	3,183	1,627	640
Post-reinsurance DR (b)	1,918	5,506	6,107	4,723	3,063	1,564	594
Impact to DR (c)	60	147	214	180	120	63	46

Notes

- Impact to DR is (a) – (b)

APF 2019-42 | TERM RESULTS

Development of Net DR for illustrated interpretation scenarios

C.50 – Fully reactive after 1 year

	0	2	4	6	8	10	15	20
Pre-reinsurance DR (a)	-9	190	303	357	363	327	225	35
Post-reinsurance DR (b)	11	218	310	370	381	356	241	20
Impact to DR (c)	-20	-28	-8	-13	-18	-29	-16	15

C.51 – Fully reactive after 1 year, including 10 year MI

	0	2	4	6	8	10	15	20
Pre-reinsurance DR (a)	-9	190	303	357	363	327	225	35
Post-reinsurance DR (b)	-15	186	278	338	347	324	221	18
Impact to DR (c)	6	4	25	19	15	3	4	17

C.52 – Break even after 1 year

	0	2	4	6	8	10	15	20
Pre-reinsurance DR (a)	-9	190	303	357	363	327	225	35
Post-reinsurance DR (b)	10	206	298	353	355	325	222	18
Impact to DR (c)	-19	-16	5	4	7	2	3	17

Notes

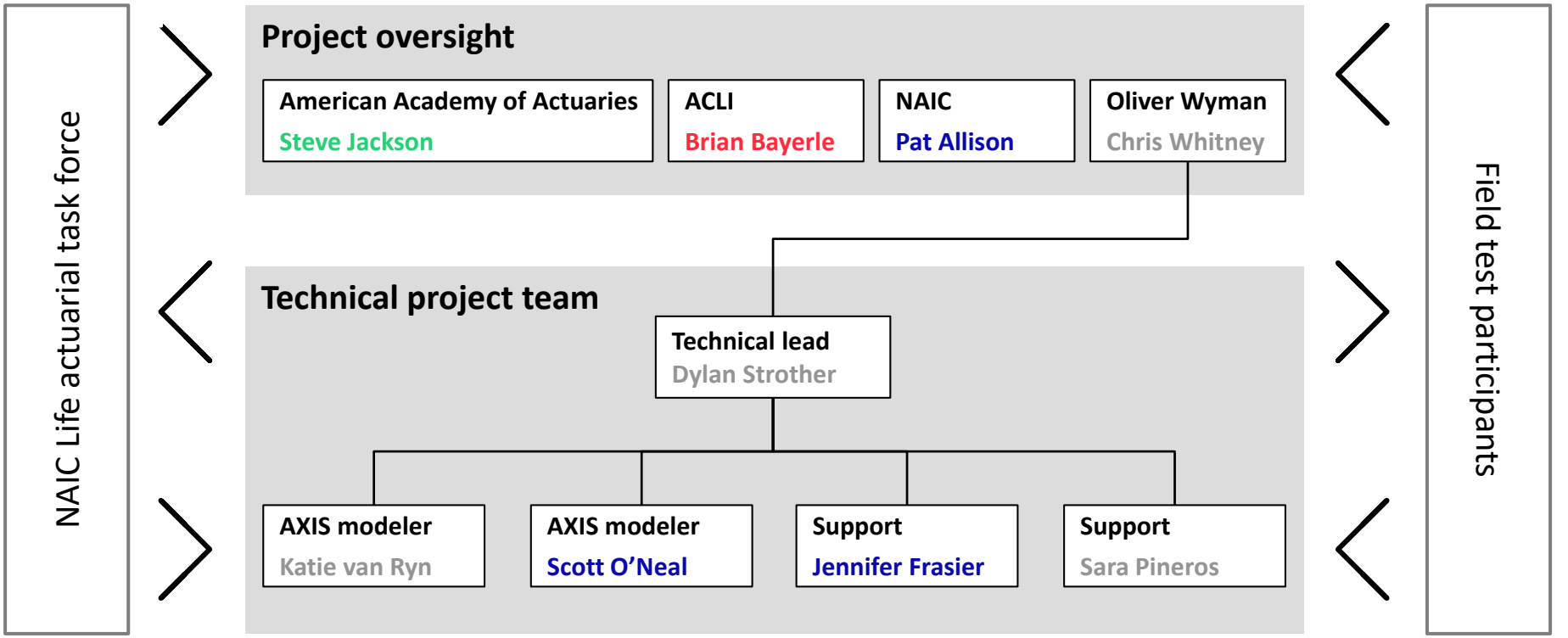
- Impact to DR is (a) – (b)

APPENDIX D

Project team

PROJECT TEAM AND GOVERNANCE

The consultant analysis will be overseen by NAIC Staff, the Academy, and the ACLI, as depicted in the following chart



OLIVER WYMAN TEAM

	Contact information	Role
	**Chris Whitney, FSA, MAAA** **Principal, Hartford** christopher.whitney@oliverwyman.com	Engagement manager
	**Dylan Strother, FSA, MAAA** **Senior Consultant, New York** dylan.strother@oliverwyman.com	Technical lead
	**Katie van Ryn, FSA, MAAA** **Consultant, Toronto** katie.vanryn@oliverwyman.com	AXIS model development
	**Sara Pineros** **Consulting Intern, Toronto** sara.pineros@oliverwyman.com	Support

The report and the findings herein are subject to the reliances and limitations outlined at the beginning of this report. This report is considered a statement of actuarial opinion under the guidelines promulgated by the American Academy of Actuaries. Chris Whitney, Dylan Strother and Katie van Ryn of Oliver Wyman developed this report and meet the qualification requirements of the American Academy of Actuaries to render the opinion contained herein.

QUALIFICATIONS, ASSUMPTIONS, AND LIMITING CONDITIONS

Oliver Wyman was engaged by the American Council of Life Insurers, the American Academy of Actuaries and the National Association of Insurance Commissioners to support an industry field test being conducted to aid the NAIC Life Actuarial (A) Task Force in the selection of a long-term solution for the treatment of non-guaranteed reinsurance under PBR.

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