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G1: Capital Motivated Longevity Solutions

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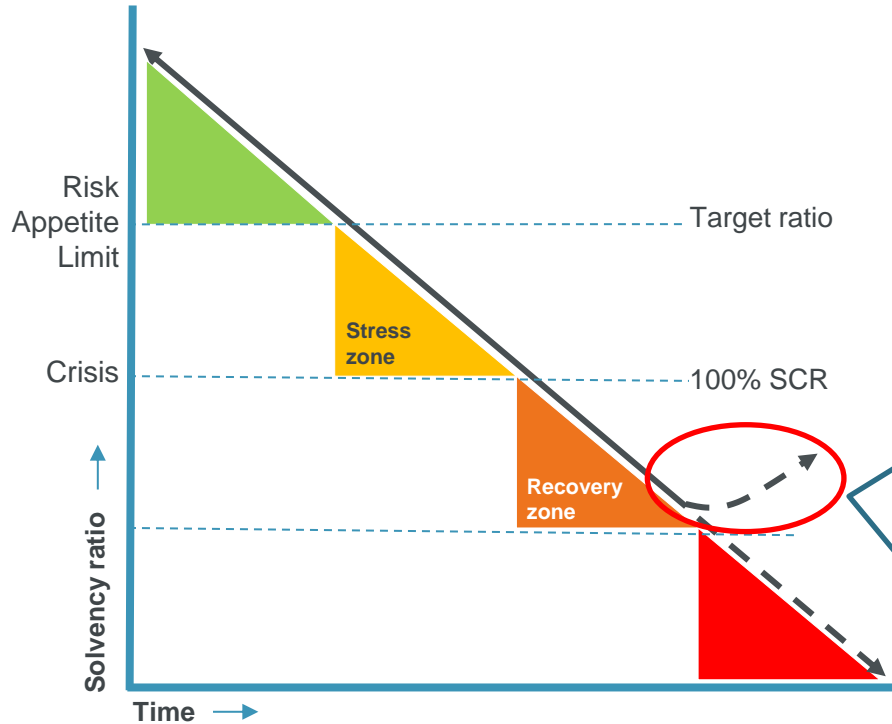


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1. Intro to Capital Motivated Reinsurance

Capital Management



Significance of Capital Management:

- In recovery situations
- Or increase solvency ratio in business as usual situations. E.g.
 - Sell portfolios
 - Capital injection
 - Cost reduction
 - De-risking
 - *Reinsurance*

Capital Motivated Reinsurance



Capital Motivated Reinsurance may be used to reduce the required capital on two levels:

- Reduction of SCR
The SCR includes a component for longevity risk
- Reduction of the risk margin in technical provisions
Non-hedgeable risks, which include longevity, are captured by a risk margin in the technical provisions

Regular Reinsurance

- Transfer of risk
Less volatility in P&L, less risk, ...

E.g.:

- Asset intensive reinsurance
- VIF monetization
- Longevity reinsurance

E.g.:

- Quota share reinsurance
- Stop-loss reinsurance



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2. Capital Motivated Longevity Solutions

Longevity Transfers in the Netherlands to Date

| Insurers | Risk Takers | “Size” | Date |
|-------------|----------------------------------|-------------------------|---------------|
| AEGON | Capital Markets | EUR 12 bln of reserves | February 2012 |
| AEGON | Capital Markets and Reinsurer(s) | EUR 1.4 bln of reserves | December 2013 |
| Delta Lloyd | Reinsurer | EUR 12 bln of reserves | August 2014 |
| Delta Lloyd | Reinsurer | EUR 12 bln of reserves | June 2015 |
| AEGON | Reinsurer | EUR 6 bln of reserves | July 2015 |

Source: http://www.artemis.bm/library/longevity_swaps_risk_transfers.html

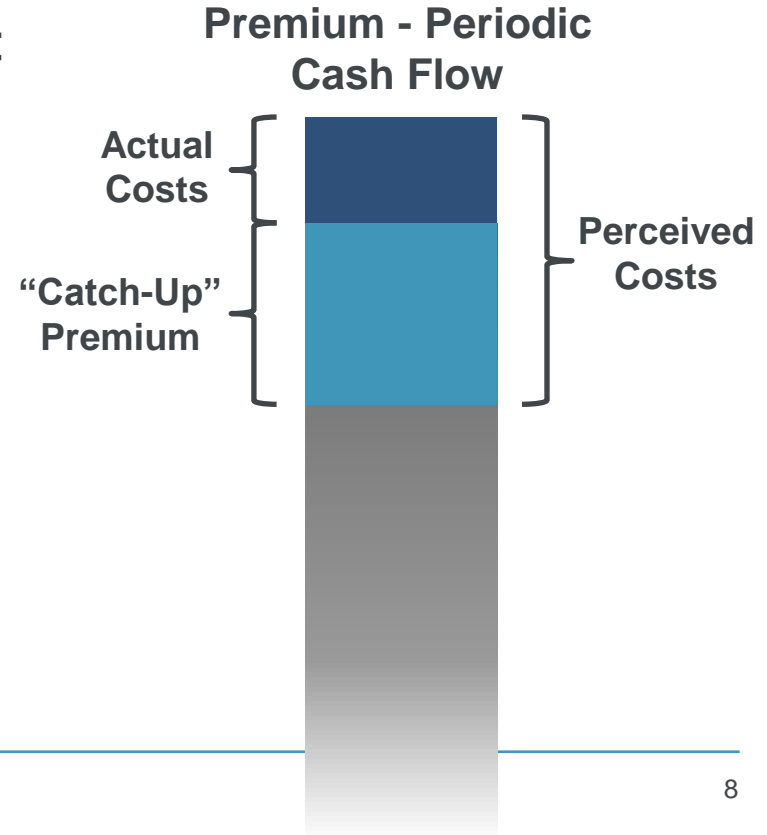
Challenge in Transferring Longevity Risk

- Components of Longevity Swap's Price:

- Starting Mortality Rates
- Mortality Improvements
- Compensation for Capital and Costs

- Actual versus Perceived Costs:

- “Catch-Up” Premium

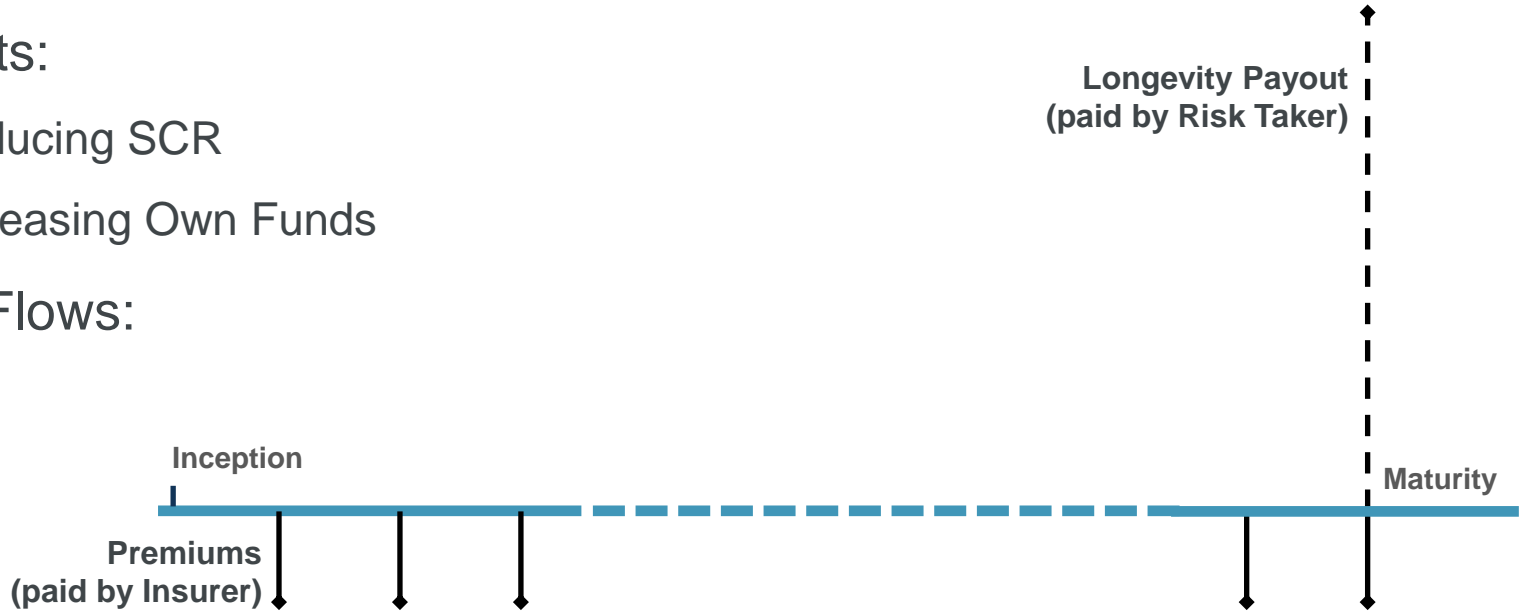


Types of Longevity Cover

| | Indemnity | General Population |
|---------------------|--|--|
| Reference | Actual Annuity Payments | Model Portfolio with General Population Mortality |
| Settlement | Difference between Actual Annuities and Premium | Difference between Initial and Ultimate Projection |
| Parties | For institutions that are not comfortable bearing basis risk | For institutions that can bear basis risk |
| Duration | Unlimited | Limited |
| Including Deferreds | Very Limited | Possible |
| Transfers (in/out) | Challenging | Easier |
| Due Diligence | Extensive | Very limited |

Capital Motivated Longevity Solutions

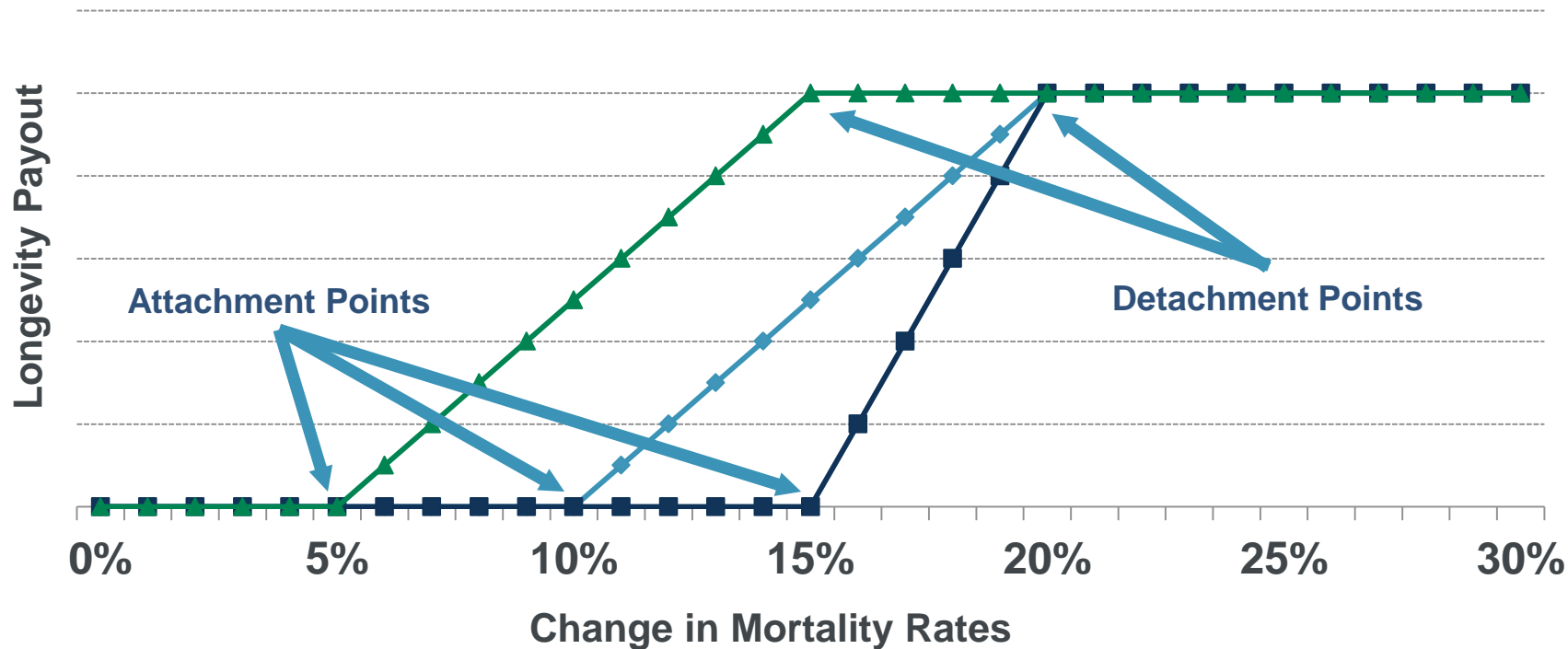
- Striking Balance between Costs and Benefits
- Benefits:
 - Reducing SCR
 - Increasing Own Funds
- Cash Flows:



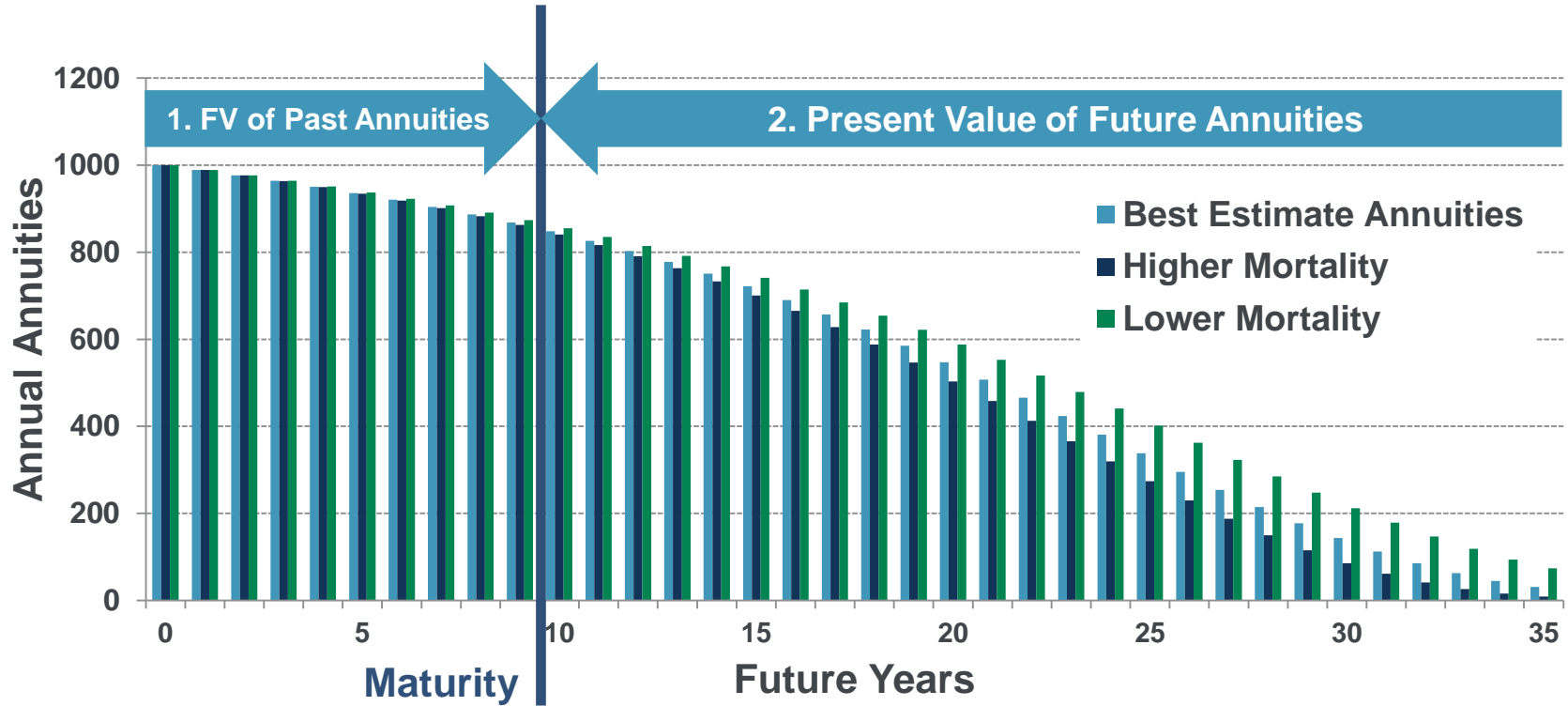
Tailoring Longevity Risk Transfer



Cover of Mortality Development

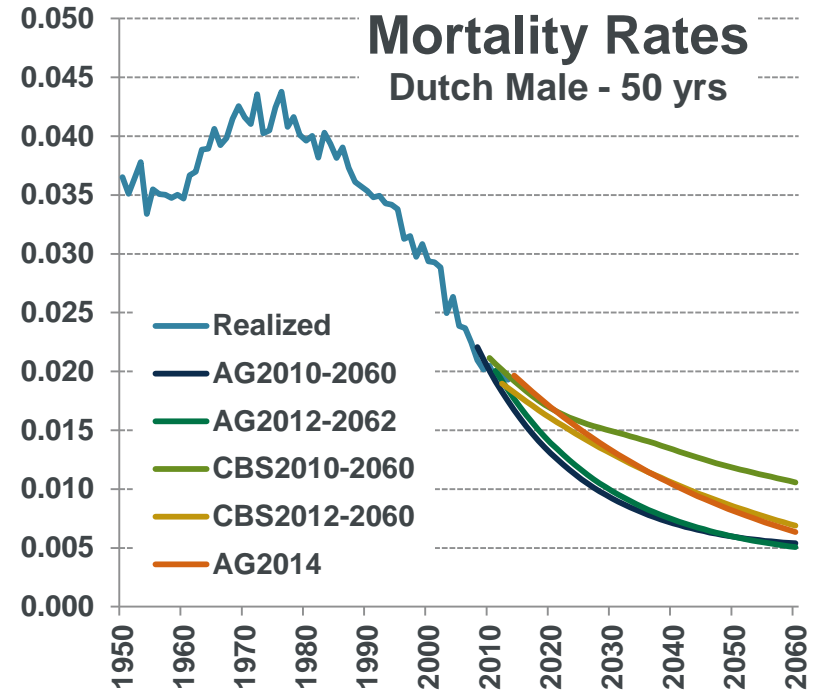


Two Components Underlying Longevity Payout

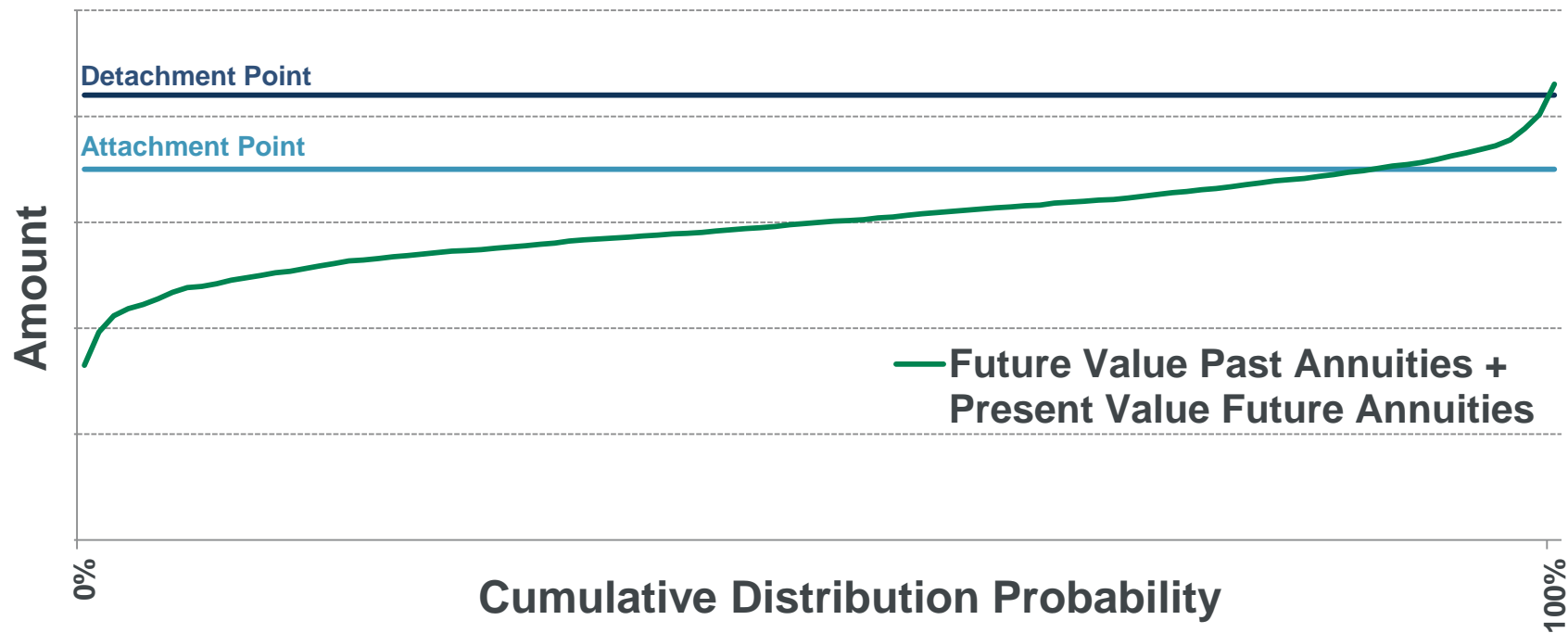


Mortality Model for PV of Future Annuities

- Captures Annuity Payments Beyond Hedge Term
- Key Component
- Pre-agreed Model
- Based on Objective Data
- Calibrated at Maturity



Potential Longevity Payout





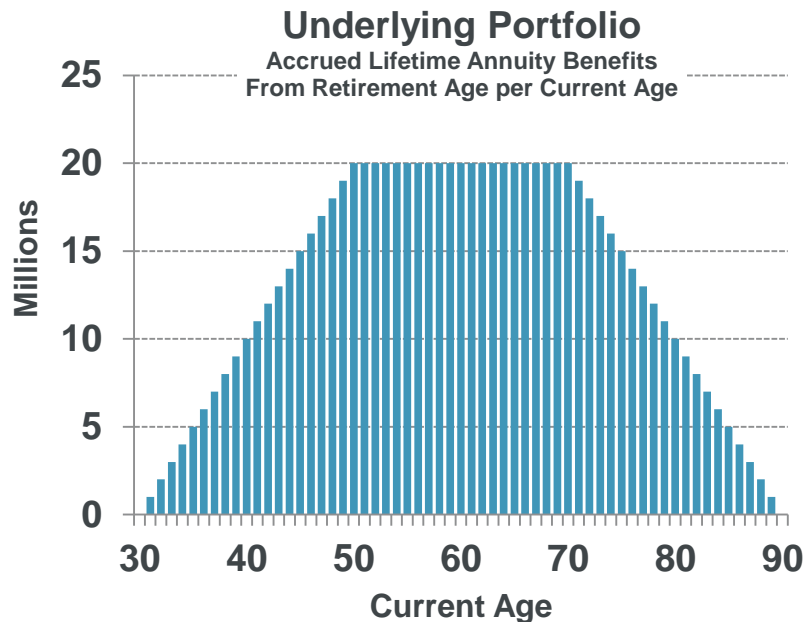
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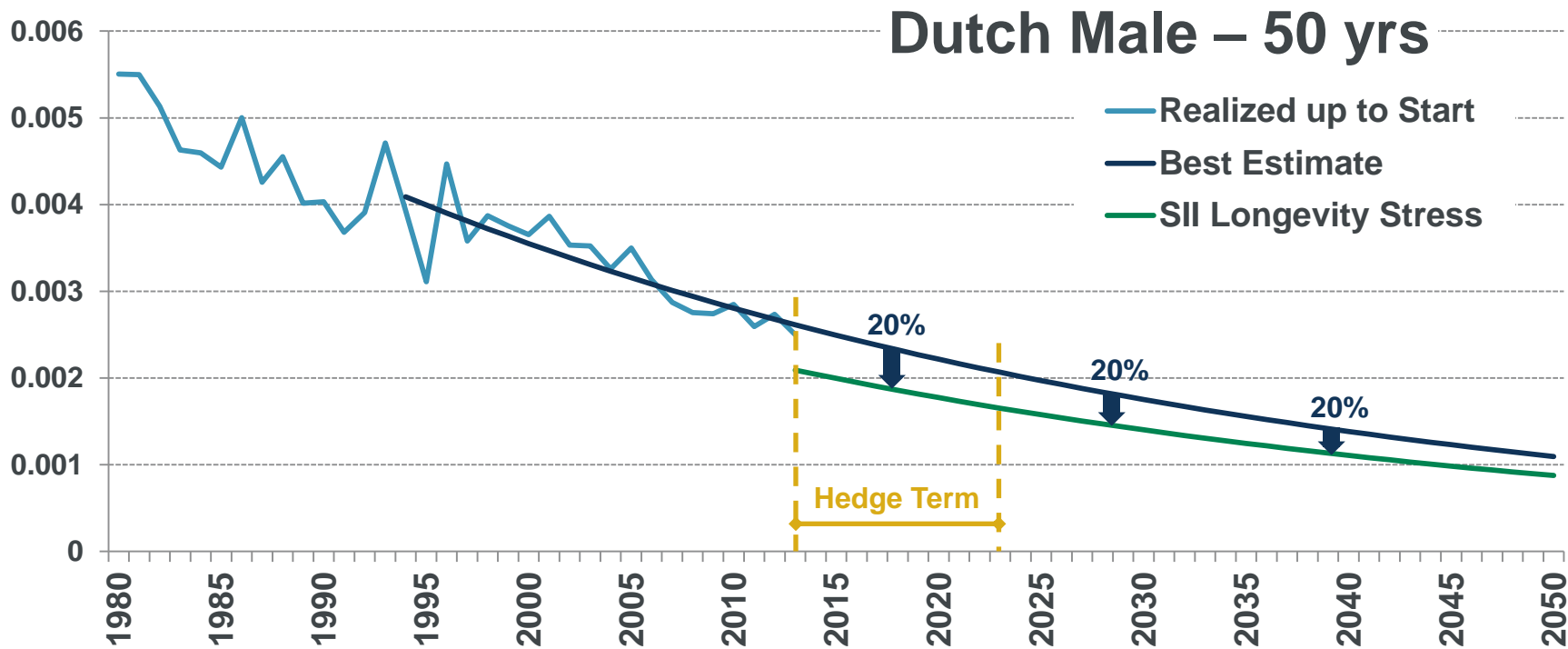
3. Assessing Capital Benefit

Numerical Example

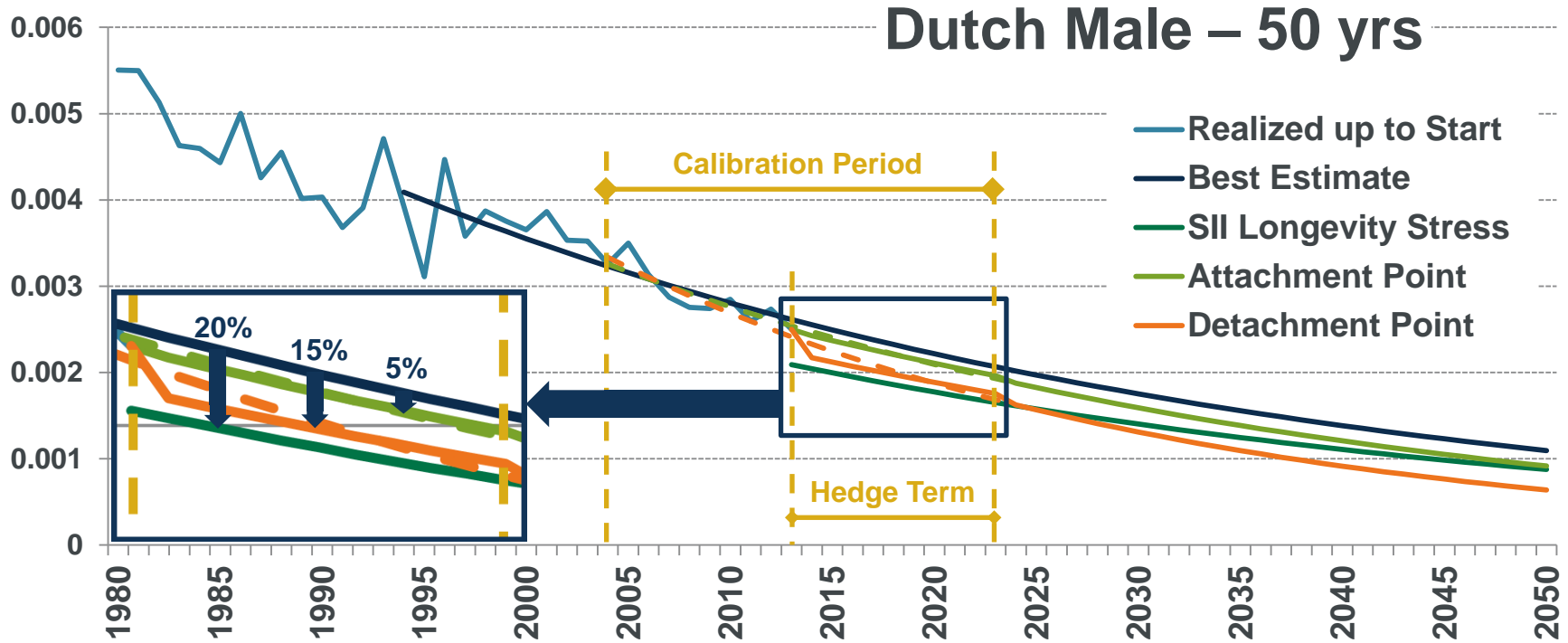
- Assess Reduction in SCR Longevity:
 - Current and Future
- Capital Motivated Longevity Solution:
 - “Longevity Shock Absorber”
 - Attaching at 5% and Detaching at 15% reduction of Best Estimates
 - 10 yr Term with 20 yr Calibration



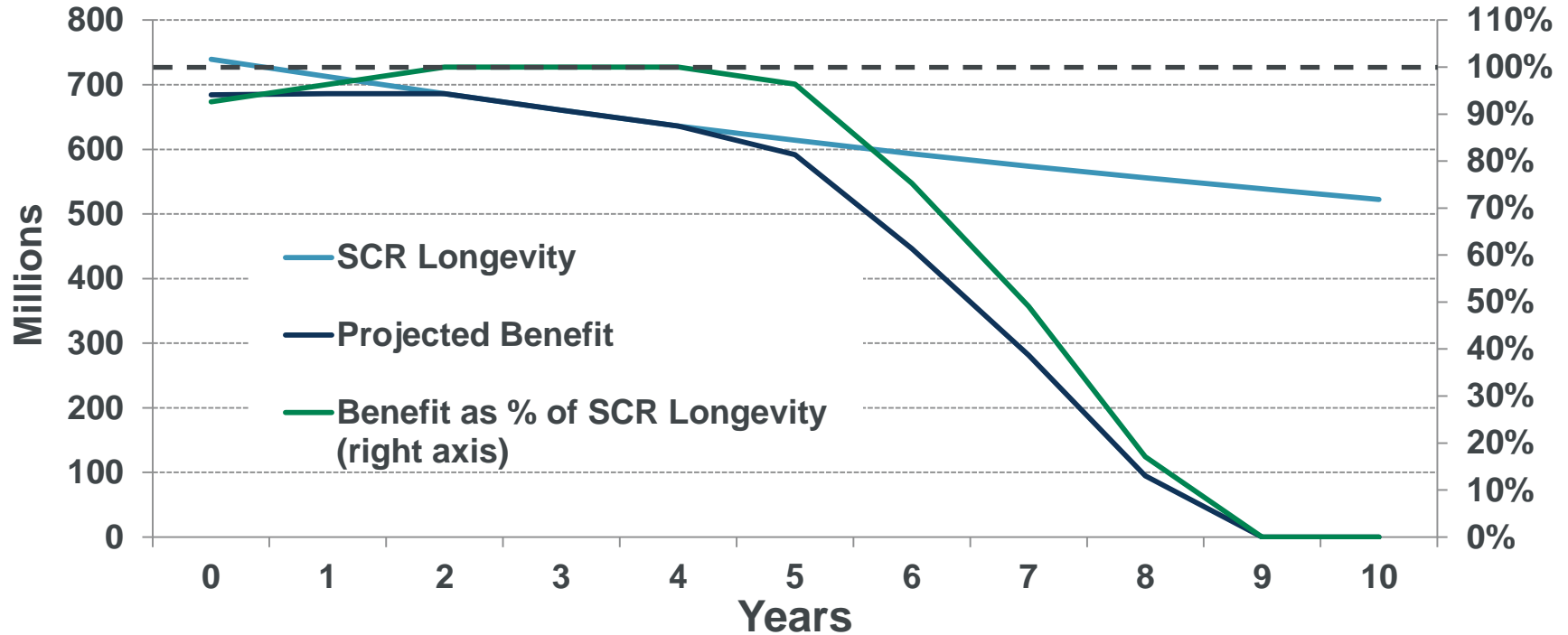
Projecting Mortality Rates



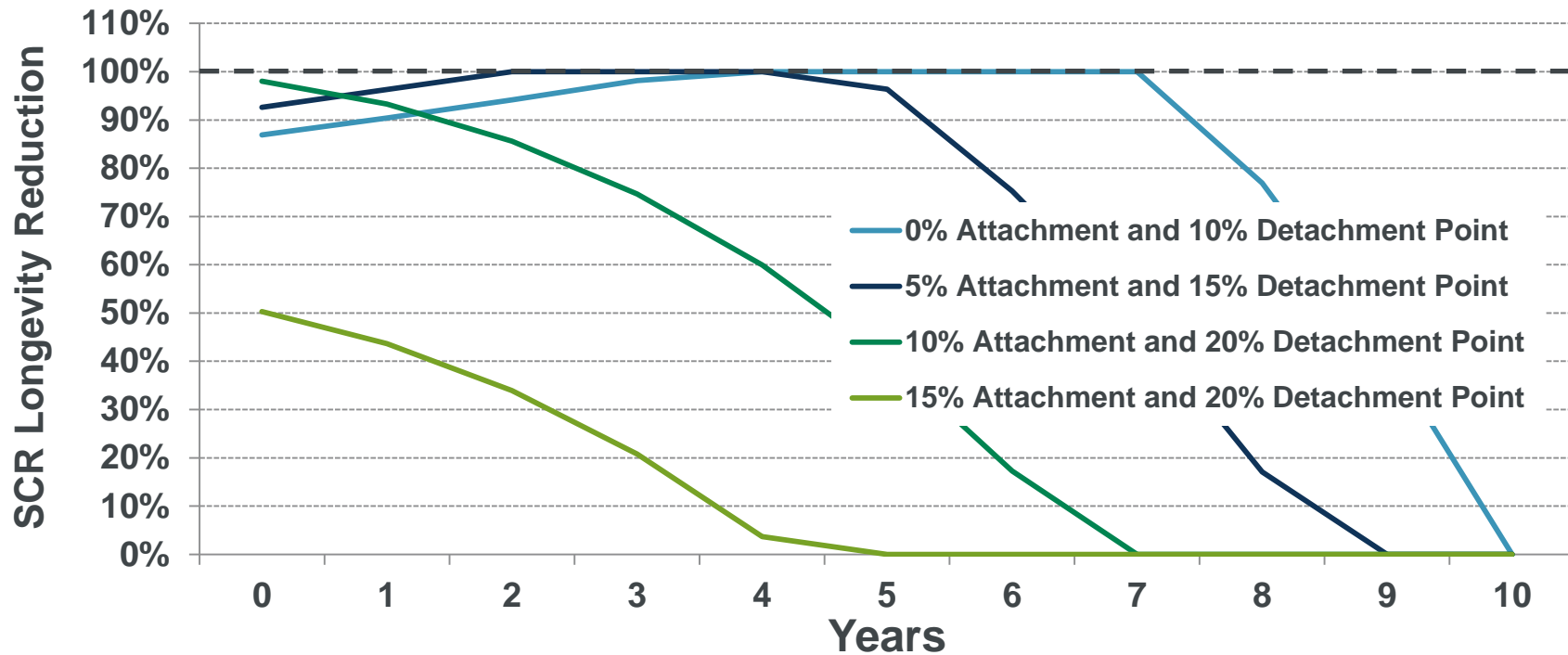
Projecting Mortality Rates (continued)



Projected Capital Relief



Different Attachment and Detachment Points





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4. Assessing Basis Risk

Basis Risk

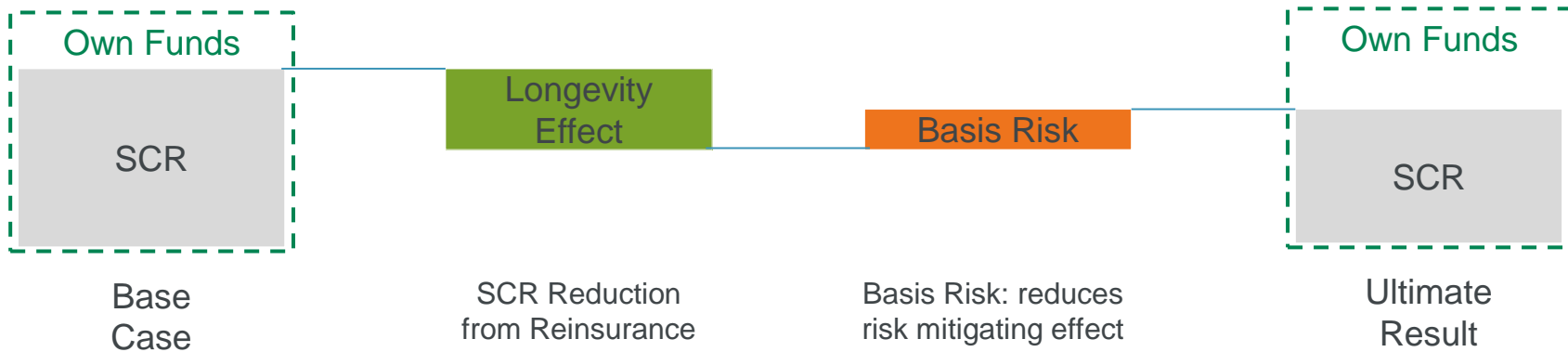
- When engaging in a longevity solution, basis risk is probably introduced because of a **difference between mortality in the portfolio and the pay-off of the derivative** that depends on general population mortality.
- Types of basis risk:
 - Structuring / structural risk
 - Sampling risk
 - Demographic risk

Basis Risk – Two Examples

- Demographic risk
 - Insured rights might change, and therefore, the portion of the underlying portfolio that is insured might change
 - Another source of basis risk: changes in assumptions
- Sampling risk
 - An example for assessing the risk – analyse the following:
 - Variance in liabilities with sampling, vs
 - Variance in liabilities with stochastic mortality (no sampling)

Assessing Basis Risk in general

- The risk mitigating effect may only be taken into account in the Solvency 2 SCR calculations if the basis risk does not lead to a material misstatement of the risk mitigating effect



Questions

Comments

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