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ASHLEY LOOK AT HOW
INVESTMENT MANAGEMENT IS
EVOLVING AND ASKS WHAT IS
LIABILITY DRIVEN INVESTMENT?

The rise and rise of LDI

The last two years have seen a seismic shift in the way UK corporates manage the investment strategy of their final salary pension schemes. Liability Driven Investment (LDI) is an industry buzzword, the darling of conference organisers, and for some, the nemesis whose rise they deny or deride. Just what is LDI, and why is it causing such a ripple through the investment management industry? LDI is not about pension schemes moving their investments entirely into bonds. It does not sound the death knell of the cult of equity, and is not the herald of a derivatives revolution – although these instruments can play a very useful role in constructing LDI portfolios. Rather, it is about effective risk management and reducing long-term funding costs. It is about diversifying sources of alpha and risk premia. LDI extends to the UK pensions industry the investment reasoning and management techniques that are already being applied to the investment management of insurance assets and corporate treasury operations.

WHY LDI? The rise of LDI, and the increased prominence of liability benchmarks is not simply a knee-jerk reaction to the capital market weakness of 2002 and 2003. Rather, a culmination of factors over the last five years has brought about an increased awareness of the need to explicitly link assets to liabilities when formulating and managing the investment strategy of final salary pension schemes.

The current model of setting investment strategy is characterised by scheme-specific strategic asset allocations, usually the result of an asset liability study. Specialist managers were appointed to manage the various segments of the benchmark. Very often, equities, despite a lack of liability matching characteristics, swamped the strategic asset allocation, backed by the assumption that the long-term rate of return on this asset class would exceed that at which scheme liabilities accrue. As the 1990s drew to a close the approach seemed vindicated. The longest bull run the asset class had ever seen

Executive summary

- Liability Driven Investment (LDI) is about effective risk management and reducing long-term funding costs.
- Liabilities must be the keystone of pension scheme investment strategy, if not avoidable losses will be incurred.
- The value of the liabilities is affected by non-financial factors so an LDI strategy needs to retain the flexibility for some outperformance of the liability benchmark.

left trustees struggling with the tax implications of surpluses, rather than the funding of deficits. Strong equity market performance masked the deficiencies of a process encumbered by a number of serious flaws:

- the Asset and Liability Modelling (ALM) approach was only as good as its assumptions, which included parameters for expected returns and volatilities on each asset class as well as correlations between them. One key assumption of the modelling was that the correlations between asset classes would remain stable over time. This proved to be flawed. At the end of the 1990s ALM models were showing a positive correlation between equities and bonds, as a result of which the models seriously underestimated the risk of equity heavy investment strategies. This flaw was exposed during the subsequent equity bear market from 2000 to 2003, when equity and bond returns both moved sharply, but in opposite directions.
- within each mandate, the specialist manager was set a benchmark based on a market index. Debate on how the trustees' risk budget

Chart 1. Projected scheme cashflows: annual cashflow comparison

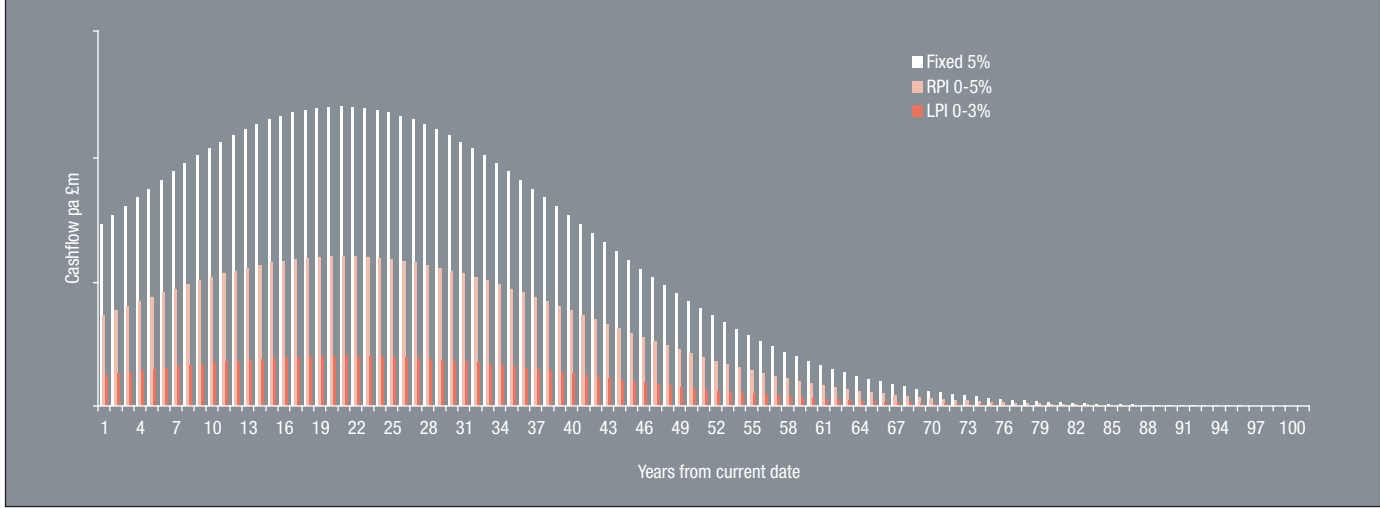
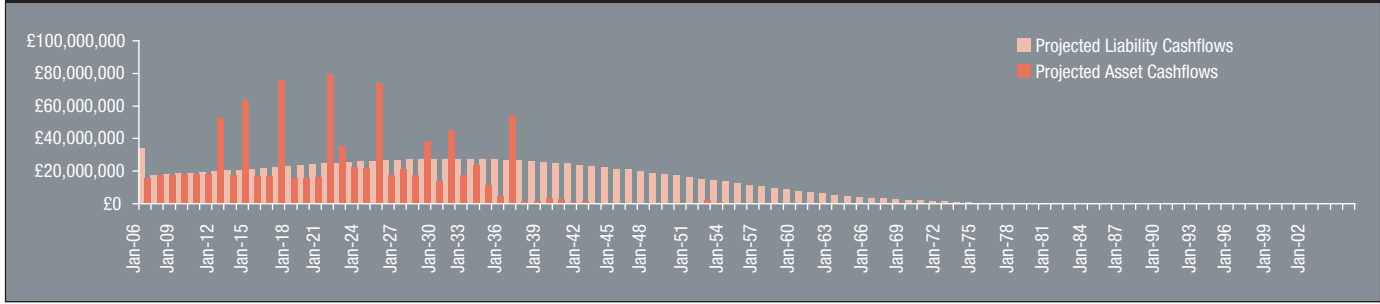


Chart 2. Projected scheme cashflows: current benchmark allocation



should be spent focused on the tracking error against these market indices, rather than the risk relative to the actual liabilities of the scheme. In addition to the large equity market risk assumed by most trustees, these investment strategies were also very exposed to the risk of moves in long-term interest rates and inflation expectations. However investment performance monitoring remained focused on risk relative to the market index for each asset class, so many trustees were unaware of the scale of these risks.

It would be remiss not to point out that, despite these shortcomings, the move to specialist benchmarks did represent a major step forward for the industry, by recognising the need to link scheme assets with scheme liabilities. Advances in modelling techniques and the development of capital markets in inflation and interest rates, have now made possible the explicit linking of these assets and liabilities. Liability benchmarking and LDI strategies simply formalise the link.

Today, defined benefit pension schemes are increasingly being viewed as a major source of financial risk to their sponsors, with the power to adversely affect credit ratings and hinder potential mergers and acquisitions. Sponsors have moved to limit that risk and are increasing their involvement in the investment strategy of their pension schemes. LDI is a key element of that response.

HOW DOES LDI WORK? The philosophy of LDI is a simple one. Liabilities must be the keystone of pension scheme investment strategy. If not, avoidable losses will be incurred in economic

scenarios where falling bond yields, or rising inflation expectations, cause liabilities to increase at a rate that is greater than the return on scheme assets. The strategy sets its investment managers outperformance targets that are expressed relative to scheme liabilities, that is, the true funding objectives of the portfolio. The LDI framework places risk in its proper context. Risk is defined as the probability of shortfall, or the probability of the portfolio being unable to meet the scheme's projected funding requirements. The LDI zero risk position, or a passive investment management strategy, will aim to construct a benchmark portfolio that moves in step with the changing value of the liabilities. The construction of an asset portfolio with the same economic risk factor sensitivities as the liabilities results in a substantial decrease in projected scheme funding volatility. Actively managed LDI strategies take positions away from this benchmark portfolio.

THE LDI PROCESS
Analyse the liabilities Unsurprisingly, the first step in the construction of an LDI strategy is a detailed analysis of the liabilities. These liabilities represent the projected cashflows a scheme needs to generate each year to meet future pension payments. A detailed liability analysis will usually divide the cashflows into different types of pension benefit, along with any associated linkages to RPI and LPI inflation (LPI benefits are linked to inflation, but with a floor struck at 0% and a cap at either 3% or 5%). Pension scheme liabilities can be modelled as a portfolio of nominal or inflation-linked zero coupon

bonds, depending on the nature of the benefit. The resulting portfolio can be valued, marked-to-market daily, and verified independently, making it suitable for benchmarking purposes. The diagram Projected Scheme Cashflows (see *Chart 1*) gives an indication of how a liability cashflow projection for a UK scheme might look.

ECONOMIC FACTORS ARE NOT THE ONLY RISKS Using any reasonably competent risk management system, the financial risks inherent in the liability portfolio can be quantified. Financial risk, however, is not the sole factor that can affect the value of the liabilities. Broadly speaking, we can divide those risk factors into two categories, financial and non-financial. Financial risks are the economic factors that affect the value of the liabilities, specifically, changes in interest rates and inflation expectations. These risks are substantial. For a typical UK pension scheme a 1% decrease in interest rates accompanied by a 1% increase in inflation expectations can cause a 15% increase in the present value of its pension liabilities. For a stark illustration of the potential impact of these economic factors, we need look no further than a review of 2005: despite a reasonable performance by UK equity markets, with the FTSE 350 index returning a healthy 18.1%, the pensions deficits of FTSE 350 companies rose from £75bn to £93bn¹. Fortunately, economic risks are hedgeable, i.e. there exists a market for those risks, they can be priced and traded away. However, while economic factors represent the greatest source of funding gap volatility, non-financial risks remain which must also be considered. Perhaps the most publicised of these is longevity risk: the danger that mortality expectations are not met.

Hedging longevity risk is difficult. Although longevity bonds do exist, this market is still in its infancy. However, as the primary function of capital markets is to equate supply with demand, these difficulties should be considered the growing pains of a new class of securities. Because of these non-financial factors, an LDI strategy, while hedging the principal sources of funding volatility, must also retain the flexibility to manage residual risks.

BUILDING THE LIABILITY MATCHING PORTFOLIO The next step in the process is to construct a liability matching portfolio that will fund the projected cashflow requirements of the scheme, as they fall due, while minimising active interest rate and inflation exposures. To build a truly robust matching portfolio, interest rate and inflation exposures must be calculated at each point along the liability term structure, and assets selected with corresponding sensitivities. Such a portfolio will hedge both inflation exposure and second order effects. Less sophisticated strategies, such as duration matching, fail to do either.

It is only intuitive to look to the gilt market for the initial building blocks with which to construct the matching portfolio. In *Chart 2* we have projected a standard liability profile, alongside a matching gilt portfolio. The limitations of solely using gilts should be apparent. The cashflows are not particularly well matched and the strategy demonstrates substantial residual interest rate exposure and reinvestment risk. Running the portfolio through an optimisation routine can, to some extent, mitigate these shortcomings, but cannot compensate for the lack of instruments with a sufficiently long maturity to match the scheme's longest-dated liabilities.

SWAPS REFINE THE SOLUTION For a solution to this problem we look to the interest rate and inflation swap markets. With the advent

of LDI, the much maligned (and much misunderstood) OTC derivatives market has finally taken its place in the firmament of institutional investment management. Interest rate and inflation swaps can be used to match liability cashflows, adjust exposures and transform fixed-income portfolios that clumsily match liabilities into precise LDI solutions, removing unnecessary risk.

It can be argued that a pure synthetic liability matching portfolio is preferable, and, from an operational perspective, synthetic hedges do make the inclusion of active management strategies simpler. However, most pension schemes have substantial allocations to fixed income, and an optimal LDI solution must always take account of implementation costs. While overlaying swaps on an existing bond portfolio may require some additional effort on the part of the investment manager, it also incurs a lower level of transaction costs than liquidating a scheme's entire bond portfolio and re-investing the proceeds in an entirely synthetic structure. While using swaps does entail accepting the credit risk of the counterparty bank that executes the derivatives, the scheme is compensated by the swap spread, reducing the cost of the benchmark portfolio. Furthermore, effective collateralisation procedures mitigate much of the credit risk.

With gilts, index-linked gilts, interest rate and inflation swaps available as an investment universe, an optimisation routine can be used to solve an initial hedging portfolio. Scenario-based, non-parametric optimisation generally produces better results than its mean variance counterpart in this regard.

ACTIVE MANAGEMENT REQUIRED The value of the liabilities is also affected by non-financial factors, such as demographic risks, so an LDI strategy needs to retain the flexibility for some outperformance of the liability benchmark. Furthermore, few schemes are in the happy funding position where passive or enhanced passive management is an option. Active management (or sponsor contributions) needs to be re-introduced to close funding gaps. The next step in the LDI process, therefore, is to determine the scheme's risk budget and set an appropriate outperformance target. Take, for example, the case of a fund with a 10% funding deficit, and a ten year time horizon in which to restore itself to financial health. An appropriate outperformance target for this scheme might be expressed as "to produce a return in excess of 1% a year over the liabilities over a three year rolling period". Because the strategy has a liability benchmark, any returns from active management go straight into plugging the deficit, making for a much less volatile path to full solvency.

The rate at which LDI solutions are evolving is astonishing. Once only the domain of the larger funds, pooled fund offerings now make hedging possible for schemes of all sizes, and the asset harvesting success of these funds is testament to their popularity. We may well see the LDI sceptics of 2006 resurface as converts to proclaim its merits on the 2007 conference circuit.

1. Source: Mercer Human Resource Consulting

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