

2019 Reinsurance Seminar

Jeffrey S. Katz

Overview of Reinsurance and US Market

24 September 2019



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SOA Antitrust Compliance Guidelines

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

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ASK!

Fundamentals of Reinsurance

What is Reinsurance?

- SSAP 61 ¶2 definition is a good one

"Reinsurance is an agreement by which a reporting entity transfers all or part of its risk under a contract to another reporting entity. The entity that issued the policy is called the primary insurer, direct writer, or ceding entity, and the entity to which the risk is transferred is called the reinsurer or assuming entity. The process of transferring the risk from the ceding entity to the reinsurer is known as a cession."

Fundamentals

Why reinsurance?

- Risk transfer
- Volatility management
- Capital management, such as new business financing
- Technical assistance

Kinds of Reinsurance

Kinds of Reinsurance

Coinsurance: Think "Partnership"

- Reinsurance coverage ceded to the reinsurer on an individual policy is in the same form as that of the policy issued to the policyholder
- “Same form” means that the ceding company and reinsurer are exposed to the same risks. They are essentially sharing responsibility for insuring the policy, hence the name co-insurance.
- Since the cedant generally continues to administer the policy, the reinsurer will allocate a portion of the premium to return to the cedant to cover a portion of these administration expenses.
- In addition to covering administration expenses, the reinsurer will also return a portion of the premium to the cedant to cover agent commissions and underwriting expenses.
- The absolute level of this expense allowance can vary from reinsurer to reinsurer
- The larger the expense allowance, the more attractive the reinsurance to the cedant

Kinds of Reinsurance

Yearly renewable term (YRT)

- Reinsurance coverage for which the premium rates are not directly related to the premium rates of the original plan of insurance
- YRT is generally thought of as “mortality only” reinsurance and is one of the cheapest forms of mortality risk transfer
- The premium rates are typically set as a percentage of a mortality table and are multiplied by the Net Amount at Risk (NAAR)
- NAAR is defined as the excess of the death benefit of a policy over the policy reserve or cash value
- Since mortality rates generally increase each year, the premium rates per \$1,000 will be increasing
- There is generally not an expense allowance

Kinds of Reinsurance

YRT (continued)

- Can easily be utilized for any type of life contract
- Actual rates charged to the cedant are only guaranteed for one year, and the reinsurer has the right to increase rates
- YRT frequently has zero-first year premium
 - This helps cedants recover a portion of first-year acquisition costs
 - Exposes reinsurer to lapse risk

Kinds of Reinsurance

Other

- Stop-Loss
- Catastrophe

Ways of Apportioning Risk

Between cedant and reinsurer

- Excess of retention
- First dollar quota share
- Combination of the two

Among reinsurers

- Percentages
- Layers
- Alphabet split

Kinds of Reinsurance

Auto vs. Fac

- Automatic: inside the box
 - Cedant does the underwriting
- Facultative: all other
 - Reinsurer does the underwriting

Reinsurance Treaties

Treaty Provisions: Automatic Reinsurance Requirements

Normal
underwriting
standards

Age and rating
ranges

Retention limit

Automatic
binding limit

Jumbo limit

Other: US
citizen; no
prior fac; etc.

These can be viewed as conditions precedent to reinsurance coverage.

Treaty Provisions: Facultative Reinsurance

Cedant sends underwriting papers to reinsurer

Reinsurer underwrites; may make offer

Reinsurer must make an offer and cedant must accept for reinsurance to occur

- Standard principles of contract law
- Cedant must notify reinsurer of acceptance – variety of ways to do so
- Facultative not covered by errors and omissions provision (see below)

Reasons for facultative submissions

- Cases outside normal limits
- Underwriting opinion from reinsurer desired
- Cedant looking for best offer

Treaty Provisions

Premiums

Vast majority of US life reinsurance is self-administered by cedant

- Cedant prepares billings and submits with premium
- Cedant prepares listings of inforce risks
- Cedant prepares listings of transactions affecting reinsurance
- Cedant prepares statutory reserves
- Netting of claims against premium may be permitted

Inspection of Records

Errors and Omissions

Boilerplate

- Offset
- Insolvency
- Entire Agreement
- Arbitration

Reinsurance Regulation

Reserve Credit Security

NAIC Model Act/Reg on Credit for Reinsurance

- Establishes conditions that a reinsurer must meet in order for a domestic ceding company to take credit for reinsurance, either as an asset or as a reduction in liability for reinsurance ceded (“reserve credit”)
- Credit is allowed under the following conditions:
 - Reinsurer is licensed in the state
 - Reinsurer is accredited as a reinsurer in the state
 - Reinsurer posts collateral of some kind
 - Certified reinsurer status affects *amount* of collateral

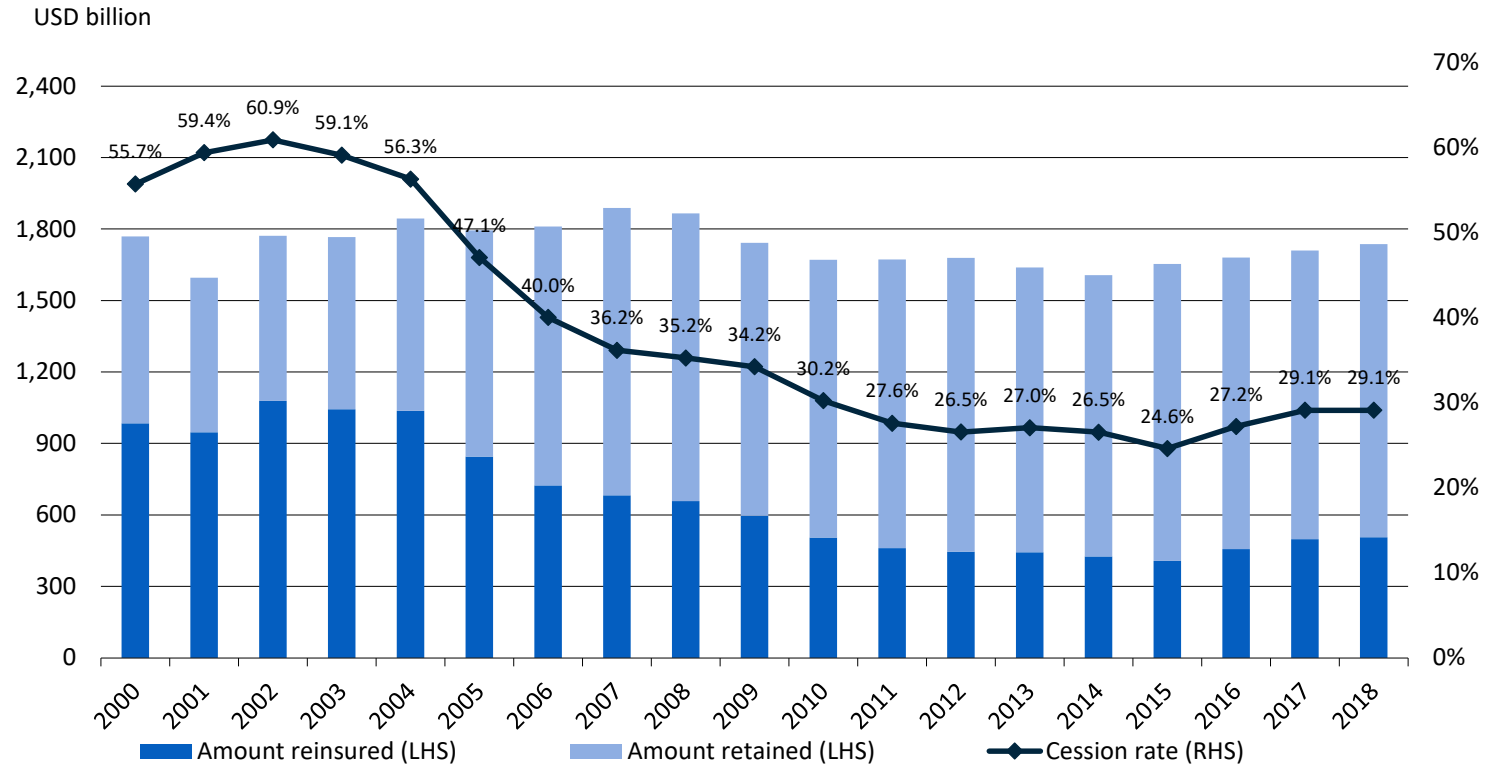
Risk Transfer

Life & Health Reinsurance Agreements Regulation: the 10 Commandments

- I. Adequate renewal allowances
- II. Cedant cannot be deprived of surplus or assets
- III. No reimbursement of losses
- IV. No auto termination or recapture
- V. No payments from outside the business reinsured
- VI. Must transfer all significant risk
- VII. Must participate in underlying asset risk
- VIII. Settlements at least quarterly
- IX. No warranties outside the business reinsured
- X. No warranties about future performance

US Life Reinsurance Market

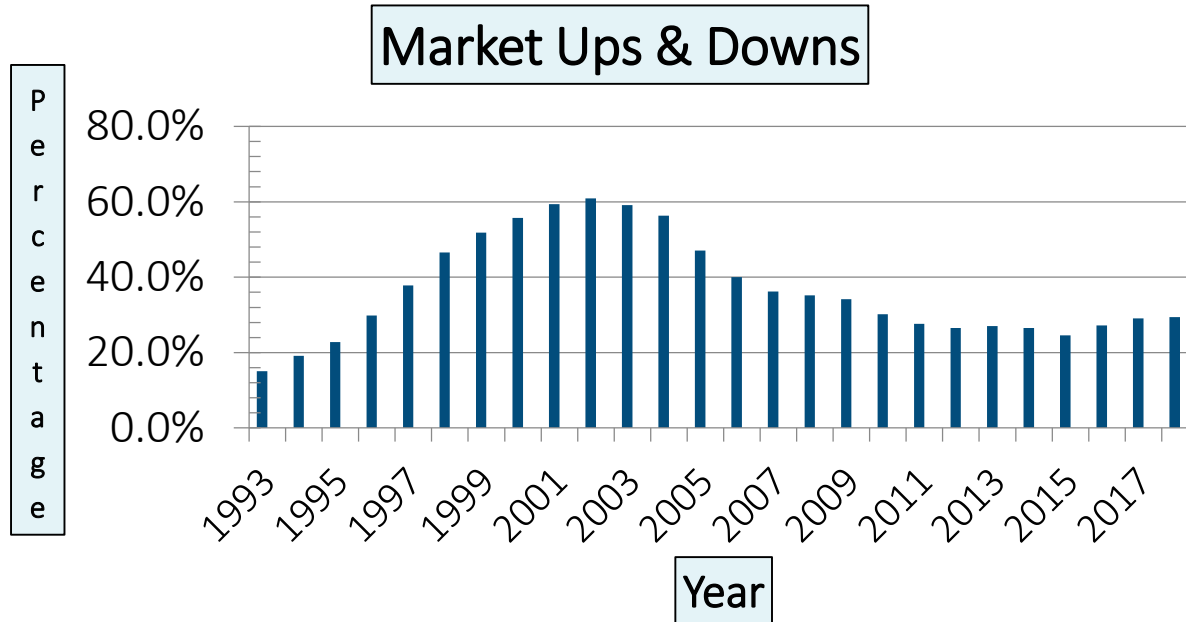
US Ordinary Life NB Cession Rates (recurring)



Note: Cession rates on new recurring ordinary life business

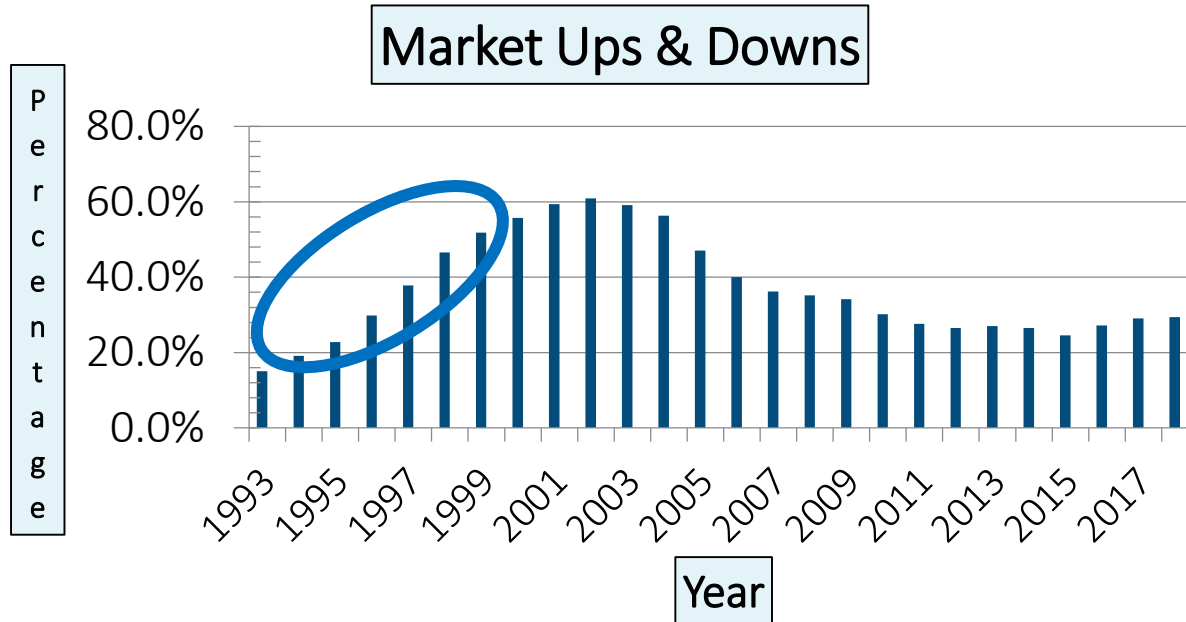
Source: Munich Re/SOA "2018 Life Reinsurance Survey Results"

Reinsurance Market: Cession Rate



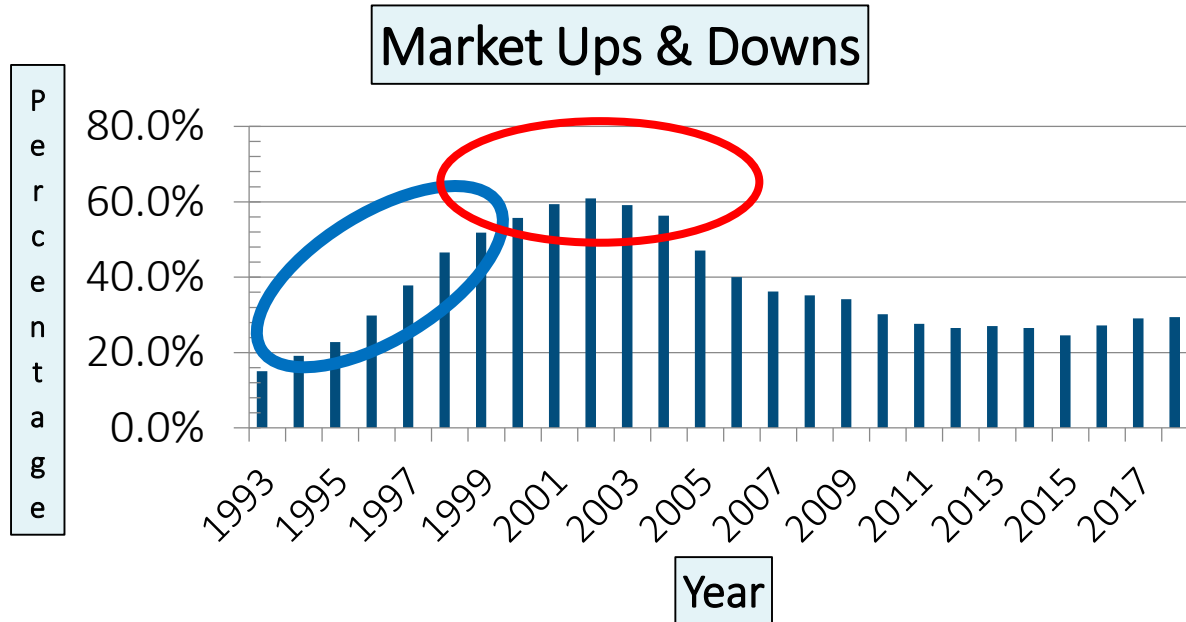
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Reinsurance Market: Cession Rate



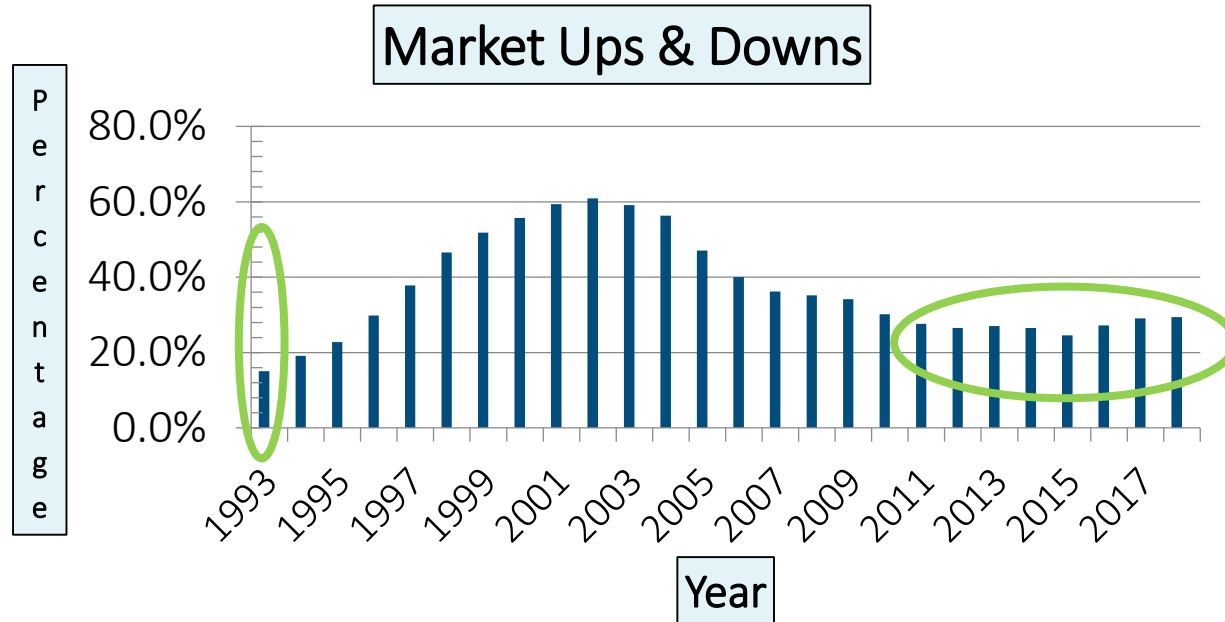
Source: Munich Re/SOA "2018 Life Reinsurance Survey Results"

Reinsurance Market: Cession Rate



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Reinsurance Market: Cession Rate



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US Life Reinsurers

2018 Recurring New Business

Reinsurer	Volume \$M	Share	Change from 2018
SCOR Global Life	114,653	22.6%	+1.6%
RGA Re	94,151	18.6%	+0.8%
Swiss Re	93,730	18.5%	-0.7%
Munich Re (US)	93,015	18.4%	-0.2%
Hannover Life Re	56,300	11.1%	-2.1%
Canada Life Re	19,567	3.9%	Unch
Partner Re	13,644	2.7%	+0.4%
All Other	21,265	4.2%	+0.2%
Total	506,325	100.0%	+1.6%

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Top 5:
89.2%
market
share

Source: Munich Re/SOA "2018 Life Reinsurance Survey Results"

US Life Reinsurers

- Two-tiered market by NB and IF
- Not much change in top tier for several years
- Bottom tier is a mixed group
- Different line-ups for other product lines
 - Group Life
 - Group LTD
 - Individual Disability Income
 - Long Term Care
 - Remote risk/structured solutions

Questions



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2019 Reinsurance Seminar

Greg Roemelt and Jeff Katz
Regulatory Reforms and Impact on Reinsurance
24 September 2019



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Regulatory Reforms

Key Regulations and Potential Reforms

1. Credit for Reinsurance: certified reinsurers and reciprocal jurisdictions
2. Reserve credit for YRT reinsurance under PBR
3. New York Regulation 210
4. Potential changes to the risk transfer regulation (aka L&H Reinsurance Agreements reg)
5. RBC longevity charge
6. Potential changes to RBC equity charges
7. Variances in permitted practices by state regulatory departments



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Jason Kao

The Pension Risk Transfer-mation:
Market Overview and Intro to Reinsurance
September 24, 2019

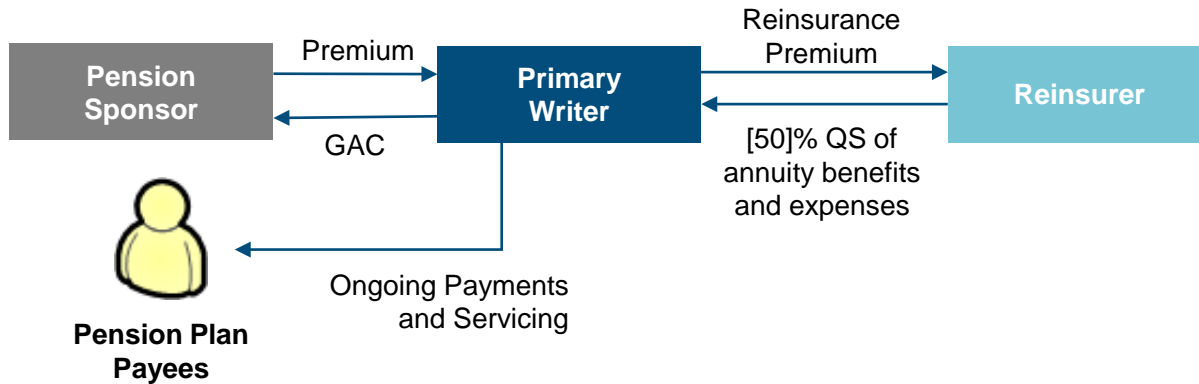


PRT Reinsurance Overview

Quota-share reinsurance can provide accretive pricing and improve competitiveness in PRT auctions
It also provides capital relief and longevity risk reduction given it is a full risk transfer solution

Example:

- Cedant and Reinsurer enter into a simple coinsurance transaction for [50]% of the block
- Cedant will continue to issue the GAC and retain responsibility for 100% of the servicing of the business
- Reinsurer will pay its quota-share of all liability outflows and expenses



The “Case” for PRT Reinsurance

Quota-share reinsurance can provide accretive pricing and improve competitiveness in PRT auctions, where the difference between 1st and 2nd place can be as tight as 0.25% or 0.5% premium

Example:

Total Premium for 100%	\$300
Primary Writer Premium for 50%	\$150
Reinsurer Premium for 50%	\$144
Total Premium w/ Reinsurance	\$294
\$ Improvement	\$6
<i>% Improvement on 100% of Deal</i>	<i>2.0%</i>
<i>% Improvement on 50% of Deal</i>	<i>4.0%</i>

Other benefits to the primary writer include:

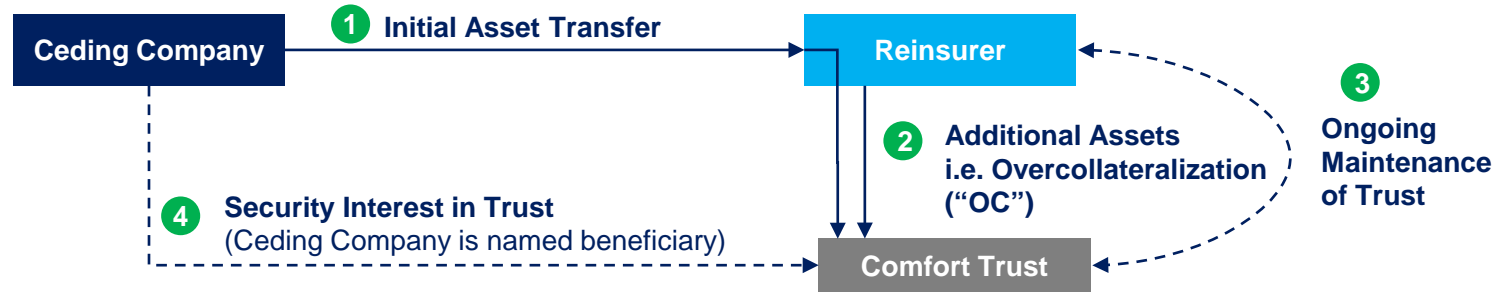
- **Laying off risk** e.g. longevity risk, deferred lives, asset risk
- **Consuming less capital**
- **Exchanging views on underwriting**

Reinsurance of PRT vs. Typical Inforce Blocks

	PRT Cases	Typical Inforce Blocks
Diligence Timing	<ul style="list-style-type: none"> ▪ 2 – 3 weeks per case ▪ Added to single reinsurance / trust agreement 	<ul style="list-style-type: none"> ▪ 3 - 6 months, or more ▪ Reinsurance and trust agreements negotiated for individual transactions
Process	<ul style="list-style-type: none"> ▪ Typically an auction process led by brokers/intermediaries 	<ul style="list-style-type: none"> ▪ Can be auction or bi-lateral / direct
Availability of Data	<ul style="list-style-type: none"> ▪ Census file (i.e. seriatim file) ▪ MED file (i.e. transaction data) sometimes available, but not always 	<ul style="list-style-type: none"> ▪ Seriatim data ▪ Policy forms ▪ Transaction data and experience studies ▪ Appraisal
Asset Transfer	<ul style="list-style-type: none"> ▪ Cash ▪ Assets-in-kind 	<ul style="list-style-type: none"> ▪ Typically assets-in-kind

Overview of Comfort Trust

The reinsurer holds assets backing the block in a comfort trust for the benefit of the Ceding Company



Description

- 1 Ceding Company transfers assets to the reinsurer
- 1 Assets are transferred to the trustee that maintains the trust account
- 2 Reinsurer deposits additional assets from its surplus into the trust as overcollateralization
- 3 On an ongoing basis, the reinsurer maintains a minimum trust balance e.g. Reserves + [x]% OC
- 4 Ceding Company can draw on trust assets if reinsurer does not fulfill its obligations

Investment Guidelines

In order to provide risk mitigation to the Cedant, the Reinsurer may agree to a set of investment guidelines that govern the assets held in the trust account

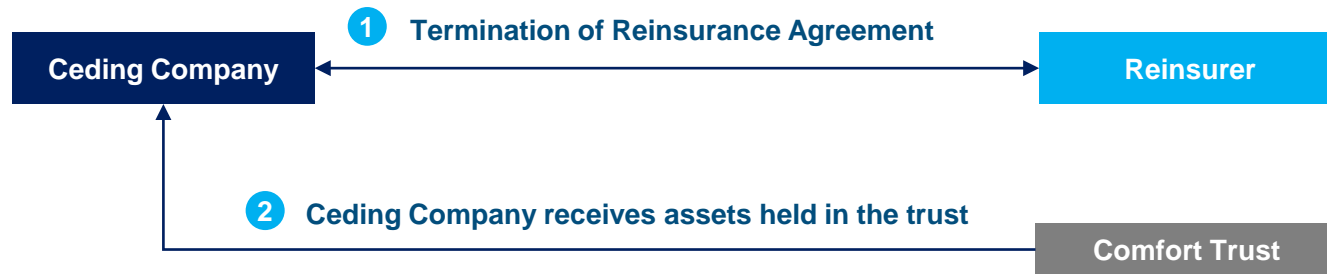
Examples of Investment Limits

Credit Quality	<ul style="list-style-type: none">▪ Maximum allocation to non-investment grade securities▪ Maximum WARF (Weighted Average Rating Factor) score
Asset Classes	<ul style="list-style-type: none">▪ Maximum allocation to equity, EM, alternatives, structured products, etc.▪ List of prohibited asset classes
Duration	<ul style="list-style-type: none">▪ Cap on asset-liability duration mismatch
Concentration	<ul style="list-style-type: none">▪ Maximum allocation to single issuers or industries

Block Recapture

The Ceding Company typically has the right to recapture the block under certain conditions, such as:

- 1 Reinsurer fails to pay its share of liability cash flows
- 2 Cedant is not able to receive credit for reinsurance
- 3 Reinsurer fails to maintain the minimum asset balance in the trust account
- 4 Breach of material terms of contract e.g. investment guidelines
- 5 Reinsurer enters into insolvency or bankruptcy proceedings, or is placed into receivership





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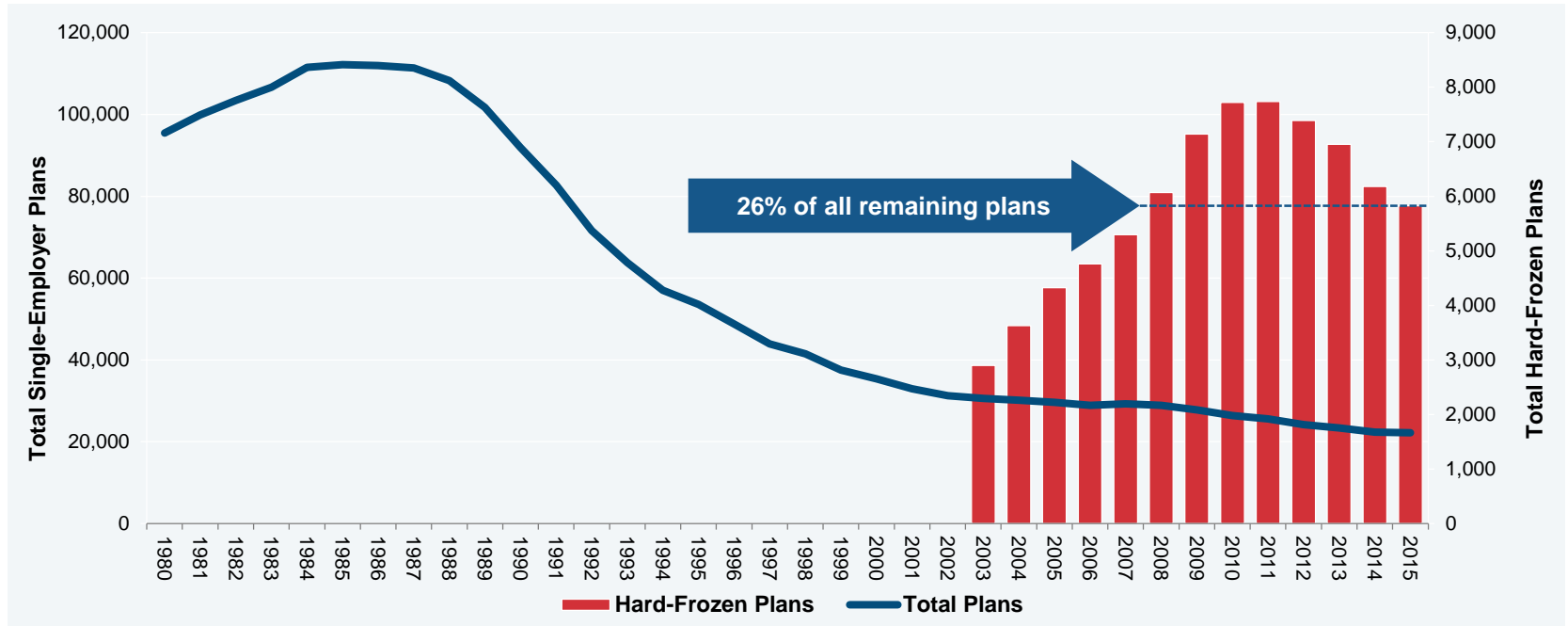


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Defined Benefit Plans Are Diminishing¹

Private-sector DB Plan Assets - \$3.2 Trillion²

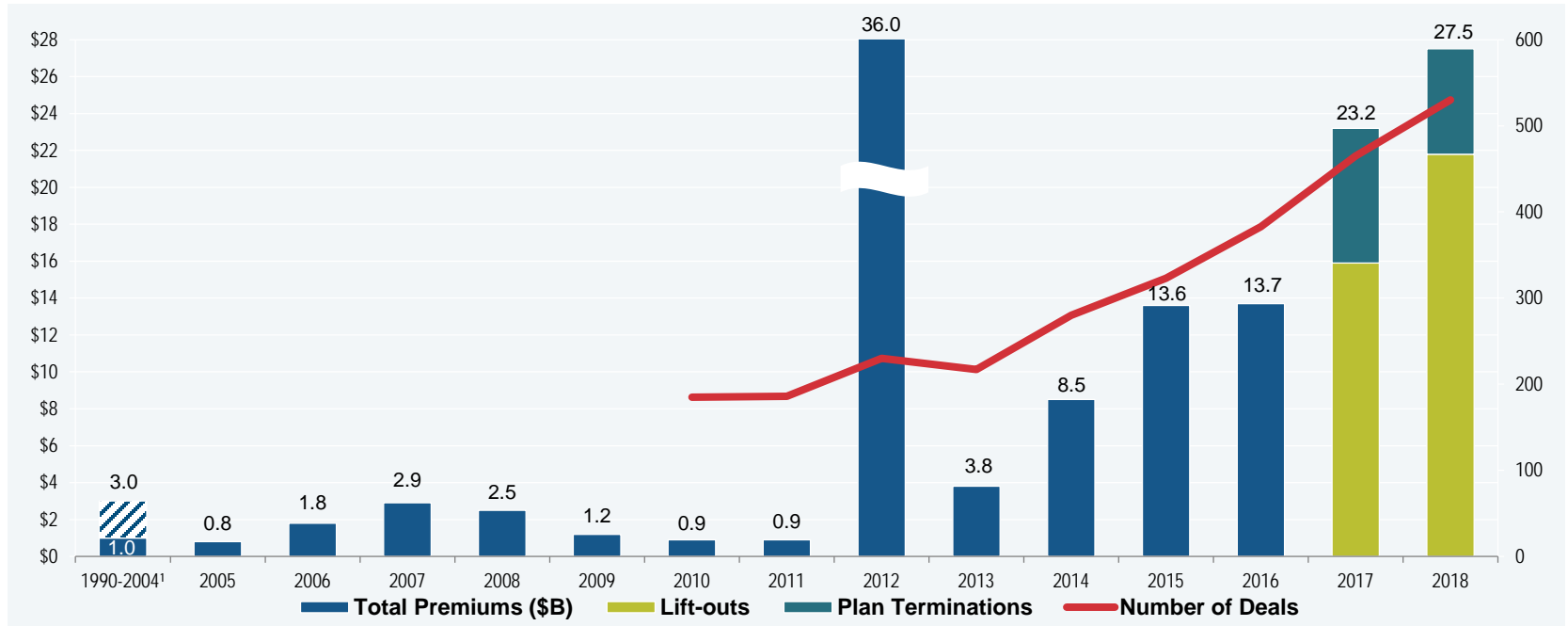


¹ PBGC Insured Plans Single-Employer Program sourced from PBGC 2016 Pension Insurance Data Tables. 2015 figures are most recent available estimates.

² Investment Company Institute website, 'The U.S. Retirement Market, First Quarter 2019'.

Historical Group Annuity Sales Volume

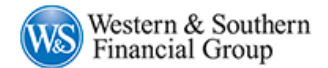
Insurer Sales – Single Premium Products (\$ Billions)



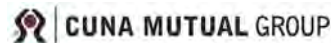
¹ For 15 years between 1990 and 2004, sales were between \$1B and \$3B.

Source: LIMRA Secure Retirement Institute and BCG Penbridge. Breakdown of total premiums in 2017 and 2018 sourced from Aon 2019 U.S. Pension Risk Transfer Annuity Settlement Market Update.

Annuity Buyout Providers¹



Most recent market entrants



¹ Insurers shown on this page are currently active in the US PRT market.

Pension Risk Transfer Market Entry – Required Capabilities

1. Financial Strength:

- a) Meet standards of Department of Labor Interpretive Bulletin 95-1.
- b) 95-1 is minimum guidance. Plan fiduciaries are responsible for the choice of insurer and could use more criteria than just 95-1 guidance.

2. Investment Capabilities:

- a) Ability to manage long duration liabilities.
- b) Expertise in long duration fixed income investments and possibly alternative investments.

3. Risk Assessment:

- a) Underwriting judgment to evaluate unique risk characteristics regarding mortality, participant options, and all plan benefits.

4. Administrative and Operational Capabilities:

- a) Operational elements in place to administer the business efficiently and accurately.
- b) Administration quality also has relevance to DOL IB 95-1.

PRT Insurer Competitive Landscape

Provider	Small (<\$100M)	Mid (\$100M-\$500M)	Large (>\$500M)
Prudential	✓	✓	✓
MetLife	✓	✓	✓
New York Life	✓	✓	
AIG	✓	✓	✓
MassMutual	✓	✓	✓
Principal	✓	✓	✓
Pacific Life	✓	✓	✓
Athene		✓	✓
Securian	✓	✓	
Western & Southern	✓	✓	
Great American	✓		
OneAmerica	✓	✓	
Mutual of Omaha	✓		
Mutual of America	✓	✓	
CUNA Mutual	✓		
Legal & General	✓	✓	✓

Notes: (1) Providers ordered by size of US Life Insurance Group Assets; (2) The size breakpoints above are general guidelines. Each PRT insurer has minimum and maximum cases sizes that they will bid on. For example, an insurer with a check in the small category above may have a minimum case size of \$5 million. Another one might have a minimum case size of \$50 million. Most insurers do not disclose a maximum case size.

Reinsurance Market Development

Key Considerations

- The US is a strategic priority for many reinsurers. Key to success include:
 1. Strength of capital
 2. Size of company
 3. Credit ratings
 4. Jurisdiction of domicile of reinsurer
 5. Ability/interest in expertise and knowledge sharing
- As PRT direct writers continue to write business, we expect increasing interest in longevity reinsurance to balance their mortality/longevity books.
- Creditworthiness of the reinsurers looking to provide capacity will be a front and center issue.
- Reinsurers (and new fronting insurers) that are willing to offer capacity for deferred lives will have an advantage.

Reinsurance Market Development

Traditional reinsurers are considering entry into the market in two ways:

1. Reinsurance of Inforce Business

- Structures primarily include coinsurance and longevity only reinsurance.
- In coinsurance, the reinsurer shares in all of the risks (longevity, investment, etc.) with the ceding company.
- Longevity only reinsurance
 - Not contemplated when reinsurance risk transfer requirements were developed by the NAIC and FASB.
 - Need to request a statutory accounting permitted practice, but there is no guarantee that the ceding company's regulator will approve such practice.
- Increased demand for reinsurance in the future
 - Growth of longevity-based products may encourage companies to reinsure PRT transactions to balance insurance (mortality/longevity) risk profile.
 - Upcoming longevity charge for risk-based capital may also cause ceding companies to consider some form of reinsurance.

Reinsurance Market Development

Traditional reinsurers are considering entry into the market in two ways:

2. Partnering with Direct Writers¹

- There is growing interest from both reinsurers and ceding companies in these partnerships as larger pension risk transfer cases are placed.
- There are few carriers willing to participate in the \$500 million+ sector due to the size of these transactions relative to the overall size of their PRT business.
- Leveraging reinsurers' capacity, investment expertise, and capital/tax advantages may allow ceding companies to participate in and be more competitive on larger cases where they cannot today on a standalone basis.
- Coordinating and preparing a combined bid on a timely basis could be a challenge.
- Ensuring that ceding company has appropriate security for its reinsurance counterparty exposure (through a trust or some other means) is also important.

¹ Reinsurers (when partnering with direct writers on new business opportunities) could also be subject to DOL IB 95-1.

Inaugural PRT Longevity Reinsurance Transaction

Deal Highlights

- The first of its kind longevity reinsurance transaction in the US was completed during the first half of 2019.
- The transaction was executed on ceding company's inforce PRT business, covering a portion of its in-payment participants with ~\$1 billion in statutory reserves.
- The ceding company had four objectives:
 1. Capacity to write more business in consideration of the balance of its risks between mortality and longevity risk;
 2. Protection against future mortality improvements being better than their expectations;
 3. An external validation of their internal view on longevity; and
 4. Receiving reserve and capital relief consistent with traditional reinsurance transactions.
- These objectives were achieved.

Important Legal Information

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Annuity and Asset-intensive Reinsurance

August 25, 2019

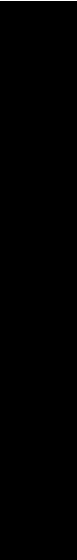
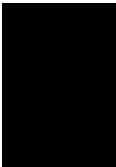
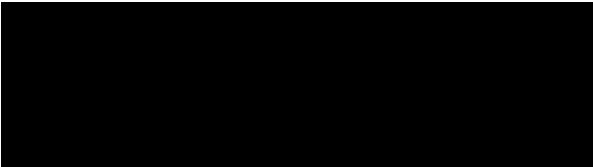
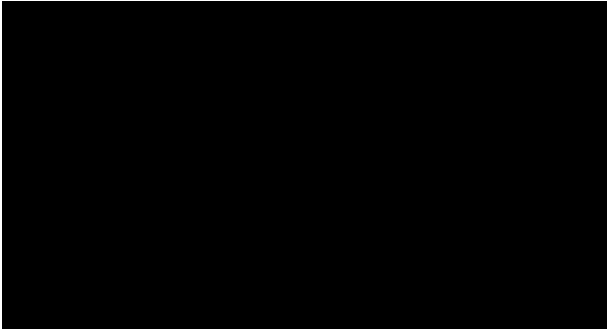
Mike Kaster, FSA, MAAA, MBA



Agenda

- Asset Intensive Products
- Market Drivers and rationale for Asset Intensive reinsurance
- Dynamics of the reinsurance market
- Reinsurance process
- Types of Annuity Reinsurance structures
- Challenges and considerations with Asset-intensive reinsurance
- Questions/next steps

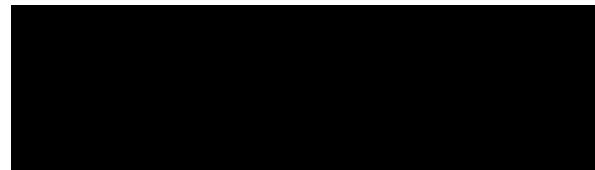
Asset Intensive Products



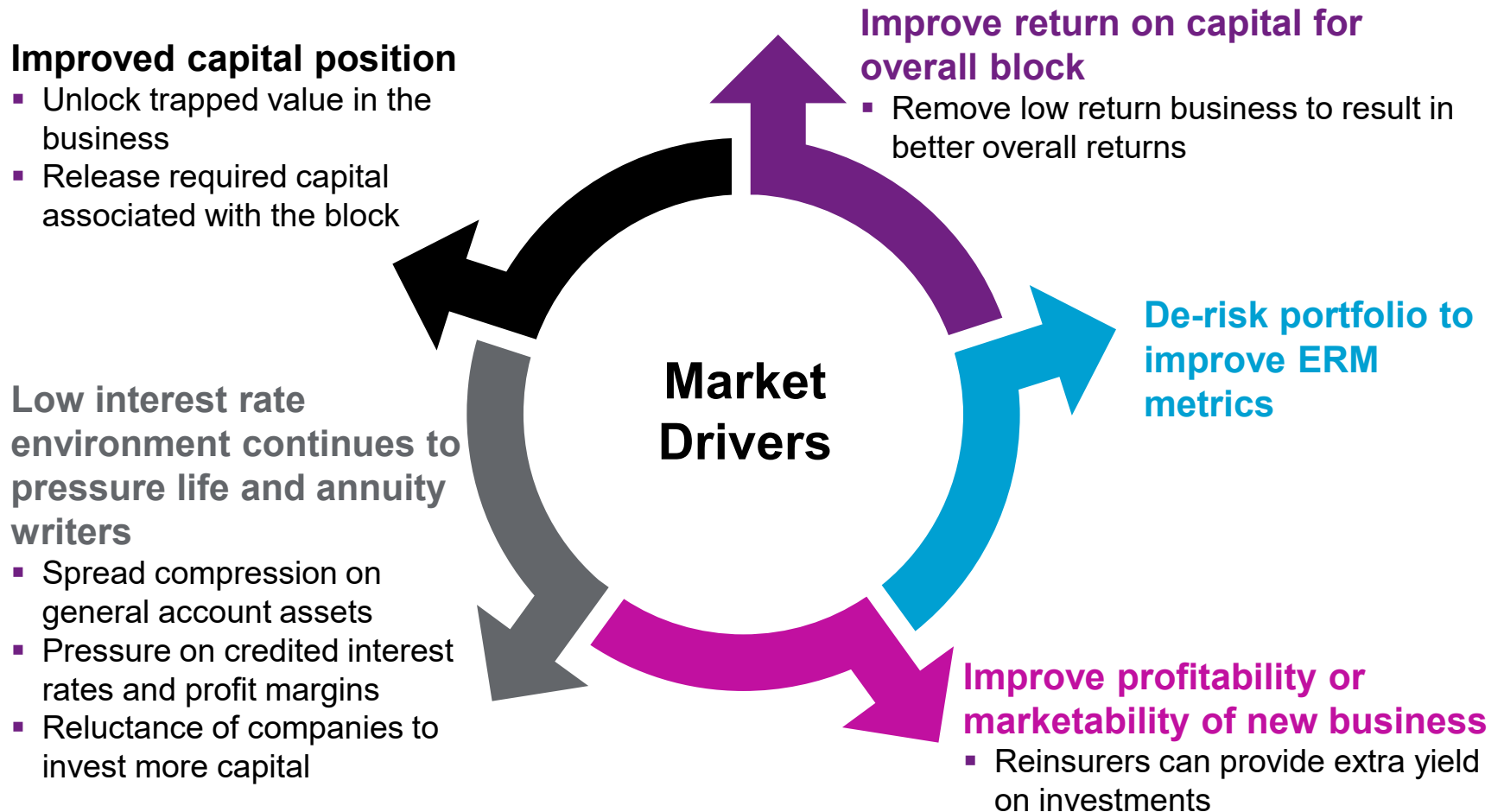
What are Asset Intensive products?

- Annuity reinsurance is really the ultimate form of Asset Intensive (“A-I”) reinsurance, i.e. reinsurance of liabilities that are heavily weighted on asset/interest rate risk.
- Forms of reinsurance can be developed on the Asset Only component of these types of liabilities;
 - ISWL
 - Universal Life
 - Payout Annuities
 - Indexed Annuities
 - Structured Settlements
 - Disabled Life Reserves
 - Whole Life
 - Long Term Care
- Full Risk-transfer solutions would need to deal with all risks, and the investment risk would be just one aspect of all of these products
- Separate account products (VA, VUL) would not be considered in this category, as those “assets” are policyholder related.
- Pension Risk Transfer (PRT) is the newest category of A-I Reinsurance

Market Drivers and rationale for Asset Intensive reinsurance



Market drivers for A-I Reinsurance transactions



Closed Block transaction market – North America



Major transaction themes:

- New Capital continues to enter market
- Asset Accumulators dominate
 - Most activity has been focused on asset-intensive liabilities
- Difficult products continue to be evaluated:
 - including variable annuities, universal life with secondary guarantee, long term care and other highly complex products
 - Reinsurers and capital markets continue to explore creative solutions
- Traditional reinsurers still focused on mortality and not interested in investment risk

Many buyers have appeared, with differing motives

New entrants have created a seller's market

We can broadly categorize four types of buyers



Each has different characteristics

Recent large North American annuity reinsurance transactions

Based on publicly available data – over \$1b in reserves

Ceding Company	Reinsurer	Reserves (billions)	Block Description	Year Closed
Voya	Athene	\$19.0	Fixed annuity	2018
Talcott	Global Atlantic	\$9.0	FA, payout, SS	2018
Manulife	Jackson National	\$8.0	US group payout annuities	2018
Lincoln National	Athene	\$7.7	FDA, FIA	2018
Transamerica/Aegon	Wilton Re	\$6.0	Payout annuity	2017
Symetra	Resolution Life	\$5.7	SS, income annuities	2018
Manulife	RGA	\$4.0	Individual payout annuities	2018
Horace Mann	RGA	\$2.9	Fixed Annuity and VA (403b)	2019
Farmers New World	RGA	\$2.3	Fixed Annuity, SS and VA	2017
Ameriprise	Global Atlantic	\$1.7	Fixed Annuity (high GMIR)	2019
Mutual of Omaha	RGA	\$1.1	Fixed Annuity (high GMIR)	2018
Undisclosed	F&G Re	\$0.9	Fixed Annuity	2019

Source: S&P Global Market Intelligence and company press release.

Several fixed annuity blocks with high guarantees have traded with commissions in the range we have seen is between 5 to 10% of reserves.

Recent North American life reinsurance transactions

Based on publicly available data – Reserve credit taken at EOY

Cedant	Reinsurer	Reserves (billions)	Block Description	Transaction Date
Liberty	Protective	\$13.4	Substantially all of the individual life and annuity business	May-18
Mass Mutual	RGA	\$8.1	In-force universal life, variable life and 20-year term life	Dec-17
Transamerica	Wilton Re	\$7.1	Bank owned / corporate owned life insurance business (BOLI/COLI)	Apr-17
Transamerica	SCOR	\$1.7	Other Life	Oct-17
State Life	London Life	\$1.0	Other Life	Oct-17
Symetra	Wells Fargo	\$0.7	AXXX Life	Apr-18
Delaware Life	Sun Life	\$0.7	AXXX Life	Oct-17
Aetna	Hartford	\$0.7	US Group Life and Disability	Nov-17
National Life	Hannover	\$0.7	AXXX, and XXX Life	Dec-17
Transamerica	SCOR	\$0.6	Other Life	Jul-18

2019: Great West and Protective*

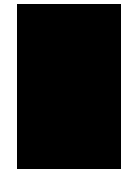
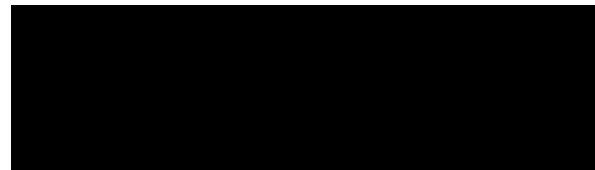
- Great-West Life & Annuity Insurance Company has agreed to sell, via reinsurance, substantially all of its individual life insurance and annuity business.
- Protective notes that the transaction price is expected to be roughly \$1.2 billion.

*Source: S&P Global Market Intelligence and company press release.

Reasons for Reinsuring Closed Blocks

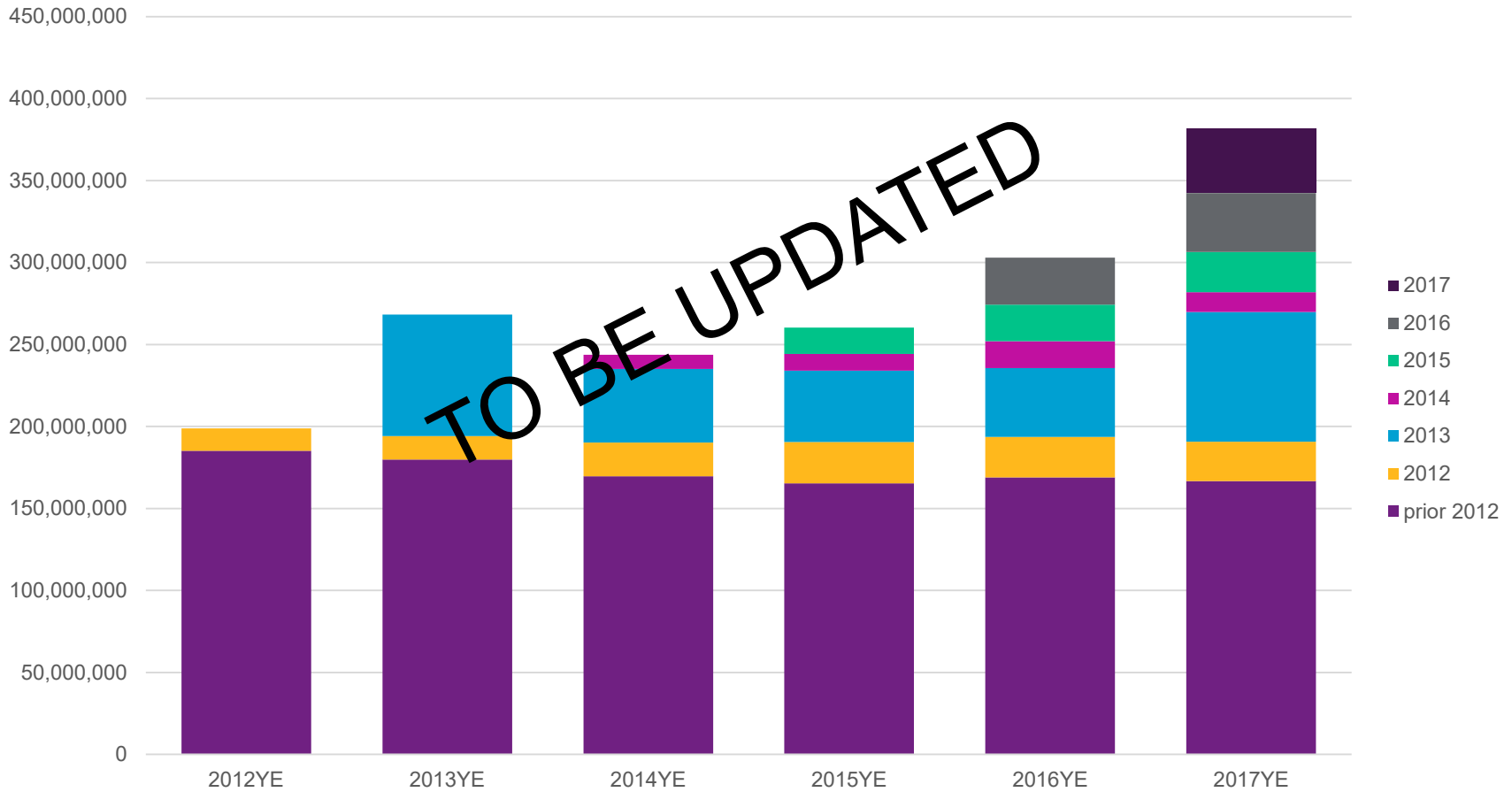
Reasons	Descriptions	Downstream Impact(s)
Divest Non-Core Business	No appetite for on-going management of non-core business	Focus on growing core business
Capital Base	Release of EV within closed blocks	More readily support and grow new business for core products
Diversification	High concentration of risks	Diversify risks to protect balance sheet, in particular during adverse environments
New Business Competition	Improve competitive position through reinsurer's expertise	Share in expertise
Investment Experience	Annuity reinsurers consider investment management one of core strengths	Share in expertise

Dynamics of reinsurance market



Annuity Reinsurance Reserve Credit Taken + Modco Reserve Trend

Combined total (\$000s) through 2017



Source: S&P Global Market Intelligence

Various types of Reinsurers

Reinsurance of Asset Intensive business is very different than traditional mortality reinsurance...and the interested parties are different as well.

Types of Reinsurers:

- Established, highly rated, well capitalized
 - Generally, most have pulled back from capital driven reinsurance – but some movement back.
- Newer, annuity focused reinsurance entities
 - Growing – but capital situation is varied
 - Generally bring Investment expertise
- Off-shore vs. On-shore – tax reform and SII impacting this
- Unauthorized vs. Authorized

No less than 30 different companies currently working in the U.S.

Many buyers have appeared, with differing motives

- New entrants have created a seller's market

We can broadly categorize four types of buyers

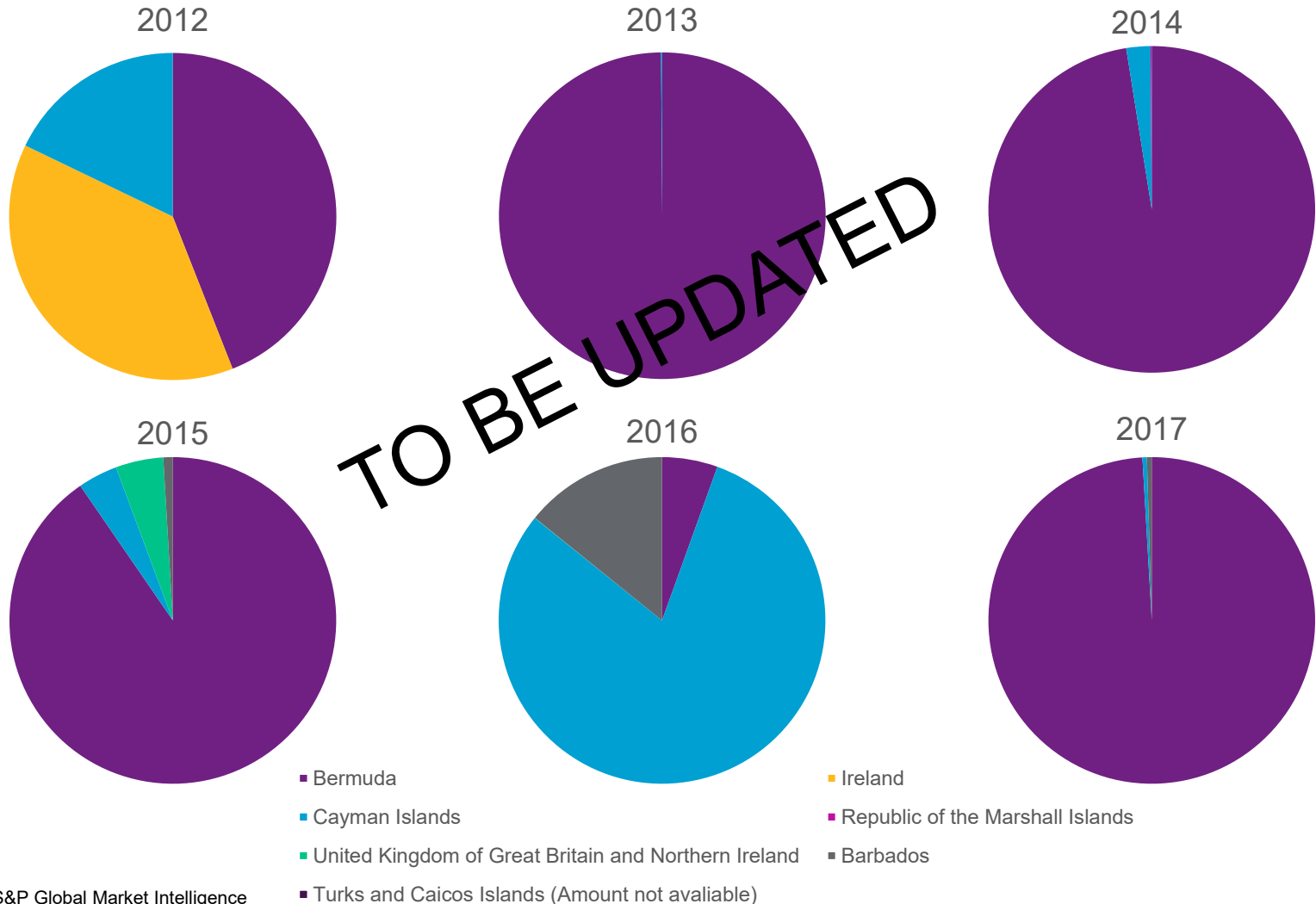


Each has different characteristics

Drivers of growth in A-I Reinsurance

- Diversification – organizations looking to diversify their earnings, and view the “life” market as having stable earnings
- Growth – for most, they are looking for growth in assets under management (AUM) and are willing to be aggressive to see this growth
- Rising rates – even slightly has caused positive movement
- Stable markets – no volatile market disruptions has been favorable to newer entrants
- New Capital sources – looking for ways to deploy capital more quickly than through organic growth

Non-Domestic Reinsurance Amount by Country



Source: S&P Global Market Intelligence

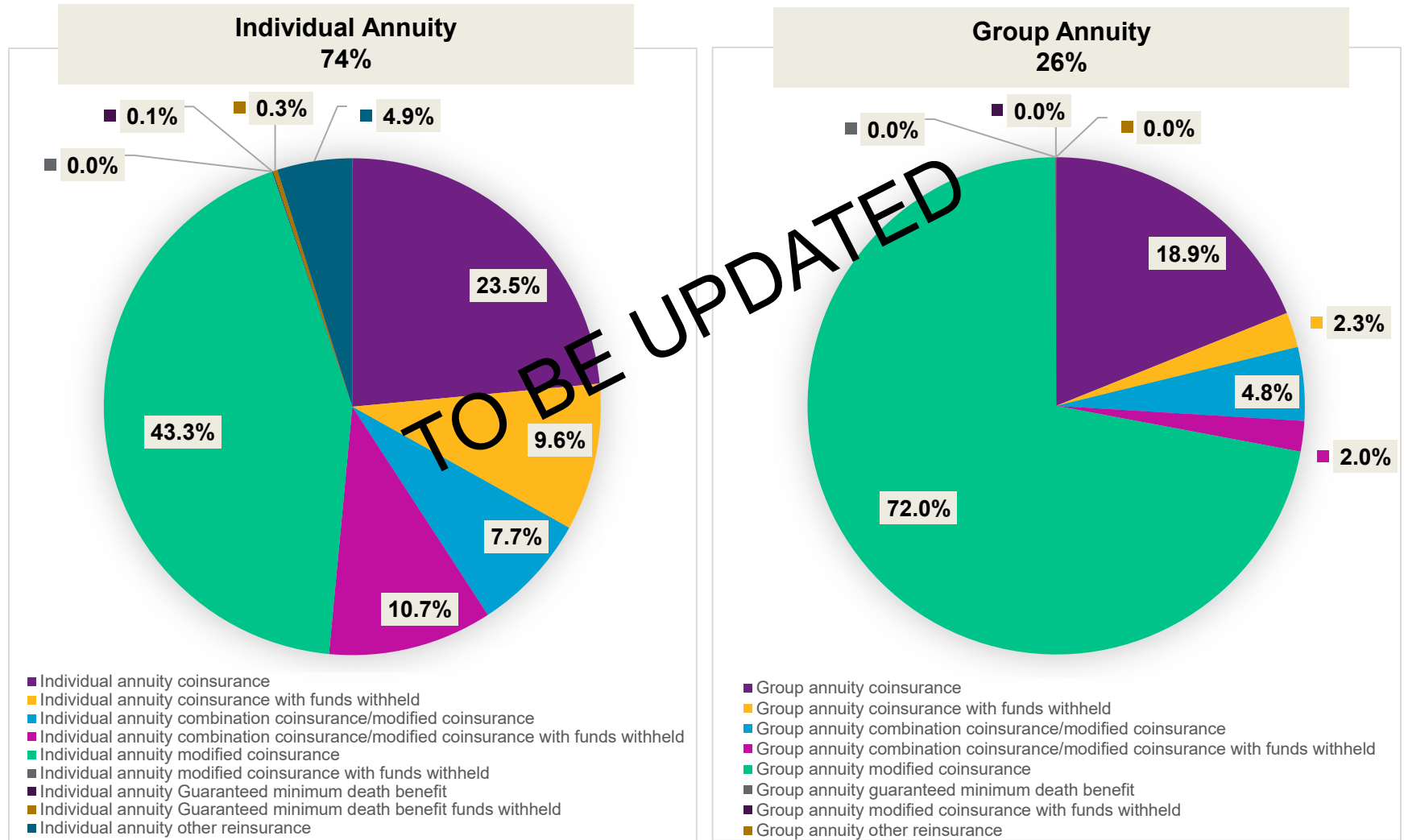
■ Bermuda
 ■ Cayman Islands
 ■ United Kingdom of Great Britain and Northern Ireland
 ■ Ireland
 ■ Republic of the Marshall Islands
 ■ Barbados
 ■ Turks and Caicos Islands (Amount not available)

Reinsurance market segments to consider

- AM Best rated NAIC Reinsurers: US Statutory accounting and US tax/less flexible investment strategy
- AM Best rated non-NAIC Reinsurers: GAAP accounting, non-NAIC regulations, non-US tax, collateral structure / moderately flexible investment strategy
- Unrated Reinsurers: GAAP accounting, non-NAIC regulations, non-US tax, collateral structure / flexible investment strategy
- Other variations exist – there are no less than a dozen
- Reinsurers in each category can be categorized as follows.
 - Highest Rated – “A” or better (by A.M.Best)
 - Strong Ratings – “A-” or “B++”
 - Non Rated – but some with strong experience
 - Traditional Reinsurers– some may have interest in A-I Re, but generally not competitive

Annuity Reinsurance by Type

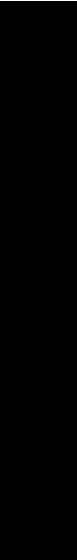
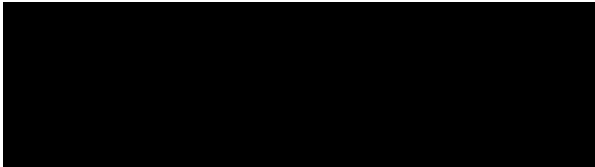
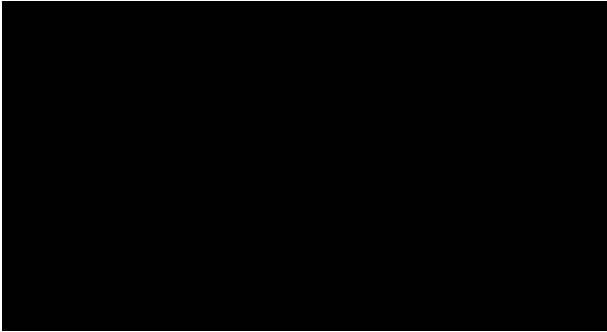
- Based on Reinsurance Reserve Credit Taken and Modco as of 12/31/2017



Source: S&P Global Market Intelligence

Reinsurance Process

Choosing a suitable partner



Key considerations for reinsurer negotiations

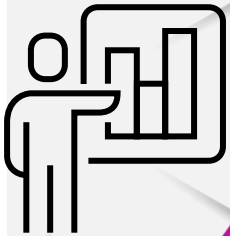
Running a competitive transaction process is most typically the preferred route from the seller's perspective

If it is decided to go forward with a competitive process, we would recommend including a few of the lesser-rated entities. This will facilitate two benefits:

- Educate on the potential risk mitigants each reinsurer is willing to put forward
- Knowing there is competition will push each reinsurer, including the higher rated reinsurers, to improve their competitiveness

Relative to pricing, with more restrictive investment guidelines and collateral comes less competitive pricing

- Can be examined through some preliminary pricing



Approach for Annuity Reinsurance – similar, but not the same

When you embark on a new reinsurance process around annuities or other asset-intensive products, there are a number of considerations.

- Counterparty credit and potential markets
 - No less than 25-30 potential reinsurers and markets for Asset-Intensive reinsurance
- Non-Disclosure Agreements (NDA)
 - To allow for free-flow of information
- Data sharing with markets
 - Fairly intensive for inforce business
 - May want to discuss product features for new business
- Meetings with interested parties
 - Many are not well known and are newer to the market
- Transaction objectives and motivations
 - Most important as you embark on an evaluation of potential reinsurance for your asset-intensive business.

Ceding company considerations when choosing a Reinsurer

- Credit Rating of reinsurer
- Capital levels or over-collateralization
- Experience in market
- Investment expertise
- Pricing / Competitiveness
- Regulatory concerns
- Rating agency reactions
- Reinsurance structure proposed
- Partnership Approach

Considerations – choosing a reinsurance partner

Pricing assumptions

- Annual full surrender (“lapse”) rate assumptions (assuming current low interest environment remains during projection period):
 - Review of experience of company
 - Benchmark to competitor rates
 - High lapse at end of SC period – older business may be stable
- Investment yield (per investment guidelines)
- Expenses (for administration – typically paid to ceding company)
 - Commissions are an expense on new sales - shared
- Taxes, cost of capital, etc. – all different by reinsurer

Considerations – choosing a reinsurance partner (cont'd)

Viewing all of the economic factors in a block transaction:

- Ceding allowance is only one consideration
 - Reinsurers have been offering “negative” ceding allowances on blocks of fixed annuities with relatively high minimum interest rate guarantees
- Liquidation of assets to provide a cash transfer to the reinsurer often results in releasing unrealized gains that can be used to off-set the negative allowance
- 100% coinsurance transaction may also release a portion of the Interest Maintenance Reserves – both existing and new
 - Treatment of this varies by company / off-shore vs NAIC entity.

Case Study (1/2)

▪ Zurich's divestiture of the U.S. Annuity Business

Background



- Capital pressure on Zurich was growing, and the U.S. annuity business was determined to be non-core to the company
- The M&A team in Europe began a process to sell the U.S. Annuity business – **Project West**
- Over the years, Farmers New World Life in Seattle had sold around \$2.5 bil of fixed annuities, variable annuities and structured settlements
- Zurich began a process to find an advisor to run a process and develop an actuarial analysis of the business

Book Analysis



A review of the book of business was commissioned, including validation of projection assumptions and appraisal development:

- Most of the annuity business was straight forward (fixed products), but structured settlements required a more in-depth review
- A price (ceding commission) estimate was derived, with projections shared with interested parties

Market Analysis



A competitive auction started with broad analysis of the span of potential markets, including 17 different entities

- Proposals from 15 companies representing a variety of reinsurers, capital markets, on-shore and off-shore entities
- A conventional 2-round process was followed, and eventually was narrowed down to 5 companies for second round bids

Case Study (2/2)

- Zurich's divestiture of the U.S. Annuity Business

Execution



Several key issues needed to be dealt with during this process, including:

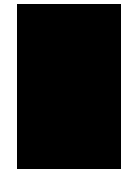
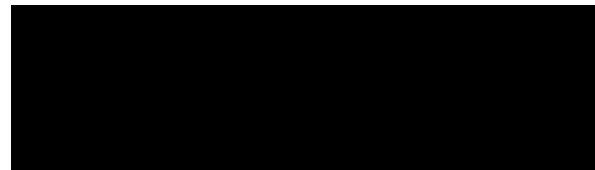
- Evaluation of counterparties for risk exposure and counterparty credit considerations
- Detailed analysis of investment guidelines and investment approach of each party needed to be vetted and evaluated
- Reinsurance structures and impact to Farmers was extensively analyzed to ensure the expected outcome was achieved
- Collateral and trust structures were compared to ensure the maximum long-term protection was achieved for the insurer
- Even though two potential reinsurers were in final negotiations to the end, eventually RGA was chosen because of their strong pricing, counterparty considerations and execution certainty

Outcome



Zurich realizes very large capital benefit from Project West, and announces this as a part of an overall \$1.7bn capital benefit from released non-core businesses

Types of Annuity Reinsurance Structures



Key Issues – Reinsurance Transactions

A-I Reinsurance: More to consider than a typical reinsurance transaction

1

Form of reinsurance (Coinsurance, Mod-Co and Co-FWH)

2

Investment guidelines

3

Potential counterparty concerns and ways to structure protections

4

Level of protections (collateral, LOCs, etc.)

5

Obtaining full reserve credit and capital release from reinsurance

6

Regulatory approval

7

Expense coverage and administrative controls (if applicable)

8

Treatment of deal from an accounting (Statutory, GAAP, IFRS) and tax perspective, as well as the potential capital relief obtained

Forms of Annuity Reinsurance

- Coinsurance
 - Reinsurer assumes risk for quota-share portion of asset performance, disintermediation, expense and persistency
 - In force vs. new business
 - Ceded premium is either defined as a quota share of the annuity deposits (new business) or a quote share of the reserves (inforce)
 - Ceding commission is generally calculated to support the ceding company. For IF, it's the value. For NB, offsets cost of writing business.
 - Assets backing reserves – held by reinsurer
 - Does not require a separate investment management agreement
 - Acceptable investment guidelines are defined in treaty.

Forms of Annuity Reinsurance

- ModCo or Coins funds withheld (Co-FWH)
 - Risks are still transferred from cedant to reinsurer.
 - Key difference - Assets remain on ceding company's balance sheet
 - Usually put into a trust or separate account, to the benefit of the reinsurer, but not always in trust
 - Ceding company maintains more control over assets – still “on balance sheet” – or perception of control
 - Reinsurer likely will want separate investment management agreement between two parties – to manage the interest risk.
 - Viewed as less risky; qualifies for reserve credit.
 - Ceding company has access to assets at all times.
 - Assets are maintained at Book Value – preferred by reinsurers

Asset-Intensive Reinsurance Structures

Reinsurance Form		Collateralization		Investments	
<input type="checkbox"/>	Coinsurance	<input type="checkbox"/>	No collateralization	<input type="checkbox"/>	Investment guidelines
<input type="checkbox"/>	Coinsurance with comfort trust account	<input type="checkbox"/>	Collateralization level (up to 100% of reserves)	<input type="checkbox"/>	Allowable investments
<input type="checkbox"/>	Modified Coinsurance	<input type="checkbox"/>	Over-collateralization (in excess of 100% of reserves)	<input type="checkbox"/>	Due diligence of investment approach
<input type="checkbox"/>	Coinsurance funds-withheld	<input type="checkbox"/>	Forms of collateral		

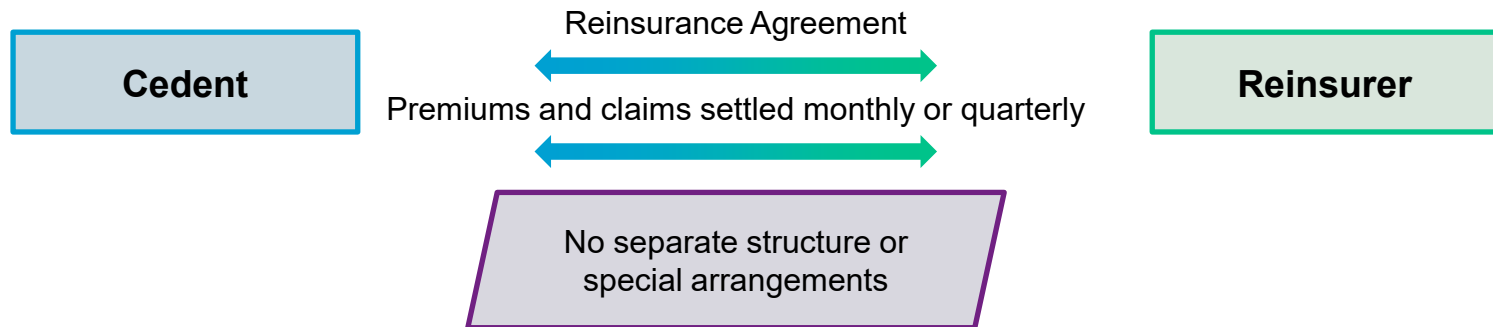
Forms of A-I reinsurance (1/3)

	Description	Protection	Likely Companies
Structure 1	Coinsurance – No Trust	Creditworthiness of counterparty	Large, highly-rated reinsurers

Explanation

- For well-established and strong credit counterparties, they want to maximize their flexibility in managing the risk by simply holding all the assets and liabilities on their own balance sheet without restrictions.
- Does not require separate investment management or guidelines
- Very little transparency into reinsurers approach
- Limited ability for on-going review of security of the deal by cedent.

Potential Structure



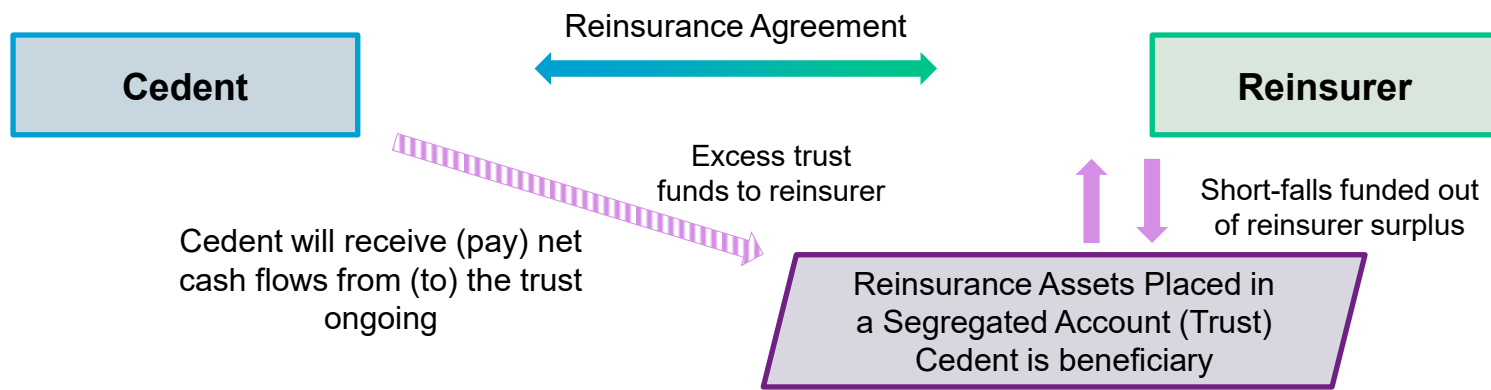
Forms of A-I reinsurance (2/3)

	Description	Protection	Likely Companies
Structure 2	Coinsurance – w/ Comfort trust	Pre-defined asset amounts (90-105% of reserves) held in separate trust	Highly capitalized, experienced reinsurers

Explanation

- Similar to straight coinsurance, but experience asset-intensive reinsurers have agreed to holding assets in a segregated trust account for the benefit of the ceding company.
- Gives an extra level of protection, as the assets are kept separate, and usually subject to a separate set of investment or collateral guidelines.
- Trustee is assigned, and subject to a separate trust agreement.
- Monthly or quarterly settlements are defined and settled between the parties.
- Offers more protection than Structure 1, but the lower level of flexibility for the reinsurer may impact their ability to price competitively.

Potential Structure



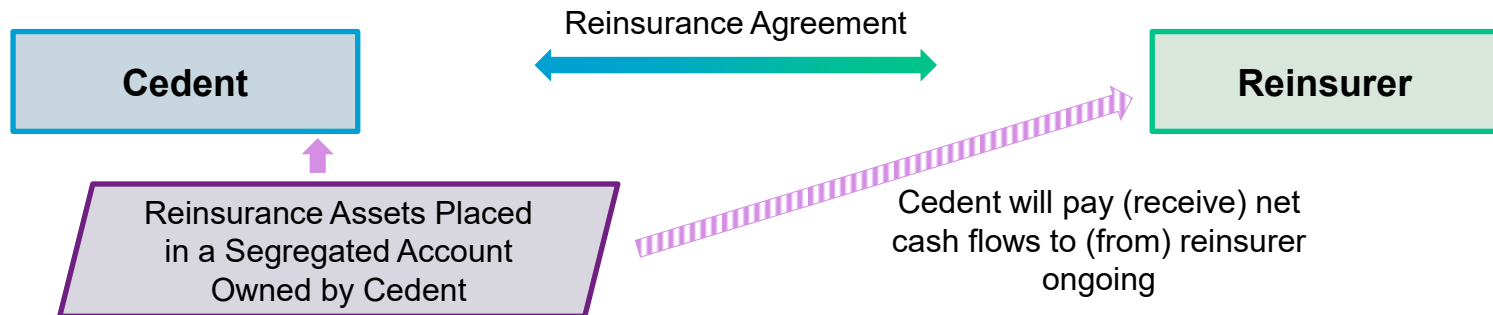
Forms of A-I reinsurance (3/3)

	Description	Protection	Likely Companies
Structure 3	Mod-Co or Co-FWH	Security of counterparty	Off-shore, unauthorized reinsurers

Explanation

- Key to Mod-Co and Co-FWH is that the assets remain on ceding company's balance sheet
- Assets typically placed in trust or separate account, to ease external investment management and cedent operations and accounting, but not always
- Ceding company maintains more perceived control over assets – still “on balance sheet”.
- Viewed as less risky; required for unauthorized reinsurers to qualify for reserve credit
- Reinsurer most likely will want separate investment management agreement between two parties – with reinsurer named as a sub-advisor on these specifically allocated assets.
- Assets are maintained at Book Value

Potential Structure

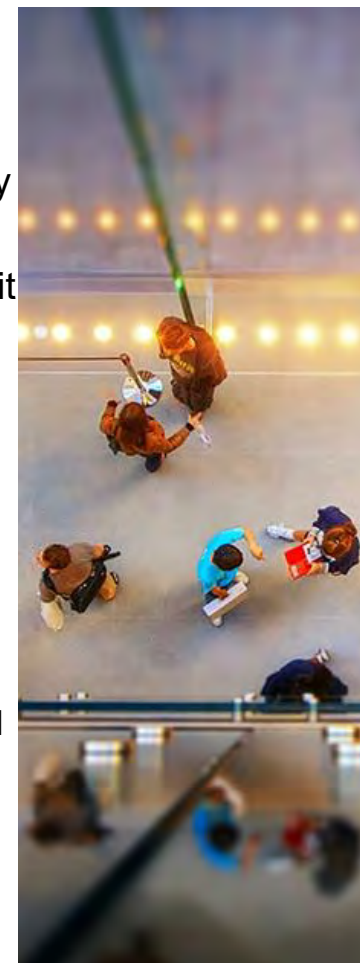


Pros and cons of each reinsurance transaction structure

#1 Coinsurance	#2 Coinsurance with Trust	#3 Mod-Co or Co-FWH
Pros		
<ul style="list-style-type: none"> ▪ Simple structure ▪ Maximum flexibility to investments allows reinsurer most competitive pricing ▪ Straight forward accounting 	<ul style="list-style-type: none"> ▪ Assets in trust provide cedent the ability to see the investments backing liabilities ▪ Comfort trust reduces counterparty exposure ▪ Provides more negotiating leverage in case of problems 	<ul style="list-style-type: none"> ▪ Assets on cedent's balance sheet provides full. transparency and protection ▪ Provides least amount of counterparty exposure relative to the other structures ▪ Provides more negotiating leverage
Cons		
<ul style="list-style-type: none"> ▪ No transparency of investments ▪ Generates highest counterparty exposure relative to the other structures ▪ Offers least amount of negotiating leverage during reinsurer breaches, defaults, or recapture negotiations – no collateral to seize ▪ Only suited for the higher rated, and authorized, reinsurers 	<ul style="list-style-type: none"> ▪ Less flexibility for reinsurer may result in slightly worse pricing ▪ Separate trust agreement needs to be put in place ▪ Requires on-going monitoring of compliance with collateral and investment limits 	<ul style="list-style-type: none"> ▪ Investment accounting a little more difficult ▪ Reinsurer will need to be designated as a subadvisor for investment management ▪ Requires more operational support by cedent (accounting)

Collateralization to mitigate counterparty exposure

- In lieu of requiring certain minimum ratings by outside agencies, many ceding companies look to separate collateral structures as a means to help protect a transaction
- Terms and features of collateralized transactions are highly negotiable and vary by deal, even with the same provider
- Transactions can be collateralized at inception or triggered via a reinsurer credit event (ratings downgrades, breach of RBC ratio, etc.)
- From our past experience, confidentiality prevents us from sharing specifics. From what we have seen, the following might be reasonable expected collateralization levels by tier:
 - Highly rated firms typically do not expect to be required to post collateral, but more recently the experienced players have agreed to some minimal levels of specific collateral
 - Posting levels can range from 0 – 3% of reserves
 - Strong, but not A-rated reinsurers understand that they generally will be required to post collateral
 - Posting levels can range from 1 – 4%
 - Unrated and newer firms expect to collateralize at a sufficient level to offset
 - Posting levels can vary broadly, and structures vary, but generally start at 4%+



Collateralization to mitigate counterparty exposure, continued

- Collateralization parameters typically include:
 - Establishment of a bankruptcy remote trust (potentially separate from the core reserve-credit trust) with an independent trustee
 - Investment guidelines and collateralization levels by asset class or portfolio
 - Collateral can be posted on a book or market value basis
 - Authorized reinsurers typically prefer to offer a trust with assets carried at book value
 - If a reinsurer is unauthorized, regulations require collateral to be posted on a market value basis
 - Periodic mark-to-market of the collateral (relative to current reserves) due to collateral market or book value changes and/or changes in reserves (subject to a cure period)
 - Frequency of counterparty reporting on the value of collateral relative to reserves



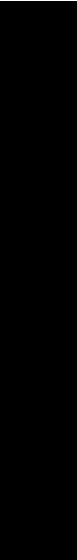
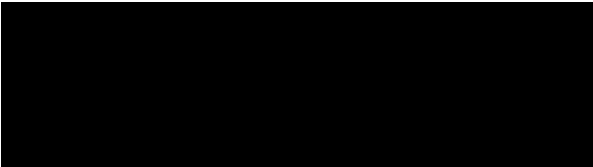
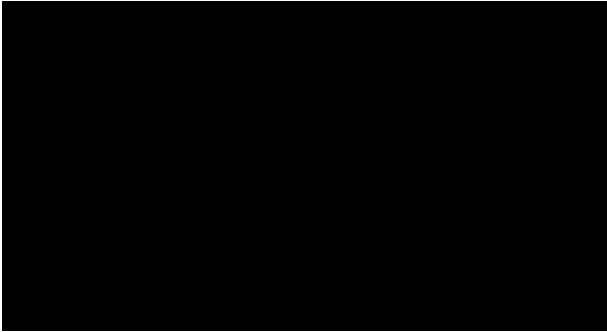
Unauthorized Reinsurer – Trust requirement

How do new reinsurers qualify to provide valid reinsurance credit.

Two approaches:

- Coinsurance – with Reserve Credit Trust and over-collateralization
 - To obtain reserve credit, a market value trust is established
 - Assets held in trust are marked to market at all times – equal to 102% of statutory reserves
 - Fluctuations in market conditions that impact asset value are responsibility of reinsurer
 - Investment guidelines are agreed to for trust assets
- Modified Coinsurance or Co-FWH – also qualifies
 - May still provide a “comfort trust” to hold capital (over collateralization) to protect transaction.

Challenges and Considerations with Asset-Intensive Reinsurance



New Business vs. In-Force Reinsurance - Annuities

New Business

- Also called “Flow” reinsurance
- Monthly (or more frequent) credited interest discussions. Rates determined by mutual agreement.
- Ceding commission to cover new issue expenses and administration.
- Reinsurer likely will want to help with new product development.

- May allow a company to get into a new line of business easier by leveraging the reinsurers expertise.

In-Force

- Much more M&A oriented.
- Significant diligence required by the reinsurer on the business.
- Will need to understand how business was sold, experience, demographics.
- Existing asset portfolio critical to the success of a transaction.
- Ceding commission represents the reinsurers view of the “value” of the business – pays for a portion of future profits.
- Most of the discussion is around appropriate investments going forward.

Investment guidelines

- When considering what's appropriate for investments backing the reinsured reserves, the ceding company generally will want to think about several items;
- Protecting the policyholder – ensuring that good ALM practices are followed.
- Assuring there won't be adverse investment experience – but need to remember the reinsurer is really baring the risk.
- In an adverse tail event, would the insurance company be comfortable taking back these assets.
- For Mod-co or Co FWH, would there be any impact to overall company investment guidelines.
- For Reinsurer – they will want sufficient flexibility to earn a good return!

Investment guidelines

Most reinsurance of asset-intensive business is focused around investments

- Early in the process of treaty term negotiation, either the cedent sets forth proposed guidelines, or the reinsurer defines the guidelines, subject to cedent approval.
- This becomes a very important part of each asset-intensive reinsurance negotiation. Some of the key considerations are:

Concentration Limits	Portfolio Limits	Other Limits
<ul style="list-style-type: none">▪ Asset Class▪ Sector▪ Entity	<ul style="list-style-type: none">▪ WARF or other Overall Credit Limits▪ Duration and/or Average Life Mismatch Limit	<ul style="list-style-type: none">▪ Downgrade or capital triggers further limiting risky assets or sectors▪ Leverage (Derivatives)▪ Limited Partnerships▪ Real Estate▪ Commodities

Limits should not be overly conservative:

Reinsurers should have some leeway in the management of their portfolio

Experienced reinsurers for asset-intensive liabilities have established a specific investment expertise or strength that they are looking to put to work, to generate higher yields for the benefit of the reinsurance.

Additional Items to be addressed in Investment Guidelines

- Appropriate Investment classes, with Maximums and Target allocations
 - Generally start with the cedent's own investment guidelines, but consider areas that would be OK for additional allocations.
 - Alternative assets, CMLs, Structured Securities (CLOs), etc.
- Asset-Liability Management constraints
 - Consider asking reinsurer to commit to a duration matching tolerance
- Defining specific investments that are not permitted
 - Items like derivatives, equities, hedges, etc.
 - For some reinsurers, they will generally use these instruments within their surplus accounts, to give cedent comfort.
- Reporting and Compliance – frequency of reporting, auditing, etc.
 - Cure period – need to allow reinsurer some time to make “right”.

Treaty issues

- Non-guaranteed Element management
 - Reinsurer does NOT have authority to determine non-guaranteed interest rates; must work in cooperation with the reinsurer.
 - “seek consent, not to be unreasonably withheld”
 - Agreement will specify process to be followed.
 - Should ideally address cure and compromise approach.
 - May be formulaic or indexed based.

Other issues in negotiations

- Quota share – how do you manage different profit objectives and investment approaches with new business reinsurance?
 - Example 60/40, with reinsurer assuming 5% yield and cedant assuming 3.5%.
 - If both have same profit objective, will need to discuss an on-going allowance from reinsurer to cedant to off-set the lower return target.
- Minimum capital requirements and recapture provisions
 - If market value of assets fall below a certain level, reinsurer must either top-up or may trigger recapture option.
 - Recapture could also be tied to RBC level of the reinsurer.
 - For overcollateralization levels, may consider tying to the reinsurers external rating (like A.M. Best) for determination.

Important Considerations when deciding to move forward

- An advisor can help you succeed from strategy to execution.

Team Selection

- Are there subject matter experts on your team?
 - Pricing
 - Modelling
 - Treaty terms
 - Risk Protections



Data Preparation

- Is your data available and organized to support the transaction?
 - Raw data
 - Experience data
 - Robust projections
- Are you positioning your business in the best light?

Execution

- How does the transaction get approved and completed?
- Issues will naturally arise; how are they solved?

Market Selection

- Have all the appropriate markets been identified?
- Can you structure the transaction to leverage particular market strengths?
- Does your process mitigate counterparty exposure?

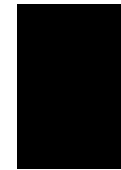
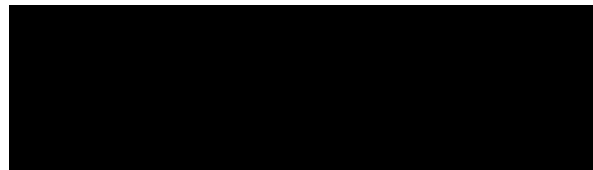
Negotiation

- What is the best strategy and approach for your block?
- Will each bidder share their concerns, and how should they be addressed?

Pricing and Risk

- How do you know your bid is competitive?
- Did you receive the best possible terms and conditions?
- How do you evaluate the trade off between price and counterparty credit risk?

QUESTIONS???



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Life Solutions Group

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200 Liberty Street
New York, NY 10281



Thank you

SOA Reinsurance Seminar 2019

MODELING POLICYHOLDER BEHAVIOR

TIMOTHY PARIS, FSA, MAAA

September 25, 2019

9:30-10:30am Central



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Analyzing
Experience Data

Modeling and
Assumptions

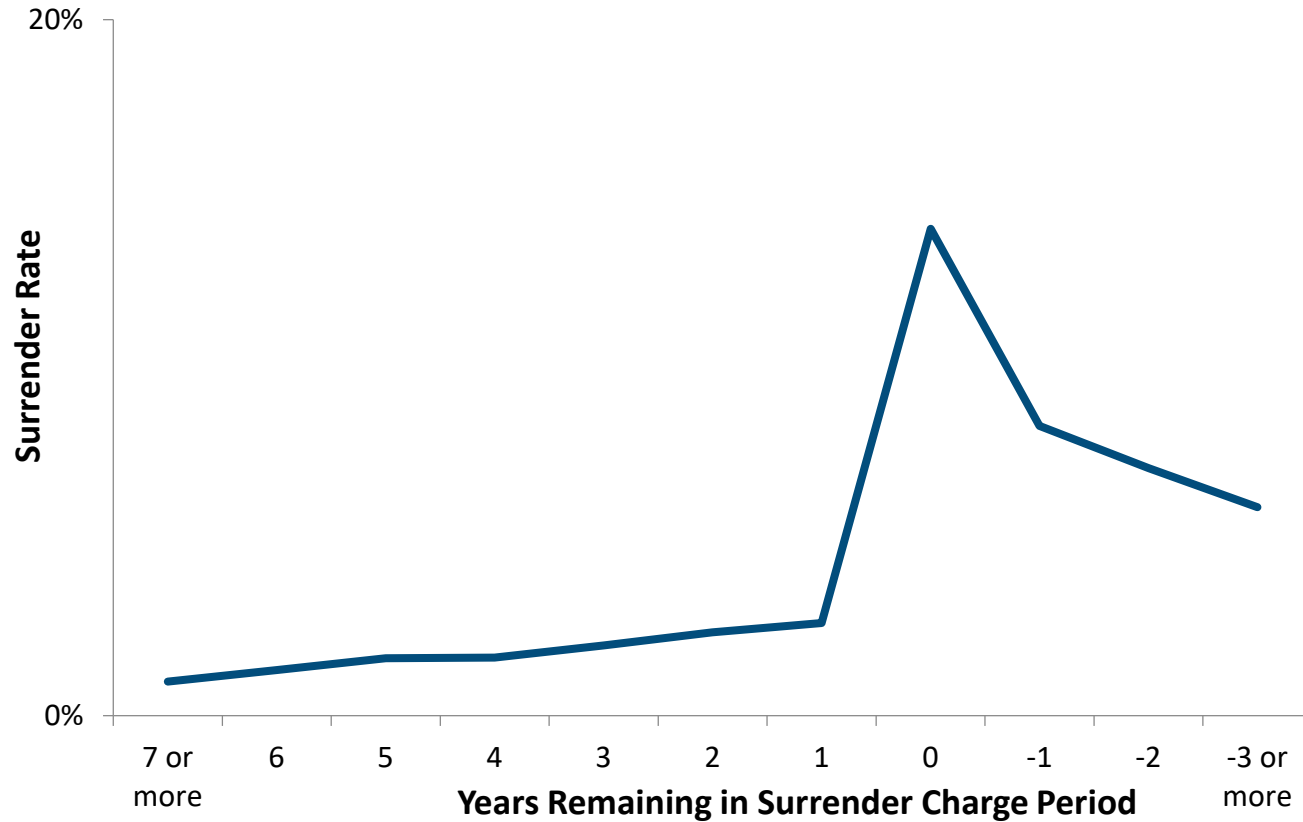
Analyzing Experience Data



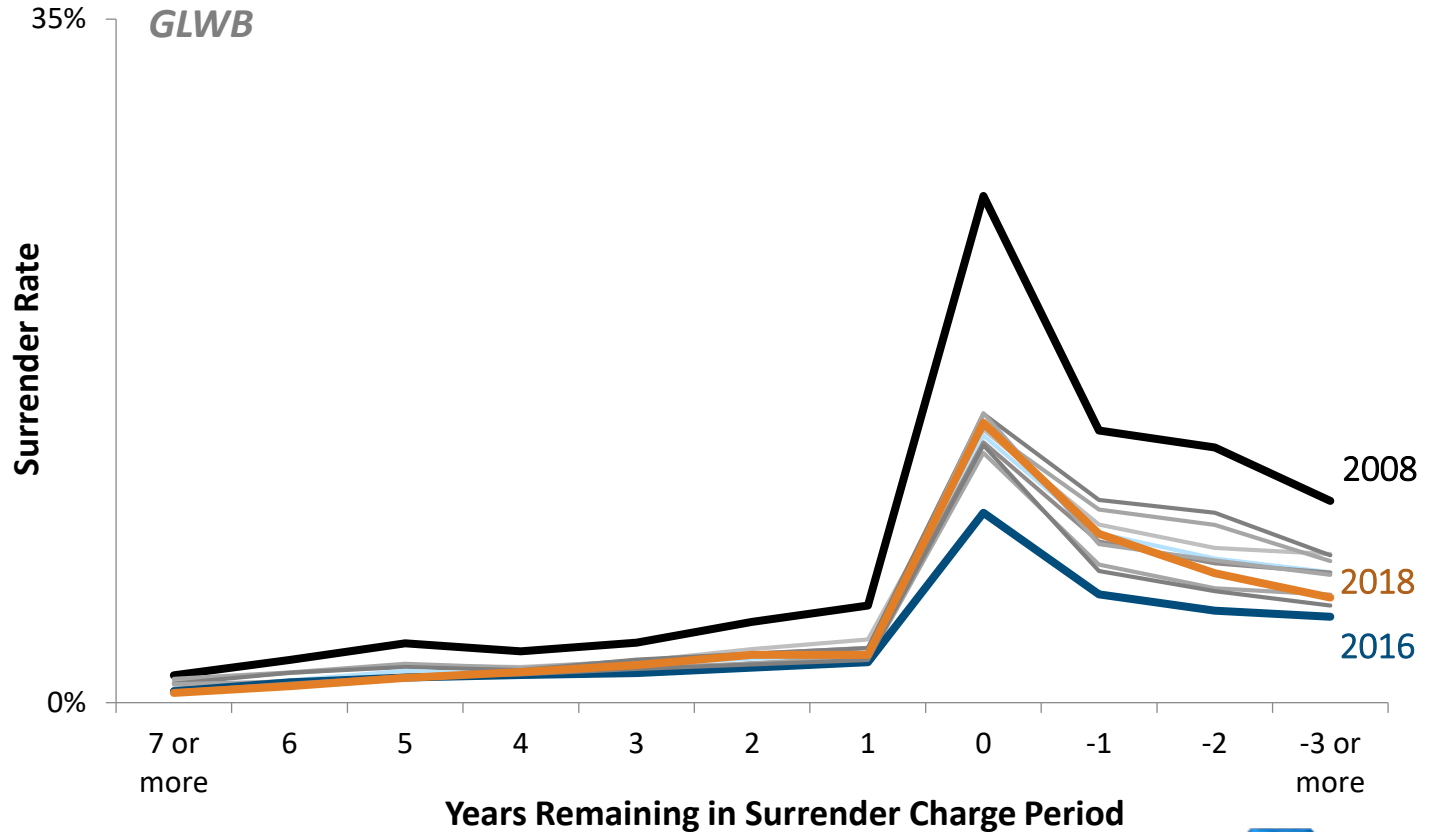
Example: Variable annuity industry data

- 24 companies
- Seriatim monthly data
- January 2008 through December 2018
- \$795 billion ending account value

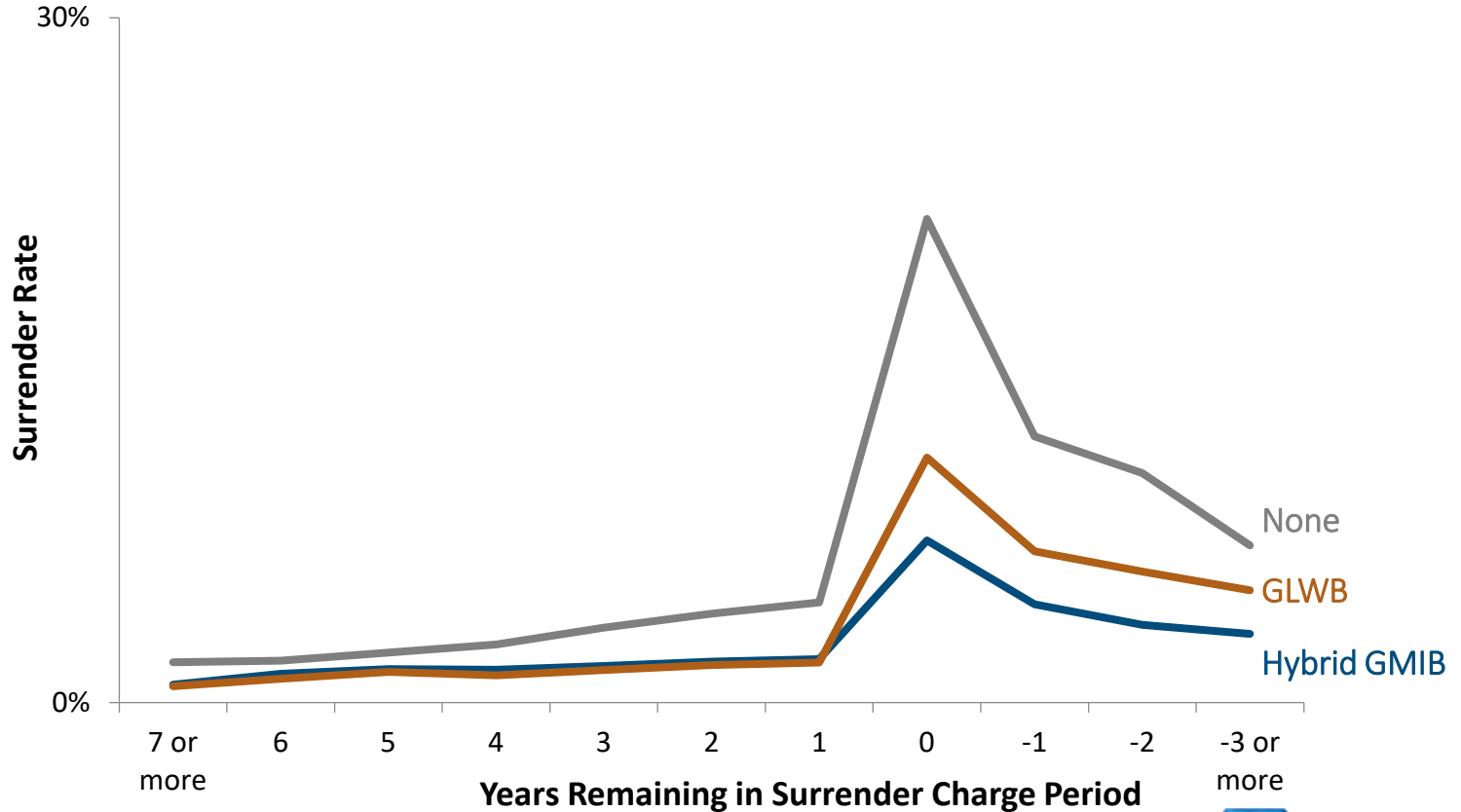
Surrender charges work



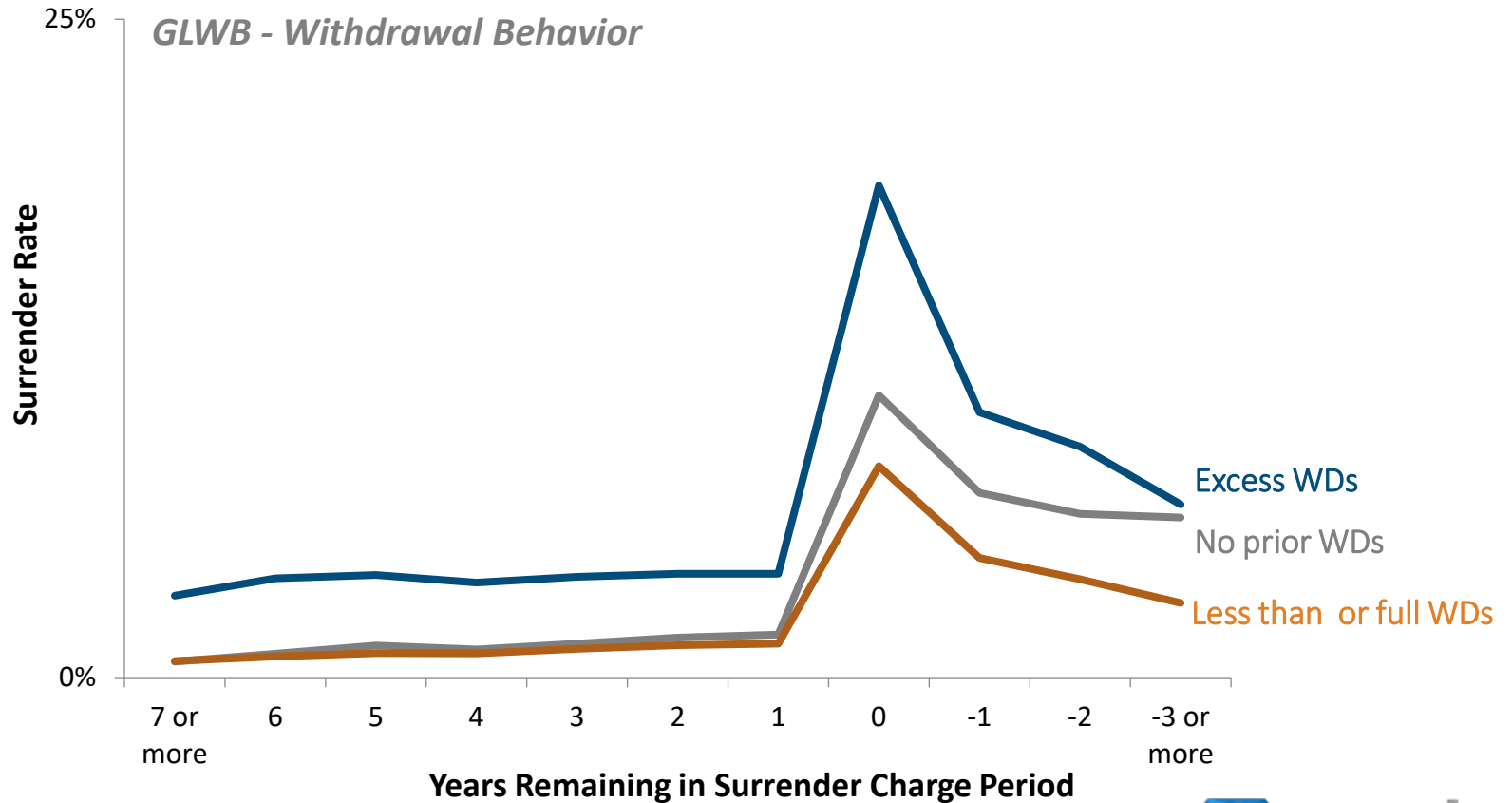
Surrender rates have changed over the years



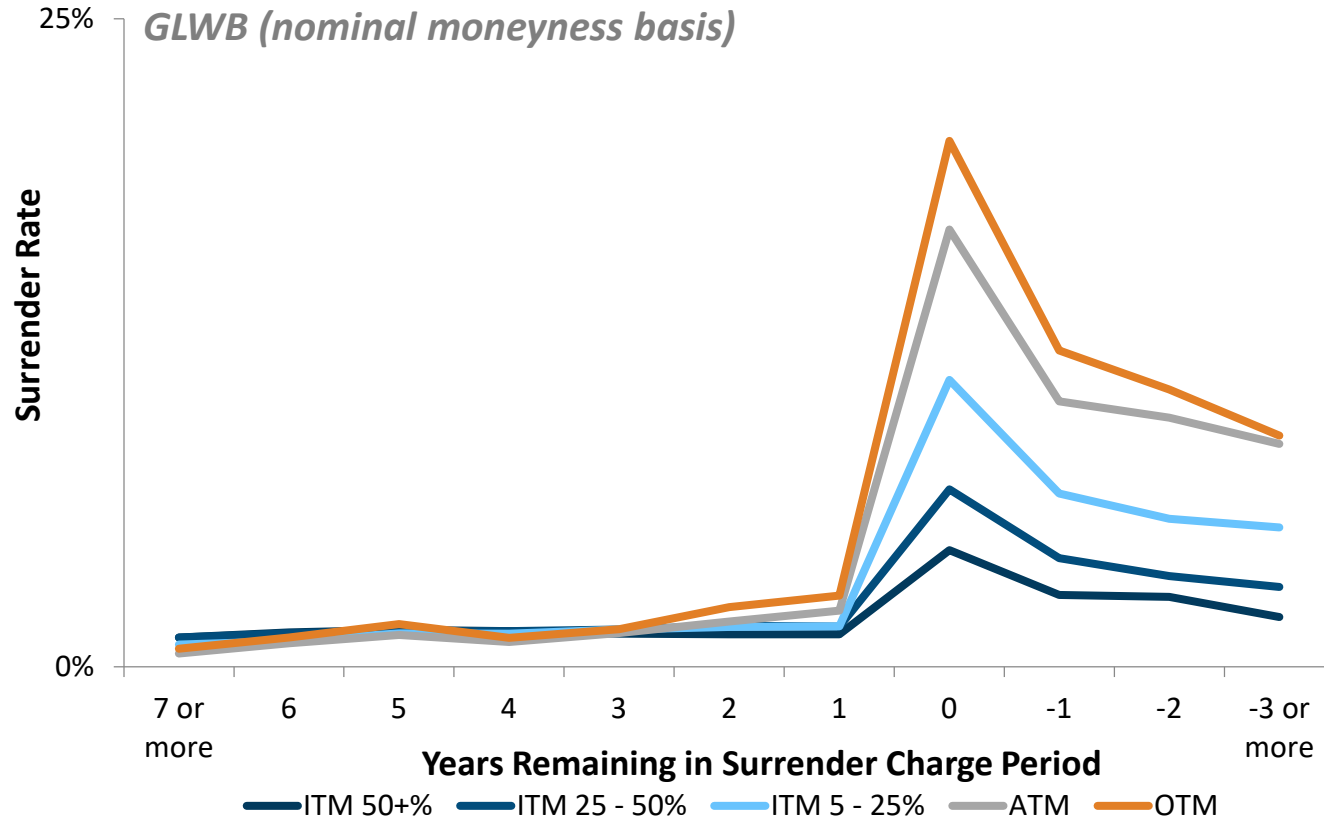
Surrender rates are lower with living benefits



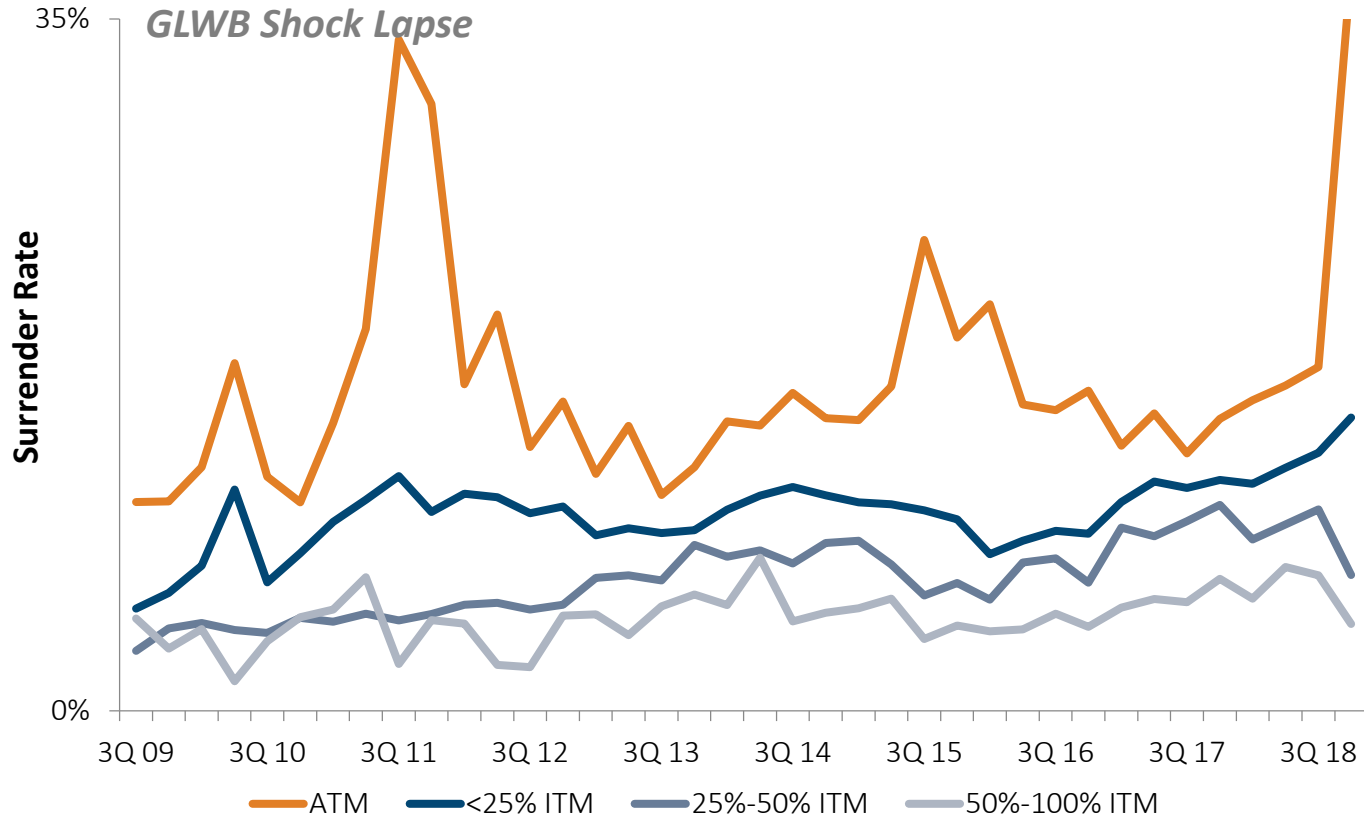
...and even lower with income utilization



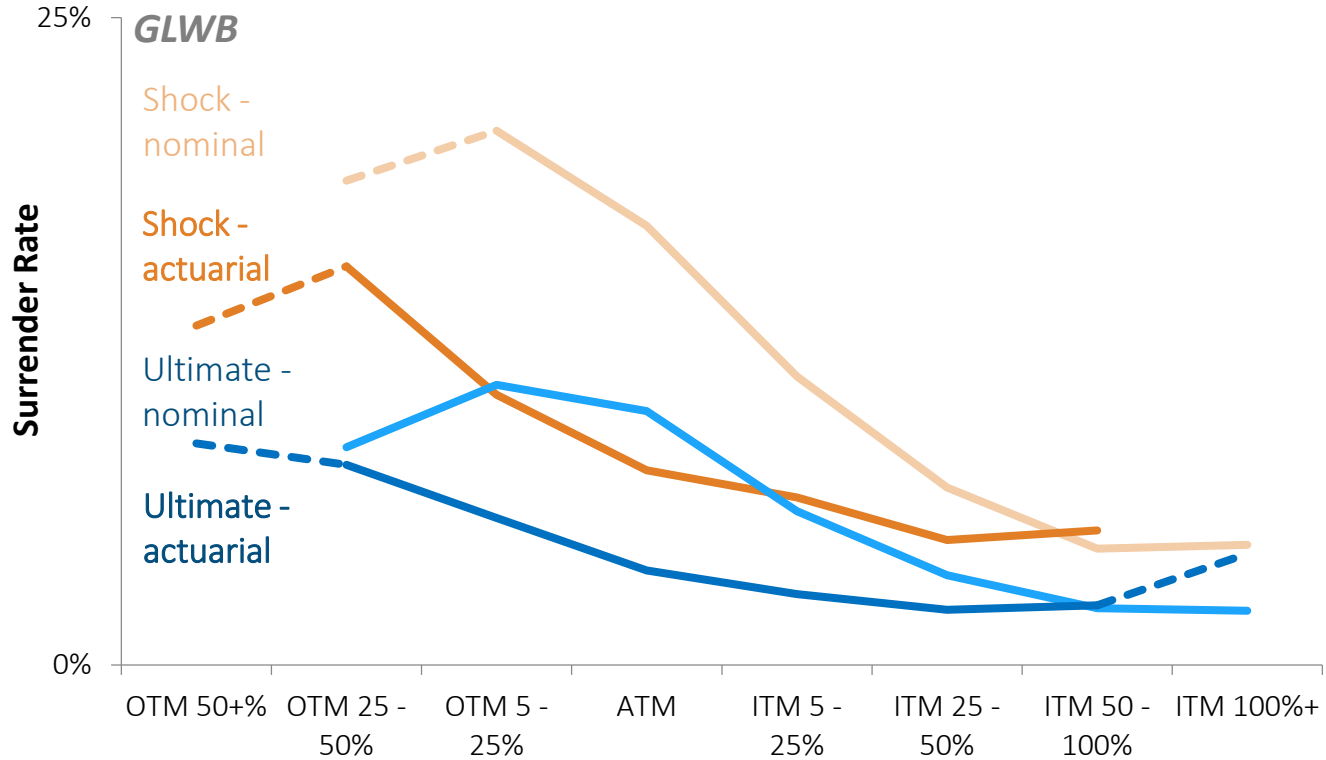
Surrender rates are lower when guarantees are more valuable



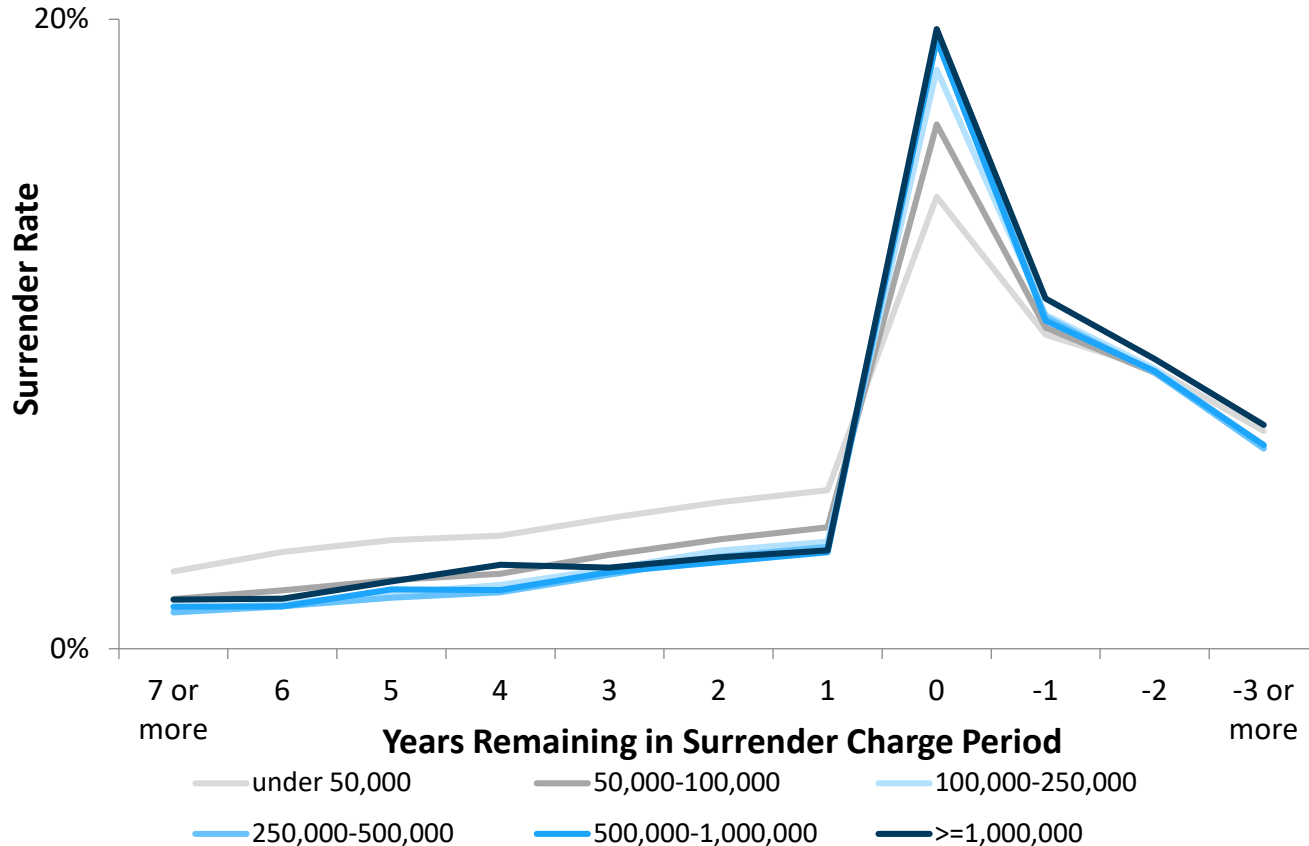
...but dynamic sensitivity has also changed over the years



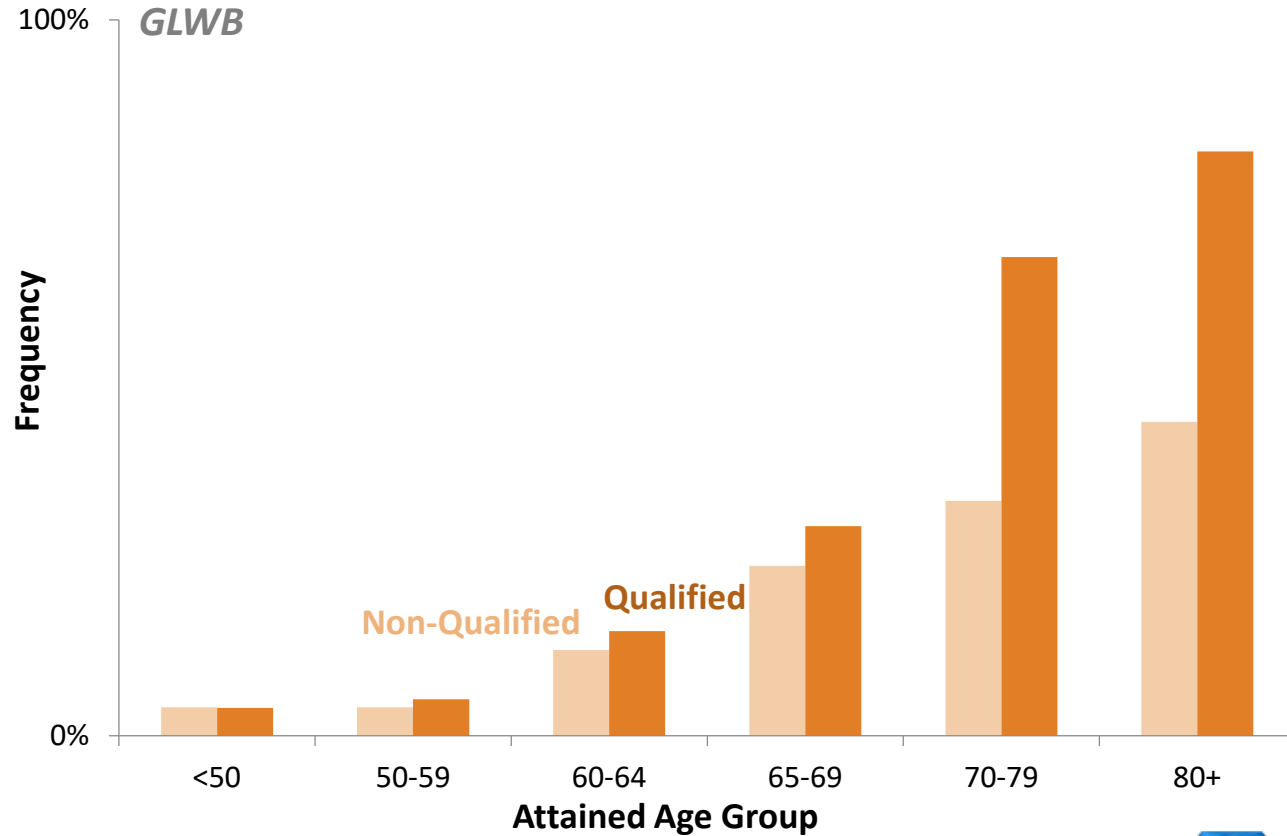
How you measure value matters



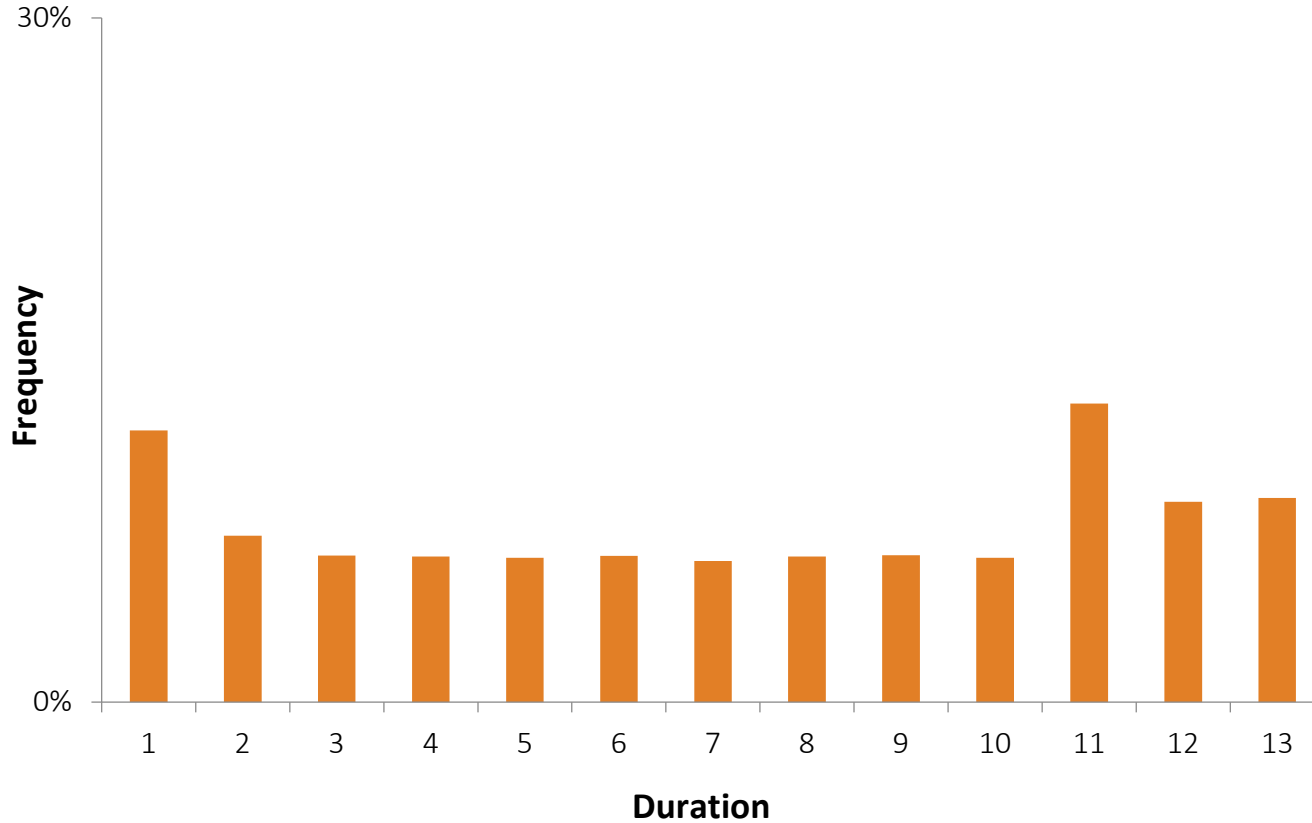
Largest and smallest contracts behave differently



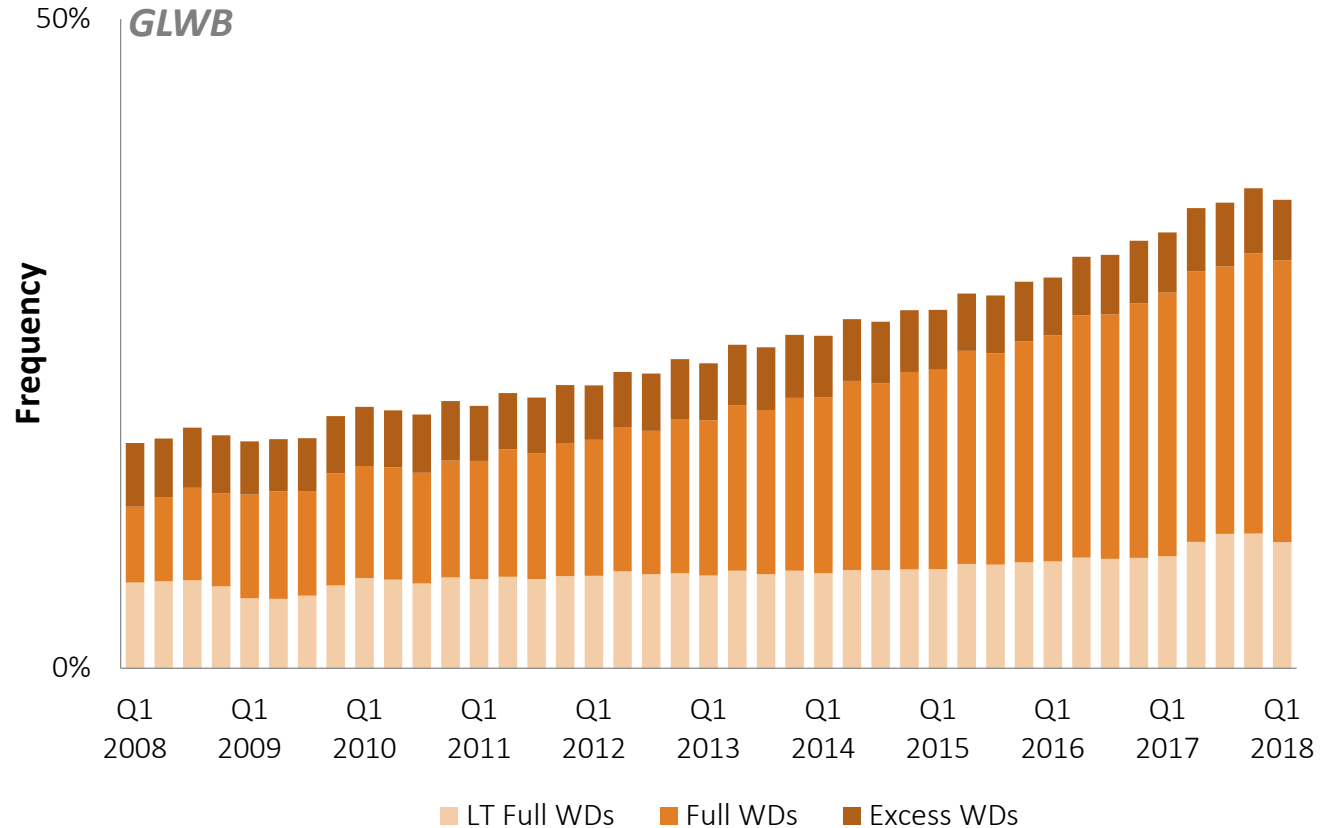
Withdrawals vary by age and tax status



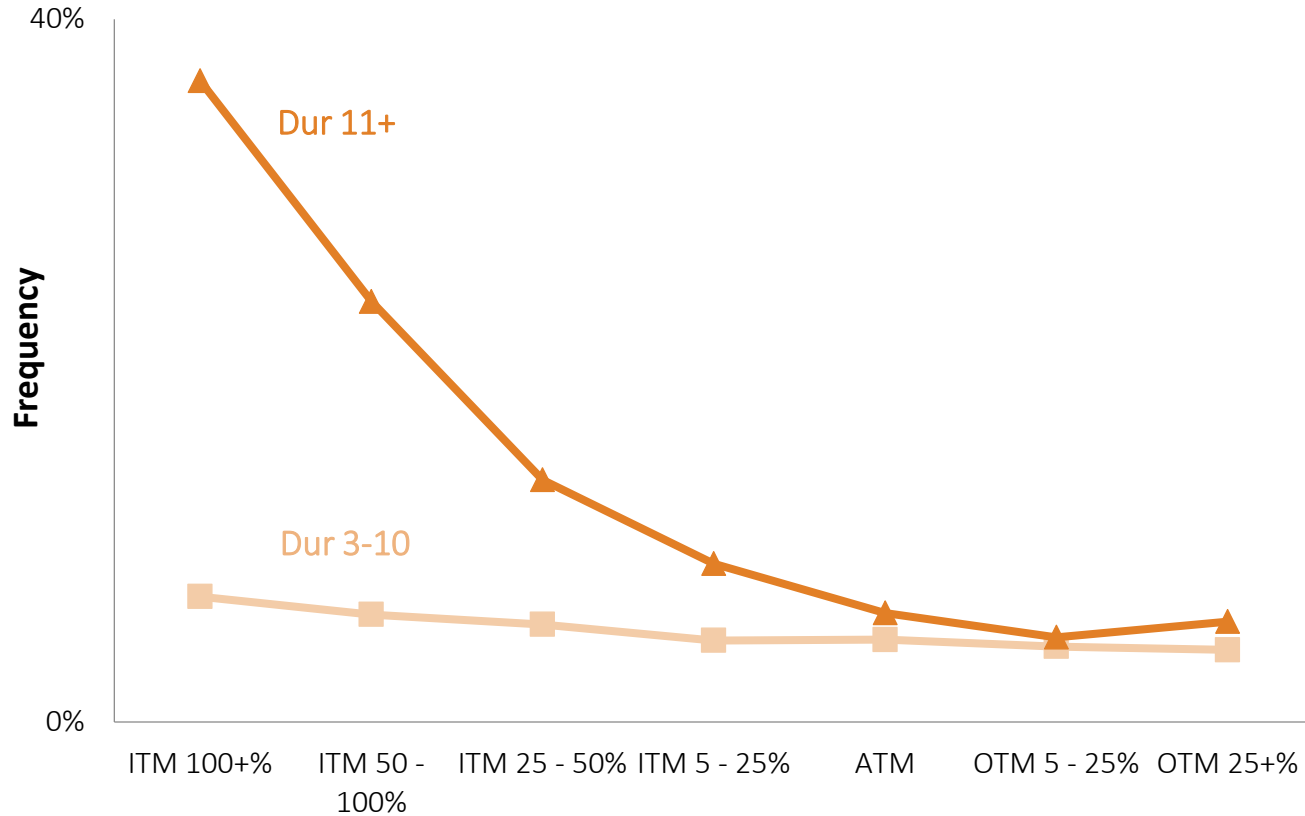
GLWB income commencement is highest at issue and after bonuses expire



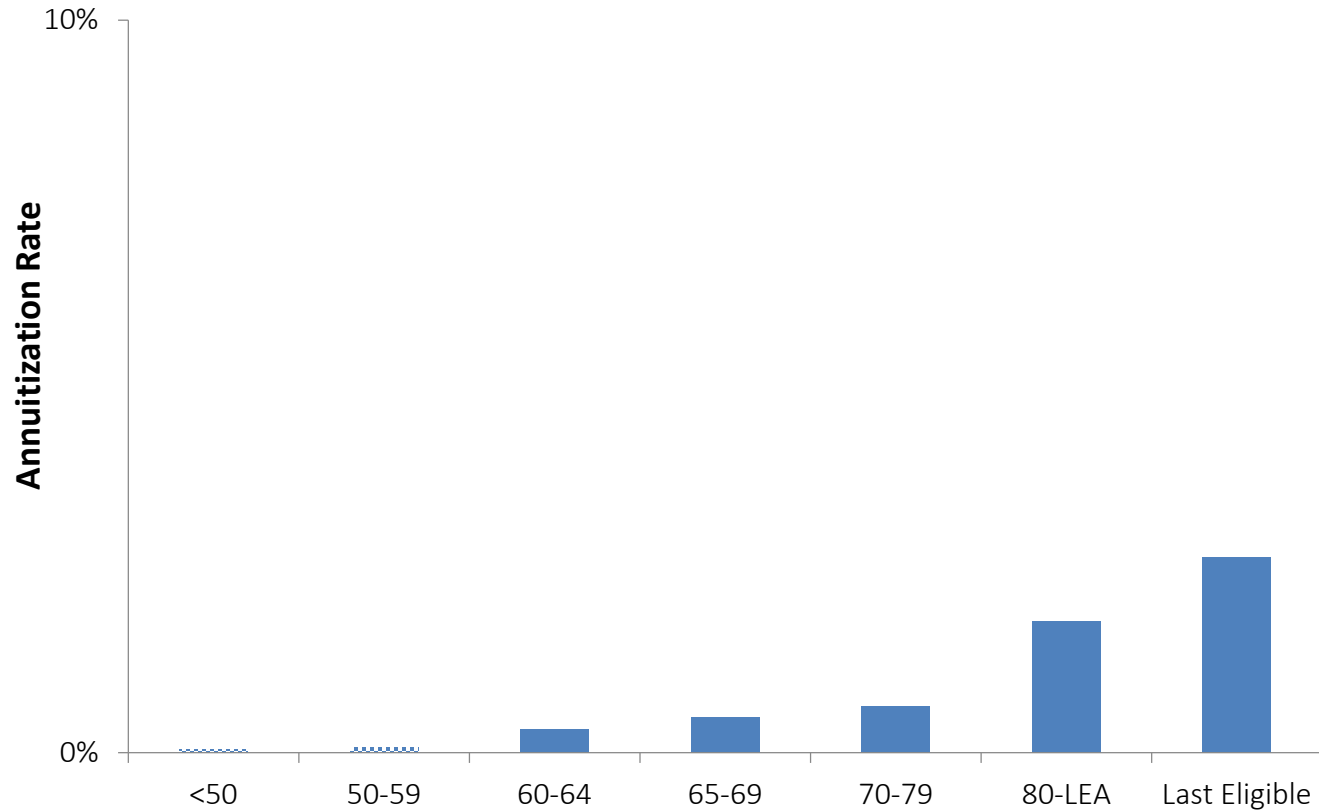
Withdrawal behavior is becoming more efficient



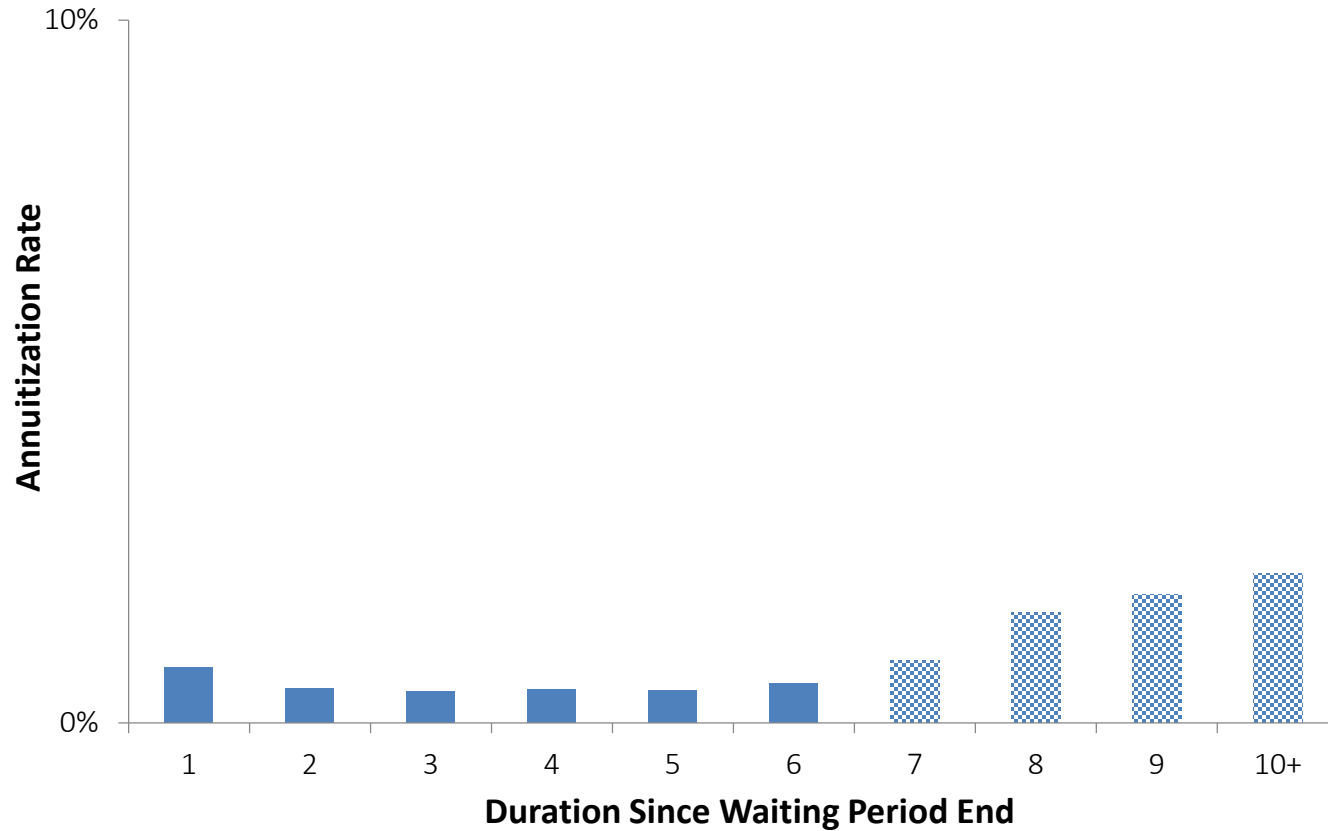
GLWB income commencement is dynamic



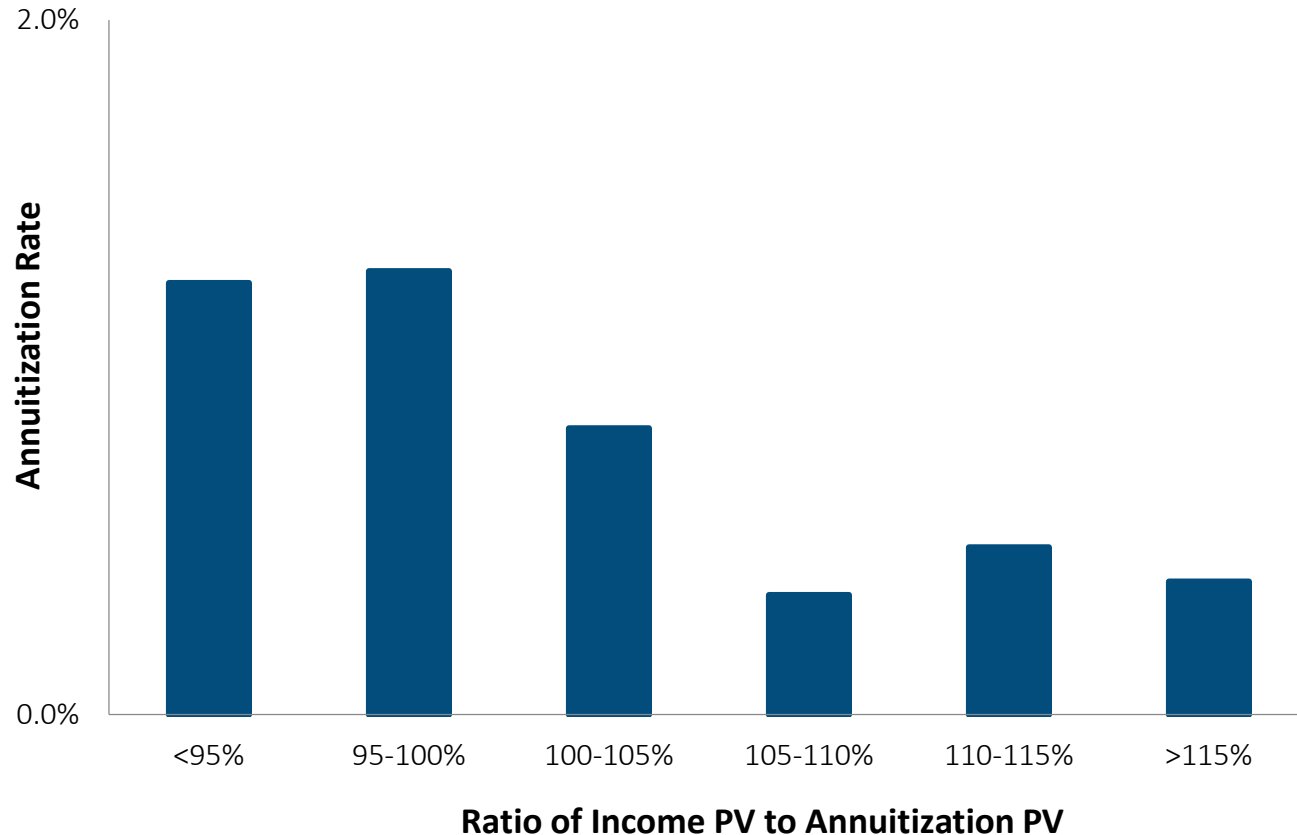
Hybrid GMIB annuitization rates are low and backloaded...



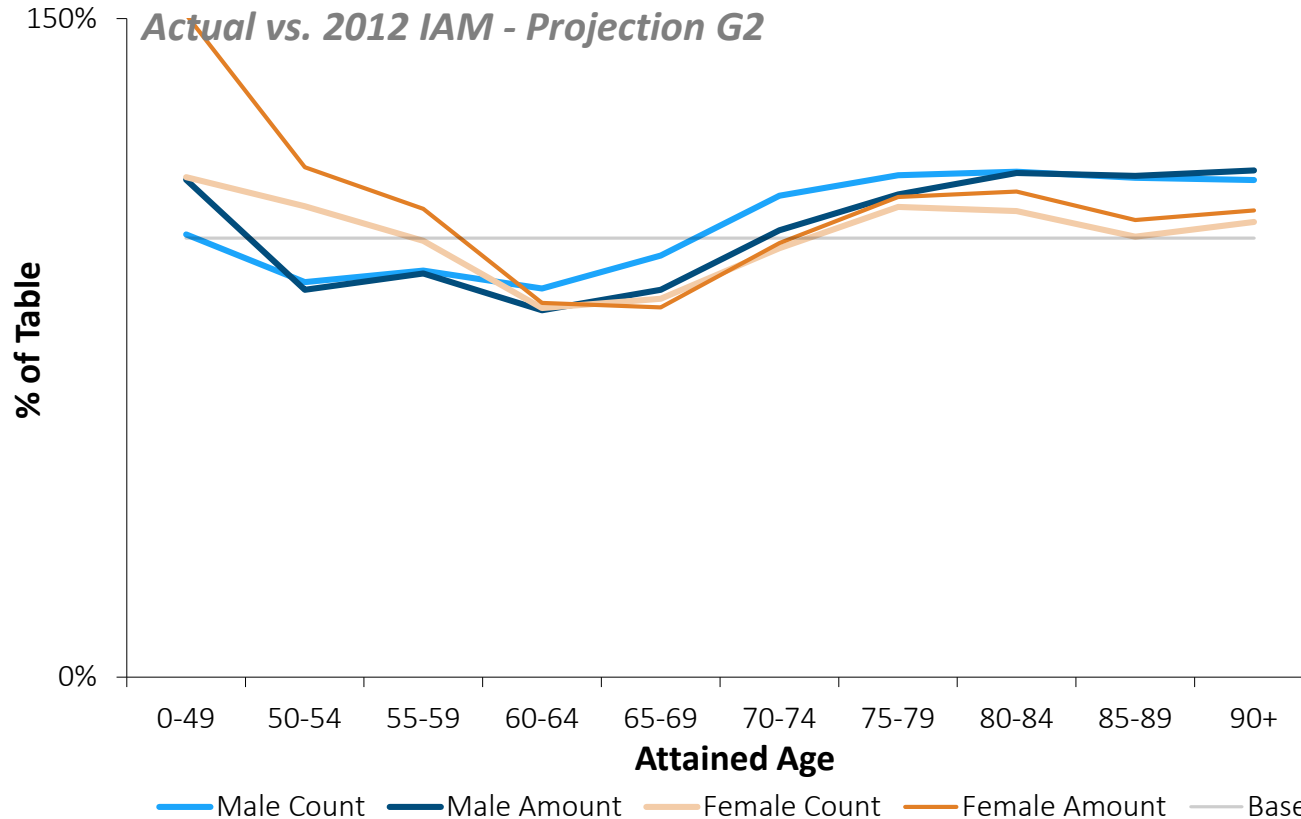
...and increase slightly in later years



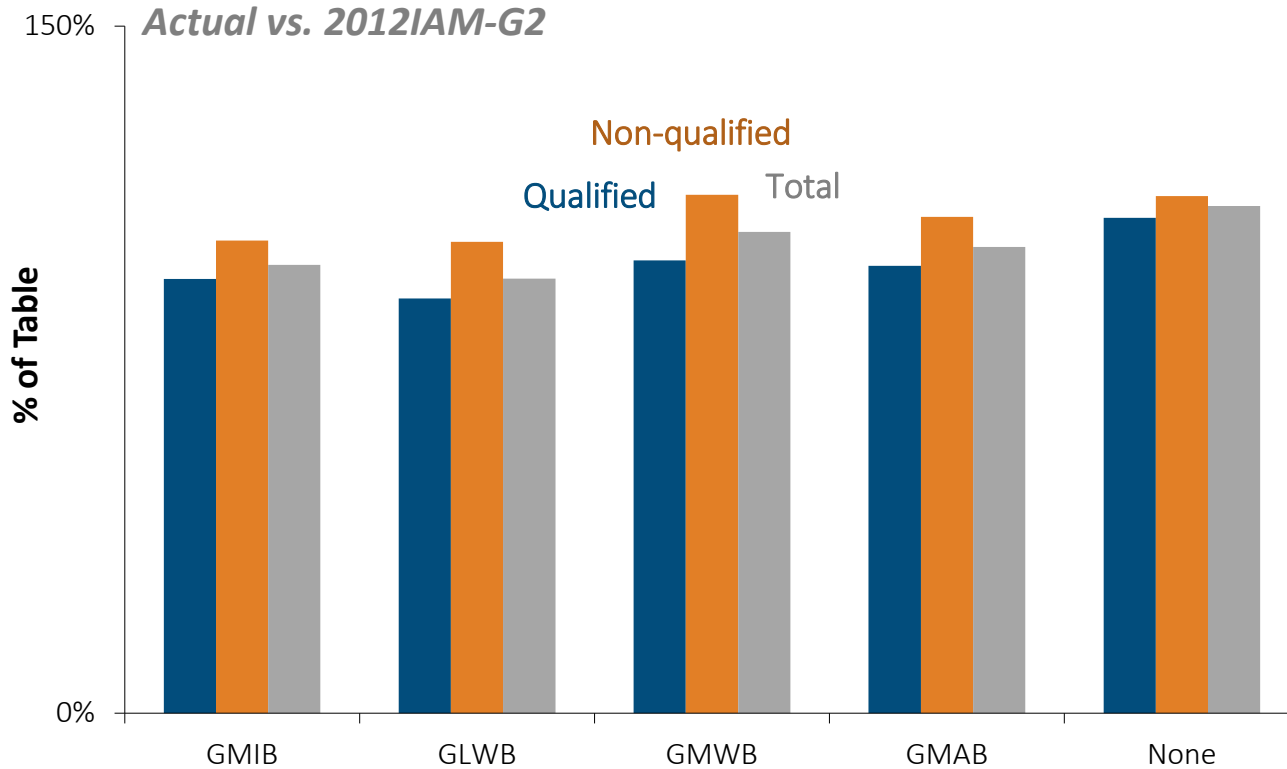
Annuity rates also depend on economic value of other benefits, such as continued income utilization



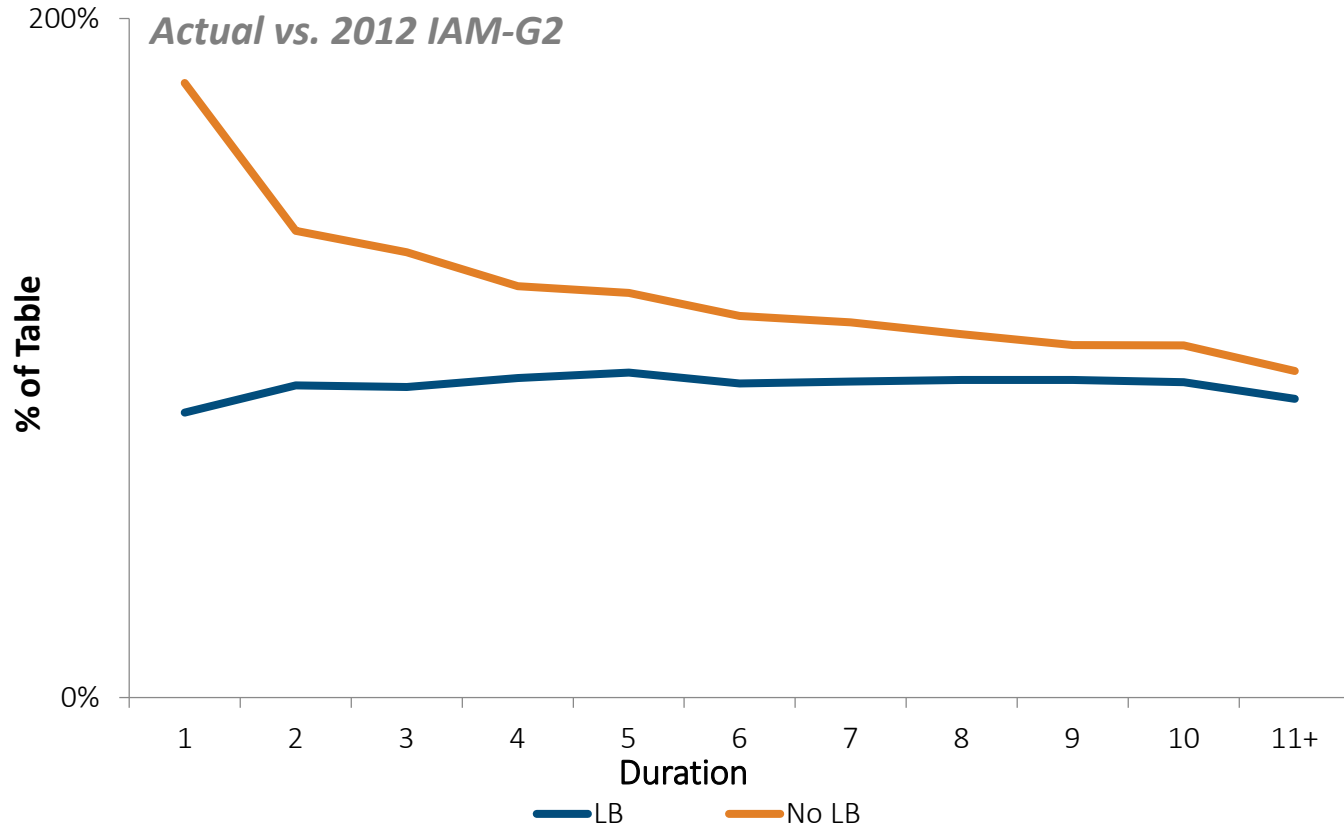
2012 IAM does not fit VA mortality experience very well



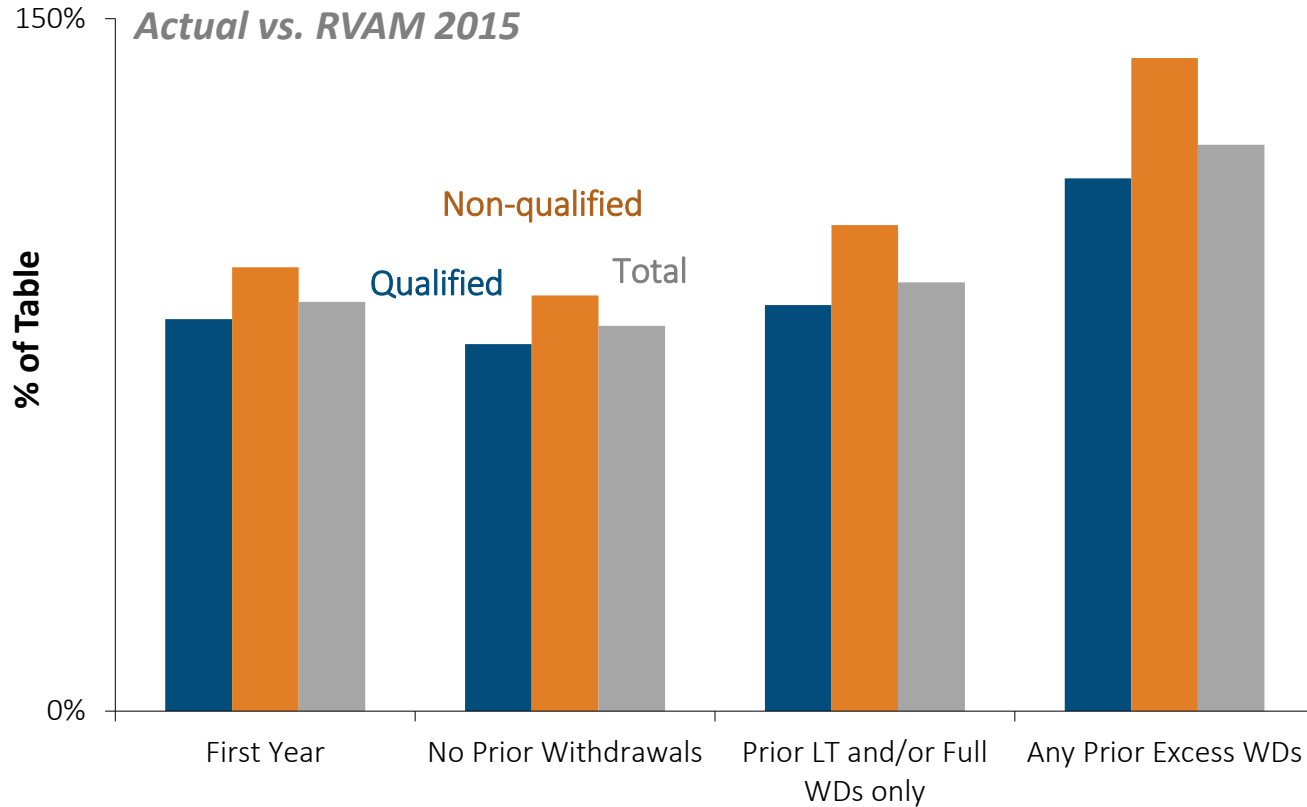
Mortality is lower where longevity benefits are greatest



Evidence of anti-selection for death benefit guarantees



Income utilization affects mortality





Modeling and Assumptions



Examples: SOA reports

Post-level term insurance lapses

<https://www.soa.org/resources/research-reports/2015/lapse-2015-modeling-post-level/>

Accelerated underwriting

<https://www.soa.org/resources/experience-studies/2017/predictive-analytics-underwriting/>

Other examples: deferred annuity industry studies

FIA

<https://ruark.co/ruark-releases-2019-fixed-indexed-annuity-study/>

<https://ruark.co/ruark-consulting-releases-2018-fixed-indexed-annuity-mortality-study/>

VA

<https://ruark.co/ruark-releases-2019-variable-annuity-study-results/>

<https://ruark.co/ruark-consulting-releases-variable-annuity-mortality-study-results/>

Regulatory example: VM-21 PBR for Variable Annuities

Public redline exposure draft as of April 30, 2019

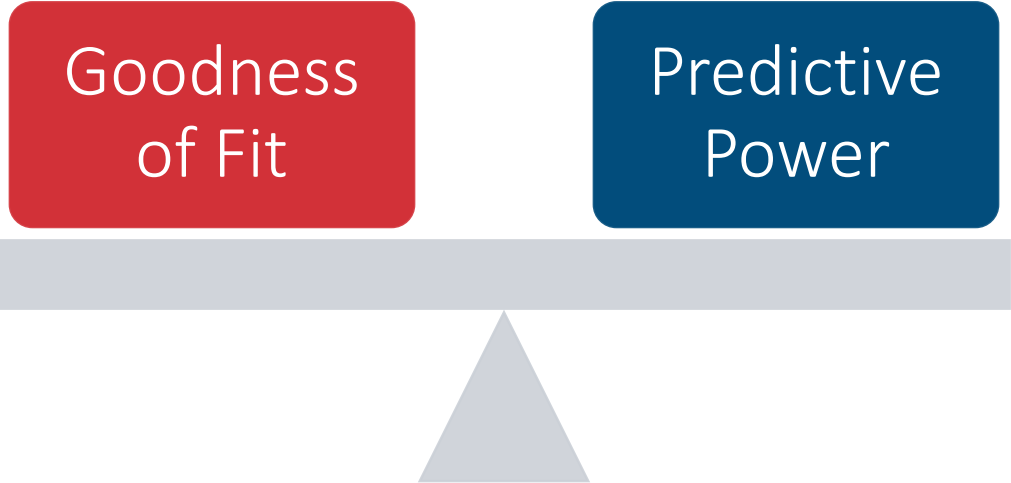
<https://naic-cms.org/exposure-drafts>

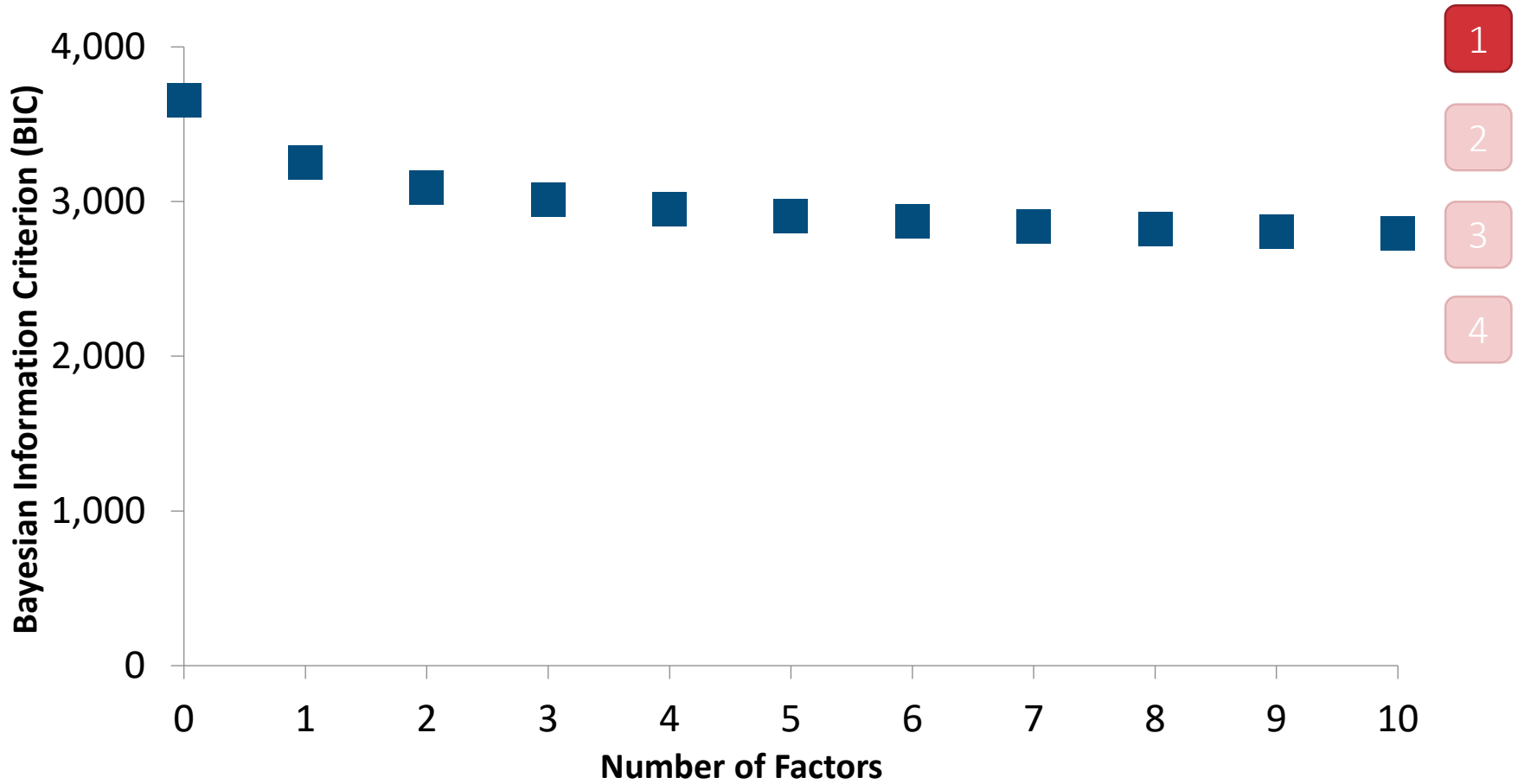
Section 10: Contract Holder Behavior Assumptions

- 1 Should examine many factors including cohorts, product features, distribution channels, option values, rationality, static vs dynamic
- 2 Required sensitivity testing, with margins inversely related to data credibility
- 3 Unless there is clear evidence to the contrary, should be no less conservative than past experience and efficiency should increase over time
- 4 Where direct data is lacking, should look to similar data from other sources/companies

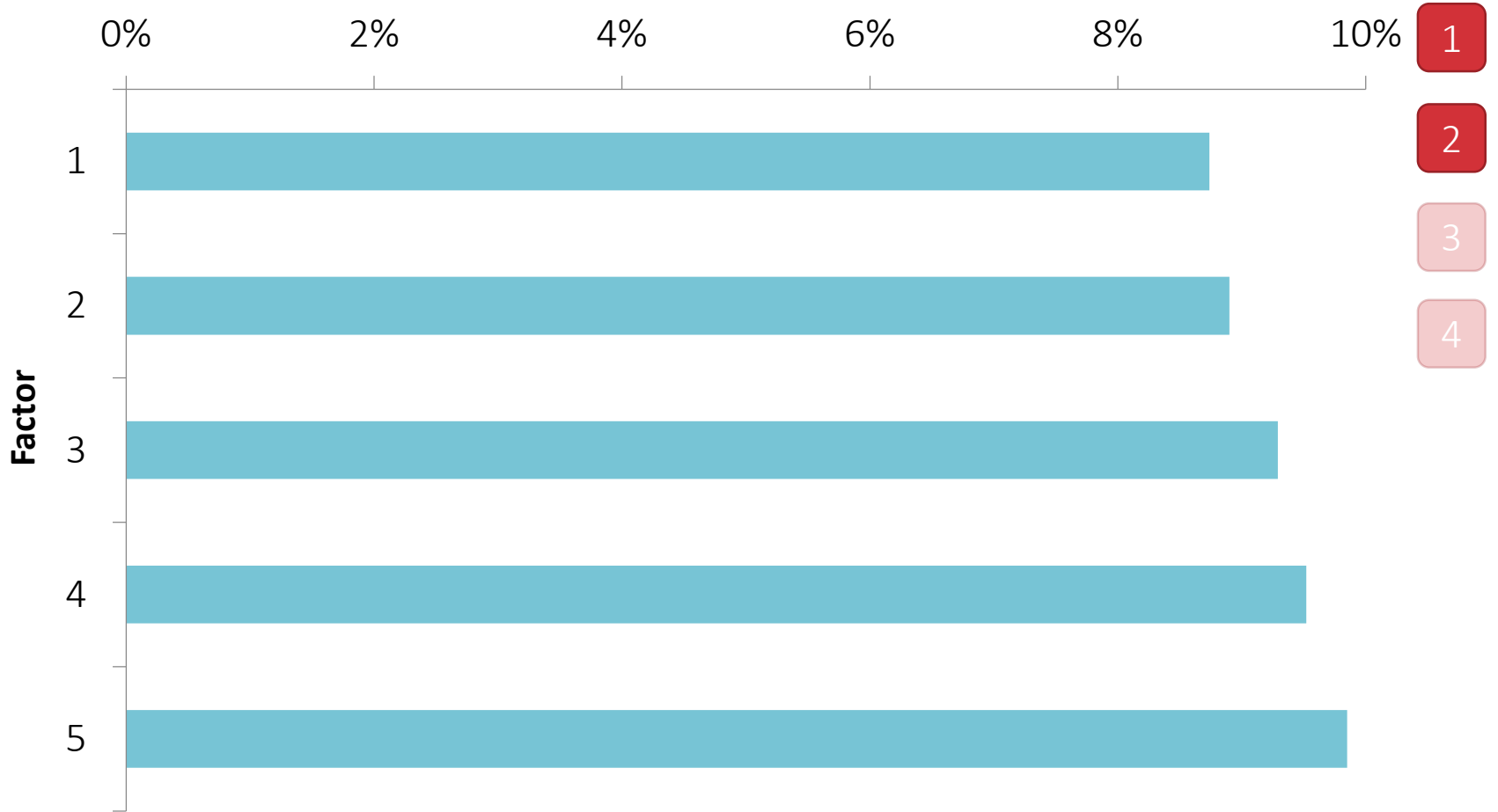
Modeling and Assumptions

- Measuring goodness-of-fit for candidate models
- Testing predictive power on out-of-sample data
- Using external data to improve candidate models
- Art + science: choosing



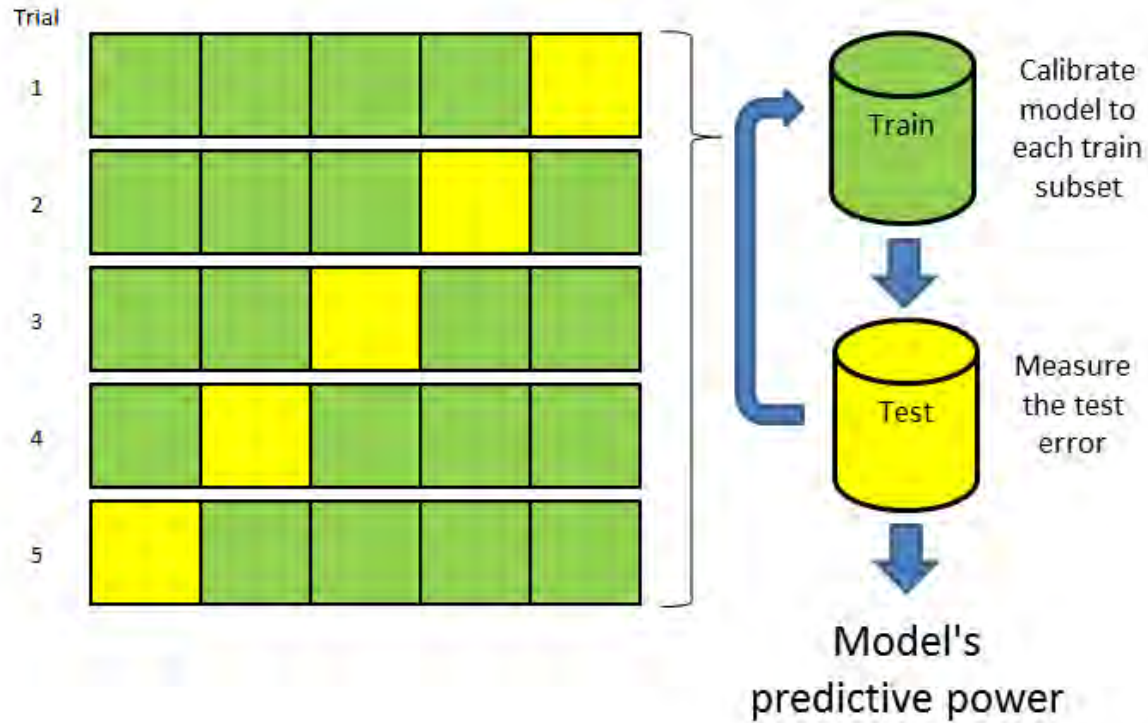


Coefficient Standard Error



5-Fold Cross Validation

Measures the bias-variance trade-off

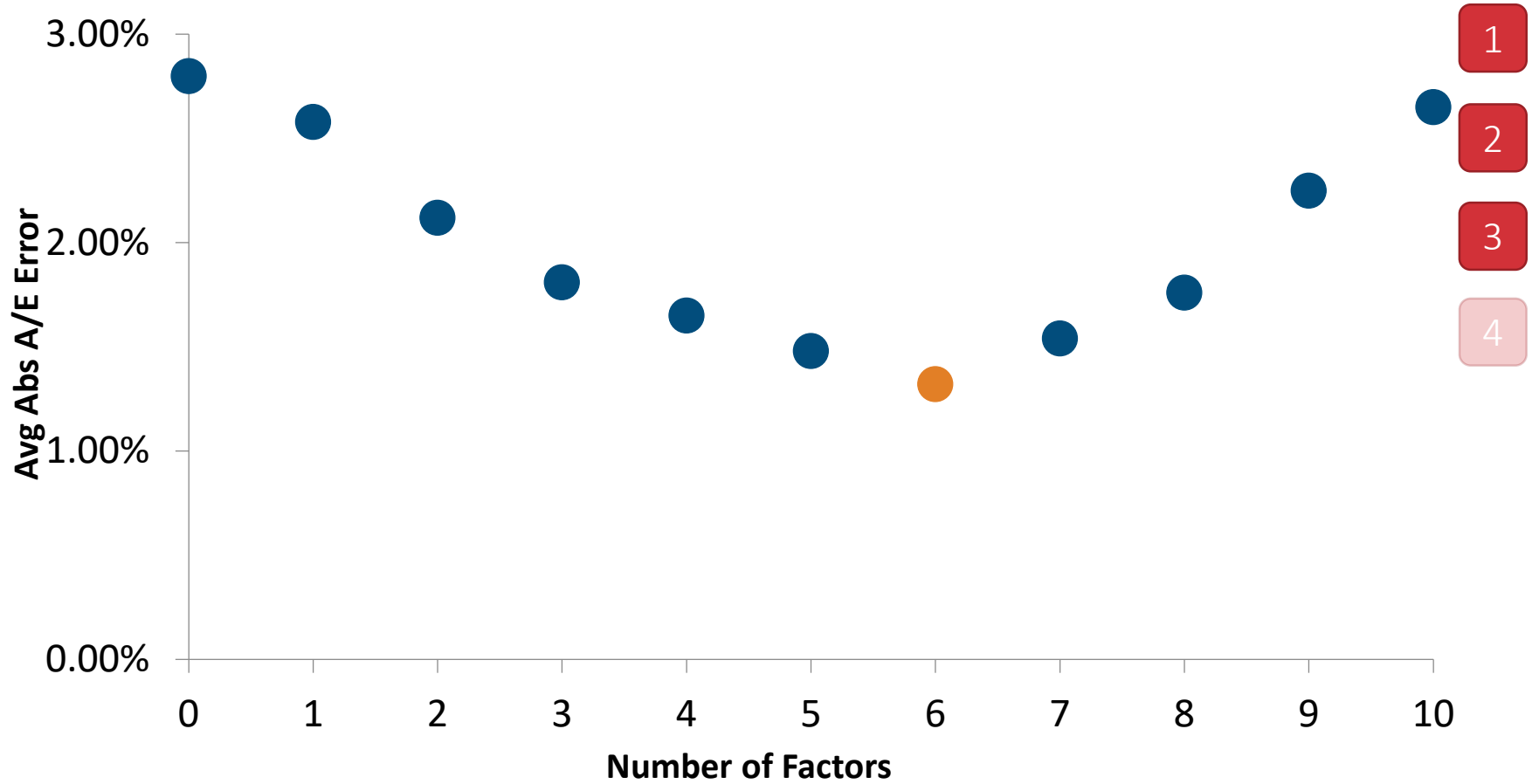


1

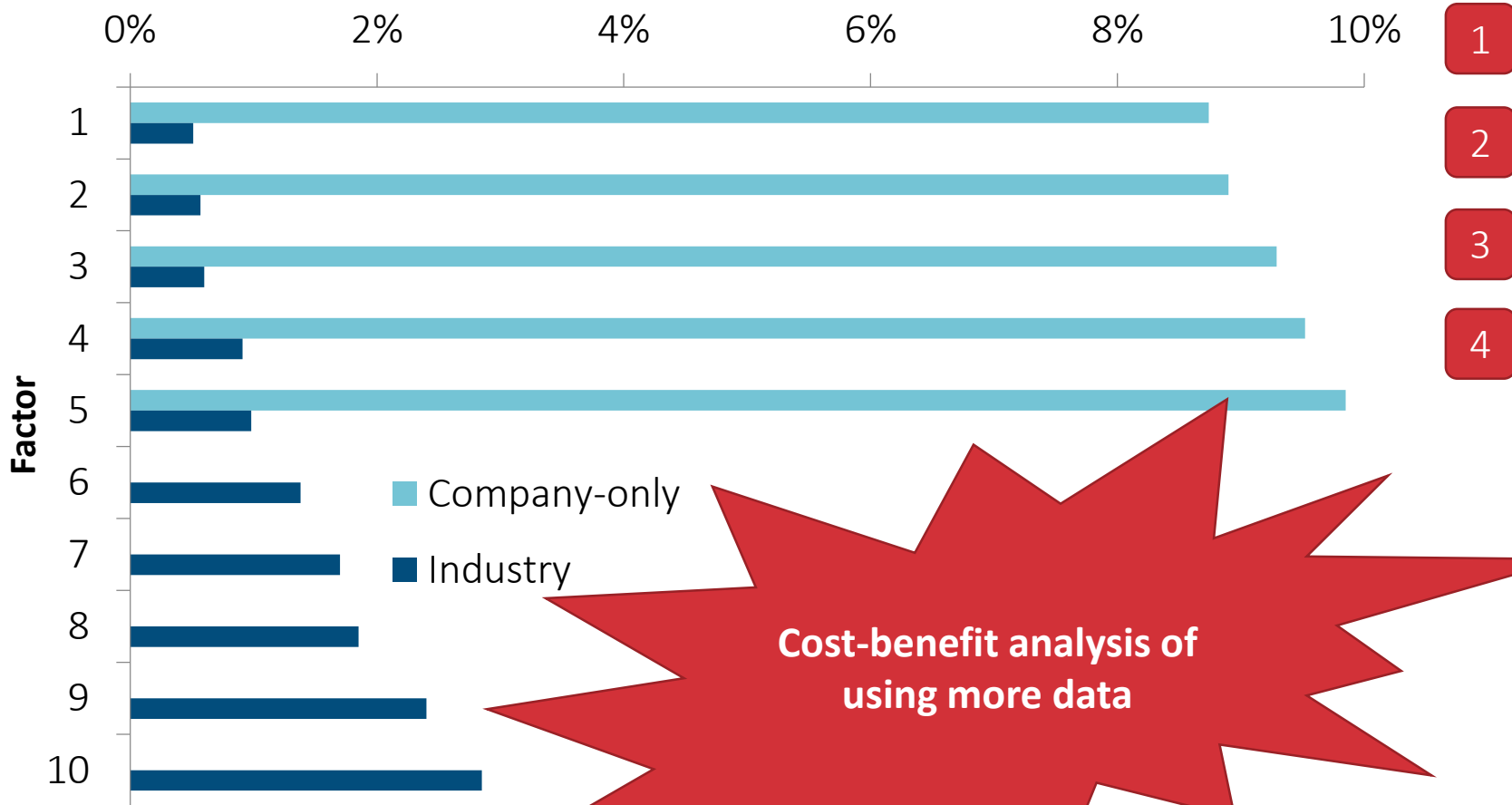
2

3

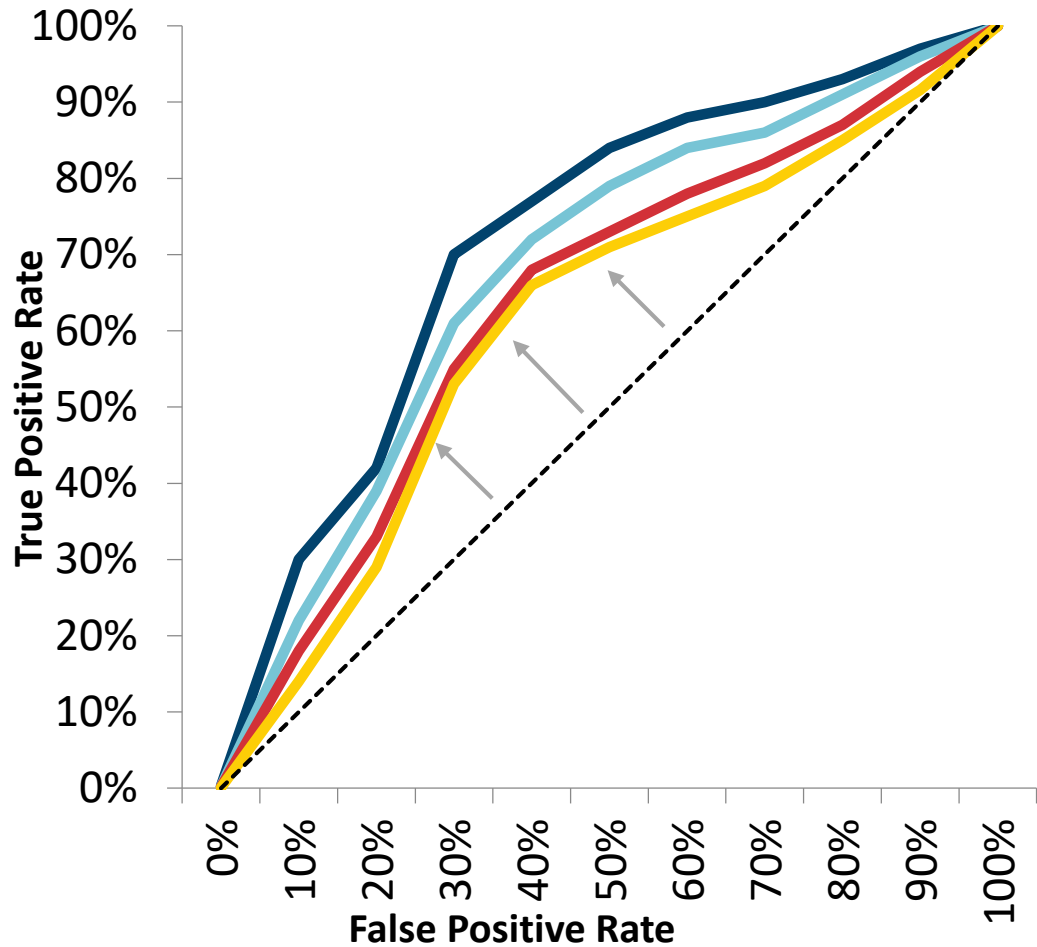
4



Coefficient Standard Error

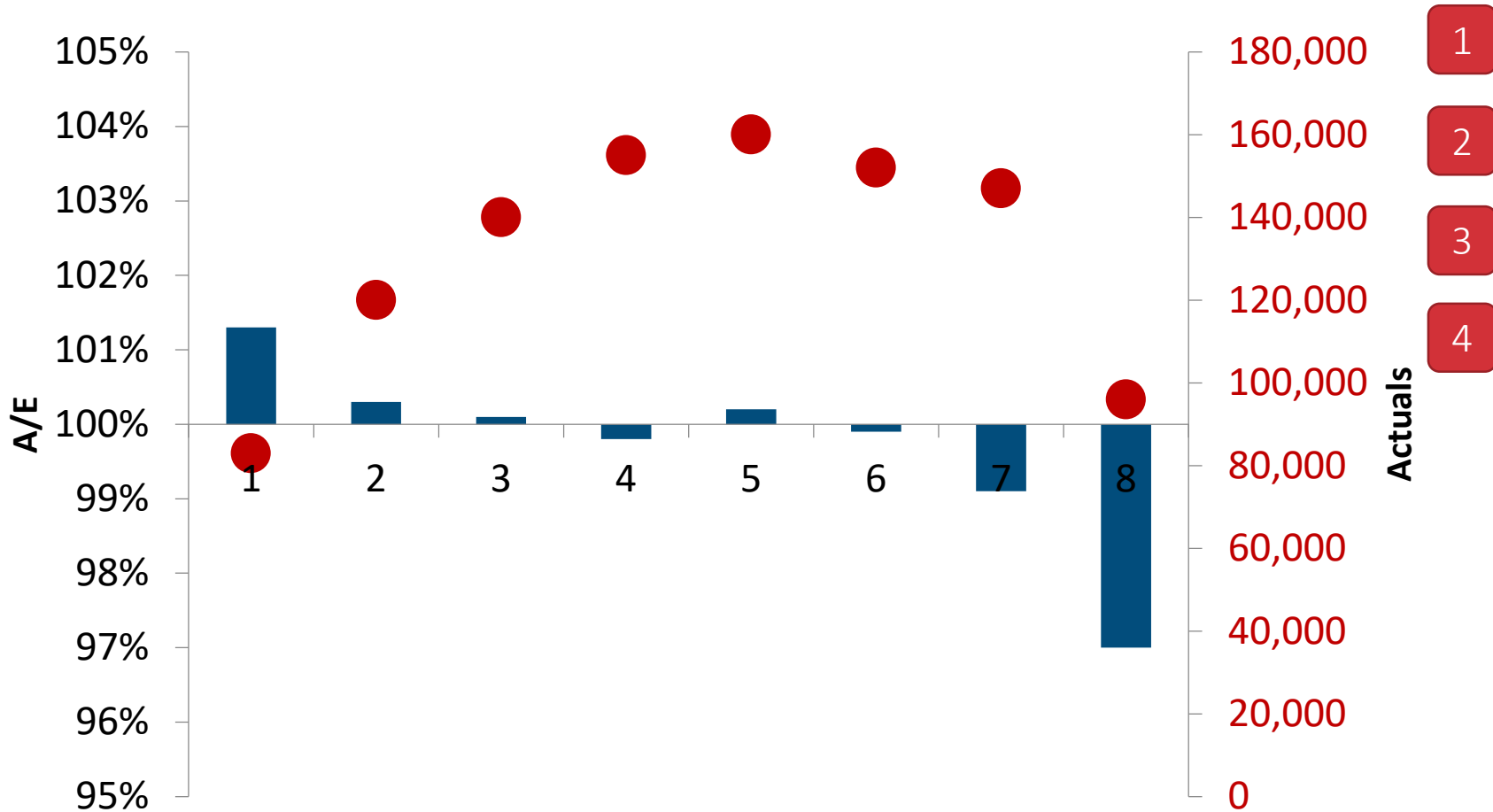


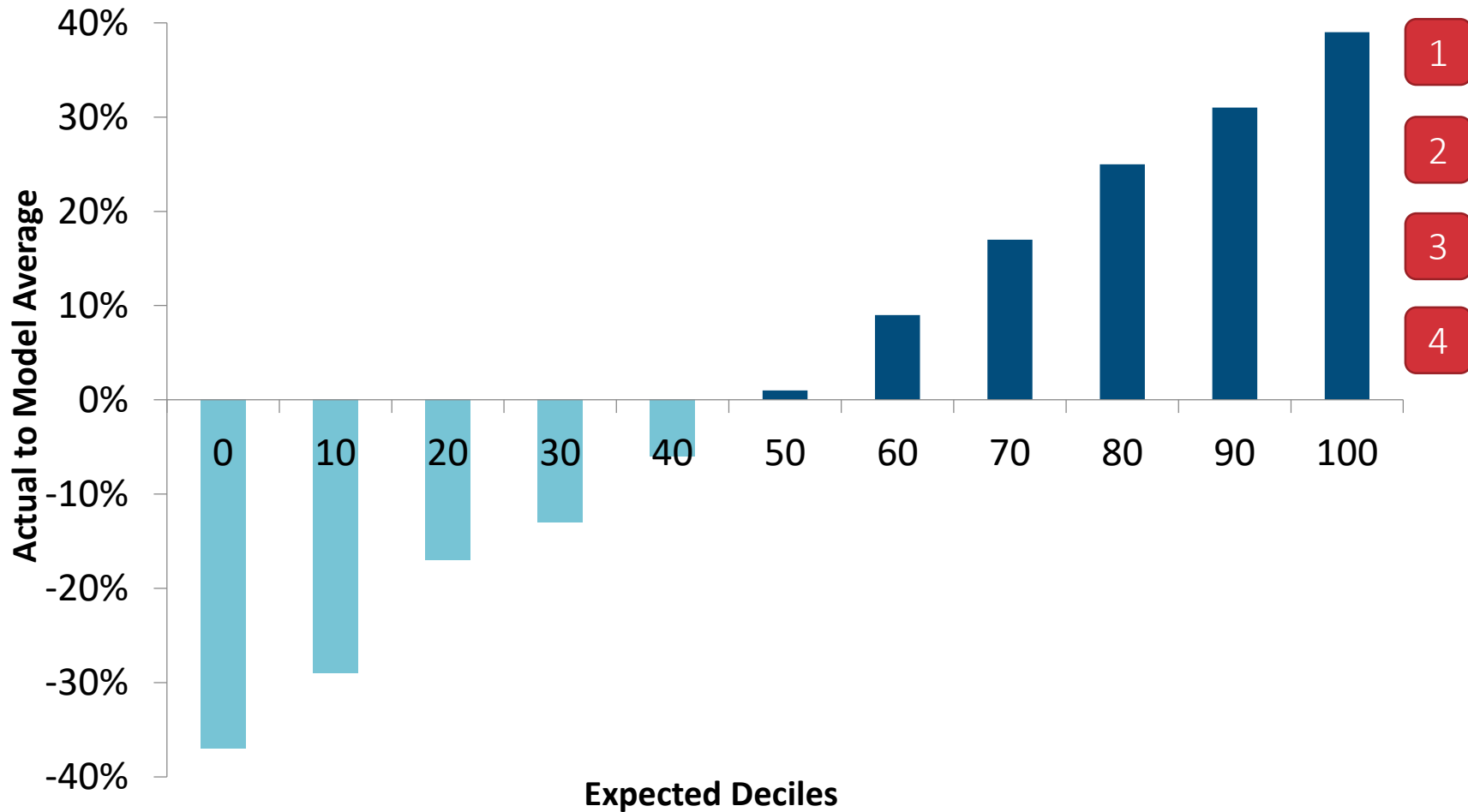
Cost-benefit analysis of using more data



- 1
- 2
- 3
- 4

Factor Xi



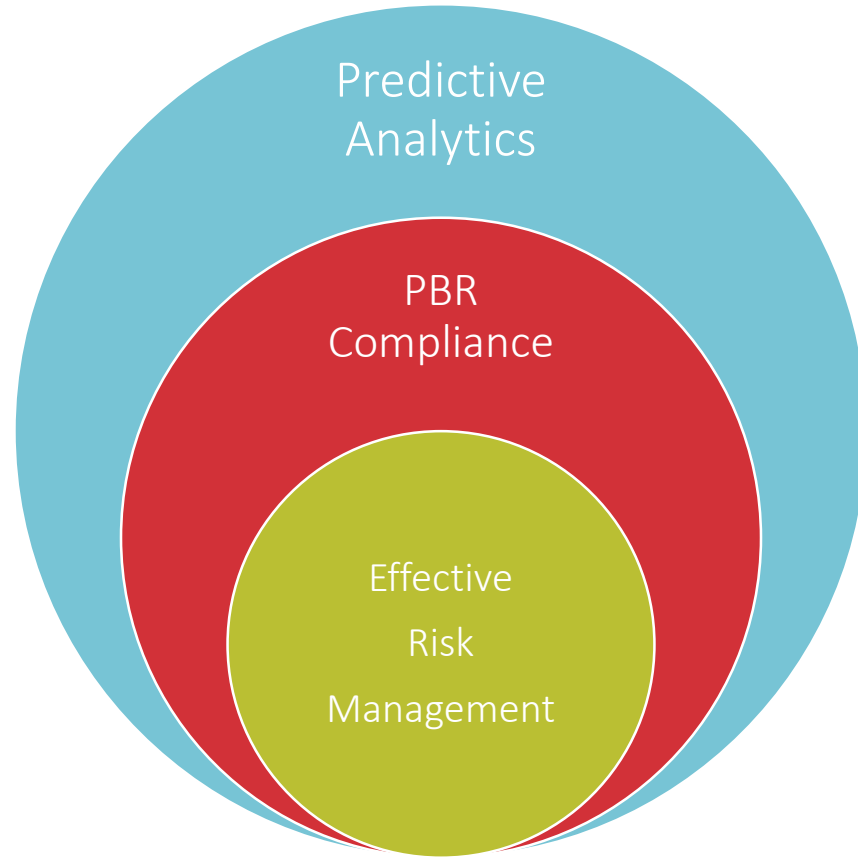


More data
and/or
relevant
industry data



Art + science,
subject matter
expertise and
actuarial
judgment

More
statistically
justifiable
model factors
and
dramatically
improved fit
and predictive
power



Discussion



**SOCIETY OF
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Session 8: Reinsurance Treaty Remediation

LISA DOMONKOS, FSA, CERA

CHRIS HALLORAN, ASA

PATRICK DAVIDSON, ASA

September 25, 2019



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Agenda



Non-guaranteed reinsurance premiums



Non-guaranteed policy elements



YRT at high attained ages



Other remediation topics

Non-guaranteed reinsurance premiums



YRT Life Reinsurance refresher

Yearly Renewable Term refers to the rates charged being guaranteed for one year at a time



Premiums are the key lever for reinsurers to manage their risk and YRT reinsurance is structured to allow this



YRT treaty considerations

- Consider what the treaty says and what it does not say
 - Typically states that the rates are guaranteed for first policy year
 - Variety of language about “subsequent” policy years
 - may explicitly say reinsurer has the right to increase premiums
 - may place maximums on the amount premiums can be increased
 - may reference that reinsurer will not hold deficiency reserves
 - may state that if Reinsurer raises rates, the ceding company may recapture the impacted policies
 - may say Reinsurer has right to raise rates if the Ceding Company raises charges to policyholders
 - “Comparable commitments” are when reinsurer can only raise rates when raising rates on all comparable business
-

YRT rate increase industry update

Key drivers



Adverse mortality experience

Legacy blocks experiencing elevated mortality and lower profitability led to a focus on inforce management

1



Outdated mortality tables and new data

Mortality data at high issue & attained ages increased in recent years driving updated views of future mortality

2



Inforce management

Focus on treaty language and rights to improve future performance

3

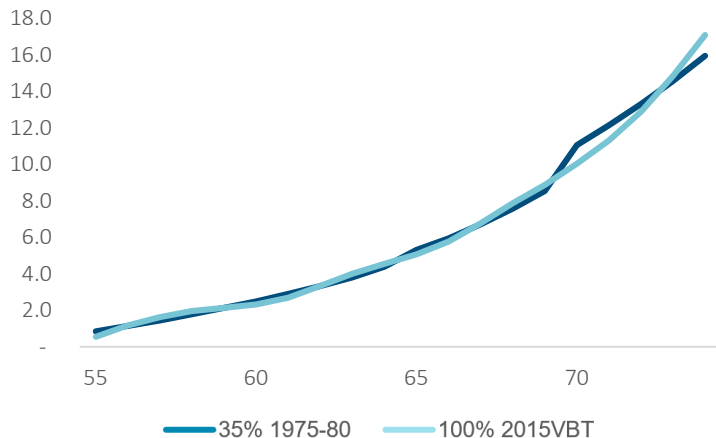
Outcomes & implications

- A handful of notable, successful rate increases are public with growing anecdotal evidence of exploratory reviews and pending actions
- Cedants and reinsurers should review their treaties carefully to understand the precise language and associated rights, each situation will be unique

Rate increase drivers – illustrative example

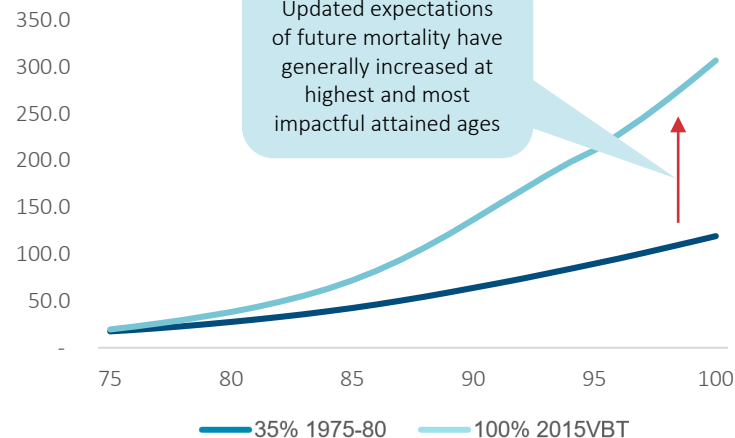
Durations 1-20

Male IA55, Std NS



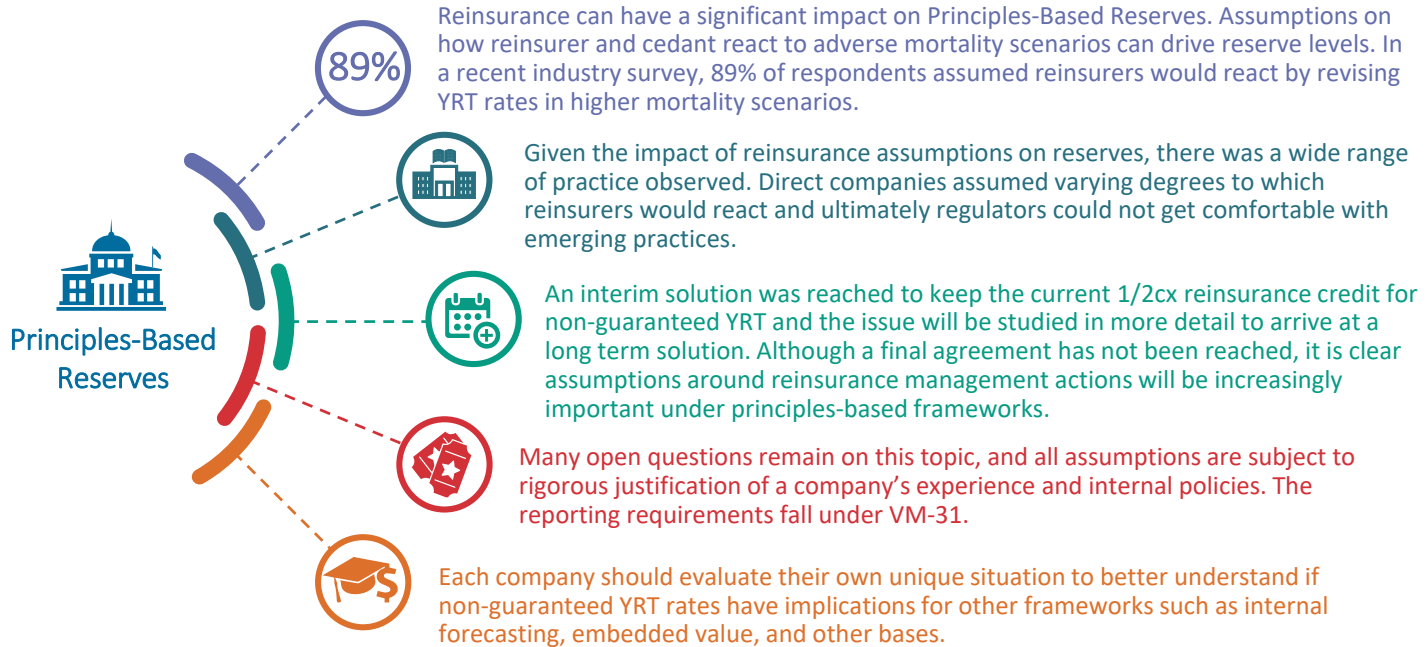
Durations 21+

Male IA55, Std NS



Late 1990s & early 2000s YRT reinsurance priced on now outdated mortality tables (SOA 1975-80 table) with typically flat mortality percentages. Recent experience has led to updated views of mortality especially at the highest attained ages.

Emerging regulatory considerations



YRT key takeaways



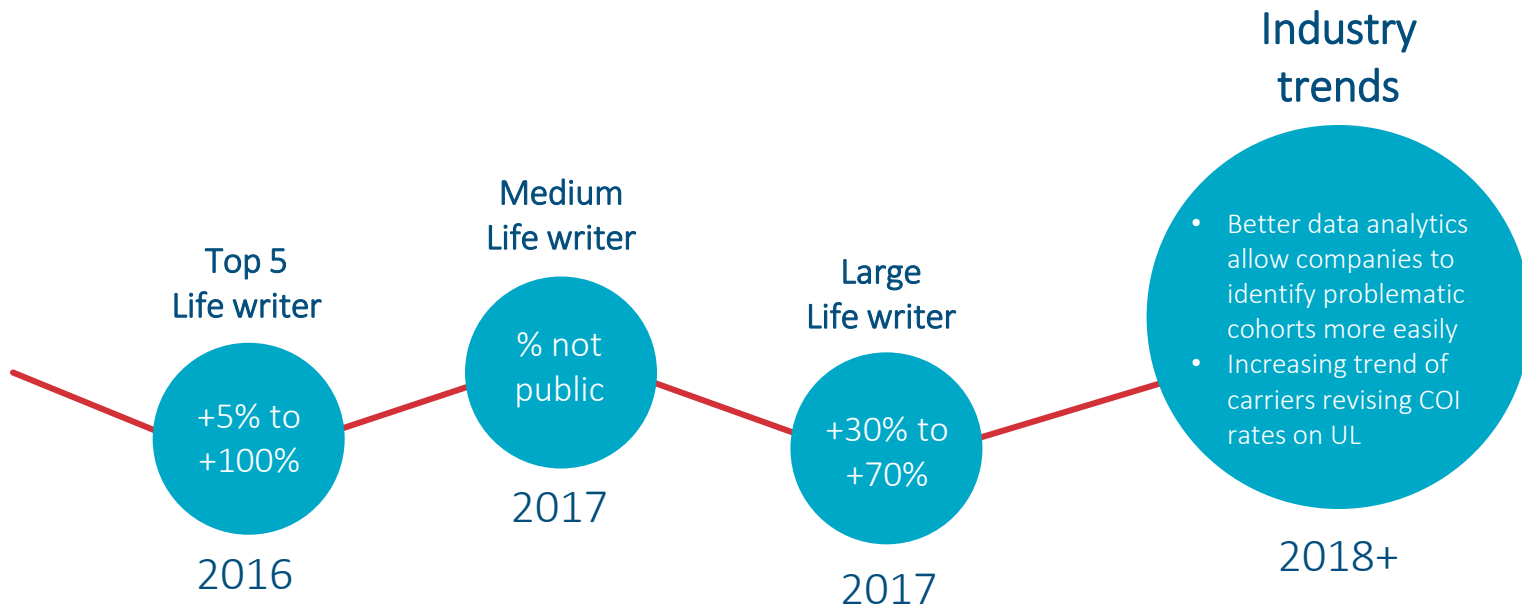
Policyholder non-guaranteed elements



Overview

- Cost of insurance ('COI') management
 - Industry update
 - Considerations
 - Post-level term ('PLT') management
 - Industry update
 - Considerations
 - Key takeaways from a reinsurance perspective
-

COI action industry update



Note: COI actions above are on a single product or subset of products and not entire blocks



COI action considerations between Ceding Company and Reinsurer

- Reinsurers not involved in decisions to increase COIs, though impacted
 - Notification to reinsurers required, earlier the better
 - Administrative challenges are easier to overcome with proactive partnership
 - Implementation varies depending on YRT rate basis:
 - If COI table, may update with new COIs in reinsurance agreement
 - If mortality table, then YRT rate changes required to implement participation
-

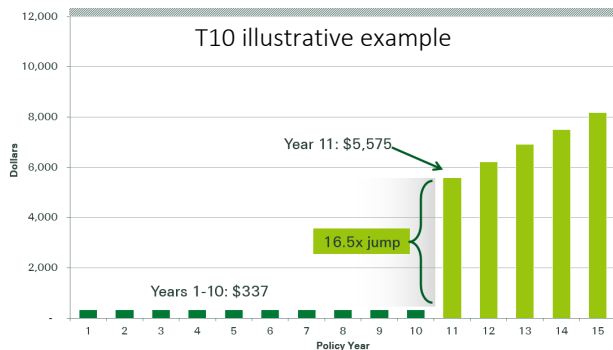
Post-level term management

When a direct insurance company manages (lowers) post level premiums to policyholders

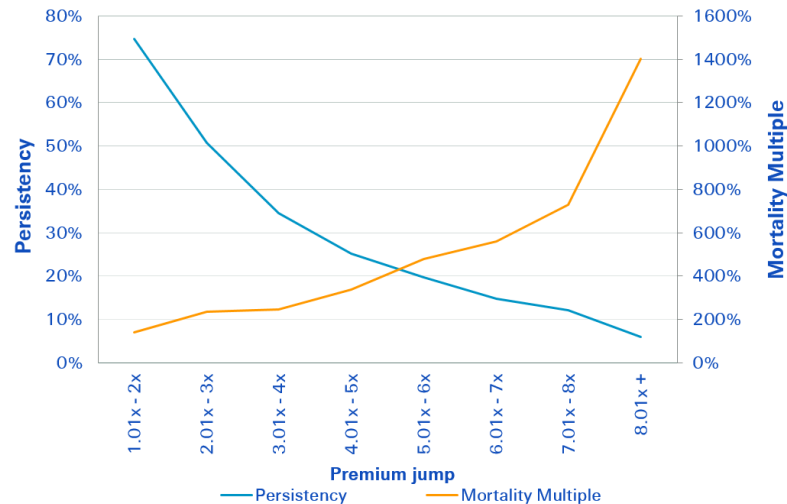
Post level “cliff premiums” follow the guaranteed level period



Policyholder shock lapse and severe mortality deterioration



Persistence and Mortality Multiple by premium jump



Management of PLT = Win-Win-Win

- ✓ Lower premiums for policyholders
- ✓ Opportunity for improved profitability for both ceding companies and reinsurers

* Source: Swiss Re experience studies



Post-level term industry update

- Majority of the large term writers are managing their PLT premiums
 - 8 out of the top 10 term sellers from 2018 are managing in force business
 - Mixed activity on proactively managing new business
 - Some graded premiums for new business
 - Some have decreasing face amounts
 - Some setting cliff premiums with expectation to manage before the post level
 - Data and experience availability growing, e.g. T10 and T15
 - Management of T20 is underway
-

NGE key takeaways



YRT at high attained ages



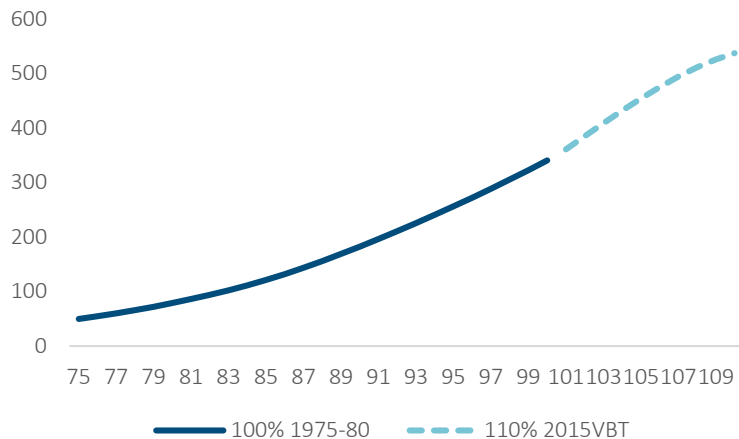
Overview

- High attained age YRT considerations
 - Explicit language
 - Maturity extension riders
 - Clear YRT rates through advanced ages
 - Treaty ambiguity
 - Lack of rates
 - Do you know your exposure and how to identify?
 - Potential solutions
-

Example and key takeaways

YRT rate extrapolation

Illustrative example of a solution



Common pitfalls

- Often overlooked with a prevailing past opinion that policyholders would not reach these ages
- Policyholder charges and reinsurance premiums can be different structures for these high attained ages
- Rate structure for reinsurance agreements may also vary by reinsurer
- Depending on product features policyholders may or may not have this feature depending on type of rider (elective or non-elective)
- Utilization rates vary based on the above and if the rider had associated charges
- **Critical to understand the nuances** above as many models do not accurately reflect this feature and could be missing a material item at ages that contribute heavily to projected future claims

Proactively identifying high attained age risks is critical to determining solutions, especially when ambiguous language exists such as a lack of rates for high ages

Other topics



Retention increases and recapture

- Retention increases may be applied to new business only or also to in force
 - Contractual requirements in order to apply retention increases to in force and recapture business:
 - ✓ Timing of notification
 - ✓ Retention held at/since issue
 - ✓ Minimum duration in order to recapture
 - Non-contractual recaptures possible when mutually agreeable
 - Operational ease is a common driver for small non-contractual recaptures
-

Other topics of remediation

Adjustable features, e.g. Experience Refunds

- Refunds (or adjustable premiums) are typically reviewed annually and often require manual administration
- Other examples: Mortality Adjustment Factors or Adjustable Allowances

Conversion rate clarifications

- May have explicit rates in the treaty for any conversions -> use existing treaty
- May have language to use rates of product being converted to -> use different treaty
 - Ambiguous and difficult to administer - what product or treaty does it convert to?
 - Is the reinsurer covering that product in an existing treaty?

When treaty is unclear or not administered correctly, treaty remediation necessary:

- Amend for clarity, one time corrections / payments, administration fixes for future



Questions





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2019 Reinsurance Seminar

Brendan Kearney FSAI FIA FSA
Mortality Improvement and Impact on
Reinsurance – Europe Focus

September 25, 2019



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Mortality Improvement (MI) & Reinsurance – Europe

Outline

- Territories & Products
 - UK
 - The Netherlands
- MI Trends
- MI Models

Territories in Focus

- UK and The Netherlands
- Both of these countries have developed markets for pension schemes to de-risk their longevity exposures
 - Pension scheme is responsibility for paying all future pension / payout annuity amounts
 - Pension is payable for remainder of pensioner's life
 - Pension amounts may increase with inflation, and may continue after death of first life if spouse is still living
 - Longevity risk represents the risk of paying pensions for longer than anticipated
 - Lower MI leads to higher liabilities
 - To de-risk, pension scheme enters a transaction with insurer, who in turn may be backed by 1 or more reinsurers

Territories in Focus

- UK:
 - Population is 66 million
- The Netherlands:
 - 17 million
- Ireland:
 - 4.8 million



(Re-) Insurance Products in Focus

- Pension Buy-Out / Buy-In
 - Pension scheme pays up-front premium to Insurer
 - Insurer takes on responsibility for all future pension payments
- Longevity Swap
 - Fixed Cashflow from Pension Scheme – expected future pensions plus fee
 - Floating Cashflow from Re-Insurer – actual future pensions
 - Customizable:
 - At the money / Out of the money at time-0
 - Simplify reference population / pension terms vs. basis risk
 - Collateralize if transaction becomes significantly in the money

US vs. Europe – Life Expectancy

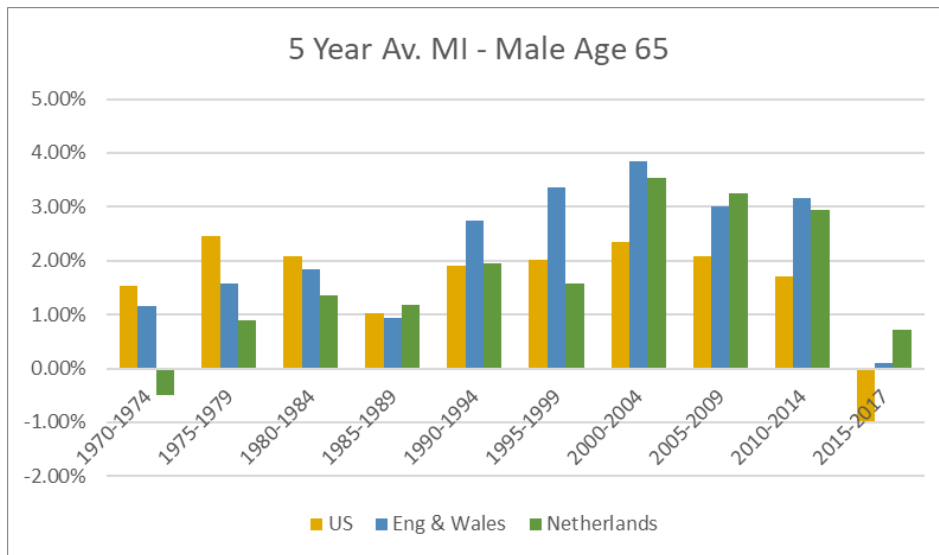
Life Expectancy at Age 65

<i>In years</i>	US	UK	Netherlands	Canada	Japan
Male Age 65	18.1	18.8	18.7	19.3	19.6
Female Age 65	20.6	21.1	21.2	22.1	24.4

Source: OECD (2019), Life expectancy at 65

US vs. Europe – MI Trends

5-year Average MI (Male Age 65 Only)

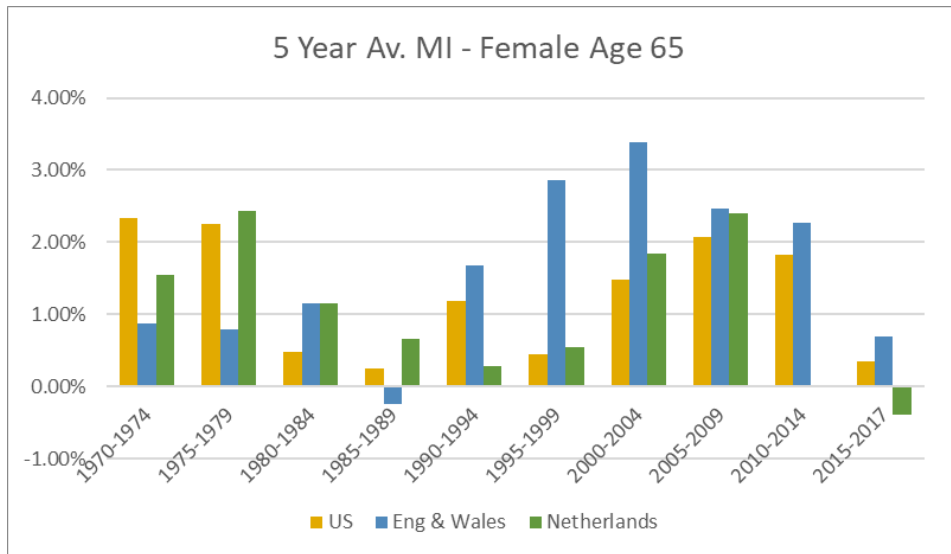


Note: Final data period is 2015-2017 for US and 2015-2016 for others

Source: Human Mortality Database

US vs. Europe – MI Trends

5-year Average MI (Female Age 65 Only)

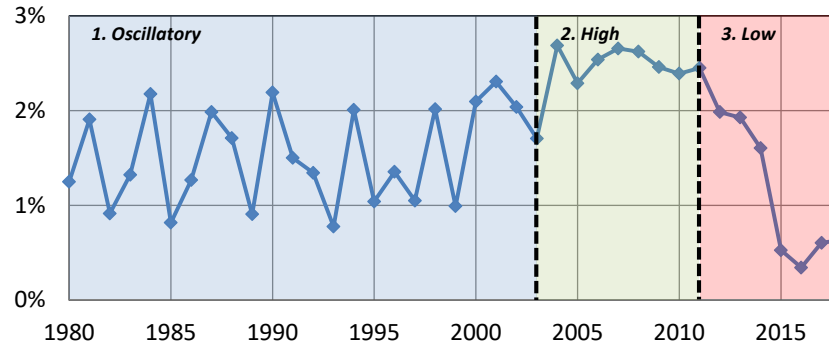


Note: Final data period is 2015-2017 for US and 2015-2016 for others

Source: Human Mortality Database

MI Trends

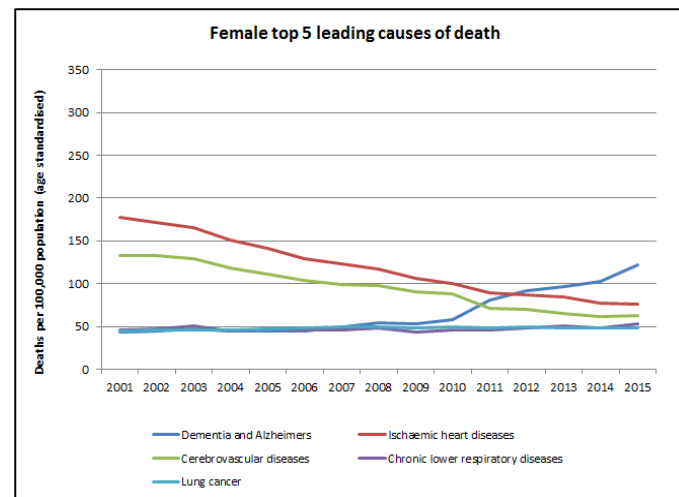
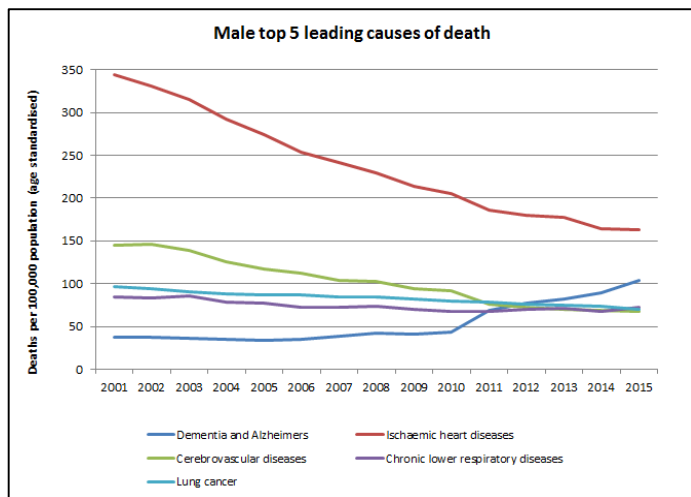
UK 5-year Average MI Rate



- 1980-2003: Average MI rates oscillate between 1% and 2%
- 2004-2011: Improvements remain at around 2.5% (a “high and stable” phase).
- 2011+: Improvements begin falling, averaging around 0.5% from 2015

Source: Data from Office for National Statistics (ONS), UK

Trends in Top 5 Causes of Death



- **Red Line** (Decreasing): Ischaemic heart diseases
- **Blue Line** (Increasing since 2011): Dementia - increasingly important CoD
 - Note: Some recoding changes in 2011 and 2016 made dementia more likely to be selected as the single cause of death that is recorded in the presence of multi-morbidities

Source: WHO Mortality Database, England and Wales Population; Age-standardised mortality rates

MI Trends

- Comparing 2000-2011 to 2011-2017, there are observed reductions in population MI in the US and in many European countries
 - The size of the MI reduction varies by country
 - Japan is one of the few countries to demonstrate strengthening MI over the period
- MI trends by socioeconomic status
- 2011-2017 vs. 2018 vs. 2019 vs. the future?
 - US Population MI in 2018
 - UK Death Date for Early 2019

Setting an MI Assumption – Some Considerations

Mortality Base Table vs. MI

Age Cohort Effect in the UK (in particular)

Selection of Data

Population vs. Insured Lives vs. Pensioner Lives

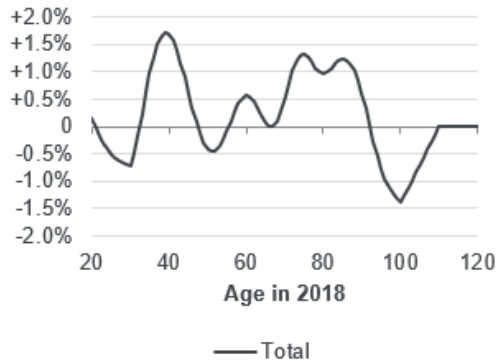
UK CMI Projection Model

- CMI – Continuous Mortality Investigations
 - Subsidiary of the Institute & Faculty of Actuaries (IFoA)
- MI model first released in 2009
 - Annual updates published since 2019 – revisions for emerging data, and model refinements
 - Deterministic model dependent on user inputs & expert judgement
 - CMI_2018 published in March 2019
 - Based on 40 years of England & Wales population data, provided by the Office for National Statistics (ONS)
 - Calibrated for mortality data up to Dec. 31, 2018
- Recognized standard for MI analysis in the UK

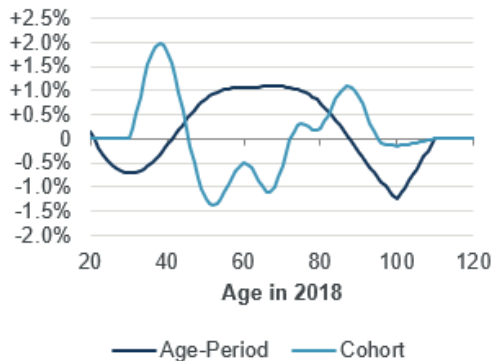
UK CMI Projection Model

CMI Model Sample Output (Male)

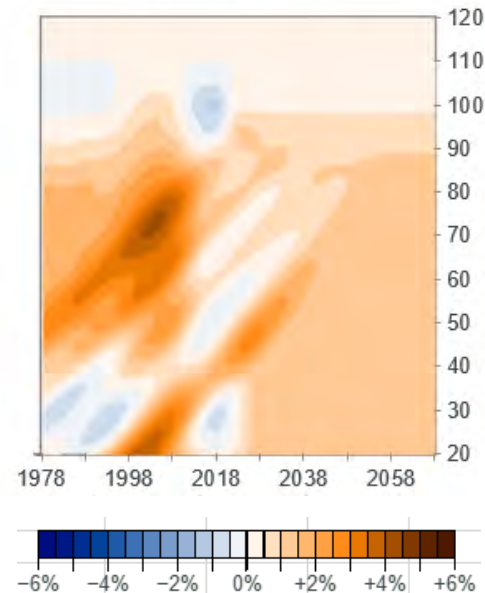
Initial mortality improvements



Initial mortality improvements - components



Projected mortality improvements

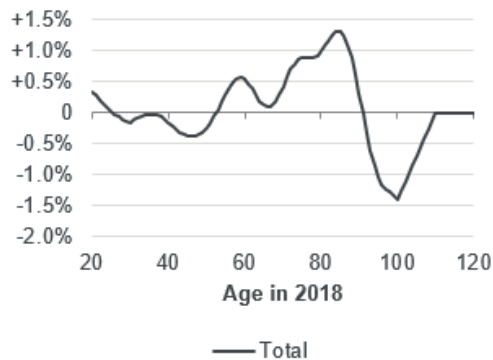


Source: CMI_2018 (v02); Male; Core Assumptions; 1.25% LT Rate

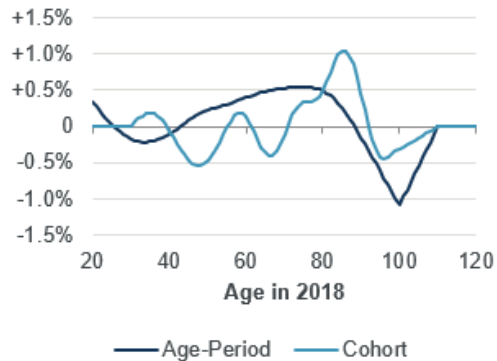
UK CMI Projection Model

CMI Model Sample Output (Female)

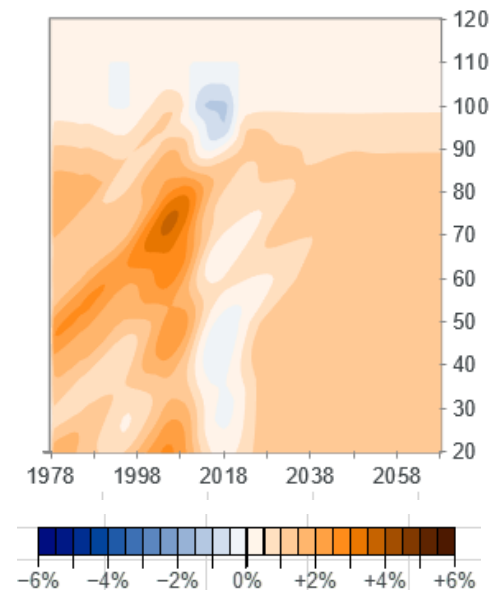
Initial mortality improvements



Initial mortality improvements - components



Projected mortality improvements



Source: CMI_2018 (v02); Female; Core Assumptions; 1.25% LT Rate

UK CMI Projection Model

- Model Parameters
 - Calibration
 - Calendar Years; Age Range; Cohort Age Range
 - Long-Term MI Rate
 - Period Smoothing Parameter
 - Attained Age Tapering

UK CMI Projection Model

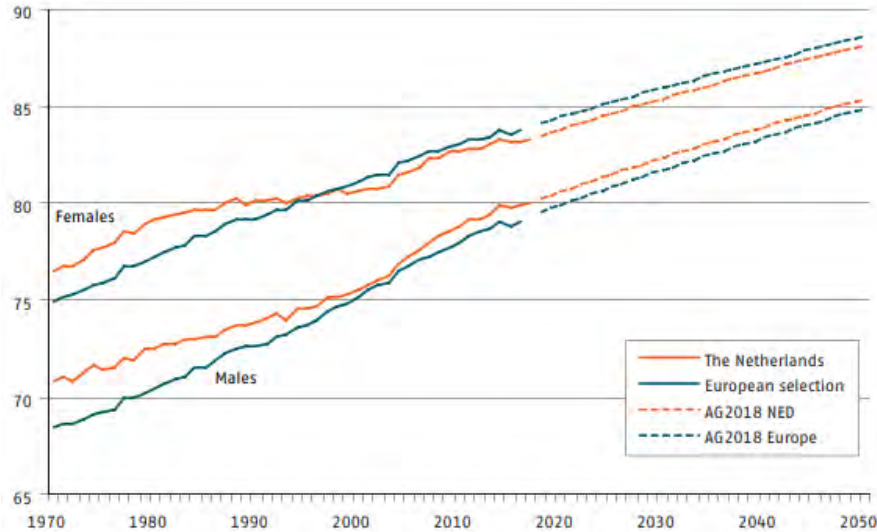
- Other Parameters
 - Adjustment for Basis Differentials
 - Population vs. Pensioner Lives
 - Differentiating factors such as Pension Amount, Gender, Blue/Grey/White Collar, Postal/Zip Code
 - Floor for MI Rate
- CMI Working Papers

Netherlands MI Model

- Royal Dutch Actuarial Association (Koninklijk Actuarieel Genootschap, AG)
 - AG Mortality Research Committee
- Projections Life Table: AG Series
 - Projection table published every 2 years since 2010; AG2018 is the latest model
 - Designed for use by pension funds and life insurers
 - 47 years of population mortality data from the Netherlands, and other European countries with similar prosperity levels
 - Data sourced for the Human Mortality Database, Eurostat and Statistics Netherlands
 - Methodology first derives a mortality projection for Europe, and then an assumption calibrated for the Netherlands population

Netherlands MI Model

AG2018: Life Expectancy at Birth



Source: Projection Table AG2018 Report

Netherlands MI Model

- Projection Table AG2018
 - Stochastic Model
 - Parameters and best estimate mortality rates are published, along with the input death and exposure data for Europe and the Netherlands
 - Model documentation allows for the results to be recreated and/or further customized
 - Correlation coefficient included for Male and Female MI
- Life Expectancy and State Pension Retirement Age
 - Life expectancy at age 65

Takeaways

- Learnings from Europe for the US
 - Models & Statistical Techniques
 - Use of industry models still requires expert judgement
 - Data will need to be tailored to local requirements
 - Applications in the US:
 - Insurance products with exposure to late durations and high attained ages
 - Emerging PRT market for insurers and reinsurers

Questions?

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Canada Life Reinsurance
brendan.kearney@canadalifere.com



References

- CMI Model <https://www.actuaries.org.uk/learn-and-develop/continuous-mortality-investigation/cmi-investigations/mortality-projections>
© Continuous Mortality Investigation Limited
- Human Mortality Database; University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany). Available at www.mortality.org or www.humanmortality.de
- Organisation for Economic Co-operation and Development (OECD) Health Stats <https://data.oecd.org/healthstat/life-expectancy-at-65.htm>
- Office for National Statistics (ONS) Data <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/ageing>
- Royal Dutch Actuarial Association (Koninklijk Actuarieel Genootschap, AG) <https://www.ag-ai.nl/>
- World Health Organization (WHO) Mortality Database https://www.who.int/healthinfo/mortality_data/en/



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MORTALITY IMPROVEMENT AND IMPACT ON REINSURANCE

SEPTEMBER 25, 2019

Mark Spong, FSA, CERA, MAAA
Senior Consultant

Today's approach

Overview of research into mortality improvement differences driven by socioeconomic factors and implication for reinsurers

- 1. What and why** - Origin and motivation for the research
- 2. Data and methods** – Challenges for the industry, potential opportunities to use public data sources and research approach
- 3. Results** –Differentials for key socio-economic splits
- 4. Next steps** – Practical issues for setting assumptions and next steps for research



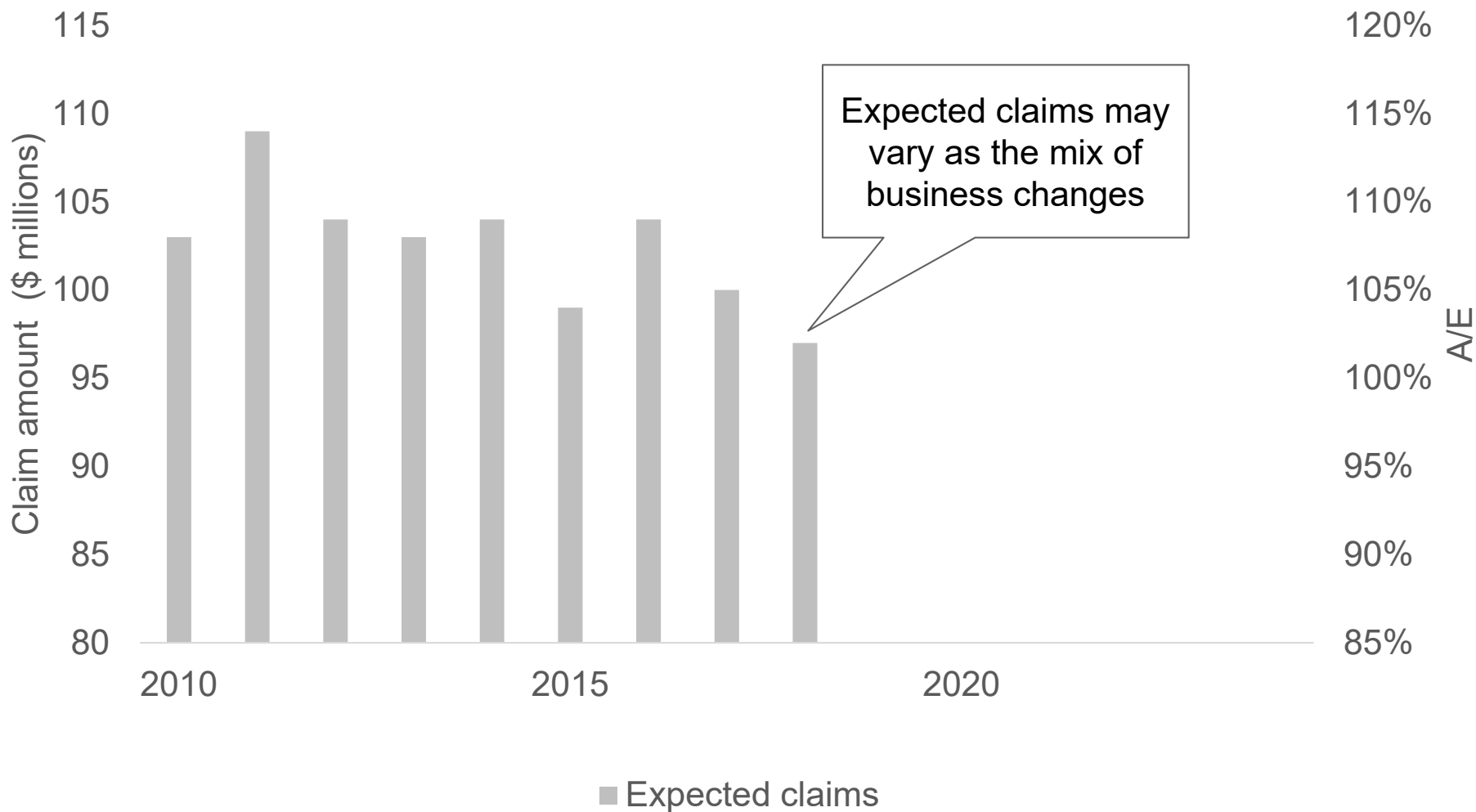


1 | What and why



What is mortality improvement?

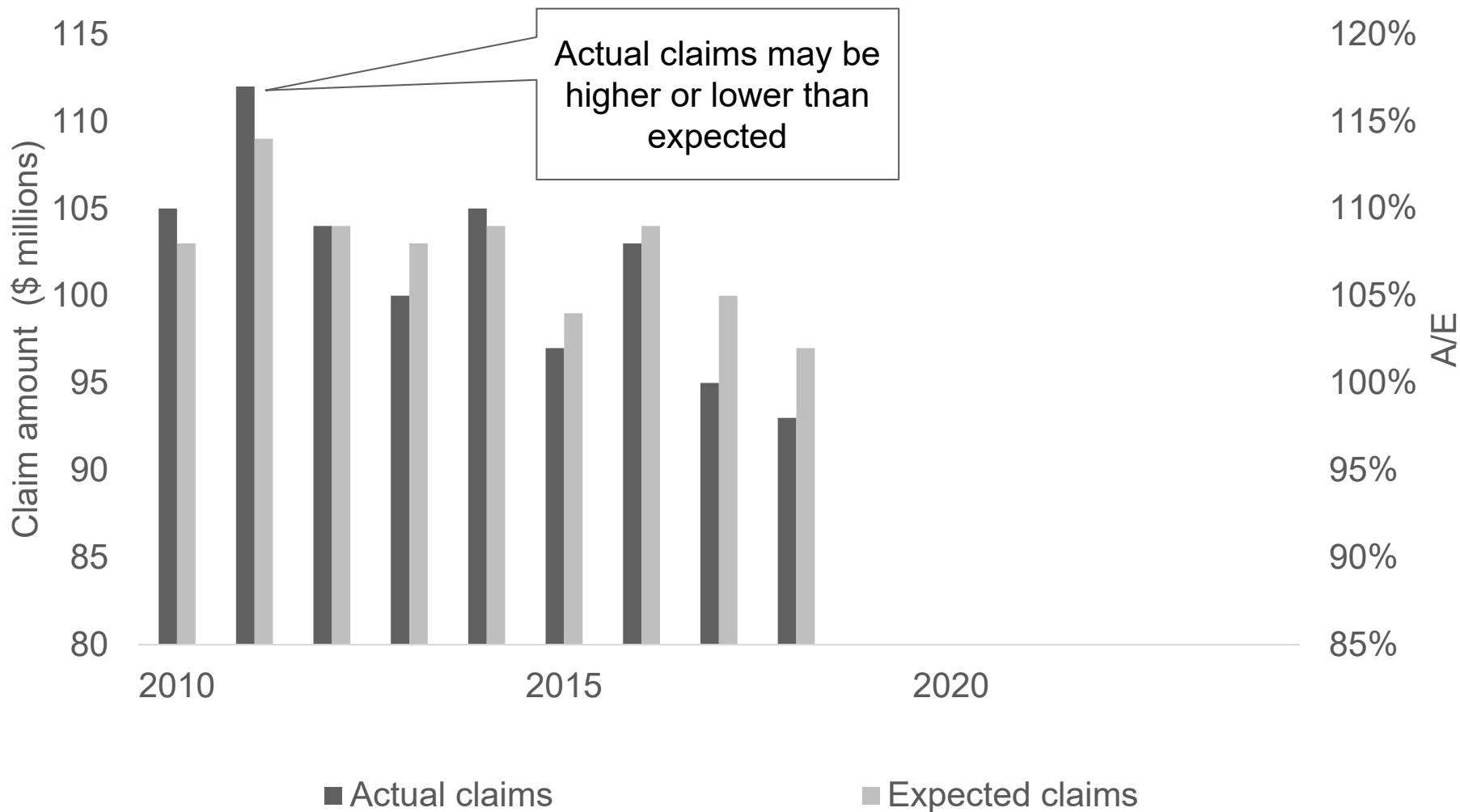
Mortality improvement is a method to capture long-term mortality trends in actuarial models





What is mortality improvement?

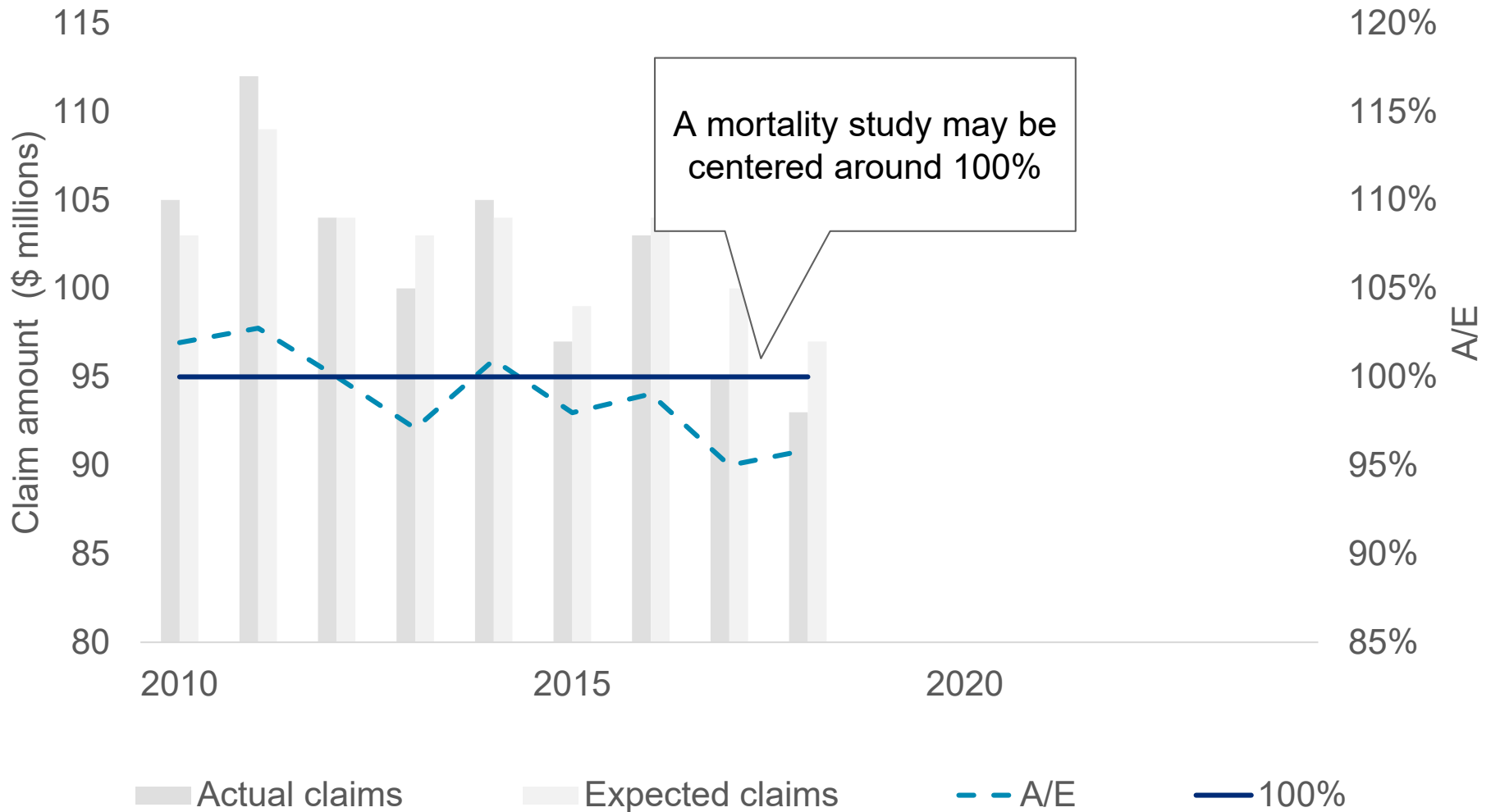
Mortality improvement is a method to capture long-term mortality trends in actuarial models





What is mortality improvement?

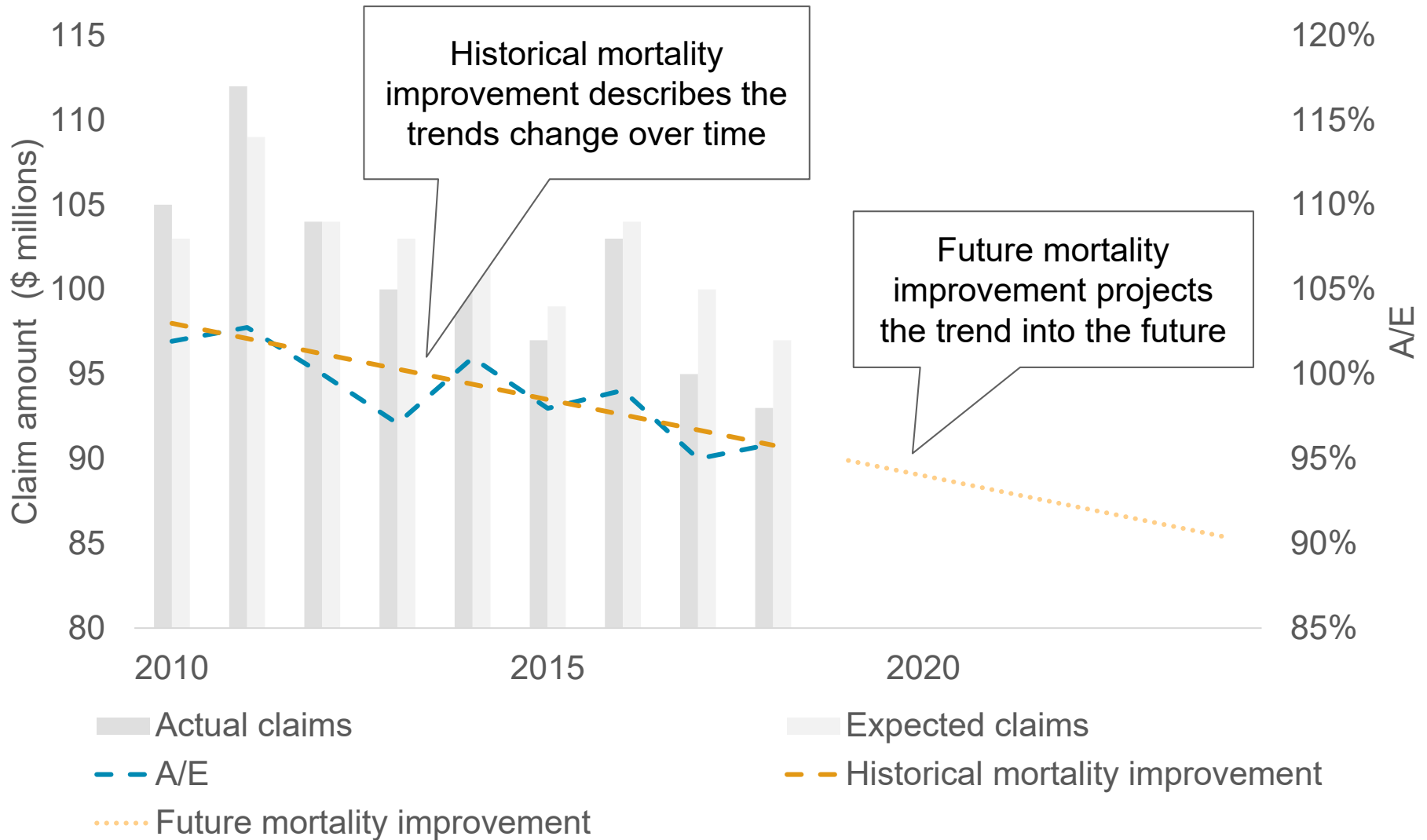
Mortality improvement is a method to capture long-term mortality trends in actuarial models





What is mortality improvement?

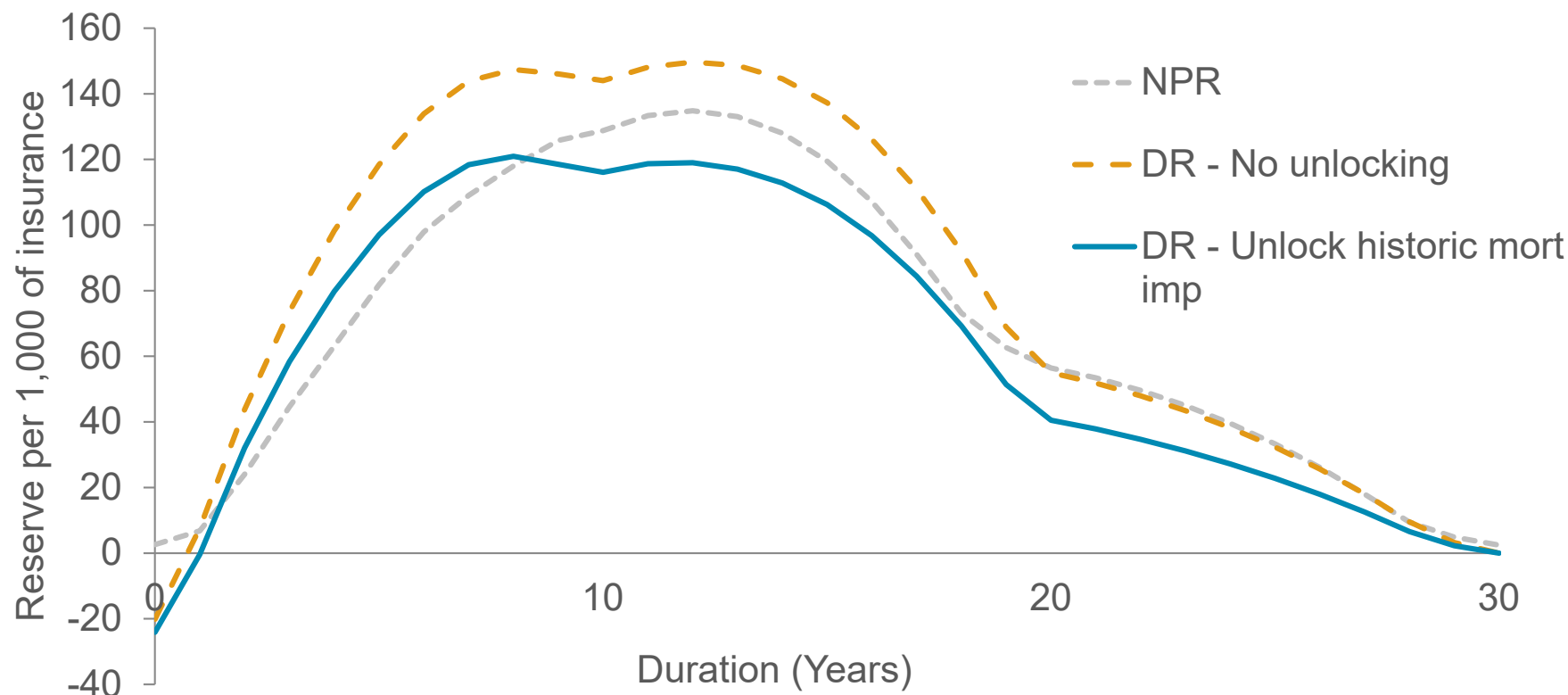
Mortality improvement is a method to capture long-term mortality trends in actuarial models





PBR case study

The impact of unlocking the mortality assumption has a significant impact on future reserve levels for the modeled reserve components




DR with no unlocking creates the highest reserve. With unlocking, the NPR begins to take over at most durations.



State of the industry

Mortality improvement assumptions have become more sophisticated over time because longevity gains are not evenly distributed

	Degree of sophistication 		
	BASIC (G2 2012)	ADVANCED (MP 2018)	NEXT GEN
Age	✓	✓	✓
Gender	✗	✓	✓
Calendar Year	✗	✓	✓
Income	✗	✗	✓
Education	✗	✗	✓
Occupation	✗	✗	✓

The next generation of mortality improvement will be further refined to differentiate by socioeconomic and other demographic variables



State of the industry

Socioeconomic factors are known to be key drivers of mortality improvement and the gap is expected to widen

...the most important driver affecting U.S. mortality past the next 10 years [is] socioeconomic status inequity¹



This study finds a difference in both the level and the rate of change in mortality improvement over time by socioeconomic status...³

Recent evidence indicates that inequities in life expectancy in England have not only widened, but are forecasted to widen further.²

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...mortality inequality is increasing highlights a growing relationship between [socioeconomic status] and life expectancy.⁴

ANNUAL
REVIEWS

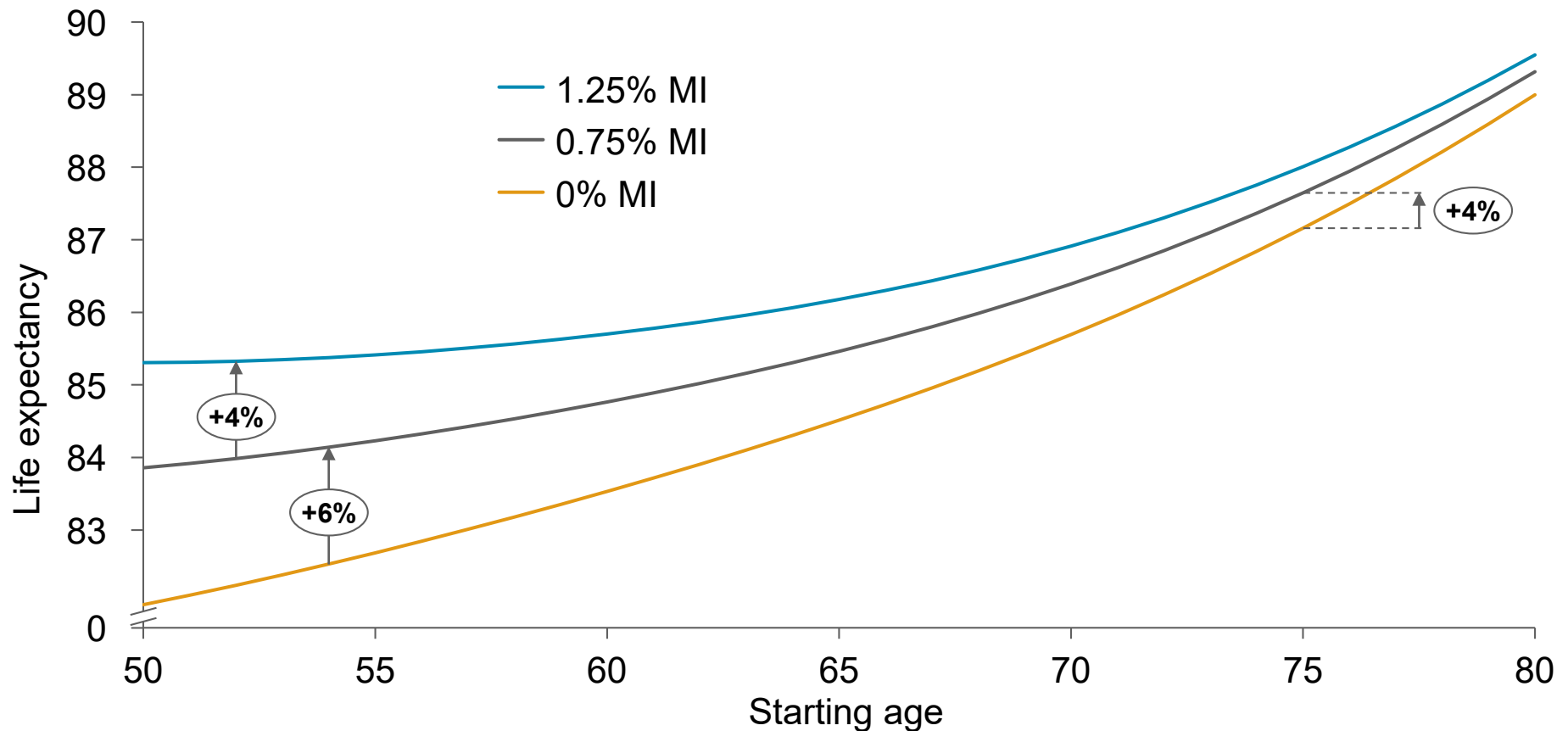
In recent years, there has been a major increase in the availability of data linking mortality risk and measures of socioeconomic status. The result has been a virtual explosion of new empirical research showing not only the existence of large inequities in the risk of death between those at the top and those at the bottom of the socioeconomic distribution, but also that the gaps have been growing.⁵

1. SOA - Drivers of U.S. Mortality Improvement Expert Panel Forum Report, January 2019
2. Living to 100 - Causal Mortality by Socioeconomic Circumstances: A Model to Assess the Impact of Policy Options on Inequalities in Life Expectancy
3. Social Security Administration - Trends in Mortality Differentials and Life Expectancy, 2007
4. Center for Retirement Research at Boston College – Rising Inequality in Life Expectancy by Socioeconomic Status, 2017
5. Annual Review of Public Health – Increasing Disparities in Mortality by Socioeconomic Status, April 2018



Mortality improvement has a large impact on life expectancy

Moderate differentials in mortality improvement change remaining life expectancy by years not months



Refining mortality improvement assumption is a small assumption but has a large impact; getting it right is not merely an exercise in 'sharpening the pencil'

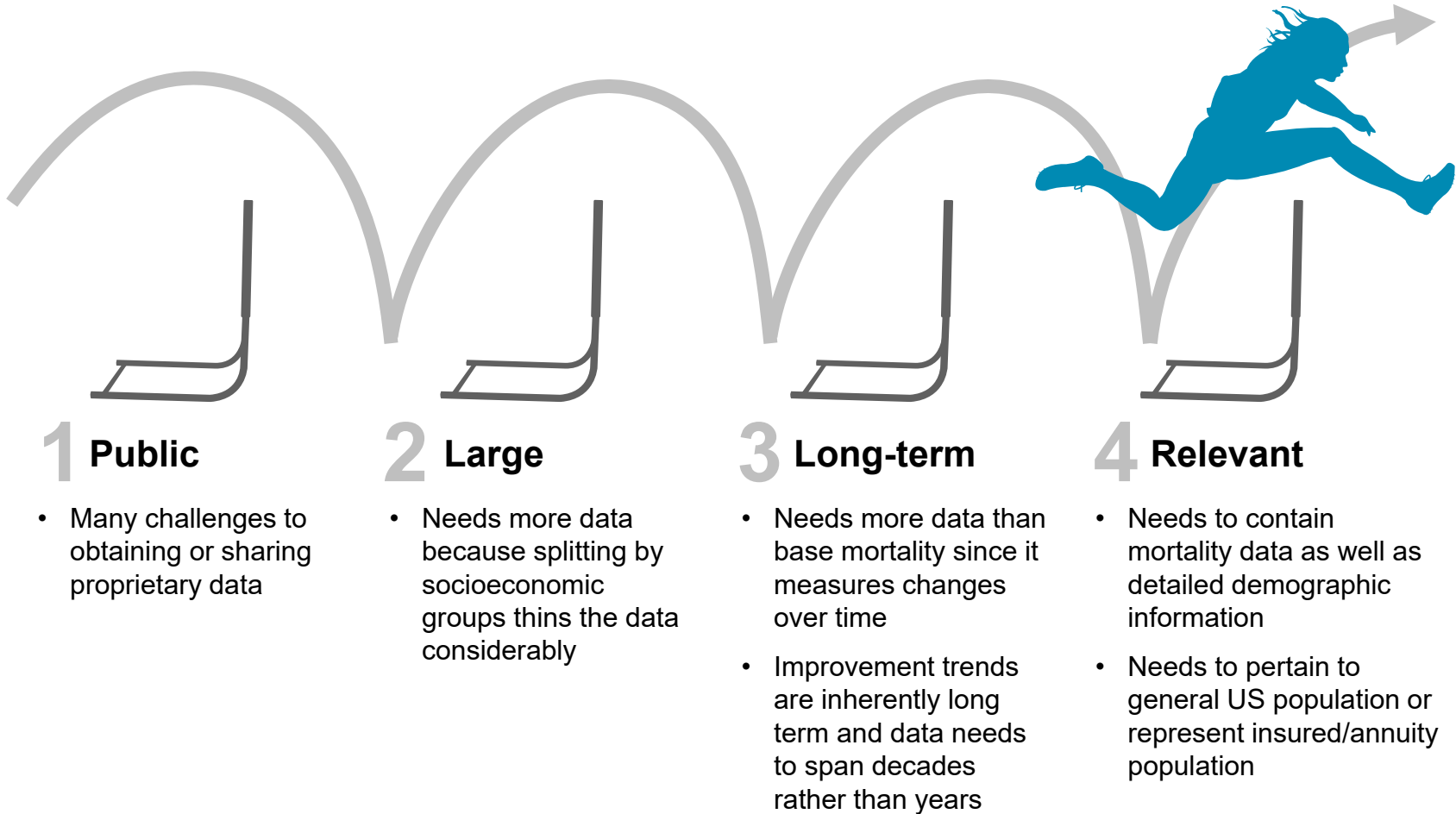


2 | Data and methods



Data

Getting the right data has been a major barrier for reinsurers and direct writers





Data

Successfully obtained data from U.S. Census/CDC spanning 1980-2005 with 3.8 million records and over 550,000 deaths

 DEATH, CAUSE OF DEATH

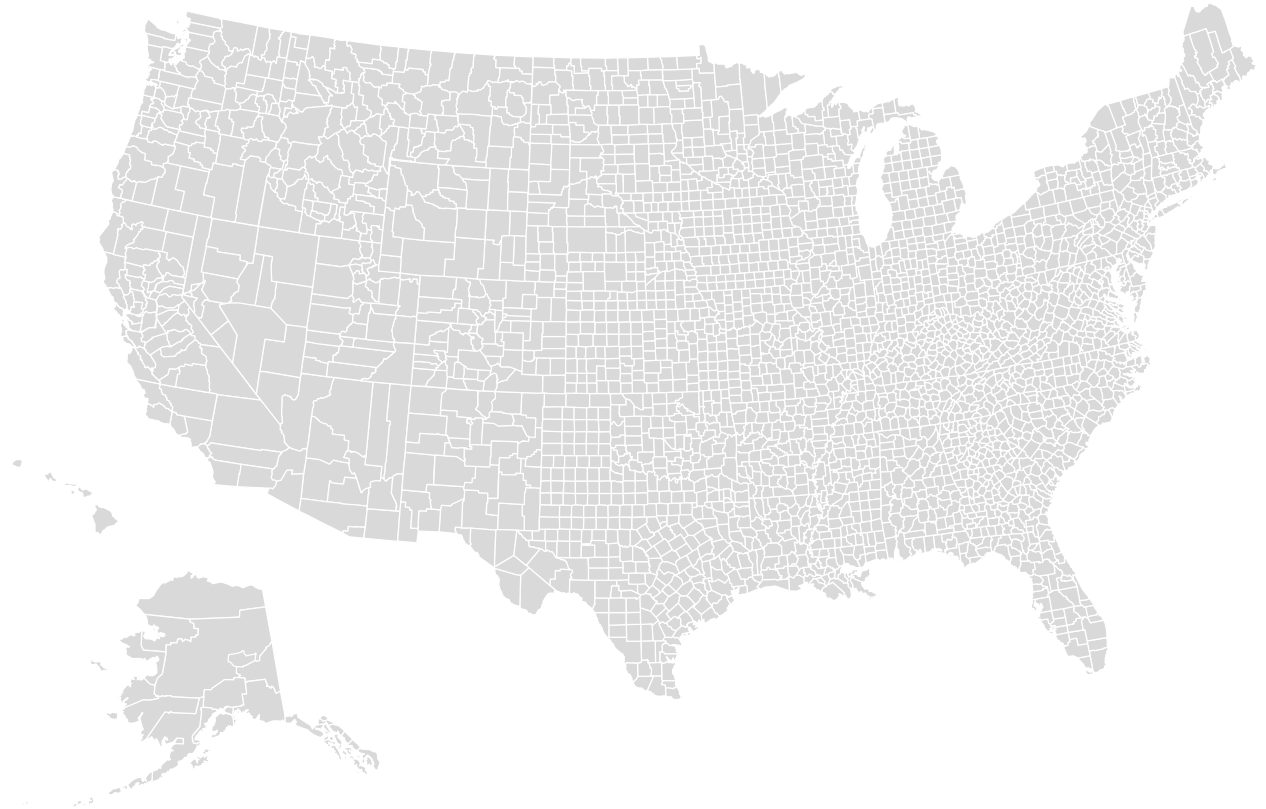
 GEOGRAPHY

 CITIZENSHIP, VET STATUS

 AGE, GENDER, RACE, TOBACCO

 OCCUPATION, INDUSTRY

 INCOME, EDUCATION



Dataset is explicitly for studying the effects of differentials in demographic and socioeconomic characteristics on mortality



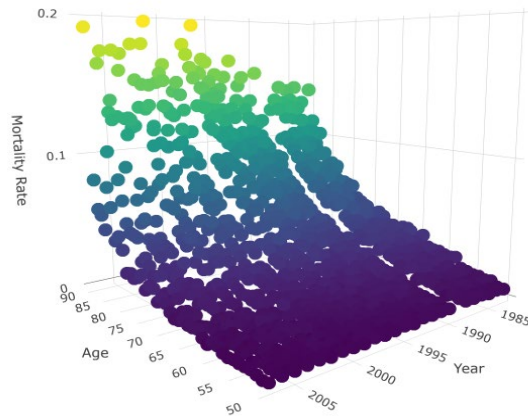
Smoothing approach and limitation

Average Box Smoothing is a simple approach to apply in practice

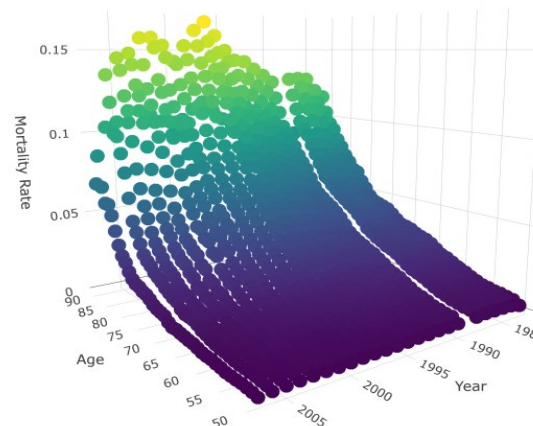
1			
		1	

Used a 3x3 box

1/9	1/9		
1/9	2/9	1/9	1/9
	1/9	1/9	1/9
	1/9	1/9	1/9



Before Smoothing



After Smoothing

Limitations

- Mortality rates are artificially low along the edges of the array
- All cells are given equal weight meaning that the credibility of individual cells is ignored

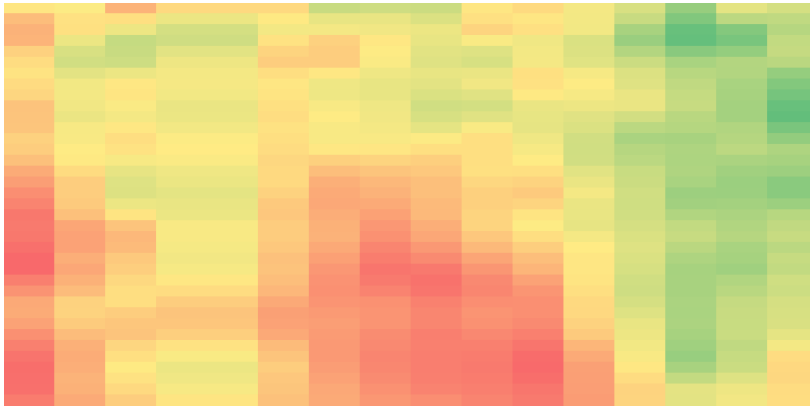
Future research will use the Whittaker-Henderson-Lowrie smoothing approach to be consistent with MP-2018 and does incorporate credibility of cell level data



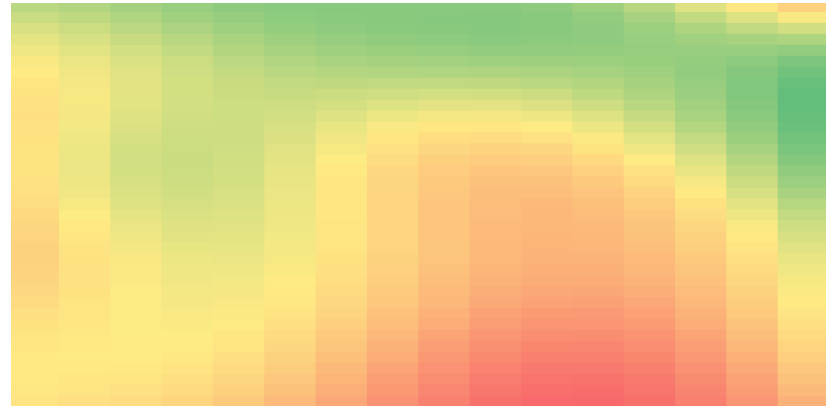
Dynamic validation vs MP-2018

Data follows general trend of MP tables

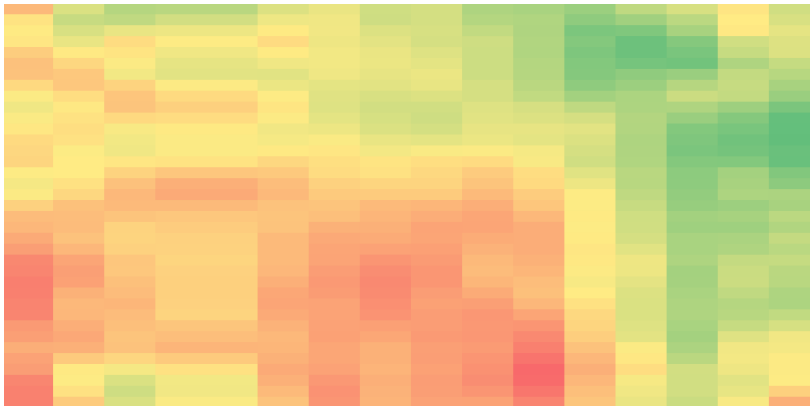
Female Data MI Rates



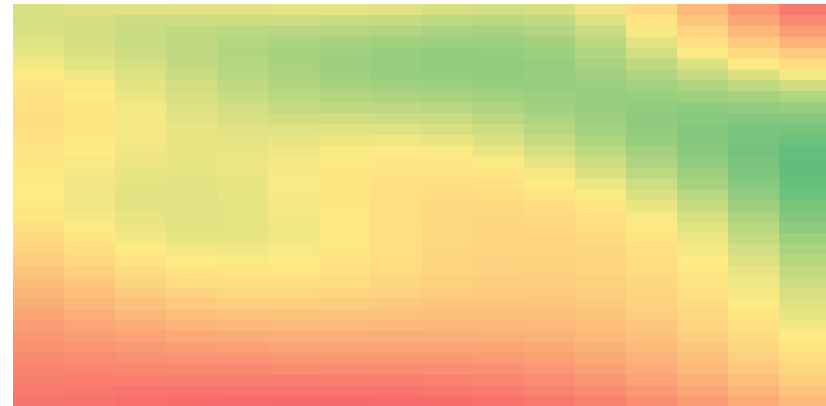
Female MP MI Rates



Male Data MI Rates



Male MP MI Rates





Statistical tools and user interface

Web interface still in development

The screenshot shows a web browser window with the URL 127.0.0.1:5752. The application title is 'Experience Tables'. The sidebar on the left contains five tabs: 'Mortality' (selected), 'Smooth Mortality', 'Mortality Improvement', 'Smooth Mortality Improvement', and 'Graphs'. The main content area has an 'About' section with text: 'The data used in this app is the National Longitudinal Mortality Study Public Use Data. It has been filtered to exclude records that do not contain a social security number and are below the age of 40. Please contact the current owner, Mark Spong, with any questions. Previous owner: Lisa Grieco'. Below this is a filter selection area with six buttons: 'Gender', 'Urban/Rural', 'Education', 'Income', 'Region', and 'Occupation', each with a '+' icon. At the bottom right of this area are 'Run' and 'Download' buttons. The 'Mortality Table' is a grid with columns for 'age' and years from 1983 to 2000. The first row shows values for age 50, and subsequent rows show values for ages 51 through 60.

Access raw and smoothed mortality plus raw and smoothed mortality improvement via tabs that update automatically

User can select one or more filters via drop down options

Results can be downloaded to CSV for further analysis

The app enables users to calculate historical mortality improvement in real time



Statistical tools and user interface

~/IC/Mortality Research/Working folder - Shiny
http://127.0.0.1:7513 | Open in Browser | Publish

Experience Tables

- Mortality
- Smooth Mortality
- Mortality Improvement
- Smooth Mortality Improvement
- Graphs

About

The data used in this app is the National Longitudinal Mortality Study Public Use Data. It has been filtered to exclude records that do not contain a social security number and are below the age of 40. Please contact the current owner, Mark Spong, with any questions.

Previous owner: Lisa Grieco

Gender +	Urban/Rural +	Education +
Income +	Region +	Occupation +

Mortality Table Run

< >

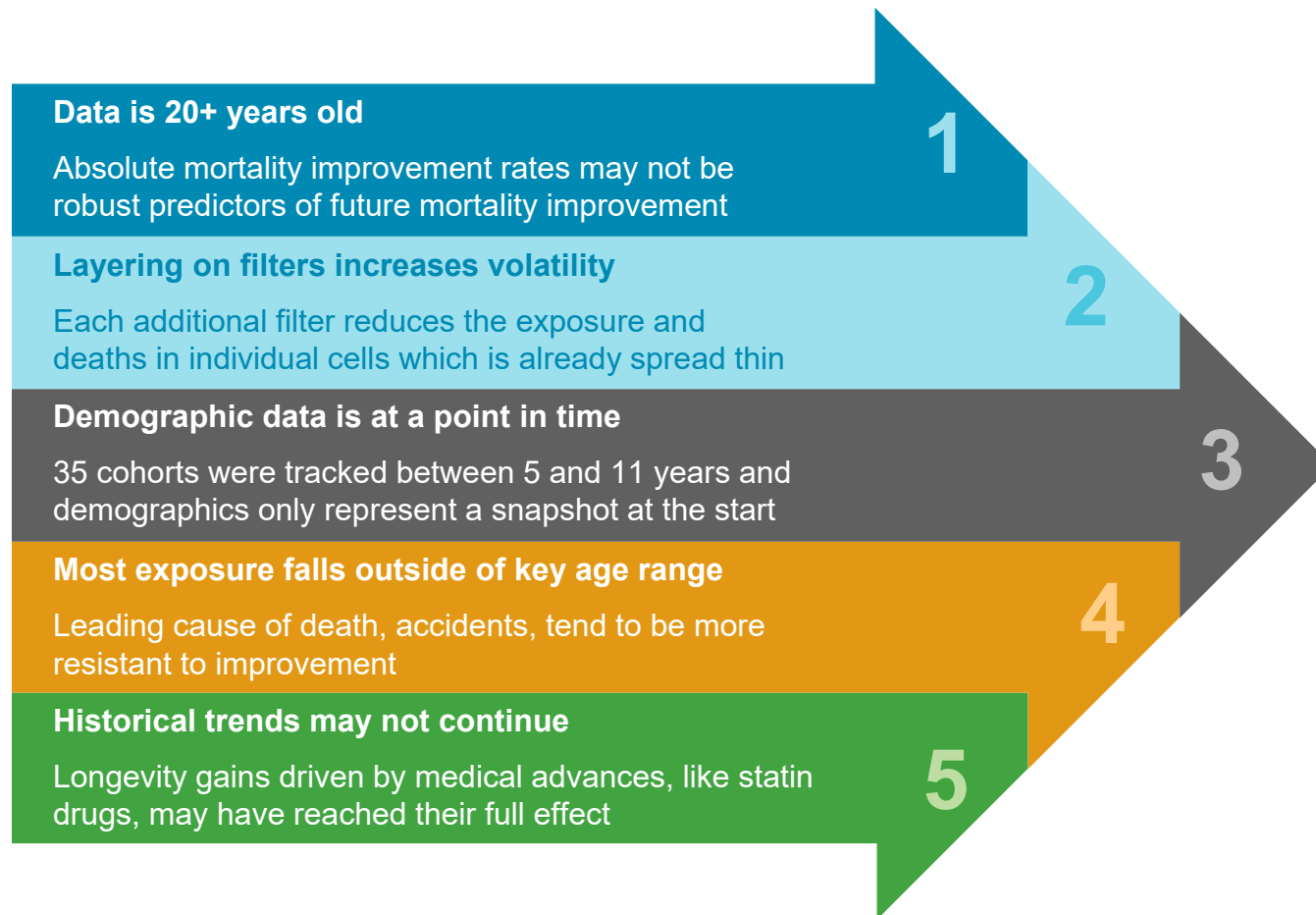


3 | Results



What can the data actually tell us?

Level set expectations



Conclusions

Long term patterns show mortality improvement differences are real and linked to socioeconomic factors

The differences can be expected to continue into the future

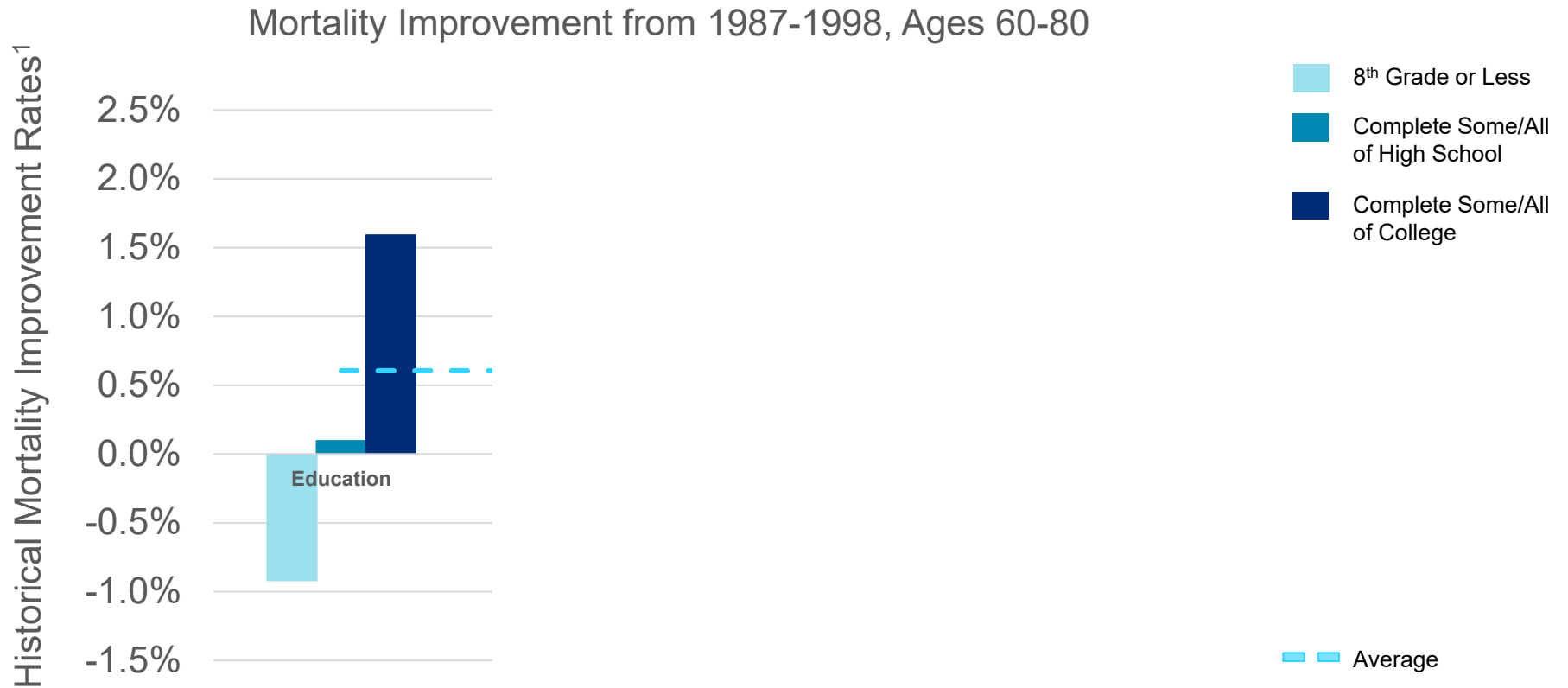
Overly refined projections or complex models are an exercise in spurious precision

A rule of thumb to differentiate mortality improvement by SES may be the best balance of transparency and accuracy



Summary of results

A 'rule of thumb' approach demonstrates differentials without getting lost in the weeds

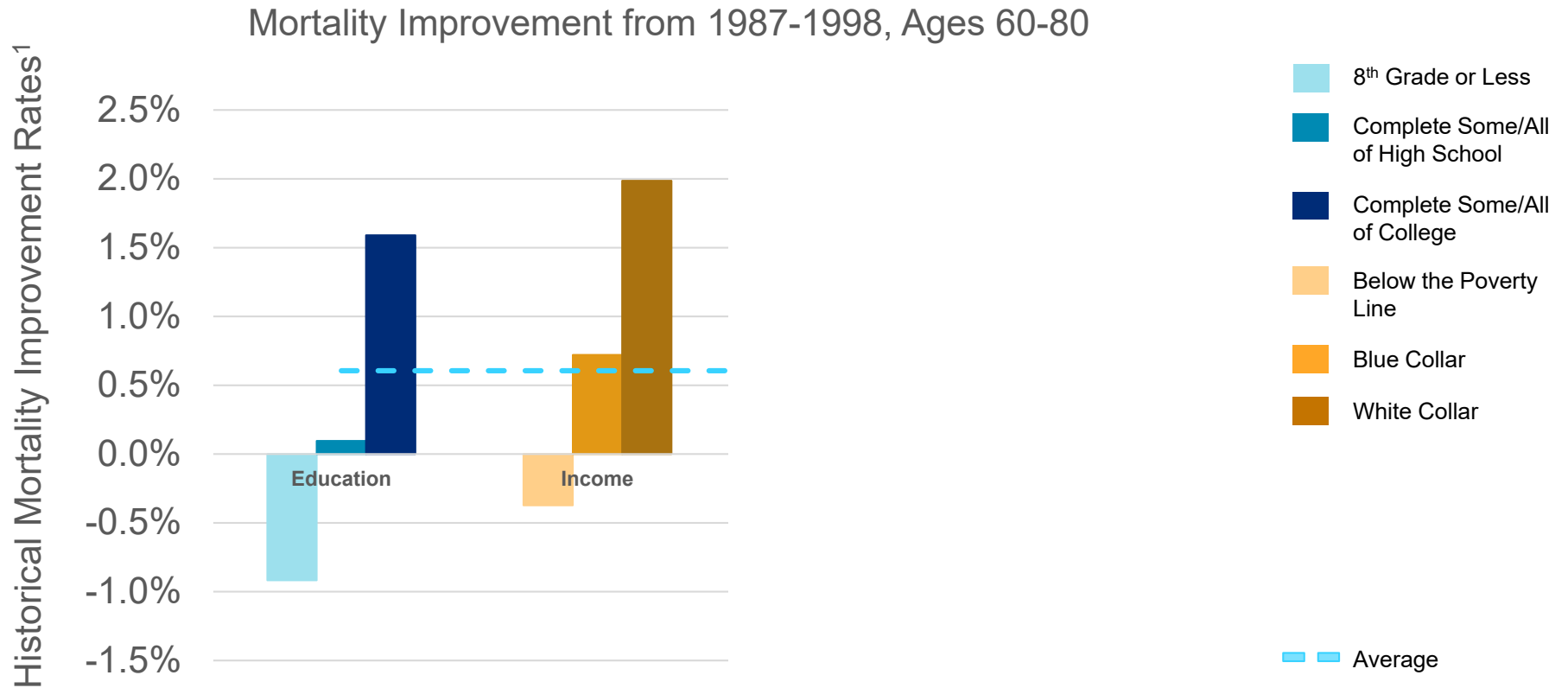


* Note: Rates shown above are the geometric average of year over year improvement rates from 1987-1998



Summary of results

A 'rule of thumb' approach demonstrates differentials without getting lost in the weeds

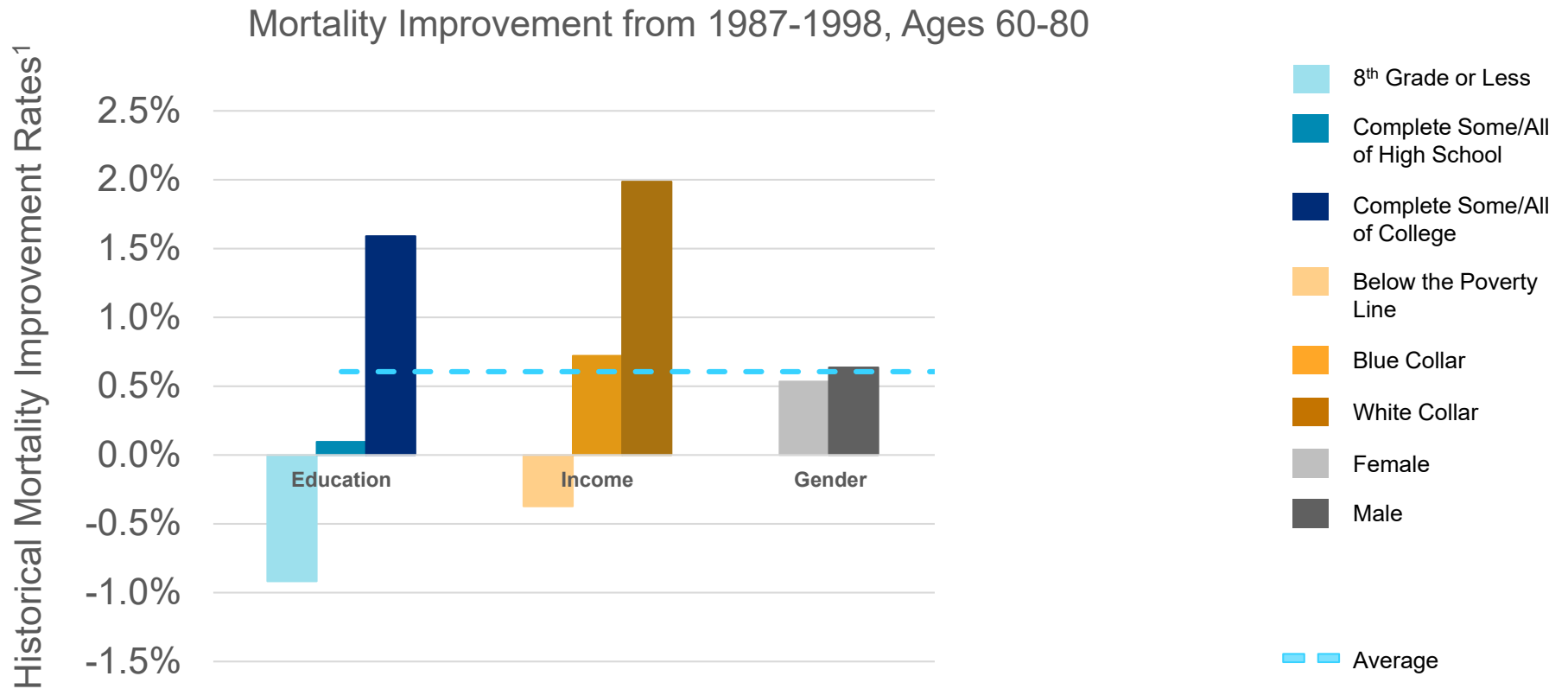


* Note: Rates shown above are the geometric average of year over year improvement rates from 1987-1998



Summary of results

A 'rule of thumb' approach demonstrates differentials without getting lost in the weeds

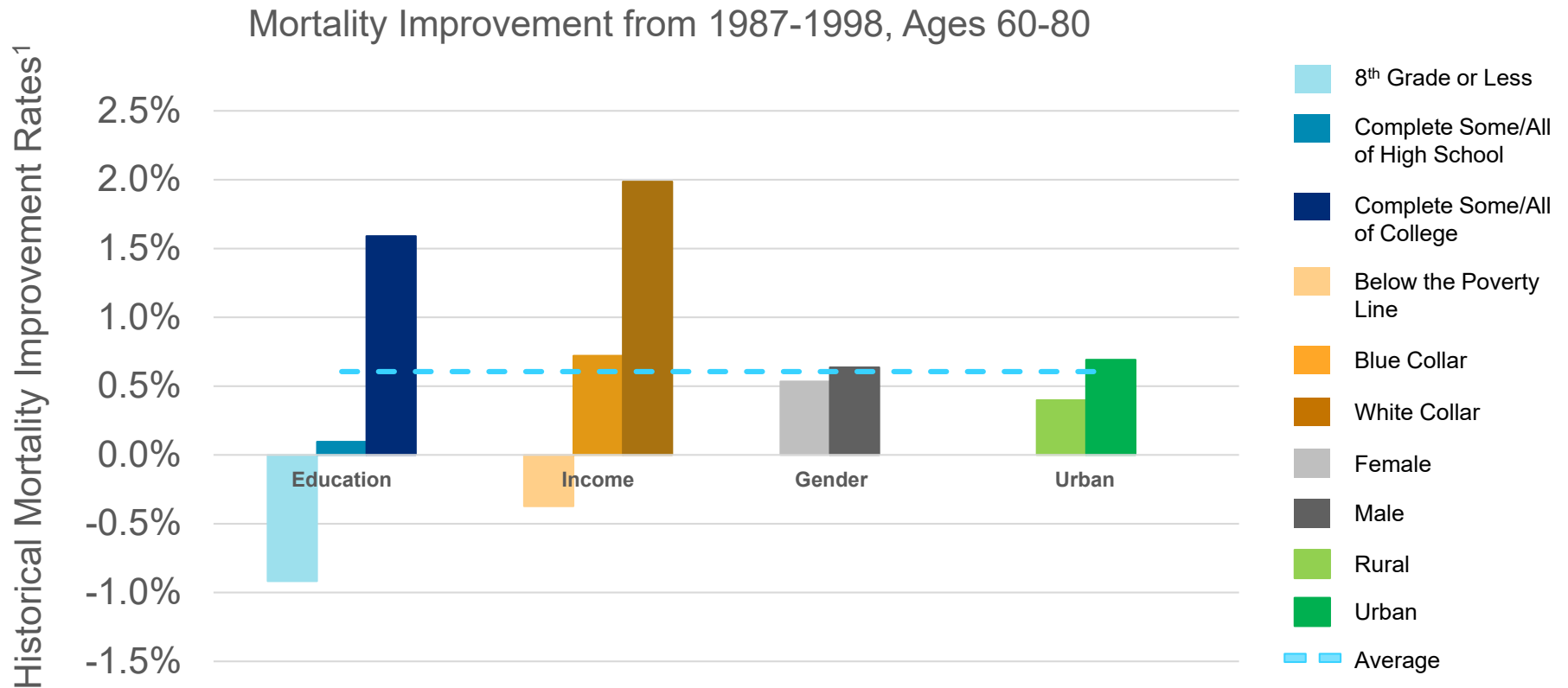


* Note: Rates shown above are the geometric average of year over year improvement rates from 1987-1998



Summary of results

A 'rule of thumb' approach demonstrates differentials without getting lost in the weeds



* Note: Rates shown above are the geometric average of year over year improvement rates from 1987-1998



4 | Next steps



Next steps

Practical issues pose challenges to setting mortality improvement assumptions that differentiate by SES



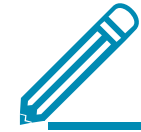
Model structure

- Mortality improvement may be structured as a constant, vector or two dimensional array
- Improvement may be expected to trend to a long term average or end after a fixed number of years
- Adjustments may be additive (e.g. +25 bps) or applied as a scalar (e.g. 120%)



Inconsistency

- Diversity of practice across an enterprise due to model structure, institutional inertia, and line-of-sight challenges
- Often viewed as a minor or secondary assumption, possibly because supporting data has been relatively thin



Research

- Mortality improvement is caused by medical and lifestyle changes and statistical fluctuations which make it more challenging to study
- Industry experience studies do not typically rely on cause of death analysis, which may be the key to better predicting mortality improvement

