

Understanding ‘roll-down’ risk and the ‘reward’ for delaying hedging

INTRODUCTION

It is not uncommon for liability-related risks to represent the dominant risk borne by pension schemes as very few UK pension schemes have fully hedged these risks (we refer to this as being ‘under-hedged’). Generally, this is because schemes believe there will be better market conditions to do the hedging in future, and because they can tolerate the risk that this exposes them to in the meantime.

The purpose of this short note is to describe one of the key risks that is often not considered, which we refer to as ‘roll-down risk’. On the upside, we also illustrate why a scheme may expect to be rewarded for delaying the liability hedging decision. In our experience, these are two areas that are commonly overlooked or are not well understood but which should influence the hedging decision. We would encourage investors to assess both the risks and the expected rewards associated with the hedging decision to ensure that this can be appraised in much the same way as any other asset allocation decision.

WHAT IS ‘ROLL-DOWN’ RISK?

When most people think about liability-related risks, they focus on the risk of yields being lower in future than they are today. It is then common to take a view that because yields today are low, the risk of yields being materially lower in future is tolerable, and so there is no need to ‘hedge’ this risk now. However, this somewhat binary assessment misses another important risk that investors need to consider which we will refer to as ‘roll-down risk’. Essentially, this is the risk that yield curves in future look the same as they do now, rather than increasing in line with current market expectations (which can have a significant impact given the current steepness of the yield curve). We will use a simple example to illustrate why roll-down risk exists, and to give a feel for its materiality.

We also use the same example to illustrate why a scheme may expect to be rewarded for delaying liability hedging and how this ‘reward’ can be assessed.

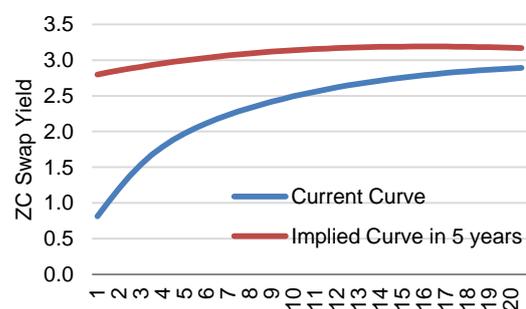
EXAMPLE SCHEME

For the purpose of the example, we will consider a very simple scheme, with a single liability obligation to pay £100m to beneficiaries in 20 years’ time. The obligation in the example is fixed, but the principles would apply equally if it were real, or linked to LPI, or increased in some other manner. The principles applying to the single cashflow could also be applied to multiple cashflows, and so provide a reliable guide to the behaviour of the liabilities of a typical pension fund.

Valuing the liability

Liability cashflow obligations can be discounted (i.e. valued) in a variety of different ways, but these are generally linked in some way to risk-free interest rates (e.g. gilt yields or swap yields). For funding valuations, a margin above the risk-free interest rate is generally applied, and this can vary by cashflow maturity or benefit category (e.g. pre or post retirement). For the purpose of this short paper, we will discount the liability obligation using swap rates, but the principles would apply equally to liabilities valued using any other market-related discount rate.

The current zero coupon swap curve is shown below. For our example, the key market rates of interest are the 5 year rate (i.e. 2.00%), the 15 year rate (i.e. 2.75%), and the 20 year rate (i.e. 2.90%).



The value of the 20 year liability cashflow obligation for our example scheme is calculated by discounting the obligation (i.e. £100m) at 2.90% per annum (i.e. the 20 year zero coupon rate) for 20 years. This gives a present value of £56.5m.

If this scheme had £56.5m of assets, it could hold the assets in cash and enter into a 20 year zero coupon swap with a counterparty bank. As long as the cash generated a LIBOR return over the next 20 years to meet the floating leg of the swap, and the counterparty didn't default (collateral would be held to mitigate this risk), then the scheme will meet its liability obligation.

Expected development of the liability

In 5 years' time, the current expectation is that the 15 year zero coupon interest rate will be 3.20%¹, derived using the current 5 year rate (of 2.00%) and the current 20 year rate (of 2.90%). Therefore, in 5 years' time, the liability obligation is expected to have a present value of £62.3m (calculated by discounting the £100m liability cashflow obligation at 3.20% per annum for 15 years).

If the cash held has grown at 2.00% p.a., then the assets will also be worth £62.3m in 5 years' time, and the scheme will still be fully funded. Furthermore, if the scheme had entered into the 20 year zero coupon swap, this would have a mark-to-market value of zero in this scenario.



For a scheme that had invested part (or all) of the cash in riskier assets, the funding level would have increased or reduced to reflect the extent to which these risky assets had outperformed or underperformed cash.

NEGATIVE SCENARIOS

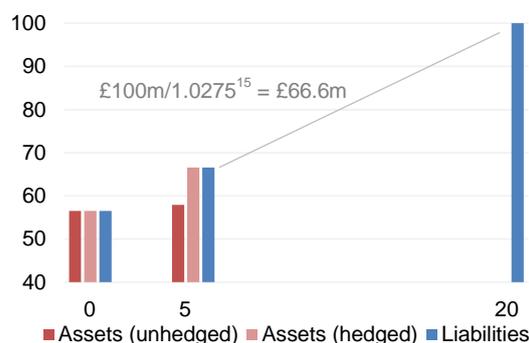
There are many positive and negative scenarios in which future yield curves are different to those implied by current market rates. For this note, our primary focus is on the scenario in which the yield curve in 5 years' time looks exactly the same as the current yield curve. In this scenario, the present value of the liability obligation in 5 years' time would be £66.6m (i.e. c£4.3m

higher than expected), calculated by discounting the £100m liability cashflow obligation by 2.75% per annum (the current 15 year rate) for 15 years.

The value of the cash held is highly unlikely to have grown by c£10m over this 5 year period (a cash return of 3.3% p.a. would have been required). Indeed, if cash rates have remained constant throughout the period (at c0.5% p.a.), then the cash would have grown to only c£57.9m, leaving a shortfall of c£8.7m (i.e. a funding impact of c13%).

Had the zero coupon swap been held, then the value of the swap would have increased to match the change in value of the liability, provided the cash return matched the LIBOR rate referenced in the swap. The actual LIBOR rate is less important, since lower LIBOR rates and cash returns would simply be reflected in a lower floating obligation under the swap.

The 'cost' of not hedging this liability obligation would therefore be the full c£8.7m (a funding impact of c13%). This impact is often referred to as the 'roll-down' effect.



Clearly, there are many scenarios which are materially worse (or significantly better) than this scenario. For example, if the 15 year rate in 5 years' time fell to the level currently prevailing in Japan (i.e. 0.90% per annum), the shortfall would be more like £29.5m (i.e. a funding impact of c34%).

A POSITIVE SCENARIO (THE POTENTIAL 'REWARD' FOR DELAYING HEDGING)

Many investors are anticipating more positive scenarios and currently view hedging assets as being 'expensive'. The implicit assumption here is that the expected return on cash will be higher than the return from the matching assets over time and that there will be a better time in future to implement hedging policies.

¹ The actual calculation is $[1.029^{20}/1.02^{5}]^{1/15} - 1 = 3.20\%$

If this is the implicit belief, we think it makes sense to convert this into an explicit return expectation. For example, if the 15 year rate in 5 year's time increased to 4.0% per annum, then the liability value would reduce to c£55.5m (instead of £62.3m), and the return on cash over the 5 year period could easily average more than 2.00% per annum in this scenario. Remaining in cash (without the hedging swap) in this scenario would result in an asset value of £62.3m and a funding surplus of c£6.8m (i.e. a funding improvement of c12%). Holding the swap would neutralise this gain, and ensure that the funding level remained at 100% provided the return on the cash held matched the LIBOR rate referenced in the swap.

If a 15 year rate of 4.0% p.a. in 5 years' time is viewed to be a likely (or 'best estimate') scenario, then the funding improvement of c12% (or c2.3% p.a.) in this scenario can be viewed as the **reward for remaining under-hedged**.

SUMMARY

Liability values will increase by significantly more than currently expected if yield curves in future look the same as they do today. This is often referred to as a 'roll-down' affect. We have shown that for a simplified scheme with a single, fixed liability obligation in 20 years' time, and no hedging assets, the funding level

would fall by c13% over a 5 year period in such a scenario (all else being equal). In the same scenario, the funding level would remain constant if the scheme fully hedged its liability obligations. The impact is likely to be similar for any scheme with a duration of c20 years.

We have also shown how a positive view on the likely level of future swaps rates could be used to quantify the potential 'reward' available from delaying liability hedging.

Clearly, other factors would also affect the development of the funding level for this example scheme, and for schemes in general. In particular, to the extent that scheme assets are invested in return seeking investments rather than cash, the funding level will also be impacted by the performance of these assets. However, the impact of return seeking assets does not affect the roll-down affect (or the potential reward from delaying liability hedging) illustrated in this note, it simply complicates the picture.

We would encourage clients to consider all aspects of potential risk and reward when making their hedging decisions, including those (often overlooked) aspects which we have sought to highlight in this paper.

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