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## Session 48PD: PBR - Real Life Applications

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# 2017 Valuation Actuary Symposium

**SESSION 48: PBR – REAL LIFE APPLICATIONS**

**Alberto Abalo  
Lauren Cross  
Martin Snow  
Erzhe Zhang**

August 29, 2017



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# AGENDA

- 1** How the pricing process has changed and what it means for the valuation actuary
- 2** Automated Underwriting
- 3** Real life PBR case studies:  
Indexed Universal Life, premium modeling, and LTC-combo products
- 4** Impact of reinsurance on VM-20 modeled reserves

# Session 48: Panel Discussion: PBR – Real Life Applications

## How the Pricing Process has Changed and What it Means for the Valuation Actuary



Martin Snow FSA, MAAA



# What the Chief Actuaries Say

- The most significant change in communication due to PBR is “Increased collaboration and awareness of initiatives with pricing and product development groups.”
- “Product development & Pricing functions rely more heavily on the valuation group for the modeling of PBR reserves and their impact on profitability metrics.”
- We are seeing a significant amount of communication and collaboration between our pricing and valuation teams in preparing our term portfolio for PBR. This type of change is very productive and will serve as a model for all future pricing activity.

# First Impressions of PBR

- Trust
- Simplicity
- Clarity



# How the Pricing Process has Changed and What it Means for the Valuation Actuary

- Conceptual changes
- Operational challenges
- Potential workflow changes
- Outstanding questions

# Principle Based Reserves Are Not New

Several actuarial calculations performed before 2017 are ‘principles based’

Purpose	Description	Applicable Products
Statutory	Asset Adequacy Testing	Life & Annuity
	VA CARVM	Variable Annuity
	AG 38 Section 8D	ULSG
	AG 48	Term & ULSG
US GAAP	FAS 97	Annuity & UL
Other	Economic Reserves/Capital	Life & Annuity
	Embedded Value	Life & Annuity

Certain ‘principles based’ calculations follow the methodology prescribed by VM-20

# Reserve Computation under VM20

The PBR reserve is the maximum of three components

Component	Methodology	Calculation	Assumptions	Scenarios
Net Premium Reserve	Formulaic reserve. CRVM for products other than Term & ULSG.	Seriatim	Prescribed Industry Assumptions	None
Deterministic Reserve (“DR”)	Present value of liability cash flows	Grouped	Prudent	Single Scenario
Stochastic Reserve (“SR”)	CTE(70) of starting assets plus the greatest present value of accumulated deficiencies	Grouped	Prudent	Full scenario set from AAA ESG

# Conceptual changes

- Reserves not formulaic
- Reserves change after issue – Reserve risk!
- Impact of Aggregation
- Which Reserve Governs?
- Is my judgment good enough to set an assumption?
- Assumption unlocking
- Consistency of assumptions between pricing and valuation – e.g., UL premium payment patterns
- Sensitivity to small changes in assumptions
- What is the tax reserve?
- What happens to my profitability metrics?

# Operational Challenges

- Asset modeling
- Stochastic modeling
- Do I build a new model or patch on PBR functionality in my existing model?
- How long does the pricing model take to run? What level of precision is needed?

# Operational Challenges (continued)

- What is my implementation plan?
- Timing considerations – both time to do work and deadlines by which work is needed
- Resource impacts – e.g., training
- Partner timing, coordination
- Who leads the PBR effort?

# Potential Workflow Changes

- Who sets the assumptions?
- Who designs and builds the PBR model?
  - Do pricing and valuation each have their own model?
  - How do you maintain consistency of valuation results?
  - What types of internal controls does pricing need?
- When do I loop in my valuation partners? Assumption team?
- What is the impact on the pricing calendar?
- Potential reorgs

# Outstanding Questions

- Are rider reserves done separately or together with base policy reserves?
- What will NY do? How important is this?
  - Chief Actuary – “Addressing the complications of New York is compounded with NY’s approach to PBR and may further strain the attractiveness of the NY market.”
- Impact of internal reinsurance
- Will additional guidance be provided on reinsurance?
- Other, e.g., will possibility of aggregate margins be revisited?



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# SI/ACCELERATED UNDERWRITING – VM20 RESERVING SUBGROUP UPDATE



Lauren Cross, MAAA, FSA

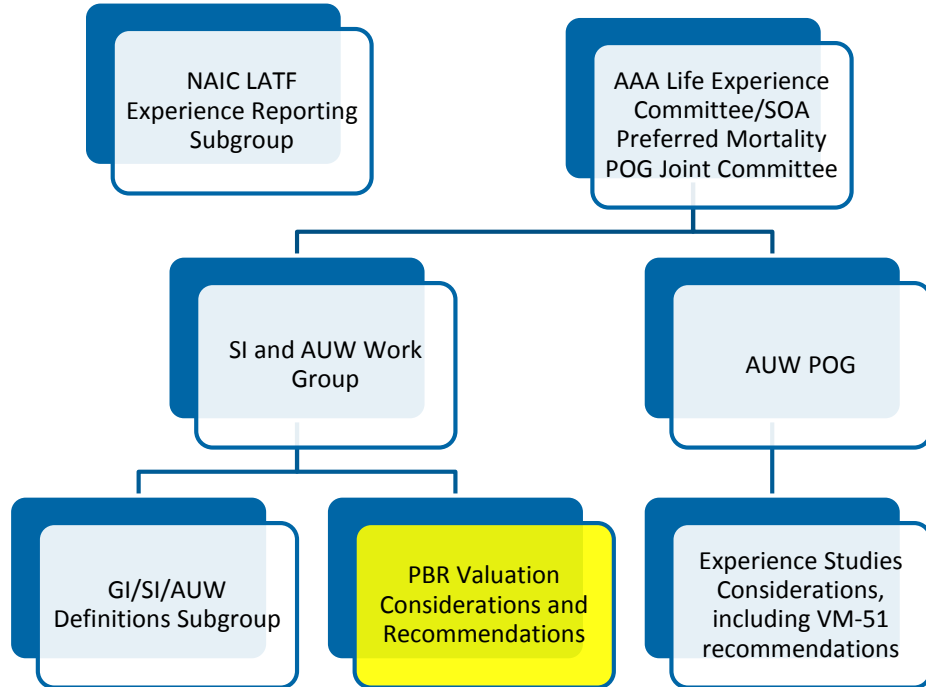


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# Joint Committee SI and AUW Structure

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## GI/SI/AUW Subgroup

- Define underwriting type definitions

## PBR Valuation Considerations and Recommendations

- Identify issues when applying VM-20 to policies issued using an accelerated underwriting program

# VM20 Reserving Subgroup Goals and Focus

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- Primary Goals
  - Identify current valuation practice for underwriting types
  - Identify areas where additional guidance is needed
  - Out of Scope: Appropriateness of underwriting techniques
- Focus on Mortality in Modeled Reserves
  - Deterministic (DR) and Stochastic (SR) rather than NPR
- Durability
  - Relevance to future innovation



# Short-Term Approach - Interpretations

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- Timing: 2017 and 2018 Valuations
- Potential guidance to calculate PBR until...
  - ...Decisions on any appropriate VM changes
  - ...Decisions on implementing guidance
- What form of guidance/approach?
  - ▣ Guidance Notes within VM
  - ▣ LATF “Interpretations”



# Short-Term Approach - Interpretations

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## Potential Topic List

- ☑ Can mortality segments that use different underwriting techniques be combined for calculating credibility?
- ☑ What margins should be considered for new accelerated underwriting techniques?
- ☐ Can existing company experience data be adjusted for new accelerated underwriting techniques?
- ☐ What rationale and support are needed for a company to adjust experience data for new accelerated underwriting techniques?
- ☐ Can business issued with accelerated underwriting techniques be considered an “expected incremental change” of VM-20 9.C.2.f?
- ☐ When is it appropriate to combine experience under a new technique with existing experience by using an underwriting adjustment?
- ☐ Does the underwriting criteria scoring (UCS) procedure accommodate accelerated underwriting programs?
- ☐ Are there alternatives to the UCS tool to identify appropriate RR tables for an accelerated underwriting program with preferred classes?
- ☐ Is the use of 2017 CSO tables clear in the VM for SI or newer underwriting methods?



# Moving Forward - Long Term Approach

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- Research Study: Delphi Technique
  - A multi-round survey of experts
  - Draw conclusions regarding:
    - Emerging underwriting practices
    - Impact on observed mortality under emerging practices
  - Purpose is to provide practitioners and regulators with a framework that:
    - Clarifies how to categorize different underwriting practices
    - Benchmarks adjustments to base mortality tables for different practices
- Precedent for future changes and evolutions to products valued under VM-20



# REAL LIFE PBR CASE STUDIES

## INDEXED UNIVERSAL LIFE, PREMIUM MODELING, AND LTC-COMBO PRODUCTS

Erzhe Zhang FSA, MAAA

August 29, 2017





# Introduction

- 1 Indexed Universal Life:** explicit guidance, unintuitive results
- 2 Premium modeling:** some guidance, range of acceptable approaches
- 3 LTC-combo products:** no clear guidance

# Indexed Universal Life

Net equity returns under the prescribed scenario for deterministic reserve produces unintuitive IUL reserves.

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## 1 Deterministic reserve (DR) scenario

- *The Scenario 12 interest rate yield curves and total investment returns are based on approximately a one standard deviation shock to the economic conditions as of the projection start date, where the shock is spread uniformly over the first 20 years of the projection.*

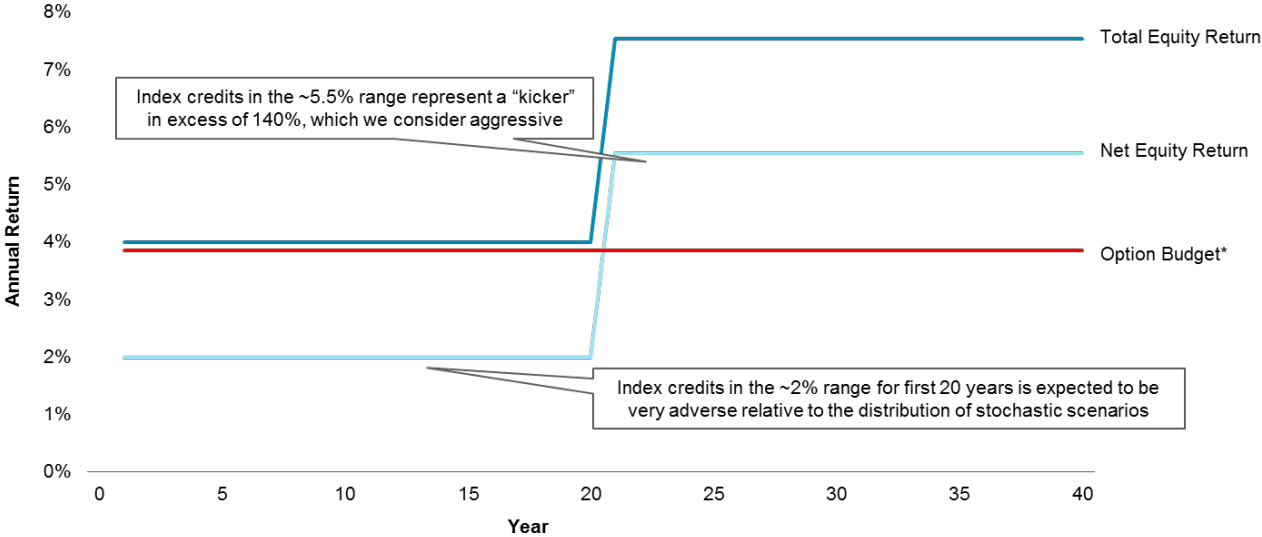
## 2 Unintuitive IUL reserves

- The prescribed equity return results in low account value growth.
  - The suppressed account value lowers interest spread earned on account value (interest earned minus interest credited).
  - Based on analysis to date, the resulting Deterministic Reserve is significantly higher than the Stochastic Reserve, which we believe to be an unintended result.
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# Indexed Universal Life

The graph below shows a comparison of the option budget to the net equity return, assuming a 2% dividend rate and an option budget of 3.85%

### Scenario 12 – Equity Returns vs. Option Budget



\*Option budget is based on a net rate of 4% and pricing spread of 0.15% (3.85%)

## Indexed Universal Life

Comparison of equity returns and index credits (using the assumptions from the prior slide) from the American Academy of Actuaries Economic Scenario Generator.

### Geometric Annualized Compound Index Credits

	Average	Min	5th	10th	25th	50th	75th	90th	95th	Max
Index Credit First 5 Years	4.3%	0.4%	1.4%	1.9%	3.3%	4.3%	5.4%	6.4%	7.0%	7.5%
Index Credit First 10 Years	4.3%	1.2%	2.3%	3.0%	3.7%	4.4%	5.0%	5.8%	6.1%	6.5%
Index Credit First 15 Years	4.2%	2.2%	2.8%	3.1%	3.7%	4.3%	4.8%	5.4%	5.5%	6.6%
Index Credit First 20 Years	4.1%	2.6%	3.0%	3.1%	3.7%	4.1%	4.6%	5.0%	5.4%	5.6%
Index Credit First 25 Years	4.1%	2.8%	3.2%	3.4%	3.7%	4.1%	4.5%	4.8%	5.0%	5.5%
Index Credit First 30 Years	4.1%	3.1%	3.2%	3.4%	3.7%	4.1%	4.4%	4.8%	5.0%	5.4%
Annual Volatility for 30 Years	3.2%	2.7%	2.9%	2.9%	3.1%	3.3%	3.4%	3.5%	3.5%	3.5%

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Source: <http://soa.org/research/software-tools/research-scenario.aspx>

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# Indexed Universal Life

## IUL deterministic reserve approach

### Approach

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#### “Wait and see”

- The AAA Life Reserves Working Group (LRWG) is conducting a survey to determine the fit of the DR scenario for IUL products.
  - Many companies are taking a “wait and see” approach for IUL products.
  - It is not uncommon for pricing or forecasting models to adjust DR in anticipation of an update to VM-20.
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**Any approved change to the Valuation Manual will not be in effect until 2019, or later.**

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# Premium modeling

Premium funding assumption is a significant driver of UL reserves under PBR.

## Valuation Manual requirements

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- 1 **VM-20 section 9.A.7**
  - Perform sensitivity tests to understand the materiality of prudent estimate assumptions on the modeled reserve.

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- 2 **VM-20 section 9.D.4.b**
  - For policies that give policyholders flexibility in the timing and amount of premium payments, at a minimum the following four sensitivities are to be performed:
    - i. No further premium payment scenario
    - ii. Minimum premium scenario
    - iii. Pre-payment of premiums – single premium scenario
    - iv. Pre-payment of premiums – level premium scenario

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- 3 **VM-20 section 9.D.3.b**
  - Per section 9.D.3.b, if dynamic behavior is modeled, the company must assume that policyholders' efficiency will increase over time unless the company has relevant and credible experience or clear evidence to the contrary.
  - "Policyholder efficiency" means the phenomenon that policyholders will act in their best interest.

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# Premium modeling

## UL premium funding approaches

### Approaches

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#### 1 Traditional

- Value each policy based on billed premium. The billed premium is generally tied to the illustrated premium but may not necessarily be equal.
- Perform sensitivity tests as required by VM-20 section 9.A.7 and 9.D.4.b.

#### 2 Premium buckets, static assumptions

- Based on actual premium history, assign each policy to a distinct behavioral bucket.
- Common buckets used are as defined under VM-20 section 9.D.4.b. A static vector of premium rates is determined for a chosen scenario of credited rates.
- An unique, but static, set of surrender assumptions is assumed for each bucket.

#### 3 Premium buckets, dynamic assumptions

- Based on actual premium history, assign each policy to a distinct behavioral bucket.
- Premium and surrender assumption are dynamic, and adjusted “on-the-fly” for each scenario of credited rates.

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**Ideally, the approach chosen will reflect policyholder efficiency and actual experience, aligning funding, premium, lapse, and surrender.**

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# LTC-combo products

## No clear guidance

### Valuation Manual requirements

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#### 1 Riders and supplemental benefits

- If a rider or supplemental benefit has a separately identified premium or charge, then reserves may be computed separate from the base contract following the reserve requirements for that benefit.
- If a rider or supplemental benefit does not have a separately identified premium or charge, all cashflows associated with the rider or supplemental benefit must be included in the calculation of the reserve for the base policy.

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#### 2 Claim reserves

- Claim reserves are not subjected to PBR requirements.
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# LTC-combo products

## LTC modeling approaches

### Approach

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#### “Wait and see”

- An AAA working group has been established to make a recommendation on reserves for LTC-combo products.
  - VM-20 provides no guidance on DR/SR morbidity assumptions. Without a morbidity margin, including LTC cashflows may reduce DR/SR.
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**The approach taken will depend on the structure and richness of guarantees underlying the LTC benefit.**

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# Takeaways


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**1 The Valuation Manual will not have explicit guidance for every product and situation.**

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**2 Companies should choose an approach that suits their unique product design and experience, then justify the chosen approach.**

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# Impact of Reinsurance on VM-20 Reserves

## 2017 Valuation Actuary Symposium

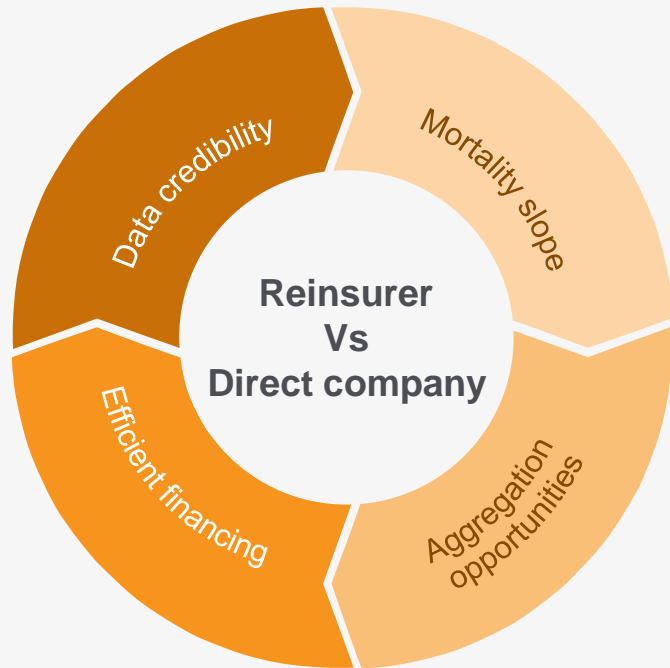
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# Reinsurance modeling under PBR

## No mirror reserving requirement



### What does this mean?

- A reinsurer's view of the incremental risk posed by a block of business can be different than the direct company's view of that same block
- A reduction in a ceding company's liability does not have to be matched with an equal increase on the reinsurer's books, sometimes resulting in better pricing
- Section 8.C.1 of VM-20:  
"The company shall use assumptions and margins that are appropriate for each company pursuant to a reinsurance agreement. In such instance, **the ceding and assuming companies are not required to use the same assumptions and margins for the reinsured policies**"

# Reinsurance modeling under PBR

## YRT rates as non-guaranteed element

“Projected non-guaranteed elements shall be established based on projected experience consistent with how actual NGE are determined.” (VM-20, Section 7.C.3)

### Section 8.C:

7. The company shall assume that the counterparties to a reinsurance agreement are knowledgeable about the contingencies involved in the agreement and likely to exercise the terms of the agreement to their respective advantage, taking into account the context of the agreement in the entire economic relationship between the parties. In setting assumptions for the non-guaranteed elements in reinsurance cash flows, the company shall include, but not be limited to, the following:
  - a. The usual and customary practices associated with such agreements.
  - b. Past practices by the parties concerning the changing of terms, in an economic environment similar to that projected.
  - c. Any limits placed upon either party’s ability to exercise contractual options in the reinsurance agreement.
  - d. The ability of the direct-writing company to modify the terms of its policies in response to changes in reinsurance terms.
  - e. Actions that might be taken by a party if the counterparty is in financial difficulty.

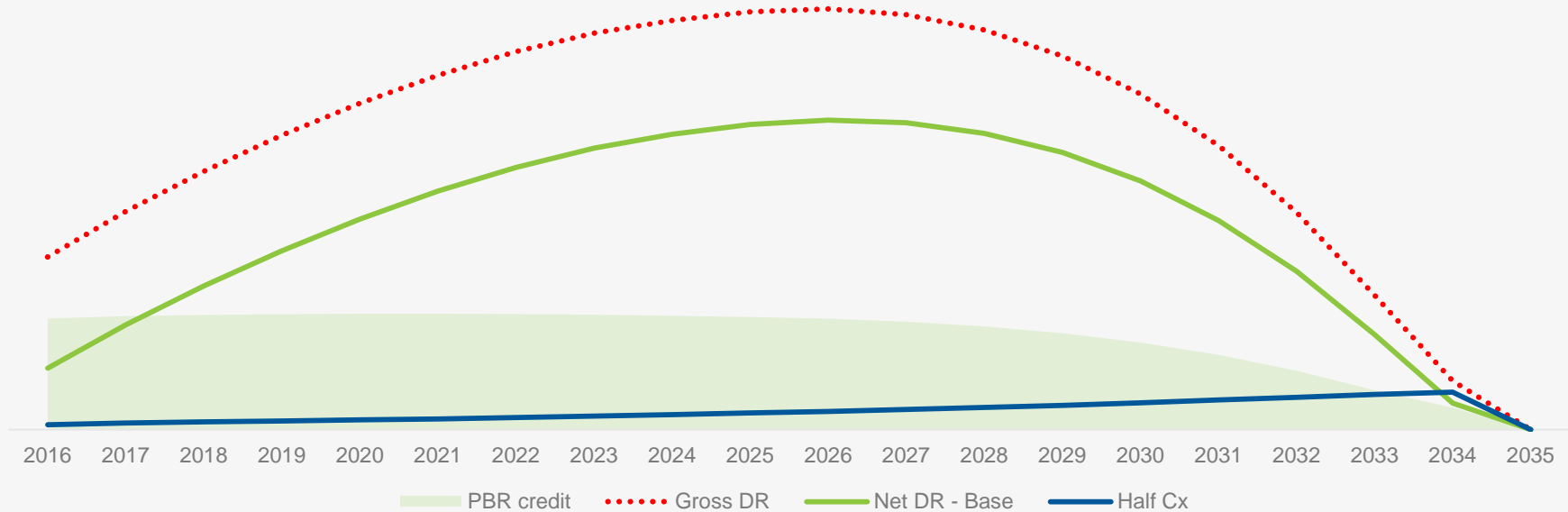
# Reinsurance modeling under PBR

## Should margins be added to YRT premium rates?

Option	What is assumed about reinsurance agreement?
Use current scale throughout, without margin	Reinsurer will never raise rates above current scale, regardless of increasing levels of prudent estimate mortality
Adjust current scale as negative mortality experience emerges	Reinsurer will raise rates as negative experience materializes to offset future losses, but would limit increase
Adjust current scale immediately to achieve breakeven	Reinsurer will raise rates instantaneously to stop projected losses from materializing

# Deterministic Reserve - reinsurance credit illustration

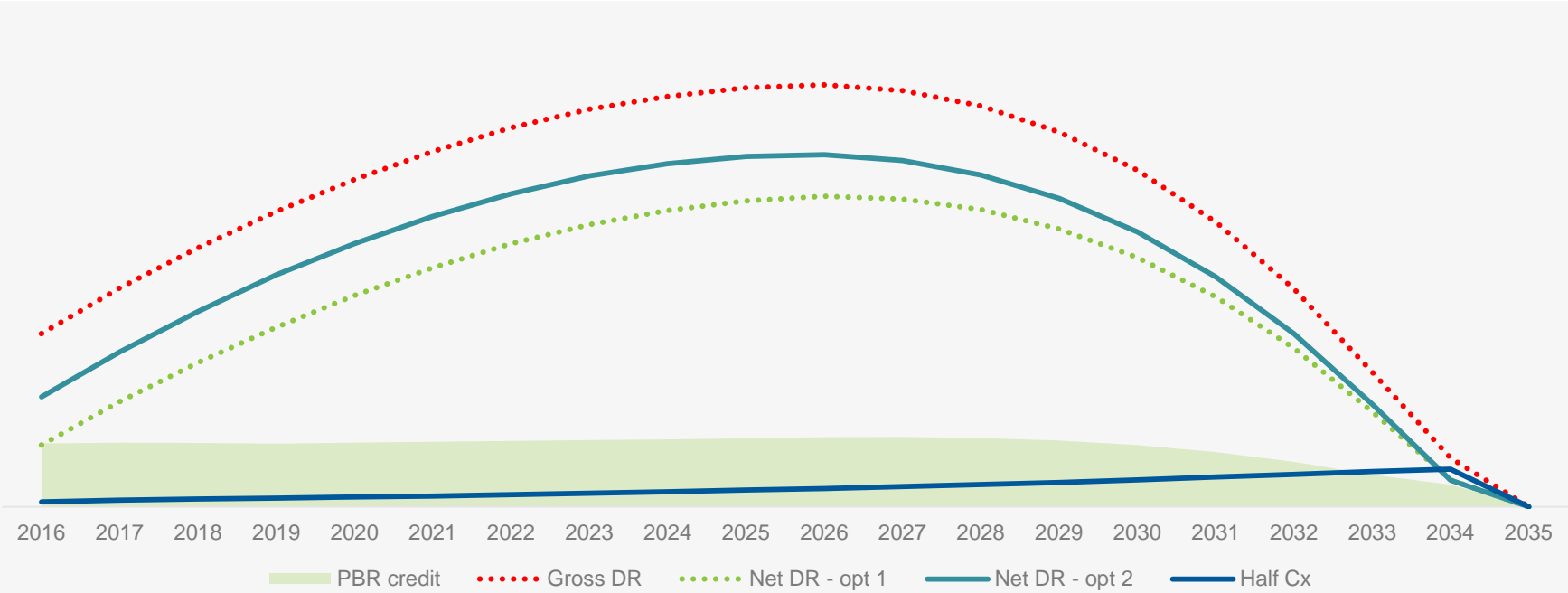
## Option 1: use current YRT scale



If a ceding company does not consider a rate increase to be “usual and customary practice” and the reinsurance partner does, the difference in treatment may draw attention from regulator.

# Deterministic Reserve - reinsurance credit illustration

## Option 2: adjust current scale as mort experience emerges

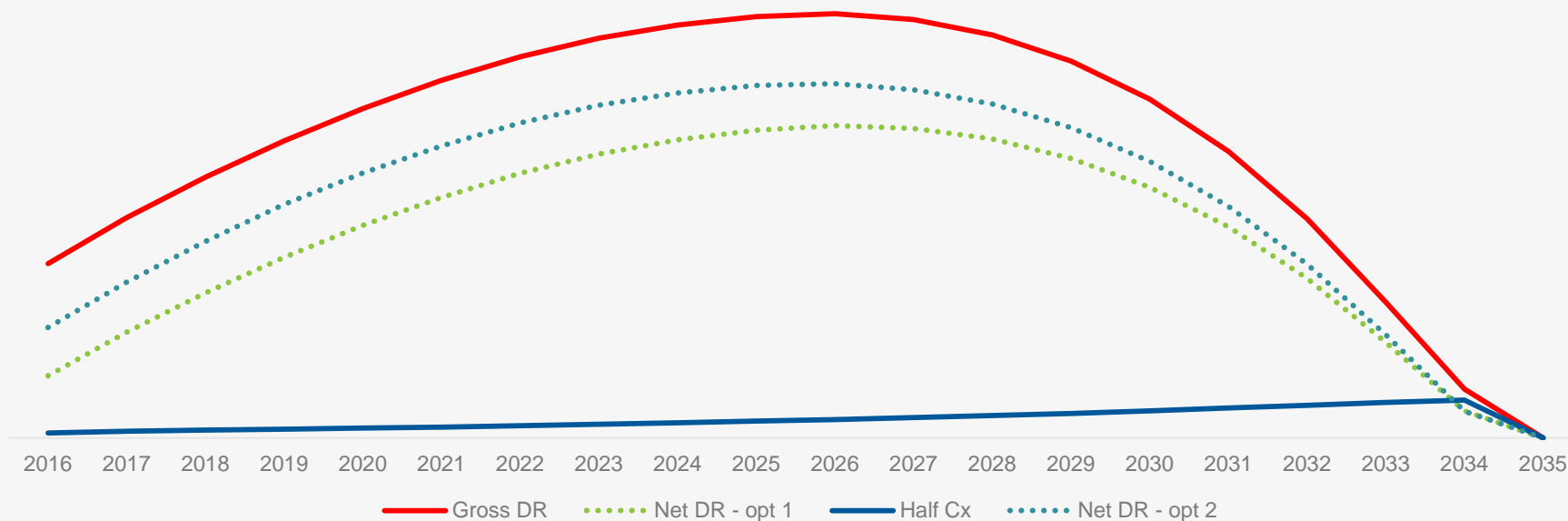


▶ By reflecting the reinsurer’s contractual option to raise rates as prudent estimate mortality increases, the net deterministic reserve increases and PBR reserve credit decreases



# Deterministic Reserve - reinsurance credit illustration

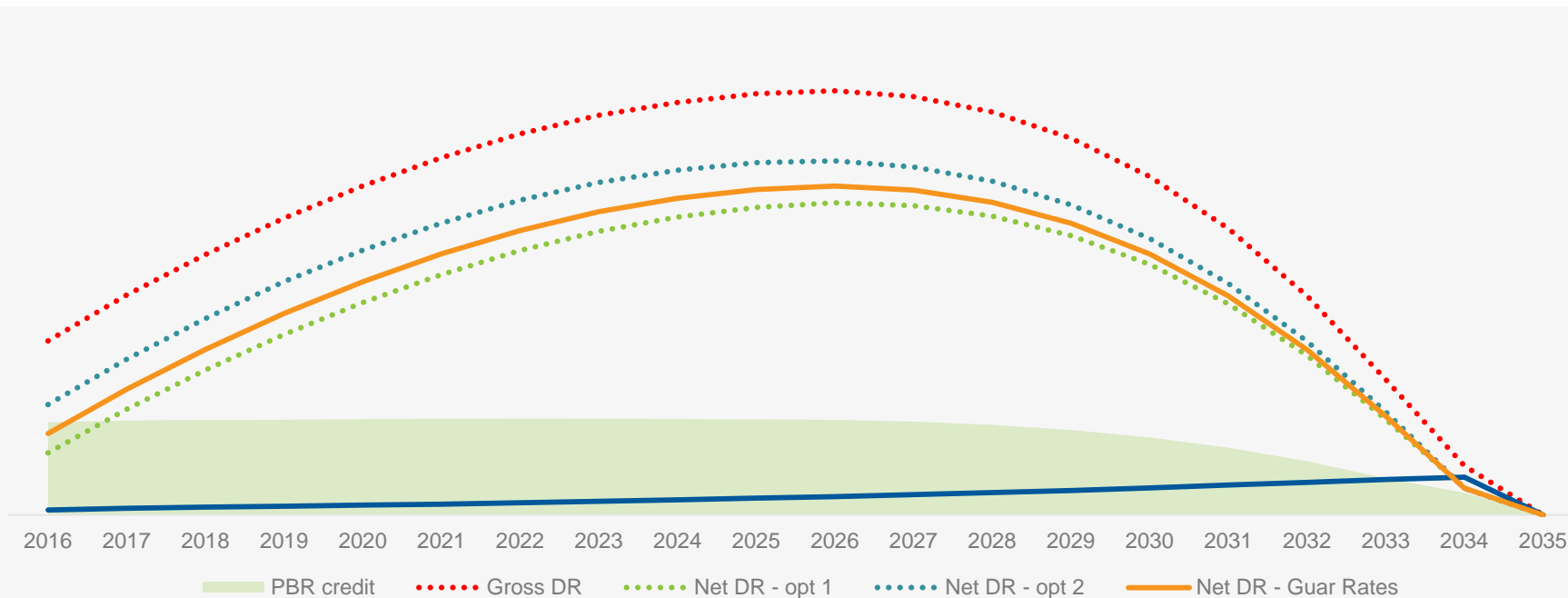
## Option 3: adjust scale immediately to achieve breakeven



In this scenario, the Gross DR equals the Net DR and there is no PBR reserve credit

# Deterministic Reserve - reinsurance credit illustration

## Guaranteed rate scale



If reinsurance rates are guaranteed, the ceding company no longer has to consider margins on those premiums. Reflection of the credit illustrated above should draw no special attention from the regulator.