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PENSIONS & WEALTH

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When is Longevity Hedging a Cost Effective Risk Management Option?

Overview

Defined benefit pension schemes are exposed to significant longevity risk, which can be managed using longevity hedging techniques. Increasingly schemes have in place a de-risking plan, switching out of return-seeking assets as the funding level improves, targeting either buy-out or self-sufficiency.

In this paper, we consider the cost effectiveness of longevity hedging as a risk management option for scheme sponsors, trustees and their advisers. We contrast the impact of implementing a complete hedge at the start and end of the journey plan.

Longevity risk is the risk that scheme members live longer than anticipated and therefore that pensions in payment continue for longer than expected. Rather than accepting longevity risk, trustees and sponsors can instead choose to transfer longevity risk to a third party at a cost, for example by purchasing a liability hedge.

This analysis shows that, for a scheme with any notable market risk exposure, longevity hedging early in the journey /de-risking plan is likely to be of limited value. The value of longevity hedging increases significantly at the end of the journey plan, at the point when market risk is substantially reduced.

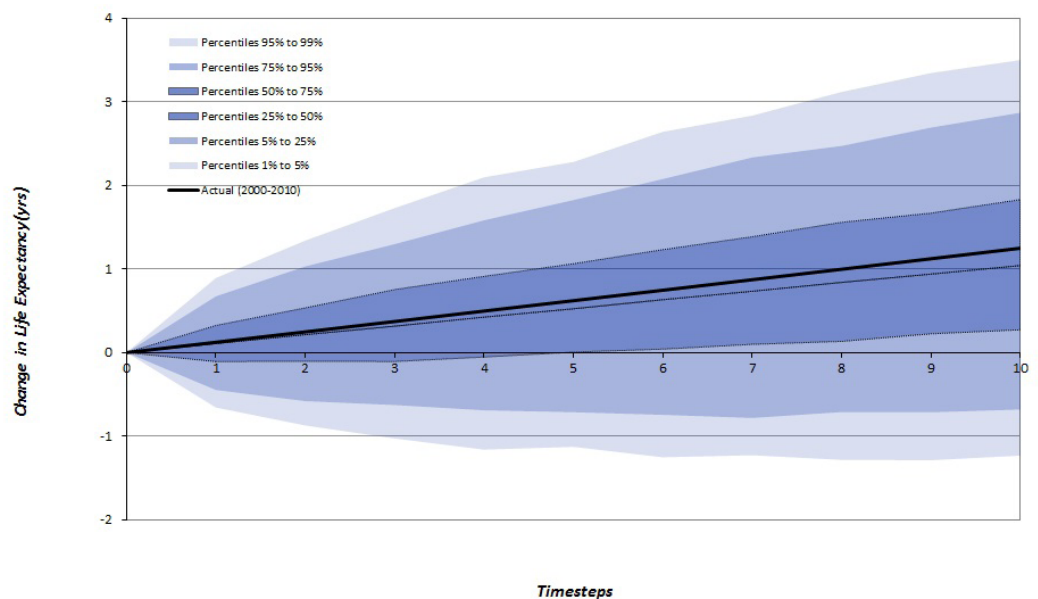
Modeling the Pension Scheme

We use Monte-Carlo simulation to model a representative pension scheme at the beginning and the end of its journey plan. Monte-Carlo simulation involves simulating the position of the pension scheme using many scenarios to produce statistical distributions for metrics of interest. In this case, the metric we are interested in is the distribution of the surplus. A risk decomposition technique is used to separate the overall risk of the scheme into the exposure due to individual risk drivers, for example longevity risk. This approach allows us to analyse and compare the contributions of individual risk drivers and to analyse the diversification benefits arising from the imperfect correlations between risk drivers.

We model longevity risk assuming two sources of uncertainty. The first represents the uncertainty associated with estimating the "true" trend in mortality represented by a standard generational mortality table. The second represents the variation about this trend that is the extent to which actual mortality experienced in a given year differs from the trend.

Figure 1 illustrates the distribution of the change in life expectancy produced by the longevity model. The expected value represents the "true" trend, in mortality, the funnel captures the variation of outcomes stemming from the two sources of uncertainty. The solid black line represents actual historical experience. Figure 1 shows that ten years in the future, the life expectancy of a 65-year old male is expected to have improved by approximately one year. In contrast, there is a one in 20 chance that life expectancy has instead decreased by nine months or more.

Figure 1 – Change in Life Expectancy for a 65 Year Old Male



A Representative Scheme

In this section, we consider a representative scheme at the start and end of its journey plan. Table 1 summarises the characteristics of this scheme. At the start of the journey plan, the allocation to return-seeking asset is relatively high at 54% as the scheme seeks to recover a shortfall of 20% on a gilts basis. The matching assets are invested in a portfolio of bonds that broadly match the duration of the scheme liabilities.

At the end of the journey plan, the scheme is fully funded, with no allocation to return seeking assets. The matching assets have been invested to achieve an approximate cash flow matched position. To simplify our analysis, we have assumed an unchanged liability profile at the end of the journey plan.

Table 1 - Summary scheme characteristics

	Journey plan start	Journey plan end
Funding level	80%	100%
Deficit	£16 m	0
Return seeking assets	54%	0%
Matching assets	46%	100%
Deficit contributions	Level contributions commencing at the start of the journey plan that aim to recover the shortfall over 10 years.	
Liabilities	All liabilities of the scheme are index-linked Liabilities are valued on a gilts basis.	

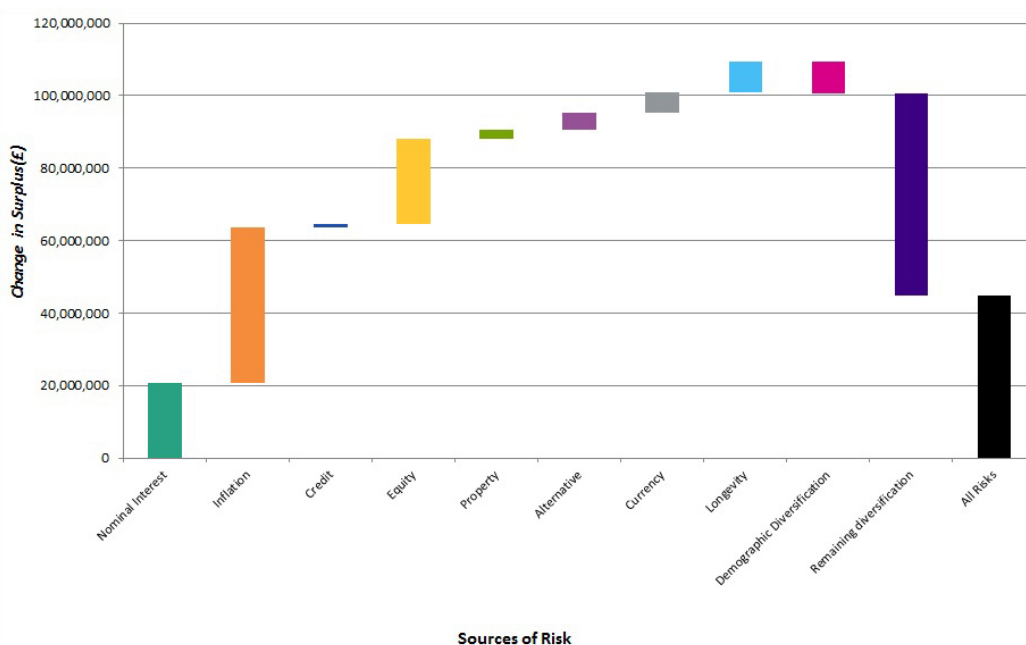
Longevity Hedging Provides Limited Value at the Start of the Journey Plan

Initially the scheme is exposed to significant levels of market risk, for example equity risk, and longevity risk is small in comparison to market risk. Longevity risk is assumed to have a low correlation with market risk so the combination of market risk and longevity risk yields a diversification benefit mostly offsetting the longevity risk contribution to overall risk.

These effects are clearly seen in Figure 2 where the contribution of longevity risk is small in comparison to the aggregate contribution from the market risk drivers. Figure 2 also shows that even this small contribution is offset by the demographic diversification benefit. The net contribution of longevity to overall risk is negligible.

Third parties will require compensation to assume longevity risk, trustees will require advice to arrange the risk transfer transaction. Given that the net impact of longevity risk is small and that the cost of transferring this risk is material, implementing a longevity hedge is unlikely to be cost effective in the early stages of a journey plan.

Figure 2 - Risk Decomposition at the Start of the Journey Plan

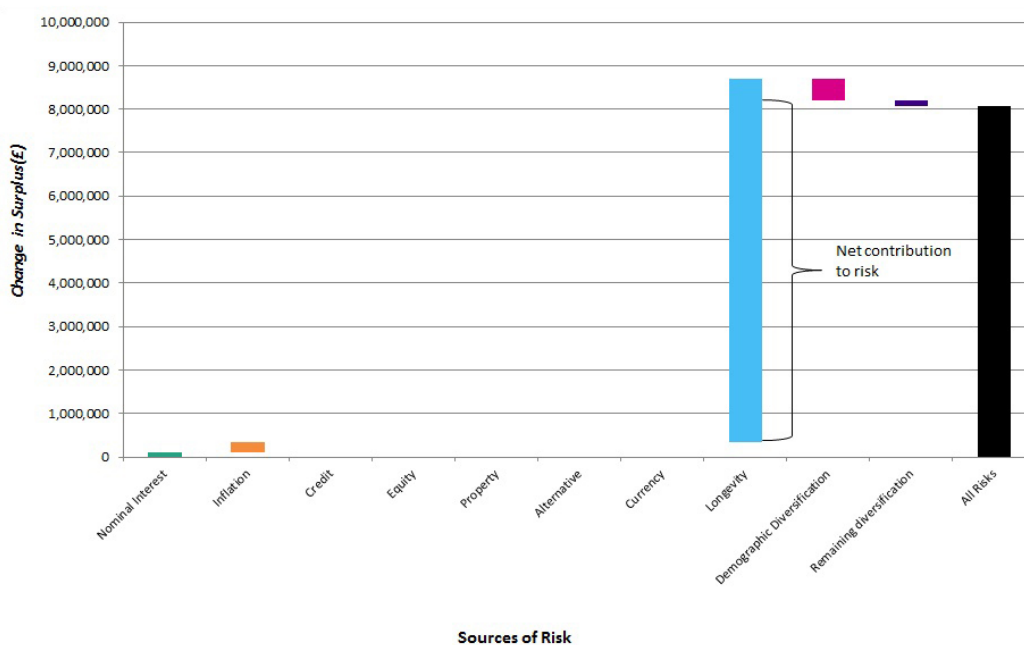


Longevity Hedging is a More Compelling Proposition at the End of the Journey Plan

By the end of the journey plan, the shortfall has been recovered, the allocation to return seeking assets reduced to zero and all assets invested in a suitable range of Liability Driven Investment (LDI) instruments achieving an approximate cash flow matched position. The exposure to market risk has been largely eliminated, as shown in figure 3; note the change in scale from figure 2. The only remaining risk exposures of the scheme, other than longevity risk, are some residual interest rate risk and inflation risk due to the imperfect nature of the LDI strategy.

Longevity risk is unchanged in absolute terms and is now the largest contributor to overall risk. The effective absence of market risk means that the demographic diversification benefit due to the low correlation between longevity risk and market risk is greatly reduced. The net contribution of longevity risk now dominates the risk exposure of the scheme. At the end of the journey plan, a longevity hedge has clearly become a cost effective risk management option.

Figure 3 - Risk Decomposition at the End of the Journey Plan



Conclusion

When a scheme's investment strategy includes a relatively high allocation to return seeking assets, the net contribution of longevity risk to overall risk is small and the cost of implementing a longevity hedge is likely to outweigh the benefits. As the journey plan advances, the allocation to return-seeking assets diminishes. The net contribution of longevity risk to overall risk increases, as does the attractiveness of a longevity hedge.

The net contribution of longevity risk dominates the risk profile at the end of the journey plan and the cost effectiveness of a liability hedge becomes compelling. In future papers, we will consider the implications of this end-state, including the impact of a staged implementation of a longevity hedge spread across the journey plan.

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