

Practical implementation of Liability Driven Investment

by

**The Finance, Investment & Risk Management Board
Working Party**

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1. What is the problem to which Liability Driven Investment is the solution?

1.1. What is Liability Driven Investment (LDI)?

This section aims to put LDI in the context of the wider issue of pension scheme funding by examining the issues that face the stakeholders in a pension scheme and asking the question 'what is the problem to which LDI is the solution?'

At a high level, LDI is about reducing investment risk by measuring the success or otherwise of the investment strategy by reference to the funding position (or other related metric such as cash contributions). It is not whether the return on the assets beat a performance target or a peer group or a benchmark but whether it keeps pace with the changing value of the liabilities. LDI is not necessarily about investing in bonds or about selecting the lowest risk investment strategy.

One particular insight from LDI is that the value of the liabilities itself has risks. Specifically the market value of the liabilities is sensitive to changes in the yield curve and expectations of future inflation. Hence, for a pension fund, cash is not the lowest risk asset strategy.

In this paper, we regard LDI solutions as strategies designed to achieve a required performance target, for an acceptable level of risk, measured against a Liability Benchmark Portfolio.

The Working Party concurs with the definition of the Liability Benchmark Portfolio (LBP) given by Speed et al (2003). For a fully funded scheme the LBP was defined as "the portfolio of assets such that, in the absence of future contributions, benefit accrual or random fluctuations around demographic assumptions, the scheme maintains its current solvency level (the ratio of assets to liabilities) as economic conditions change".

The Liability Benchmark Portfolio will typically contain long-dated interest rates and inflation exposures, and many LDI solutions make use of derivatives to manage the corresponding sensitivity to interest rates and inflation within the asset portfolios against the Liability Benchmark Portfolio.

The remainder of this section examines the context in which the investment strategy is set, but first we consider the nature of the liabilities.

In the Working Party's view, pensions are essentially bond like. A pension is a series of cash flows and a bond is a series of cash flows. So bonds are the lowest risk investment for pension funds, but the fact remains that schemes do not invest 100% of their assets in bonds. Most pension schemes do not even match their pensioner liabilities with bonds¹. The reasons for this are well documented and many of the historical factors are considered in section 1.2 below. The main problem with bonds is two-fold:

1.1.1 *The yield is "too low"*

Corporate sponsors have generally shown no appetite for paying off pension fund deficits without the help of the equity risk premium. When faced with relatively certain costs based on bond yields or uncertain but 'lower' costs calculated using an equity risk premium, it is not surprising that most employers would prefer to use the equity risk premium; especially when the risks are not well understood.

Section 3 discusses the implications of current market yields for LDI strategies.

1.1.2 *Bonds are "too short"*

A 'typical' pension fund has liabilities with duration of around 20-25 years. Such a pension fund might allocate 40% of its assets to a bond portfolio with duration of 10-15 years. Whilst in theory

¹ See for example PwC (2005)

the reason for investing in bonds is that they are a matching asset, at this level of investment, the risk reduction is more to do with the diversification benefits as the matching properties are swamped by the equity risk and the size of the unmatched (and longer duration) element of the liabilities.

The LDI strategies discussed in this paper enable pension funds to overcome these problems by investing in instruments that better control the risks associated with liabilities but also retain a certain level of investment risk.

Section 2 of this paper goes on to consider which elements of the liabilities to hedge and the approaches that can be used.

1.2. Historical view on asset allocation

The approach to asset allocation and investment has evolved considerably since the mid nineties when traditional balanced mandates were the norm. Under this approach, the asset allocation decision was delegated to the fund manager who followed a balanced investment strategy investing across a range of asset classes, with the benchmark being the median or average return on a peer group of pension schemes with a similar strategy. Over time, the average proportion invested in equities by the peer groups increased significantly as individual managers tried to overweight each other in a bid to beat the peer group. This strategy proved successful during the equity bull market, creating surpluses, which allowed contribution holidays and generous early retirement packages or other improvements.

The implementation from 1997 of the Pensions Act 1995, in particular the Minimum Funding Requirement, highlighted the need for trustees to consider the potential mismatch between assets and liabilities. This led to two approaches:

- Balanced plus fixed interest e.g. holding in over 15 year gilts
- Specific scheme benchmarks, but typically based on standard investment indices

The Myners (2001) Report on Institutional Investment in March 2001 further encouraged similar strategy changes by encouraging trustees to set an asset allocation with reference to their liabilities and not the peer group. Furthermore, trustees were encouraged to articulate their 'willingness to accept underperformance'.

One of the most significant events of recent times has been the independence of the Bank of England following the election of the Labour government in 1997. Combined with good economic conditions, the Bank's independence brought about a sustained fall in interest rates and long term gilt yields as the market adjusted to the idea that the Bank would set rates purely to control inflation. During this period long term gilt yields fell from 8% at the beginning of 1997 to 4.4% by the end of 1998. By the end of 2006 long term gilt yields were actually higher than in 1998 (albeit with a more inverted curve) which shows that despite some lows in the meantime, bond yields have been remarkably stable over the last 8 years.

The substantial rise in pension fund liabilities during this period was hidden by strong equity performance and what became known as the TMT Bubble. When the bubble burst and stock markets fell, the mismatch between assets and liabilities was revealed and deficits appeared.

The fall in yields and stock markets are not the only factors that have affected the way in which decision makers assess pension scheme funding and investment decisions. Other factors include:

- Improvements in life expectancy: unexpected improvements in post retirement mortality increased longevity. This trend was not fully allowed for in actuarial valuations.
- FRS17

- Pension scheme deficits were consolidated into the company's balance sheet
 - Finance Directors worried about the size of the deficit and the risk of a worsening position
- Budget 2005 – issue of 50-year gilts (conventional and index-linked). The Government issued new 50-year bonds in response to rising institutional demand. However, there was insufficient issuance to meet demands of UK pension funds
- Pensions Act 2004
 - Pensions Protection Fund (PPF)
 - Impact of the Pensions Regulator (TPR)
 - Trustees' Knowledge and Understanding (TKU)

1.3. How to fund a pension scheme – the rules of the game

It is important to view the asset allocation decision within the wider context of scheme funding. Although the trustees have primary responsibility for setting investment strategy, there are various other interested parties; the employer (including shareholders), the Regulator and the PPF (and also the members).

1.3.1 *The Pensions Regulator*

The Pensions Regulator (TPR) is the UK regulator of work-based pension schemes.

The Pensions Act 2004 gives TPR a set of specific objectives:

- to protect the benefits of members of work-based pension schemes;
- to promote good administration of work-based pension schemes; and
- to reduce the risk of situations arising that may lead to claims for compensation from the Pension Protection Fund.

In meeting these objectives, TPR aims to act as a 'referee and not a player'. The TPR has set out its approach to refereeing in a number of publications e.g. *The Pensions Regulator* (2006a).

The following is taken from the Regulator's website:

"Under the new requirements each scheme must have a statutory funding objective. This statutory funding objective is that the scheme must have sufficient and appropriate assets to cover its technical provisions. These technical provisions are an estimate, made in actuarial principles, of the assets needed at any particular time to make provisions for the benefits that have already accrued under the scheme. The technical provisions are calculated using an accrual benefits funding method and assumptions all chosen by the trustees, after taking the actuary's advice and obtaining the employer's agreement."

1.3.2 *Funding*

There are many ways to value the technical provisions (hereafter referred to as the 'liabilities'); the following is a list of bases that could be used in approximate increasing order of magnitude/strength.

- MFR
- Scheme specific (ongoing) funding (this could be as strong as IAS19)
- PPF
- IAS19 (in some circumstances the PPF level could be higher than IAS19)
- Economic value

- Buyout (see Section 5.3)

A key element in these valuation bases is the discount rate. Other differences are over which benefits to value.

In the Working Party's view, the economic value of the liabilities can be found by discounting the future cash flows at market rates of interest from fixed-income markets. Crucially, in the Working Party's view, the economic value of the liabilities is not dependent on the investment strategy; changing the asset mix does not change the value of the liabilities.

There are some subtleties over which fixed-income discount rate should be used; gilts, AAA rated, swap rates or even AA rated. A consensus seems to be forming that gilt prices include a premium for liquidity that reduces their yield below the 'risk free rate', but that other yield curves include some element of credit risk. Typically insurance companies use gilts plus 10bps as the risk free rate in their realistic balance sheets. Others suggest that the swap curve is appropriate for this purpose, with perhaps a deduction for the inherent credit risk in earning Libor (e.g. other insurance companies use swaps – 10bps as the risk-free rate).

Another key element is whether to use a single discount rate or the full curve. A single discount rate has the clear advantage of simplicity but often fails to reflect all of the information in the market. With modern computer power it should be possible to incorporate the full term structure of the yield curve into the valuation of liabilities and we would encourage actuaries to either make use of the full yield curve or to set a single discount rate that accurately reflects the duration of the liabilities (i.e. a single discount rate that gives the same present value of the liabilities as using the full term structure). This is particularly important in current conditions where the yield curve is inverted, and using a single discount rate based on the duration of liabilities can significantly understate the value of long-dated liabilities (see Section 3.1 and Section 5.3).

1.3.3 The investment strategy

Measuring the liabilities using a fixed-income discount rate does not necessarily mean investing in these assets. It also does not necessarily mean setting the future contribution rate using the same discount rate. Equities and other return seeking assets have played a prominent role in the investment strategies of pension funds and this is unlikely to change.

Equities offer investors the opportunity to benefit from higher expected returns but £100 of equities is worth exactly the same as £100 of bonds, nothing more and nothing less. The higher expected return of equities over bonds is compensation for the additional level of risk. This risk means that equity investors are likely to have periods of 'insolvency' from time to time when the funding level would fall below 100%. They are also likely to have periods of 'super-solvency' when their assets are worth significantly more than the liabilities.

The main decision for trustees is the split between matching and return seeking assets. Myners (2001) said that trustees should set an investment objective that relates to the scheme's liabilities, hence pointing the way to liability driven investment, and also their 'willingness to accept underperformance'. This willingness is directly related to the employer's ability to make good any underperformance should the liabilities fall due. The employers' ability to pay is now much more prominent in the minds of trustees, particularly in the case of a significant change to the employer covenant, e.g. as a result of a leveraged buyout.

By assessing the employer covenant, using specialists in corporate finance, it is possible to find the level of investment risk that can be borne by the employer. By combining this with a suitable measure of risk such as the 1 year Value at Risk (Vary) (at, say, the 95th percentile) it is possible to find the mix of equities and bonds that can be supported by the employer.

The role of LDI is to manage risk relative to liabilities. Typically this allows unrewarded risk to be identified and removed, which, in turn, may enable a higher proportion of the assets to be invested in return seeking assets i.e. a more efficient investment strategy.

Many pension funds have substantial deficits as measured by IAS19/FRS17 or a similar bond related basis. The Pensions Regulator (TPR) requires that pension fund trustees and their sponsoring employers have to agree a funding plan to close the deficit over a suitable recovery period. It is reasonable for these deficits to be funded by a combination of cash contributions and investment returns. The Pensions Regulator is willing to accept recovery plans that incorporate a significant component of future risk premiums from assets e.g. equities.

1.3.4 Trustee knowledge and understanding

Trustees' Knowledge and Understanding (TKU) is important when considering LDI, or other changes to the investment strategy. Consideration may need to be given to the extent to which all trustees need to understand fully the investments of their scheme, and whether additional expertise be brought onto the trustee board. Trustee education sessions, often available from solution providers as well as consultants, can help fill any knowledge gaps.

1.3.5 The company perspective - does the asset allocation affect the company share price?

Current accounting rules, e.g. IAS19, allow a company to improve its P&L by switching the assets of the pension fund into equities and booking the higher expected return as profit. In theory this could lead to a short-term boost in the share price.

However, academic research supports the theory that shareholders should be indifferent, to first order, to the asset allocation of a pension fund as they can simply unwind the position in their own portfolios. See Black (1980) and Exley, Mehta & Smith (1997).

A recent paper by Jin, Merton and Bodie (2004) found that the "equity risk [as measured by share price beta] does reflect the risk of the firm's pension plan despite arcane accounting rules for pensions."

The paper goes on to suggest that the cost of capital calculations may not adjust for the estimated beta for the risk of pension assets and liabilities and may therefore bias upwards the discount rate used in capital budgeting with the result that positive net present value projects might be rejected.

1.3.6 The Pensions Protection Fund (PPF)

The PPF came into being as a result of the Pensions Act 2004 and provides a safety net for schemes whose employers have become insolvent. The PPF is paid for by a levy charged to all schemes based 25% on the number of beneficiaries and a 75% risk based levy.

Insolvent companies typically leave insolvent defined benefit pension schemes. If a scheme is funded using an 'ongoing' valuation basis, even one based on gilt yields, it is unlikely to be able to secure the benefits of its members in full. This is because, on insolvency, the measure of funding becomes the buyout basis i.e. the trustees risk tolerance falls to zero and the logical next step is to seek to buy the lowest risk investment available – annuities from an insurance company (although as the Telent case study in Section 6.5.2 shows, this may not always be the case).

As discussed in Section 5.3, the cost of buying out liabilities with an insurance company is typically significantly in excess of ongoing pension scheme valuations.

The actuarial basis used to assess the solvency position for PPF purposes was designed to be similar to that used by an insurance company but only covering the benefits that would be protected by the PPF (the PPF does not protect the full members' benefits).

The existence of the PPF provides a floor for trustees when considering the risk. If the company is solvent then it is the employers' responsibility to fund the scheme, if the employer is insolvent then the trustees should seek to secure benefits for members in excess of those that would be provided by the PPF.

It is also interesting to consider the approach of the PPF to setting the risk-based portion of the levy. This is set by reference to the deficit in the scheme, for benefits covered by the PPF and on the PPF's prescribed basis, and the assessed credit rating of the employer.

The Pension Protection Fund (2007a) confirmed in May 2007 that it would not be including the investment mix of a pension scheme in the calculation of the risk based levy.

The Working Party agreed with the conclusions of the Board for the practical reason that quantifying investment risk on a reasonable basis – for example the degree of matching of interest rates and inflation risks – would have been difficult for many small schemes. Other factors in this decision are that:

- the investment strategy is indirectly accounted for by the fact that poorly performing investments will lead to a lower level of funding and an increased levy. Hence the levy will reflect investment risk a posteriori, although not a priori.
- there is a fair degree of homogeneity in the investment strategies of pension schemes in the UK, which limits the extent to which the investment mix can be used to redistribute the levy. However, the counterargument is that an investment-risk-based levy would still effectively penalise / reward those schemes that deviate most from the average allocation.
- in theory, the covenant of the employer, which is taken into account in setting the levy, should reflect the risk associated with the pension fund asset-liability exposures. However, in practice, under the current determination of the levy, and current practices of rating agencies, this is not the case with the pension deficit typically taken into account at the current level.

However, the Pension Protection Fund does acknowledge the positive role of LDI in pension funds as stabilising claims on the PPF. Their management plan [Pension Protection Fund (2007b)], also published in May 2007, specifically highlights a growth in the adoption of **liability driven investing and liability matching from pension schemes, and the increased use of derivatives to better manage interest-rate risk, as factors suggesting lower future volatility of claims on the PPF.**

1.4. Conclusions

Pensions are bond-like but in practice bonds are too short to match the duration of pension fund liabilities and furthermore, many pension funds are seeking to fund deficits by seeking a return in excess of bonds from their assets (as well as additional cash contributions).

The use of derivatives within LDI solution can overcome these problems by increasing the duration of the assets but retaining the exposure to asset classes with a higher expected return, thus achieving a more 'efficient' investment strategy.

However, LDI is only one aspect of scheme funding. In setting their investment strategy trustee should consider the appropriate funding measure and take into account the employer's ability and willingness to pay contributions. Where there is a mismatch between these two factors, negotiation should take place with the Regulator acting as a referee if necessary. Innovative solutions involving contingent assets can potentially help to bridge the gap between short term volatility and long term expected returns (Section 6).

The remainder of this paper discusses:

- practical issues for implementing LDI (Section 2)
- implications of market conditions on LDI implementation (Section 3)
- recent public case studies of LDI implementation (Section 4)
- methods of implementing LDI, including pooled funds (Section 5)
- contingent asset solutions and their interaction with LDI (Section 6)
- life insurance approaches to LDI, contrasted to pension fund approaches (Section 7).

2. Which liabilities should be hedged?

2.1. Background

Pension cashflows consist of a series of payments stretching over the next 80+ years. These payments can be either fixed or, more usually for UK pensions, linked to inflation (often with caps and floors). As well as these complex inflation linkages, pension cashflows are packed with other uncertainties, for example longevity and member options.

Precise hedging of such complex cashflows is, at best, very hard work. Also, in practice, the benefit of precise hedging may well be outweighed by the time and expense involved. In this section we explore whether or not it is appropriate to hedge 100% of assets or some lower percentage. We also look at the case for extending the hedge to cover any deficit or future contributions.

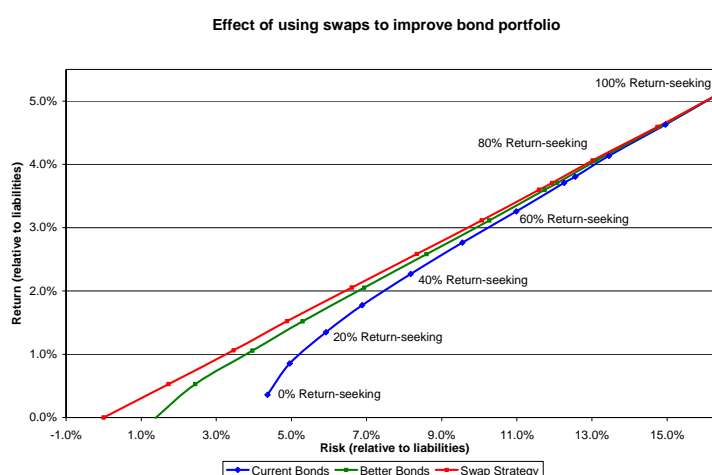
We go on to discuss design issues including the types of cashflows to be hedged. Does it make sense, for example, to hedge active members' liabilities? Also, there are uncertainties in the cashflows which cannot be hedged at the present time (mortality risk, cash commutation etc) and we investigate how these unhedgeable risks influence views on the shape of a hedging programme. Finally, certain optionality can be hedged (for example pension increase caps and floors) and we briefly review the case for this.

Market conditions will also influence on the design of a liability hedging programme. For example, it is often said that the current inversion of the yield curve makes hedging of long-dated cashflows unattractive. We address this and other market timing issues in Section 3.

2.2. Swaps backed by bonds

The arguments for using swaps backed by cash or high quality bonds to hedge liabilities are well rehearsed. Ignoring (for the time being) the risk that the benefit cashflows themselves might change, it is in principle possible to construct a portfolio of bonds or swaps which will match the cashflows. This portfolio would provide the pattern of cashflows with a very high degree of certainty.

If this approach is followed, it may be that a full LDI approach is warranted (i.e. design of a bespoke portfolio to match the liabilities) but this depends on whether or not the scheme has a significant allocation to risky assets. If the allocation is significant, a relatively simple portfolio of index-linked gilts, nominal gilts and, perhaps, corporate bonds may be adequate. Clearly for high allocations to bonds, refining the portfolio is more worthwhile.



The chart illustrates this: for high allocations to return-seeking assets, using swaps backed by bonds or cash does not significantly reduce risk. At lower allocations swaps can have a significant impact (compare the blue and the red lines). It is worth noting, however, that physical bonds may provide a similar level of risk reduction (green line).

Note that in this chart, the risks shown are the risks between the assets and Liability Benchmark Portfolio, and, at this stage, do not reflect actuarial uncertainty and unhedgeable risks in the liability cashflows.

2.3. Swaps backed by risky assets

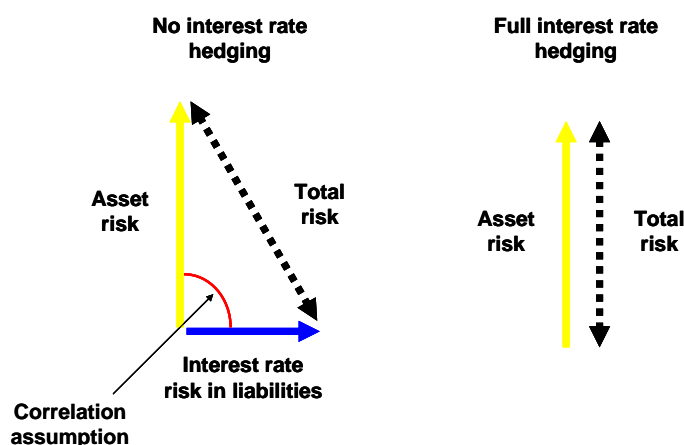
There is no need to restrict the use of swaps to improving bond portfolios. Increasingly, schemes are looking to use swaps as an overlay on their risky assets to reduce inflation and interest rate risk. This appears to be a panacea: the swaps reduce risk while allowing the scheme to hold risky assets which will maintain reasonable expected levels of return (rather than low yielding bonds).

Swaps backed by risky assets may well reduce overall levels of risk but it is important to bear in mind that the flavour of the risk-reduction is rather different. Swaps backed by bonds will not produce a poor outcome in any scenario (a slight simplification which ignores operational, demographic and systematic risks but serves to illustrate this point). Swaps backed by risky assets can, however, give poor outcomes in certain scenarios. Indeed using swaps in this way might make outcomes under certain scenarios worse. The argument for using swaps in this way is that, statistically, such scenarios are less likely so swaps reduce risk.

As this flavour of risk reduction is statistical, it is very dependent on assumptions. This is illustrated by the diagrams opposite which illustrate how the liability risks (interest rates and inflation) combine with the asset risks.

Without liability hedging, the overall level of risk is a combination of asset risk (e.g. due to volatility of equity holdings) and liability risk (in this context we mean interest rate and inflation risk although, of course there are non-

investment risks in the liabilities as well). The aggregate level of risk will therefore depend on the size of the asset risks and the liability risks and on how they combine. The left hand diagram assumes that these risks are independent and therefore the overall risk is found by a sum of squares approach. The right hand diagram illustrates the effect of removing interest rate and inflation risk in the liabilities: the total risk simply reduces to asset risk only. In this example, liability hedging reduces risk slightly.



Alternative assumptions would show a higher or lower aggregate risk. For example if we assume that liability risks and asset risks are negatively correlated (i.e. when asset values fall, liability values tend to rise) the total risk is higher so liability hedging looks more attractive.

At the other extreme, if assets are strongly positively correlated to liabilities, using a swap overlay to hedge liability risks might actually increase overall risk. Some practitioners would argue that equities represent a good match, over the long-term, to long-dated inflation-linked liabilities, and hence swap overlays should not be applied to that portion of the liabilities backed by equities. However, over short time periods, equities and long-dated real yields (which drive the value of inflation-linked liabilities) can be very poorly correlated, as seen during the period 2001-2003. Section 2.3.2 further considers short-term vs. long-term risks.

Effectively, using swaps to hedge liabilities backed by risky assets transforms the benchmark for these assets to Libor, or Libor +, as in the Friends Provident case study in Section 4.2.3. This might be expected to lead to a diversification in sources of beta, as discussed in Section 7.4.

2.3.1 What is the best hedge ratio?

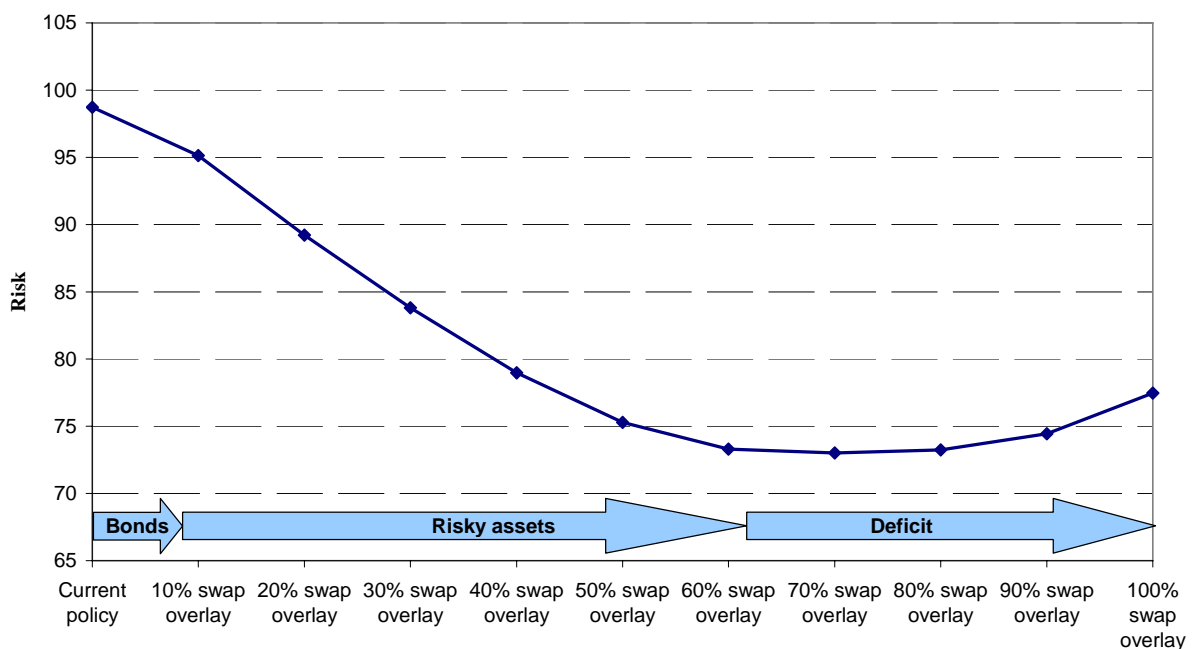
As described in the previous section, the degree of risk reduction is dependent on a number of factors and similarly, the theoretically best hedge ratio will depend on a number of factors:

- Duration of the liabilities: longer duration tends to favour hedging
- Assumed volatility of long term interest rates and inflation expectations: higher assumed volatility tends to favour hedging
- The nature of the risky assets held: more cash-like risky assets make liability hedging look more favourable
- Assumed volatility of the risky assets: lower volatility tends to favour hedging
- Correlation of the risky assets and the liabilities: low or negative correlation favours hedging

We show in the chart below the risk reduction benefits that might be achieved at various hedge ratios for a hypothetical scheme with a funding level of 60%. Based on the assumptions underlying this chart, hedging 50-60% of the liabilities (80-100% of assets) looks attractive (before taking account of costs).

For completeness we have also illustrated the impact of hedging the deficit and we discuss this further in Section 2.4.

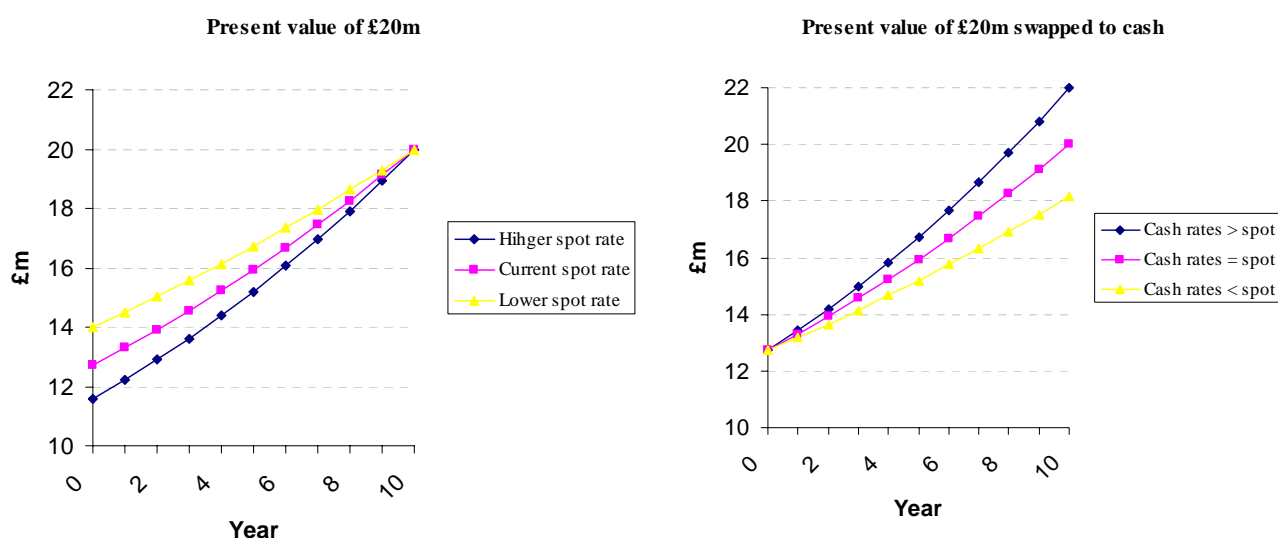
What is the best hedge ratio?



In addition, practical issues will govern the choice of hedge ratio. For example, taking account of transaction costs tends to shift the balance in favour of lower hedge ratios. Also, it is important that any hedge strategy is robust under a wide range of assumptions and this will influence views on the best hedge ratio.

Finally, if using a pooled fund approach the hedge ratio might be constrained by the availability of suitable vehicles: we understand that currently the maximum hedge ratio allowed by pooled funds is around 25% (4 times leveraged), and typically 33%-50% (2 – 3 times leveraged). See Section 5.2.

2.3.2 Long and short term risks



It is important to distinguish between short term and long term risk reduction arguments. This is illustrated by the diagram on the left above which shows how the amount of money required now to finance a fixed payment in 10 year's time changes over time.

Over the short term, risk is significant: the amount required is volatile, reflecting volatility in 10 year interest rates. Swapping this exposure for a requirement to pay cash returns over the 10 year period reduces short term uncertainty as the present value of the cash is quite stable, simply rolling up with short term interest rates over time.

Over the long term, however, cash is uncertain. The risk reducing proposition is therefore more evenly balanced: are risky assets better able to deliver a payment linked to short term cash rates over time than a fixed payment in 10 years?

Similar considerations apply to inflation linked payments. Again, in the short term, risk in the liabilities is reduced (changes in capital values due to changes in long term real yields are replaced with (much lower) volatility of cash over short periods). Over the long term, however, the risk-reduction proposition is less clear: are risky assets better able to deliver a payment linked to short term cash rates than an inflation-linked payment.

2.3.3 Summary on swaps backed by risky assets

- Swaps backed by risky assets can reduce short term risks
- Such risk reduction is statistical in nature and depends on assumptions
- The long term risk reduction arguments are not clear cut
- 100% hedging may not give the optimum (short term) risk reduction

2.4 Swaps over deficits or contributions

In principle, swaps can be extended to cover a deficit and we illustrated this in Section 2.3.1. This is often described as a leveraged position. However, this is true whether or not swaps are used, as the only thing changed by the swap is the type of leverage. With no swap in place, schemes have net short position in long dated bonds (the liabilities): with a swap in place the scheme would still have a net short position but instead of a short position in long bonds, the swap converts this to a short position in cash.

2.4.1 What is the effect of changing the type of leverage?

A swap covering all of the liabilities, including the deficit has the effect of locking in the £ amount of the liabilities – the swap changes the liability from a series of fixed or inflation-linked payments to a series of payments linked to short term cash rates. This may be desirable if it is important to crystallise the deficit in £ terms for example because the sponsor is committed to a set level of contributions. The £ amount of the deficit is also most relevant when assessing the employer covenant and affordability of the deficit contributions.

However, it should be noted that such an approach, locking in the £ amount of the deficit, increases the volatility of the funding level reported in % terms, and this may need to be explained to Trustees and members.

2.4.2 Swaps over contributions

A contribution stream is a series of promised cashflows due from a sponsor over a set period. Contributions are therefore akin to a short to medium duration bond with sponsor-specific default risk. Using this frame of reference, contributions might be thought of in the same way as an asset of the Scheme and using swaps to extend the duration of the “contribution asset” or convert it from a fixed cashflow to a liability-hedging inflation-linked cashflow should reduce (largely unrewarded) risk.

In our experience it has been rare to see swaps used in this way, perhaps because there is inherent uncertainty in the contributions (default risk) or because other risks dominate. As contribution levels increase we would expect to see swaps used in this manner more often, particularly where contributions are supported by a high quality guarantee or by contingent assets (see Section 6).

2.5. Future service

The liability profile for Schemes which allow members to accrue further benefits for future service will change over time. In principle, liabilities for future service could be hedged in advance but this is not normally attractive. This is because there is some flexibility over the benefit promise for future service (whereas past service benefits are protected by legislation) which means that hedging is less attractive: why hedge a benefit which you may not have to pay? Even if future service benefits were fully guaranteed, there is far more uncertainty over the number of members that will accrue benefits and their liability profile making hedging impractical.

Rather than hedging future service benefits in advance, a more practical approach is to monitor and refine any liability hedging programme to take account of the new liabilities and any other changes to the cashflow profile.

2.6. Which liabilities should be hedged?

Unless the entire stream of liabilities is to be matched, pension trustees embarking on a liability hedging programme need to decide which liabilities to hedge. There are a number of approaches that may be adopted.

2.6.1 Liability class

Traditionally, bonds have been seen as the natural asset class to back pensioners and, to a lesser extent, deferred pensioners. There has been much debate over the natural backing asset for active members.

Under this frame of reference, trustees would tend to match in the following order: pensioners; deferred pensioners; active members. The purpose of this paper is not to debate the natural backing asset for particular types of liability instead we observe that the purpose of a liability hedging programme is to hedge interest rate and inflation risk and these risks are no less prevalent in active member’s cashflows than they are in, say, pensioner cashflows. Indeed, liabilities for active members are typically longer-dated and hence more exposed to fluctuations in yields.

There are of course other risks in active member's cashflows such as salary inflation, cash commutation and other optionality (e.g. choice of retirement ages). These uncertainties cannot be ignored and they should influence the overall level of hedging to be applied and the degree of precision of the hedging programme. We contend, however, that uncertainty in the cashflows does not mean that it is wrong to hedge interest rate and inflation risks in the cashflows to some degree.

2.6.2 Short or long duration cashflows

In the past, hedging programmes have sometimes focused on shorter dated liability cashflows. Reasons for this might be that there was more liquidity in short-medium dated swaps and, perhaps, reflecting a belief that because longer dated cashflows are less certain (due to demographic risk etc) the case for matching is weaker.

In our view, if the purpose of the hedging programme is to reduce interest rate and inflation risk, the longer dated cashflows cannot be ignored, even if they are more uncertain than shorter dated cashflows. This is not to say that they should be matched year by year but they normally represent a significant inflation and interest rate exposure which can be hedged.

In addition, the precise details of a hedging programme for short and long dated cashflows will depend on views on markets. In the current yield curve environment, hedging long dated fixed cashflows with long dated fixed-floating swaps may look unattractive, but long-dated inflation hedging may still represent good value. This is discussed in more detail in Section 3.

2.6.3 Level of precision

Precise matching of cashflows will result in maximum risk reduction but it is rarely economic or possible to match precisely. Typically, the vast majority of risk can be mitigated with relatively simple structures. For example, cashflows might be grouped into 5 year buckets or, even more simply, swaps might be used to match interest rate duration (sensitivity of liabilities to a 1 basis point parallel shift in yields), inflation duration and convexity.

The level of uncertainty in the cashflows will influence the level of precision in the liability hedge. There is a stronger case for precision if the cashflows are known with certainty but as the level of uncertainty increases so the benefit of precise hedging diminishes. For example, arguably longer dated cashflows have greater exposure to demographic risk so less precision is warranted. Similarly uncertainty in the active member's cashflows due to commutation, early retirement etc may shift the balance in favour of an approximate hedge.

A higher degree of precision may also be more appropriate as the scheme matures, particularly if the ultimate goal of the investment strategy is to buyout the liabilities with an insurer (see Section 5.3).

Importantly, the fact that these liabilities are less certain does not necessarily undermine the case for hedging but it does change the type of hedge which is appropriate. It should also be noted that, when implementing bespoke swap overlays, it is not typically more costly for these to be based on annual rather than, say, 5 yearly flows.

2.6.4 Optionality in the cashflows

Pension cashflows are packed with optionality and we list some typical options:

- Cash commutation on retirement
- Leaving service (for active members)
- Transfer values
- Early retirement (active and deferred members)

- Spouses and dependants pensions
- Option to give up pension for additional spouses pension
- GMP underpins, statutory underpins at age 60 and 65
- Caps and floors on pension increases

The subject of member options has been considered in detail in the December 2006 report by the Actuarial Profession's Member Options Working Party [(Gordon et al (2006))]. Also, the Profession has drawn members' attention to the importance of this issue in a letter dated 14 February 2007. One area that the Working Party report concentrates on is cash commutation on retirement and some key observations are:

- The framework for setting cash commutation terms is set by the scheme rules (and is therefore specific to each scheme). There can be a number of parties either directly involved in setting the commutation terms or with some degree of influence, including trustees, sponsor, scheme actuary, government
- Actuarial equivalence (with the pension given up and other member options) is only one of a number of factors which will influence commutation terms
- There is asymmetry in changing commutation terms. Once commutation terms are improved it tends to be difficult to reverse the improvements, unless there is a clearly defined framework for setting the terms
- The take-up by members is uncertain, in the case of cash commutation (which is currently tax free) take-up is generally insensitive to the commutation terms. This could, of course, change if taxation regime changes

All of these factors make precisely hedging the cash commutation option difficult unless the terms are well defined and even when the terms are defined, take-up of the option will depend on non-financial factors (e.g. tax or other legislation).

However it should be noted that if the cash commutation terms are based on market rates of interest, and reviewed sufficiently frequently, then the take up of cash commutation does not actually impact the interest-rate sensitivity of the liabilities and hence uncertainty in the take-up rate does not impact on the hedging.

More generally, pension scheme options fall into two categories. Those that can be hedged using traded instruments (e.g. caps and floors on pension increases) and those that cannot.

Options which cannot be hedged represent additional uncertainty in the cashflows and the degree of optionality will influence the precision of any hedging strategy (as discussed above). Where optionality can be hedged, the design of the liability hedge needs to incorporate views on whether the cost of such a hedge and against the risk reduction benefits. This is discussed in Section 3.5.

2.7 Concluding thoughts

On deciding to implement and LDI solutions, there are many factors to consider.

This section has considered some of the key elements covered by this Working Party and each scheme will have its own particular set of circumstances that will dictate which of these issues are more important.

In summary, the issues to consider are:

- How material is the risk reduction

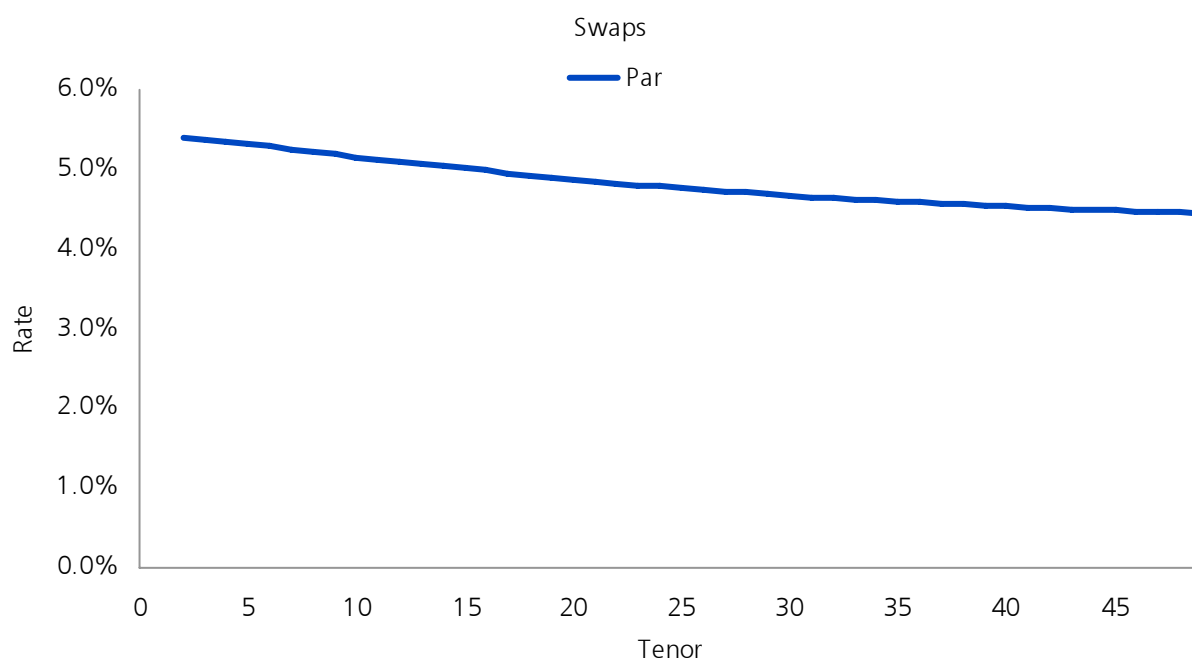
- Are swaps being used to hedge the part of the liability backed by bonds, the entire asset portfolio or the full value of the liabilities?
- How important is short term volatility to the stakeholders?
- How should future contributions and accrual be treated?
- Should liability classes be treated differently?
- How should long-dated cash-flows be hedged?
- How precisely should cash flows be hedged?
- What impact could optionality and demographic factors have on the hedge effectiveness?

3. Market related issues

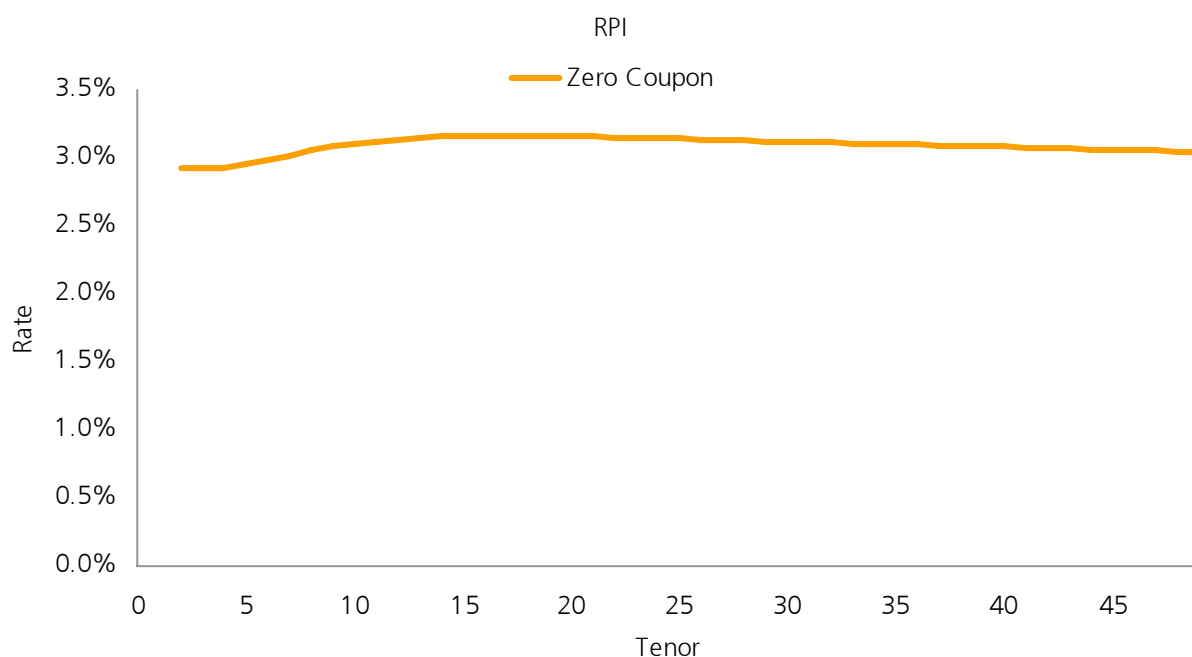
3.1. Market levels at end March 2007

The graphs below show the main quoted market variables for hedging purposes, taken from market data (source: UBS Investment Bank) at the end of March 2007.

- The “par” nominal fixed-floating swap rate.
I.e. the 20 year mid-market rate of 4.9% indicates that a fund could receive a fixed rate of 4.9% in return for a floating rate of Libor, paid semi annually for 20 years on the same nominal. The “par” rate is analogous to the yield on a coupon-paying bond.



- The zero coupon inflation swap rate.
I.e. the 20 year mid-market rate of 3.16% indicates that a fund could receive the increase in the RPI index over 20 years, $[RPI(t=20) / RPI(t=0)]$ in return for paying a compounded rate of 3.16% per annum $[(1+3.16\%)^{20}]$. The zero swap rate is analogous to the yield on a zero-coupon bond.



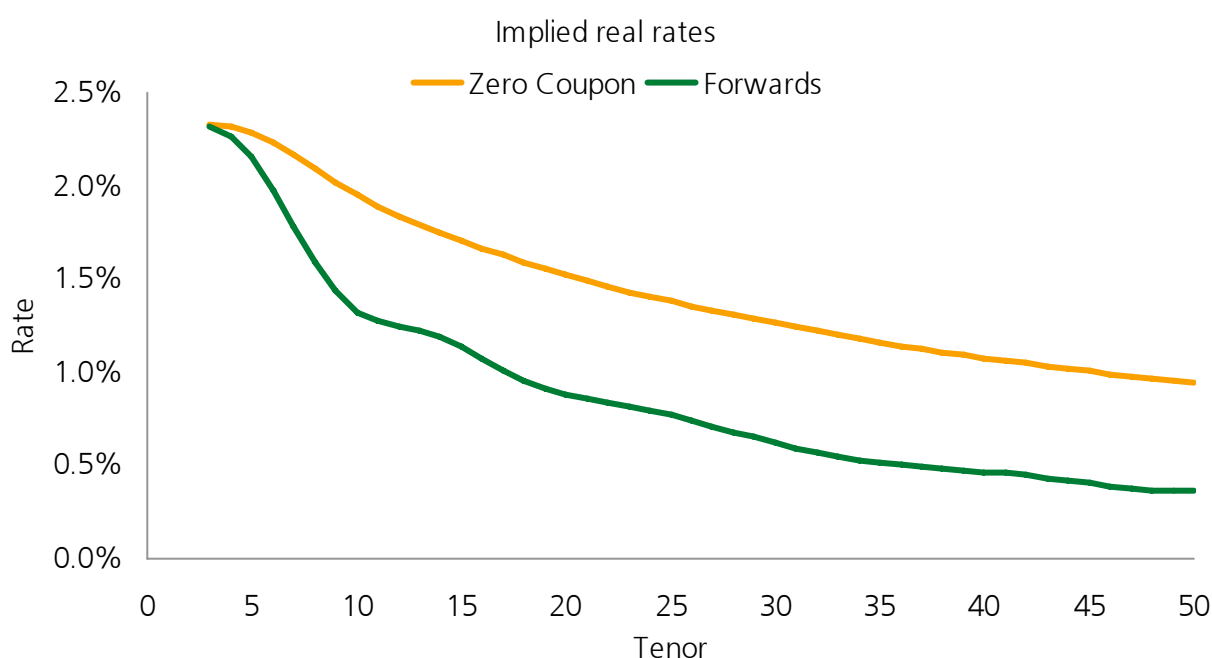
3.2. Comments on market levels

Currently, the yield curve is strongly inverted, that is long dated yields are lower than shorter dated yields.

In particular, for inflation linked liabilities, it is the real rate of interest that is important. The graph below shows the real rates of interest that result from a combination of fixed-floating and inflation swaps.

We see that real yields fall sharply over time – indeed when one considers the forward real yield (i.e. the implied 1 year real yield in x year's time) we see that forward real yields are close to zero. Indeed at times, the implied forward real yields for very long durations have fallen below zero.

Another benchmark for this is the real (par) yield on the 50 year index-linked gilt (2055 maturity, 1.25% inflation linked coupon) which fell to a low of 0.38% on January 18 2006, although this has since risen to closer to 1%.



3.3. Implications for hedging strategies

When considering implementation of hedging strategies, the potential variation in the levels that can be achieved, depending on market conditions, will typically swamp the transaction costs, in terms of bid-offer spreads. Hence having regard to market conditions is very important.

Low market yields are sometimes cited as a reason to avoid hedging and LDI strategies.

This overlooks, however, the trade off between risk and return for schemes.

By choosing not to hedge longer dated cashflows, a scheme should be aware that it is consciously accepting a degree of risk.

This risk is worthwhile if, but only if, the scheme expects to be rewarded for the risk.

If investors believe that the forward curve is a good predictor of future yields, then there is no expected return associated with shorter bonds (as the forward curve currently predicts that they will need to be reinvested at lower yields, giving an overall return equivalent the return on a long dated bond). The case for hedging long dated liabilities would be clear for this investor. Hence in order

to justify not hedging, the investor would need to differ from the market consensus as indicated by the forward yield curve.

Furthermore, it is not sufficient simply to expect to be rewarded for the risk but the expected reward needs to be at least as good as the expected reward associated with the same level of risk-taking elsewhere in the portfolio.

Put in this context, it is not clear that hedging longer dated cashflows is poor value. Ultimately, the case for hedging long-dated liabilities will depend on the level of risk reduction achieved versus beliefs regarding the degree to which forward rates understate future yields, and a comparison of the associated risk-return to other opportunities.

Furthermore, given the leveraged solutions and derivative products available, pension funds have much more flexibility to hedge the risks that are unwanted (e.g. inflation risk), but still choose to maintain other exposures (e.g. equity risk, long-dated rate exposure). Hence LDI need not mean "locking-in" the deficit, as is commonly perceived.

3.4. Potential approaches to achieve value in LDI hedging strategies

3.4.1 Risk budgeting

The case for hedging could be considered as part of an overall risk budgeting exercise, as part of the overall investment strategy. When optimising the overall risk-return trade-off, and for example determining an efficient frontier of investment and hedging strategies:

- Risk is measured relative to the Liability Benchmark Portfolio, i.e. assets that best replicate the sensitivities of the liabilities
- A risk budget is defined as the acceptable level of risk, e.g. based on a 90% Value-at-Risk over the 3-year inter-valuation period, or some similar measure. The aim of risk budgeting is to maximise expected returns for this given level of risk.
- A view needs to be formed on the extent to which the interest rate and inflation market curves are below "fair value". As stated in Section 3.3, if the scheme believes that the forward curve is a good predictor of future yields, there is no expected return associated with mismatching.
- Then the risk-return trade-off associated with not hedging can be assessed in the context of the risk-return trade-off associated with investment in return-seeking assets (e.g. equities)

An alternative approach, to illustrate the opportunity cost / benefit of not hedging is to quantify the extent by which the scheme must believe that forward rates are understated in order to justify expending some of the risk budget, that might otherwise be invested in return-seeking assets, on not hedging liabilities.

To give a simple example, suppose

- equities are expected to return 3% pa over risk-free, and have a volatility of 15% pa
- the fund has a duration gap of 10 years between assets and liabilities
- the volatility of interest rates is assumed to be 0.5% pa.

We ignore correlation effects in this simple example (see Section 2.3).

In this case, if interest rates are expected to rise by 0.1% pa faster than the market forward rates predict, then the return per unit risk on the duration mismatch (return of $10 \times 0.1\% \text{ pa} = 1\% \text{ pa}$ versus risk of $10 \times 0.5\% \text{ pa} = 5\% \text{ pa}$) is equivalent to that on equities (return of 3% pa versus risk of 15% pa).

Hence in this simple example, even if rates were expected to rise say 5bpa faster than implied by the forward yield curve, it would still be efficient to hedge liabilities to use the risk budget to invest in equities.

3.4.2 Separation of inflation and nominal hedges

The swaps market allows decisions on hedging of nominal interest rate exposure to be separated from decisions on hedging inflation. Indeed, to fully hedge inflation linked cashflows, a combination of an inflation swap and a nominal swap is required.

The curves above illustrate that, at the time of writing, it is nominal yields which are inverted, and which cause the very low long-dated real rates, while breakeven inflation rate is fairly level across the curve. Coupled with recent RPI rates at 4.6% (February 2007), hedging long-dated inflation risk at around 3% pa may be regarded as relatively attractive.

This may mean that there is better value in hedging inflation exposures at the current time than nominal liabilities. Nominal interest rate risks may be better addressed via the dynamic strategies discussed in Section 3.4.3.

3.4.3 Phasing and dynamic strategies

If making a major asset allocation switch (e.g. 50% of assets) from say equities to bonds, trustees may be concerned with market timing and market impact if this transition is carried out in a short period of time.

Similarly, when considering liability hedging, if the Trustees are concerned about whether market rates represent fair value, then they may be concerned about implementing a major hedging program over a short period of time.

Phasing of a liability hedging program is one response – it reduces the risk that the decisions look poor in timing terms. Phasing does, however, leave schemes exposed to a higher level of risk during the phasing period.

Another option that is sometimes followed is dynamic switching. Under this approach, trigger points based on target yield levels might be used to time the hedge. An alternative approach is to monitor the overall funding position – if this improves the hedging program might be accelerated. The Pension Protection Fund (2007b) highlight that de-risking in UK pension schemes does appear to be more prevalent in schemes with higher funding levels.

While dynamic approaches seem attractive it is important to bear in mind that in a deteriorating environment, they may result in failing to implement the hedging program. Hence it may also be appropriate to put in place “stop loss” limits, when hedging will be implemented to limit downside risk.

Dynamic approaches can be implemented via option strategies. For example, the fund may choose to defer full swap hedging, but instead put in place zero-cost swaption collar strategies. A swaption is the right, but not the obligation, to enter into a swap. The pension fund can

- buy the right, at any point in the next year say, to enter into a swap at a rate at, say, 50bps below current market levels, at a level where the fund may be forced to de-risk due to deteriorating solvency;

- and fund the premium for this option by selling the right, over the same period, to be put into a swap at a rate say 50bps² above current market levels, set at the target level where the fund is happy to hedge the liabilities.

The fund is thus protected, with no premium paid, against a severe deterioration in funding levels, if rates fall beyond 50bps, and is automatically put into hedging strategies if its target level is reached, forfeiting any improvement in funding resulting from a rise in interest rates above its target levels.

Such swaption strategies have been common, and executed in very large size, amongst Dutch pension funds.

Of course, each of the legs of the collar could be entered into separately – i.e. the fund could pay a premium to protect its solvency, or could forfeit upside above a certain level in return for receiving a premium.

3.4.4 Other strategies

Other potential strategies include:

- Hedging only those liabilities where there is perceived “value” (e.g. fixed cashflows up to 30 years only).
- Proxy hedging of the overall interest and inflation sensitivity but using those instruments that appear to offer better value, e.g. medium rather than long-dated fixed-floating swaps, and short / long dated inflation swaps.
- Active management of the hedge, giving the investment manager discretion to take active views, subject to risk constraints.

3.5. Hedging optionality

In principle the decision on hedging caps and floors on inflation can be separated from the high level decision to hedge (or not) inflation.

This tends to be a simple value based decision. For example at the current time the cost of hedging LPI(0,5) cashflows (which increase in line with inflation with a floor of zero and a maximum of 5% applied each year) is similar, or slightly cheaper, than the cost of a full RPI hedge.

Interestingly, LPI hedges have become more expensive relative to RPI hedges over the last couple of years. This is despite an increase in inflation levels which might have been expected to increase the value of the 5% cap and reduce the cost of the 0% floor and hence reduce the cost of LPI relative to RPI. In practice, this change reflects an increased demand for LPI hedges from pension funds and limited supply.

Schemes, and their advisers, need to formulate their own views on whether this is a worthwhile trade taking into account the impact of removing this risk in comparison with other risks.

Some pension schemes will have more exotic inflation exposures – e.g. floored at 3% rather than 0%, and LPI caps/floors applying over longer than annual periods e.g. LPI in deferment. These exposures can be hedged but supply, liquidity, and hence value for money, is much lower than for annual LPI hedges.

² In practice, for an overall zero-cost option, this will typically be less than 50bps above current market levels, due to skew in the “options” market and to transaction costs.

3.6. Market liquidity and capacity

Another relevant consideration is market liquidity and capacity.

Interest rates and inflation swaps tend to be most liquid out to 30 years and to trade reasonably regularly up to 50 years, but hedging beyond this point tends to be much less liquid.

The GBP interest rate market is very large with strong two way flows.

The inflation swaps market is smaller, although there is a good two way flow with, for example, strong interest in paying inflation from Private Finance Initiative projects with long-dated inflation linked revenue streams.

Watson Wyatt, as quoted in the Financial Times in February 2007, estimated that the total volume of inflation swaps transacted by UK pension schemes was £20bn in 2006, up from £9bn in 2005 and £3bn on 2004.

Hence, in practice, market capacity is typically only a constraint for the very largest of schemes, and only then if they wish to implement a major hedge in a short space of time.

4. Real Life LDI Approaches – public case studies

4.1. Background

Since early this decade, there have been several high profile pension schemes that have adopted and made public LDI asset strategies. Many of these have been documented in the financial press, and a summary of some of these is set out in 4.2.

However, many more schemes have also adopted LDI strategies, both large and small, but have not publicly disclosed the fact and/or the details.

More recent years have seen an increasing number of these mandates. Hymans Robertson (2006) estimated that, as at 31 December 2005, total LDI assets under management for UK institutional pension fund clients were around £42 billion, around half of which was new business in the preceding two years, and this excluded LDI solutions sold directly by investment banks to end clients.

This trend is expected to continue, as more pension schemes and their advisors look more closely at managing and mitigating the risks being run in their schemes, and as more solution providers, develop products to address these needs.

The current product offerings in the LDI space are still under development and evolution.

Several investment banks have been active at building relevant derivatives capabilities, hence, improving the depth and efficiency of the underlying markets and in setting up in-house pension teams to develop solutions for pension funds and their advisers. Hymans Robertson (2006) identifies the leading players.

An increasing number of investment managers have developed capabilities and products to provide LDI solutions. The more successful managers, winning mandates, appear to be those that can demonstrate the in-house expertise, skills and systems to not only implement but also administer and monitor these strategies. Hymans Robertson (2006) suggested that, as at 31 December 2005, the top three investment managers accounted for 70% of the LDI market, which they attributed, in part, to economies of scale in building effective administration.

No particular LDI solution has as yet emerged as the 'market standard'. This can be seen from the variety of approaches in Section 4.2.

4.2. Case studies

4.2.1 Boots - 100% bonds/swaps & passive management.

Boots was one of the first large pension schemes to go public with the implementation of an LDI investment strategy back in July 2001.

At the time, Boots pension scheme had £2.4bn in assets (41% of the company's market capitalisation) and 72,000 members, including employees and pensioners. The scheme had 75% of its assets in equities, 20% in short term bonds and 5% in cash before it started transferring all its assets into long dated AAA sovereign bonds, including 25% inflation linked. This transfer occurred over 15 months to July 2001, which meant that the equities were sold at an average FTSE level of 6000.

The bonds purchased had a weighted average maturity of 30 years, similar to the maturity and indexation of the accrued pension liabilities. Credit risk was minimal since in the scheme did not invest in corporate bonds, which average a BBB credit rating, but focused instead on AAA-rated pseudo-sovereign bonds, issued by supranational issuers such as the World Bank and European Investment Bank. The stated reasons for this were:

- the trustees were reluctant to embrace significant credit risk, particularly over the long durations required to match liabilities.
- these supranational issuers offered, or were prepared to issue, very long-dated bonds that could be used to immunise long-dated pension liabilities.
- at the time, these supranational bonds offered a significant premium (close to 100bps) over equivalent Government bonds. This, in part, reflected lower liquidity (Boots pension scheme owned 100% of the total issuance of some of the bonds purchased) but the scheme expected to be a long-term holder.

Legal & General Investment Management was appointed to transfer all the assets into bonds and prior to this the funds were managed in-house.

In hindsight, this move turned out to be well-timed as it avoided the worst of the equity bear market earlier this decade and bought long-dated bonds at relatively high yields, crystallising the pension fund surplus. However, the strategy of investing in long-term bonds was "about matching assets and liabilities, not about second-guessing the market," according to John Ralfe, the company's director of corporate finance at that time.

Mr Ralfe was quoted as saying that Boots four main objectives were

- to reduce the financial risk for the company
- to fix at a set level its cash contributions to the plan
- to reduce dealing costs and fees paid to fund managers
- and to increase security for members of the plan.

"The advantages to the company are that they will hope to gain a much more stable and predictable contribution requirement to the scheme, because there is less volatility," he said. That, in turn, can be an advantage for workers, he explained, as the stability of bond investments may make an employer more inclined to continue supporting a pension plan.

Switching from active portfolio management to a passive bond portfolio was reported to have reduced management costs from circa £10m to £0.25m per annum.

According to John Watson, chairman of Boots Pensions, the decision was based on a desire for "a more conservative investment strategy that aims to secure members' pensions and reduce investment risks to a minimum."

The scheme had to justify the decision to its 72,000 scheme members, and it did so by saying that the move would help to secure current and future pensions against a background of low inflation and stock market decline, plus a maturing fund and increased longevity risk.

Another factor that the corporate sponsor cited as a trigger for this move was the imposition of FRS17, which obliged companies to disclose the balance sheet effects of pension fund fluctuations.

This highlighted the fact that Boots shareholders were effectively indirect investors in whatever stocks the Boots pension fund put its money into.

Corporate finance theory suggests that although legally separate, pension fund assets should be viewed as if they were assets of the sponsoring firm [Black (1980) and Alexander (2002)]. John Ralfe cited the paper by Exley, Mehta & Smith (1997) as influencing Boots's thinking.

Hence a reduction in the matching risk within the pension fund, allows the corporate sponsor to increase risk within the corporate balance sheet by taking on additional gearing. For Boots this meant that the change in investment strategy within the pension fund, corresponded with a share

buy-back of £300m (5.4% of market capitalisation) announced in March 2002. The company used cash on the balance sheet, but attributed the purchase to the reallocation of its pension fund.

The pension fund subsequently made two amendments to its original investment strategy.

The fund subsequently increased its exposure to inflation-linked investments through the use of inflation-linked swaps, in April 2002, by £200m. This move increased the exposure of the fund to inflation-linked assets from a quarter to a third.

In 2004, the fund moved away from 100% bonds, to invest 10-15% of assets in equities and other 'risky' assets. One explanation provided for the move from the Trustees was that there was a shortage of appropriate sterling denominated bonds of sufficient maturity in issue to cover the fund's liabilities. However the fund was also subject to longevity risk and was being hit with the increasing life expectancy of its members. Given the realisation that the scheme still carried unmatched risks, the Trustees maintained that the relatively modest reallocation to equities and property has only a limited impact on the scheme's overall risk.

4.2.2 ICI - unleveraged pooled funds as part of diversified asset mix

Together with Boots, in 2001, ICI Group pension fund was one of the first large schemes in the UK to implement a LDI investment strategy.

The mature £7bn ICI Pension Scheme backed 75,000 members, out of which only 1,000 were active. Due to its mature profile and the Company's aim of reducing cost volatility, the ICI Pension Fund was one of the first to reduce its exposure to equities in late 2000, before the worst of the bear market.

The objective was to move to a 20% allocation to equities. The restructuring also saw changes in investment managers, and transfer of £2bn gilts and £1bn equities into corporate bonds.

However, the fund wanted to further reduce unrewarded risk using a swap overlay to more closely match liabilities.

However, the pension fund had an issue in that derivatives were not a permitted asset under the Trust deed, and so the fund could not contract directly with banks. The solution was to use Barclays Global Investors (BGI) as an intermediary, with the ICI Pension Scheme invested £1.75bn in pooled LDI funds chosen to match the liability cashflows.

In 2003, following the disclosure of a widening in the scheme deficit, ICI implemented a funding strategy involving contingent assets (see section 6.5.1).

4.2.3 Friends Provident - swapped liabilities to floating, with no change to asset mix

Historically, the Friends Provident Pension scheme boasted a sizeable surplus. As a result, Friends hadn't paid in employer contributions for about four years and employees had also not paid contributions, other than AVCs, since 1986. However, as a result of the stock market downturn and other factors such as increased longevity, and the scheme found itself with a relatively small (£29m) deficit.

As a result, the scheme decided to hedge more of its interest and inflation risk in 2003, and employer and employee contributions both resumed from January 2004.

Friends Provident already had significant experience working on derivatives strategies related to its life insurance business, for example guaranteed annuity option hedging done with Goldman Sachs, Merrill Lynch and UBS Investment Bank. Hence, the company was already comfortable with the use of derivatives, and used this expertise to implement similar risk-management strategies for the pension fund.

In particular, Friends Provident wished to buy protection against changes in the real yield that could adversely affect the value of its liabilities.

The approach adopted, at the recommendation of Merrill Lynch, was to fully swap the pension fund's exposure to interest rates and inflation.

Friends Provident chose to use swaps to allow much more customised hedging of their liability exposures. But rather than hedging every single point on the curve, they took a bucketed approach and went as long as they could, where there was a sufficiently liquid market.

The fund now only faces equity risk, which is an exposure it is used to managing, and can make asset allocation decisions independently of considerations relating to reducing the risks on the liability side.

Friends Provident chose to implement a full hedge of liability risks, while maintaining a high equity weighting in the scheme. Essentially the benchmark for asset performance was transformed to Libor (see 2.3 regarding hedging liabilities backed by risk assets).

Friends Provident announced in March 2007 that the inflation swaps used had been exchanged for positions in 10 liability driven investment pooled funds. The Working Party believes these are likely to be leveraged pooled funds.

4.2.4 W H Smith - swaps & LIBOR generating asset, equity call options

The £870m pension fund found itself with a £220m deficit back in 2004.

The LDI process began in 2004 when W H Smith sold Hodder Headline, and invested the proceeds in inflation linked bonds to reduce the deficit and more closely match the liabilities.

Following on, W H Smiths appointed Goldman Sachs to look at the risks faced by the scheme and the sponsor, and to construct a solution. The key risks identified were interest rate, inflation and equity risk. The first two were undesired risks, on which the firm had no directional view, and the equity downside exposure potentially exceeded the firm's risk tolerance.

In September 2005, the Trustees of the W H Smith Pension Trust adopted a new investment policy. 94% of the assets were invested in inflation and interest rate hedged investments, to match liabilities. The remaining 6% was used to purchase long-dated equity call options designed to enable the fund to benefit from any higher equity returns. This provided exposure to the upside on equities representing around 40% of assets.

Deloitte was employed as an independent consultant and State Street Global Advisers was brought in to set up a bespoke pooled fund – a special purpose vehicle with an insurance wrapper – to manage the investment on a daily basis.

"We wanted State Street to stand between us and Goldman," says Martin Taylor, Chairman. "We needed a fiduciary to administer and manage the collateral calls. State Street does so at a fraction of the usual asset management fees."

Goldman Sachs transitioned the fund into the new structure of swaps – limited price indexed (LPI) swaps, total return swaps and cash. The fund swaps cash instruments paying Libor for LPI returns to match the fund's promises to pensioners. There is a second set of contracts – total return swaps – to ensure that the fund pays Libor. The fund also holds cash to act as collateral and provide liquidity.

4.2.5 Schroders - bonds/unleveraged derivatives, plus diversified alpha

As Schroders advises about 600 schemes and institutions on how to manage pension funds, taking steps on its own pension fund sets a strong precedent.

The justification of the investment restructuring was stated as the realisation that the risk of the fund was skewed, and that investments in equities exposes Schroders' to a double risk, as its own earnings are heavily correlated with equity markets. The majority of the governance effort was devoted, historically, to controlling risks from active positions relative to the benchmarks, rather than the more significant risks arising from the mismatch between the asset benchmarks and the pension liabilities.

In late 2005 / early 2006, the £465m Schroders pension fund moved to a liability-driven investment (LDI) strategy with a 35% allocation to liability-matching bonds and derivatives, 36% in equities (reducing UK equity exposure bias), and 29% in alternatives, of which property accounted for half.

Despite being fully funded, after allowing for the firms extra contributions, the strategy still seeks outperformance and alpha. This reflects the view that even though the interest rate and inflation risks can be hedged, the pension fund bears other risks that cannot be, such as longevity risk, tax risk and regulatory risk.

Benefits cited are:

- the portfolio will now encourage greater separation of alpha and beta, and so alpha can be sought in areas most likely to deliver, such as emerging market debt, property, or smaller companies.
- with the liabilities at the centre of the fund, the risk budget can more directly be released to add value
- the high level of diversification across asset classes significantly reduces overall portfolio risk

Under investment advice from Hewitt Associates, the Schroders pension fund had limited its liability-matching element to 20 years to avoid locking in to long-dated bond yields, which have fallen to historically low levels.

John Troiano, executive director at Schroders, said: "Historically, sponsors have sought primarily to minimise the long-term cost of contributions to their firm. This supported high equity weightings and made sponsors relatively risk-tolerant. The advent of FRS 17 has now caused sponsors to focus on the volatility of the funding level since changes feed straight through to the (profit-and-loss account). As a result, sponsors have become significantly more risk-averse and the measurement of this risk is now relative to their liabilities."

4.2.6 London Pensions Fund Authority (LPFA) – different approach for actives and pensioners

During 2005, the £3.2bn London Pensions Fund Authority, which oversees the schemes of more than 220 public sector employers, such as local authorities, overhauled its investment strategy in an attempt to ensure it has enough cash each year to pay its promised benefits without calling on taxpayers to pay more.

The funding ratio backing active members had fallen to 74% (from 103%) and for pensioners and deferreds to 91% (from 99%) between 2001 and 2004.

The LPFA cut the proportion of its assets that it held in equities and reduced the risks in its bond portfolios through increased use of derivatives.

LPFA choose to pursue distinct strategies for the active members, and for the deferred/pensioner members. Essentially:

- for active members the focus was on diversification, and long-term outperformance of liabilities, and
- for deferred/pensioners, the focus was on close short-term matching of liabilities with a much lower outperformance target.

The £1.8bn active member portfolio reduced its equity holding from 75% to 65% and switched from an index-tracking fund to two active fund managers mandated to outperform a world stock market index by 2%. Bond and cash investments increased to 20%, and were mandated to return inflation plus 5%. The portfolio also implemented currency hedging to reduce additional risks from foreign currency exposures. The fund had a target allocation of 15% to alternatives, of which 7% was in property unit trusts and 5% in private equity.

The benchmarks for the active member portfolio were designed to outperform liabilities over the long-term, but offered relatively limited protection against short-term volatility from fluctuations in market interest rates.

In contrast, the £1.4bn pensioner and deferred member portfolio moved to a new strategy of holding 12.5% in an equity index tracking fund with Legal & General and 87.5% in bonds and derivatives designed to match and exceed liability cashflows by 1.5%. The LDI part of the investment strategy is split between BGI, ECM and Insight.

4.2.7 Kvaerner / TH Pension - liability matching + levered hedge funds

The Norwegian-controlled group owned the Trafalgar House construction and many other interests in this country. Faced with difficult trading conditions in recent years it wound down or sold off its UK business, leaving very little to back its £1.2bn pension fund or to cover an estimated £245m deficit. The scheme has around 14,000 pensioners and 17,000 deferred pensioners.

In April 2006, the Trustees did a deal whereby the company agreed as a final settlement to inject £101m into the fund. Kvaerner Pension Fund received an initial lump-sum payment of £20m, followed by six further annual payments, together with a loan note payable by 2012. In return, TH Global is no longer associated with the Kvaerner Pension Fund, which continues as an un-sponsored pension scheme, which the Working Party believes to be the first of its kind in the UK. The Pensions Regulator cleared this plan for TH Global to terminate its liabilities without making good the full funding shortfall.

Following the deal, the trustees have embarked on an aggressive investment strategy to reduce the deficit. Half the fund was invested in liability matching assets, bonds, swaps and derivatives, to bring the risk in the fund under control. The other half was invested in a diverse range of alpha and outperformance generating assets, including hedge funds, private equity and active equities. More than a quarter of the total fund is to be allocated to hedge funds and private equity and nearly as much to active equities and property.

Ros Altman, one of the trustees and a prominent pensions campaigner, said the alternative faced by the pension fund was between going into the PPF or to get a cash injection into the scheme and then pursue outperforming assets to make good the shortfall.

The affair highlights the dilemma of trustees of weakly funded pension schemes. Should they defend what remains of the pension assets through cautious policies, resulting in low returns and cut benefits, or should they gamble on high returns, potentially resulting in an even larger shortfall.

In this case, the trustees chose the latter. As discussed in Section 1.3.6, the PPF does not charge higher risk-based levies for schemes adopting aggressive strategies, which may have encouraged the Trustees to adopt the more aggressive approach to recover the deficit.

4.2.8 Vivendi - CPPI relative to liabilities + swap hedges

A different LDI solution was implemented by Vivendi, managed through by Axa using products from JP Morgan and Merrill Lynch. At the end of 2004, the £175m pension fund had a deficit of £74m on an FRS17 basis (£158m buyout basis). At the time, its asset mix was 60% bonds and 40% equities. Vivendi assessed the 10-year VaR to be in the region £80-100m, far in excess of the risk budget they were prepared to run of £12m.

Given the dual objectives of drastically reducing the VaR and filling a large deficit, the pension fund decided to:

- Purchase a 10-year constant proportion portfolio insurance (CPPI) solution from JP Morgan, through Axa. To avoid locking out of equities, the structure ensures a minimum 20% exposure to equities, whilst ensuring certain out-performance above a given bond benchmark does get locked-in. The equity exposure is to the S&P 500 and FTSE 100, and is aimed at four times gearing.

CPPI strategies effectively manage equity risk against a liability benchmark, with the equity weighting cut back as assets values fall relative to liabilities, and increased if equities perform relatively well. The bank covers the "gap risk" that equity exposure can not be cut back in time and assets fall below the liability floor.

Under CPPI equities are sold on weakness and bought on strength. It has typically, therefore, been a more common strategy amongst life companies and Dutch pension funds, who have regulatory constraints requiring them to maintain a minimum level of surplus risk capital above the value of liabilities. It has been less common amongst UK pension funds, who have often preferred to be value players, buying equities when perceived to be cheap, and who typically have the issue that their asset values have already fallen below liabilities: hence UK pension fund often follow the reverse strategy of de-risking as solvency levels rise, rather than fall (see Section 3.4.3).

- Enter into inflation and interest rate swaps with Merrill Lynch, to hedge curve risks, for a notional £100m up to 50 years out.
- Maintain two active fixed income portfolios with Pimco and Axa
- Seek substantial additional corporate contributions

4.2.9 Sainsbury – internally sourced inflation

By October 2005, declines in bond yields had increased the pension deficit in the Sainsbury's pension fund, as measured by IAS19, to £408m. The physical assets of the scheme at that time were invested in around 55% equities / 35% bonds / 10% alternatives (hedge funds, private equity, property).

The corporate covenant was also under pressure due to increased competition in the retail markets, and the need for Sainsbury to repay £800m of debt over the following 18 months.

Advised by UBS Investment Bank and Morgan Stanley, Sainsbury carried out an innovative property securitisation, as described in Section 6.5.6.

This led to an immediate capital injection of £350 million into the pension fund, which was entirely invested in bonds as part of a plan to move to a 55% bond weighting over 5 years. Equity futures were also used to facilitate the shift away from equities.

The Trustees of the scheme also embarked on an LDI strategy, entering into a £1.1 billion inflation swap, receiving LPI and paying a fixed rate. The inflation hedging was focused on that part of the curve deemed to offer best value.

However, unusually, the inflation was actually sourced from the corporate sponsor, which needed to take an opposite position in inflation as part of the property securitisation and refinancing. The swap was intermediated by Sainsbury's banking advisors, UBS and Morgan Stanley, so as to remove the associated credit exposure of the pension fund to the corporate sponsor.

By transacting in this way, Sainsbury pension fund saved an estimated £8 million in transaction costs and was awarded the Pension Fund Risk Manager of the Year award for 2007 by Risk Magazine.

Sainsbury's pension fund has also announced its aim to further increase the size of the inflation hedging to £2 billion (around 50% of the liabilities) and to increase the exposure to alternatives, including commodities, to 20% of the fund.

4.2.10 BAA – swap and futures overlay to reduce risk

In 2007, following the takeover by Ferrovial, the £2.1bn BAA pension scheme sold £580m of equity exposure using exchange futures, and bought £720m of swaps to hedge inflation and interest rate risks. The move allowed the scheme to switch from 70/30 equity/bond exposure to a 40/60 net exposure, without selling any of the underlying assets.

This was aimed at protecting the funding ratio immediately, whilst allowing time to evaluate a long term strategy. The move was triggered by the Trustees perception that the strength of the covenant had weakened, and Ferrovial's desire to reduce the level of risk in the portfolio.

4.2.11 Pension Protection Fund (PPF) – swaps to match liabilities

The Pension Protection Fund (2006b) Statement of Investment Principles sets out a strategy of investing in:

- a diversified range of investments maximising expected excess returns subject to specific constraints, and avoiding unrewarded risks.
- interest bearing assets
- a swap overlay to minimise the fund's exposure to interest rate or inflation risk.

The successful implementation of the 'swap' hedge by Insight was announced in March 2007. Insight also manages the PPF bond portfolio alongside other existing PPF fund managers, Goldman Sachs and Pimco.

The swap overlay minimises exposure to sensitivities affecting PPF liabilities and allows the rest of the portfolio to be managed against appropriate asset benchmarks. The PPF will also use the liability profile of schemes approaching transfer to the PPF to determine the profile of the swaps used.

4.2.12 Other public LDI adopters

Other pension schemes that have publicly adopted LDI investment strategies, typically involving the use of interest/inflation swaps, either directly, or via pooled funds, include Telent (see Section 6.5.2), Durham County Council, Scottish and Newcastle, Kingfisher, RHM and Xerox UK

4.3. Contrast of approaches

The case studies above demonstrate that there are a variety of contrasting approaches to LDI (with examples shown):

- Use of very long-dated bonds (Boots) or swap overlays (most others) to match very long-dated liabilities.
- LDI with 100% of assets in bonds/swaps (historic Boots strategy), versus assets mostly in bonds/swaps, but with some investment in 'risky' assets (new Boots, ICI, W H Smith, LPFA pensioners).
- LDI used to support aggressive strategy on residual assets (Kvaerner).
- Derivative overlay to swaps liabilities to floating but with no change to asset allocation (Friends Provident).
- Swaps used as part of overall risk budgeting and in conjunction with diversification (Schroders, ICI, LPFA actives, Kvaerner).
- Focus on short-term mark-to-market risk relative to liabilities (LPFA pensioners) versus focus on long-term out-performance of liabilities (LPFA actives).
- CPPI with automatic de-risking as solvency falls towards a floor (Vivendi), versus more common UK pension fund approach of de-risking on strength (see Section 3.4.3 and Pension Protection Fund (2007b)).
- Sourcing of inflation from the corporate sponsor (Sainsbury) versus from external sources (other case studies).
- Use of pooled funds (ICI, Friends Provident) versus bespoke solutions (other case studies) – see Section 5.1.3.
- Leveraged (Friends Provident) versus unleveraged pooled funds (ICI) – see Section 5.2.
- Swaps / inflation swaps chosen with regard to market conditions (Schroders, Sainsbury) or on a market-neutral basis (WH Smiths, Friends Provident) – see Section 3.
- Equity futures to synthetically reduce equity risk in short time frame (Sainsbury, BAA)

5. Practical implementation of LDI derivative strategies

5.1. Current approaches

Implementation of derivative strategies typically falls into three main categories:

5.1.1 Bespoke derivatives solutions contracted directly with an investment bank.

This maximises flexibility and offers the most tailored solutions to meet the specific needs of the pension fund.

It may also reduce overall fees paid if an investment manager is not involved.

Many of the case studies in Section 4 were implemented in this way.

The disadvantage is typically the administrative costs involved in establishing ISDA agreements and collateral arrangements related to OTC derivative contracts. Therefore, bespoke arrangements tend to be used by larger pension funds only.

If the investment bank is acting as principal on the transaction, then the pension fund will require independent advice on pricing and execution. This could be provided by a consultant, or by an investment manager under a bespoke portfolio.

5.1.2 Segregated bespoke portfolios established by investment managers.

This would allow similar access to derivatives but effectively outsources the execution and administration of derivatives to an investment manager.

For LDI portfolios implemented with investment managers, this has to date been the main route used. Hymans Robertson (2006) estimated that around 90% of LDI funds under management at with investment managers at 31.12.05 were held in segregated funds, with only 10% in pooled funds (see 5.1.3).

The legal documentation of OTC derivatives could also be covered under a standard “umbrella” ISDA agreement, which has been previously established by the fund manager with investment bank counterparties, and to which the pension funds can be added.

Segregated bespoke portfolios are typically available to, and cost effective for, larger funds with mandate sizes in excess of £50 - £100 million.

5.1.3 Pooled funds established by investment managers

An increasing number of investment managers are launching pooled fund solutions to provide access to LDI solutions, particularly for smaller pension funds.

Generically, a pooled fund is a fund where more than one investor pays money into the same fund. It is a way of co-investing money with other investors to participate in a wider range of investments than may be feasible for an individual investor and to share the costs of doing so. The monies are used to purchase securities depending on the objective of the fund. When the investor pays money into the fund he is allocated a number of units based on the unit price at the time of investment and amount of money invested e.g. ignoring dealing spreads etc, an investment of £1,000 would purchase 1,000 units if the units were priced at £1 each. When an investor wishes to realise his investment he will receive a payment equal to 1,000 times the unit price – if for example the unit price has risen to £1.20, the proceeds will £1,200 i.e. a profit of 20%

In an LDI context, pooled funds typically provide relevant exposure to specific segments of the yield curve and real yield curve.

Pooled funds are typically invested to provide bullet payments at long-dated maturities, e.g. one payment in 2040, or 5 to 10 year 'buckets', e.g. a series of equal payments (nominal or linked to a reference inflation index) from 2035 to 2045.

For unleveraged (see Section 5.2 for leveraged) funds, this is achieved by investment in cash and/or fixed interest securities together with swaps to exchange the cashflows on the fixed interest securities, or their underlying indices, for the desired longer-dated cash flows. Funded swaps may also be used to achieve the desired cash flows i.e. payment from the pension scheme is made up front to purchase fixed or inflation-linked cashflows from a bank.

The buckets of most interest to investors have been the 30-50 years duration. Liabilities at this distant range are more affected by changes in interest rates, so by buying into the longer-dated buckets, trustees are reducing the balance-sheet volatility of their pension costs.

Pooled fund buckets are currently available to gain exposure to interest rates, and to retail price indexation (RPI) or limited price indexation (LPI) linked cashflows by the further use of inflation swaps within the pooled fund.

5.1.4 Advantages of pooled funds compared to bespoke solutions

The use of pooled funds removes the need for pension funds to individually negotiate legal agreements such as ISDAs.

Pooled fund also offer advantages for clients who can not, or are unsure if they may, invest in derivatives directly. This applies to schemes in the Local Government Pension Scheme, and also to some corporate schemes (see ICI case study in Section 4.2.2).

The fees are likely to be lower for smaller clients e.g. less than £50 to £100 million.

The range of pooled LDI funds in the market has developed significantly over the last two years giving pension schemes a wider choice of 'off the shelf' options.

An approximate match to the theoretical liability cash flows may be sufficient in context of other risks to UK defined benefit pension schemes e.g. mortality.

Pooled funds can give clients anonymity i.e. the market does not know that one particular scheme is putting on a large swap position.

5.1.5 Disadvantages of pooled funds compared to bespoke solutions

Some managers will offer a fund "wrapper" on bespoke solutions. I.e. the pension fund is the sole investor in a pooled fund tailored to the pension fund's specific needs. This service is normally available to larger clients but provides many of the advantages of pooled funds in a bespoke format.

The documentation advantage may be less clear-cut in practice.

- Umbrella ISDAs can ease the legal negotiation process.
- The documentation process is a one-off exercise, so once it is in place then future execution directly with banks or via bespoke portfolios is much easier.

Fees for pooled funds may not typically be so cost effective for larger clients, e.g. over £50m to £100m.

Liability Driven Investment, by definition, should be based on the specific liabilities of the pension fund. Pooled funds will not provide an exact match to the liability cash flows of a particular fund and the closeness of fit will depend on the available choice of pooled funds. In contrast, segregated approaches can be as flexible as the client requires.

The choice of discount curve (e.g. gilts, AA, Libor) is embedded within the pooled fund and the choice of instrument (government bonds, credit, swaps) used to provide the cashflow matching.

For pooled funds with a mix of credit and active management as well as swaps, it may be difficult to assess the performance versus the benchmark and to produce useful attribution analysis.

Pooled funds typically limit the ability of the pension fund to access more innovative and bespoke solutions.

For inflation-linked liabilities, pooled fund solutions to date typically combine both inflation and duration matching, as with index-linked bonds. In contrast, bespoke solutions allow these elements to be separated and hence separately optimised. The bespoke approach has significant advantages in current market conditions (see Section 3.4.2).

Finally, pooled funds require a physical investment of assets to the value of the liabilities that are to be hedged. This is in contrast to derivative overlays, which can leave the physical assets unaffected. In particular, investment in pooled funds might reduce the availability of funds to invest in return seeking assets to outperform the hedged liabilities. This issue has been partially addressed by the development of leveraged pooled funds as discussed in Section 5.2.

5.2. Leveraged pooled funds

Leveraged pooled funds were a 2nd generation development, established to allow a pension fund to hedge interest rate and inflation risks on all or a large part of their liabilities, whilst still leaving part of the funds free to be invested to generate excess return.

This is particularly attractive to pension schemes that are currently in deficit and need to attempt to reduce this through excess returns on the assets in the fund.

Leveraged pooled funds, as with unleveraged funds, lengthen duration and inflation exposure by using swaps. The swaps are set up to hedge a desired liability exposure, with a certain amount of cash being set aside to back the swaps. The cash needs to cover any margining requirements plus a contingency to meet margin calls in the event of market movements that reduce the value of the swap position. But, crucially, the cash required is less than the present value of the hedged liability flows, hence the leverage.

VAR analysis can be used to help determine the cash requirements (and consequently the amount of gearing that can be achieved).

Typically most leveraged funds achieve 2 to 3 times leverage e.g. the cash that is invested in the pooled fund is around 33%-50% of the value of the hedged liability cash flows and the remaining assets can be invested to seek excess returns.

5.2.1 Advantages of leveraged funds

The key point of having leveraged funds is to allow flexibility to include return seeking assets outside the LDI pooled fund as part of the backing for the swap exposure. This avoids “locking-in” deficits, and enables the pension fund to aim to outperform the hedged liabilities.

Leveraged funds can also be used to hedge an unfunded deficit, although in practice few pension funds have gone down this route to date (see Section 2.3.1 and 2.4).

The higher the gearing, the greater the flexibility to include return-seeking assets outside the LDI fund within the investment strategy.

5.2.2 Disadvantages of Leveraged funds

If interest rates rise the investor may be required to invest more money (or sell other investments with the same manager) in order to maintain gearing within reasonable limits. Alternatively the liabilities secured with the swap could be reduced. Potentially, also, the leveraged fund could be closed if interest rates rise too far.

The higher the gearing the higher the risk the more likely the fund manager may need to take such action in future to reduce the gearing.

The concept of leveraged pooled funds, and the risks involved, can be complex to explain to Trustees.

Investment in leveraged pooled funds may also be perceived as 'gearing' and therefore high risk, and indeed may even conflict with the scheme's investment principles. Although, equally, this may allow some clients to access leverage through a pooled fund who might be unable to do so directly.

If assets backing the hedge outside the LDI fund are not cash there is a risk of a shortfall between the investment return on those assets and the LIBOR leg of the swaps.

Leveraged funds are more complex for the investment manager to administer and the Trustees, and their advisers, will need to be satisfied that the processes involved are robust.

5.3. Insurance buyouts – and their role in a LDI strategy

The ultimate method of offloading all risk from the pension fund is to buyout the liabilities with an insurance company.

The insurance buyout market had until recently been largely a duopoly between Prudential and Legal & General. However, recently the market has attracted significant interest from potential investors, with a number of new entrants such as Paternoster, Synesis, Pensions Insurance Corporation and Axial, joining the incumbent players, and some established insurers such as Aegon, Canada Life and AIG re-entering the market.

The cost of a full insurance buyout is generally significantly higher than the value placed on the liabilities under a 'regular' actuarial valuation (see Section 1.3.1) – for example 30%-40% higher than FRS17/IAS19 liabilities. This is for a number of reasons, largely reflecting the stricter regulatory regime for insurance companies, under the Financial Services Authority's jurisdiction.

- Insurers can not rely on the covenant of an external sponsor to make good any shortfalls. Consequently, insurers must fully fund their liabilities and hold additional risk capital against longevity risk and asset-liability mismatches
- Insurers typically discount using the full curve, rather than one specific point (see Section 1.3.2)
- Insurers typically adopt more conservative assumptions on future mortality improvements
- Insurers typically back pension liabilities with 100% bonds, rather than any equity exposure (see Section 7.2) and this is reflected in the discount rates used to determine liabilities and pricing.
- Insurance buyout quotes include the capitalised cost of future administration expenses
- Insurance companies are commercial enterprises and need to earn a commercial return on the capital held in their business and make a profit.

It should be noted that many of these effects are much more significant for deferred pensions. For pensions in payment, the cost of buyout might not be materially higher than the amount of bonds a pension fund might hold to cover these liabilities.

The increased competition has had the effect of reducing margins and hence narrowing this gap, but only slightly.

The more significant effect of the new entrants has been:

- a significant expansion of market capacity, making buyout feasible even for very large (e.g. £5 billion+) pension funds.
- an increase in product innovation and flexibility, for example partial buyouts, profit sharing and deferred buyouts in addition to the potential development of pure longevity hedges.
- more innovative investment strategies (see Section 7.4) which should further improve pricing and are also leading to a coming together of pension fund and life insurance approaches to LDI.

Hence, going forward, we would expect to see insurance buyout move from an all-or-nothing solution, to part of the overall LDI framework. Essentially buyouts can represent another asset class within an LDI mandate, with returns managed towards a buyout target. The joint venture announced in May 2007 between UBS Global Asset Management and Aegon is an example of this form of solution.

The investment banking community are also in the early stages of developing pure longevity risk-transfer solutions – for example the LifeMetrics initiative developed by JP Morgan with Watson Wyatt and The Pensions Institute – which can also form part of the LDI toolkit of the future.

6. Contingent assets

6.1. Background – what is a contingent asset?

The beneficiaries of a pension fund draw their security from two sources:

- The assets in the pension fund, which are ring-fenced from other assets and liabilities of the corporate sponsor on insolvency
- The corporate covenant. This refers both to the security of the ongoing contributions, including contributions required to make good a deficit under any recovery plan, and the status of the fund as a, typically unsecured, creditor of the sponsor on insolvency.

The Pensions Regulator (2005) has endorsed this view of pension deficits, stating that pension deficits are an unsecured loan by scheme members to the company and that “pension schemes in deficit should be treated in the same way as any other material unsecured creditor”.

The Working Party defines a contingent asset as an asset that has an additional value to the pension fund, and its beneficiaries, contingent on the insolvency of the sponsoring employer. This is essentially equivalent to the definition of the Pension Protection Fund (2006a) except they refer to the asset specifically producing cash in this event.

A contingent asset could be either:

- Assets held outside of the pension scheme, but available to the beneficiaries of the pension scheme on the insolvency of the sponsoring employer. That is, the pension fund becomes a secured creditor of the sponsor.
Or:
- Assets within the fund but which have an enhanced value in the event of insolvency.

6.2. Rationale for using contingent assets

The regime implemented by the Pensions Regulator is likely to create increasing pressure for funding of pension funds. However, fully funding benefits within the pension fund can have disadvantages to the plan sponsor, several of which relate to investment strategy, such as:

- Cashflow and financing constraints.
- Loss of investment and risk management control over invested funds.
- Difficulty to access surpluses if investments perform well, and tax penalties even when surpluses can be extracted.
- Restrictions e.g. on self investment.

As explained above, the need to hold assets within a ring-fenced pension fund is primarily important to provide additional security to the beneficiaries only on the insolvency of the sponsor, since if the sponsor continues as a going concern then the benefits should be paid.

Hence the use of contingent assets might provide a valid part of an overall funding strategy agreed between the sponsor and Trustees. In particular contingent assets might provide additional flexibility compared to an immediate injection of cash into the pension fund, and hence facilitate agreement over a funding strategy. Examples of how contingent assets may be used are:

- To provide an additional level of security above the agreed ongoing funding level for the pension scheme (e.g. see Section 6.5.2 on Telent)

- To enable a deferral of cash contributions to reduce cashflow strain (e.g. see Section 6.5.1 on ICI)

Contingent assets will normally result from bilateral negotiation, but in some cases, the choice may be unilateral, for example:

- The pension scheme might choose to purchase credit protection on the sponsoring employer
- A corporate might set up an IAS 19 compliant vehicle, designed to finance future contributions, and used to pursue a particular investment strategy under corporate control. This may have accounting and rating agency advantages from setting up such a vehicle rather than holding assets on balance sheet. For example, the corporate could use such a vehicle to pursue a Liability Driven Investment overlay strategy (see Section 6.5.7 on Henkel).

6.3. Interaction between contingent assets and investment strategy

Contingent assets can be particularly helpful in overcoming the potential conflicts that might exist between the pension fund and the corporate sponsor when setting investment strategy. They may therefore facilitate agreement on an appropriate liability-driven approach.

Contingent assets might:

- Provide a method of sharing the risks and rewards of an investment strategy, by allowing assets to pass back to the employer if investment risk is rewarded.
- Allow the corporate sponsor to gain greater control over asset allocation and/or risk management. The corporate might want to pursue either a more or a less risky strategy than the Trustees might otherwise pursue.
- Provide support to give the Trustees confidence to agree to riskier investment strategies.

6.4. Requirements of contingent asset solutions

Contingent asset solutions can be assessed against a number of potential objectives. Typically these seek to replicate the advantages associated with cash contributions into a pension fund, but address the disadvantages.

- Security to Trustees / pension fund in case of sponsor insolvency.

This is the basic test that any contingent assets should satisfy.

- Ability for sponsor to access contingent assets if surpluses arise.

This is a key objective in many, but not all, cases, and is a significant advantage offered by many contingent asset solutions over direct cash funding into the pension scheme.

- Access to funds for general corporate purposes if need arises.

Typically this will not satisfy the Trustees' requirements for security, nor the requirements of accounting standards and pension regulation for recognition of the contingent asset.

- Tax relief on contributions paid.

Cash contributions into a pension fund typically receive tax relief. This is typically more difficult to achieve for many contingent asset solutions, indeed care is needed to ensure tax relief is maintained on any subsequent transfer of assets into the pension fund.

- Gross roll-up of investment returns.

Again this is an advantage of cash contributions into a pension fund, which contingent asset solutions may try to replicate, for example by the use of offshore vehicles.

- Qualification as IAS19 “plan assets”

The IAS 19 definition of plan assets is as below.

‘Plan assets’ are assets held by a long-term employee benefit fund and qualifying insurance policies. Assets held by a long-term employee benefit fund’ are assets that are:

1. held by an entity (a fund) that is legally separate from the reporting entity and exists solely to pay or fund employee benefit
2. available to be used only to pay or fund employee benefits, are not available to the reporting entity’s own creditors (even in bankruptcy), and cannot be returned to the reporting entity, unless either (i) the remaining assets of the fund are sufficient to meet all the related employee benefit obligations of the plan or the reporting entity; or (ii) the assets are returned to the reporting entity to reimburse it for employee benefits already paid.

If assets held outside the existing pension fund can be classified as “plan assets” under IAS19 then this has significant accounting advantages.

This can be particularly important when assets strategies are risky, or where they are designed to hedge liabilities. For example, a swap overlay designed to hedge liability risk would typically not provide a good match for accounting purposes unless it was designated a plan asset, as otherwise the accounting treatment would be inconsistent with the liabilities hedged.

Optically, this also helps to shrink the balance sheet, by reducing the overall net pension liability.

- Reduction to the Pension Protection Fund levy

The PPF should benefit from contingent assets and so one might hope for a deduction to the PPF levy – for example by taking account of the value of the contingent asset on sponsor insolvency.

In practice, the PPF has imposed detailed and relatively restrictive guidance on the recognition of contingent assets for levy purposes. See Pension Protection Fund (2006a) for further details.

- View of Pensions Regulator as part of a recovery plan

In contrast to the PPF, and reflecting the different nature of their responsibilities, the Pensions Regulator has provided a more principles based approach to the recognition of contingent assets. See The Pensions Regulator (2006b) for full details.

The Pensions Regulator does not typically regard contingent assets as a permanent substitute for funding within the pension scheme.

However, they recognise that the existence of contingent assets may:

- support a slower or more back-ended loaded recovery plan than would otherwise be acceptable,
- allow lower technical provisions due to greater certainty of achieving higher asset returns, with limited risk of underperformance,

- similarly, support the recognition of more aggressive returns in a recovery plan,
- provide protection against further deterioration in funding e.g., due to asset-liability mismatches.
- Facilitate use of existing corporate assets (within “self investment” rules)

Contingent assets might comprise a ring-fenced investment in part of the employer’s business that would breach the self-investment rules if held inside the pension fund itself. (E.g. see Section 6.5.5 on Marks and Spencer)

The Pension Regulator (2006b) has suggested that using contingent assets will not, in itself, result in a breach of the employer related investment requirements, but that some forms of contingent asset may require the trustees to give special consideration to this issue if a contingent event were to occur.

It will be important for trustees to consider how the value of such an asset would be affected by insolvency.

- Rating agency neutral / positive

Rating agencies typically regard pension deficits as debt, but as a relatively soft and flexible form of debt e.g. without a final bullet maturity. Hence paying large cash contributions into a pension fund can be slightly negative from a ratings perspective, particularly if there had not been a perceived pressure to make the contribution. Contingent assets, with their greater flexibility, can be beneficial from a ratings perspective.

- Limited market impact

Contingent assets providing additional support from third parties on the event of sponsor insolvency, such as credit default swaps, can have a similar market impact to issuing debt.

The ability to achieve these objectives can come down to the structuring vehicle for holding contingent assets, as well as the legal nature of the contract between the sponsor and pension fund. E.g. use of Limited Liability Partnerships, Trusts, or offshore SPVs may be helpful.

The legal considerations surrounding the use of contingent assets are discussed further in Greenstreet (2007).

6.5. Case studies

The range of potential types of contingent asset solution can be illustrated by some public case studies. Interestingly, in many of these cases, LDI asset strategies have also been adopted.

6.5.1 ICI – use of illiquid business assets to defer recovery plan

The ICI Pension Fund is both relatively mature, and also relatively large compared to the size of the corporate balance sheet. Under the Trust Deed, the Trustees and actuary have the power to set the contribution rate.

In 2003, ICI announced an agreement to pay in about £62m per year for 9 years in order to make good a £443m actuarial shortfall.

In addition, the Pension Fund was given additional security of £250m by way of an asset backed guarantee. This guarantee was provided via a wholly owned SPV subsidiary, ICI Receivable Funding Ltd and secured by way of fixed and floating charge over the receivables of certain companies, which have been assigned to the SPV and by way of cash and cash equivalents deposited with the

SPV.

At 31 December 2005, £268 million of trade debtors and £5 million of cash were assigned to the SPV.

The use of the SPV enabled the Trustees to agree to a more deferred recovery plan than would otherwise have been acceptable.

This structure was put in place prior to the issuance of PPF Guidance, and, given the use of trade receivables as the supporting asset, will likely not qualify for any credit in the PPF levy calculation.

But the use of trade receivables, rather than cash, was an important factor to further ease the cash strain associated with pension funding, and was important to support ICI's credit rating.

6.5.2 Marconi / Telent – use of cash in escrow to provide enhanced funding

The bulk of Marconi's business was sold to Ericsson, but Ericsson did not want to assume the pension liabilities associated with the legacy business. However, the size of the remaining business – since renamed Telent – would have raised issues as to the ability to support future pension contributions.

As part of the clearance procedure for the transaction, it was agreed that there would be an injection of £185 million into the pension fund, but also that a further £490 million was placed in an escrow account for the potential benefit of the pension fund members.

The escrow account is held under a Trust separate from both Telent and the pension fund. Telent could potentially have access to the money in the escrow account if at some future point the pension fund becomes fully funded on a buy-out basis. Equally the escrow money could potentially pass to the pension scheme if required to meet benefits.

The escrow account is designed to provide additional security above the level of ongoing funding in the scheme – broadly the funding with the escrow account is enhanced from a IAS19 level to a gilts-based level of funding. However, even with the escrow account, the pension funding falls short of current buyout quotations.

The Telent scheme also implemented a LDI strategy, using fixed-to-floating and inflation swaps, to further reduce risk.

6.5.3 Whitbread – use of covenants

In April 2003, Whitbread plc announced an agreement with the Trustees of the pension fund to reassure members as to the company's willingness to act positively to fulfil its pension obligations.

Specifically, Whitbread provided the trustees with various undertakings similar to covenants that are provided to other creditors in banking agreements, e.g. a net assets covenant, limit on prior charges, and cross-default clauses.

The covenants gave the Trustees additional security in terms of their exposure as a creditor of the corporate sponsor, and in particular to prevent their security being worsened.

The company was also able to use this mechanism to exercise direct influence on the pension scheme asset allocation by making the continuation of the covenants dependent on the Trustees maintaining an asset allocation within agreed guidelines both as to a maximum and minimum level of exposure to return-seeking assets.

6.5.4 National Grid – letters of credit

The 2005/2006 of National Grid report and accounts state that it was agreed that there should be no funding of the deficit identified in the 2003 actuarial valuation until the outcome of the interim actuarial assessment at 31 March 2007 was known. At this point the Group will pay a gross amount of any deficit up to a maximum amount of £520 million (£364 million net of tax) into the scheme.

Until the 31 March 2007 valuation has been completed the Group has arranged for banks to provide the trustees of the National Grid UK Scheme with letters of credit. The main conditions under which these letters of credit can be drawn relate to events that would imperil the interests of the scheme, such as National Grid Gas plc, a Group undertaking, becoming insolvent or the Group failing to make agreed payments into the fund.

Hence the letters of credit provide additional third party support to the pension fund, and enabled National Grid to defer immediate funding of the deficit pending a full actuarial review.

6.5.5 Marks & Spencer – property assets and SPV, pension bond – and Sainsbury

In January 2007, Marks & Spencer announced it would establish a partnership vehicle with its pension fund, which will hold properties used by M&S (e.g. retail stores) with a current market value of approximately £1.1bn. These properties will be leased back to M&S and a fixed annual distribution to the pension fund of c£50m will be made out of partnership profits for a 15-year period. The Pension Scheme will hold the £500m partnership interest, representing the net present value of these future distributions, as part of its total investment portfolio and accordingly the deficit will be reduced by this amount. M&S will retain control over the properties held as part of this arrangement, including flexibility to substitute alternative properties.

In one sense this is not a contingent asset since part ownership of the interest in the partnership has been transferred to the pension fund. However, the nature of the arrangement clearly provides M&S with greater flexibility than a cash injection – in one way this can be viewed as a future contribution schedule of £50m p.a. given security via ring-fenced property assets.

M&S have themselves previously issued a 10-year sterling bond, in March 2004, which was specifically designated and marketed to investors as raising fund to finance the pension deficit. In practice, in many previous cases, proceeds of bond issues were in part used to finance pension deficits, but as far as we are aware this was the first case in the UK where the bond was issued explicitly for that purpose. Raising debt and using the proceeds in this way has certain tax efficiencies (see Section 6.5.7).

6.5.6 Sainsbury – securitisation of property portfolio

A similar, but contrasting, case to Marks & Spencer's treatment of their property portfolio was Sainsbury.

The corporate covenant of Sainsbury was under pressure due to increased competition in the retail markets, and the need for Sainsbury to repay £800m of debt over the following 18 months. Sainsbury's credit ratings were Baa3 (-ve watch) / BBB- / BBB (-ve watch).

Sainsbury's had a significant property portfolio, whose value was not fully recognised by rating agencies and equity markets.

So, in 2006, advised by UBS Investment Bank and Morgan Stanley, Sainsbury securitised around 50% of their retail outlet property portfolio, raising £2.1 billion from external investors in the form of Commercial Mortgage Backed Securities rated from AAA to A. Sainsbury retained operational flexibility to manage the property portfolio and the economic benefit of any future appreciation in value.

The cash raised from the securitisation was primarily used to pay back all of the company's £1.7bn of external unsecured bonds.

The replacement of the unsecured corporate debt, which ranked pari-passu with the pension deficit, with debt secured on the property portfolio potentially reduced the security of the pension beneficiaries. Hence as part of the overall structure, £350 million of the funds raised were paid directly into the pension scheme, with a further schedule of annual contributions agreed to pay down the deficit over an 8 year recovery period.

Of the £2.1 billion of securitised bonds raised, £868 million was in the form of 25 year inflation linked bonds, enabling Sainsbury to benefit from the high demand for such assets from pension funds.

As described in Section 4.2.9, this transaction also facilitated the implementation of a LDI strategy.

6.5.7 Henkel – hybrid debt used to finance IAS19 compliant SPV

Corporate finance theory [e.g. Black (1980)] demonstrates the potential tax advantages of selling stocks and buying bonds in the pension scheme while, at the same time, issuing bonds and repurchasing stock in the company. This was essentially the approach followed by Boots (see Section 4.2.1).

The same theory supports the tax efficient issue of bonds to finance pension deficits, such as practiced by Marks and Spencer (see Section 6.5.5).

A more recent development has been the issuance of hybrid debt to finance pension schemes. Hybrid debt is a form of subordinated debt that ranks somewhere between debt and equity, and in particular receives partial equity credit from rating agencies.

Using hybrid debt to finance pension liabilities therefore provides a ratings boost, since pension deficits are treated entirely as a form of debt by rating agencies.

The first company to use hybrid debt in this innovative way was the Germany corporate Henkel, following advice from UBS Investment Bank.

In November 2005, Henkel issued a €1.3bn hybrid bond to fund its previously unfunded German pension liabilities. The proceeds were used to finance a Contractual Trust Arrangement (CTA), a form of IAS19 compliant single purpose vehicle which has been developed in Germany as an alternative to setting up a regulated pension fund (e.g. Pensionsfond, or Pensionskasse). Henkel is also able to use the SPV to pursue liability driven investment strategies for its pension liabilities, with a favourable accounting treatment.

6.6. Other potential solutions

The Working Party is aware of other potential solutions that have been considered, and in some cases implemented.

6.6.1 Group guarantees

A stronger parent company may provide a guarantee to the pension fund of a smaller subsidiary, for example for a UK subsidiary of a large multinational organisation.

6.6.2 Credit default swaps

Credit default swaps (CDS) at first sight represent a very natural form of contingent asset, since they provide a payout on the default of a corporate sponsor in return for a recurrent premium.

They are the most liquid and commonly traded credit derivative, with an estimated notional outstanding of over US\$5 trillion at end 2006, and with a well established form of legal documentation. See Muir et al (2007) for further details of CDS contracts.

In practice, take-up of CDS by pension funds has been limited to date, for a number of reasons:

- Trustee understanding of the instrument, in particular the settlement mechanism when a default occurs
- Letters of credit (see Section 6.5.4) have typically been available at a cheaper price, as part of overall bank relationships, although the availability of these instruments is diminishing
- Concern with the risk of needing to renew the CDS, which might be for a 5 or 10 year term, if the credit of the sponsor has deteriorated but they have not defaulted
- The Pension Protection Fund (2006c) have chosen not to recognise CDS in their levy calculations to date, mainly for the reasons outlined above.

One potential solution is for a CDS to be provided in a more “pension friendly” wrapper, such as an insurance contract, where the insurer provides a form of credit insurance and hedges the exposure with a bank. An example is the Pensions Security Indemnity product launched by Aon Consulting in December 2006, where the credit protection is provided in the form of insurance from Aegon, which is ultimately hedged with UBS Investment Bank, who in turn pass this risk into the financial markets using CDS.

6.7. Conclusion

Contingent asset solutions potentially enable corporate sponsor’s to improve the control over their corporate capital and risk management, while providing security to the beneficiaries of the pension fund.

In particular, they can facilitate the agreement and implementation of liability driven investment strategies.

7. Liability Driven Investment for Insurance companies with annuity liabilities

7.1. Background

Insurance companies offering bulk purchase annuity (“BPA”) buyouts to pension funds will acquire very similar liabilities to those pension funds. Hence it is instructive to consider the asset allocation approach that they follow to meet these liabilities, and their approach to liability driven investment.

The one significant difference in insurance company liabilities, is that bulk purchase annuity buyouts are based on accrued deferred pensions, and do not offer a linkage to final salary prior to retirement. Instead pensions in deferment may be indexed with respect to RPI, e.g. with a floor of 0% and cap of 5% over the deferred period, depending on the scheme rules and the benefits secured.

In this regard, the insurance companies are effectively similar to a pension fund looking to base their investment strategy on the accrued liabilities, with statutory or scheme based increases in deferment but not allowing for the impact of future salary increases. The Speed et al (2003) working party that originally introduced the concept of the Liability Benchmark Portfolio proposed that liability driven investment should focus on such liabilities, i.e. not allowing for future salary increases, although this conclusion caused some controversy.

The purpose of this Section is not to provide a comprehensive study of insurance company investment, but rather to contrast the approaches followed to typical pension scheme practices and analyse the reasons for these differences.

Further discussion of these topics from a life company perspective is contained in Dyer et al (2004).

7.2. Traditional investment approaches

Traditionally insurance companies have typically backed BPA liabilities with a portfolio almost exclusively of bonds, with perhaps a small amount (e.g. 5%) of property with bond-like characteristics (e.g. long-dated secure leases). Typically no equities are held.

The bonds used typically:

- are denominated entirely in sterling.
- have a high proportion of corporate credit, rather than government bonds.
- have been selected so that the bond cashflows match reasonably closely not only the duration but also the year-on-year expected cashflows from the liabilities.
- where liabilities are inflation linked, the bonds will be similarly inflation linked, which tends to require a higher proportion of Government index-linked bonds due to the relative dearth of corporate inflation linked issuance.

This contrasts to the traditional pension fund approach which typically held significant equity investments against pension liabilities and with bond holdings based on market benchmarks rather than the specific nature of the liabilities. Pension funds have also historically not invested significantly in credit, with bonds seen as a risk-free investment. See Chambers et al (2005) for further comments.

7.3. Rationale for traditional life company approach

The traditional insurance company approach is driven by a combination of good economic reasons and particular regulatory features.

In contrast to UK pension funds, insurance companies must hold sufficient assets at all times to meet their liabilities. They must also hold additional capital against asset-liability mismatches. This is because insurance companies can not rely on the support of future contributions from an external sponsoring employer.

This has focused insurance companies, much more than pension funds, on the importance of asset-liability matching and on the cost – in terms of a cost of capital – of asset liability mismatches.

Insurers are also required to discount liabilities at rates that are based on current market yields using the full yield curve, consistent with the view that the pension liabilities are essentially bond like.

In particular, holding significant equity assets against essentially bond like liabilities leads to significant capital requirements which would typically render the business uneconomic.

Credit can also be a good asset to back annuity business:

- ◆ Credit spreads historically have been very wide relative to historic default losses, leading to an expected credit premium above risk-free rates.

The resulting, so called, credit spread “puzzle” is discussed in Muir et al (2007).

- ◆ Year-by-year cashflow matching is possible to a reasonable tolerance from available bonds.
- ◆ Available market yields and credit spreads can be used to drive pricing of new business

However, there are also specific features of the regulations that drive specifics of behaviour:

- The traditional regulatory valuation allowed life offices to capitalise part of the expected capture of credit spread when valuing liabilities. In addition, mark to market volatility on credit, arising from spread volatility, could be recovered via the liability valuation.

Hence, and in contrast to the treatment of equities, taking risk through credit actually leads to a reduction in regulatory capital requirements.

- Life companies must hold resilience reserves against exposure to equity volatility and interest rate mismatches. In addition, most insurers hold compute additional cashflow mismatching reserves, assuming prudent dis- and re-investment rates where asset and liability flows are not fully matched.
- Regulations strictly limit the extent of currency mismatching allowed.
- An EU Directive requires that insurers match “index-linked” benefits “as closely as possible” with assets. This EU Directive is interpreted as including inflation linked pensions.
- There is no explicit credit for diversification of asset/liability exposures.

The combination of these factors led to the investment strategy discussed above.

7.4. Future investment

This orthodoxy is coming under challenge from three areas:

- Improved technology in terms of assets available, in particular from the derivatives market.
- Regulatory changes, in particular the increased emphasis on the Pillar 2 Individual Capital Assessment, which treats credit consistently with other assets and focuses on the benefits of

diversification.

- An influx of new entrants into the BPA market. These have often been funded by private equity capital and the owners and management teams may not have a traditional insurance perspective (see Section 5.3). The new entrants have also increased competition and hence the need to further enhance asset returns to compete.

This is leading to the following changes in strategy:

- Use of interest-rate and inflation swaps to separate liability matching and investment decisions

Interest-rate swaps enable long-duration and cashflow matching to be achieved using a combination of a shorter-dated benchmark, such as a diversified market benchmark, and swaps. This frees active investment management from the constraints of liability matching.

Inflation swap overlays enable the “close matching” requirements of inflation linked liabilities to be met without requiring investment in inflation linked bonds.

Derivatives can also be used to allow credit portfolios to be diversified into the Euro (€) and US\$ markets, offering much greater diversification of exposures, with currency and interest rates risks versus liabilities hedged by swaps, and FX contracts.

In extremis, interest and inflation swaps can be used to transform the Liability Benchmark Portfolio to a cash (i.e. Libor+) benchmark.

- An acceptance of tactical asset-liability mismatches in a risk budgeting or capital framework

As discussed in Section 3, tactical decisions may be made to mismatch certain parts of the duration or inflation exposure if this is considered to be a remunerative strategy, relative to the risks run and capital required.

While “close matching” of inflation linked liabilities is a legislative requirement, this only requires an appropriate amount of inflation-linked assets at any point in time, not precise cashflow matching.

- An increased role for diversification of sources of return and a reduced reliance on purely corporate bonds. This includes the use of structured credit products, in addition to the potential for (small) equity exposures, commodities and other diversifying assets.

In that regard, investment for insurance companies is moving towards the same position as LDI for pension funds – particularly approaches where liabilities are swapped to Libor with swaps and diversification used to outperform the Libor benchmark – albeit from the opposite direction

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The case studies in Section 4.2 are based on article from the financial press from 2001 to 2007 including the following publications:

- Financial Times
- FT Mandate
- Life & Pensions Magazine
- Risk Magazine
- Pensions Week
- Global Investor
- Corporate Finance
- Money Management
- The Economist
- The Guardian
- The Times
- The Observer
- The Telegraph

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