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Liability Driven Investment:
Pooled Asset Liability Matching Solution

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Joe Moody, SSgA Global Fixed Income

Contents

- **Liability driven investing**
  Objectives
  Types of liabilities

- **Limitations of traditional bond investing**
  Examples of the investment problem, strategic FI benchmarks are simply flawed!
  The relationship to unrewarded risk , a free option

- **Practicalities of swap overlays**
  Who is wearing the fiduciary hat?

- **The pooled solution**
  How it works and what are the benefits?
  What does LDI mean for the Actuarial Profession?

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Liability Driven Investing - Concept

Deliver future pension cash flows when they are needed.
Inflation rate, RPI, LPI or Fixed
Discount rate Corporate AA fixed, Swap Rate or Gilts
Similar profiles for many mature schemes
Defined Benefits, Solvency and Longevity

Legend: Real Liabilities | 1% inflation | Market rate | 4% inflation

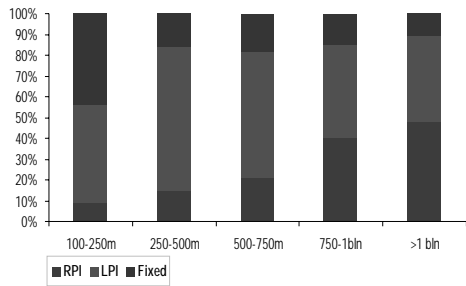**The Actuarial Profession**
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Liability Types – Which Liabilities to Match?

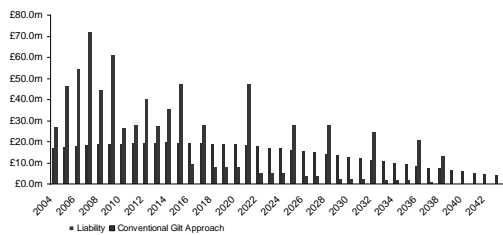Legend: RPI, LPI, Fixed

X-axis: 100-250m, 250-500m, 500-750m, 750-1bln, >1 bln

Conventional Gilt Index

- **Coupon and principal structure of available Gilts**
- **Inflation built into the curve at entry**

Legend: Liability, Conventional Gilt Approach
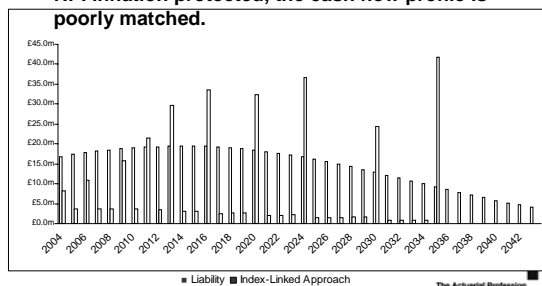

Inflation Linked Gilt Index

- **Not many Gilts in issue.**
- **RPI inflation protected, the cash flow profile is poorly matched.**
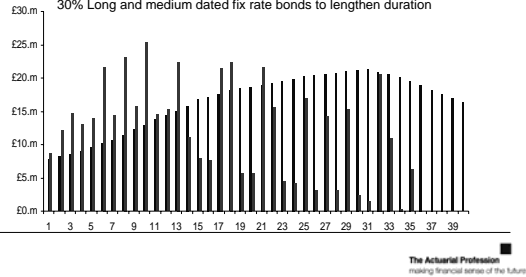

Legend: Liability, Index-Linked Approach

Strategic Bond Composite - Example

- **Typical Composite Bond Allocation**

  40% Long index linker/inflation protection index (FTSE 5y+)
  30% Non-government and corporate bonds to add yield (UN00)
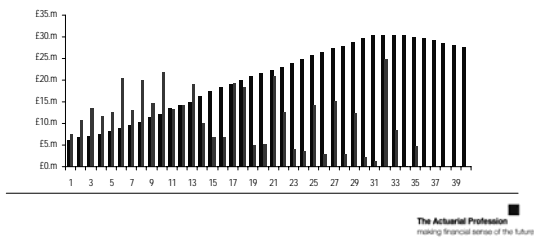 30% Long and medium dated fix rate bonds to lengthen duration

+2% Inflation Shock

- **Significant risks to a poor liability matched bond portfolio**
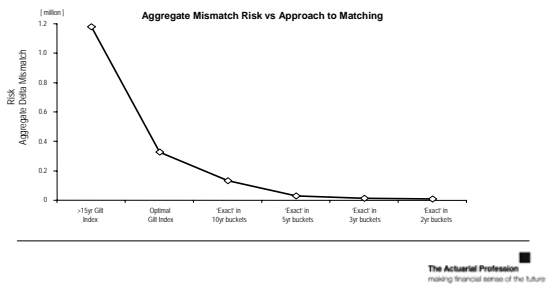
  No reward for this risk!
  How will the difference be funded?

Example: Quantifying the Risks

- **£1 billion portfolio with Yield curve shifts - 1bp**
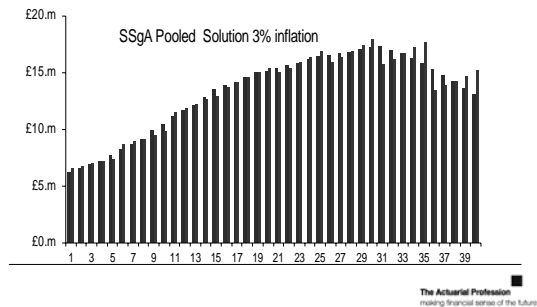- **Option to remove/spend inefficient risk**

Pooled Solution
Dynamic Inflation Protection

SSgA Pooled Solution 3% inflation

(bar chart, y-axis £0.m to £20.m, x-axis 1 to 39)

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Pooled Solution, +2% Inflation Shock

SSgA Pooled Solution 5% inflation

(bar chart, y-axis £0.m to £40.m, x-axis 1 to 39)

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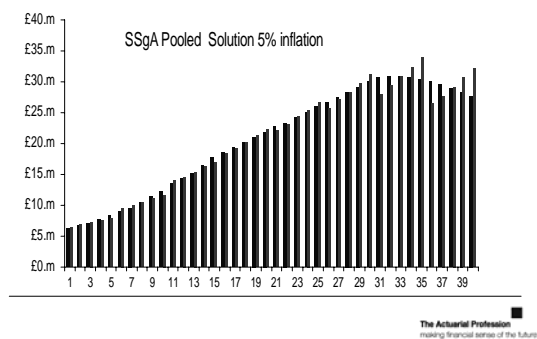
Practicalities to Investing with SWAPS

- **Independent sources of fair value prior to trading**
- **Access to multiple counterparties for price discovery**
- **Conflicts of Interest**
- **Legal agreements, ISDA & CSA**
- **Governance budgets**
- **Collateral management**
- **Counterparty Risk**
- **Custody**
- **Flexibility to change exposure at a later date**
- **Reporting - No index**

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The Pooled Solution - Investment Objective

- **Return LPI inflation protection**

- **Agree a fixed known rate, so that today's cash contribution matches future real cash flows**

- **Deliver LPI inflation protection at maturity for the real exposure at today's contribution rate, through cash fund accruals and swap payments**
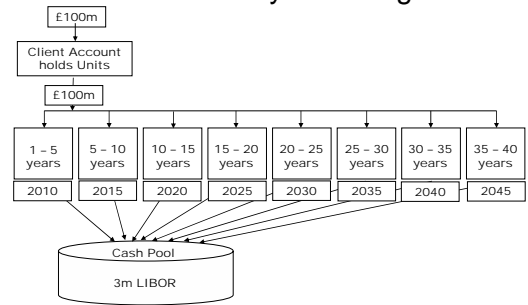
Pooled Asset Liability Matching Solution

5 Year Granulation provides High Dynamic Accuracy
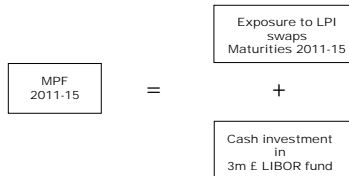

SSgA Pooled Solution 5% inflation
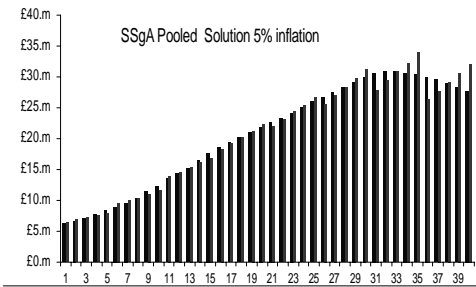
Inside PALMs Maturity Structure

▪ **Each MPF fund contains**

Holding in 3m £ LIBOR cash fund.

Exposure to a limited price inflation (LPI) swap structure according to the maturity years specified in the MPF sub-fund.

```
                              ┌─────────────────┐
                              │  Exposure to LPI │
                              │      swaps       │
                              │ Maturities 2011-15│
                              └─────────────────┘
┌──────────┐
│   MPF    │    =            +
│  2011-15 │
└──────────┘
                              ┌─────────────────┐
                              │ Cash investment │
                              │       in        │
                              │ 3m £ LIBOR fund │
                              └─────────────────┘
```
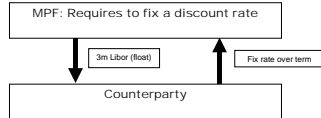
Building the Swap Structure

▪ **£10m invested at today's fixed rate delivers an equivalent known swap exposure in 10 years time.**

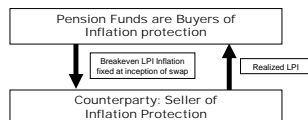▪ **Using zero coupon swaps eliminates cash flow considerations.**

```
┌──────────────────────────────────────────┐
│   MPF: Requires to fix a discount rate    │
└──────────────────────────────────────────┘
      │ 3m Libor (float)    ▲ Fix rate over term
      ▼                     │
┌──────────────────────────────────────────┐
│               Counterparty                │
└──────────────────────────────────────────┘
```

Building the Swap Structure

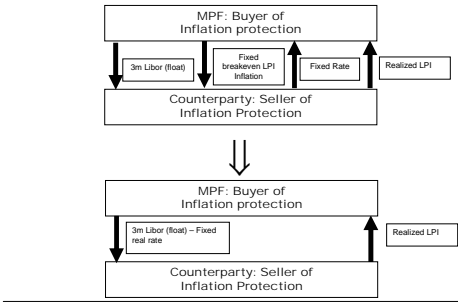▪ **Hedging the inflation risk if future inflation differs from current predictions**

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┌──────────────────────────────────────────┐
│       Pension Funds are Buyers of         │
│          Inflation protection             │
└──────────────────────────────────────────┘
      │ Breakeven LPI Inflation   ▲ Realized LPI
      ▼ fixed at inception of swap │
┌──────────────────────────────────────────┐
│        Counterparty: Seller of           │
│           Inflation Protection            │
└──────────────────────────────────────────┘
```

Overall Swap Structure

MPF: Buyer of Inflation protection

| 3m Libor (float) | Fixed breakeven LPI Inflation | Fixed Rate | Realized LPI |

Counterparty: Seller of Inflation Protection

⇓

MPF: Buyer of Inflation protection

| 3m Libor (float) – Fixed real rate | Realized LPI |

Counterparty: Seller of Inflation Protection

Summary of Accruals

- **Cash fund delivers 3m Libor (compounded) over the term of the swap.**

- **Pension Investor receives LPI index over the term of the swap.**

- **Pension Investor pays**

$$\frac{(1 + 3m\,Libor)}{(1 + Fixed\,Rate)} - 1$$

Example of Indicative Market Rates

- **Example of an initial contribution of £10m**
- **Indicative dilution levy is quoted in terms of yield**

Five year PALM Funds Maturity[1]	2006-2010	2011-2015	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045
Credit Overlay Target (70bps)	5.54	5.56	5.54	5.50	5.44	5.39	5.33	5.27
Swap Rate	4.84	4.86	4.84	4.80	4.74	4.69	4.63	4.57
Fixed LPI Rate[2]	2.17	2.00	1.91	1.79	1.68	1.56	1.44	1.33
Real Exposure	£10.70m	£11.74m	£12.76m	£13.67m	£14.51m	£15.16m	£15.66m	£16.06m
Entry Offer – Mid[3]	0.04	0.05	0.06	0.07	0.07	0.08	0.09	0.09
Exit Bid - Mid	0.04	0.05	0.06	0.07	0.07	0.08	0.09	0.09

Index linked	UKTI 2 1/2 05/09	UKTI 2 1/2 08/13	UKTI 2 1/2 07/16	UKTI 2 1/2 04/20	UKTI 2 1/2 07/24	UKTI 4 1/8 07/30	UKTI 2.0 01/35		
Real Yields	1.70	1.73	1.71	1.68	1.61	1.52	1.46	-	-

[1] Pays every year 31st March
[2] Inflation protection on each pay out will be provided up to the December preceding pay out date
[3] Indicative dilution levy is quoted in terms of yield

Summary of Pooled Benefits

- **Mitigates complexities of bespoke legal agreements and counterparty guarantees**
- **'Best Execution' & Quarterly 're-couponing'**
- **Ease of collateral management**
- **Efficient implementation**
- **Flexibility**
  - To adjust investments if projected liabilities change.
  - To add credit enhancement or other overlay strategies
  - Swap rate offers improved return

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- **A passing phase or a generational change?**

- **Cash Flow Projections are recognized as the real benchmark to beat**
  - Greater involvements with Fund Managers
  - Greater focus from Trustees on accuracy

- **Actuarial standards for discounting Liabilities**

Presenter Biography

Joseph Moody

Joe is a Principle of SSgA's Global Fixed Income business in London responsible for product and business strategy. He is also a Senior Investment Manager with over 11 years experience managing domestic, Euro & global fixed income portfolios. Prior to joining SSgA in 2001 he was an Assistant Director of Fixed Income at Foreign & Colonial management. He has also been a Chartered Engineer in the aerospace industry working on development and flight testing programmes of military aircraft and later as a Lecturer and Consultant in Avionic systems at the International Test Pilot's School.

Joe holds a B.Sc. in Electrical & Electronic Engineering from Sunderland and an M.Sc. in Strategic Risk Management from Cranfield University.

Disclaimer