

A brief guide to LDI

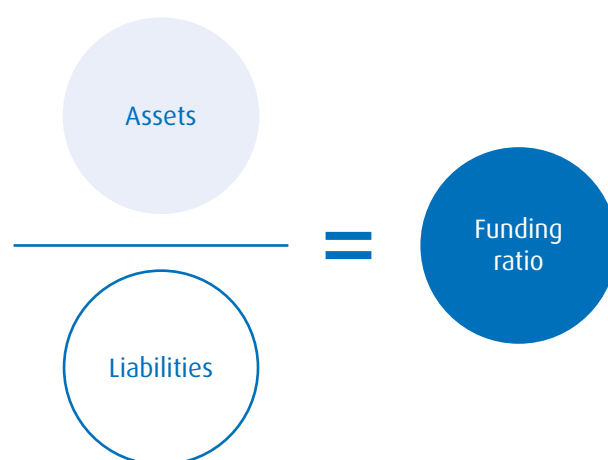


The funding ratio

Defined benefit pension schemes' financial health can be measured using a simple metric known as the funding ratio.

This is calculated by dividing the value of the scheme's assets by the value of its liabilities and converting to a percentage. If a scheme has a funding ratio of 100% it is described as fully funded, less than 100% and it has a funding deficit, more than 100% and it has a funding surplus.

Historically, the pensions industry has focussed on the assets and on making them grow as much as possible, in the belief that this will, over the long term, lead to a strong funding position. However, the value of the liabilities can be highly volatile with changes in liability values having a knock-on effect to the funding ratio, irrespective of asset returns. Changes to accounting rules, regulatory pressure and falling interest rates have all put more focus on the liability side of a pension scheme's balance sheet. These factors have combined to drive the popularity of liability driven investment (LDI) strategies designed to manage and minimise the volatility of pension scheme funding ratios.



"LDI is about putting a scheme's liabilities at the heart of its investment strategy, in order to minimise adverse movements in the funding ratio."

Alex Soulsby, Head of Investment Solutions EMEA, BMO Global Asset Management

What affects the value of liabilities?

There are three key factors which will affect the value of a scheme's liabilities as follows:



Inflation expectations

A large proportion of most schemes' liabilities are linked to inflation in some way. For example, they are a promise to pay a fixed future benefit adjusted for inflation between now and then. If inflation is high, the value of the resulting pension payment will be high and vice versa. When valuing the liabilities, the scheme actuary will use a measure of expected inflation (which can be derived from investment market pricing). If inflation expectations rise then the value of the liabilities will rise and vice versa.



Interest rates

Having determined the likely monetary value of the future pension payment (either a fixed or inflation linked payment) we need to convert this into a present value in order to make a direct comparison with the market value of the scheme's assets. This process is known as "discounting" and involves applying an assumed rate of return to the known future pension payments in order to work out how much money is required today to reach the scheme's target. The greater the assumed rate of return, the less money is needed today and vice versa. The assumed rate of return is known as the discount rate. If this rate rises then the present value of the liabilities will fall and vice versa. The rate used by the actuary will be linked to market rates and is typically based on a corporate bond yield, a gilt yield or a swap yield so as markets move, the value of the liabilities change. It should be stressed that these are long-term (up to 50 years) interest rates and should not be confused with the short-term central bank rate.



Longevity

Longevity risk is the risk that the members of the scheme live longer than anticipated. If this happens, the scheme has to pay benefits for longer and thus needs more money than anticipated. Longevity is generally rising, leading to an increase in pension scheme liabilities. There are very few longevity linked investments, which mean it is difficult and expensive to hedge longevity risk. The majority of LDI strategies therefore focus only on managing interest rate and inflation risk. A lot of schemes simply take the pragmatic view that longevity will continue to rise and thus target a modest funding surplus to offset this.

How do market movements affect pension scheme funding levels?

The negative effect of interest rate risk can, and has, outweighed the benefit of positive equity market returns.

“Real” interest rates can be used as a simple proxy for the combination of interest rate and inflation risk that a pension scheme is exposed to. “Real” interest rates are essentially the difference between regular interest rates (often referred to as “nominal” interest rates) and inflation and so can be thought of as the rate of interest generated net of inflation. For example, if regular interest rates are 4% and inflation is 3% the real rate of interest is 1%. A rise in real interest rates results in a fall in pension scheme liabilities and vice versa.

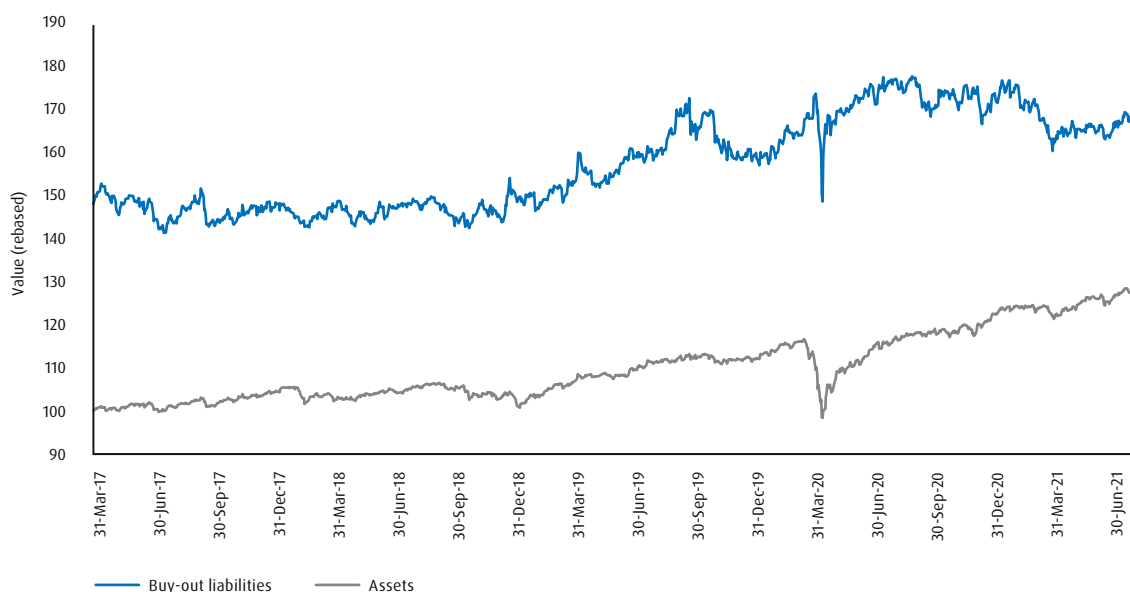
What does this mean for funding ratios?

Unfortunately for pension schemes, real interest rates have fallen significantly in recent years resulting in a large rise in liability values and thus a deterioration in most scheme’s funding ratios. In the five years to end of 2018, real interest rates fell by around 1.7%, which for most schemes that have

not hedged their liabilities equates to a c. 34% deterioration in their funding ratio. Over this same period, equity markets exhibited strong positive performance but not sufficiently so to offset the negative effect of falling yields.

The Pension Protection Fund compiles some useful data to help us assess funding ratio trends in the market. The PPF 7800 index measures the funding ratio of over 6,000 pension schemes in the UK and tracks them over time. We have used this information to separately model the progression of a typical pension scheme’s assets and liabilities over time, which is illustrated in the chart below. Whilst liability values have remained largely unchanged over the last couple of years (consistent with real yields being largely unchanged over this period) they have been volatile, and noticeably more volatile than asset values. This highlights how hedging liabilities can significantly reduce the volatility of a scheme’s funding ratio.

Unhedged liabilities are typically a greater source of funding ratio volatility than a schemes assets



Source: BMO Global Asset Management, PPF and Bloomberg, as at 30-Jun-21

Quantifying the risks

If asked, most schemes would probably cite equity market risk as the biggest risk they are running. However, the impact of changing interest rates and inflation expectations can be significantly greater than the impact of equity market moves.

The average time to payment of most pension scheme liabilities is around 20 years. A 1% fall in interest rates means we assume that the scheme earns 1% per annum less each year for 20 years, which results in a 20% rise in the liability value (i.e. you need 20% more assets today to counteract the 1% p.a. lower yield you will achieve over the next 20 years). This sensitivity to interest rates is often referred to as duration. The higher the duration (measured in years) the greater the sensitivity to change so if duration is 10 years, a 1% interest rate fall would result in a 10% liability increase and if duration is 20 years, the increase would be 20%. The same sensitivity principle can be applied to inflation, albeit typically not all of the scheme's liabilities will be linked to inflation.

It is worth considering the impact of equity market moves as well. Equity markets could realistically go up or down by up to

20% in a year. If a scheme has a 50% allocation to equities then this will equate to a 10% funding ratio impact (assuming the scheme is fully funded). This is clearly a smaller impact than that caused by a 1% interest rate or inflation movement.

Rewarded and unrewarded risks

We often describe equity market risk (as well as other asset class risks) as rewarded risk because the scheme has taken an active decision to run the risk in the hope of generating a premium return. Interest rate and inflation risk on the other hand is often described as unrewarded because it is inherent in the mathematics of valuing the liabilities and is not a consciously sought risk. Therefore, LDI is about managing and minimising these unrewarded risks whilst continuing to take and potentially optimise the rewarded risks.

“Not only are the interest rate and inflation risks faced by a pension scheme significant, but they are usually viewed as unrewarded risks. As a result, schemes should minimise them as much as possible.”

Lianne Walsh, Head of Solutions Risk Management and Control, BMO Global Asset Management

How do we manage these risks?

We can immunise a pension scheme from interest rate and inflation risks by holding assets that behave in the same way as the liabilities. So any movement in the liabilities is offset by an equal movement in the assets.



Bonds

Bonds can be used to match liabilities:

- ⊕ A bond's price rises as interest rates fall and vice versa, just like a pension scheme's liabilities.
- ⊕ Inflation-linked bonds additionally provide protection against changing inflation.
- ⊕ Bonds issued by the UK government (government bonds) are low risk hedging assets.

But:

- ⊖ Bond availability is limited, meaning that it is not possible to create a perfect liability match using solely bonds.
- ⊖ Bonds are capital inefficient, £100 must be spent to hedge £100 of liabilities, constraining a pension scheme's ability to invest in growth assets.



Swaps

Swaps are invaluable hedging assets, overcoming a number of limitations inherent in bonds:

- ⊕ Swaps behave like bonds in that they rise in value when interest rates fall and vice versa. Additionally, inflation swaps provide explicit inflation protection.
- ⊕ Swaps are capital efficient. They have no value on day one and therefore do not consume capital upfront. Their value rises and falls from zero rather than £100 in the case of the bond.

But:

- ⊖ It is important to set aside some assets (collateral) to cover the scenario where the swap falls in value, for example setting aside 1/3 of the value of liabilities being hedged.
- ⊖ It is also important that your LDI manager has robust processes in place for managing **counterparty risk**.



Counterparty risk

Swaps are commonly used over the counter derivatives meaning that they are traded directly with market counterparties who are typically investment banks. This has historically given rise to concerns about counterparty risk in that the bank could go bust whilst owing money to the investor. However, there are a number of tried and tested risk management tools used to ensure that this risk is minimal. The most common is central clearing, whereby trades are given up to a central clearing house immediately after execution. This means that the investor has no ongoing exposure to the bank and that the central clearing house becomes the counterparty to both sides of the trade. Variation margin (cash) is then passed between the investor and the clearing house to settle any mark to market on a daily basis. In addition, the clearing house holds initial margin from all participants as a further protective buffer.

This variation margin process is two way and so the scheme (or LDI fund) must post margin if the swap takes on a negative value (noting that this simply matches a fall in the liability value). This is why some capital must be retained in the LDI portfolio (e.g. the 33% referred to in the "Swaps" section) as opposed to everything being invested in growth assets.

“LDI has been around for over 10 years and there are many tried and tested tools for hedging liability risks. These include swaps, government bonds and gilt-based derivatives.”

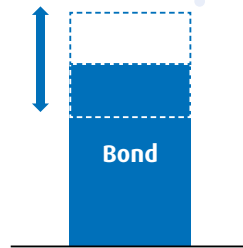
**Jonathan Smith, Head of Solution Design,
Investment Solutions EMEA, BMO Global
Asset Management**

An example

Current

Let's imagine we have a £600 liability to pay in 20 years' time. 20-year interest rates are currently 3.5% so this liability has a present value of £300. If interest rates fall to 2.6% the present value of the liability rises to £360.

Bond's value goes up (and down) from £300 when interest rates fall (and rise)



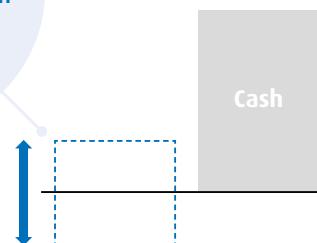
Matching using bonds

We could hedge this risk by buying a bond. Having paid £300 for the bond, its value would rise to £360 when interest rates fall. The liability risk has been matched but this is capital inefficient as we have tied up £300 of the scheme's assets in the bond.

Matching using swaps

Instead, we could enter into an interest rate swap. We retain the £300 and the swap has zero value initially. If interest rates fall the swap rises in value to £60, which in combination with the £300 cash, matches our liability. The swap behaves in the same way as the bond but rises and falls in value from zero rather than £300. This allows the scheme to invest the £300 in growth assets to help close the funding gap (noting earlier comments about collateral which would probably see £100 of this £300 set aside for collateral purposes).

Swap's value goes up (and down) from £0 when interest rates fall (and rise)



£300 cash remains available for investment in growth assets

Building the hedge

LDI portfolios usually comprise of government bonds and swaps. The portfolio's yield can be enhanced by optimising the allocation between government bonds and swaps.

When building a liability hedge, we consider the interest rate and inflation sensitivity of a scheme's liabilities in each year and in aggregate, and then build a portfolio to match these sensitivities as closely as possible. The resulting portfolio will take account of any bond assets that the scheme may already hold to avoid doubling up on hedging that is already provided by these bonds.

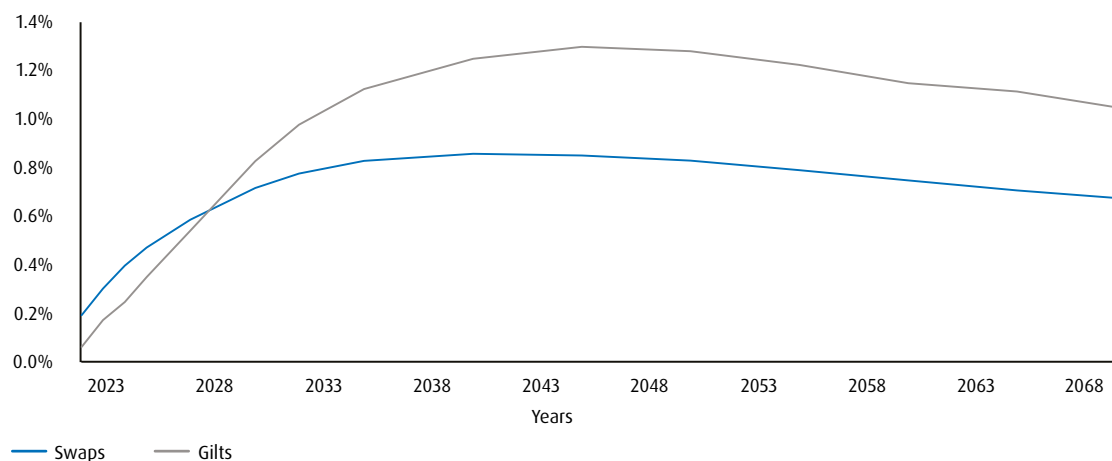
Most liability hedging portfolios comprise a combination of swaps, physical government bonds and gilt-based derivatives. These latter instruments provide capital efficient exposure to government bonds, as government bonds can offer a higher yield than similar swaps for the same hedge exposure. We would generally advocate monitoring the allocation between these instruments on an ongoing basis and systematically switching between them to ensure that the hedge delivers the highest yield possible over the long term.

This opportunity set is illustrated in the chart (below). The lines represent the fixed rate of interest we will receive for buying a swap or a gilt of a particular maturity. As we would when selecting a savings account, we want to receive the highest fixed rate of interest possible. The chart shows that swaps offer the highest yield for hedging short dated liabilities whereas government bonds are preferable for medium and long dated liabilities. This yield differential between swaps and government bonds varies over time (due to the supply and demand dynamics of investment markets) and so it is beneficial to have gilt/swap allocations revised regularly. Fortunately, this does not need to be something for pension schemes to worry about directly as it can be delegated to an LDI manager as part of their day-to-day investment responsibilities.

Key risks

The value of investments can go down as well as up as a result of market or currency movements and investors may get back less than the original amount invested.

Interest rates (high level preferable)



Source: Bloomberg, BMO Global Asset Management, as at 31-Mar-21

“LDI can be a governance challenge for many pension schemes. It is therefore important that schemes remain focussed on the big picture and avoid getting distracted by second order details. This can be done by working with a specialist LDI manager and delegating day-to-day decisions to them. At the same time, we are always happy to provide tailored training sessions to help clients improve their understanding of LDI.”

**Simon Bentley, Head of UK Client Portfolio
Management, BMO Global Asset Management**

Leaders in LDI

A market leader with a reputation for innovation, BMO Global Asset Management has a strong derivatives execution pedigree and is regarded by many clients as their derivative fund manager as well as LDI manager. We have a track record for delivering effective synthetic equity, foreign exchange and options based solutions as well as offering the full range of traditional LDI solutions.



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Leaders in investment solutions

BMO Global Asset Management has been at the forefront of the LDI market since 2003. We are renowned within the industry for our innovation and have been first to market with a wide range of pooled fund solutions, in turn allowing schemes of all sizes to have access to strategies that have historically been the preserve of larger segregated schemes.

Our innovation, client service and keen focus on risk management has led to us receiving a number of industry awards. This successful framework means that we now manage solutions for over 580 clients and have implemented over £624bn in notional derivatives overlay transactions (as at 31 December 2020).

Team and resources

Led by Alex Soulsby, the Investment Solutions team includes 28 investment professionals dedicated to LDI mandates. The team includes derivatives fund managers, quantitative

analysts and investment specialists who are experts in derivatives, insurance, pensions, quantitative methods and fund management, with an average of 14 years in the industry. The team is well supported in its activities by the global rates, credit and dealing teams, as well as a deep pool of middle office and client servicing functions. The seamless delivery of investment solutions to our clients is underpinned by a first-class technology and systems infrastructure.

We have always been impressed by your innovation and easy-to-understand approach to Liability Driven Investment. I've never worked with a team that is so knowledgeable, so professional and have generated so much trust and confidence.

Ben Fowler, Western United Group Pension Scheme

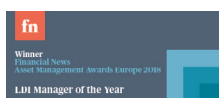
Award winning capabilities

Our expertise has been recognised through numerous industry awards, many of which have cited our high level of client service and support as features that set us apart from our peers.

**LDI Manager of the Year
2021 and 2020**



**LDI Manager of the Year
2019 and 2018**



**Asset Manager of the Year
2019**



**Risk Management
Provider of the Year
2020, 2018, 2017 and 2015**



**UK LDI Manager of
the Year 2018 and 2017**



**LDI Provider of the Year
2019, 2017, 2016, 2015,
2014, 2013 and 2012**



**LDI Manager of the Year
2016**



**LDI Manager of the Year
2013, 2012 and 2011**



Past performance should not be seen as an indication of future performance.

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