OLIVER WYMAN

AMERICAN ACADEMY of ACTUARIES

NAIC National Association of Insurance Commissioners

ACLI

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

DECEMBER 5, 2019

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

MARSH & McLENNAN COMPANIES

QUALIFICATIONS, ASSUMPTIONS AND LIMITING CONDITIONS

Oliver Wyman was requested 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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Executive summary

Executive summary

Long-term solution for modeling non-guaranteed reinsurance

BACKGROUND

A wide range of practice was observed from early adopters of PBR in regards to the modeling of non-guaranteed reinsurance and a formulaic solution was adopted on an interim basis for the 2020 Valuation Manual.

A field test is being performed to aid the NAIC Life Actuarial (A) Task Force ("LATF") in the selection of a longer-term solution that is more principles-based.

ANALYTICAL SUPPORT

Oliver Wyman was selected to support and supplement the industry field test. The scope of our support is summarized below and further outlined in the remaining slides in this section of this presentation.

1 - Analysis and insights

Using generic industry models, Oliver Wyman will perform analysis that will be provided in advance of field test results and provide additional insights beyond those provided by field test participants, informed by a survey on broader industry practices. As needed, analysis outside the scope of the field test may be performed.

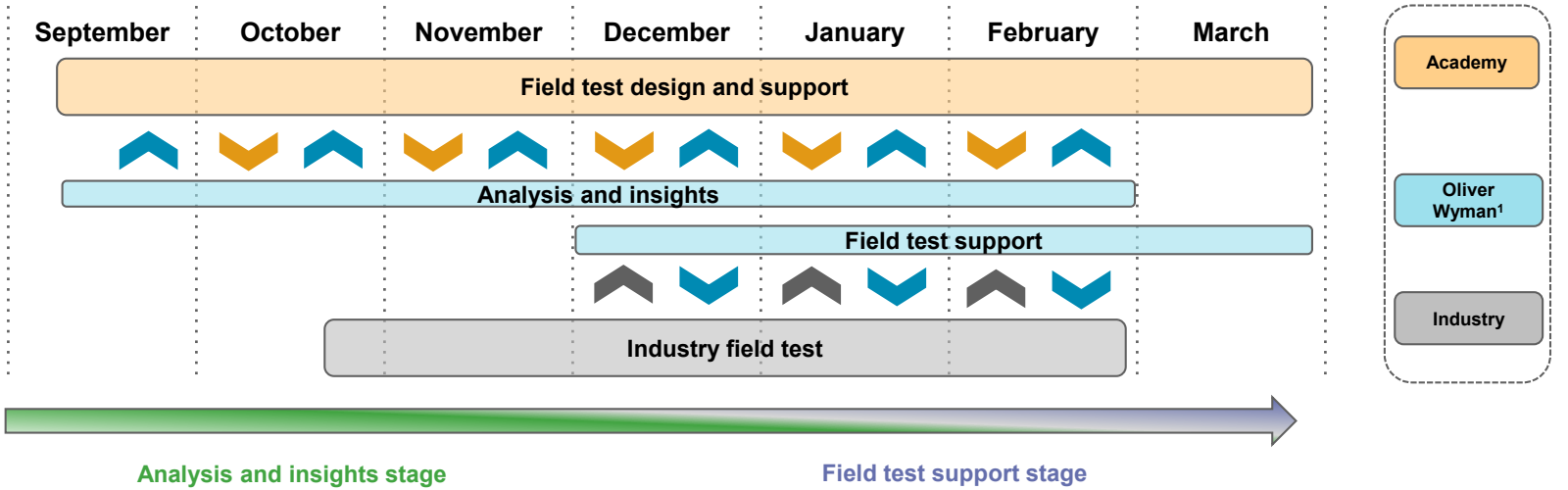
2 - Field test support

Oliver Wyman will lead calls with field test participants and assist in the preparation and interpretation of results. Additionally, analysis will be performed to better understand the range of variation in participant results (e.g., company and reinsurance structure, field test interpretations, modeling simplifications and/or limitations).

The purpose of today's presentation is to share details on the design of the analysis models as well as initial insights

Timeline

Oliver Wyman will support the stages of the field test depicted below



Analysis and insights

- Field test participants will prepare their models for the field test while Oliver Wyman performs deep analysis across a range of products and reinsurer-action scenarios to provide regulators with representative potential solutions impacts on an apples-to-apples basis. Initial analysis will be shared with LATF at the Fall NAIC meeting (December 2019) and subsequent analysis shared at the Winter NAIC meeting (March 2020)

Field test support

- The industry field test will commence; initially the focus will be on model preparation, testing of simple solutions and point-in-time reserve impacts, with a goal of identifying model challenges and testing the integrity and range of variability in the results of Oliver Wyman's analysis
- Field test participants will produce projected reserves for the various solutions, while Oliver Wyman assists with the interpretation and collection of results. The results of this test will give regulators additional comfort with conclusions drawn from the initial analysis by extending the range of results for optionality and variation not previously captured.

Deliverables for the stages of work are described on the next slide

[1] Oversight from Academy, NAIC and ACLI. See Appendix D for further details

Deliverables

Deliverables for the stages of work shown on the prior slide are described below

Stage	Deliverables
Analysis and insights	• AXIS models, documentation and Testware which will be made available to the NAIC[1] • Initial analysis and associated model design, with capabilities to analyze the impact field tested proposals across a range of product types, reinsurance structures and reinsurer reaction scenarios[2] • "Range of interpretation survey" intended to further understanding on the range of interpretations for field tested proposals across a much larger participation base than the actual field test
Field test support	• Conference calls with field test participants to ensure consistent understanding of field testing instructions and provide advice in light of any model simplifications or limitations (one-on-one calls with participants will be used as needed) • Reports summarizing results from industry field test, with additional analysis to further understanding of these results[3] (Note: Separate reports will be created for point-in-time and projected reserves due to the timing of the field test) • Additional analysis performed in light of responses to "range of interpretation" survey and beyond the scope of the field test (if desired by LATF to allow an informed decision to take place)

[1] See Appendix C for further details
[2] Using reinsurer reaction scenarios as opposed to treaty provisions will provide more flexibility in how the results are used because reaction scenarios can be mapped to treaty provisions
[3] Oliver Wyman will help bridge the impact of model simplifications (e.g. no assumption unlocking in participation submissions) to increase the relevancy of field test results

Initial analysis and insights

Assumptions and modeling methodology[1] underlying the results shown today are summarized below

Component	Description
Model	• GGY AXIS • 60 year projection horizon (30 for Term)
Best estimate assumptions	• Liability assumptions are intended to reflect industry averages and are based on analysis from recent SOA experience studies • Future mortality improvement is .75% per year in all years • Current scale of YRT rates equal to best estimate mortality
Prudent estimate assumptions	• Mortality is improved to each valuation date to reflect historic mortality improvement • Initial sufficient data period equal to 15 years and increased by one year at each future valuation date, subject to maximum years of sufficient data allowed for under VM-20 for the given level of credibility • Prudent margins intended to reflect industry averages with a separate set of mortality margins to resemble a small/mid-sized and large insurer (or reinsurer)
Reserve assumptions	• The NPR uses the 2017 CSO and a valuation interest rate of: 4.5% for calculations subject to VM-20 Sections 3.b.4 and 3.b.6 and 3.5% for calculations subject to VM-20 Section 3.A.2 and 3.b.5 • The valuation scenario for the DR follows the 12/31/2018 scenario at each valuation date • Starting assets at each valuation date use the 'direct iteration' approach • The DR (and if shown, SR) are re-valued annually for 10-years and every 5-years thereafter. Reserve balances are interpolated using policy level reserve calculations between re-valuation dates and smoothed to account for any "reserve blips" caused by the reinvestment frequency and resulting earned rates.

Analysis is intended to align with industry field test instructions and the products and assumptions are intended to be broadly representative of the industry

[1] See Appendix B for further details

Background

Background

This section explores the relationship between mortality margin and the impact that reinsurance has on reserves under PBR

1 **Mortality and PBR prescribed margins**

2 **Impact of mortality margins**

3 **Projected reinsurance credit**

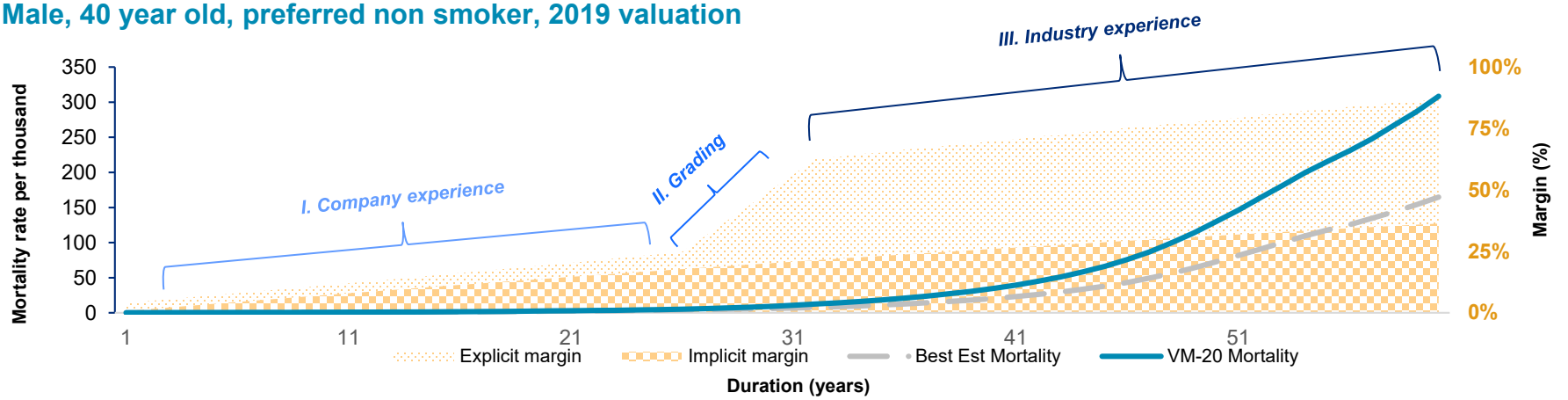
4 **Formulaic reserve credit**

Results are presented for two sets of boundary reinsurer reactions under PBR mortality margins, and an analytical benchmark (10% mortality margin)

Mortality and PBR prescribed margin

Level of margin by VM-20 mortality assumption component is illustrated below

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

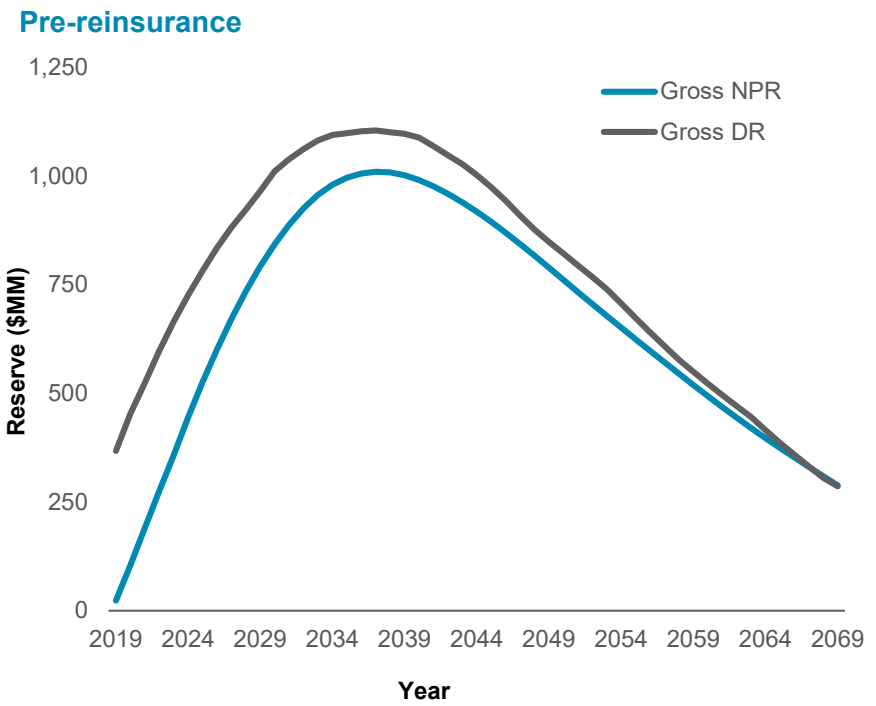


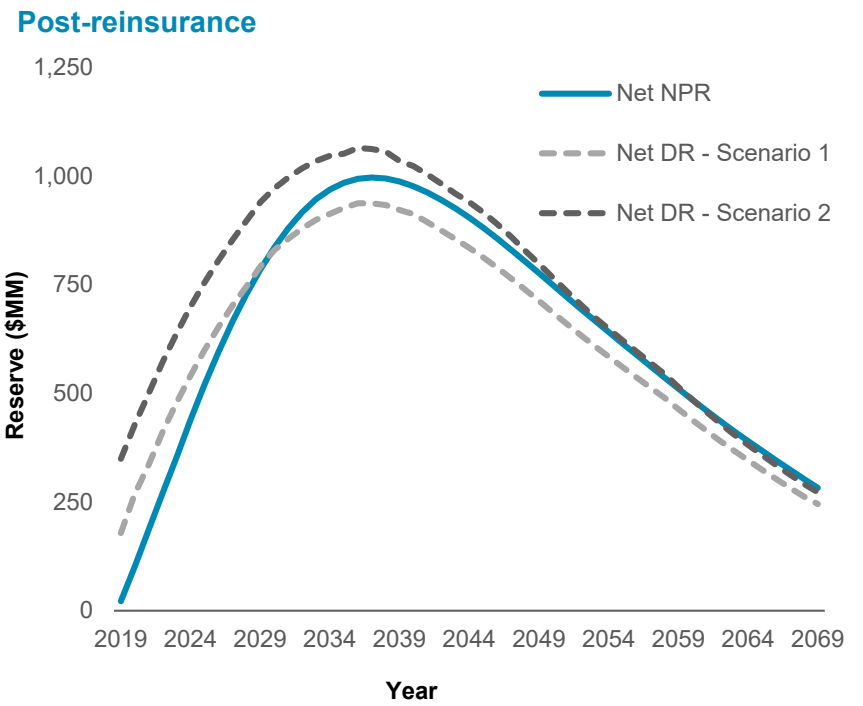
	PBR mortality components	Applicable duration	Assumption structure	Margin type
I.	100% company experience phase	Duration < sufficient data period + maximum years before grading start	Anticipated experience ⊠ (1 + Experience margin)	Explicit
II.	Grading to industry phase	Duration between I and III	Linearly 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 of mortality margins (1/2)

The impact of a 50% first dollar YRT reinsurance agreement with the current scale of rates equal to best estimate mortality is shown below





YRT Scenario 1: No change in rates

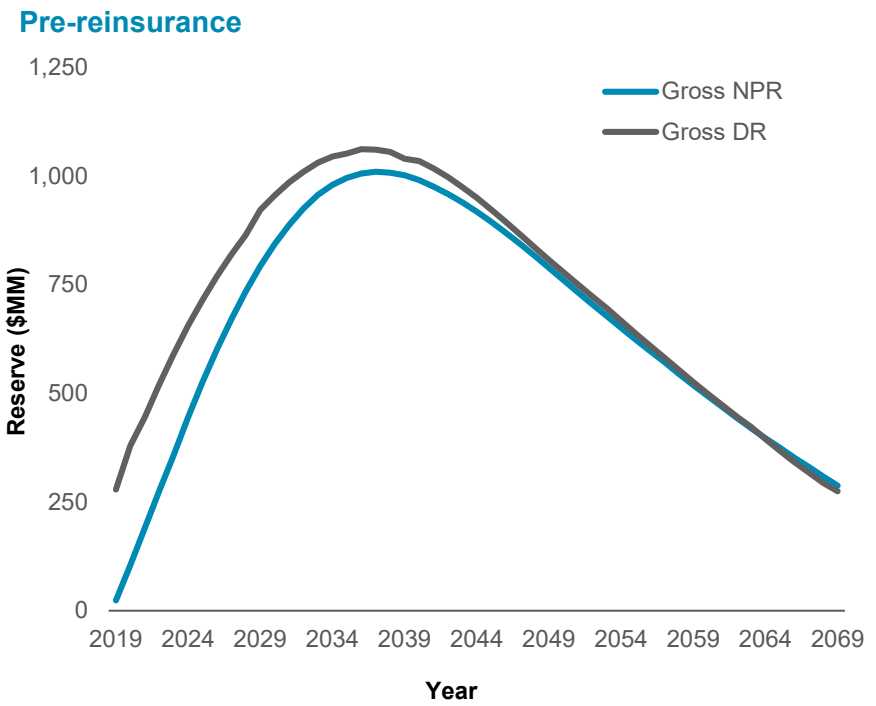
YRT Scenario 2: Increase rates to equal PBR mortality[1]

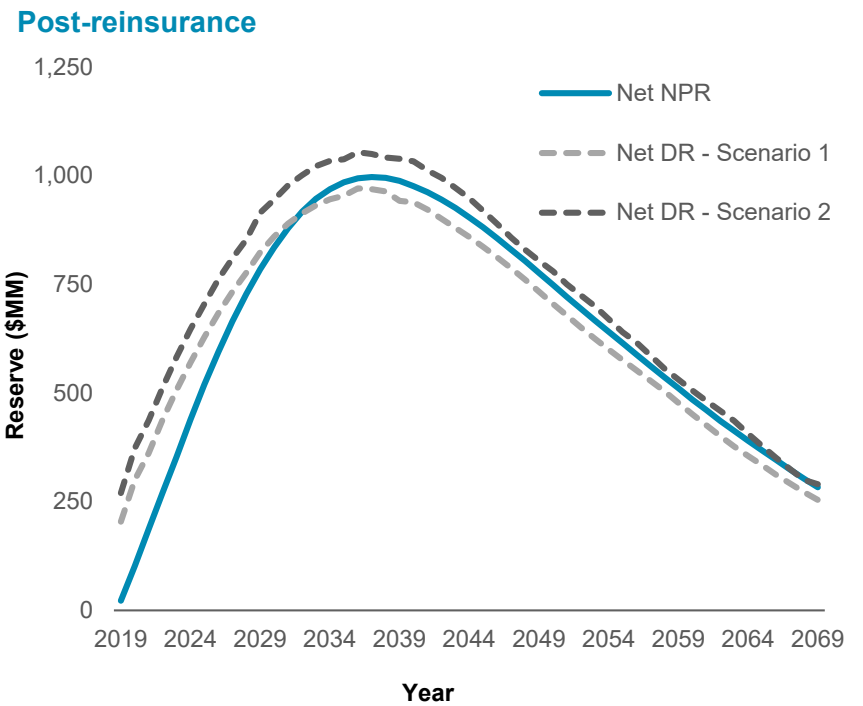
The impact of reinsurance depends largely on the modeled reinsurer reaction

[1] Rates are increased annually, on policy anniversary, by an amount equal to the difference between PBR mortality and the current scale of YRT rates

Impact of mortality margins (2/2)

The impact of the 50% reinsurance agreement is re-evaluated below after updating the PBR mortality assumption to use a level 10% margin





YRT Scenario 1: No change in rates

YRT Scenario 2: Increase rates to equal PBR mortality[1]

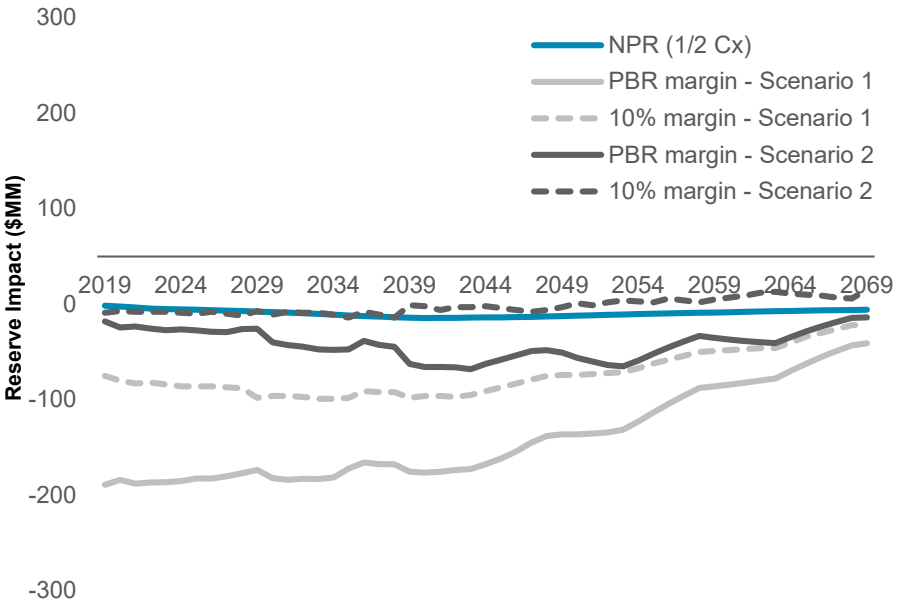
The impact of reinsurance depends largely on the modeled reinsurer reaction

[1] Rates are increased annually, on policy anniversary, by an amount equal to the difference between PBR mortality and the current scale of YRT rates

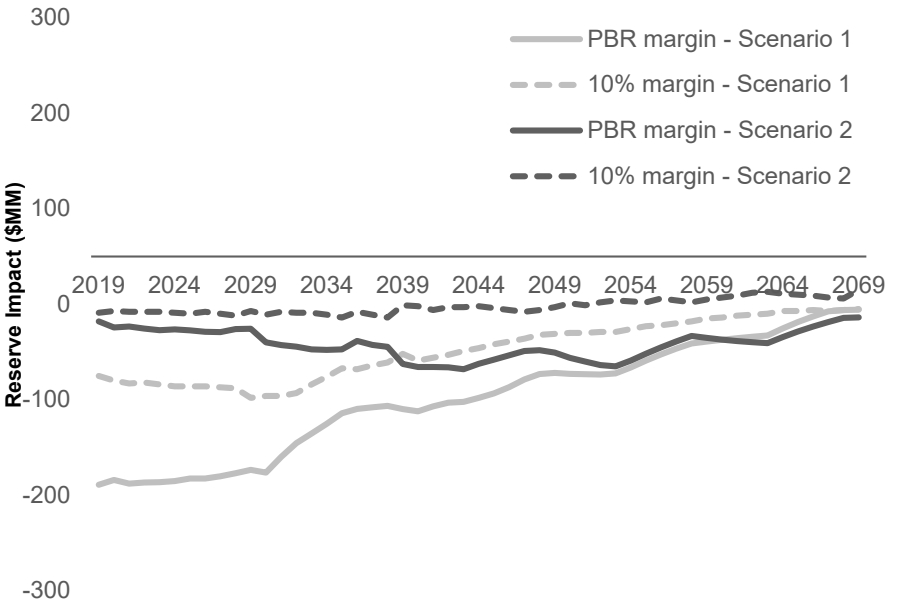
Projected reinsurance credit

The reinsurance reserve credit (difference between pre- and post-reinsurance reserve) under the two sets of margins is shown below

Impact on deterministic reserve



Impact on PBR reserve (max of NPR and DR)[1]



YRT Scenario 1: No change in rates

YRT Scenario 2: Increase rates to equal PBR mortality[1]

The impact of reinsurance on PBR margins gets closer to the analytical benchmark over time because of mortality assumption unlocking at future valuation dates

[1] Rates are increased annually, on policy anniversary, by an amount equal to the difference between PBR mortality and the current scale of YRT rates

Key takeaways

Takeaway		Justification
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 scenario tested allow for: ○ Reinsurer reaction that reflects differences between evolution of mortality margin and reinsurance premium payment dates ○ Contractual provisions around the return of future unearned reinsurance premiums on death and lapse ○ Other mechanical differences due to VM-20 requirements (e.g. differences in starting assets and the 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

Analysis 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 contains the results of sensitivities performed to confirm this level of granularity. See Appendix B for further details on the analysis design.

Reinsurer reaction scenarios

Proposed coverage is shown below. As needed, these results will be produced for the methodology analysis dimensions (e.g., product, company size, reinsurance attributes)

Reinsurer reaction	Change to non-guaranteed YRT rates	
N/A: Informational	• N/A: Allow future mortality improvement in reserves	APF 2019-40
	• N/A: Best estimate assumptions / economic reserve	
	• N/A: Interim solution (½ Cx credit)	
None	• No change	
Immediate	• Increase by 100% of prescribed mortality margin[1], excluding future mortality improvement	APF 2019-41
	• Increase by 100% of prescribed mortality margin[1], including future mortality improvement	
	• Same as previous, except assuming ½ of best estimate mortality improvement	
	• Same as previous, except assuming 2x of best estimate mortality improvement	
	• Increase by the difference between current scale and PBR mortality	
	• Increase by 105% of the difference between current scale and PBR mortality	
	• Increase by 110% of prescribed mortality margin[1], excluding future mortality improvement	APF 2019-42
	• Increase by 110% of prescribed mortality margin[1], including future mortality improvement	
Delay 5-years	• Same as immediate, but no change to rates until 5-years after each valuation date	
Delay 10-years	• Same as immediate, but no change to rates until 10-years after each valuation date	

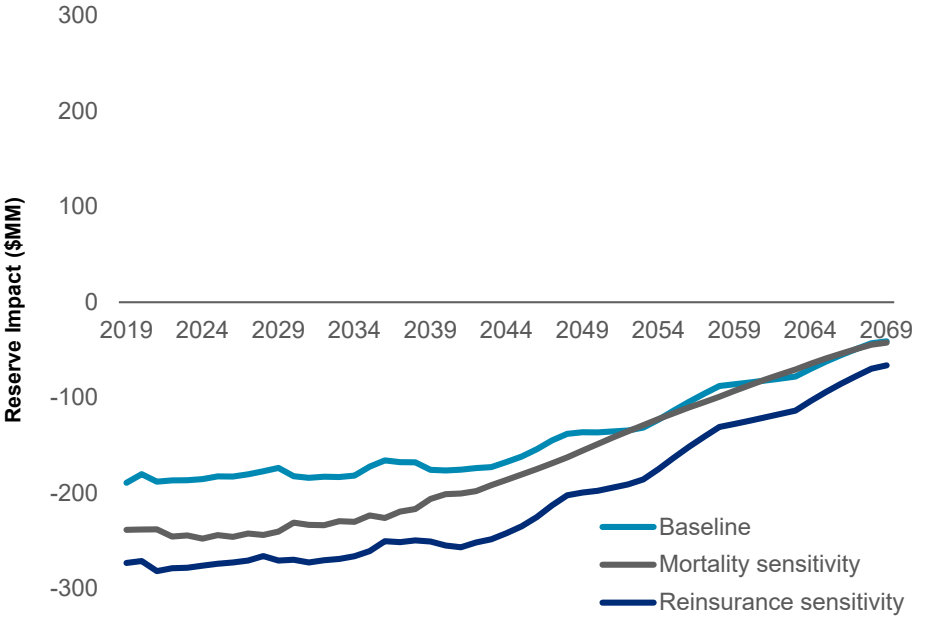
[1] Includes both progressive and immediate reaction. The mortality margin will be evaluated on both an additive ($q_{valuation} - q_{experience}$) and multiplicative ($q_{valuation} / q_{experience}$) basis.

These results will be produced primarily to assist with the analysis and interpretation of field test results

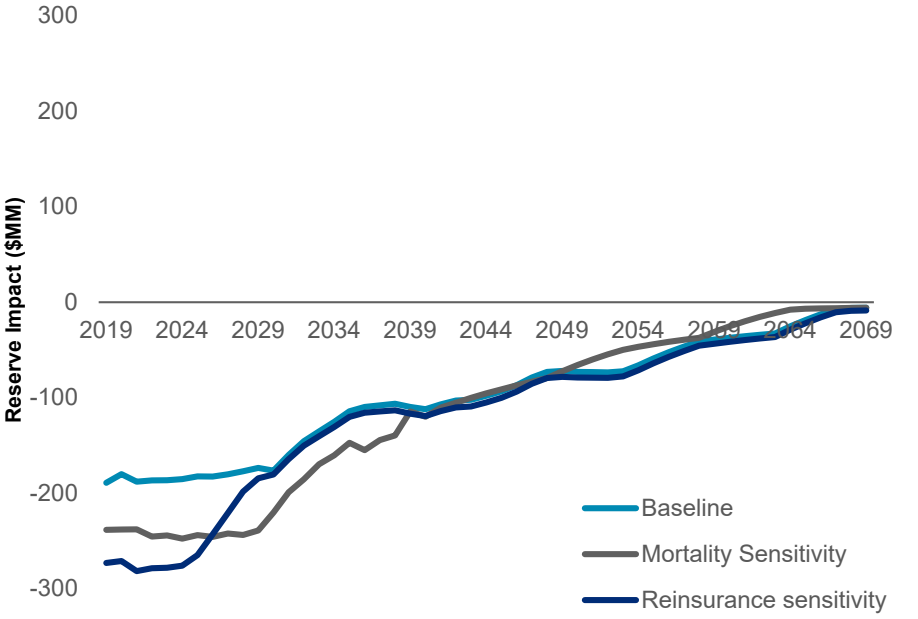
Impact analysis | High granularity

The following summarizes the impact reinsurance on PBR reserves for the sensitivities on model components with high granularity

Impact on Deterministic Reserve [1]



Impact on PBR reserve (max of DR and NPR)[1]



Mortality: Reduce credibility and sufficient data period (5 years and 50%, respectively)

Reinsurance: Increase portion of business reinsured to 75%

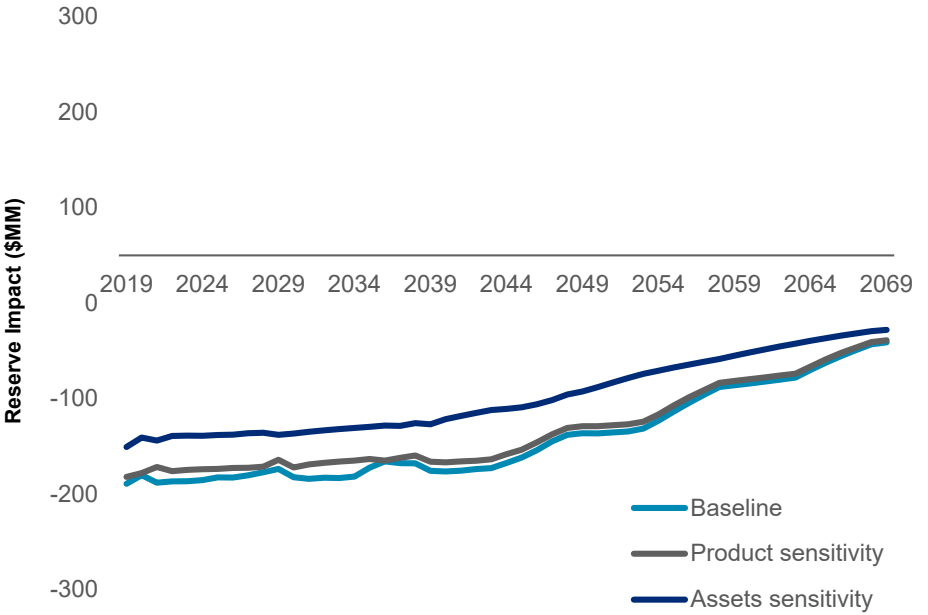
Both the properties of reinsurance and mortality have a significant impact on the reinsurance reserve credit

[1] See Appendix A for projected gross and net reserves.

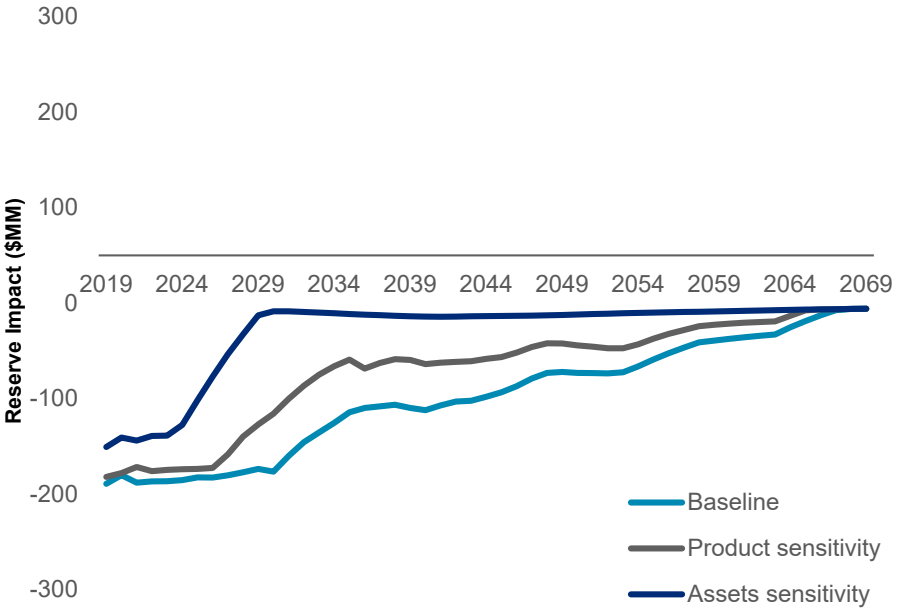
Impact analysis | Low-medium granularity

The following summarizes the impact reinsurance on PBR reserves for the sensitivities on model components with low-medium granularity

Impact on Deterministic Reserve [1]



Impact on PBR reserve (max of DR and NPR)[1]



Product: Increase product cost by increasing premium loads by 5% in all years

Yield curve: Increase all points of outer loop yield curve by 100bps

The product and yield curve sensitivities have a lower impact on the reinsurance reserve credit

[1] See Appendix A for projected gross and net reserves.

Initial insights and analysis

Scope of field test

The scope of the industry field test is focused on the "field test modified" APFs discussed on the September 12th LATF call and summarized below

APF	Description	Field testing variations
2019-40	• Actuarial judgement with clarified modeling principles/guidance	• Prudent estimate of all counterparty actions • Prudent estimate of rate changes only after reaching 115% reinsurer loss ratio • Model prudent estimate of rate changes only after reaching 5 consecutive years of reinsurer losses
2019-41	• Reinsurance margin such that the difference between best estimate mortality and the current scale of YRT rates is maintained	• Best estimate mortality (for the purposes of calculating reinsurance margin) contains future mortality improvement for 15 years at a rate of 0%, .5% and 1% per year
2019-42	• Increase reinsurance rates by reinsurance premium margin, equal to the percentage difference between PBR and best estimate mortality • Judgment modifications are allowed (if these are less conservative, other than recapture, then they require commissioner approval)	• Future mortality improvement included in best estimate mortality (used for the purpose of calculating reinsurance margin) for 5, 10, 15 and 20 years

The field test submission calls for two baselines; the interim solution (½ Cx) and a scenario where no change from the current scale of YRT rates is assumed

Initial analysis

The remainder of this section focuses on representative impacts for the field-tested APFs, as summarized in the table below. In addition the impact is provided for the two baselines described on the prior slide.

APF	Field testing variations	Initial analysis parameters
2019-40	• Prudent estimate of all counterparty actions • Prudent estimate of rate changes only after reaching 115% reinsurer loss ratio • Model prudent estimate of rate changes only after reaching 5 consecutive years of reinsurer losses	• YRT rates are increased by 105% of the difference between the current scale and PBR mortality, until recapture in 2044[1] • No change in YRT rates until 2024[1] at which point YRT rates are increased by an additional 5% of the difference between PBR mortality and the current scale of rates each year until 2044[1], at which point rates have been increased by 100% of the difference
2019-41	• *Description:* Reinsurance margin such that the difference between best estimate mortality and the current scale of YRT rates is maintained • *Variations:* Best estimate mortality (for the purposes of calculating reinsurance margin) contains future mortality improvement for 15 years at a rate of 0%, .5% and 1% per year	• Reinsurance premiums increased by the relative difference between PBR and best estimate mortality • Mortality improvement on best estimate mortality (used for the purpose of calculating reinsurance margin) limited to 15 years at a rate of .75% per year (Note: The current scale of YRT rates is unchanged)
2019-42	• *Description:* Increase reinsurance rates by reinsurance premium margin, equal to the percentage difference between PBR and best estimate mortality • *Variations:* Future mortality improvement included in best estimate mortality for 5, 10, 15 and 20 years	

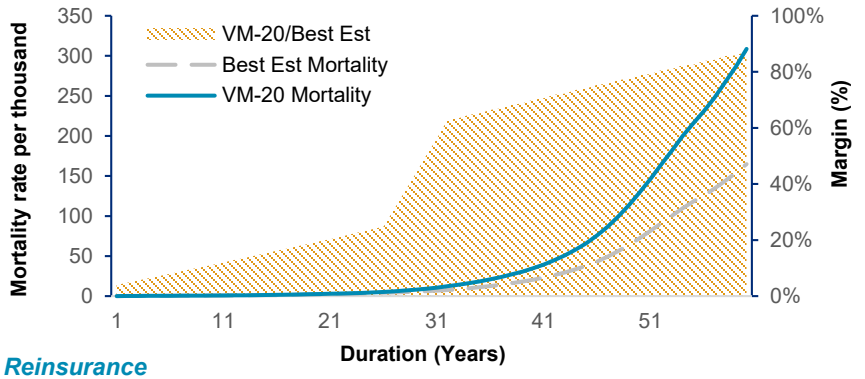
The purpose of these results is to foster dialogue around these APFs, the format results are presented in, and any desired follow-up analysis

[1] This calendar year is fixed (i.e. doesn't change at future valuation dates)

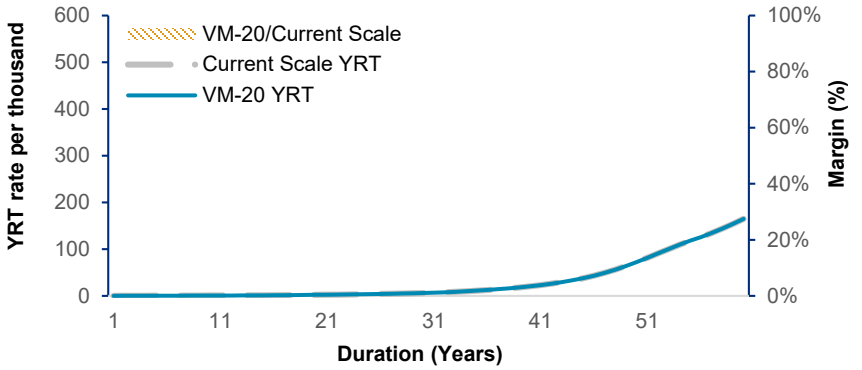
Impact analysis | Baseline
½ Cx and no change to current scale of YRT rates

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

Mortality

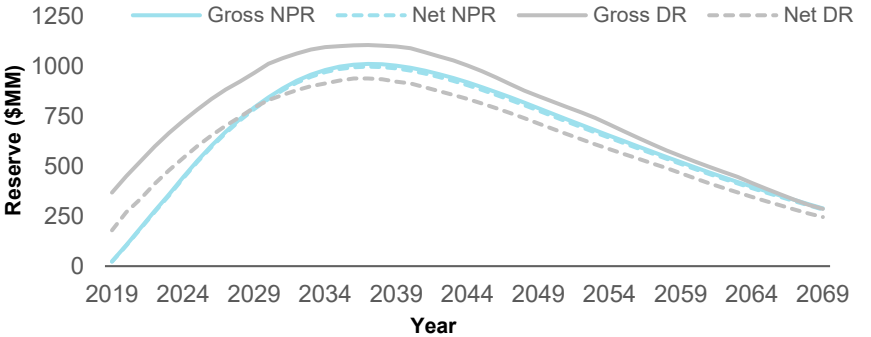


Reinsurance

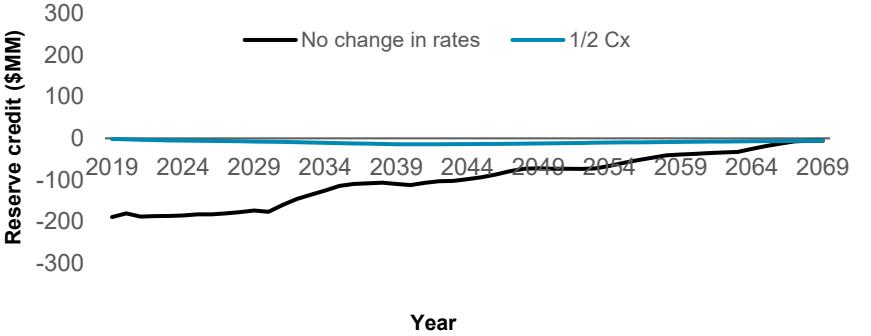


Projected reserves
Baseline | ½ Cx and no change in YRT rates

Gross and net reserves



Reinsurance credit – PBR reserve



There is no margin on reinsurance premiums under the baseline results because the first is formulaic and the second assumes that YRT rates are unchanged

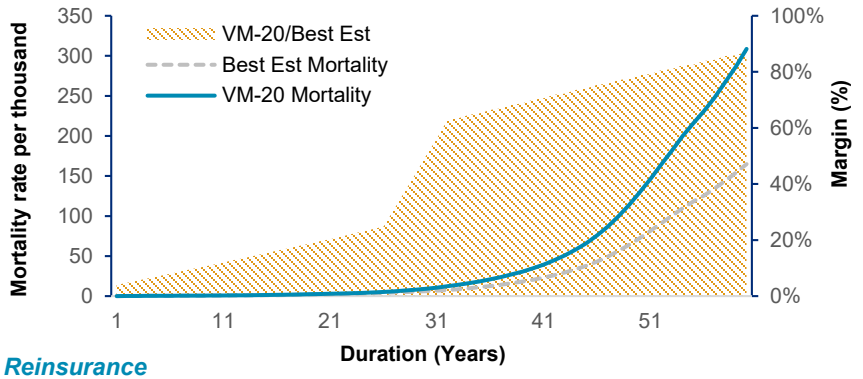
Impact analysis | APF 2019-40

YRT rates are increased by 105% of the difference between the current scale and PBR mortality, until recapture in 2044

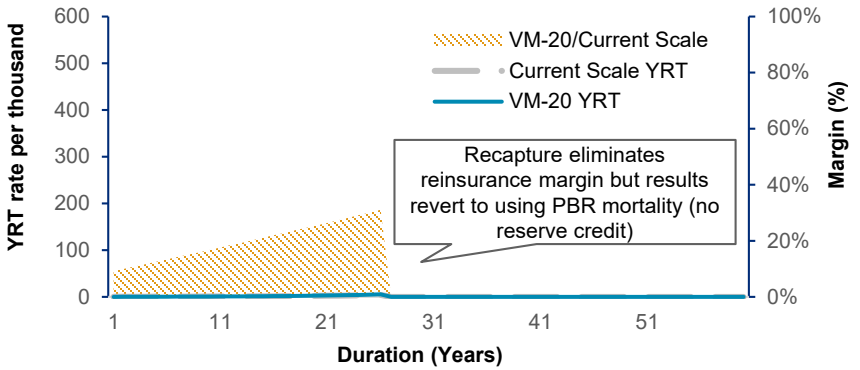
Mortality and reinsurance margins

40-year-old male, preferred non-tobacco, 2019 valuation

Mortality



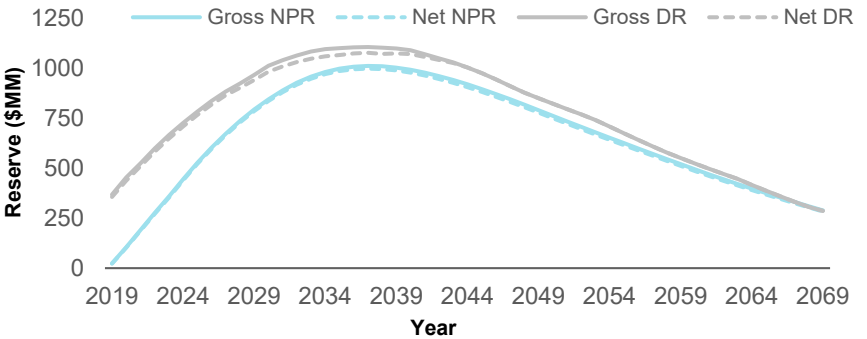
Reinsurance



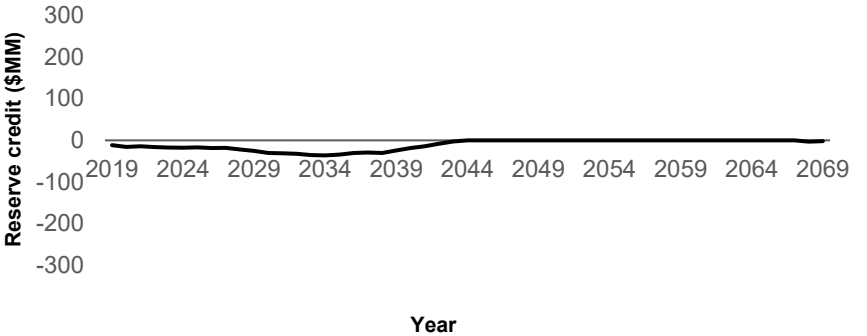
Projected reserves

APF 2019-40 | YRT rate increase followed by recapture

Gross and net reserves



Reinsurance credit – PBR reserve



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

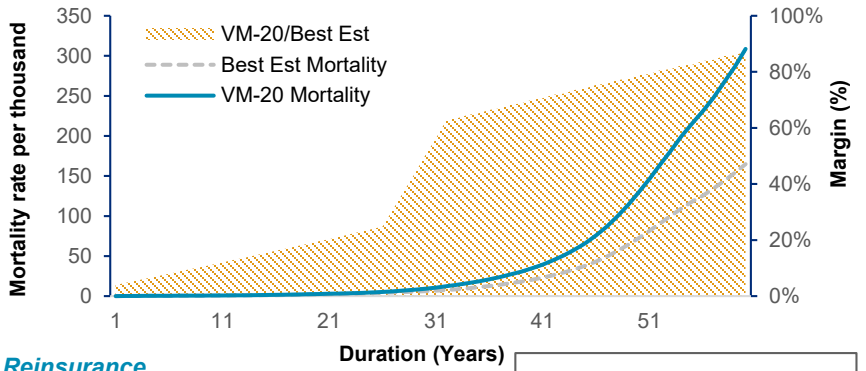
Impact analysis | APF 2019-40

No change in YRT rates until 2024 followed by progressive increases to break even in 2044 and later

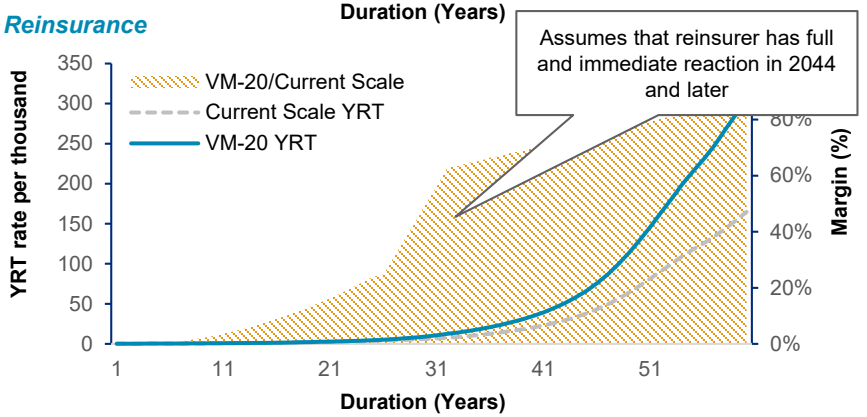
Mortality and reinsurance margins

40-year-old male, preferred non-tobacco, 2019 valuation

Mortality



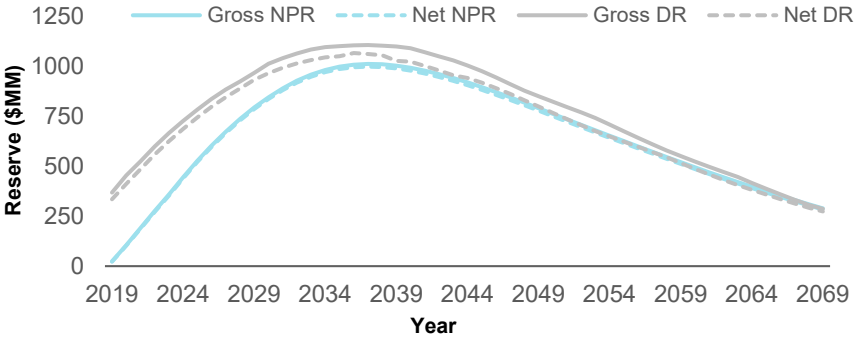
Reinsurance



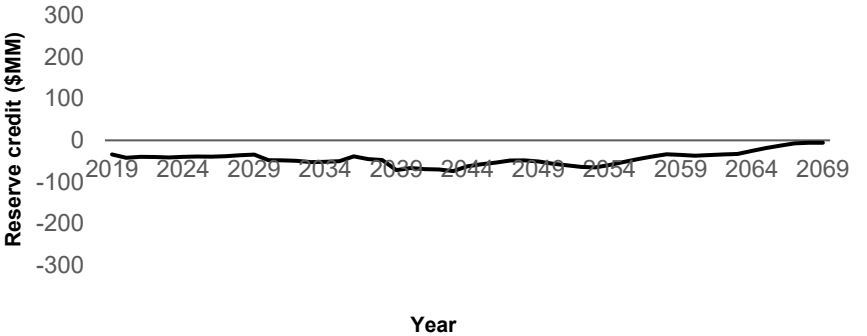
Projected reserves

APF 2019-40 | Progressive rate increases starting in 2024

Gross and net reserves



Reinsurance credit – PBR reserve



The reserve credit is higher than the prior slide because of a slower reinsurer action. The reserve credit persists beyond 2044 because recapture is not modeled.

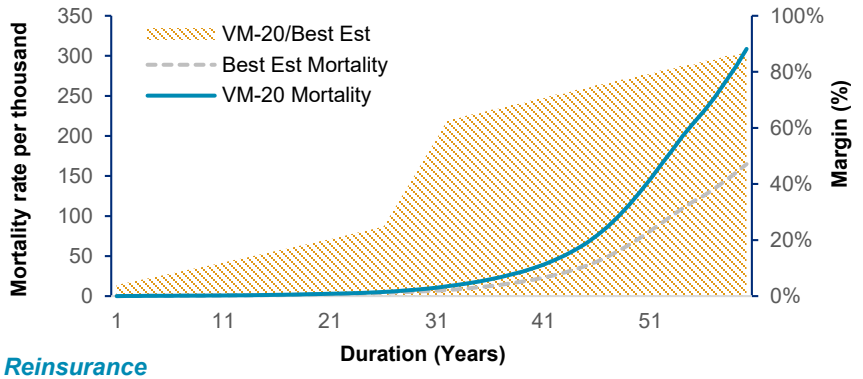
Impact analysis | APFs 2019-41, 2019-42

Future mortality improvement included in the best estimate component of reinsurance margin for 15 years at a rate of .75% per year

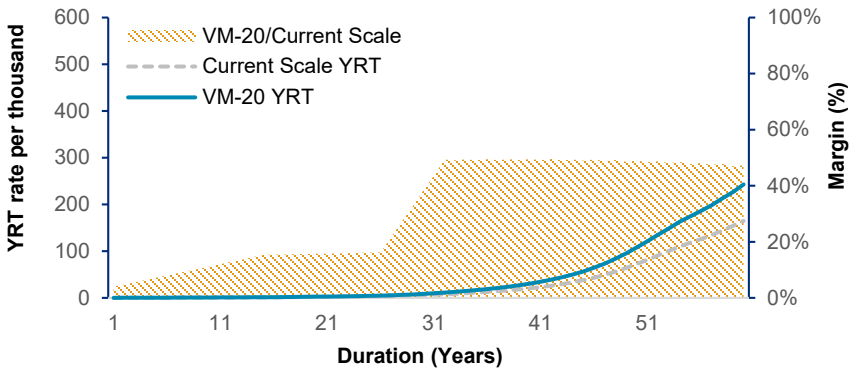
Mortality and reinsurance margins

40-year-old male, preferred non-tobacco, 2019 valuation

Mortality



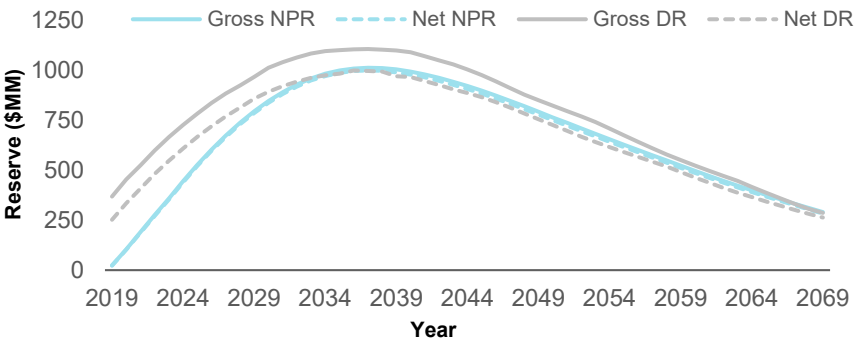
Reinsurance



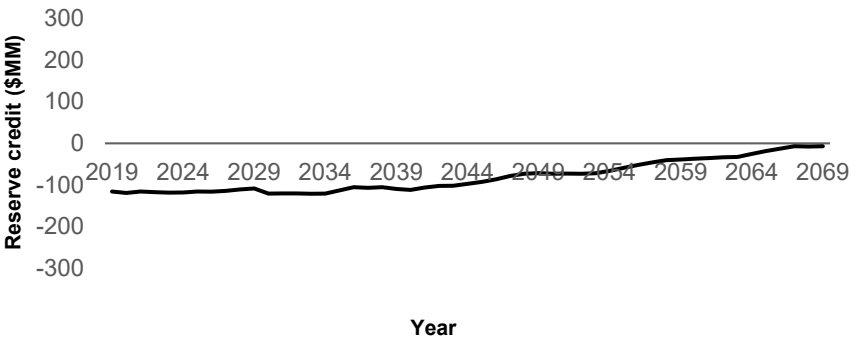
Projected reserves

APFs 2019-41, 2019-42 | 15 years of improvement

Gross and net reserves



Reinsurance credit – PBR reserve



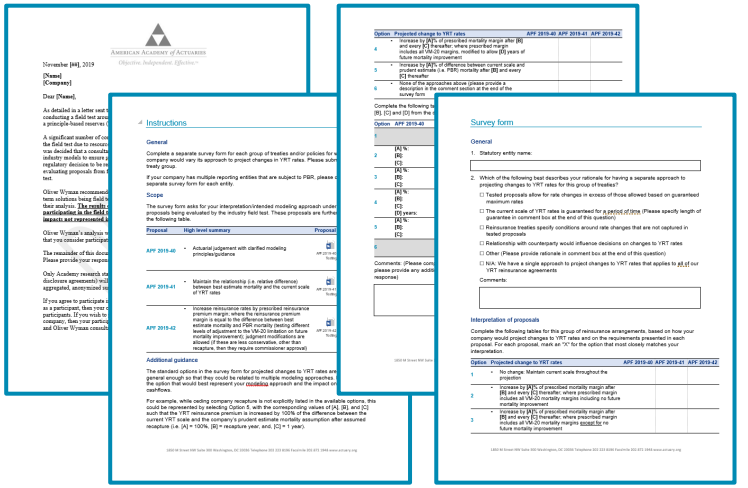
The impact of APFs 2019-41 and 2019-42 are equal due to the selection of mortality improvement parameters and the method used to calculate the reinsurance margin

Next steps

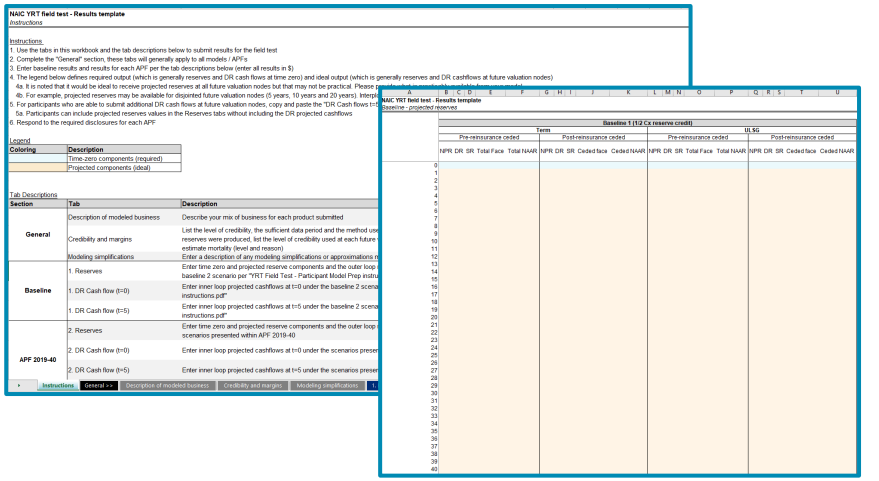
Listed below are next steps for the analysis and field test

Next Step		Target Date	Description
1	Point in time reserves	February 2020	Oliver Wyman to confirm and share results of industry field test for point-in-time reserves as well as additional consultant analysis at a LATF call in February
2	APF results	March 2020	Oliver Wyman to share APF specific results informed by industry range of practice survey at the March LATF meeting
3	Projected reserves	April 2020	Oliver Wyman to work alongside companies to develop projected reserves and share results with LATF at an April call
4	Draft amendment	May - June 2020	Academy working group will work with LATF to draft an amendment and expose for comment. Oliver Wyman will perform additional analysis as needed.

Range of interpretation survey



Field test submission format

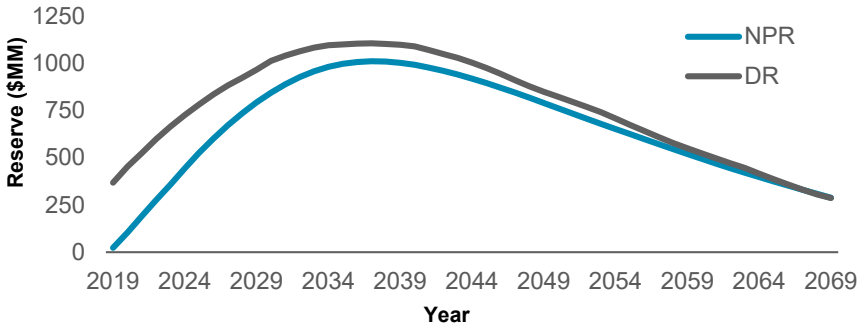


Appendix A | Supplementary results

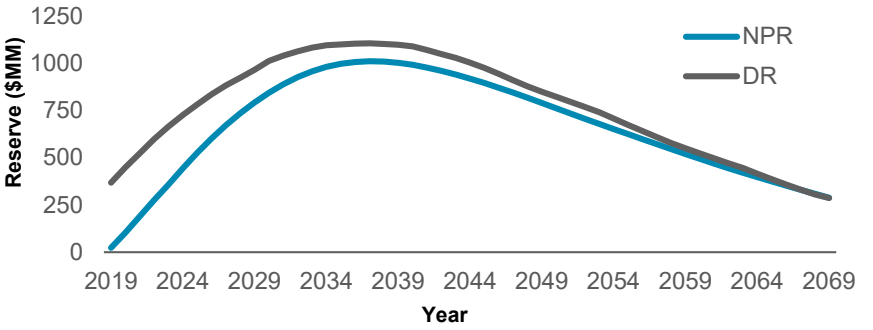
Impact analysis | gross reserves (1 of 2)

Pre-reinsurance reserves are shown below for the sensitivities on model components with high granularity

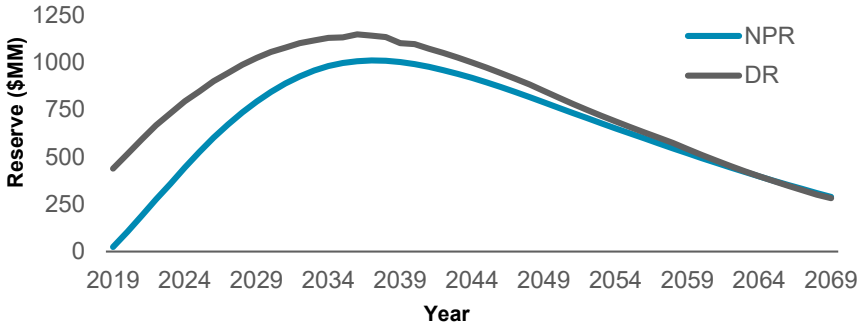
Baseline
Results from Section 1



Reinsurance sensitivity
Reduce portion of business reinsured



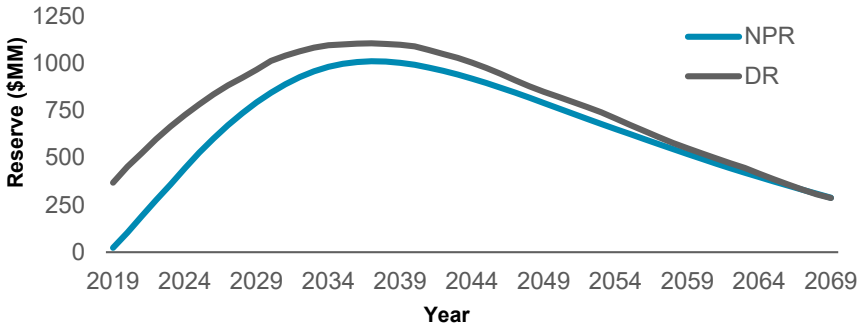
Mortality sensitivity
Reduced credibility and years of sufficient data



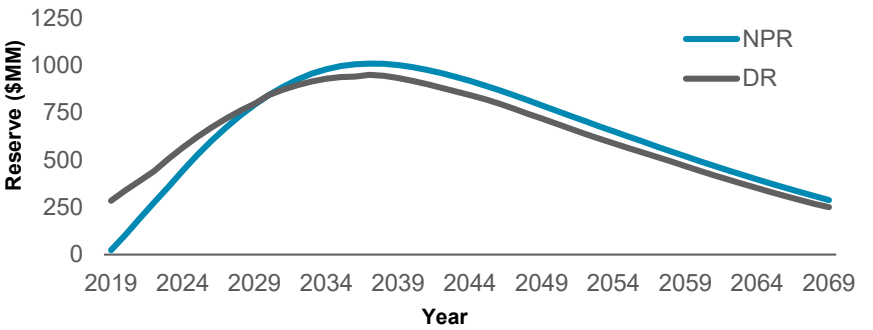
Impact analysis | gross reserves (2 of 2)

Pre-reinsurance reserves are shown below for the sensitivities on model components with low-medium granularity

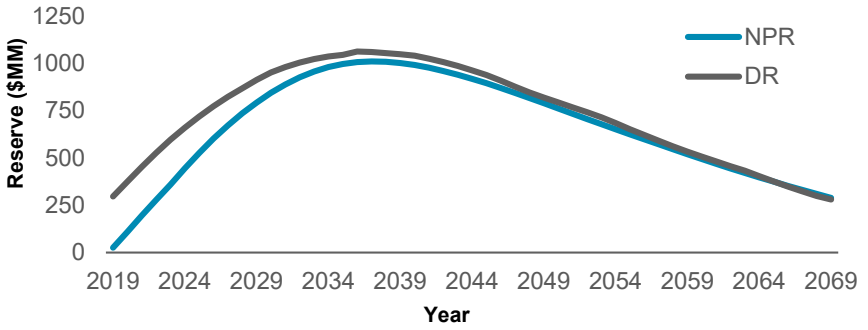
Baseline
Results from Section 1



Assets sensitivity
100bps increase to outer loop yield curve



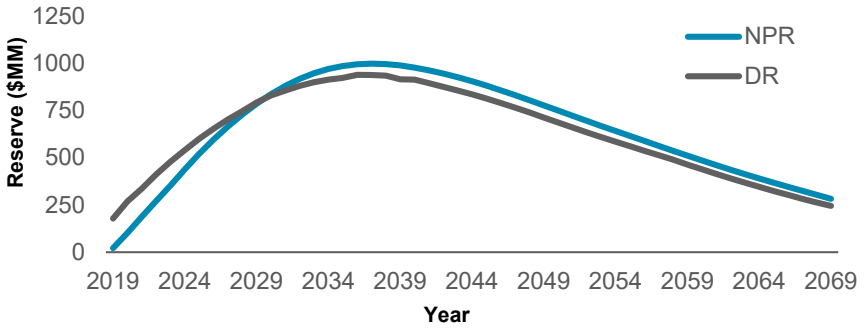
Product sensitivity
5% increase in premium loads (and retail premiums)



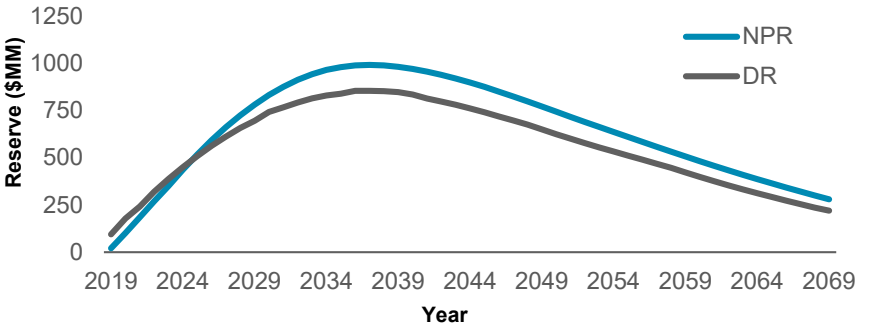
Impact analysis | net reserves (1 of 2)

Post-reinsurance reserves are shown below for the sensitivities on model components with high granularity

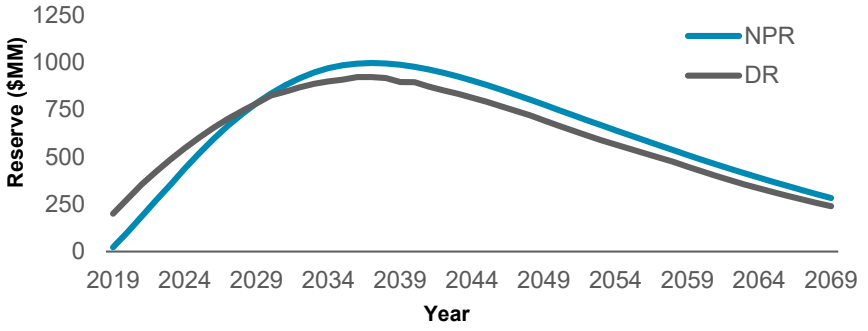
Baseline
Results from Section 1



Reinsurance sensitivity
Reduce portion of business reinsured



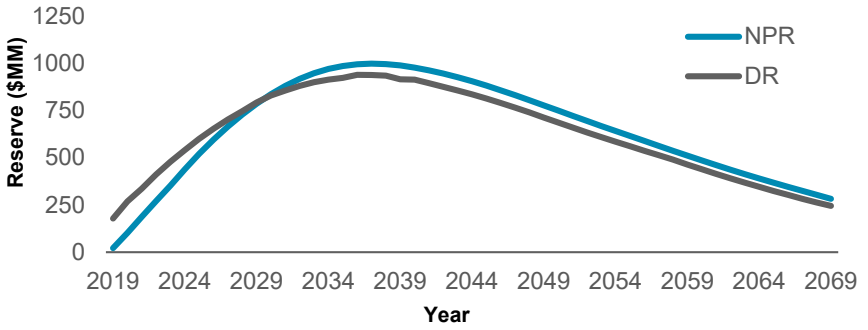
Mortality sensitivity
Reduced credibility and years of sufficient data



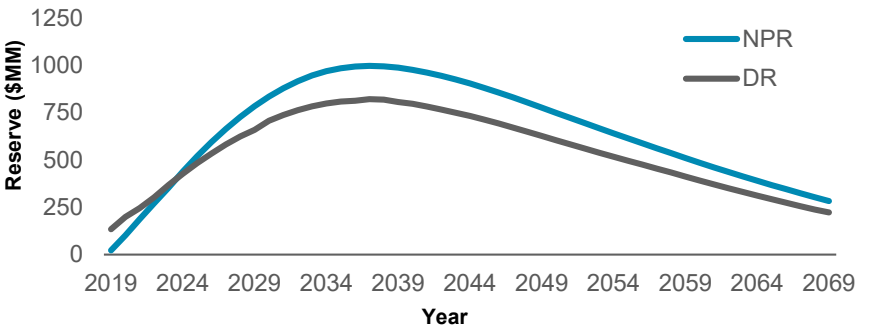
Impact analysis | net reserves (2 of 2)

Post-reinsurance reserves are shown below for the sensitivities on model components with low-medium granularity

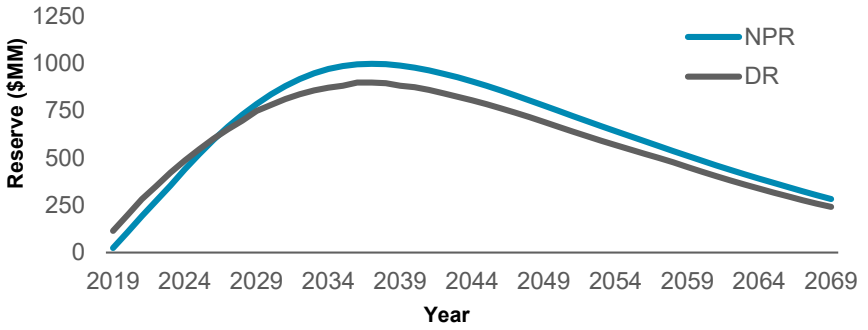
Baseline
Results from Section 1



Assets sensitivity
100bps increase to outer loop yield curve



Product sensitivity
5% increase in premium loads (and retail premiums)



Appendix B | Model design and assumptions

Methodology analysis dimensions

The proposed coverage for the analysis is summarized below

Component	Granularity	Coverage
Reinsurance	Very high	• Amount of reinsurance (None, 10% and 50%) • Attachment point (First-dollar and excess of retention) • Relationship between the current scale of YRT rates and best estimate mortality (i.e., equal to, less than and greater than) • Default/company recapture and various reinsurer reaction scenarios (See next section)
Mortality	High	• Different best-estimate mortality improvement rates (0%, .5%, .75%, 1% per year) and levels of credibility & years of sufficient data
Reserves	Medium	• Projected reserves will be calculated based on the 2020 Valuation Manual and set to the Max(NPR, DR) with the SR enabled for select runs • Reserves will be re-valued annually
Products and population	Medium	• Mix of business by issue age, risk class, gender and band for Term (T10 and T20), ULSG (Shadow account, lifetime guarantee) and CAUL (5-year specified premium guarantee, general account only) products issued on June 30, 2019
Assets	Low	• Reinvestments only, level yield curve • 50/50 mix of A/AA assets with 15-year duration in both inner and outer loop (Note: Credit spread and defaults will vary by inner and outer loop)

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 • .75% annual future mortality improvement	• Prescribed margins applied to company mortality • Industry table: 2015 VBT with prescribed margins and mortality improvement scale • Grading and margins assumes 100% LF credibility
Lapse	• 3% annual lapse rate	• 2% annual lapse rate
Expenses	• $50 per policy (annual) • 2.5% premium tax • 2% inflation	• 105% margin on expenses • 2.5% inflation

Appendix C | Analysis and validation tools

Suite of modeling tools
Overview (1 of 2)

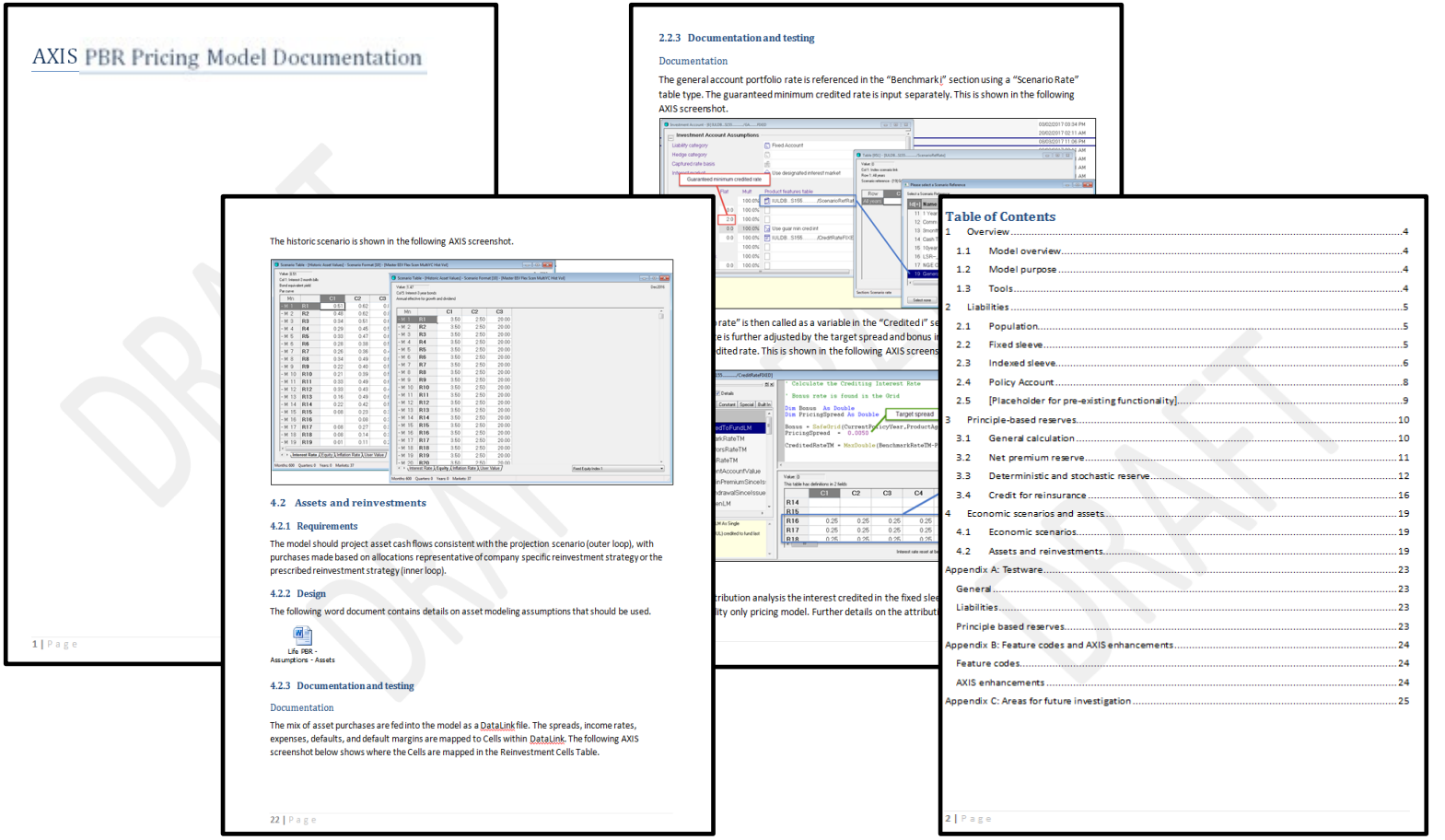
Item		Details
AXIS Dataset		• AXIS pricing/new business model equipped with ALM and PBR functionality, representative policies from generic product types and the flexibility to run various reinsurance reaction and PBR re-valuation scenarios • DataLink functionality allowing for automated updates to product features and assumptions
Model documentation		• Self-contained documentation of model requirements, design, and testing
Detailed user guide		• Comprehensive guide showing the model setup for product features, assumptions and Batches • Instructions on how to use the Testware and perform updates to the model

Suite of modeling tools
Overview (2 of 2)

Item	Details
Testware	• Comprehensive testing workbook which validates all calculations (scenario information, investment gain/loss on hedge and interpolated reserves taken as a given)
Analysis tool	• Summarize, confirm, and provide meaningful metrics for the model office results • Graphs of reserve balances, distributable earnings, and the earned rate on general account assets • Provides high level check on outer and inner loop decrements and other implied values
Input builders	• User-friendly Excel tools in which assumptions and other required model values are translated from user friendly “source information” into AXIS formatted tables • These tools are embedded in the Dataset in order to enhance controls and governance

Documentation

Details the requirements, design, documentation, and testing of the model in a modular and expandable structure



AXIS PBR Pricing Model Documentation

1 | Page

2.2.3 Documentation and testing

Documentation

The general account portfolio rate is referenced in the "Benchmark" section using a "Scenario Rate" table type. The guaranteed minimum credited rate is input separately. This is shown in the following AXIS screenshot.

The historic scenario is shown in the following AXIS screenshot.

4.2 Assets and reinvestments

4.2.1 Requirements

The model should project asset cash flows consistent with the projection scenario (outer loop), with purchases made based on allocations representative of company specific reinvestment strategy or the prescribed reinvestment strategy (inner loop).

4.2.2 Design

The following word document contains details on asset modeling assumptions that should be used.

Life PBR - Assumptions - Assets

4.2.3 Documentation and testing

Documentation

The mix of asset purchases are fed into the model as a DataLink file. The spreads, income rates, expenses, defaults, and default margins are mapped to Cells within DataLink. The following AXIS screenshot below shows where the Cells are mapped in the Reinvestment Cells Table.

22 | Page

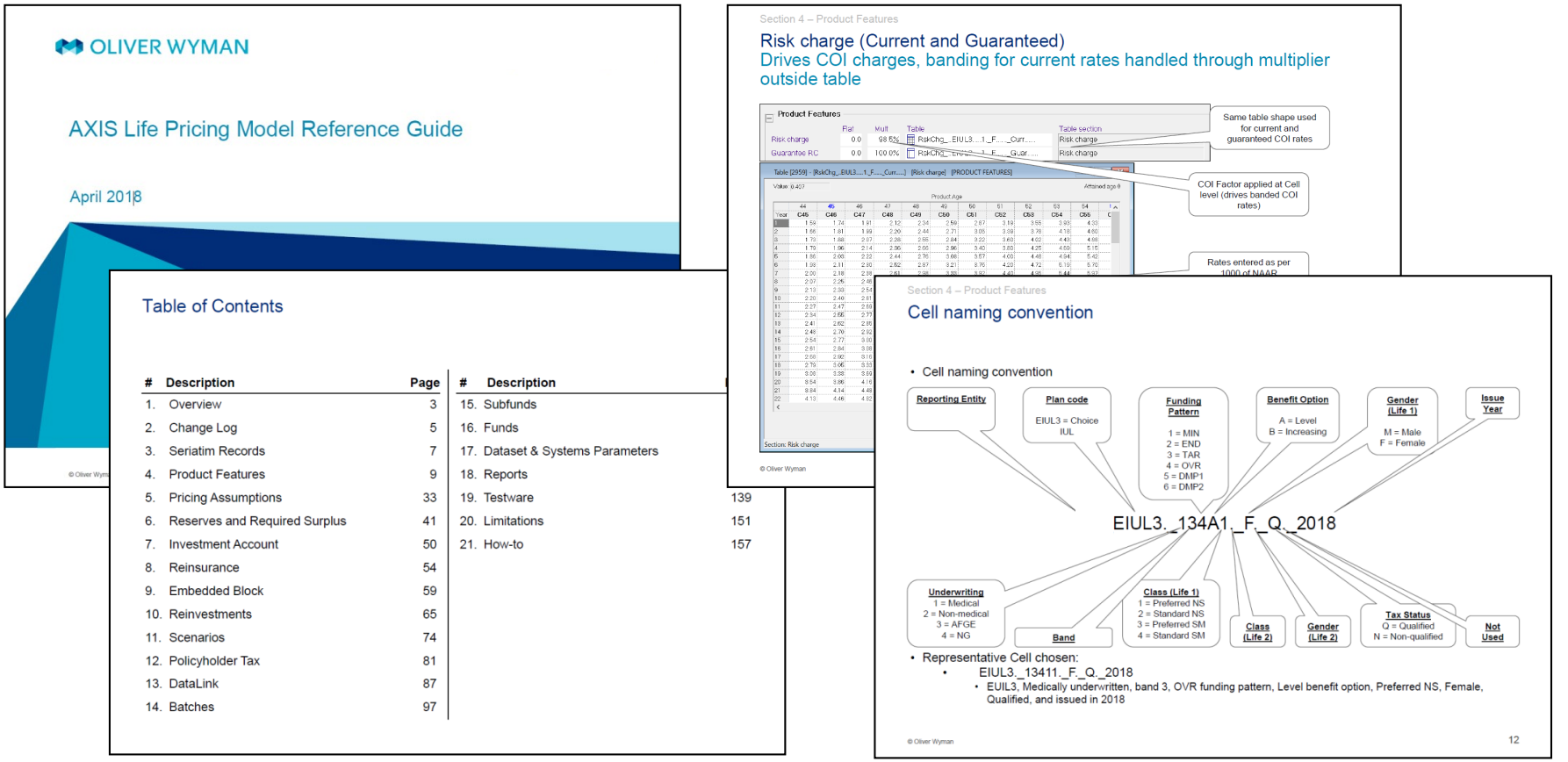
Table of Contents

2 | Page

Documentation is centralized into a single, all-inclusive report to facilitate future maintenance. Appendices summarize future improvements and other key project deliverables.

User guide

Supplements the model documentation and provides additional detail on the AXIS model structure



Testware

Replicates model calculations while supporting version management, increasing transparency, and augmenting documentation

Testware
Policy Info
As of date: 2018 04 09

Policy Information	Lookup	Value
Cell Name	*Cell Name*	FG_EIUL3._123A3._M._Q._2018
Plan Code		EIUL3.
Issue Age	*Iss Age*	55
Gender	*Gender 1*	M
Policy Count	*Policy Count*	0.0092
Policy Count for Expense		1.000000
UW Class	*Class*	3
Issue Day	*Iss Day*	1
Issue Month	*Iss Month*	1
Issue Year	*Iss Year*	2018
Issue Date		1/1/2018
Cell Volume	*Volume*	5,217.49
Average Policy Size		568,929.96
Total Policy Size		
Valuation Date		1/1/2018
Maturity Age		121
Band	*Band*	2
Death benefit option	*Death Benefit Option*	A
Funding Pattern	*Funding Pattern*	3
Chargeback Table	*TABLE Product Total Bo*	Comm._..EIUL3....._....._ChgbackS..
Crediting Type (Fixed/Indexed)		

Other Information (User Input)	
DAC tax rate	9.20%
Corporate tax rate	21.00%
Tax Reserve Adjustment	7.19

GMF Premium Solve / GMF Reprojection / AG36 GMF Premium Solve / AGE

	Policy Year	0	1	1
	Policy Month	-11	1	2
	Month in Policy Year	1	1	2
	Calendar Year	2017	2018	2018
	Calendar Month	1	1	2
	Attained Age		55	55
Monthly Report - Gross CFs				
	- first year		171.55	-
	- renewal		-	-
			(3.43)	-
	- first year		(248.75)	-
	- renewal		-	-
			-	3.90
	- first year		(9.89)	(0.04)
	- renewal		-	-
	- death		(0.72)	(0.73)
	- surrender		-	-
	- other		-	-
			(91.24)	3.13
	Gross Premium		171.55	-
	Gross Commission		(248.75)	-
	Gross Chargeback		-	3.90
	Expenses		(9.89)	(0.04)
	Gross Benefits - death		(0.72)	(0.73)
	Gross Benefits - surrender		-	-
	Gross cashflow		(91.24)	3.13
	Gross Premium		0.000	0.000
	Gross Commission		0.000	0.000
	Gross Chargeback		0.000	0.000
	Expenses		0.000	0.000
	Gross Benefits - death		0.000	0.000
	Gross Benefits - surrender		0.000	0.000
	Gross cashflow		0.000	0.000

Differences (%)	Gross Premium	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	Gross Commission	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	Gross Chargeback	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	Expenses	0.000%	0.062%	0.123%	0.190%	0.265%	0.350%	0.446%
	Gross Benefits - death	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	Gross Benefits - surrender	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%

Documentation / Control / Overview >> / Seriatim - Recon Overview / PY Illustration - Main / PY Illustration by Account / PY Decrements / CY Report (Monthly) / Fund Report (Month

Testware
Seriatim - Recon Overview
As of date: 2018 04 09

Reconciliation Metrics	PV %	AXIS PV	Testware PV	Difference ($)	Difference (%)
Total gross cashflow	4.82%	69	69	0.00	0.00%
Total net cashflow	4.82%	69	69	0.00	0.00%
Contribution to free surplus CTFS	4.82%	(72)	(72)	0.48	-0.67%
Stat Res - Gross reserve	4.82%	3,095	3,095	0.01	0.00%
Tax Res - Gross reserve	4.82%	2,874	2,874	0.00	0.00%

Becker IRR Calculations					
Tetware Becker IRR	8.34%				
AXIS Becker IRR	8.34%	Solve For Becker IRR			
Discount Rate	4.00%				
PV of Testware Cashflows	(0.00)	98.85	103.71	109.02	115.10
PV of AXIS Cashflows	(0.00)	98.85	103.71	109.02	115.10

Becker EV Calculations					
Interest Rate	12.00%				
Discount Rate	4.00%				
PV of Testware Cashflows	(33.89)	64.23	68.43	73.19	78.86
PV of AXIS Cashflows	(33.89)	64.23	68.43	73.19	78.86

CY Projection Comparison					
Comparison ($)	Jan-18	Feb-18	Mar-18	Apr-18	May-18
Total gross cashflow	0.00	0.00	0.00	0.00	0.00
Total net cashflow	0.00	0.00	0.00	0.00	0.00
Contribution to free surplus CTFS	0.01	0.01	0.01	0.01	0.01
Stat Res - Gross reserve	0.00	0.00	-	-	-
Tax Res - Gross reserve	0.00	0.00	0.00	0.00	0.00
Comparison (%)	Jan-18	Feb-18	Mar-18	Apr-18	May-18
Total gross cashflow	0.00%	0.00%	0.00%	0.00%	0.00%
Total net cashflow	0.00%	0.00%	0.00%	0.00%	0.00%
Contribution to free surplus CTFS	-0.01%	0.09%	0.10%	0.10%	0.11%
Stat Res - Gross reserve	0.00%	0.00%	0.00%	0.00%	0.00%
Tax Res - Gross reserve	0.00%	0.00%	0.00%	0.00%	0.00%

CY Projections					
Testware	Jan-18	Feb-18	Mar-18	Apr-18	May-18

Qualifications & Conditions / Documentation / Control / Overview >> / Seriatim - Recon Ov

Analysis tool

Aggregates results under pre-PBR and PBR setups and provides financial metrics and implied rate analysis

Model Analysis File
Load Control
As of date: 2018 04 11

Inputs

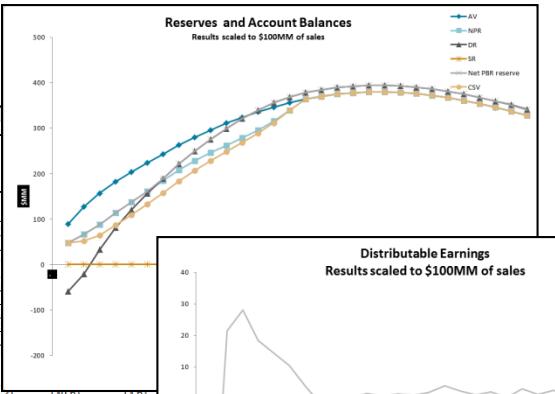
Scale	1,000,000
Desired First Year Premium	100,000,000
Normalize	0.0022
PV Interest Rate	5.30%
Coinsurance percentage	0.00%
Tax rate	21.00%
LOC Cost	0.23%
Hurdle Rate	10%
EV Interest Rate	12%
CGR pre-tax rate	6.00%
Becker Borrow	4.74%
Entity specific calculations	No
Economic Floor	No
Reserving Regime	PBR
Product	EIUL3
Purpose	PRIC

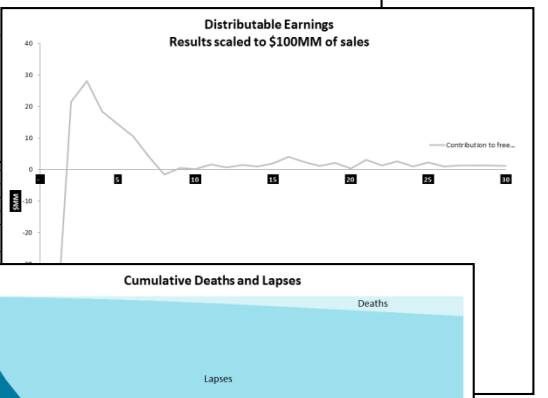
Input location of Access output:

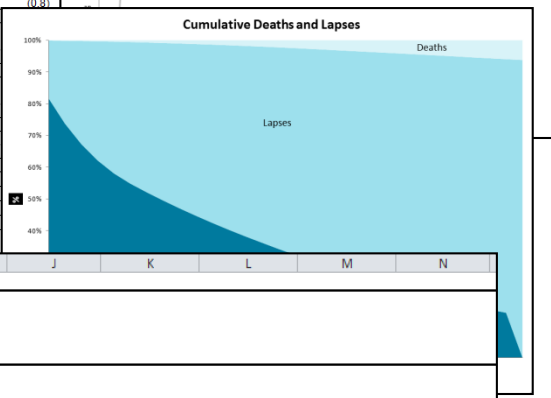
File path	Filename	Acc
	OUTPUT.MDB	PB
	OUTPUT.MDB	PB
	OUTPUT.MDB	DR
	OUTPUT.MDB	DR
	OUTPUT.MDB	PB
	OUTPUT.MDB	

Information
Analysis file name
Version name
AXIS Version

	Calendar Year	PV @ NPV	PV @ Hurdle	Y20		
Gross Premium	First Year	129.7	124.1	136		
	Renewal	552.0	390.8	-		
	Total gross premium	681.6	514.9	136		
Gross premium tax	Premium tax	(13.6)	(10.3)	(2		
	Total gross premium tax	(13.6)	(10.3)	(2		
Gross Commissions	First Year	(113.2)	(108.4)	(119		
	Renewal	(45.6)	(38.7)	-		
	Bonus	-	-	-		
	Total gross commissions	(158.8)	(147.0)	(119.2)	(30.6)	(3.6)
Gross Chargeback	Chargeback	12.7	12.0	10.0	3.4	0.3
	Total Chargeback	12.7	12.0	10.0	3.4	0.3
Gross Expenses	First Year	(18.5)	(17.7)	(19.5)	-	-
	Renewal	(14.0)	(8.3)	-	(0.8)	(0.8)
	Total expenses	(32.5)	(26.0)	(19.5)	(0.8)	(0.8)
Total Gross Commissions and Expenses	First year	(131.7)	(126.1)	(138.7)	-	
	Renewal	(59.6)	(47.0)	-	(31.4)	
	Total gross commissions and expenses	(191.3)	(173.1)	(138.7)	(31.4)	
Gross Death Benefits	Benefits on death	(180.6)	(99.4)	(4.0)	(5.5)	
	Other	-	-	-	-	
	Total gross death benefits	(180.6)	(99.4)	(4.0)	(5.5)	
Gross Surrender Benefit	Benefits on lapse	(196.5)	(109.4)	(5.1)	(5.7)	
	Total gross surrender benefits	(196.5)	(109.4)	(5.1)	(5.7)	
Total gross cashflow		112.2	134.8	(4.1)	39.7	
Total gross cashflow CHECK		0	0	0.0	0.0	
Ceded Premium	First Year	0.1	0.1	0.1	-	
	Renewal	12.5	6.3	-	0.3	







Model Analysis File
Run Summary
As of date: 2018 04 11

AXIS Life PBR Analysis for EIUL3 ($100M of first year premium)
Present values at 5.3%

Version	Description	AXIS release	PBR	Standard IRR	Becker IRR	F&G IRR	Breakeven month	Standard EV	Becker EV	Breakeven Month	Profit Margin (Pre-Tax)	Profit Margin (Post-Tax)	New Business Strain
		2018.26.02	Yes	20.60%	20.53%	17.94%	37.0	30,145.6	30,428.9	37.0	9.18%	5.82%	1.53%

Input builders

Document and generate assumptions and product features in Excel with a process to import into AXIS

Current Risk Charge Builder
Control
As of: 2018 03 09

Naming Convention	
Table/Object	RskChg
Separator	_
Legal entity	..
Product	EIUL3.
Distribution Cha	.
Band	.
Funding Pattern	.
Benefit Option	.
Class 1	From Run Menu
Class 2	.
Separator	_
Gender 1	From Run Menu
Gender 2	.
Tax Status	.
Year	....
Separator	_
Descriptor	Curr.....

Make Tables

Run menu	Gender	Risk CI Table Name	Length Check
1	F		
2	F		
3	F		
4	F		
5	M		
6	M		
7	M		
8	M		

Current Cost of Insurance - Annual
Per 1,000 Basis

Underwriting	Gender	Risk Class	Issue Age	Policy Year 1	2	3
Medical	Female	Preferred Non-Smoker	0	0.407	0.31	0.23
Medical	Female	Preferred Non-Smoker	1	0.301	0.23	0.2
Medical	Female	Preferred Non-Smoker	2	0.223	0.2	0.19
Medical	Female	Preferred Non-Smoker	3	0.194	0.19	0.18
Medical	Female	Preferred Non-Smoker	4	0.184	0.18	0.184
Medical	Female	Preferred Non-Smoker	5	0.175	0.177	0.18
Medical	Female					
Medical	Female					
Medical	Female					

Run Id	Section	Shape	TableName	Row	Op	C1	C2		
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	-2		0.0000			
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	1		0.4070			
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	2		0.3100			
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	3		0.2300			
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	4		0.2000			
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	5		0.1900			
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	6		0.1800			
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	7		0.1900			
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	8		0.2100			
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	9		0.2100			
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	10		0.2100	0.2200	0.2230	0.1940
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	11		0.2200	0.2500	0.2230	0.1940
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	12		0.2500	0.2700	0.2230	0.1940
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	13		0.2700	0.3010	0.2230	0.1940
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	14		0.3100	0.3010	0.2230	0.2080
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	15		0.3400	0.3010	0.2230	0.2230
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	16		0.3600	0.3010	0.2300	0.2300
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	17		0.3900	0.3010	0.2370	0.2440
571271946	S_RISKC	EA_121_100	RskChg_..EIUL3.....1._F....._Curr.....	18		0.4070	0.3010	0.2510	0.2510

Import/Export Macro Wizard - Step 1 - Batch Process Selection List

Actions for import/export macro:

On	No	Action	Table	
☑	0	Read Tables	0_AXIS - Chargeback	Product Features and Assumptions Mapping
☑	1	Import	0_AXIS - Chargeback	Product Features and Assumptions Mapping
☑	2	Read Tables	0_AXIS - Deferred Commission	Product Features and Assumptions Mapping
☑	3	Import	0_AXIS - Deferred Commission	Product Features and Assumptions Mapping
☑	4	Read Tables	0_AXIS - Total Commission	Product Features and Assumptions Mapping
☑	5	Import	0_AXIS - Total Commission	Product Features and Assumptions Mapping
☐	6	Read Tables	0_AXIS - Curr Risk Charge	Product Features and Assumptions Mapping
☐	7	Import	0_AXIS - Curr Risk Charge	Product Features and Assumptions Mapping
☐	8	Read Tables	1_AXIS - Expense Charge	Product Features and Assumptions Mapping
☐	9	Import	1_AXIS - Expense Charge	Product Features and Assumptions Mapping
☐	10	Read Tables	2_AXIS - Composite Expense Charge	Product Features and Assumptions Mapping
☐	11	Import	2_AXIS - Composite Expense Charge	Product Features and Assumptions Mapping
☐	12	Read Tables	0_AXIS - Face Amount	Product Features and Assumptions Mapping

Add... Insert... Remove Up Down Edit... Enable All Disable All Copy

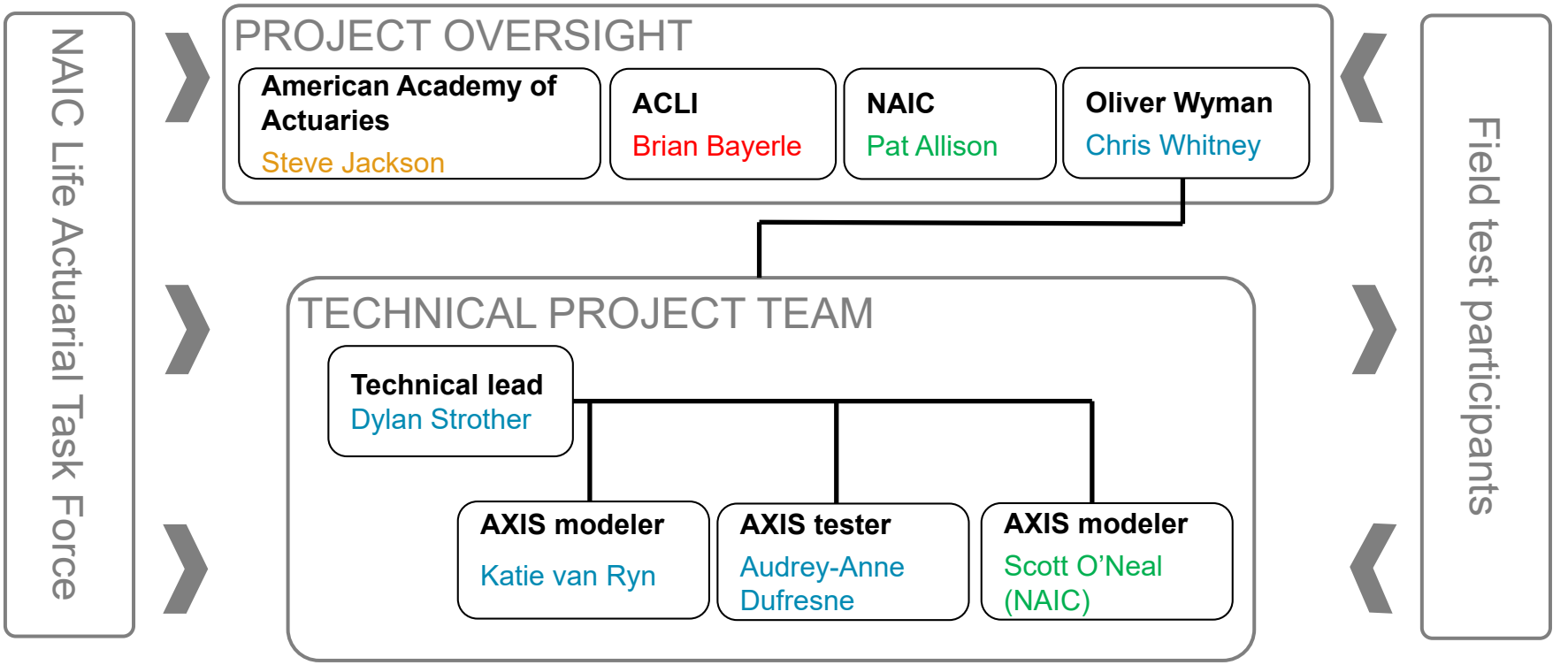
152 available
☐ Show enabled steps only

Help Go to Cancel < Back Next > Finish

Appendix D | Project team and governance

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

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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 requested 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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