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Longevity Indices - Is the time ripe?

Mortality & Longevity Seminar 2018

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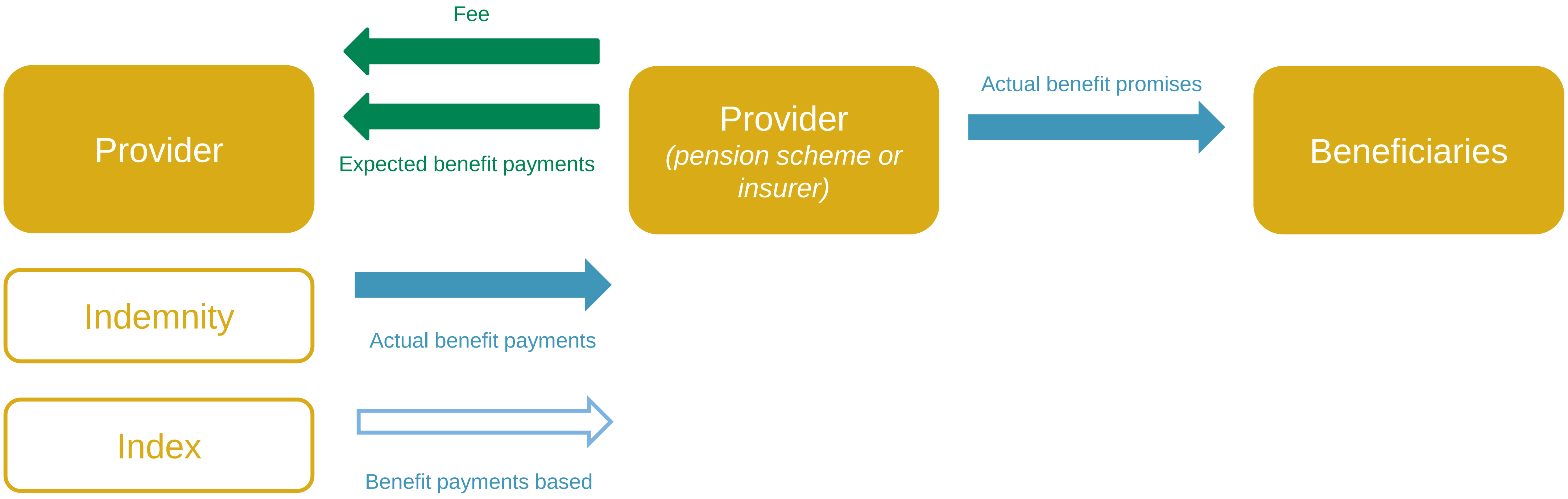
Index vs indemnity longevity swaps

A quick reminder



Fee

Provider

Expected benefit payments

Provider

(pension scheme or insurer)

Actual benefit promises

Beneficiaries

Indemnity

Actual benefit payments

Index

Benefit payments based on experience of a **reference** population, typically for limited **term**

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Index vs indemnity longevity swaps

Risk protection

	Data Risk	+	Event Risk	+	Basis Risk
	"update projections for one year of new population data"		"update projections as cure for cancer discovered"		"scheme/portfolio will not mirror population trends"
Indemnity	✓		✓		✓
Index	✓		?		✗

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Historical reflections

18 June 2018

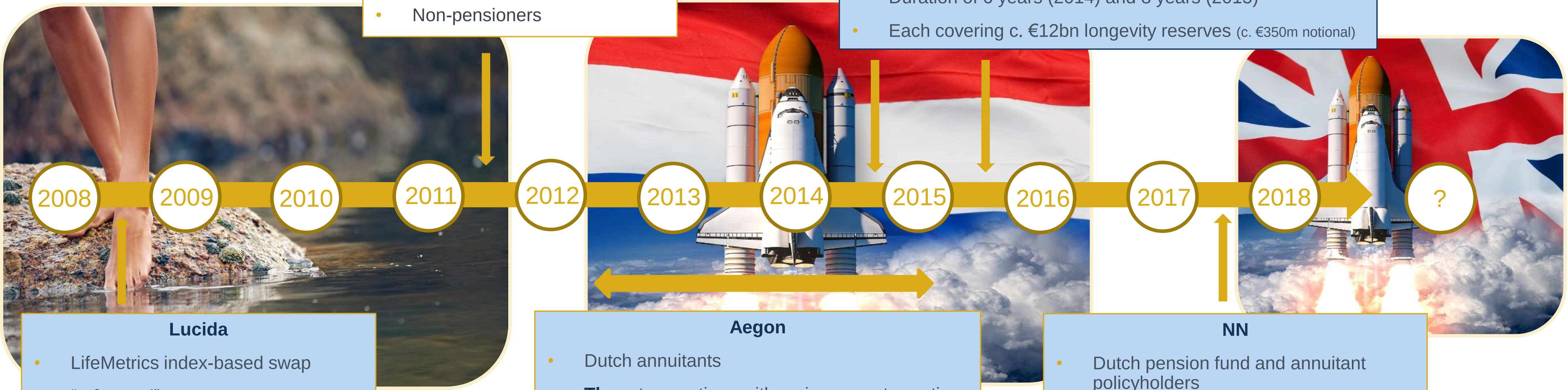
Transactions to date

Pall (UK) Pension Fund

- LifeMetrics index-based swap
- 10 year duration
- Non-pensioners

Delta Lloyd

- Dutch pensions and annuity policyholders
- **Two** transactions with **RGA**
- Duration of 6 years (2014) and 8 years (2015)
- Each covering c. €12bn longevity reserves (c. €350m notional)



Lucida

- LifeMetrics index-based swap
- “q-forward”
- First use by insurance company

Aegon

- Dutch annuitants
- **Three** transactions with various counterparties inc. SCOR and Deutsche Bank
- Covering a total of c. €20bn longevity reserves

NN

- Dutch pension fund and annuitant policyholders
- **Single** transaction with Hannover Re
- Covering c. €3bn longevity reserves

Pension schemes

Insurance companies

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Sources: Websites of Lucida, Professional pensions, Artemis & Hymans Robertson buy-ins, buyouts & longevity swaps updates. Pure longevity swaps only. Ignores Bonds e.g. Swiss Re Kortis Bond (2010) and the unsuccessful EIB/BNP Bond (2004). Also ignores swaps based on underlying experience of a specific book e.g. Aviva-RBS (2009).

Why the (UK) hiatus?

Theoretically..

Price Index swap < Price Indemnity swap

- Materially simpler to administer
  - e.g. no need for multiple parties to track members
- *Less* ‘portfolio-specific’ analysis
- Standardised contracts
- Lower barrier to entry => more competition

Reality?...

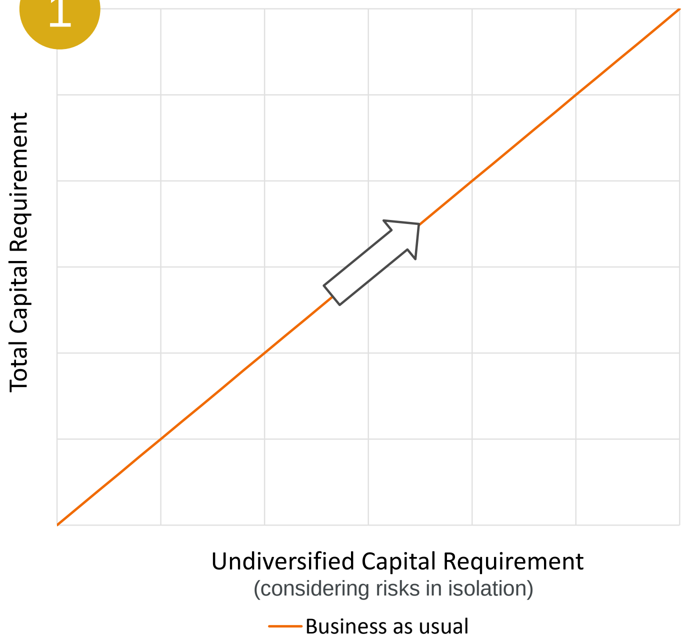
Price Index swap > Price Indemnity swap

Price Index swap *not suff* < Price Indemnity swap

- **Supply:** Additional sources of capital (e.g. capital markets) have ***higher*** return on capital requirement?
- **Supply:** Preference for indemnity? Not passing on administration savings in pricing?
- **Demand:** Risk-reward dynamic – saving from index not ***sufficient*** to compensate for retaining some risk

Writing longevity for "better than free"

1



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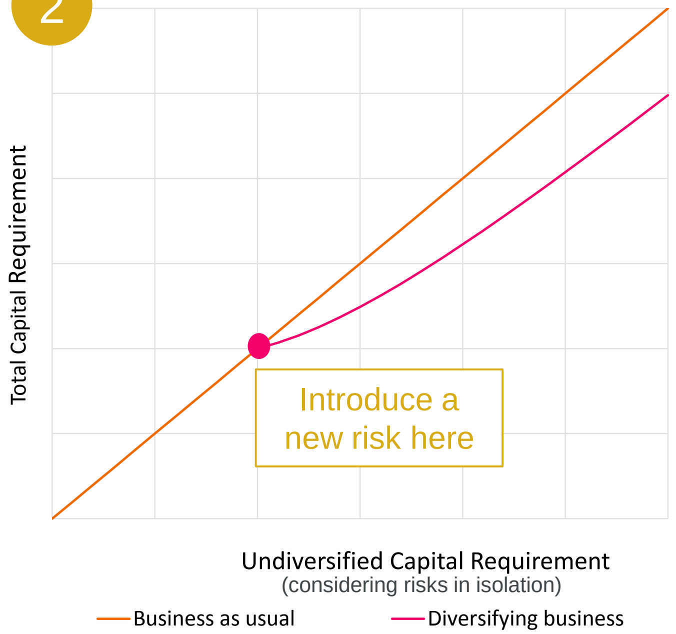

- If an insurer writes one risk only then ever additional unit of business costs the same in overall **(total)** capital (1)
- Adding a new, **different** risk introduces **diversification** and is capital efficient (less capital per unit of extra business) (2)

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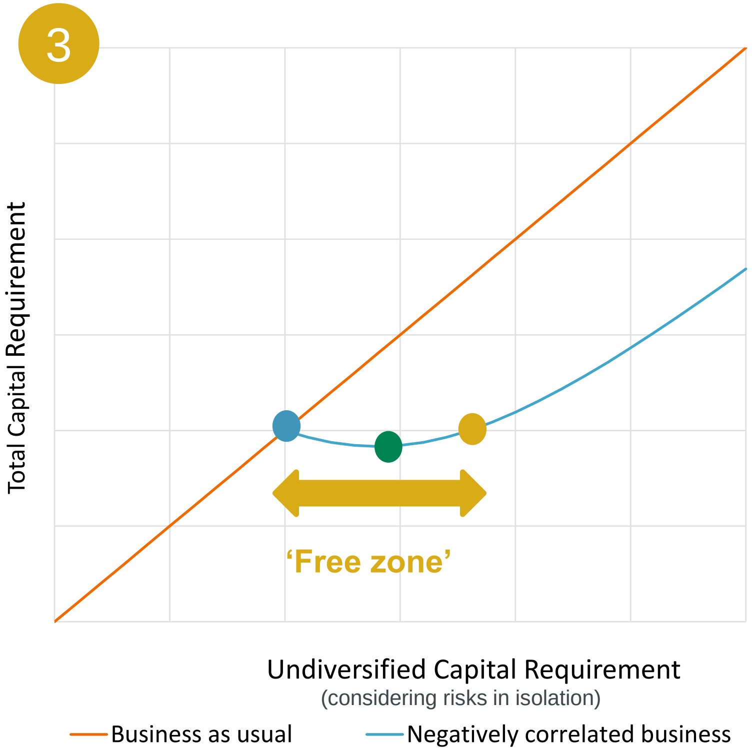
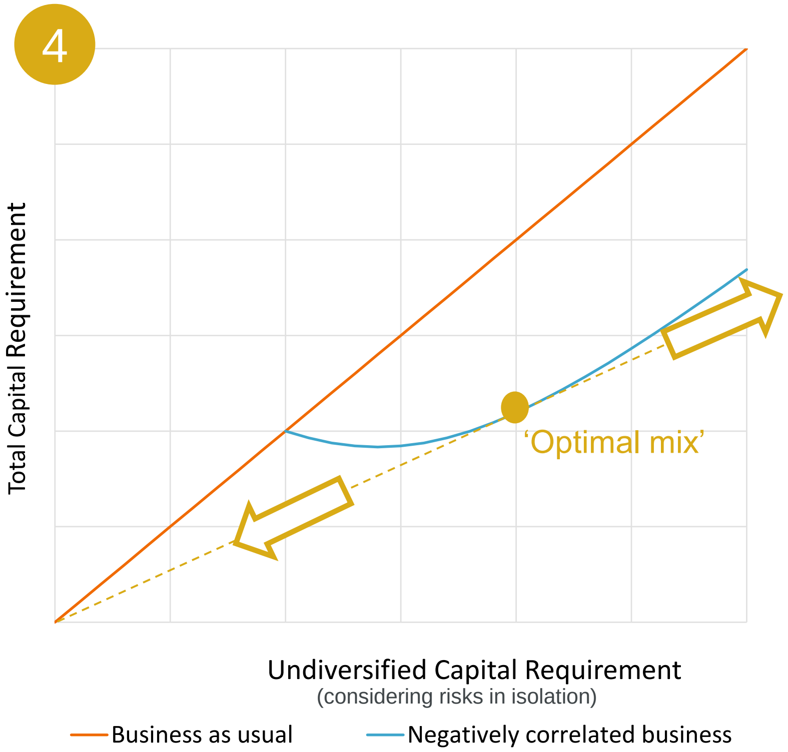
Source: Original graphics produced by presenter for chapter on longevity risk in the Palgrave Handbook of Unconventional Risk Transfer

Writing longevity for “better than free”





- For a **negatively correlated risk** it is possible capital reduces – e.g. reinsurers with lots of mortality risk (life insurance) pricing for longevity (3)
- Will reach an **optimal** mix of business between risks (4)
  - Reinsurer constrained to maintaining this mix
  - New entrants (light on longevity, heavy on mortality) are able to offer better prices (all else being equal)

Source: Original graphics produced by presenter for chapter on longevity risk in the Palgrave Handbook of Unconventional Risk Transfer

Why indemnity not index?

To date…	Looking forward
Cedant demand *(‘get me out of here…’)*	Cedant demand changing (deferreds, ‘trickier’ indemnity cases, tail risk protection…)
Lack of confidence in index	*Growing* body of work showing hedge effectiveness
Plenty of cheap (mortality) capital to support indemnity	*Reducing* (mortality) capital to support indemnity
Suppliers have systems for, or were willing to create systems, for managing indemnity	Can existing systems cope with changing demands e.g. deferred pensioners? New entrants less willing to invest in indemnity systems / upskilling?

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Triggers for the UK index market

What will it take for the UK index market to take off?

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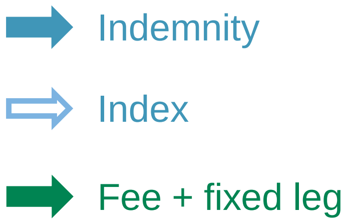
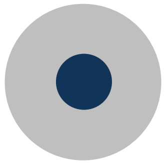
The longevity "ecosystem"

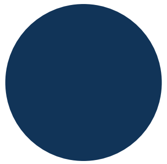
Now





Global mortality risk market can ***potentially*** support 'diversification benefit' for *c.* 100% of **UK** longevity risk (currently)

Source: Own high-level and preliminary calculations based on estimated size of global mortality risk protection market and typical capital holdings against mortality risk per £ of sum assured. SCR only, no allowance for risk margin. No allowance for growth in global life market. Assumes global applicability of SII, standard formula level stresses for mortality risk and 'typical' internal model stresses for longevity.

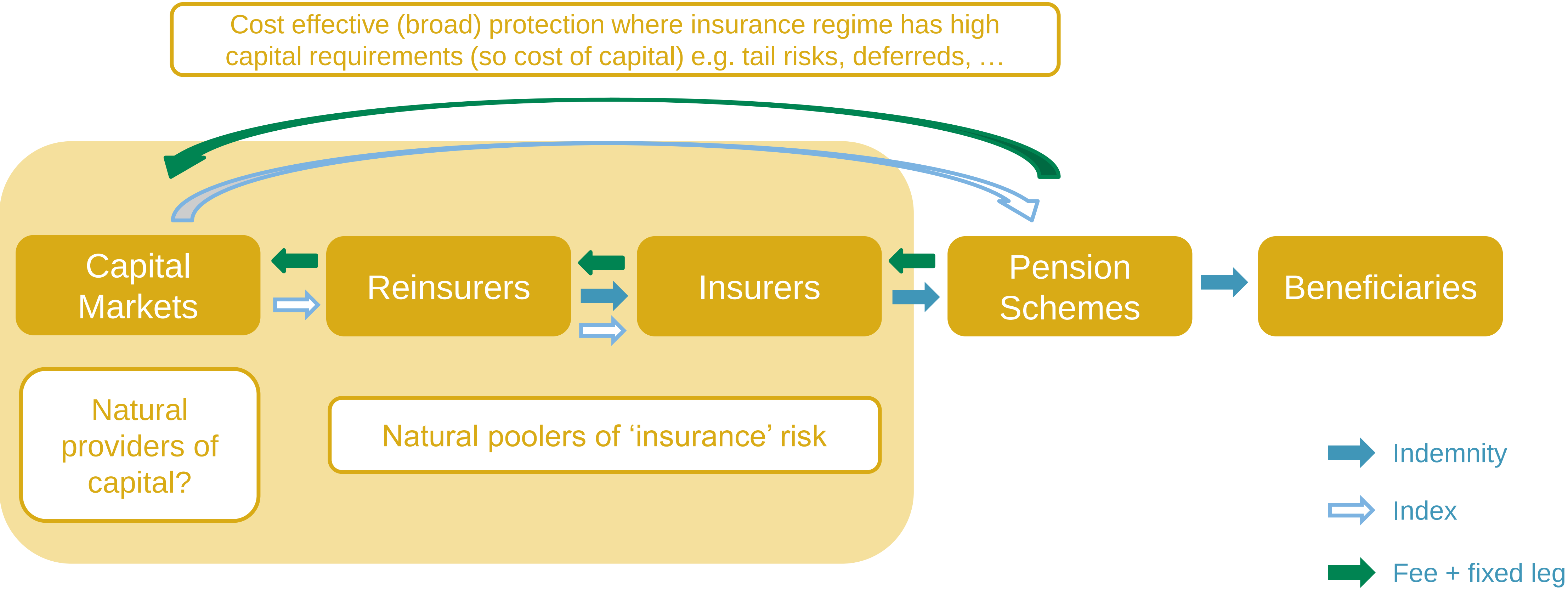


c.£2trn+ of private sector pension liabilities exposed to longevity risk

Source: Still Living with Mortality: The longevity risk Transfer Market after One Decade, Blake et al

The longevity "ecosystem"

Future?



Cost effective (broad) protection where insurance regime has high capital requirements (so cost of capital) e.g. tail risks, deferreds, …

Capital Markets

Reinsurers

Insurers

Pension Schemes

Beneficiaries

Natural providers of capital?

Natural poolers of 'insurance' risk

Indemnity

Index

Fee + fixed leg

Achieving index cheaper than indemnity

	Price Indemnity ↑	Price Index ↓
Demand	• Smaller schemes • Deferred pensioners • ‘Difficult’ cases	• Increased confidence in level of risk protection
Supply	• Less capital available • Less mortality diversification benefit	• Regulatory enthusiasm • New (broader) entrants • Attractive to capital markets

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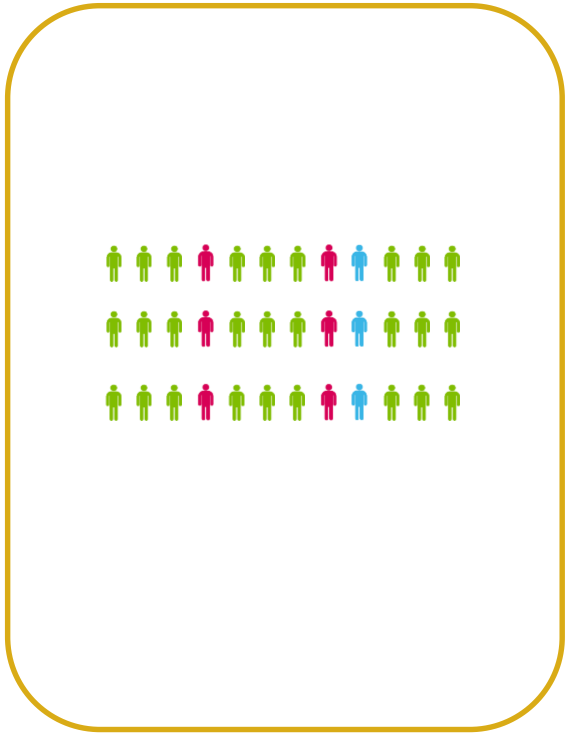
Overcoming the final hurdles…

- Value for money – risk reduction
- Term matters – attraction to capital markets
- Regulatory appetite

Value for money: Basis risk

Population Index

Portfolio



Basis Risk

- Population indices **equally weight each person**
- Specific portfolios have
  - Greater exposure to *binomial risk*
  - Different socio-economic mix to population
  - Unequal mix of ***liability*** exposure
- Portfolio experience will differ from the index
- How much less than 100% ‘hedge’?

2010-2015: A case in point

Group	**Annualised mortality improvement (age-standardised)**
	2010-2015
England & Wales	1.1% (±0.1%)
Club Vita	1.3% (±0.4%)
Comfortable	**2.1% (±0.7%)**
Making-do	**0.9% (±0.6%)**
Hard-pressed	**1.0% (±0.6%)**

70% liabilities
(typically)

Source: Club Vita & PLSA ‘Longevity Trends: One Size Fits All’

Note that Comfortable / Making Do / Hard-Pressed evenly split on lives basis. Average 5 year improvement on a liability weighted basis c. 1.7%.

Value for money: How much basis risk?

Longevity Hedging 101
Coughlan et al

2011

>80%

- Industry level (v.large portfolio)
- Liability hedge
- 10 year horizon

Towards an Industry Standard…
LBR Phase 1 report

2014

65-80%

- Portfolio level
- Survival rates hedge
- 10 year horizon

Longevity Basis Risk Phase 2 report

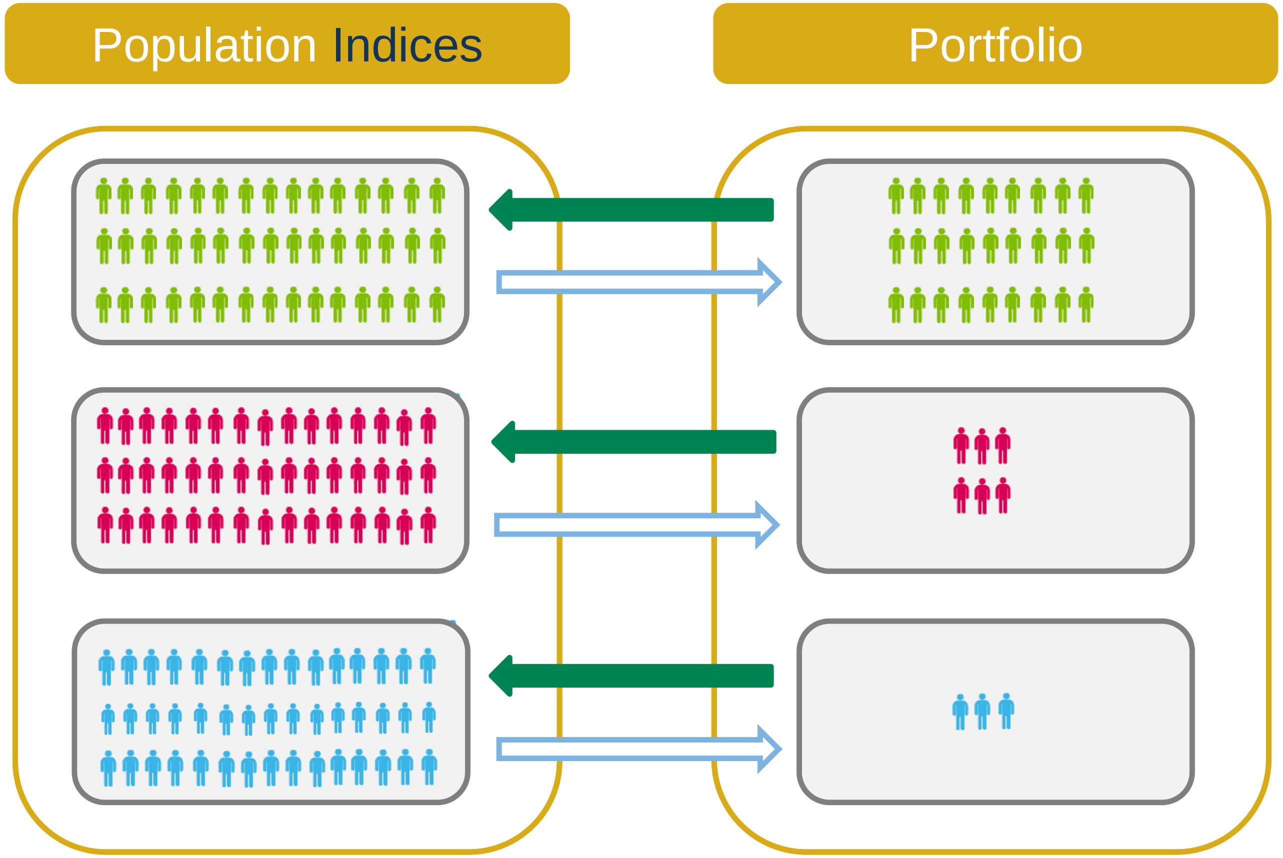
2017

50-80%

- Portfolio level
- Variety of metrics
- Run-off basis

Lower bound reflects inclusion of materially smaller portfolios

Value for money: Narrowing the gap



Club Vita
Forthcoming, Longevity 14

80% - 90%?

- Portfolio level
- Variety of metrics

** Very early indications of potential results range for large portfolios. Subject to detailed review and stress testing of modelling.*

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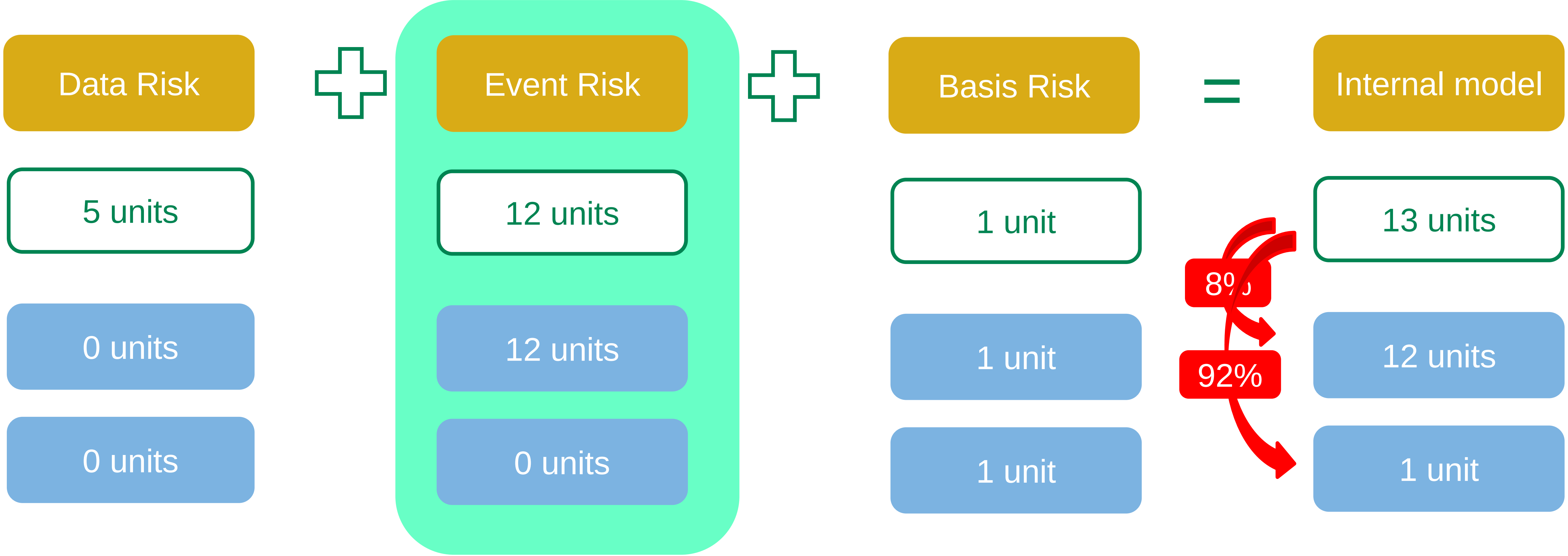
Value for money: One year VaR / Solvency II



Data Risk	+	Event Risk	+	Basis Risk	=	Internal model
5 units		12 units		1 unit		13 units
0 units		12 units		1 unit		12 units
0 units		0 units		1 unit		1 unit

Technical notes:

Indicative relative sizes of event and data based upon analysis of PRA Quantitative Indicators in “Making the most of an Internal Model” presented to Risks in Life, 2 February 2017. Firms individual internal models will give different weights to these risks, may include other risks, and may have a different definition of event risk. Inclusion of Basis Risk is an addition to the PRA QIs. Aggregate risk level assumes an independence of risk for simplicity. This may differ from Firms’ internal models and from PRA application of QIs.

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Attractive to Capital Markets: Term matters

Cap Markets

Risk Cedant

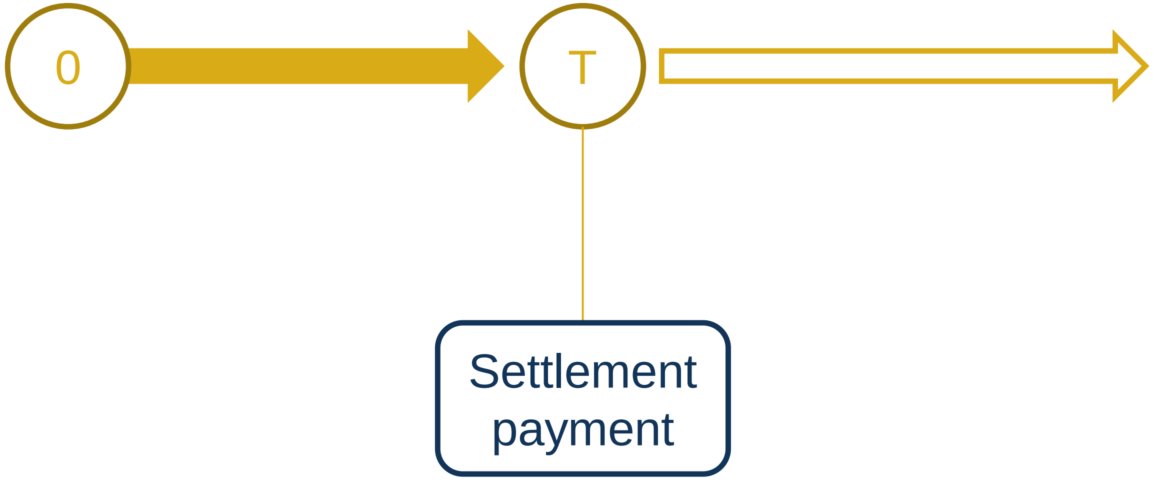
Short
2-5 yrs

Long
30+ yrs

- Credit Crunch
- Basel III
- “Anti-exoticism”

- Removal of risk
- Indemnity benchmark

Attractive to Capital Markets: Meeting in the 'middle'?



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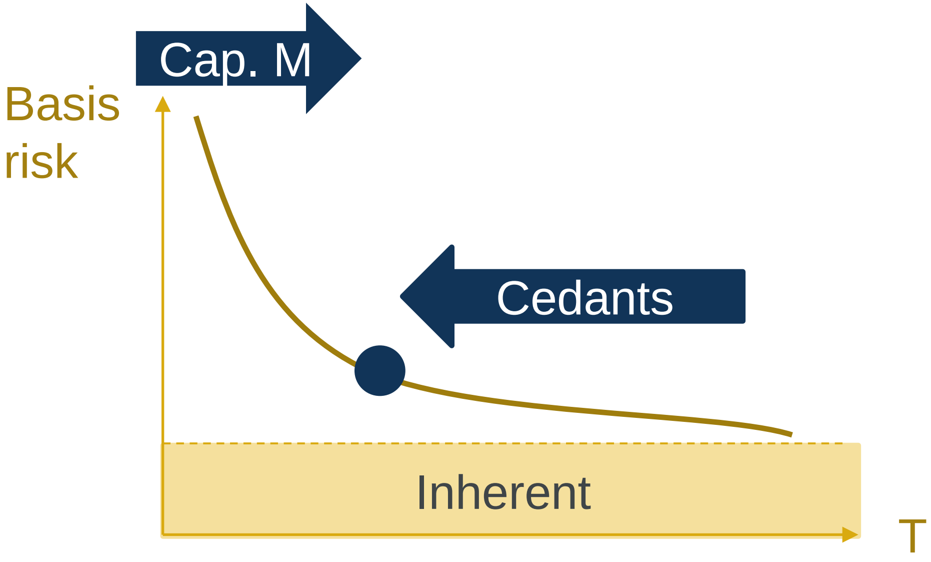
Settlement payment



Cap. M

Basis risk

Cedants

Inherent

T

- Formulaic
- Assesses 'anticipated' deviation post time T, based on experience up to time T

Source of additional 'basis risk'

- Take PV to get a settlement "bullet" payment at time T

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Regulatory Enthusiasm / Challenges

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Summing up

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Longevity indices – is the time ripe?

- ? Do you think we will we ever see a (material) UK longevity index market?
- ? Will it be based on population indices or something more granular?
- ? How long will it take for the first 3 index deals in the UK?

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Questions

Comments

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