Index vs indemnity longevity swaps
A quick reminder

Provider (pension scheme or insurer)

- Fee
- Expected benefit payments
- Actual benefit promises

Provider (pension scheme or insurer) to Beneficiaries

- Actual benefit payments

Beneficiaries

- Index
  - Benefit payments based on experience of a reference population, typically for limited term
- Indemnity

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Institute of Actuaries

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Index vs indemnity longevity swaps
Risk protection

“update projections for one year of new population data”
“update projections as cure for cancer discovered”
“scheme/portfolio will not mirror population trends”

Data Risk
Event Risk
Basis Risk

Indemnity
Index
Historical reflections
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

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/SNP 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

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

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

- Will reach an **optimal** mix of business between risks
  - Reinsurer constrained to maintaining this mix
  - New entrants (light on longevity, heavy on mortality) are able to offer better prices (all else being equal)
Why indemnity not index?

To date…

• Cedant demand (‘get me out of here…’)

• Lack of confidence in index

• Plenty of cheap (mortality) capital to support indemnity

• Suppliers have systems for, or were willing to create systems, for managing indemnity

Looking forward

• Cedant demand changing (deferreds, ‘trickier’ indemnity cases, tail risk protection…)

• Growing body of work showing hedge effectiveness

• Reducing (mortality) capital to support indemnity

• Can existing systems cope with changing demands e.g. deferred pensioners?

• New entrants less willing to invest in indemnity systems / upskilling?
Triggers for the UK index market
What will it take for the UK index market to take off?
The longevity “ecosystem”

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.

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The longevity “ecosystem”

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

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Achieving index cheaper than indemnity

Price Indemnity ↑
- Smaller schemes
- Deferred pensioners
- ‘Difficult’ cases
- Less capital available
- Less mortality diversification benefit

Price Index ↓
- Increased confidence in level of risk protection
- Regulatory enthusiasm
- New (broader) entrants
- Attractive to capital markets

Demand
Supply

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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**
  - Equally weight each person

- **Portfolio**
  - Greater exposure to binomial risk
  - Different socio-economic mix to population
  - Unequal mix of liability exposure

- **Basis Risk**
  - Portfolio experience will differ from the index
  - How much less than 100% ‘hedge’?

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## 2010-2015: A case in point

<table>
<thead>
<tr>
<th>Group</th>
<th>Annualised mortality improvement (age-standardised)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010-2015</td>
</tr>
<tr>
<td>England &amp; Wales</td>
<td>1.1% (±0.1%)</td>
</tr>
<tr>
<td>Club Vita</td>
<td>1.3% (±0.4%)</td>
</tr>
<tr>
<td>Comfortable</td>
<td>2.1% (±0.7%)</td>
</tr>
<tr>
<td>Making-do</td>
<td>0.9% (±0.6%)</td>
</tr>
<tr>
<td>Hard-pressed</td>
<td>1.0% (±0.6%)</td>
</tr>
</tbody>
</table>

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

Towards an Industry Standard…
LBR Phase 1 report

Longevity Basis Risk Phase 2 report

2011
>80%
- Industry level (v.large portfolio)
- Liability hedge
- 10 year horizon

2014
65-80%
- Portfolio level
- Survival rates hedge
- 10 year horizon

2017
50-80%
- Portfolio level
- Variety of metrics
- Run-off basis
Lower bound reflects inclusion of materially smaller portfolios

Final hurdles
Narrowing the gap

Value for money:

Population Indices

Portfolio

- Portfolio level
- Variety of metrics

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

Club Vita
Forthcoming, Longevity 14

2018

80% - 90%?
Value for money: One year VaR / Solvency II

Data Risk

5 units
0 units
0 units

Event Risk

12 units
12 units
0 units

Basis Risk

1 unit
1 unit
1 unit

Internal model

13 units
12 units
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.
Attractive to Capital Markets: **Term matters**

- **Cap Markets**
  - Credit Crunch
  - Basel III
  - “Anti-exoticism”

- **Risk Cedant**
  - Removal of risk
  - Indemnity benchmark

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Attractive to Capital Markets: Meeting in the ‘middle’?

- Formulaic
- Assesses ‘anticipated’ deviation post time T, based on experience up to time T
- Take PV to get a settlement “bullet” payment at time T

Source of additional ‘basis risk’
Regulatory Enthusiasm / Challenges
Summing up
Longevity indices – is the time ripe?

Do you think we will 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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