

**Biennial Convention 2009**

**Go for Gold**

**19–22 April 2009 • Sydney**



Institute of Actuaries of Australia



# **Longevity Derivatives**

**Illustrating a “New” Approach to Investing**

**Zac Roberts**



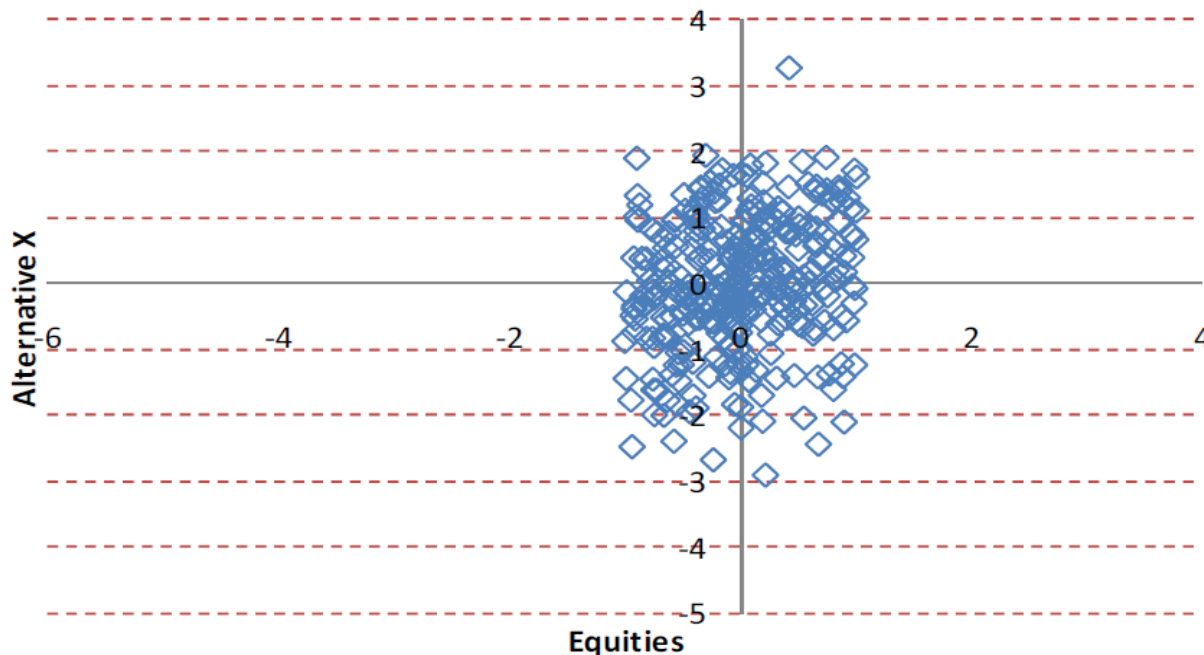
## Contents

- 1. Risk Premia: A “New” Approach to Investing**
2. Longevity as an Asset Class
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4. Discussion



## How correlation behave 1

**X is a great diversifier for my portfolio**



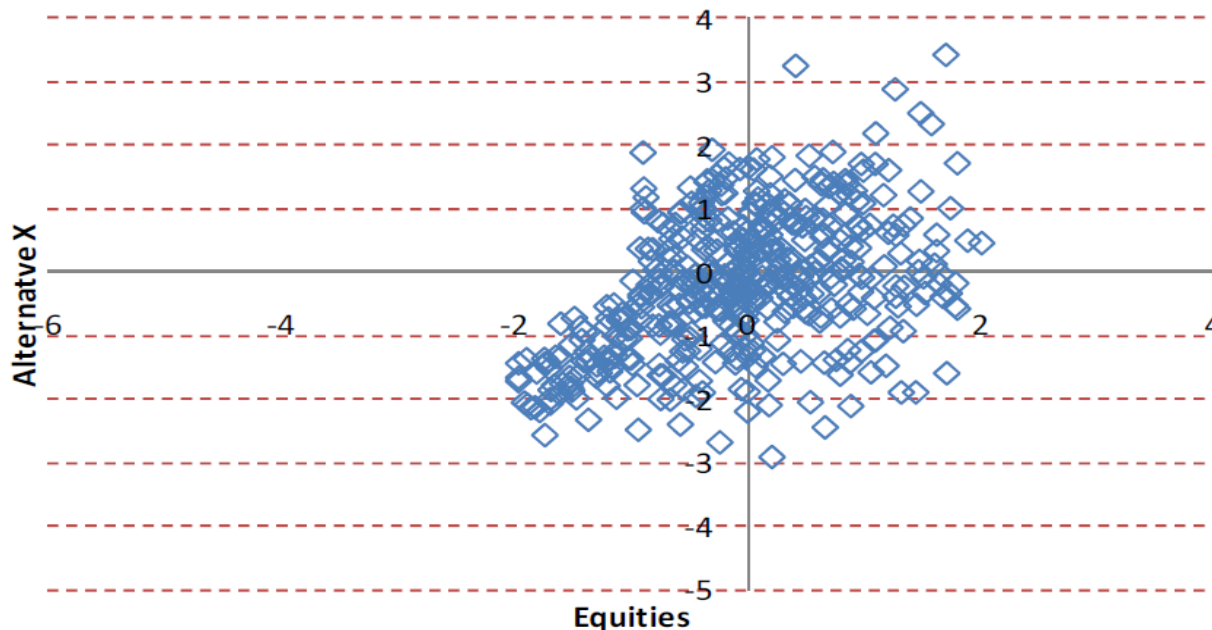
Within -1 to +1 standard deviations the two assets seem uncorrelated

Source: *International keynote address: The role of Alternatives in asset allocation strategies*, Erik Valtonen, Chief Investment Officer, AP3, Sweden, Terrapinn Asset Allocation Summit, February 2009



## How correlation behave 2

**X is a good diversifier for my portfolio**

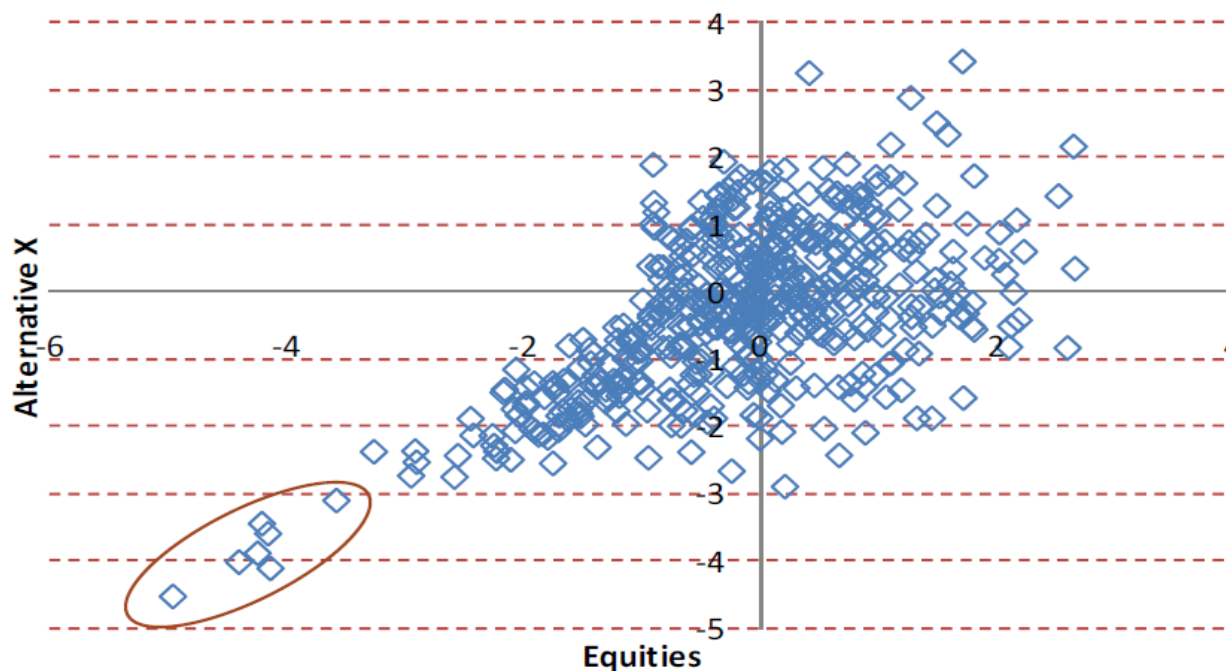


Some dependency in the more negative outcomes



## How correlation behave 3

Oh my!

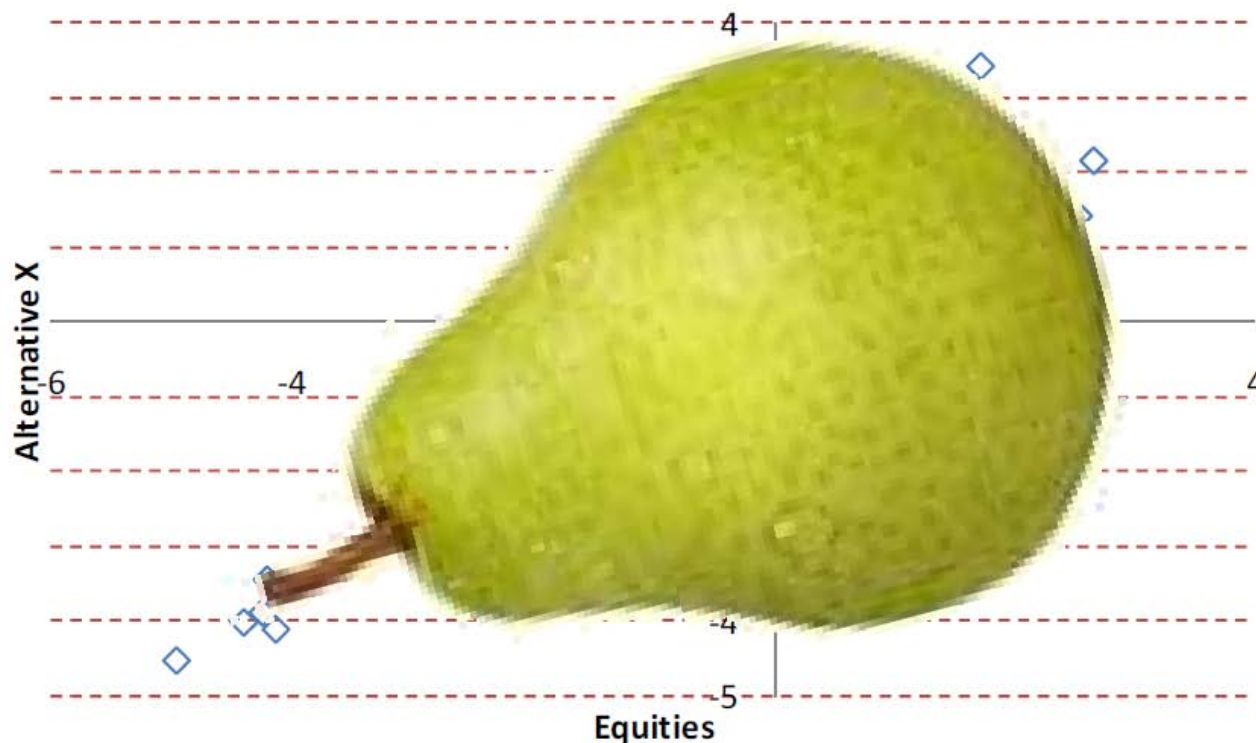


Until we find the Murphy's island



## How correlation behave 4

It's all gone pear-shaped



Source: *International keynote address: The role of Alternatives in asset allocation strategies*, Erik Valtonen, Chief Investment Officer, AP3, Sweden, Terrapinn Asset Allocation Summit, February 2009



## Traditional “Alternative” Assets

Private Equity  
Infrastructure  
Hedge Funds

Why have my  
alternative assets  
not performed as  
expected?





## Traditional “Alternative” Assets

Private Equity  
Infrastructure  
Hedge Funds

Aha!  
My alternative  
assets have  
performed exactly  
as expected.



Equity Risk Premium

Debt Risk Premium

Liquidity Risk Premium

Property Risk Premium

Funding Risk Premium

Interest Rate Term Risk Premium





## Understanding Risk Premia is Key

- “A risk premium is payment received over and above the risk-free rate as compensation for putting capital at risk
- Asset classes are aggregates of several risk premia and recent market turbulence has highlighted that the mainstream asset classes of equities, credit and property are all fundamentally linked to the same risk factor – corporate earnings
- When the investment universe is viewed as a selection of premia, it forces investors to recognise that risk has little to do with when times are ‘normal’ but everything to do with when something unusual and out of the ordinary occurs
- Over the next 10 years there will be an increased focus on risk premia and finding more cost-effective ways of accessing both traditional and alternative premia”

Source: *Back to the basics – risk premia and alternative beta*,

Simon O’Grady, Global Premia, Tyndall Investment Management, January 2009



## Benefits of Risk Premia Focus

- “When an investor focuses on risk premia as the portfolio building blocks it can deliver a number of benefits:
  1. Makes investors highly risk aware and prompts them to first ask the question: “where is the risk coming from?”
  2. Makes investors explicitly examine the premium they are paid for each particular risk and whether that premium is high enough.
  3. Highlights the fact that risks are like insurance premia and are ‘fat tailed’.
  4. Provides a framework in which to evaluate the performance of all investments and identify other valuable non-traditional risk premia.”
  
- Main role for a fund manager should be to understand the risk premia available and adjust the fund’s exposure to each risk premia over time

Source: *Back to the basics – risk premia and alternative beta*,

Simon O’Grady, Global Premia, Tyndall Investment Management, January 2009



## Demystifying the Market Timing Objection: 1



***“I thought that Sticking to a Long-Term Strategic Asset Allocation was the only way to invest”***

- So, are you saying that I should hold basically the same proportion of my assets in fixed income regardless of whether interest rates are 2% or 12%?
- Also, are you saying that I should hold basically the same proportion of my assets in equities regardless of whether they are trading at a P/E ratio of 25 or 10?
- If equity P/E ratios mean-revert and the long-term equity risk premium is constant, surely the medium term expectation must be different at such vastly different P/E ratios
- What about considering credit as an alternative way of accessing the equity risk premium?





## Demystifying the Market Timing Objection: 2



*“Maybe you’re right, but surely it is too difficult to consistently add value over the long-term through market timing”*



- **Active Equity Management:** Adjusting your allocation between different equities based on an assessment of the relative value of the equities available
- **Active Risk Premia Management:** Adjusting your allocation between different risk premia based on an assessment of the relative value of the risk premia available
- **The Same Thing:** But there is much more scope to add value with active risk premia management as the differences between risk/return of the risk premia are greater



## A “New” Approach to Investing

1. Understand your liabilities or investment objective and your risk appetite
2. Understand the range of risk premia available
3. Determine your desired mix of these risk premia, looking at both the asset and the liability side of your balance sheet
4. Determine the best way of gaining access to each risk premia
5. Investigate whether any form of down-side protection can be incorporated economically, considering both your asset and your liability risks
6. Review and adjust your mix of risk premia frequently





## Benefits of the “New” Approach



Maybe we can  
avoid the trillion \$  
superannuation  
mis-selling  
scandal

1. Asset class allocation decisions would be made by those most capable of making them
  - a. Presently, investment managers focus on delivering performance within an asset class
  - b. The selection of asset classes is left to individuals, sometimes with help from a financial planner
  - c. Where can the most value be added?
  - d. Who is most qualified to make this decision?
2. Huge opportunity for the funds management industry to deliver what they believe investors want
  - a. Many balanced funds say they target “inflation + x% over the medium term” but do nothing of the sort



## This is Happening !!!

- A few weeks ago I was talking to a large super fund
  - Return objective:  $\text{CPI} + x\%$  (over  $y$  year rolling periods)
  - No specific risk tolerance
- I asked about their preferred investment approach:
  - Achieve returns consistent with a balanced asset mix (and roughly consistent with your peers) and hope that this is greater than  $\text{CPI} + x\%$
  - Achieve returns of  $\text{CPI} + x\%$  with the lowest possible risk

Response:

- “I think you have answered your own question in a way.
- A sensible investor would be looking to achieve returns of  $\text{CPI} + x\%$  at the lowest risk.
- An investor that achieves returns roughly consistent with its peers while trying to achieve  $\text{CPI} + x\%$  as you say is the approach taken by most Super Funds (including ours).
- **One approach is where we should be heading, the other is where we are.”**



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**2. Longevity as an Asset Class**

3. Managing Longevity Risk

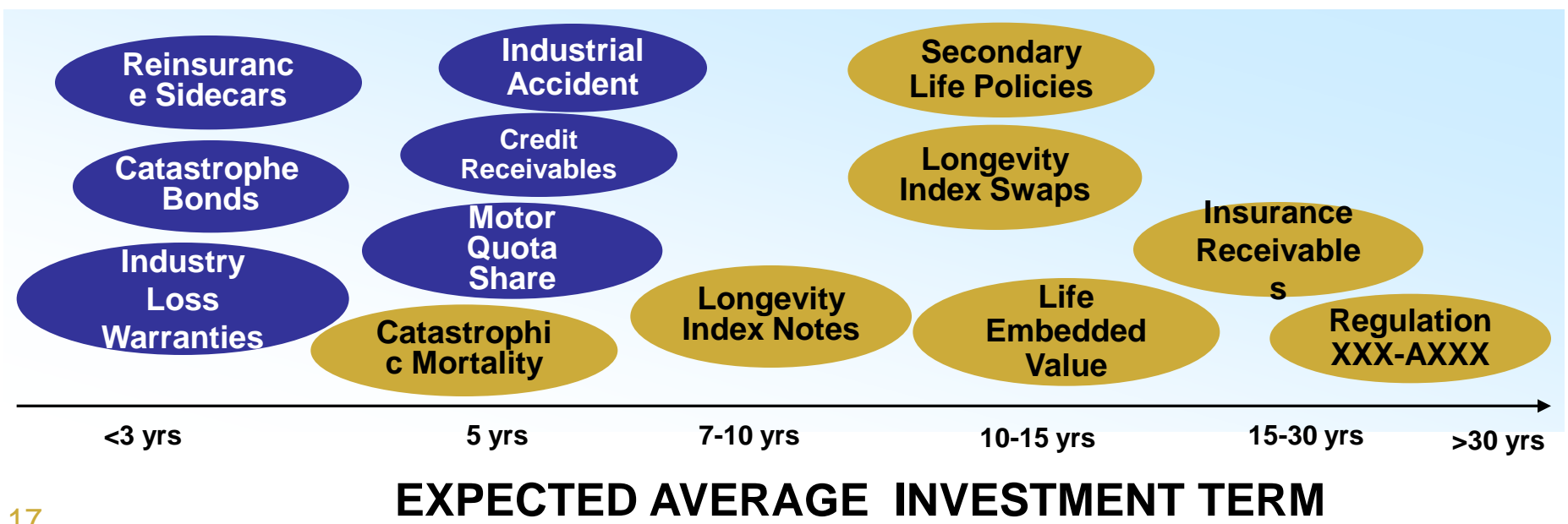
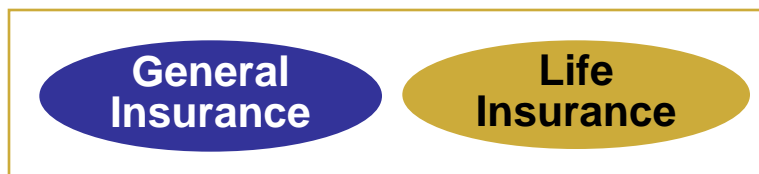
4. Discussion





## Universe of Insurance-Linked Securities

Longevity-linked products are part of the larger **Insurance-Linked Securities (ILS)** sector that has seen **increasing volumes and diversity** in the types of risks being accepted by a **wider range of capital markets investors**





## Drivers of Returns for Longevity-Linked Transactions

Low

EXPECTED RETURN

High

Catastrophic Mortality

Securitisation, e.g. Embedded Value

Life Insurance Policy Based Investments

**Capital savings** achieved by the reinsurer that issues the bond

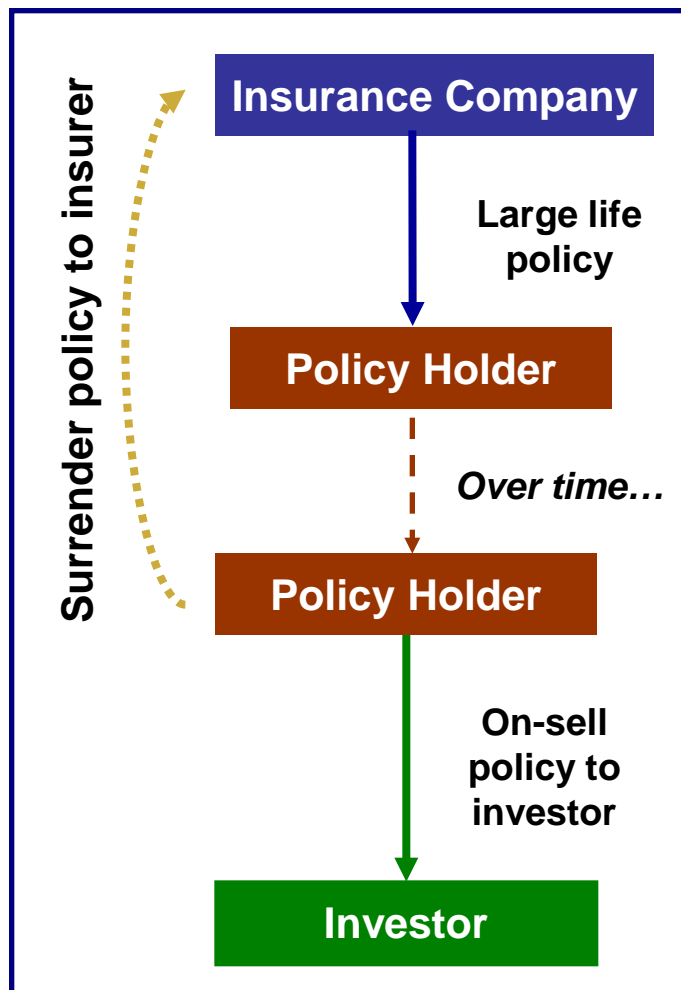
**Funding** provided to the insurer from the fact that these instruments monetise an insurer's intangible assets

**Economic and information asymmetry** created by low surrender values offered by life insurers on life insurance policies

A life office would typically offer the insured around **4 per cent** of face value if they chose to surrender the policy, whereas buyers in the second hand market are willing to pay around **30 per cent**



## Longevity Risk Premium for Policy Based Investments

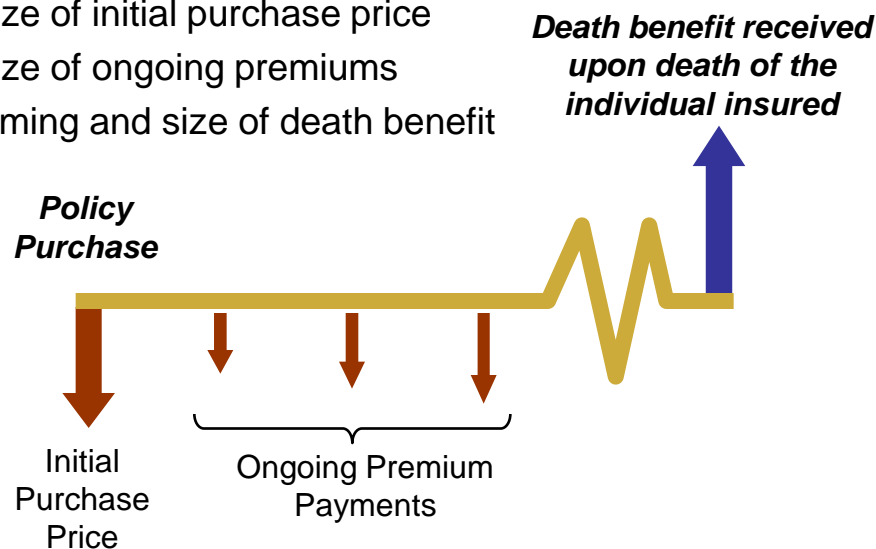


- Investor becomes the owner and beneficiary of the life insurance policy

- Investor pays an upfront amount to purchase a policy
- Investor pays regular premiums on the policy
- Investor receives policy proceeds upon death of the insured

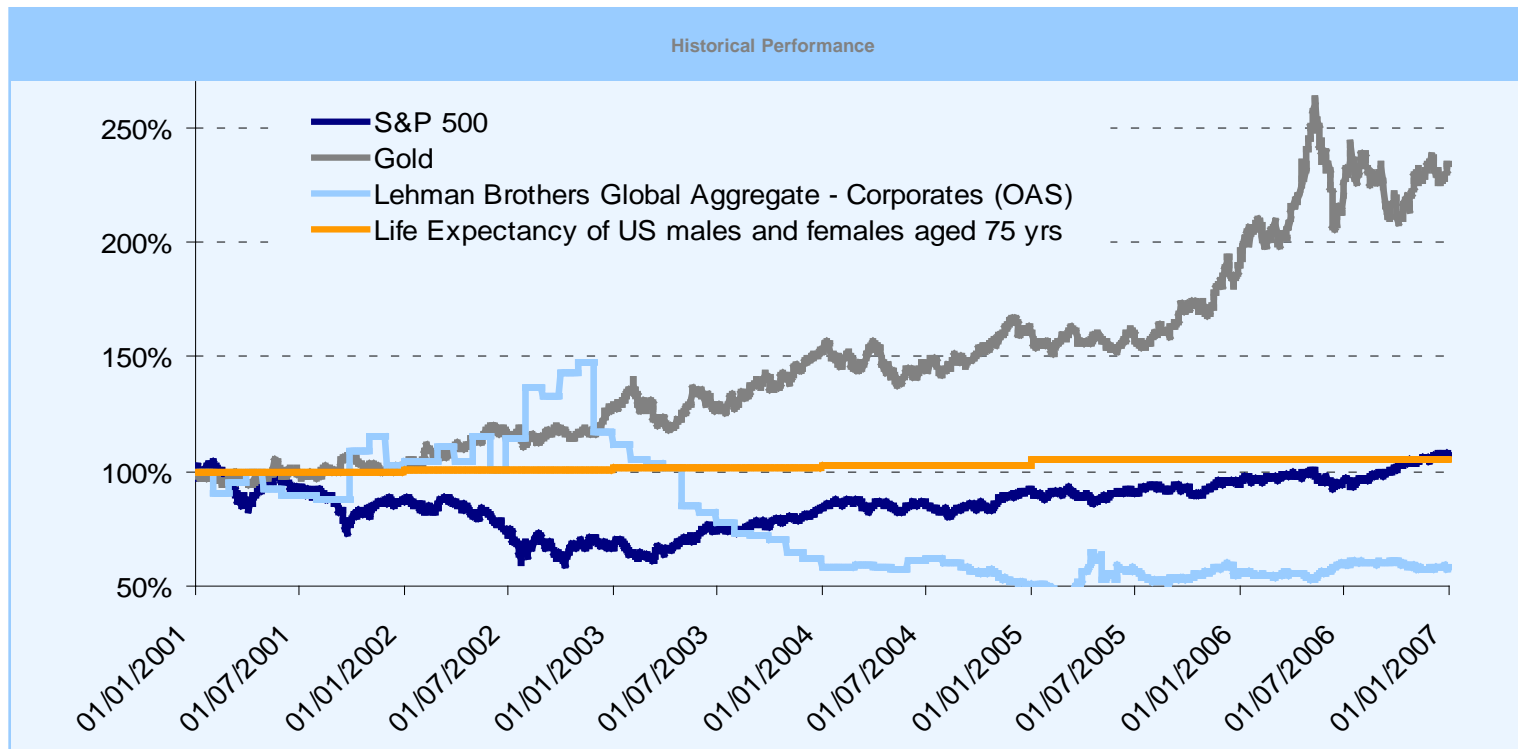
- **IRR impacted by**

- Size of initial purchase price
- Size of ongoing premiums
- Timing and size of death benefit





## Longevity Investments: Truly Uncorrelated



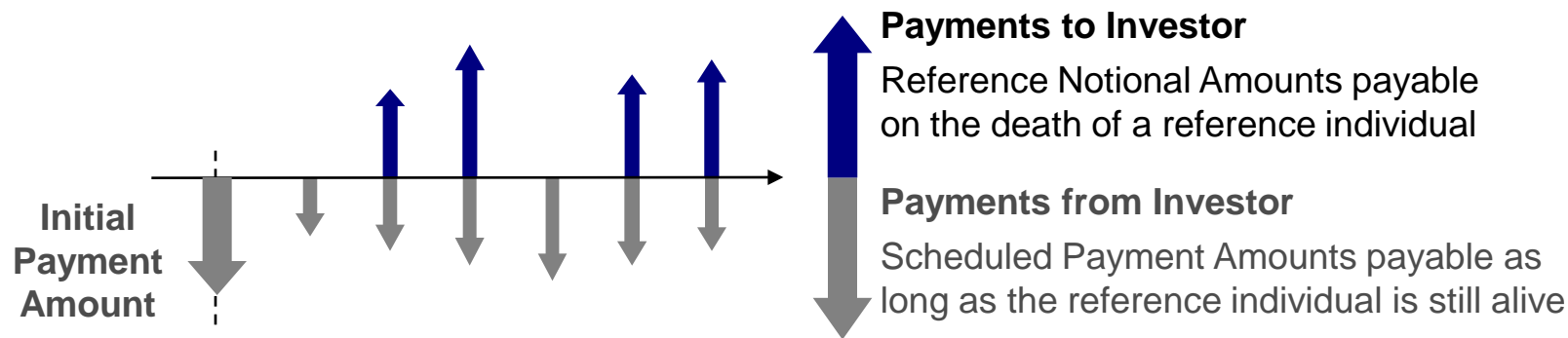
the **return** is known and is **not dependent** on the **investment strategy** of the life office\*

“When performing actuarial analysis, it is conventionally assumed that there is zero correlation between mortality rates and the capital markets. This is generally supported by historic data since mortality rates have steadily and fairly smoothly decreased, whilst equity markets have behaved erratically in the short term and grown exponentially in the long-term and interest rates have tended to revert to the mean. There seems little prospect of identifying a meaningful connection between mortality [...] and financial risk drivers.” *Source: Deloitte, May 2005*



## Longevity Index Swap: Overview

### Cash Flow Timeline for Longevity Index Swap



### Cash flows are linked to the mortality performance of a pool of equally weighted lives

#### Initial

- Investor pays amount equivalent to purchasing policies on the lives

#### Ongoing

- Investor pays amount equivalent to a premium for all lives still alive
- Investor receives amount equivalent to a death benefit for lives that passed away during the quarter



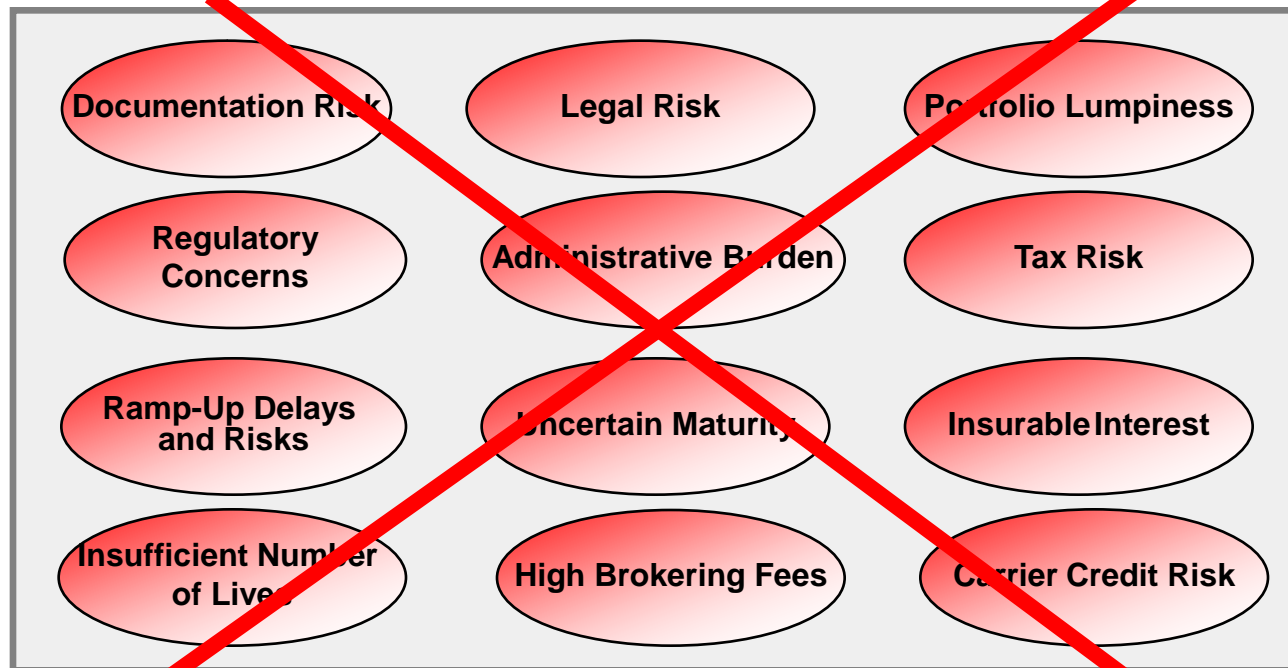
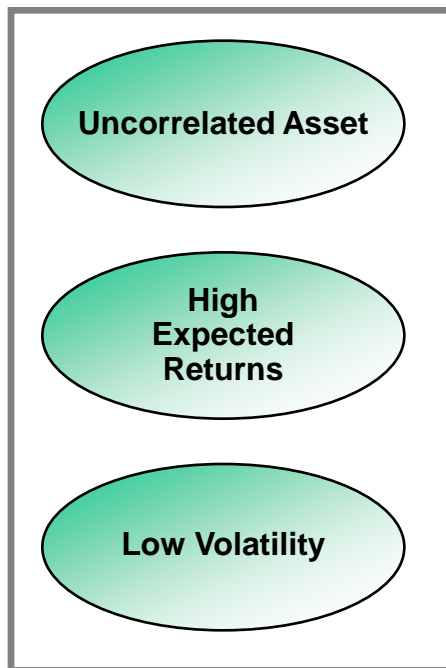
## Longevity Index Swap: Advantages

- Preserves the economics of purchasing policies
- Removes non-longevity related risks and costs
- Improves investment efficiency

Reduced volatility of return through equal exposure to a large number of lives

Retain Longevity Risk Premium...

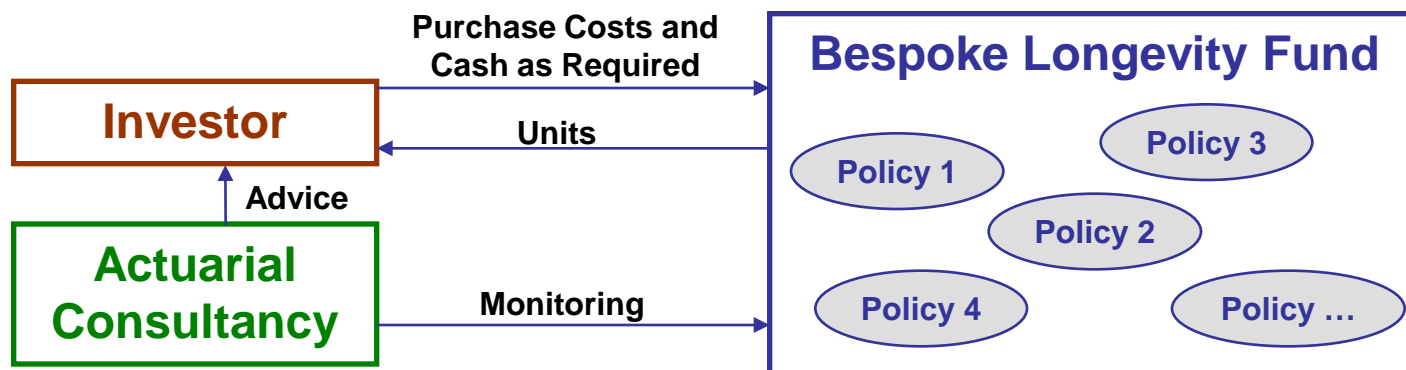
...without the additional risks and costs





## Investing in a Longevity Fund

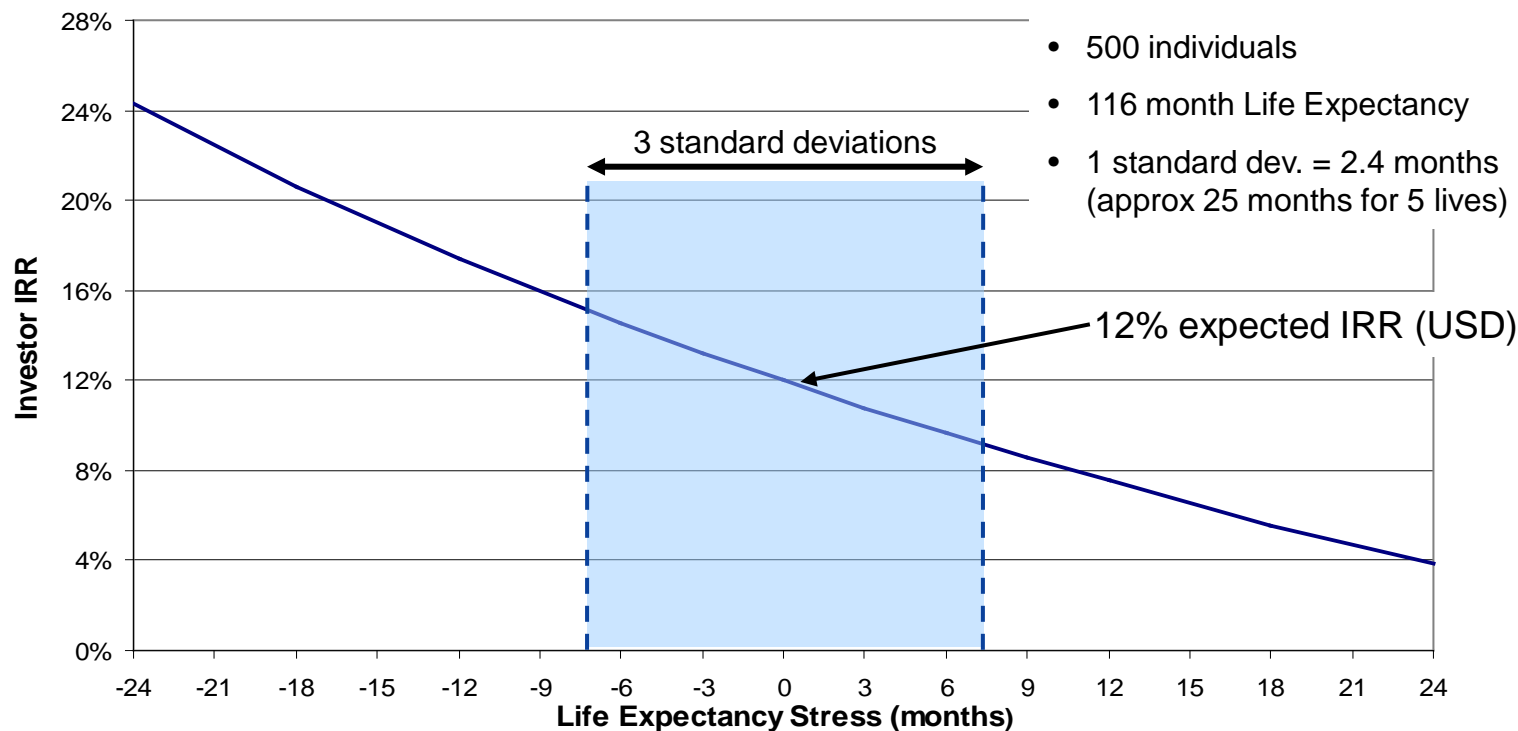
	Advantages	Disadvantages
<b>Conventional Longevity Fund</b>	<ul style="list-style-type: none"> <li>Investors are familiar with owning units</li> <li>Removes purchasing and admin effort</li> <li><b>Can gain exposure to a large number of lives for a small investment</b></li> </ul>	<ul style="list-style-type: none"> <li>High Fees, e.g. 2% pa + performance fee</li> <li>Fund manager risk, e.g. premium financing</li> <li>Usual problems of illiquid assets in a liquid fund, e.g. run on fund, forced asset fire-sale</li> </ul>
<b>Bespoke Longevity Fund</b>	<ul style="list-style-type: none"> <li>Investors are familiar with owning units</li> <li>Removes purchasing and admin effort</li> <li><b>Receive more of the asset class return</b></li> <li><b>Investor is in control, and is not exposed to the behaviour of other investors</b></li> </ul>	<ul style="list-style-type: none"> <li>Significant investment required to gain exposure to enough lives to limit volatility</li> <li>No manager acting in the investor's interests, but an actuarial consultancy can address this by assisting in policy pricing and purchase</li> </ul>





## Economics of a Longevity Investment

IRR Sensitivity to LE Shift



- If structured correctly, only risk is a systematic under-estimation of life expectancy
- This is the longevity risk, which carries the longevity risk premium
- Pricing is better now, with mid-point giving a **longevity risk premium of approx. 10%**





## Longevity Investments: Unique Source of Diversification

High Expected Return, Low Volatility and Low Correlation

	Non-correlated asset	High return potential	Low volatility	Liquidity
Longevity	✓	✓	✓	Limited
Equities	✗	✓	✗	✓
Government Bonds	✗	✗	✓	✓
Credit	✗	✓	✗	✓ ?
Commodities	✓	✓	✗	✓
Emerging Markets	✗	✓	✗	Limited
Hedge Funds	✗	✓	✗	Limited
Real Estate	Limited	✓	✗	Limited

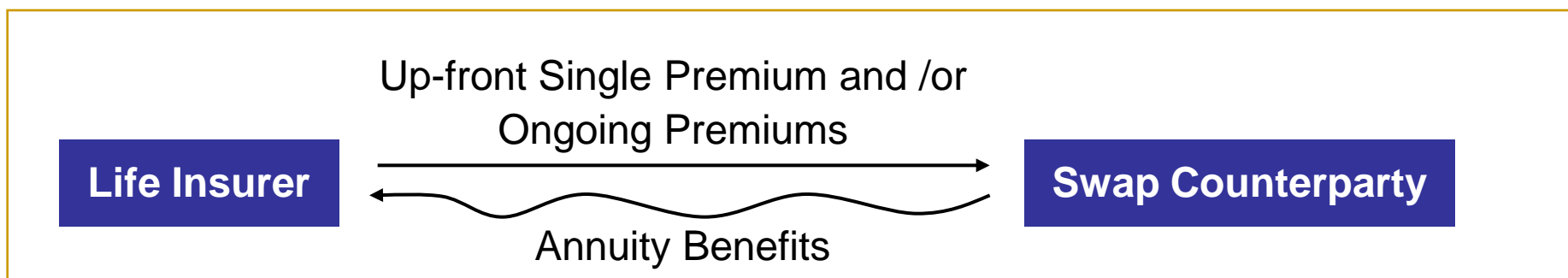


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## Hedging Longevity Risk: Case Study



Life Insurer enters into a longevity swap

- Life Insurer receives actual life contingent annuity benefits
- Life Insurer pays an up-front reinsurance premium and/or ongoing premiums

Collateral arrangements manage counterparty credit risk

Key benefit over traditional reinsurance is that the life insurer retains their assets

Though started by banks, reinsurers can probably offer this at a better price



## Improving Return on Longevity Risk: Case Study

**Australian institution with longevity risk (Life Insurer, DB Super, Government)**

- Willing to retain some longevity risk if it provides a good expected return on capital/risk
- Wants to reduce capital required and/or increase the expected return on capital



**Execute a longevity swap to remove Australian longevity risk**



**Execute a longevity swap to introduce policy based longevity risk**

- |  |   |
|--|---|
| <ul style="list-style-type: none"><li>• Set swap size such that total capital required does not change</li><li>• Expected return on capital will increase due to economic arbitrage inherent in policy based longevity instruments</li></ul> | <ul style="list-style-type: none"><li>• Set swap size such that total expected return does not change</li><li>• Capital will decrease as the policy based longevity risk will require less risk to deliver the same expected return</li></ul> |
|--|---|



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