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Introduction

This submission is in excess of the 3000-word indicative length on the submission guidelines. However, we have spent a significant amount of time over the past decade investigating LDI and related issues. It is important that the genesis for LDI and leveraged LDI are set out, including the evolution of these strategies in the run-up to the recent turmoil in the gilt market, as well as a detailed analysis of what happened during the recent crisis. We also refer to relevant pieces of law and regulation throughout. All of this is crucial to be able to respond as fully as possible to the questions asked by the Work and Pensions Committee in the call for evidence.

The submission is split into three main parts. The first is a brief overview of what we cover in our submission. The second provides a commentary on the history of Liability Driven Investment (LDI) from the root causes of the emergence of LDI, to its evolution into leveraged LDI and its subsequent growth, and a detailed analysis of the recent market impacts. This includes a discussion of the legal aspects of LDI and leveraged LDI and raises some of the serious legal issues these strategies pose. The third section directly responds to each topic raised in the Work and Pensions Committee's call for evidence.

Part I: Overview

In any discussion and analysis of LDI it is fundamentally important to distinguish between myriad features of these strategies that are all too often badged as "LDI" e.g., LDI that is in a segregated mandate vs LDI that is in a pooled fund. However, the most important distinction is between LDI and Leveraged LDI.

Basic LDI is a strategy based on holding physical assets with contractually promised income streams that exactly match the expected levels of future pension payments. To achieve this, a pension fund could invest in a portfolio of assets that include gilts and/or other bonds in the knowledge that, if the strategy works perfectly, i.e., the issuers of the bonds do not default, the pension fund will receive a stream of coupon payments and the repayment of the principal such that all pensions are paid in full and on time as they fall due. This approach is also called dedication. It also requires the assumptions about the amount and duration of the pension payments to be borne out in practice.

Leveraged LDI is a wholly different strategy. One of the biggest issues of basic LDI is that it is an extremely costly and inefficient way to achieve its intended outcome. As such, leveraged LDI is an attempt to achieve the same outcome, but at a lower cost. Specifically, in a period of low interest rates, leverage is used to reduce the cost of the LDI strategy. By using leverage (borrowing against the gilts in the pension portfolio), leveraged LDI enables the pension fund to increase its exposures to other asset classes with higher returns. As such, leverage enables the pension fund to "juice" the returns of the portfolio to enable it to pay pensions, while maintaining significant allocations to gilts and other types of assets that otherwise would not be sufficient to meet pension obligations in full and on time as they fall due. Leveraged LDI also introduces a potential death spiral into the pension scheme, as the strategy only holds in an environment of declining interest rates, which we explain more fully later in this document.

Throughout we therefore distinguish between LDI and Leveraged LDI, as this distinction matters.

It is our opinion that basic LDI is not fit for purpose as an investment management strategy. However, it is not intrinsically harmful to others; the costs, benefits, and risks are internalised to the scheme and the sponsor employer. Leveraged LDI however, creates externalities and its consequences, such as the significant disruption of the gilt market, are profoundly harmful to others.

As we see it, schemes should be free to invest in LDI, inefficient and costly though that may be, but should not be allowed to utilise Leveraged LDI. As we explain later, pension schemes are prohibited by law from borrowing, except for temporary liquidity purposes, for a very good reason.

Part II: Setting the scene for our response to the call for evidence

In 2011, Alan Rubenstein, then CEO of the Pension Protection Fund (PPF) averred "*Funding trumps Covenant*". This was a succinct and accurate description of the then-prevailing ethos and practice within both the PPF and The Pensions Regulator (TPR). It was then, and remains, profoundly misguided. It has only one advantage: it is the path of least resistance for these bodies to pursue.

The elementary flaws in this approach can be made obvious by transposing this statement to an everyday situation; driving. Rephrased as "*Seatbelts trump Brakes*", it is evidently a programme of action focussed on the mitigation of the effects of accidents on those in the car and does nothing to prevent accidents from happening. It leads also to the need for further precautions, such as lower speed limits and crash-resilient vehicles. It pays no attention to the potential harm done to pedestrians and other road-users by accidents where brakes would have been the necessary intervention.

The parallel to the DB pension arena is ever more '*prudently'* managed DB pension funds with both investment asset allocations growing ever more conservative, and the discount rates applied to projected benefits liabilities ever lower, with ever higher costs to sponsor employers. Here too, the sponsor covenant is rather counterintuitively seen as an albatross around the neck of the scheme rather than an asset of the fund. This leads to increasingly '*prudent*' scheme assumptions and ever higher and ever more inappropriate excess costs added today to the provision of a pension. And this has a direct cost to the taxpayer.

Pension contributions are tax deductible from employer profits. So, assuming, for example, a UK corporation tax rate of 20%, every extra £1 of contributions required by an ostensibly recklessly prudent regulatory approach, is 20p less to spend on other priorities. We say "ostensibly" because Leveraged LDI is just reckless but nonetheless encouraged by the TPR.

At that time, it was to be hoped that the addition of a further statutory objective for the Pensions Regulator would provide a counterbalance. However, the strangulated language of that objective when it arrived in 2013, did not bode well for its likelihood of success:

"…*to minimise any adverse impact on the sustainable growth of an employer (in relation to the exercise of TPR's functions under Part 3 of the Pensions Act 2004 only)*."

Though some lip-service to compliance with this objective has been seen, it has had no discernible effect on the direction of travel of TPR's supervisory and regulatory practices. There is no public evidence that TPR has set about acquiring the skills, expertise, and experience necessary to evaluate the growth prospects of the employer sponsors within its remit or even to monitor the effects that its actions have had on the growth prospects of a sponsor firm.

There is a related question: what effects has TPR's approach had on the willingness of sponsors to continue offering DB pensions, the most efficient form of pension provision?

To see further evidence that TPR has simply disregarded this statutory objective, we only have to look at the proposed new Funding Regulations which, although the responsibility of the Department for Work and Pensions, has been heavily influenced by the TPR's views. These Regulations would require DB schemes to be funded to levels of "*low-dependence*" on the sponsor with the allocation of investment assets as described in the consultation paper accompanying those draft regulations:

"3.14. Draft regulation 5 provides that for the purposes of these draft Regulations, a low dependency investment allocation, in relation to the investment of the assets of a scheme, means that:

• the assets of the scheme are invested in such a way that the **cash flow** from the investments is **broadly matched with** the payment of **pensions** and other benefits under the scheme; and

• the assets of the scheme are invested in such a way that **the value of the assets relative to the value of the scheme's liabilities is highly resilient to short-term adverse changes in market conditions**, in a way that complies with an objective that further employer contributions are not expected to be required to make provision for accrued rights to pensions and other benefits under the scheme."

[Emphasis Added]

Prior to the gilt market crisis, we wrote a series of nine extremely critical commentaries, almost 30,000 words, responding to the consultation questions. These are available at this link https://henrytapper.com/2022/10/17/keating-and-clachers-last-post-the-dwp-funding-regs-consultation-ends-today/ (the 9th commentary - the links to the other eight are at the end of that 9th commentary). These are also available on request. At that time, a low-dependency asset would have been taken almost universally to mean a gilt or near gilt portfolio. We ended the seventh of those commentaries with the statement:

"It seems to us that the concept of an asset allocation that is "*highly resilient to short-term adverse changes in market conditions*" is a chimera."

The Advent of Liability Driven Investment and leveraged Liability Driven Investment

As reported in the Financial Times, the first Liability Driven Investment (LDI) construction was executed in 2002/2003 in response to a change in the accounting standard for pensions. The motivation for pension funds using LDI strategies was in response to an accounting standard embedding a market yield as the discount rate to be used in the estimation of the present value of

pension liabilities for the purpose of scheme valuation. This has the effect of embedding both trends in market yields and their idiosyncratic variability into these valuations.

It is also worth highlighting at this point, a commonplace elision of language that muddies much of the discussion about pensions, and in particular about the impacts of LDI on DB pensions in the recent crisis.

The liabilities of a pension scheme are the projected future benefits to be paid from the scheme. The present value (PV) of those liabilities is an estimate of the amortised value today, or equivalently funding level, when we compare the present value of those liabilities to the value of the assets held in the portfolio today. This value depends critically on the discount rate employed, and that rate is a matter of choice.

We illustrate this sensitivity with a simplified example:

- Jo is aged 45 and has an accrued DB pension of £10,000 a year payable annually in advance for life in 20 years' time from age 65.

- We assume Jo will receive their pension for 20 years (i.e., Jo dies at age 85), the pension does not increase and there is no survivor's pension.

- We can see that the total payments made to Jo are 20 x £10,000 = £200,000.

- Let's ask the question, assuming we can earn 5% pa on our scheme assets, how much money do we need now to pay Jo, the 20 instalments of pension? Answer: £49,317. The 5% p.a. investment return makes up the balance - i.e., £150,683.

- What happens if we assume a 3% pa return rather than a 5% return? Answer: £84,844. The 3% p.a. investment return makes up the balance – i.e., £115, 156.

- The extra cost to the taxpayer (with a corporation rate of 20%) of the 3% discount rate compared to the 5% pa rate is (£84,844- £49,317) = £35,527 x 20% = £7,105.

In all too many cases, commentators treat the present value of liabilities as some irrefutable fact and erroneously equate this to the projected future benefits of the scheme, and simply refer to the PV of liabilities simply as liabilities. Our simplified example shows that, whether the discount rate/investment return assumption is 5% or 3%, Jo still receives £200,000. It is the cost of providing the 20 pension instalments of £10,000 that varies.

Similarly, the funding regulations under which schemes must operate, introduced in the Pensions Act 2004, and the Occupational Pension Schemes (Scheme Funding) Regulations 2005 (Funding Regulations), revolve around market rates, but with the option to use the expected return on the scheme's investments or expected long-term interest rates (or a mix) as the discount rate for the estimation of the present value of liabilities.

Since then, it has become almost universal practice for actuaries and almost all others to describe the discount rates employed in gilt yield relative terms – a practice that the Pension Regulator adopted, which likely served to encourage others to follow suit.

In the calculation of any present value of liabilities, there is a simple mechanical effect at work - lower interest rates increase the present value of pension liabilities, raising the apparent cost of pensions awarded. Similarly, higher interest rates decrease the present value of pension liabilities, reducing the apparent cost of pensions awarded. However, this is an accounting convention - interest rates are not a determinant of the ultimate amount of pension payable. The amount of pension payable is dependent on length of service, the generosity or otherwise of the award (half final salary for example), inflation, salary, and longevity, but not interest rates. Our simplified example above illustrates this point.

LDI was therefore flawed in conception. It involves the hedging of perceived risks, that is the variation in the present value of the pension liability that arises from the introduction of a market yield as the discount rate. It does nothing to address the actual risks that drive changes in pension liabilities such as wage growth, inflation, and longevity.

As we stated in our overview, it is critical to differentiate between:

LDI: based on holding physical assets with contractually promised income streams that exactly correspond to the expected levels of future pension payments. An example of such assets includes gilts or other bonds where the investor, subject to the issuer of the bond's solvency, knows that the investor will receive the contractually stated interest and repayment of principal on the agreed dates. If the assumptions on the amounts and duration of the future pension payments are borne out exactly, no additional employer contributions are needed for past service benefits. This approach is also called dedication. It is extremely expensive in a low interest rate environment such as that which applied in the 2008-2021 period of 13 years.

And,

Leveraged LDI: this is where, to achieve LDI in a low interest rate period, leverage is used in the attempt to reduce the cost of LDI. Leveraged LDI introduces potential death spiral risks into the pension scheme which wait for the right circumstances to arise. We explain these potential leverage induced death spiral risks later in this document.

Leaving the leveraged LDI potential death spiral risks to one side for the moment, the risks to scheme members only crystallise with sponsor insolvency; this is the primary risk for a scheme but neither the PPF nor TPR have themselves developed any understanding or capabilities in this regard. The PPF outsources analysis of this to commercial providers, while TPR appears to have done nothing in this regard. This is highlighted in the proposed treatment of the sponsor covenant evaluation in the draft Funding Regulations which can only be described as rudimentary:

"7 - (4) For the purposes of paragraph (2)(a), the matters to be considered in assessing the financial ability of the employer in relation to the scheme to support the scheme are—

(a) the cash flow of the employer, as set out in a Code;

(b) the likelihood of an insolvency event, within the meaning of section 121 of the Pensions Act 2004 (insolvency event, insolvency date and insolvency practitioner)(a), occurring in relation to the employer; and
(c) other factors which are likely to affect the performance or development of the employer's business, as set out in a Code."

We drew attention to further issues with LDI more than a decade ago. For example, it is an empirical and theoretical fact that companies in aggregate earn higher profits when interest rates are declining or low. The interest rate effects between pension scheme and company are polar opposites. When we hedge the interest-rate sensitivity of the scheme, we raise the interest-rate sensitivity of the company; in effect, this is gearing, rather than de-risking, the company. Thus hedging, the first step in an LDI strategy (or a leveraged LDI strategy), is a local decision at the expense of the global.

It is obvious that many of these risks, beyond just interest rates, have positive effects for the sponsor, such as increasing longevity in the general population. There are few companies that do not profit from the increased demand of a larger population, with a burgeoning retired community that consumes but does not produce. While higher inflation is, in general, problematic for corporate profitability, limited price inflation[1], the actual exposure of schemes for pension increases, is empirically positive for corporate profitability, when considered jointly with the higher interest rates. Simply put, it is a containment of costs, when higher prices and interest rates apply.

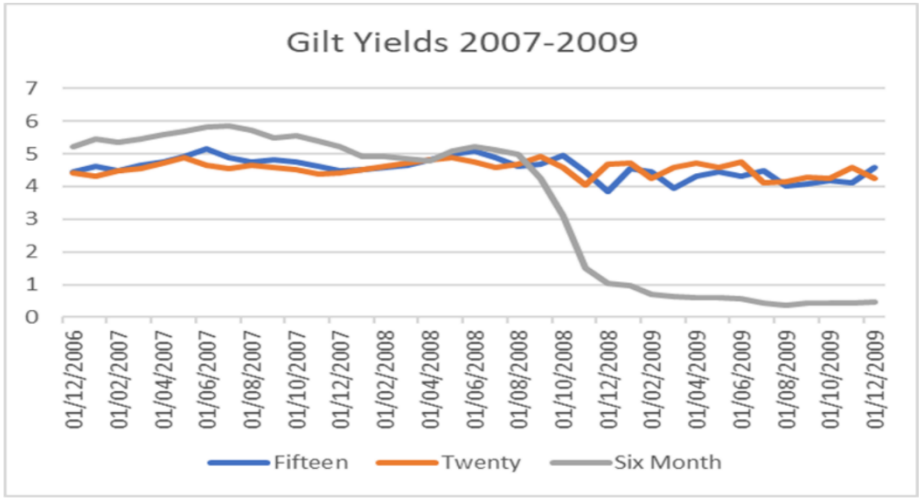
The Growth of Leveraged LDI

The take-up of leveraged LDI by schemes was relatively modest until the Great Financial Crisis (GFC) of 2007/2009. The rapid and massive decline in short-term interest rates combined with a modest decline in long-term gilt yields that came about as a result of central bank interventions made leveraged LDI strategies look attractive and provided the incentive for many to adopt them. Note that an unleveraged LDI strategy was largely unaffordable as interest rates were so low.

In other words, the solution to that crisis provided the motivation for the take-up of Leveraged LDI, and with that the use of more complex elements being added to these strategies through time, notably the use of leverage through the use of derivatives and borrowing. This is illustrated in Chart 1.

[1] Most pension schemes increase accrued pensions of deferred members and those of pensioners in payment in line with inflation each year caped at 5 or 2.5% depending on when the period of pensionable service over which the pension was earned.

Chart 1 Gilt Yields and Short Rates



(The dates on this chart should read as month ends not the 1st of the month – a quirk of Excel).

Chart 1 shows the evolution of the fifteen and twenty-year gilts together with the six-month rate; the curve is negatively sloped until the great financial crisis hit in earnest in September 2008. At that point, aggressive interventions by the Bank of England in the money market saw short rates plummet and the yield curve revert to being positively sloped, with only a modest decline in longer dated gilts. Consequently, the incentive to borrow short-term to buy long dated bonds was extremely high – of the order of 400 basis points. With rates widely expected to be 'lower for longer', this was seen and marketed as being essentially a free lunch, rather than the speculation that it was and is.

Outstanding long dated fixed receiver interest rate swaps (i.e., a type of derivative) would, at this time also have shown very substantial windfall gains and collateral receipts from the reduction of the amount of the pay legs. This was a highly successful speculation and would continue to be so as long as rates declined further and remained low.

However, embedded in that speculation was a potential death spiral risk, introduced and amplified by the leverage, of what would happen if short-term interest rates started to revert to pre-2008 levels.

Leveraged LDI strategies were also being heavily marketed by investment consultants as a free lunch and bizarrely, actively encouraged by TPR. It tied in with the twin aims:

- Of having, as at a valuation date, the market value of the assets and the present value of the scheme's liabilities to pay pensions to members move in line with the yield on gilts (so that the scheme's deficit[2] as at a valuation date would not increase), and
- Of increasing, through leverage, the interest and other investment return earned by the scheme net of the costs of the leverage (which made the strategy affordable by "juicing up" the investment return of the scheme).

[2] i.e., the amount by which the PCV of the scheme's projected future pension payments exceeded the market value of the scheme's assets (net of leverage/borrowing).

This is what the TPR's guidance said, and specifically using the word "leverage":

"The use of LDI typically enables pension schemes to achieve an improved balance between investment risk and return but it does introduce additional risks, e.g. around the use of leverage and in relation to operational risks around the management of collateral. Your investment adviser will be able to discuss the merits of an LDI approach to your matching assets with you.

Example 14: LDI

The assets of the XYZ Pension Scheme are invested 60% in global equities, 10% in index-linked gilts, 10% in fixed gilts, 10% in corporate bonds and 10% in property. The bonds are benchmarked against the over-5 years FTSE index-linked gilts index, the over-15 years FTSE gilts index and the all stocks corporate bonds index, respectively. The duration of the assets held, as advised by the scheme's investment consultant, is around five years.

The trustees are in the process of completing their actuarial valuation and the draft actuarial report indicated that:

- the scheme is 80% funded on their technical provisions (TP) basis
- the liabilities are broadly split as 50% fixed, 50% inflation-linked (uncapped)
- the duration is 18 years for the fixed liabilities and 22 years for the inflation linked liabilities

As part of their quarterly update, the scheme's investment consultant advises that:

- there is a significant mismatch between the duration of the scheme's assets and liabilities
- a 1% reduction in interest rates would increase the value of the liabilities by around 20% but only increase the value of the assets by around 5%
- as the scheme is only 80% funded, the value of liabilities, compared to the assets, would increase by more than 15%

The trustees are concerned about the level of risk in their scheme assets compared to the liabilities. They instruct the investment adviser to analyse the sensitivity of the assets and liabilities to a range of factors, and to propose changes to the investment arrangements to reduce the degree of interest rate (and inflation) mismatch without initially reducing the expected return on assets.

The investment adviser proposes an incremental approach whereby the trustees would initially allocate 30% of their assets to LDI and gradually increase their allocation afterwards. The adviser proposes that the initial allocation to LDI would be funded from the scheme's existing bond investments. The adviser also recommends that the LDI portfolio should be constructed using:

- a bespoke bond portfolio, i.e. a portfolio of bonds that better reflects the profile of the scheme's liabilities compared to the current bond holdings which are based around common industry benchmarks
- interest rate and inflation rate swaps, as these derivative instruments would allow the introduction of a limited amount of leverage (on average two times) to enable a greater reduction in liability risk

The investment adviser also advises that, due to the use of derivatives (swaps) and leverage, collateral would need to be held and managed. The adviser explains the extent of the collateral risks

that the scheme would be exposed to and develops a collateral risk and management plan for the trustees, which would be periodically reviewed.

Learning point: Trustees may wish to consider LDI to enable them to better manage the interest and inflation risks within their schemes. However, LDI introduces some additional risks, e.g. around leverage and collateral management, and trustees should understand these and take appropriate steps to manage them." [3]

Now, it may be that TPR was trying to save taxpayers money by encouraging a speculation on the short-term/long-term interest rate differential. But then, should the TPR be encouraging leverage, creating systemic risk, and embedding a death spiral risk in the pension scheme? The interesting question for trustees will be what explanation or warning did they receive of the potential death spiral risk which we discuss below?

By 2018, the November Financial Stability Report of the Bank of England reported notional interest rate swap exposure of UK DB pension funds totalled around £900 billion – the overall assets and liabilities of schemes at this time were in the range of between £1.5 trillion and £1.6 trillion. The graphic produced by the Bank of England makes it shockingly clear that the exposure and potential losses of DB were massively higher than any other non-bank financial sector. While, we have as yet been unable to replicate the reported DV01[4] value of these swaps, it appears to be rather low, in the range of between £110 million and £120 million. The sensitivity of the total interest rate risk exposure of scheme liabilities via these swaps to a one basis point increase in rates is an order of magnitude higher than this. If we assume a 15-year or 20-year average duration to scheme liabilities, the overall systemic loss from a one basis point rise lies in the range of between £2.2 billion and £2.9 billion. If the swaps had an average tenor of twenty years, then the loss on £900 billion notional would be of the order of £1 billion for every basis point increase. This may help to set the backdrop for our explanation of the potential death spiral risk to which leveraged LDI strategies exposed schemes (and also their sponsoring employers).

There can be no doubt that, at that time, TPR was also well aware of the massive volume of derivatives being used, if not their potential for causing significant losses. We have discussed the DB Pension Schemes: Leverage and Liquidity Survey conducted by OMB for TPR published in 2019[5] in another commentary.[6] We would however draw attention to one finding of that survey. It covered approximately one third of schemes by value, and reported repos being used to finance £64.6 billion of conventional and index linked gilts – that is to say, £64.6 billion of leverage or borrowing.

We discuss below why pension schemes are prohibited by law from borrowing except for temporary liquidity purposes.

Changing Asset Allocation and QE Impacts

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[3] https://www.thepensionsregulator.gov.uk/en/document-library/scheme-management-detailed-guidance/funding-and-investment-detailed-guidance/db-investment/matching-db-assets#5073310b483046e2bffa521baaf8e8a7

[4] i.e., the amount by which the PCV of the scheme's projected future pension payments exceeded the market value of the scheme's assets (net of leverage/borrowing).

[5] https://www.thepensionsregulator.gov.uk/-/media/thepensionsregulator/files/import/pdf/db-pension-scheme-leverage-and-liquidity-survey.ashx

[6] https://www.longfinance.net/publications/long-finance-reports/liability-driven-investment/

Throughout the period from 2002 DB schemes have sold equity and bought bonds, and to a lesser extent illiquid alternative investments. By the end of 2021 pension funds held around 25% of gilts in issuance and less than 3% of London listed equity.[7]

Some have suggested that the decline in interest rates since 2008/2009 was simply the product of the Bank of England's programme of Quantitative Easing (QE). However, we would suggest that the decline in gilt yields was in part driven by the purchases of gilts by DB schemes. These may have been smaller than the Bank of England, but pension funds still bought over 10% of gilts in issuance, which may be compared with the 30% bought by the Bank of England under QE. It is also crucial to note that DB pension funds dominate the index-linked gilt market, and so we can see the effects of DB pension funds buying actions clearly. Index-linked gilt prices were driven up to levels which defy reason, with the 10-year index-linked gilt at one point offering Retail Price Index (RPI) returns minus 3.2%. In the past year, the 1/8% ILG 2068 has experienced a yield range of 4.25% from RPI minus 2.13% to RPI plus 2.12%. By contrast, the equivalent maturity conventional gilt has reported a yield range of just 2.14%.

One further point to note is that the Bank of England's objective was to buy gilts to encourage reinvestment in other higher yielding more productive securities.

However, the Bank's QE activities explicitly excluded buying in the index-linked market because of the concentration of ownership in DB pensions, and the impacts that QE would have had on this segment of the market. Over this time, DB schemes were selling other assets in order to buy gilts.

This is the Bank's explanation of QE: [8]

"*Quantitative easing (or QE) acts in a similar way to cuts in Bank Rate. It lowers the interest rates on savings and loans. And that stimulates spending in the economy.*

Here's how QE works:

We buy UK government bonds or corporate bonds from other financial companies and pension funds.

When we do this, the price of these bonds tend to increase which means that the bond yield, or 'interest rate' that holders of these bonds get, goes down.

The lower interest rate on UK government and corporate bonds then feeds through to lower interest rates on loans for households and businesses. That helps to boost spending in the economy and keep inflation at target.

QE also affects the prices of other assets like shares and property.

Here's an example. Say we buy £1 million of government bonds from a pension fund. In place of those bonds, the pension fund now has £1 million in cash.

Rather than hold on to that cash, it will normally invest it in other financial assets, such as shares, that give it a higher return.

In turn, that tends to push up on the value of shares, making households and businesses holding those shares wealthier. That makes them likely to spend more, boosting economic activity."

[7] ONS and London Stock Exchange.

[8] https://www.bankofengland.co.uk/monetary-policy/quantitative-easing#chapter-3

It looks like the TPR did not get the message, and instead encouraged counter-cyclical activity.

During the extended period of declining rates, DB scheme activities in derivatives and repo resulted in the schemes receiving collateral from their counterparties, and this allowed the purchase of yet more gilts. In the period of declining rates, the feedback spiral of LDI was at work, but passed without comment and largely unnoticed, as it resulted in higher prices.

The objective of using repos as leverage or economic borrowing was to increase the income of the pension fund by borrowing for up to 1-year at short-term interest rates and to buy long-term bonds with a fixed higher interest rate compared to the short-term rate.

This is illustrated in a worked example below:

- 20-year gilt of nominal £100 and with a market value of £100 and yielding 5% p.a. owned by the pension fund is used to raise £400 (a leverage ratio of 4x) at a 1-year fixed interest rate of 2%.

- £400 is used to buy £400 of the same 20-year gilt for £400 at a fixed yield of 5% p.a. Note that there are 4 sequential repo transactions of £100 each to raise the £400.

- This improves the income of the pension fund from 5% p.a. to (5% of £500 = £25) - (2% x £400 = £8) = £17 p.a.

- In other words, the effect of the leverage has been to increase the return on the original gilt from 5% a year to 17% a year.

It is also worth noting that the above example ignores the "haircut" that would be applied on each repo (which may explain the 4.3 x median pension scheme leverage reported in the TPR's 2019 survey mentioned earlier) and the need to post collateral if the market price of the gilts falls below the £100 market value of the gilts at the time of inception of the repo. Ignoring those two elements makes it easier to see what risks were really being undertaken by the pension scheme and the introduction of the potential death spiral risk.

But for the 'juicing up' of investment returns, buying gilts through leverage resulted in the purchase of gilts in a market which the Bank of England was actively intervening in through its QE programme. This results in a guaranteed loss after taking account of inflation – not an obvious investment strategy for long-term investors seeking to achieve a positive investment return.

What was missed, or at least passed without comment, as interest rates were declining, is that leveraged LDI is form of maturity transformation. Leveraged LDI transforms the intrinsic maturity structure of a DB pension fund.

Pension funds, absent leveraged LDI, are long-term savings institution which have the ability to withstand short-term market fluctuations. With the introduction of leveraged LDI, pension funds have been transformed into an institution where the immediate and short-term are all-important. This significantly reduces the ability of the scheme to bear risks. The risks of a model based upon short-term financing for long-term lending are well know from the banking sector, and we only have to think of Northern Rock to see just how badly that can end. It also helps explain the prohibition on borrowing by pension schemes except for temporary liquidity purposes, which we come to later.

There also appears to be a legal issue here: the accumulation of risk in the pension scheme fund – a breach of Reg 4(7) of the Occupational Pension Schemes (Investment) Regulations 2005 (the Investment Regulations). Reg 4(7) states:

"(7) The assets of the scheme must be properly diversified in such a way as to avoid excessive reliance on any particular **asset**, **issuer** or group of undertakings and so as to avoid accumulations of risk in the portfolio as a whole. **Investments in assets issued by the same issuer** or by issuers belonging to the same group **must not expose the scheme to excessive risk concentration**."

[Emphasis added]

This raises a question for TPR, who clearly cannot have understood what its 2019 Survey of DB Pension Scheme Leverage and Liquidity was telling it, given the potential death spiral risk which leveraged LDI and leveraged LDI funds introduced on such a large scale.

The Market Disruption

Against a background of increasing inflation and gilt yields rising since the beginning of the year, the combination of a 0.5% increase in Bank Rate and the announcement by the Bank of a timetable for the sale of its gilt portfolio had left the gilt market febrile ahead of the mini-budget announcements.

The market fell sharply in response to that budget but by an amount which was quite modest – the fifteen-year gilt fell by 2.5% in price on that day. The next day saw further selling in response to the mini-budget, and there were reports of some pooled leveraged LDI funds entering the market to sell gilts to unwind some of their leverage. The fall on that Friday 23rd September was also not dramatic – just 3% in price for the fifteen-year conventional. By contrast, the market for index-linked gilts was showing signs of acute stress, with discontinuous prices and large gaps between trades. There were reports of a number of pooled leveraged LDI funds making calls upon their investor base for them to subscribe new units in the funds.

It is important to note that pooled funds do have limited liability. However, managers will typically make requests for new subscriptions of units in order to maintain the previous hedge ratios and leverage in the fund. Failure to meet such a request will result in the unwinding of some or all leverage and the sale of gilts for those unit-holders – and given large numbers of unit holders, this is to be expected for some. However, this places further pressure on gilt prices, and realises losses in the Leveraged LDI fund which is reflected in the price of units. That, in turn affects the value of those units used by the pension fund at its next valuation.

The combination of these three days had exhausted the cash reserves of all but the most well provisioned schemes, and sales of gilts and other securities to meet the expected collateral calls would be needed on the coming Monday. The precise situation was difficult to determine at best and impossible for many; reliable information was largely unobtainable. Strains on transaction processing resources were evident.[9] It is also important to note that this process of meeting margin calls had been going on throughout the year up until this point, with the Financial Times reporting in July that DB pension schemes had been told by their advisers to expect more margin calls.[10]

On that Monday morning there was a shortage of buyers of gilts. The Bank of England, which owned a little over 30% of the market were absent. The second largest class, overseas owners, were also absent as the exchange rate had crashed to a new all-time low in Asian trading. And the third largest class, UK pension funds were trying to sell to raise cash. By this time, selling was widespread across schemes and pooled funds who had employed leveraged LDI.

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[9] See for example, Processing hold-ups at US custody bank exacerbated UK pension sell-off, Financial Times, 14th October 2022.

[10] UK pension schemes confronted by growing liquidity strains, Financial Times, 1st July 2022.

Dealer inventories have also been extremely low, a product in part of the regulatory capital requirements introduced after the GFC, and in part the low returns for offering liquidity to the market. Prices fell precipitously as yet more collateral calls arrived. By late in the day there were rumours of a small number of pooled funds having negative net asset value. Schemes were looking at selling other parts of their overall portfolios, such as equities and corporate bonds to meet margin calls.

This continued throughout Tuesday and into Wednesday morning. The market can only be described as dysfunctional prior to the Bank intervention.

There is only one positive to come from this mess. The sale of overseas equities and repatriation of the cash by schemes provided some support for the exchange rate.

Make no mistake, the crisis unfolded as a result of the leveraged position of schemes employing Leveraged LDI, and the collateral calls arising from price declines, a process which was self-reinforcing. In the absence of Leveraged LDI portfolios, it is most unlikely that the mini-budget, economically illiterate though that was, would have triggered much more than an immediate decline in prices as was seen on the Thursday and Friday, a basic repricing of bonds.

There is a further lesson here. Leveraged LDI strategies are vulnerable to external shocks, which can trigger their self-reinforcing spiral of value destruction.

The fact that the mini budget is considered by some to be a "black swan" event is not the reason we have seen the turmoil in the gilt market and the huge destruction of capital value in DB pensions. The reason for this is that Leveraged LDI and the homogenising of the investment strategies of pension funds to "*low risk*" asset allocations as actively encouraged by TPR, meant that all DB pension funds that followed this strategy were exposed to the same risk – increasing interest rates. In other words, there was an embedding of duration mismatch risk.

Repo and Derivatives

These are the principal tools used in leveraged LDI strategies. We note that TPR failed to make any reference to either repo or derivatives in its responses to parliamentary committees. In her speech on November 7th to ISDA/AIMA[11], Sarah Breeden of the Bank of England correctly identified "*The root cause (of the gilt market disruption and Bank intervention) is simple – and indeed is one we have seen in other contexts too – poorly managed leverage.*" but fails to recognise that this is only a symptom of a deeper malaise. The question which should be asked is why do these pooled funds, segregated accounts, and self-managed leveraged LDI strategies exist in the first place; particularly when pension schemes are prohibited from borrowing except for temporary liquidity purposes.

It may be useful to explain here what leverage, in this context, is:

"*Financial leverage results from using borrowed capital as a funding source when investing to expand the firm's asset base and generate returns on risk capital. Leverage is an investment strategy of using borrowed money—specifically, the use of various financial instruments or borrowed capital—to increase the potential return of an investment.*

Leverage can also refer to the amount of debt a firm uses to finance assets.

KEY TAKEAWAYS

[11] https://www.bankofengland.co.uk/speech/2022/november/sarah-breeden-speech-at-isda-aimi-boe-on-nbfi-and-leverage

Leverage refers to the use of debt (borrowed funds) to amplify returns from an investment or project.

Investors use leverage to multiply their buying power in the market. (to which we would add this also multiplies their price influence when selling)

Companies use leverage to finance their assets—instead of issuing stock to raise capital, companies can use debt to invest in business operations in an attempt to increase shareholder value.

There is a range of financial leverage ratios to gauge how risky a company's position is, with the most common being debt-to-assets and debt-to-equity.

Misuse of leverage may have serious consequences, as there are some that believe it played a factor in the 2008 Global Financial Crisis."[12]

There are some significant legal issues arising from the purpose and use of these instruments.

Some legal issues

The investment of pension scheme assets is protected by a number of legal and regulatory requirements to help protect members pensions.

The first overriding requirement is that the investment of the scheme's assets should be in accordance with the prudent person rule and those assets may not be invested in anything which is outside the trustee's powers.

But more specificity is given to that rule by legislation; in particular, in context of leveraged LDI, 3 legislative requirements:

- No borrowing: Pension scheme trustees may not borrow except for temporary liquidity purposes (Reg 5 of the Investment Regs),

- Derivatives only to be used for permitted purposes: Pension scheme trustees may only use derivatives for risk management or efficient portfolio management purposes (Reg 4(8) of the Investment Regs), and

- Proper diversification to avoid accumulation of death spiral risks: Pension scheme trustees must ensure that assets are properly diversified so as to avoid accumulation of risks in the portfolio as a whole (Reg 4(7) of the Investment Regs).

Where the pension scheme trustees have delegated their powers to a leveraged LDI manager, those 3 legislative restrictions apply to the leveraged LDI manager who cannot contract out of those restrictions or limit or exclude liability in the investment management agreement (Pensions Act 1995, Section 33). Furthermore, the trustee cannot give the investment manager greater powers than the trustee has.

We have discussed the need for proper diversification to avoid potential death spiral risks earlier. What is becoming increasingly clear, as the facts come out, is that it looks as if there is a clear breach of Reg 4(7). To draw out the fundamental, but it seems not acknowledged, recognized, or understood risks which leveraged LDI introduced into the pension fund:

- First, the "juicing up" of investment returns using leveraged LDI, illustrated in our simplified example above, is crucially reliant on the cost of the short-term up to 1-year borrowing remaining

[12] Source: https://www.investopedia.com/terms/l/leverage.asp

below the 20-year fixed yield - of 5% a year in our simplified example above - which the scheme has locked into by, buying, in our simplified example, £400 of 20-year gilts yielding 5%.

- Second, this approach is crucially dependent on the bank which has lent the £400 via the 4 repos, in that simplified example, agreeing to roll the 4 repos at the 1-year repayment date potentially each year for the next 19 years.

Is it plausible that short-term interest rates could rise to 5%? Well, here are the views of a rating agency (Fitch) on 10th October 2022:

"*We now anticipate the policy rate rising from 2.25% to 4.25% by December 2022 and 5.0% by 2Q23 (compared to our previous forecasts of 3.0% and 3.25%, respectively), slightly below market expectations.*" [13]

And do not forget that short-term rates rose to 17% in 1979 when Margaret Thatcher became prime minister! [14]

We know that, in the Pensions Regulator's 2019 survey we have referred to above, there were in excess of £64 billion of gilts held by a small sample of pension schemes which were financed by repos.

This is a clear, and very substantial, use of leverage. So, what is a repo and is it prohibited by Reg 5 of the Investment Regulations? In the words of the ICMA ERCC Guide to Best Practice in the European Repo Market: March 2022:

"*Although the Seller sells collateral to the Buyer at the start of a repo, his obligation to buy back equivalent collateral in the future means that the Buyer has only temporary possession of the collateral and the Seller has only temporary use of the cash. Therefore, despite a repo being structured legally as a sale and repurchase of collateral, it behaves economically like a secured loan or deposit (ie a loan or deposit against a security interest in assets). The Buyer is effectively making a secured loan to the Seller. The Seller is effectively taking a secured deposit from the Buyer.*" [15]

Now it is clear under English law that, in normal circumstances, a repo is, legally, not borrowing (although in economic terms it is the same as secured borrowing). From a corporate insolvency perspective, the re-characterisation risk of a repo as secured borrowing is removed by a safe harbour created by the Financial Collateral Arrangements (No. 2) Regulations 2003.

But Reg 5 is the UK's transposition of Article 18(2) of the IORP I Directive (now consolidated and replaced by Article 19(3) of the IORP II Directive). And one of the purposes of the Directive was to protect members pensions from excessive risk taking by the pension scheme. Hence the prohibition on borrowing by a pension scheme (other than for temporary liquidity purposes).

Given the protective purpose of the Directive, it would seem strange that its restriction on borrowing could be easily circumvented by economic borrowing using repos. Despite Brexit, the Directive, and the rules for interpreting pre 11pm on 31st December 2020 Directives are part of retained EU legislation under the European Union (Withdrawal) Act 2018, as amended.

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[13] https://www.fitchratings.com/research/sovereigns/deeper-uk-recession-now-likely-as-interest-rates-rise-faster-10-10-2022

[14] https://thinkplutus.com/uk-interest-rate-history/

[15] https://www.icmagroup.org/assets/ERCC-Guide-to-Best-Practice-March-2022.pdf#page83

So, an English court would be required to interpret borrowing in Reg 5 on a purposive basis in order to give effect to the protection intended by the Directive.[16]

It follows that the use by the leveraged LDI manager of repos is in breach of Reg 5 unless used for temporary liquidity purposes. But, in leveraged LDI, repos are being used as short-term borrowing, which is expected to be rolled regularly and repeatedly to finance long-term investments.

How, may you ask can this be the correct conclusion to reach if in excess of £65 billion of gilts have been financed by repo borrowings? We think the likely answer was a disconnect between what was explained to the lawyers advising on the legalities and the presentation of these strategies by investment consultants.

We understand that, in the Netherlands, under the applicable Dutch law transposing Article 19(3) of the IORP Directive, borrowing is interpreted as including economic borrowing using repos. So Dutch pension funds do not borrow using repos. This approach is entirely consistent with our analysis.

To be clear, if the pension scheme has invested in units in a Leveraged LDI fund, that would not be borrowing. But it would raise the issue of whether there was a breach of Reg 4(7) (proper diversification) depending on quite how big the loss on the units is to the pension scheme.

We should also note that there are similar issues on the use of fixed/floating interest rate swaps. There is a difference between the wording of Article 19(1)(e) of the IORP II Directive (previously Article 18(1)(e) of the IORP I Directive) and Reg 4(8) of the Investment Regs.

Some additional wording was included in Reg 4(8) to say that efficient portfolio management included "…*the reduction of cost or the generation of additional capital or income with an acceptable level of risk*". So, an addition was made to permit Leveraged LDI using derivatives which was not in Article 19(1(e).

In addition, the word "investment" was omitted before the word "risk" in Reg 4(8). Article 19(1)(e) says that pension schemes can use derivatives for:

"…*insofar as such instruments contribute to a reduction in* ***investment*** *risks*".

(Emphasis Added)

Now, if your use of derivatives introduces a potential death spiral risk, you are not using derivatives to reduce investment risk. You are using them, in Leveraged LDI, to introduce leverage and increase investment risk as the opposite side of the coin to increase (or 'juice up') investment returns as illustrated in our simplified example above.

Our comments on repos and borrowing above as to the way the English Courts interpret regulations transposing retained EU directives apply equally here. In other words, the English Courts would interpret Reg 4(8) to give effect to the purpose of the Directive by reading in the missing word "investment" and crossing out the additional words not in Article 19(1)(e). Our comments about the likely disconnect between the investment consultants and the lawyers apply equally.

We should end this Part with a quote from the Manual of Examination Policies of the US Federal Deposit Insurance Corporation on duration risk mismatch (at Section 7.1):

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[16] See, for example, Pfeiffer C-397/01 at para 113:
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62001CJ0397&from=EN

"*Some institutions may conduct borrowing and investment transactions (leverage strategies) that are separate from the bank's core operations. In a typical leverage strategy, management acquires short- or intermediate- term wholesale funds or borrowings and invests those funds in longer-term bonds. Prior to implementing a leverage strategy, management should have the skills to understand, measure, and manage the risks. Management should be able to demonstrate a transaction's effect on the bank's risk profile and document that the exposure is within established risk limits.*

Management should measure and document a strategy's effect on IRR exposure prior to implementation, periodically thereafter, and prior to any significant strategy changes. Institutions should consider stress testing all prospective strategies and ensure IRR exposures are within established risk limits." [17]

So, we have TPR encouraging leverage to borrow for periods of up to one-year in the repo market and buy gilts with a duration of 20 years to exploit the interest rate differential with a focus on collateral without understanding that if short-term rates revert to pre- 2008 levels, it is more than a collateral problem.

The 'juiced up' yield from the leverage has gone negative. The expected income generated on the scheme assets from the repo transactions has gone negative. If the employer cannot make up the shortfall, the employer will become insolvent.

Part III: Answers to the questions in the call for evidence

The call for evidence raised six specific topics:

1. The impact on DB schemes of the rise in gilt yields in late September and early October.

The levels of gilt yields are close to their levels immediately prior to the mini budget. As the spot rate is up by 40 basis points on the 15-year gilt, and 30 basis points for 20-year gilt, there really is little that can be said.

Gilts yields appear now to have resumed their steady upward climb as monetary policy is tightened to counter inflation. Since the beginning of the year, gilt yields have risen from 1.15% to 3.81% for fifteen-year durations and from 1.22% to 3.86% for twenty-year durations. This means that prices have declined by 32% and 40% respectively. The present value of projected scheme liabilities will have fallen this year by these orders of magnitude, where the discount rate used is anchored to the gilt yield. Assets held by DB pension funds will have fallen for most schemes, but generally by less than this.

However, the fall in scheme assets means that the ultimate liabilities that must be paid are less secure and more poorly funded than previously as there are fewer assets from which pensions can be paid. Scheme assets around the start of 2022 previously covered around 80% of the projected liabilities, and we have seen that coverage decline to around 50%.

It is rather more than a paradox that schemes can have seen the destruction of capital to the tune of around £500 billion and we now have people suggesting that schemes are stronger than they were at the beginning of the year. This apparent "*improvement*" arises because the measure being used to make this assessment is the funding ratio, the ratio of assets to the discounted present value of liabilities.

[17] https://www.fdic.gov/regulations/safety/manual/section7-1.pdf

The funding ratio is mixed attribute in nature. Scheme assets are valued at market prices (marked-to-market), while the denominator is a discounted present value of projected liabilities (marked-to-assumption). What this method actually does is to divide one set of uncertainties by a different and larger set of uncertainties.

There is also a question of the degree of confidence that we may have in the funding ratio statistic.

Under normal market volatility conditions, for a fully funded scheme, the one standard deviation confidence interval ranges from 96.2% to 104.1%. Under the market conditions seen recently, that confidence interval has expanded from 89.1% to 112.6%. There are very few, if any, schemes employing LDI or leveraged LDI with improvements large enough to qualify as statistically significant.

There are also further technical issues. For schemes using leverage, there is an assumption that the present value of liabilities should reflect the full amount of gilt yield increase rather than the net of higher borrowing costs reduced expected investment return on the scheme's assets. Scheme trustees cannot prudently use a discount rate that exceeds the net of borrowing costs expected return on the scheme assets.

There is also no mention of the fact that the schemes which have performed the best, and by some considerable distance using this measure, are precisely those not employing LDI, leveraged or otherwise, and, for the majority of those schemes, the results are statistically significant.

Some schemes have also suffered through the unfortunate timing of their rebalancing of their portfolios through this turbulence and have actually seen their funding ratios decline. With many schemes now buying long-dated gilts as substitutes for interest rate swaps, some are doing so at prices far higher than those they received when selling the same gilts during the crisis to meet collateral calls.

We understand that some schemes are liquidating a broad range of assets in the continuing attempt to maintain their '*hedge ratios*'. We have received reports of private placements changing hands at prices as low as 60% of their year-end valuation. With the immediate prospects for gilt yields as rising further, as a result of the Bank of England's need to bring inflation down, these schemes will continue to be forced sellers of assets at fire sale prices.

The smaller asset base that has resulted from the crisis is also directly relevant for fund managers whose revenues are principally driven by the total amount of assets under management, and for the costs of scheme and fund management. DB schemes will be less efficient. Another way to look at the scale of value destruction we have seen is also not to look at it in terms of just UK DB pension funds, with circa £9 trillion pounds of assets under management at the start of the year, UK fund management has just lost at least 5% of the total assets that it managed, and this is likely to be much higher as we are not including spill-over effects into the wider asset base.

The open question for DB schemes now is whether they can in fact earn the higher net rates of return needed to support the use of the higher discount rates now employed, particularly in an environment of austerity and a recession that the Bank of England are predicting to the longest recession in 100 years, rather than a period of economic growth.[18]

2. The impact on pension savers, whether in DB or defined contribution pension arrangements

[18] https://www.cityam.com/bank-of-england-record-recession-warning-reinforced-by-fresh-research/

There has been little or no effect to date on DB scheme members' pensions. The press commentary on the gilt market turmoil has harmed the confidence of some scheme members in their schemes. Their schemes now have fewer assets and will need to earn more now on those remaining assets to meet their pension obligations. So, where will this extra return come from? Should the pension scheme now adopt another speculative investment strategy? We think that the reality is that the gap between the return on the scheme assets and the amount needed to pay pensions will have to come from additional employer tax deductible contributions (assuming the employer has taxable profits).

Depending on the scheme in question and the scale of leverage, in extremis this may result in the employer becoming insolvent with associated job losses (and cost to the taxpayer) and the scheme's assets and pension obligations being replaced by compensation from the Pension Protection Fund. That is the crystallisation of the death spiral risk that became embedded in the scheme by borrowing short at floating rates and buying long at fixed rates.

There is also the Northern Rock risk https://www.bbc.co.uk/news/business-41229513 that the counterpart bank will not agree to roll the repos in an extreme scenario.

As outlined above, pension schemes are prohibited from borrowing except for temporary liquidity purposes to avoid being infected with these two potential death spiral risks.

Although gilt yields have returned broadly to levels prevailing before the crisis, there have been costs of this episode to pension schemes. These costs arose from transactions undertaken during and in response to the market disruption. Many of those are irreversible losses. It is unlikely that we will ever be able to measure accurately the totality of those costs, but one partial and incomplete measure will be the profit to HM Treasury arising from the Bank of England's £19 billion of gilt purchases. We should certainly expect these to be material for some schemes and their funds.

Savers in DC arrangements saw the values of their savings 'pots' decline in line with market prices for listed equities and gilts. As many DC arrangement '*life-style*' their asset allocations, that is move to higher allocations to gilts as retirement approaches. This created considerable consternation, and some panic. However, the rally in gilt market yields since the Bank of England interventions has largely reversed this decline in value.

We would also draw attention to the fact that the losses incurred by schemes were from tax-advantaged savings and that the replacement of any of these losses through additional contributions or investment returns, if DB scheme members are to receive their pensions, these will also be tax advantaged. This will increase the effective level of tax subsidy in the final pension substantially – basically doubling the tax subsidy in the loss. This will place more pressure on government finances and ultimately the taxpayer.

3. Given its responsibility for regulating workplace pensions, whether the Pensions Regulator has taken the right approach to regulating the use of LDI and had the right monitoring arrangements.

The Pensions Regulator has failed abjectly.

TPR appears to consider its role to be to ensure that private sector DB pension provision ceases, and that schemes are transferred away or run-off and wound up as rapidly as possible, regardless of the cost to sponsor employers or the wider economy. TPR makes extensive use of the word '*risk*' in its communications but is careful never to offer anything too specific.

The latent nature of risk makes cautions concerning risks an all-purpose catch-all, capturing everything and nothing. It has become the primary tool for financial authorities in very large part because of its potential role in subsequently evading accountability, after even egregious failures.

The Pensions Regulator appears to be an enthusiastic user of this approach. It recently issued updated guidance: "*Managing investment and liquidity risk in the current economic climate*". In its six pages, the word '*risk*' appears 27 times, and in 15 instances it appears as '*liquidity risk*'. In the previous guidance, in its 11 pages, the word '*risk*' appears 37 times and '*liquidity risk*' just twice. Times have obviously changed.

The monitoring of LDI by the Pensions Regulator has been cursory at best. Even now it cannot produce any reliable statistics on the extent of its use. It is notable that the majority of statistics quoted in its letters to committees have been collected recently from external performance measurement services. The survey it commissioned in 2019, apparently at the prompting of the Bank of England, is methodologically unsound. We have discussed this in previous papers.[19]

We would question if TPR understands the duration risk issue from borrowing short and buying long which is clearly explained in the Manual of Examination Policies of the US Federal Deposit Insurance Corporation on duration risk mismatch quoted above.

Furthermore, the Pensions Regulator appears not to have understood the purpose or detail of the legislation that it is charged with enforcing. We have outlined some of these issues earlier. It also appears not to have understood the findings of its own commissioned survey. It is interesting to note that that survey concentrated on larger schemes, but as the Bank of England has reported, the crisis commenced with the actions of pooled funds, and they of course are held principally by smaller schemes. The report lists pooled investment vehicles by category, but LDI funds are not one of these:

"'Other' investments, which included a wide range of investment types including LDI pooled funds, cash, infrastructure, private debt, real estate debt and cross currency swaps, accounted for a fifth (22%) [£53.2 bn] of pooled fund holdings."

Let us take the case of repo. The survey reports a total of $64.6 billion outstanding being used to finance conventional and index linked gilt holdings. As the survey reports that 57% of repos by values are greater than 3-months in term (but no greater than one year), this cannot be described as borrowing for short-term liquidity purposes, and central to the leveraged LDI strategy was that the repos would be rolled each year - so they were not intended to be used to provide temporary short liquidity. Those repos are clearly, in economic terms, borrowing and therefore illegal. See **Some Legal Issues** above.

When challenged on the question of repo, TPR's response to us was:

"*Repo financing*

We understand that repo financing is structured as a sale and future repurchase of an asset and, as such, would not amount to borrowing for the purposes of the Investment Regulations.

Of course, trustees (and fund managers to whom investment decisions have been delegated) should ensure that investment decisions are consistent with the applicable requirements of the Investment Regulations and are appropriate for the scheme in question."

[19] https://www.longfinance.net/publications/long-finance-reports/liability-driven-investment/

This is sophistry with purpose. In our opinion, TPR, in pursuit of ever higher funding for DB schemes, wanted to permit borrowing and leverage since, if successful, these speculations would obscure the higher costs of schemes of holding "low risk" and negative yielding assets to their sponsor employers.

It is also worth noting the presence of the second paragraph. Throughout this whole process, TPR has never once acknowledged that they had any hand in this as the regulator of the pensions system. The standard approach of TPR has been, and continues to be, to place the onus onto trustees, fund managers, and investment consultants. The lack of accountability as the regulator tasked with overseeing this system stands in stark contrast to other regulators such as the FCA, BoE, and PRA who do not take such a remote approach to their statutory duties and obligations.

It is interesting that the Bank of England, the FCA, and a host of authorities all refer to repo as borrowing. Indeed, in the Netherlands, a country with a similar large DB pension system subject to the same European Directive that the Investment Regulations are transposed from, repo is considered borrowing.

The TPR 2019 survey also reports just £216 billion notional of interest rate swaps, and this sample is said to be a little more than one third of schemes by value – this does not reconcile with the Bank of England estimate of around £900 billion some 18 months earlier. However, there is no commentary or investigation of this. There are no estimates of risk in the survey.

The staffing arrangements of TPR are also interesting and may explain its failure to develop a number of capabilities itself. There is a long-standing debate in economics about the costs and benefits of revolving doors. Revolving doors can provide much needed incentives for public sector workers to perform and bring private sector expertise into the public sector.

One of our correspondents described the situation with TPR as follows:

"*The consultants, accountants (Big Four) and lawyers in the DB pension industry form the backbone of the TPR and they rotate into TPR and back into DB industry frequently.*

The TPR has a lot of staff. A bunch of civil servants from the DWP and then a load of secondees from the DB industry and with the majority of staff recruited over time from the DB industry and going back to the DB industry after a number of years (a period working at TPR is considered by the DB industry to be very good for your CV generally). You will see that loads of consultants, lawyers etc highlight their time at TPR on their DB industry CVs."

Basically, the Pensions Regulator has actively encouraged the use of Leveraged LDI. It is far from obvious that it has the necessary depth of knowledge and comprehension to supervise its use. It is far from obvious that they have considered any of the legal issues surrounding LDI.

An experienced and highly numerate trustee offered us the following insight:

"*My experience of TPR means I expect nothing from them other than self-promotion and refusal to consider the possibility that they have anything to learn. And it seems no-one will hold them to account.*"

4. Whether DB schemes had adequate governance arrangements in place. For example, did trustees sufficiently understand the risks involved?

We are not well positioned to comment on the adequacy of scheme governance arrangements. In our opinion, trustees were very poorly informed, and most had almost no understanding, of either the likelihood or the magnitude of the risks involved with leveraged LDI.

Behavioural psychologists tell us that individuals and groups make local rather than global comparisons and these psychologists have a bagful of party tricks to illustrate the resulting errors in decision and choice. They also show that groups, such as trustees, will be highly focused on external rather than internal aspects in their decision-making process. "Is our action riskier or safer than the average?" "Has the regulator criticised or praised this action?" Moreover, nudges, such as UK regulators' emphasis on prudence, will be interpreted qualitatively: "We should be, and be seen to be, doing something safe and conservative to avoid criticism from our peers and stakeholders." Similarly, if something comes as an endorsed course of action from the Regulator, it must be the correct course of action, otherwise why would it be being suggested?

This was sold to them as a '*have your cake and eat it*' proposition. We do know however, that trustees were told that everyone else is doing it, and TPR wants to see it done. So, that must be all right!

In the period since the leveraged LDI crisis erupted, we have spoken with many investment consultants about aspects of these strategies. In all too many cases our questions are answered with generalities, and these are all too often incorrect. There is a marked reluctance to admit that they do not know the answer to a question and will attempt to gloss over this. Worryingly, there are many consultants who appear to have only a fleeting acquaintance with the detail of the plumbing of the financial system, or in many cases even to understand that those operational minutiae are critically important. However, much like the trustees, everyone else is doing it, and TPR wants to see it done.

5. Whether LDI is still essentially 'fit for purpose' for use by DB schemes. Are changes needed?

LDI has never been '*fit for purpose*' if the objective is the secure and efficient provision of private sector occupational pensions. Current attention is focussed on Leveraged LDI and indeed the Bank of England is correct in attributing the gilt market turmoil to mismanaged leverage. However, that turmoil was only a symptom of a deeper malaise. The question which should be asked is why these leveraged portfolios first came into existence.

The motivation for LDI and subsequently leveraged LDI was the advent of new accounting and regulatory requirements which tied discount rates to market yields and carried with that the unfortunate side-effect of introducing the trends and idiosyncratic variability of those market yields in valuations. For ease of comprehension this is illustrated later in Annex A.

The issue is compounded by schemes and their advisors' considering schemes on what is essentially a stand-alone basis, the sufficiency of the scheme tangible asset portfolio considered alone, with no value being attached, in general, to sponsor support. The sole exception to this generality is that where sponsors have agreed with scheme trustees and TPR an explicit schedule of deficit repair contributions, these may be considered.

This market-sourced variability in yields, and the resultant valuations was seen by trustees, their advisors and TPR as a source of risk. In fact, as interest rates or yields play no part in the determination of the ultimate DB pensions payable to members, this belief is simply wrong. It is only if actions are taken based upon these spurious valuations that they become a risk.

TPR, of course, uses these valuations as the basis for its interventions in scheme and fund management. With this, a non-risk becomes a risk, and advisers immediately offered '*solutions*' to schemes to hedge or offset this interest rate risk.

As time progressed, the low returns associated with elementary LDI portfolios led to the use of borrowing, either implicitly through the use of derivatives or expressly through the use of repo. It is worth noting that the 2019 survey reported leverage statistics with the median degree of leverage using conventional gilt repo being 4.3 times, Index Linked Gilt repo was 4.0 times, and the ranges presented were from 1.8 times to 6.0 times. That survey also reported very similar degrees of leverage for all other derivatives. We do not know how these estimates were derived. Nonetheless, it is clear that, at that time, TPR was aware of and at the least condoned material leverage in schemes.

These strategies were profitable and would have remained so as long as short interest rates remained low and long rates fell. This is the basis of most leveraged speculations. If this strategy were put in place in 2003 and exited in 2021, the investment consultant and LDI manager, would be winning awards for a "*genius investment strategy*". But the returns achieved were in large part down to a Bank of England QE influenced interest rate market, and little account seems to have been taken of the two potential death spiral risks the strategy embedded into the scheme (short-term borrowing at floating rates and the repo rollover risk).

This became the much reported '*search for yield*'. There are also issues of concentration to be considered. At the end of 2020, private sector DB schemes held £351 billion in Index Linked Gilts and public sector schemes a further £17 billion, in total 92% of a total market estimated to be around £400 billion.[20] The Pensions Regulator had to have been aware of this ongoing exposure. It should be hardly surprising that we saw declines in the prices of index linked gilts from the December highs to the crisis lows of over 85%. A level of volatility twice that of conventional gilts of similar term. This is a level of risk that we would normally attribute to extremely speculative instruments.

There has been a failure to recognise that the extensive use of derivatives, such as interest rates swaps, where the scheme receives the long-term fixed rate (the yield on the gilt) and pays the short rate, fundamentally alters the risk bearing capacity of a scheme. Through this process, DB schemes have moved from being stable long-term institutions with the highest risk-bearing capacity of any financial institution, to being among those with the shortest horizons and highest sensitivity to short-term financial market performance.

Ordinarily, one would expect an increase in the riskiness of an institutional arrangement to be well compensated. However, schemes have actually incurred costs rather than receiving compensation in making this transition. Schemes are now suppliers of liquidity to markets at the whim of those markets, where previously any supply through the purchase of long-dated investments was at the discretion of schemes.

Stepping back and looking at this objectively, the arrangement is at odds with standard economic logic in that schemes are suppliers of liquidity, for free, when markets most need it, and the price is high. In consequence, as we have seen, schemes may have difficulty realising other assets to meet cash collateral calls. Schemes receive collateral when markets are strong, prices are high, and liquidity cheap.

[20] Holdings of private and public sector schemes ONS FSPS September 2022/ Estimate of overall market: Michael J. Oliver and Janette Rutterford, Index-linked gilts and the end of RPI, Economic History Review, January 2021. (https://onlinelibrary.wiley.com/doi/full/10.1111/ehr.12875)

It is interesting to note that Dutch schemes are suppliers of liquidity to markets through their repo operations rather than takers of it as UK schemes are.[21]

The position of those who continue to advocate the use of leveraged LDI, including TPR, is that the disruption we have recently seen was merely a problem of markets and liquidity.

This position shows a fundamental lack of understanding of the market function – markets exist in order to exchange liquidity through the price mechanism. If a group of market participants disrupt that mechanism through their collective actions, their complaints about the deficiencies in the market function as they see it, are entirely without merit.

There are also advocates of leveraged LDI who are also proposing some new and ill-defined collateral transformation agency. This is again revealing an elementary misunderstanding of liquidity. In their world, illiquidity commands a return premium, when it is, in fact, liquidity which has a cost. For example, in order to make their equity liquid and command a higher price, than would otherwise be the case if the equity was private, companies pay the costs of acquiring and maintaining an exchange listing.

Pooled LDI

As many smaller schemes use pooled funds, it is important to note some important differences between these arrangements and segregated LDI mandates, which are typically the domain of larger schemes. Unlike segregated LDI, pooled funds have limited liability. It is also perfectly legal for pooled LDI funds to borrow to finance gearing.

The use of interest rate swaps is however questionable for both pooled and segregated funds, as at inception the interest rate swaps have an expected return of zero, indeed after lodgement of initial margins, the expected returns are negative. This is very strange attribute of any investment.

The real problems with pooled LDI funds stem from their extensive use of leverage.

This is driven by schemes' desire to commit as little capital as possible to these structures while covering as much of a scheme's perceived interest rate risk exposure as possible. The proposals to limit the leverage capability of these funds really will not work; there are obvious ways in which such limits could be circumvented, and an army of investment bankers will be only too happy to help.

The managers of pooled funds also have an incentive to minimise liquidity provisions, as these are a drag on investment performance. In times of stress, the managers of these funds may request unitholders to subscribe further units in order to maintain exposures, but they cannot demand this. Of course, if these calls are not met, the managers may have no option but to de-lever and de-risk the portfolio, and that will involve the selling of gilts in the market. It is notable that these pooled funds were among the first sellers in the recent crisis.

The highly leveraged, highly volatile nature of these pooled funds makes them highly questionable as suitable investments for a pension fund. With fourfold leverage these pooled funds would be borderline investment grade. One potential solution to this issue would be to require such funds to be rated, though the ratings agencies have disappointed in the past, for example in the development of the US mortgage-backed securities crisis.

It is worth noting that, in many situations, the first call made by schemes during the recent crisis was to their sponsor employer and in many circumstances, this resolved the issues. Several have been

[21] https://apg.nl/en/publication/repo-transaction-swap-between-cash-and-government-bond/.

the subject of newspaper headlines. This is a clear example of holistic evaluation of risks though in this case, risks which have crystalised. There remains a question with holistic evaluation, consideration of the net position across scheme and sponsor, which arises when those risks are considered undesirable, and it is the choice of where to hedge the risk in question. It is also worth noting that sponsor companies have far greater freedom in such matters, and a wider range of instruments available to them. That said, the decision rests on the specific circumstances of sponsor, scheme, and risk of concern, and tax considerations may prove most important.

6. Does the experience suggest other policy or governance changes needed, for example to DB funding rules?

More than anything else, the experience points deficiencies of the Pensions Regulator. A case can be made that: The Pensions Regulator

- Did not understand leveraged LDI.
- Did not understand how to regulate DB scheme funding.
- Did not understand the difference between paying benefits as and when they fall due and a valuation deficit.
- Proactively and naively encouraged the embedding of systemic risk.
- Did not understand QE and so encouraged buying of gilts with a real negative yield in a market skewed upwards by QE.
- Encouraged and supported the introduction of leverage and the introduction of significant interest rate risk into pension funds by encouraging them to borrow short at floating interest rates and buying long at fixed rates.
- Encouraged and supported the introduction of roll over risk in respect of repos.
- As a consequence, the Regulator has overseen the destruction of capital on a grand scale at the expense of employers, employees, scheme members, many innocent savers and the taxpayer.

However, we would caution against immediate action in this regard; acting in haste is rarely wise.

We would recommend a thorough and detailed inquiry into the role played by the Pensions Regulator in the development of the recent crisis, but as importantly, that inquiry should have within its terms of reference, consideration of the role of the Regulator in the decline of occupational DB provision.

It should make recommendations for change as it considers necessary or advisable.

We believe that a new and paramount objective should be introduced charging the Regulator with responsibility for the promotion of secure and sufficient occupational pensions.

We also believe that since the Pensions Regulator has abjectly failed in ensuring there is resilience in the pension system, and its actions have created systemic risk elsewhere i.e., in the gilt market, there is therefore a question of how to ensure that the actions of the Regulator do not result in such folly again as they are clearly not able to manage such risks.

We have been asked on several occasions to whom and by what arrangement the Pensions Regulator is held to account; it would appear that current arrangements are inadequate.

As the variability of scheme valuations arising from the discount rates employed was, and remains, the prime motivation for the adoption of Leveraged LDI, it is obvious that change is needed here. The widespread adoption of a strategy which hedges an illusory risk is indicative of the importance of this misconceived metric. The consequences arising from its use, principally by the Pensions Regulator, are substantial, and for most sponsors, material in terms of their business finances.

If there was any doubt over this, the extreme lengths and costs to which funds were prepared to go to preserve their 'hedges' and their LDI portfolios during the crisis, should remove any hesitation that the current approach is severely flawed.

For ease of comprehension, we illustrate stylistically the nature of the discount rate choice problem in Annex A. Here we confine ourselves to the problems arising and commence by considering where market rates should be used in the valuation process.

It is appropriate to use a market-based rate, if we are trying to evaluate what the current cost of providing a future benefit today would be.

However, it is singularly inappropriate to use these rates for the evaluation of promises made at any time other than today.

- Using such market-based rates for all outstanding promises places an enormous and unjustified burden on the sponsors of DB schemes.
- The requirement to (try to) fund the scheme at all points in time, effectively operates as if all accumulated awards were being paid in full in a single lump-sum today i.e., as if all members were to transfer out at full value:
    - This is very different from the promise made by sponsor employers.
    - This promise was/is to pay the benefits on time and in full, and to fund the scheme in the interim in accordance with that promise.
    - This promise has, embedded within it, an implicit rate of return on the contribution made needed to deliver the promised benefit.[22]
    - This promise was not to fund the scheme in such a manner that members could at any point in time buy equivalent benefits in the marketplace.
    - This is extremely costly to deliver, and particularly so in an environment of sustained declines in market yields.

The costs of this approach to valuation and funding have been the principal cause of the near-total closure of private sector DB schemes to new members and future accrual. It has accelerated the costs of meeting those obligations over the life of the scheme into an extremely short time period making the cost of provision ruinously expensive for firms and has resulted in hundreds of billions of pounds being paid by UK plc into pension funds to meet an accelerated cost schedule at the expense of corporate productivity and growth.

The Pensions Regulator has an explicit incentive to use market-based valuations which arises from its statutory obligation to protect the Pension Protection Fund. Here the valuation is made on the basis of sponsor insolvency at the time of valuation, and current market-based discount rates are appropriate for that. However, this is a counterfactual and as such should not be considered relevant to ongoing schemes.

[22] We have written extensively on this rate, calling it the contractual accrual rate.

We would recommend the removal of this statutory objective. It is interesting that though there are equivalent bodies to the PPF in many other countries, none have need of a regulator protector.

It is necessary to emphasise that, from a funding scheme perspective, the legislative requirement in Regulation 5 of the Occupational Pension Scheme (Scheme Funding) Regulations does not require a discount rate to be derived from gilt yields and that the Pensions Regulator is required, in relation to the exercise of its powers in relation to scheme funding, to minimise any adverse impact on the sustainable growth of an employer.[23]

This takes us back to the fundamental question of how should the discount rates be determined?

The desirable properties of a discount rate are that the rate should be fundamentally invariant and specific to the scheme, and this discount rate should change only when the experience or expectations of the determinants of the projected ultimate benefits change.

There is such a rate, which we have called the Contractual Accrual Rate (CAR). It is that rate, the internal rate of return, which equates the contribution received with the projected benefits ultimately payable under that award. It is in other words, the rate of return promised by the sponsor employer on their contribution and that of a member.

In setting the contribution at inception of an award for a year of service, the trustees and sponsor may take account of the expected returns available from markets but would not be required to. The principal attraction of this rate is that it will only change with revisions to the projected benefits; though these may come from differences between the assumptions made and subsequent experience or changes to those assumptions, they are usually small in magnitude. Unlike market-based discount rates, changes to the CAR are reflections of real changes to the benefits to be paid after retirement. The volatility of the CAR would be an order of magnitude lower than that of market yields.

It would be feasible to adopt this approach under existing regulations. The Occupational Pension Schemes (Scheme Funding) Regulations 2005 require for the calculation of technical provisions:

5 4) The principles to be followed under paragraph (3) are

(b) **the rates of interest used to discount future payments** of benefits must be chosen prudently, taking into account either or both—

(i) **the yield on assets held by the scheme to fund future benefits and the anticipated future investment returns,** and

(ii) the market redemption yields on government or other high-quality bonds;

[Emphasis Added]

The key to acceptance of this rate under these regulations would be recognition of the sponsor covenant as an asset of the scheme, which clearly it is.

The Pensions Regulator refers often and in many contexts to the sponsor covenant but fails anywhere to recognise it explicitly as an asset of the scheme – an elementary failing.

The approach we advocate will clearly remove any and all incentives for LDI with respect to discount rate hedging. It is not unique in this regard. The real risks of a scheme which remain may be hedged

[23] Under the Pensions Act 2004, Section 5(1)(cza).

using assets, such as index-linked securities for inflation, and insurance policies for longevity, and indeed the trustees may even, from time to time, find it reasonable to buy default risk insurance cover on the sponsor.

The general principle here is that a move away from market yields with their volatility and bias as the choice of discount rate is needed if LDI related crises are not to recur in the future.

We would also state that we have made representations to the chair of the UK Endorsement Board, Pauline Wallace, that it is "*Time to review IAS19 (Accounting for pension costs) as it does not meet the criteria for its adoption and retention including the legal requirement of being conducive to the long-term public good in the United Kingdom.*"

We believe that the legal position with respect to the use of repo and derivatives should be definitively resolved by the Work and Pensions Committee, and that the law, as we understand it, should be enforced. We have discussed these issues extensively in the earlier section: **Some Legal Issues**.

We would note that enforcement of these regulations would not inhibit pooled LDI funds from continuing in their use of leverage and derivatives.

The most important recommendation we would make is that work should cease on the proposed new Funding Regulations.

We have written extensively in response to the consultation on these proposed regulations and as noted above, our commentaries on that run to almost 30,000 words. We would also note that there are widespread objections to these proposed regulations from the actuarial and investment consultant community.

The motivation cited for these new regulations is the prevention of loss to members arising from the entry of a scheme into the PPF. In response to our enquiries, we have been informed by the PPF that no work has been done to estimate empirically the amount of these losses for schemes which have entered the PPF.

These proposed regulations have been described, correctly in our opinion, as LDI on steroids.

Annex A

The role of a discount rate is to:

- set an amortisation schedule for a liability; or
- equivalently, its required level of funding.

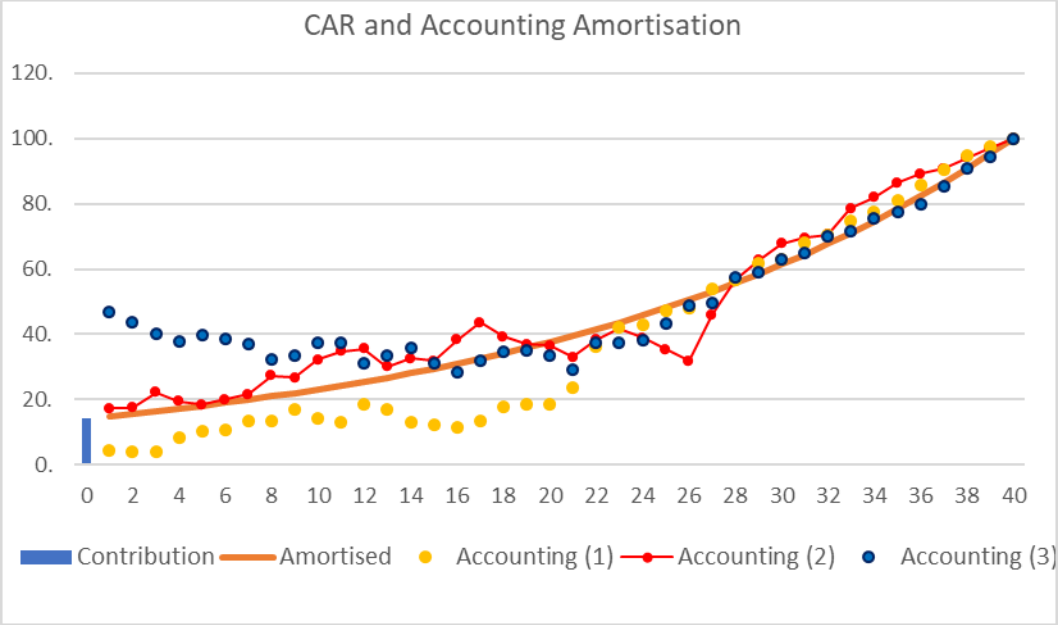
The use of a market rate has the effect of embedding both trends in market yields and their idiosyncratic variability into valuations.

We illustrate this stylistically for three scenarios below – all have a 10% yield or discount rate volatility.

- We set an arbitrary contribution of £14.20 and a single payment pension of £100 due in 40 years from today.
- Accounting Scenario 1 has rates trending uniformly down (prior to idiosyncratic variation) from 8% to 2% over the 40-year term until payment of the obligation.
- Accounting Scenario 2 has rates remaining at 5% (prior to idiosyncratic variation over the 40-year term until payment of the obligation
- Accounting Scenario 3 has rates rising from 2% (prior to idiosyncratic variation) to 8% over the 40-year term until payment of the obligation.

The chart also shows the amortisation schedule based on the required rate of return on the contribution made and needed to discharge the promised pension.[24] This serves as a required funding reference schedule. The rate is 5% pa.

[24] Elsewhere, we have defined this measure as the Contractual Accrual Rate (CAR) and it can be thought of as a scheme specific Internal Rate of Return (IRR). We call it the contractual accrual rate as it is defined within the contract/terms of the scheme i.e., employees and employers pay a contribution to the scheme and for that an amount of pension is expected to be received. If the contributions were to be very high, ceteris paribus, then this implies that a lower amount of return would be need on the contributions and similarly, if the contribution was to be lower, then the return needed on the contribution to pay the amount of pension would have to be higher.



The interpretation of this chart highlights a number of key issues about different approaches.

Points above the CAR/Amortisation line are deficits relative to that line and points below are surpluses.

Note that there can be very substantial variation.

- The 5% market valuation ranges from a surplus of 37% to a deficit of 43%.
- In cash terms, this ranges from a deficit of £11.84 to a surplus of £18.75.
- For a sense of proportion, recall that the initial contribution was £14.20, and the ultimate pension is £100.
- These are measures of the errors involved in using the market-based discount rate.
- These errors tend to diminish with proximity to the payment date.

Arguably, the most important point that comes from this chart is that discount rate employed does not affect the final pension payment value.

The other key takeaway from this is that the discount rate is strictly not a risk factor of the pension liability itself.

The Consequences of introducing interest rate risks

In looking at the variation around the central amortised costs of discharging the pension liability, it is only when decisions and actions are taken based upon the intermediate values that are estimated using the market-based yield that added costs may be incurred.

Unfortunately, within the regulatory regime of the UK, such deficit repair contribution schedules would be required by the Pensions Regulator as their focus is on the variation and not on the long-term amortisation schedule.

There are other important aspects that come from this:

- Note that there is an asymmetry; (trapped) surpluses may not be readily refunded.
- Among other things, there would be 35% tax payable on refunds.
- Trapped surpluses are to be avoided.

- This combination of circumstances raises the cost of provision of the pension.

Leveraged LDI was an attempt, through financial engineering, to eliminate any trend and its variability from scheme valuations.

- In this sense it is the ultimate example of a decision based upon the valuations.
- It is intrinsically costly.

The Pensions Regulator has been encouraging the adoption of LDI.

- The Pensions Regulator consistently describes and reports discount rates in gilt-relative terms.
- The Pensions Regulator promotes the use of a market-yield based discount rate in scheme solvency evaluation, and the determination of 'deficits' or 'surpluses'.
- Deficit repair contribution schedules are determined by these valuations and must be agreed with the Pensions Regulator.
- In a solvency evaluation, scheme assets held, valued at market-prices or close proxies, are compared to the present value of liabilities calculated using these market-based discount rates.
- This is the so-called funding ratio.
- Over the life of a scheme, and instantaneously, it is biased by the trend and variability in the discount rate utilised.

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