

WHITEPAPER

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U.K. Pensions Asset-Liability Modeling and Integrated Risk Management

Background

Are some pension schemes looking at the wrong risk metrics when developing funding strategies?

The current regulatory and reporting environment in the United Kingdom (UK) has led to a focus on short-term measures. If a pensions scheme's objectives are longer-term, focusing on short-term metrics might have significant consequences, including for the investment strategy, the ability to pay members' benefits as they fall due, and for the long-term strength of the sponsor and the scheme.

This paper considers how schemes can look at the longer-term by using asset-liability modeling and alternative metrics, which can help with understanding the long-term impact of short-term decisions, and inform an appropriate investment and funding strategy.

This approach is consistent with the UK Pensions Regulator's Integrated Risk Management approach to pension funding, which allows long-term analysis to be built in to the triennial funding cycle where it is appropriate to do so.

Scheme Objectives, Funding, and Integrated Risk Management

SCHEME OBJECTIVES AND FUNDING VALUATION

The fundamental objective of a defined benefit pension scheme is to pay benefits to members as they fall due. While this is a reasonably straightforward statement in itself, the practice is significantly more complex. In particular, schemes often focus on the short term, and they might be able to consider a wider range of options if they look at the longer term.

Traditionally, trustees tackle their funding objectives around the triennial valuation cycle. As trustees and employers set out to agree on recovery plans and contribution schedules, understanding the potential funding level of the pension scheme over a three-year horizon can naturally become a primary focus.

Why focus on the short term?

There are undeniably good reasons for pension schemes to focus on the short term.

First, and most importantly, the regulatory and reporting environment is framed around demonstrating sufficiency of assets on an appropriate funding basis. Schemes are required to carry out a formal valuation at least triennially, and establish a recovery plan, if needed. Trustees are encouraged to understand how the current funding level of the pension scheme is likely to change at the next triennial valuation date.

The funding valuation is critically important to a scheme, and the main risk metric for trustees to use to make funding decisions. Understanding the potential future funding level should help trustees make decisions around putting a recovery plan in place. Full funding offers comfort that if the sponsor defaults, the scheme should have sufficient assets to meet its obligations.

To be consistent with the asset valuation, pension schemes aim to use a market-consistent liability valuation – essentially assessing what price would be paid to secure the liabilities. This makes sense in some circumstances – for example if there is an intention to buy-out in a known timescale, or if the sponsor covenant is weak.

However, in many cases, the scheme is not about to be transferred or bought out, and in these cases there might not be an independent market view of the value of the liabilities. In this case, the value placed on the liabilities has an element of subjectivity. The key driver of valuation, the valuation discount rate, is largely negotiated between schemes, sponsors, and their advisors. Different actuaries with different views of prudence could place different values on the same liabilities. There is a degree of negotiation between trustees and sponsors to agree the basis and the deficit recovery plan.

Indices - a point to consider

There is also a recent trend for tracking the solvency of pension schemes at an aggregate level. Various parties publish monthly indices of scheme solvency, identifying the reasons for movements and commenting on the outlook. Different indices focus on different valuation metrics – for example funding or Pension Protection Fund (PPF) position – and slight variations in the range of schemes covered.

These indices are part of a trend to monitor scheme solvency at increasing frequency, some schemes monitor solvency weekly, or even daily.

However, it is worth considering the wider implications. Remember that valuation bases are agreed between sponsor and trustees. The triennial funding valuation is only one tool to help schemes ensure that they can meet their benefits as they fall due. But statutory solvency is only one available measure, a snapshot at a moment in time. It can be argued that a valuation locks in a particular interest rate curve, a particular view of asset performance, and a particular recovery plan. Depending on the strength covenant, for instance, a 90% funding level can be sustainable, or it might be disastrous.

All of these factors make total solvency an unusual measure to use as the basis for an index.

WHAT DOES THE 'TRADITIONAL APPROACH' MEAN FOR PENSION SCHEMES?

This level of scrutiny of funding levels has merit. Funding levels are definitely an issue, and in some cases they are the most important measure for schemes to consider when setting investment and funding strategy. However, they are not the only measure of a pension scheme's ability to meet its obligations. The traditional approach to valuation and the increasing focus on tracking the short-term promotes a particular approach to investment, which might not be the only option for the scheme.

Looking at other options

To determine whether there are other ways to understand the risks in a pension scheme, we need to consider the fundamental objective of a defined benefit pension scheme - to meet the liabilities as they fall due.

Statutory valuation is one way of trying to ensure a pension scheme meets its liabilities. But valuation is simply placing a value on benefits to be paid in the future. It does not actually affect the amount of those cash flows – as these will depend on the demographic experience of the scheme and the level of inflationary increases to pensions. It also does not give much insight into the level of cash flow at any given time in the future.

The funding level gives some indication of the ability of the pension scheme to meet its future benefit obligations, but it does not provide the full story. Valuations should therefore be just one of the measures the scheme uses when setting its investment and funding strategy.

Another factor worth bearing in mind is the basis used to determine the value placed on benefits. Many UK defined benefit schemes value their liabilities using a "gilts-plus" approach. This means that the evolution of the funding level depends critically on changes in gilt yields. If a scheme's strategy focuses on protecting the funding level relative to a particular basis, this leads to an investment strategy that reduces the funding level's exposure to interest rate risk.

This approach makes sense for some schemes, but not for all of them.

Case studies

In these case studies we consider two schemes with long-term goals, and strong sponsors. For each scheme we look at appropriate risk metrics and consider the impact on those metrics of two asset strategies.

There is a degree of assumption here, notably:

- » Sponsors are assumed to remain in existence in perpetuity.
- » Asset strategies are assumed to be static over time.
- » A simplified asset universe has been assumed, consisting of government bonds, corporate bonds, and equities. Leveraging of up to 2.5x on the government bonds is allowed.

CASE STUDY 1

Consider a scheme that is around 75% funded on a gilts + 0.5% basis. The sponsor is making contributions of £5 m per annum on the basis of a 15year recovery plan. The aim is to reach full funding in 15 years on gilts + 0.5%.

The sponsor can afford to increase contributions at the next triennial valuation in three years, but only by another £5 m per annum without impacting on the day-to-day viability of their operations.

The trustees want to buy out within fifteen years, if possible.

Sensible risk measures include:

- » Likelihood of reaching full funding within 15 years on gilts + 0.5%.
- » Likelihood of reaching buyout within 15 years.
- » Expected level of contributions at next triennial valuation.
- » Median time to reach full funding.

Two investment strategies are considered, optimized to different measures of risk.

Strategy A - asset mix	Strategy B - asset mix
37.5% Equity	52.5% Equity
40.0% Gilt/LDI	7.5% Gilt/LDI
22.5% Corporate Bond	40.0% Corporate Bond

Strategy A is a fairly typical asset allocation. The mean return delivered is enough to reach full funding after 15 years, with volatility around this level optimized. Strategy B is more aggressive, and designed to deliver a greater return, but with increased volatility.

The impact can be seen when considering the spread of outcomes on the target funding basis after 1 year and after 15 years.

Figure 1

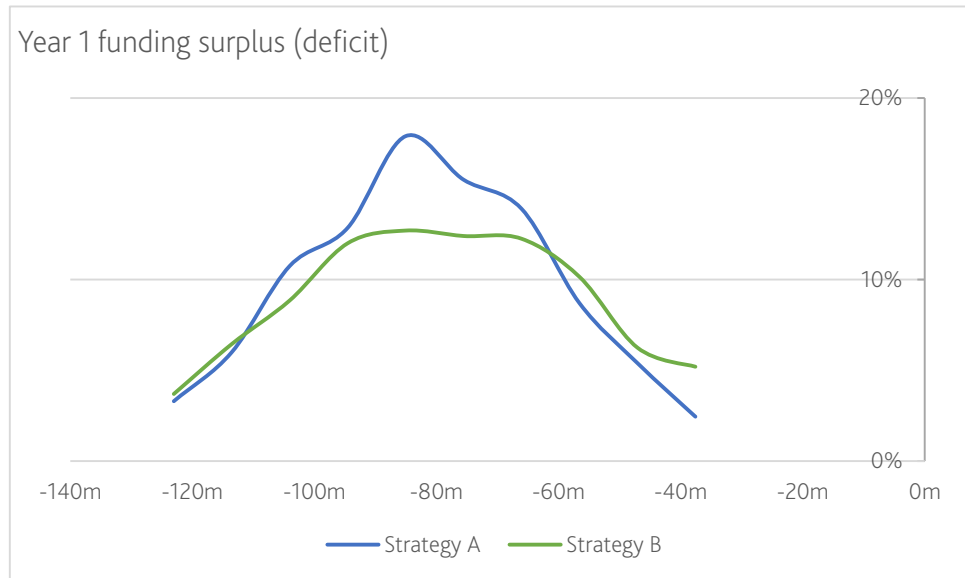
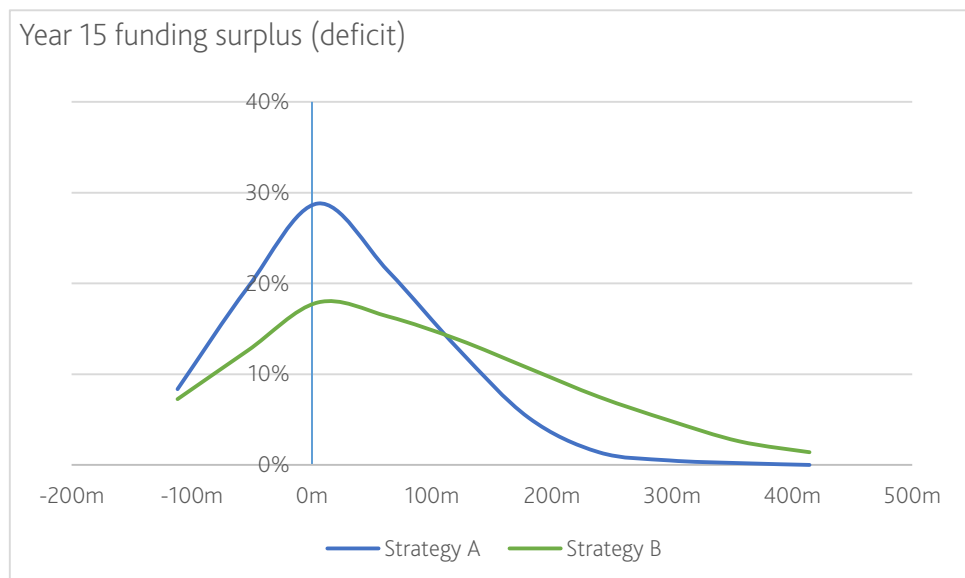


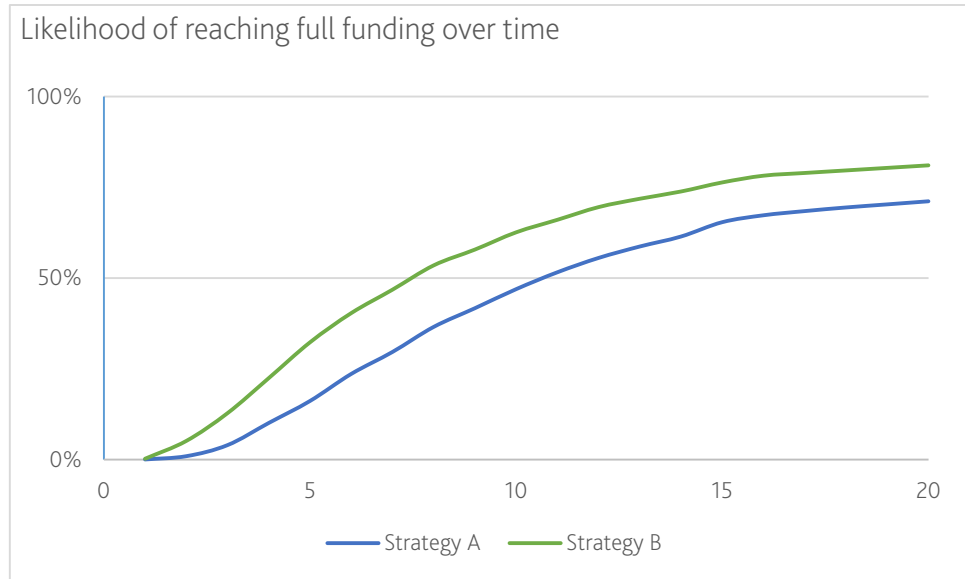
Figure 2



The two strategies show similar peaks in their distributions of funding levels, but different distributions. The narrower, higher peak of Strategy A reflects the lower volatility of surplus.

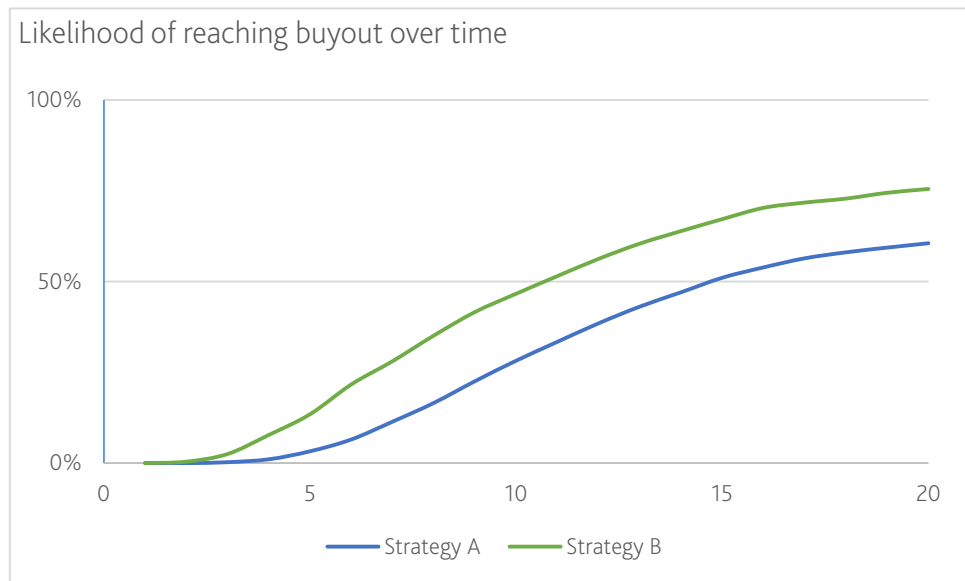
Looking at the likelihood of reaching full funding on gilts + 0.5% shows the impact on both strategies:

Figure 3



Similarly, for the likelihood of reaching buyout:

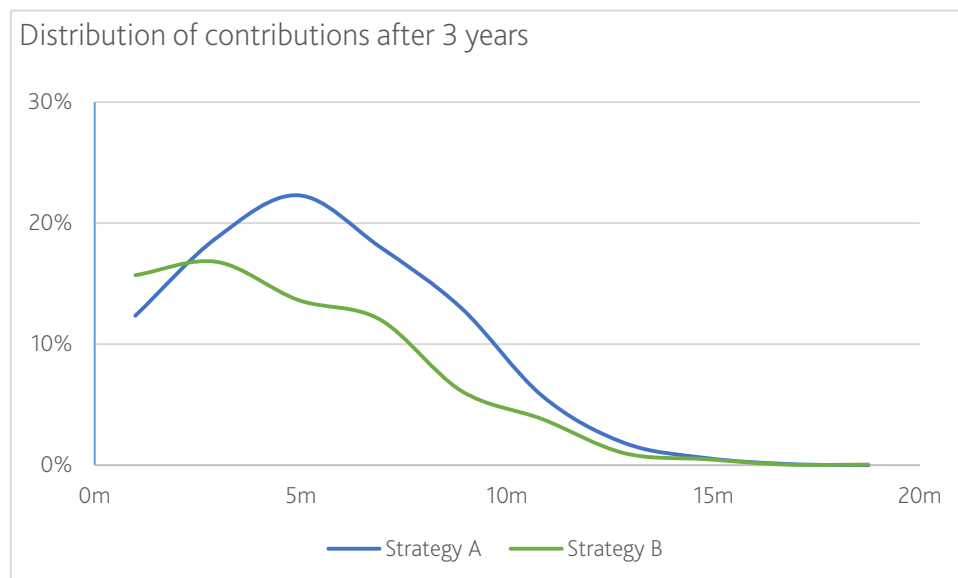
Figure 4



Clearly, the higher equity strategy increases the chance of reaching buyout.

Finally, consider the distribution of the contribution level at the next triennial valuation.

Figure 5



Strategy A is expected to need no further contributions in 3 years with a 7% likelihood. Under strategy B, this likelihood rises to 30%.

Values for key metrics

	Strategy A	Strategy B
1-year VaR 95	37.6 m	48.5 m
Median surplus at time 15	16.9 m	68.5 m
15-year VaR 95	122.3 m	181.4 m
Likelihood of reaching full funding within 15 years	59%	71%
Median time to reach full funding	11 years	8 years
Expected level of contributions at next valuation	5.1 m	3.3 m

Conclusions

It comes as no surprise that a riskier strategy offers greater rewards in the long term. However, this approach allows that risk/reward pay-off to be assessed. Strategy A offers lower value at risk figures, and might therefore be seen as less risky. The higher risk is more than offset by the expected outperformance in strategy B on other long-term metrics, reducing contribution volatility and increasing the likelihood of reaching full funding.

This conclusion factors in the nature of the scheme modeled, in particular the assumed shape of its cash flow profile. A different cash flow profile with the same funding level and the same liability duration could lead to significantly different conclusions.

CASE STUDY 2

Consider a scheme that is fully funded on a gilts + 1% basis. The sponsor is strong, and there are no contributions currently payable.

There is no immediate intention to get rid of the scheme. Realistically, the sponsor and trustees think that the costs of managing the scheme in-house are reasonable until the liability falls below £20 m (on gilts + 1%). The sponsors and trustees would want to look at buyout if the funding level exceeded 120% on the current funding basis. Other than that, they expect the scheme to remain in force for the long term.

Here, sensible risk measures include:

- » Expected term until the scheme runs out of money, assuming no further contributions are made.
- » Expected asset holding when the self-sufficiency liability falls below £20 m.
- » Median term until the self-sufficiency liability exceeds 120% on gilts + 1%

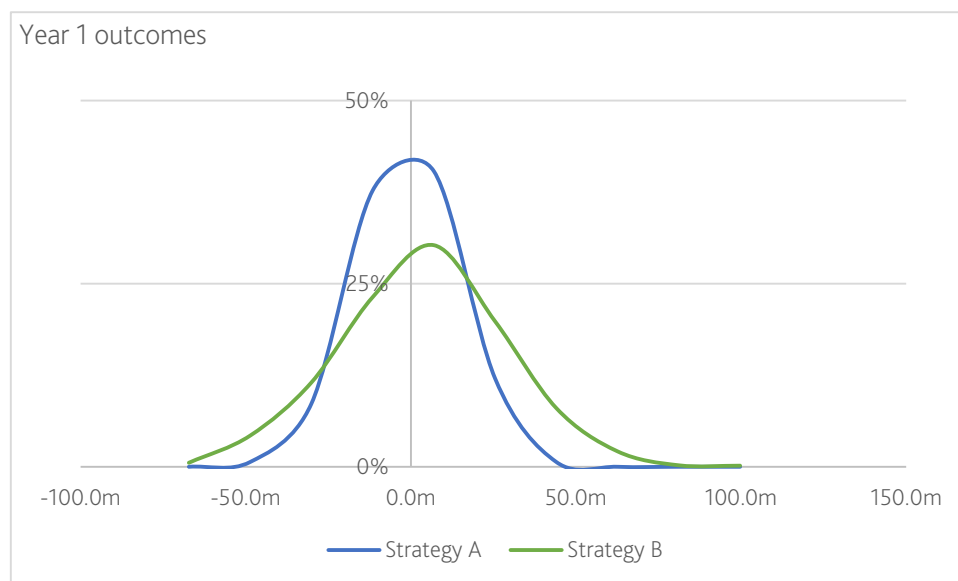
Two investment strategies are considered, again optimized to different measures of risk.

Strategy A - asset mix	Strategy B - asset mix
2.5% Equity	57.5% Equity
42.5% Gilt/LDI	40.0% Gilt/LDI
55.0% Corporate Bond	2.5% Corporate Bond

Again, Strategy A would be considered a reasonably typical asset allocation for this type of scenario. The high level of corporate bond holding provides a good match for liabilities, and offers the higher return required to reduce volatility relative to the effective target of gilts + 1%. Strategy B is more aggressive and is designed to deliver a greater return.

This can be seen if we look at the projected spread of surplus after one year.

Figure 6



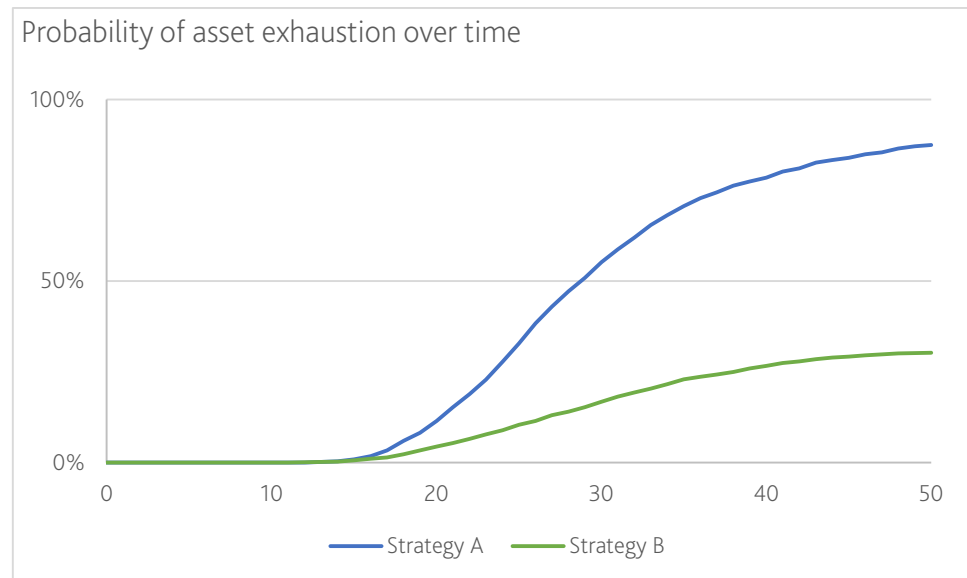
Strategy A exhibits a much lower level of risk, demonstrated by the narrower, higher peak in the distribution. This corresponds to a value at risk of £24 m, compared to strategy B's VaR of £42 m. However,

the skew in the distribution here is already visible, with strategy B clearly showing an increase in the median outcome.

Over the longer term, this will have a significant impact.

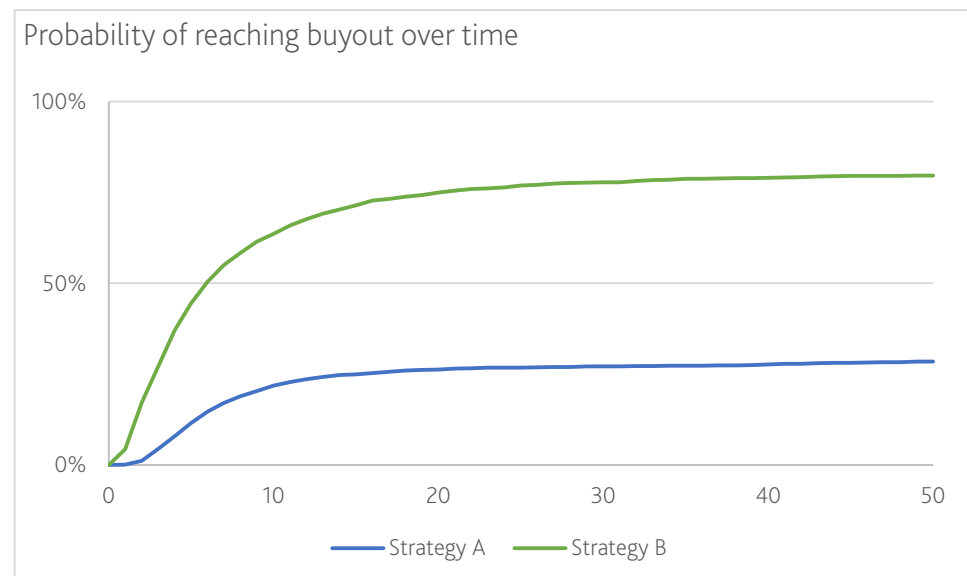
Looking at some of the other metrics:

Figure 7



There is a 33% chance that strategy A exhausts assets within 25 years – compared to 10% for strategy B

Figure 8



Similarly, the long-term likelihood of reaching the stretch target (based on funding reaching 120% on gilts + 1%) is around 80% on strategy B compared to around 25% on strategy A.

Values for key metrics

	Strategy A	Strategy B
1-year VaR 95	24.3 m	42.2 m
Median term until asset exhaustion	28	n/a
Term until 25% chance of asset exhaustion	23	38
Expected asset holding when the liability falls below £20 m	-410.8 m	721.8 m
Median term until scheme considers buyout	n/a	5
Term until 25% chance of considering buyout	15	2

Conclusions

Again, strategy A is much less volatile, which should preserve funding. However, the funding level is based on gilts + 1%, which means that some higher-risk assets must be held. Adopting a riskier strategy can increase the schemes chances of reaching its secondary objective of reaching buy-out as well as being able to pay its liabilities as they fall due.

OVERALL CONCLUSIONS

These strategies and schemes are slightly artificial, however it is clear that both sponsors and trustees who look at longer-term objectives and metrics would formulate an investment strategy closer to strategy B in both cases. However, typically, the lower-VaR strategies tend to dominate.

In both cases, strategy A is designed to minimize value at risk against the current funding measure, while strategy B is optimized against longer term goals. As a result, strategy A involves holding a high proportion of gilts, sensible when the risk being hedged is defined in terms of the return on gilts.

When we consider longer term goals, however, the valuation basis becomes less relevant. Considering the metrics around asset exhaustion, for instance, the time until there is a 25% chance of asset exhaustion depends solely on the cash flows and the assets, it is entirely independent of the valuation basis chosen.

Putting this in to practice

AN INTEGRATED APPROACH TO RISK MANAGEMENT

The UK Pension Regulator's Code of Practice on Integrated Risk Management sets out key principles for how trustees and employers should seek to agree funding plans.

The approach should be collaborative, understanding risk, bearing in mind the sponsor's risk tolerance, and taking a long-term view of the risks inherent in the pension scheme. The aim of this integrated approach is to encourage trustees to establish a continuous process to manage the risks in their pension scheme, instead of the traditional cyclical approach with the triennial valuation triggering discussions around funding and investment.

However, this approach does not necessarily sit easily alongside a more traditional valuation approach where trustee, sponsor, and advisers negotiate a basis, carefully validating and justifying assumptions, and agreeing on a recovery plan.

Building integrated risk management into the valuation process can appear cumbersome. Different investment strategies can lead to different discount rates, and the valuation basis for a sponsor with a strong covenant will differ from the valuation basis for a sponsor with a weak covenant.

However, the fact that the valuation basis is negotiated gives a way into this iterative process, increasing transparency around decision-making.

By looking at alternative metrics other than the funding level, it is possible to look at the precise measures that parties are interested in. For example, the likelihood of contributions increasing at the next valuation, the likelihood of paying all of the benefits as they fall due, or the expected time to reach buyout, and to understand the trade-off between them.

If this approach is used to determine the investment strategy and the contribution strategy, the formal triennial valuation becomes almost secondary, and much less confrontational. From the point of view of the sponsor, the contribution schedule is an input into the statutory valuation calculation rather than a result.

START FROM THE OUTCOME

Building asset-liability modeling into an integrated risk management framework, it might be possible to simplify the valuation process.

The process essentially becomes:

- » Agree on appropriate objectives for the sponsor and the trustee, such as reaching self-sufficiency or buyout, and decide on suitable metrics for these, such as:
 - The likelihood of reaching full funding
 - The volatility of contributions
 - The chances of the deficit exceeding a threshold
 - One-year value at risk

This process can be completed before any decisions are made, and can form the framework for reaching agreement.

- » Look at a range of investment and contribution strategies and their impact on those metrics.

- » Based on the trade-offs between these metrics, agree on an investment strategy and contribution schedule. For schemes with long-term metrics, the impact of the choice of valuation basis is reduced.
- » Construct a valuation basis that supports the agreed contribution schedule as an output.

LOOKING AHEAD

By putting asset-liability modeling at the heart of the valuation process, the investment strategy becomes focused on the objectives of the scheme rather than automatically focusing on protecting the solvency level. This might mean better outcomes in the future for the scheme, for the sponsor and ultimately for members.

This process is also far better aligned to the key tenets of the integrated risk management framework. It encourages collaboration, a clear and concise framework alongside suitable and proportionate use of tools, and supports a continual approach to measuring, monitoring, and managing the risks in pension schemes.

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