

Leicestershire County Council Pension Fund

Protection assets review

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April 2024



Addressee and Scope

Addressee and purpose

This paper is addressed to the Investment Sub-Committee (“ISC”) of Leicestershire County Council Pension Fund (“the Fund”). The purpose of this paper is to present the findings of a review of the Fund’s protection assets allocation. This paper should not be used for any other purpose. It should not be released or otherwise disclosed to any third party except as required by law or with our prior written consent, in which case it should be released in its entirety. We accept no liability to any other party unless we have accepted such liability in writing. We provide comment from an investment but not a legal or tax perspective.

This report complies with Technical Actuarial Standard 100: Principles for Technical Actuarial Work.

Background and Scope

In the 2024 investment strategy review, we noted that the recent rise in long-term real yields, combined with a material improvement in the funding position, warranted a review of the protection assets. As part of the review, we estimated the impact of increasing the exposure to protection assets. The analysis concluded that there may be a case to increase protection assets, as it could increase the likelihood of remaining fully funded over the longer term as well as reducing the downside risk over the shorter term.

However, this analysis did not fully consider the interaction with the Fund’s liabilities. It was therefore recommended that a full asset-liability modelling (“ALM”) analysis be carried out to properly assess the impact of increases to protection assets on funding outcomes. This report presents the results of this analysis and sets out to answer the following questions:

- Why invest in protection assets?
- Should the allocation to protection assets be increased?
- What level of protection assets best supports the aim of maintaining stable, lower contribution rates over time?
- Is there a case for introducing alternative protection assets?
- What is the optimal combination of new / existing protection assets?
- How should any increase in protection assets be funded?
- How would an increase in protection assets impact on the Fund’s aims of achieving Net Zero (“NZ”) and/or other Environmental, Social and Governance (“ESG”) considerations?

Conclusions

Here we summarise the conclusions resulting from our detailed analysis. The supporting evidence can be found in the remainder of the paper.

Why invest in protection assets?

- To reduce overall investment risk and to mitigate the impact of fluctuations in the value of the Fund's liabilities which is explored further in pages 13 and 14.

Should the allocation to protection assets be increased?

- The results of our ALM analysis do not provide a compelling case for increasing protection assets
- An increased allocation might improve probability of success and downside risk, but only marginally so
- Furthermore, increasing the allocation would reduce expected returns, and if this led to a reduction in valuation basis the improvements in probability of success and downside risk would be reduced or reversed
- An increased allocation may also help in tail risk scenarios, but it would not eliminate the risk of material deficits re-opening
- At the present time, maintaining a reasonable level of employer contributions and the current allocation to growth/income assets, and by doing so maintaining a healthy funding surplus, is we believe a better approach to mitigating tail risk
- An increased allocation to protection assets may also be more helpful in the event of sustained equity underperformance, but we do not recommend tailoring investment strategies to specific scenarios, unless there is a strong conviction that they will happen
- Equally the results do not rule out increasing protection assets if there was another (qualitative) reason for doing so

Conclusions

- Qualitative reasons could include: modelling risk (a belief that future experience may differ to the modelling assumptions), appetite for risk, tactical opportunities, or climate change considerations. We have assessed the applicability of these to the Fund as low, with the exception of climate change which we rate as medium, though we conclude overall that none of these reasons should lead to a decision to increase protection assets.
- Whilst not increasing protection assets is our conclusion at the present time, the annual strategy reviews allow us the opportunity to revisit this decision should circumstances change.

What level of protection assets best supports the aim of maintaining stable, lower contribution rates over time?

- Increasing protection assets (in isolation) would not impede the ability to reduce employer contribution rates gradually over the next few years.
- At the same time, our modelling indicates that increasing protection assets does not materially reduce the size of the deficit which could open up in a downside scenario.
- Increasing protection assets would therefore not materially improve the overall stability of future employer contribution rates.
- At the present time, maintaining the current allocation to growth/income assets, and by doing so maintaining a healthy funding surplus, is we believe a better approach to maintaining contribution rate stability.

Is there a case for introducing alternative protection assets?

- Gold potentially has some of the qualities we would be looking for in an alternative protection asset, making it an interesting one for further consideration. However, unless we were increasing the protection assets allocation materially beyond the current 8%, it is hard to see gold having a large enough impact to justify the additional governance burden of investing in a new, and highly volatile asset class.

Conclusions

- The model indicates that using ABS or Real Asset Backed Senior Debt leads to similar funding outcomes in our modelling to using the current protection assets. Given the additional complexity and/or governance burden of adding new strategies, we don't see a case for adding either into the protection assets portfolio at this stage.

What is the optimal combination of new / existing protection assets?

- We remain comfortable with the current strategic allocation of 3.5% to ILB and 3.75% to IGC agreed last year.
- We retain a preference on short-term outlook for ILB over IGC. We therefore recommend continuing to wait before proceeding with rebalancing the protection portfolio to its target weights. As part of this we will inform Officers when our tactical views on the asset classes have changed materially enough to proceed, and the Officers will enact the change at that point.

How would an increase in protection assets impact on the Fund's aims of achieving NZ and/or other ESG considerations?

- Given the Fund's current NZ strategy and risk appetite, and our current expectations on climate change outcomes, we do not believe that a material increase in protection assets could be justified solely on the basis of climate change.
- Climate risk will continue to be reviewed as part of the annual SAA review process, and it is recognised that increased climate risk may give reason to re-consider factors such as asset allocation decisions in the future.

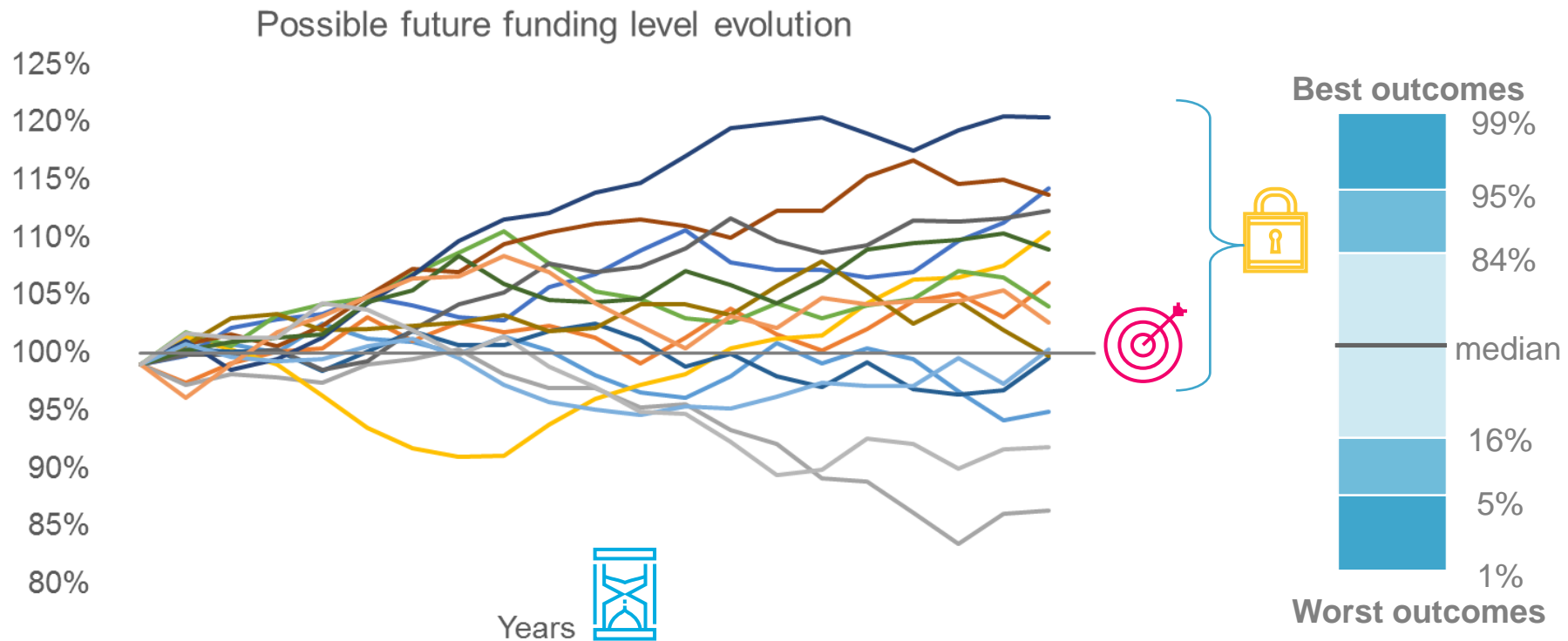
Recommendations

We recommend that the Fund:

- Considers whether they agree with our assessment that the qualitative reasons for increasing protection assets – modelling risk, increased risk aversion, capturing tactical opportunities and/or climate change (detailed on slides 21 and 22) – are not applicable.
- Maintains the current allocation to protection assets.
- Waits for the short-term outlook on IGC to improve relative to ILB before rebalancing the protection portfolio to the target weights agreed last year.

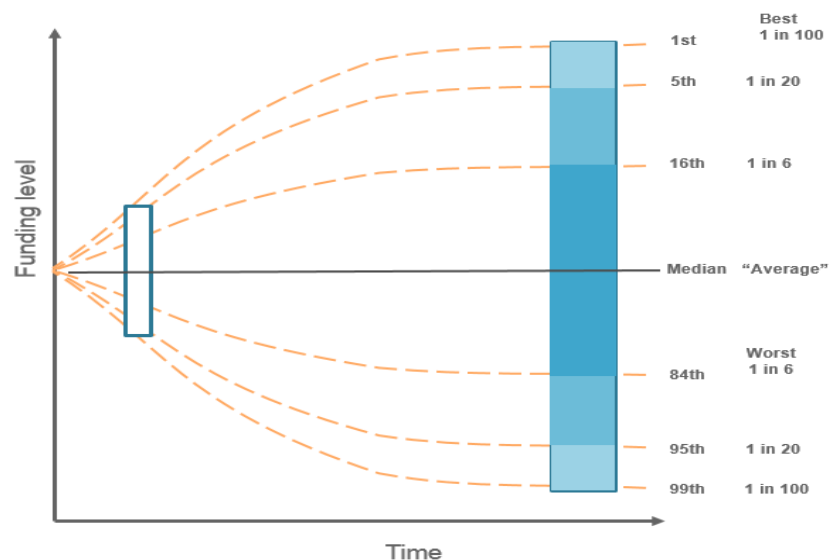
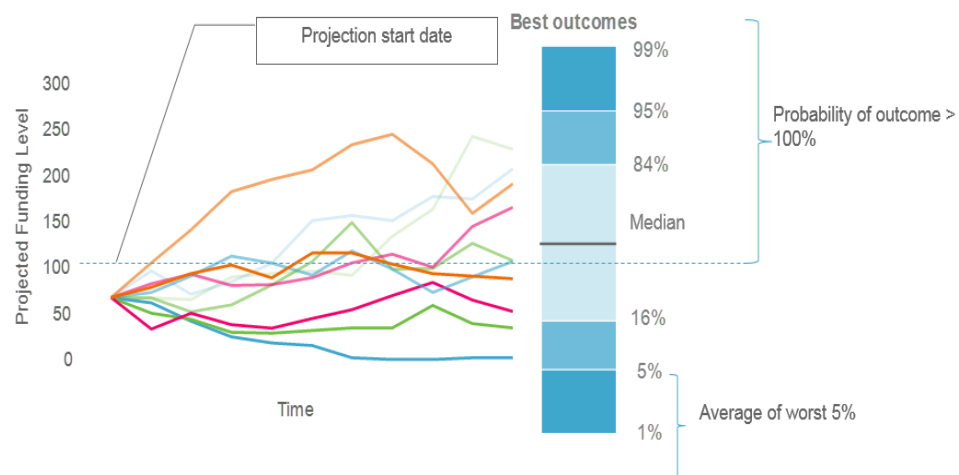
ALM training and background

ALM assesses the impact of uncertainty on future funding outcomes



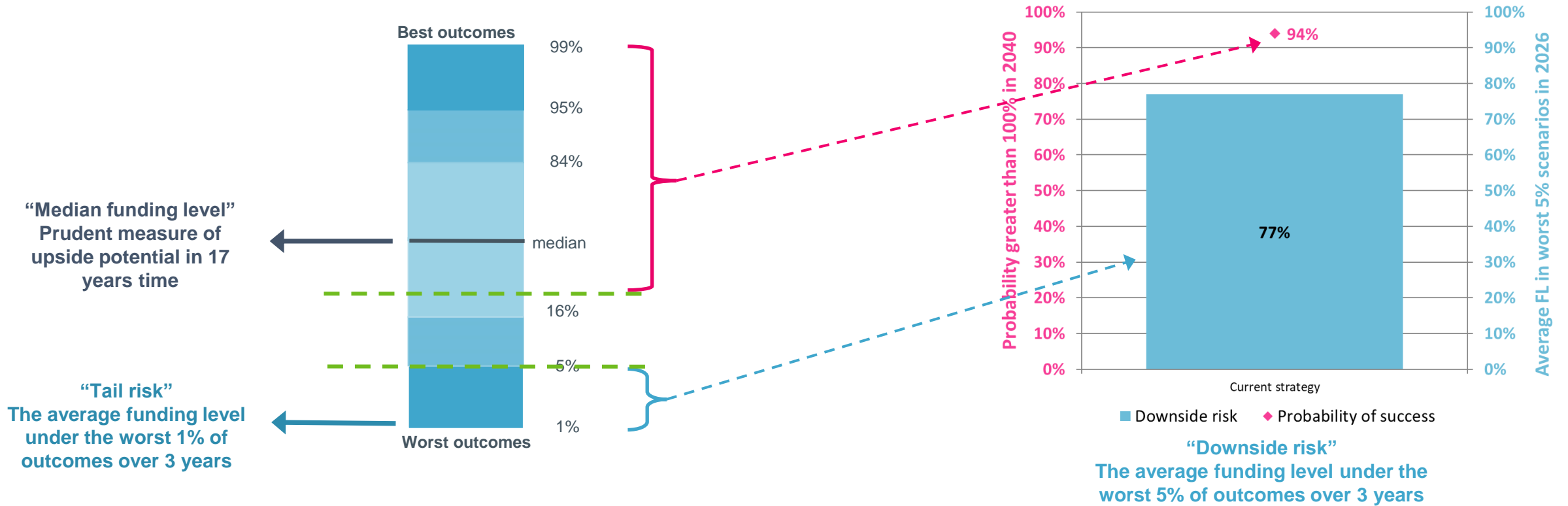
Each scenario considers a different path for interest rates, inflation, investment returns and the effect on funding outcomes

The modelling process



- We run 5,000 simulations of the future for each investment strategy and focus on the next 17 years which is the Fund's investment/funding horizon.
- Each simulation considers a different path for asset returns and liabilities, and key economic variables such as inflation and interest rates, but the projections are market-consistent (i.e. they could conceivably arise). "Bad case" funding scenarios may arise due to higher than expected liabilities, lower than expected asset performance or a combination of both.
- Projections take account of the long-term characteristics of major asset classes.
- The outcomes of the 5,000 simulations are ranked from "best" to "worst" and the results summarised graphically. We use charts to illustrate the spread of outcomes at a given point in time for a given strategy as set out on the left.
- The "median" funding level can be considered to be the expected outcome. We expect that there is a 50:50 chance that the funding level will be above or below the median.
- The "best" and "worst" percentiles highlight the chances of being above or below a particular funding level. For example, 1 in 6 of the outcomes are above the 16th percentile.

Interpreting the results of the ALM



- The four key metrics cover the likelihood of achieving the long-term goal (probability of success), the risk being run (the worst outcomes at the 5% and 1% mark) and the upside potential (median funding level).
- The long-term goal is assessed over 17 years as it is our understanding that this aligns with the funding objectives for the Fund, whilst risk is assessed over a 3-year period as this aligns with a full valuation cycle after which contributions requirements are re-assessed.

Modelling inputs – liabilities and assets

Liabilities

- We have used March 2022 liability information and cashflows.
- The liabilities have been rolled forward to December 2023 to reflect realised market conditions at that time, and to allow for actual inflation to benefits since March 2022.
- This approach reflects the fact that getting fully accurate and up to date liability information would take additional time and cost, together with the fact that an ALM will be run as part of the forthcoming 2025 valuation process.

Assets

- Uses a starting asset position as at 31 December 2023.
- Strategies modelled (details can be found in the appendix):-

Other considerations

- We have fixed the contribution rates and actuarial basis in our modelling, to enable the impact of changes in investment strategy to be more easily identified. In practice, investment strategy, contribution rates and actuarial basis are all linked. We have used the following assumptions:
 - A fixed total employer contribution rate of 27% of payroll. This is based on the total equivalent rate currently in payment, as certified at the 2022 valuation. We appreciate that “stepped” contribution reductions may be expected over the next few years. Contribution levels are considered later in this report.

- A basis with a discount rate of “cash + 2.2% p.a.” as set out by the Fund Actuary. We understand this basis to be closely reflective of the current actuarial basis. The discount rate is driven by the investment strategy, and we have considered the potential impact of this separately, later in this report.

- This should not be taken as funding advice. More information on our modelling is available upon request.
- All strategy changes are funded taking from growth and income assets in proportion, unless otherwise stated.

Strategy	Growth	Income	Current Protection	Alternative protection
Current strategy	50%	42%	8%	0%
+10%pts current protection	44.6%	37.4%	18%	0%
+20%pts current protection	39.1%	32.9%	28%	0%
+10%pts current protection – from growth	40%	42%	18%	0%
+10%pts current protection – from Income	50%	32%	18%	0%
+10%pts alternative protection	44.6%	37.4%	8%	10%
+10%pts alternative / IGC protection	44.6%	37.4%	13%	5%
+10%pts alternative / ILB protection	44.6%	37.4%	13%	5%

Why invest in protection assets?

Why invest in protection assets?

Protecting the funding position

The Fund invests in protection assets in order to reduce overall investment risk and to mitigate the impact of fluctuations in the value of the Fund's liabilities. The Fund's current protection portfolio comprises index-linked bonds (ILB; predominantly sovereign issuance), investment grade corporate bonds (IGC) and cash. The corporate bond mandates are invested globally in investment grade companies.

Protection assets are considered to be low risk because there is a very high likelihood of receiving the principal and interest payments due.

The market value of protection assets can however fluctuate significantly, particularly at times of rapidly rising or falling interest rates. They may not reduce the volatility of investment returns over the short-term.

They can however protect the Fund's funding position. They achieve this by matching the fluctuations in the value of the Fund's liabilities as interest rates and (in the case of index-linked investments) inflation expectations change. In 2022/23, as interest rates rose, the value of protection assets fell sharply, but the value of the liabilities fell further, leading to a material improvement in the funding position. This would of course work in the opposite direction e.g. if interest rates reverted to the low levels of 2 years ago, protection assets would increase in value but liabilities would increase further, leading to a material deterioration in funding position.

Why invest in protection assets?

Other forms of protection in the Fund

It should be remembered that it is not only the protection assets which protect the funding position. All the asset classes in the portfolio play a part in mitigating macroeconomic and financial risks to the Fund. For example:

- Assets with index-linked cashflows, such as certain property and infrastructure assets, provide protection against inflation
- The equity of companies with market pricing power also benefits from moderate levels of inflation linkage over the long-term
- Assets paying floating rates of interest, such as private debt and some multi-asset credit strategies, benefit from the higher rates that typically accompany higher inflation
- Assets denominated in foreign currencies and unhedged (benchmark hedge ratio is currently 30%) offer further protection because sterling typically devalues during periods of high domestic inflation, thus increasing the local value of overseas assets.

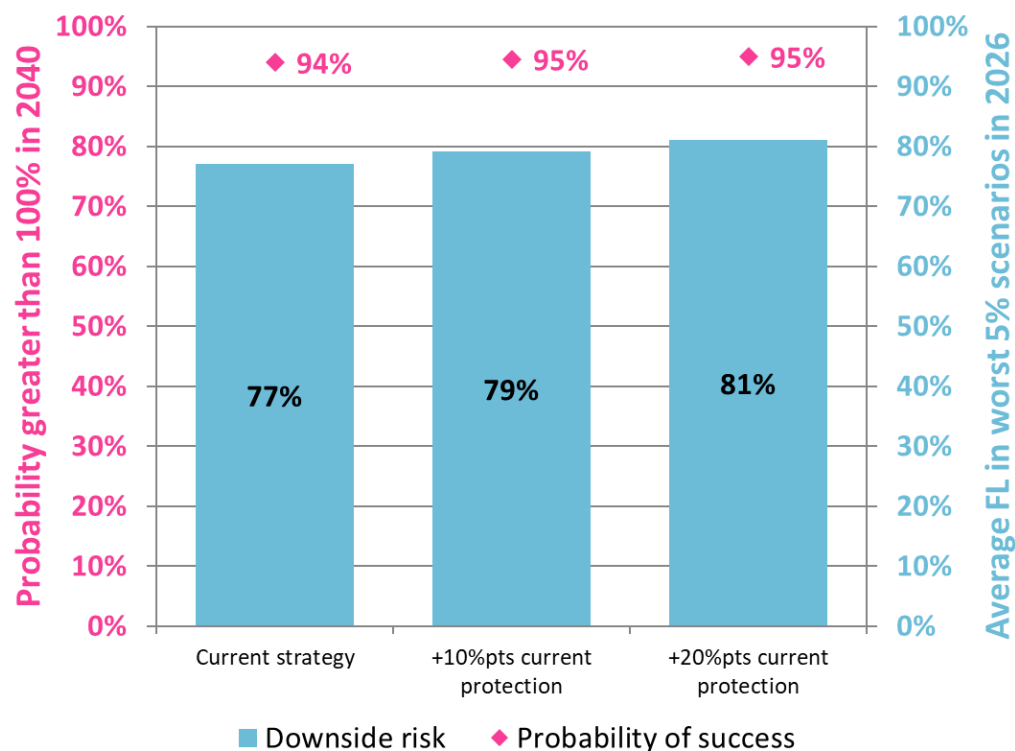
Interest rates and government bond yields rose rapidly over 2022/2023 as Central Banks sought to control rising inflation. In the UK, this trend accelerated in September 2022 after the mini-budget when its large unfunded fiscal package was introduced. Yields have fallen back to a degree since then but remain materially higher than those seen in the previous 15 years.

It is worth noting that we design investment strategies for a range of potential future scenarios, rather than specific ones such as lower interest rate expectations or higher inflationary environments. We do however consider more specific scenarios later in this report.

Should the allocation to
protection assets be
increased?

Assessing an increase in protection assets

Probability of success and downside risk over 3 years

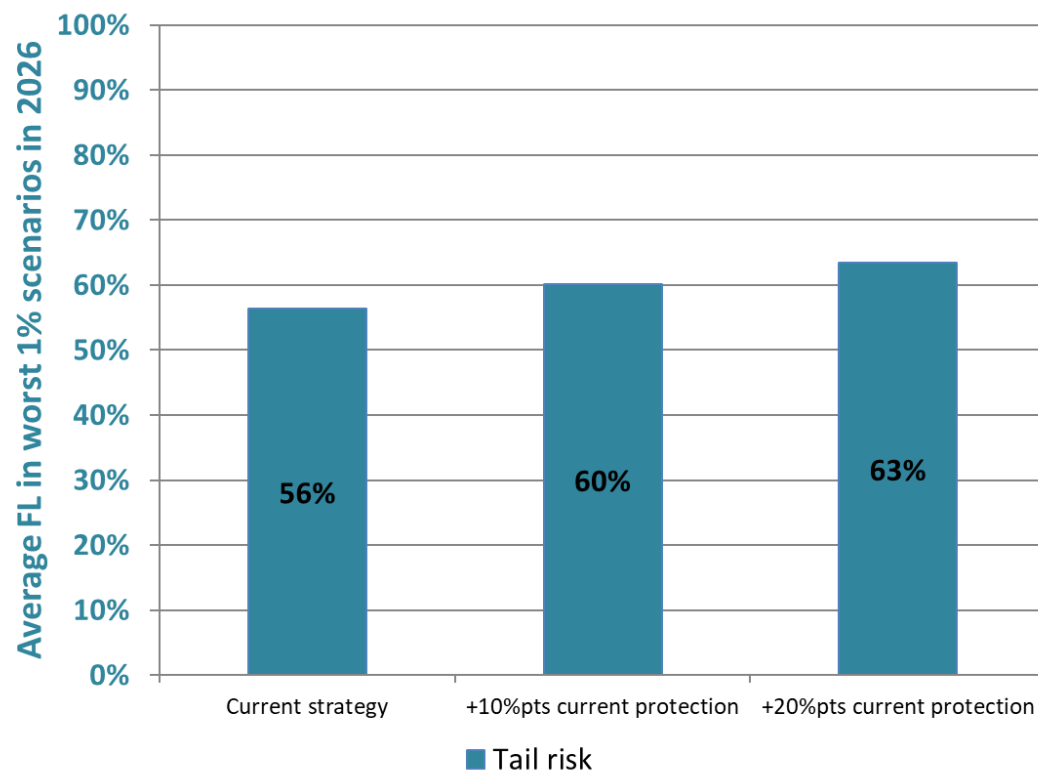


Median Funding Level in 2040	240%	228%	215%

- The probability of success (defined as being greater than fully funded in 2040) at the last ALM in March 2022 was 83%.
- Since then, the probability of success has increased to 94% largely due to subsequent changes in interest rate expectations and the future asset return outlook.
- Increasing protection assets increases the probability of success, while reducing the downside risk (defined as the average funding level in the worst 5% scenarios in 3 years).
- However, the improvements are marginal even in the case of a 20% reallocation of capital which would be a very significant change in strategy for the Fund. We believe this is because:
 - The market value of protection assets can be volatile in certain market circumstances.
 - The benefits they offer in terms of matching the fluctuations in the value of the liabilities are offset by lower expected returns for the whole fund.
 - Diversification is already protecting the Fund across many scenarios.
- Increasing protection assets reduces upside potential (measured by the median funding level in 2040) but even in the case of a 20% reallocation of capital, the projected funding level remains well in excess of that required.
- The above analysis assumes a constant valuation basis (i.e. the discount rate used to value the Fund's liabilities). Increasing the allocation to protection asset is likely to reduce the discount rate (see appendix), reducing current and projected funding levels.
- We estimate that a 20% increase in protection assets would reduce the current funding level (as at 31 Dec 2023, and as provided by the actuaries) by 9%pts, offsetting the above impact on long-term funding outcomes.

Assessing an increase in protection assets

Tail risk – worst 1% of outcomes



- Ideally the Fund’s protection assets would help to protect the funding position both from the impact of “normal” market fluctuations and extreme market events (such as the Global Financial Crisis).
- Tail risk, defined as the average funding level under the worst 1% of outcomes over 3 years, provides an indication of downside risk in more extreme circumstances.
- The tail risk for the current strategy (56%) is materially worse than the downside risk from normal market fluctuations (77%) highlighting the possibility, albeit a remote one, that a material deficit might open up again in the future.
- In extreme circumstances, the modelling suggests an increased allocation to protection assets would have a greater (positive) impact on downside risk reducing it by 7%pts although the projected deficit would still be material.
- Secondary contributions would be required to close any such deficit, highlighting the importance of maintaining a reasonable level of contributions and investment risk/return, thereby building up a healthy surplus as a buffer against tail risk.

Are there specific circumstances in which more protection assets are helpful?

- The analysis on the previous slides considered outcomes across all scenarios in our modelling. Are there specific circumstances in which more protection assets would be helpful?
- We have assessed this by considering the sensitivity of funding outcomes separately to each of a range of key market factors – inflation, interest rates/yields, equity market returns and asset values generally.
- We do so by recalculating the probability of success in the **worst 10% of scenarios** for each factor, e.g. those scenarios which experience the highest realised inflation over the long-term. We choose the worst 10% of scenarios here as we consider this to be a reasonable balance between looking into the tail of results, whilst also providing a large enough sample size of scenarios for a statistically relevant result for probability of success. The results are tabulated below, observations follow on the next slide:

Market factor	Long-term average value (absolute values)	Probability of success (under “worst” 10% of scenarios for each factor)		
		Current Strategy	+10%pts current protection	+20%pts current protection
Overseas equity returns	Below 1.5%	62%	67%	70%
17 year real yields	Below -0.7%	80%	82%	82%
Actual inflation (RPI)	Above 4.7%	92%	92%	93%
Scheme assets	Below c£13.9bn in 2040 (varies per strategy)	59%	66%	71%
All scenarios *		94%	95%	95%

* Final row shows the probabilities of success for each strategy across all scenarios (i.e. not just the worst 10%) for reference

Are there specific circumstances in which more protection assets are helpful?

Observations on the sensitivity analysis results

- Unsurprisingly (given the material allocation to this class), a period of sustained underperformance in equity markets would have a significant impact on the probability of success, reducing it to 62% for the current strategy, below the Fund's prudence threshold of 75%.
- A 10% increase in protection assets improves the probability of success; an increase to +20% modestly improves outcomes further.
- Persistently lower (real) gilt yields also reduce the probability of success, because of their impact on the value of the Fund's liabilities, but not by as much as equity under-performance.
- Surprisingly, outcomes are not materially improved by increasing protection assets. This is in part due to the assumption in most (although not all) scenarios modelled that a sustained period of low real yields would be supportive for the values of the risk assets that dominate the Fund's current portfolio. Reducing the proportion of risk assets along with the associated returns, offset the liability matching benefit that a higher proportion of protection assets brings. Some of the scenarios selected here are likely also to include longer periods of equity underperformance e.g. Japanese style deflation, which will contribute to weaker funding metrics.
- Again surprisingly, higher realised inflation has limited impact on the probability of success. This is because the returns on equities and certain other risk assets such as property and infrastructure are strongly correlated with inflation, at least over the long-term. High inflation can have an impact over the short-term, as it did in 2022 when benefits inflated more quickly than assumed and equities under-performed, but the impact on long-term funding outcomes is minimal.
- As with equity returns, scenarios with the lowest 10% of scheme asset values have a substantial adverse impact on the probability of success. Adding extra protection assets mitigates some of the impact but this is subject to diminishing returns. The improvement from adding +10% protection assets is greater than the marginal improvement from adding +20%.
- In general, we do not recommend tailoring investment strategies to specific scenarios, largely because it is extremely challenging to forecast economic/market conditions over the long-term. But if the Fund had a strong conviction that one of these sets of outcomes (notably a sustained underperformance in equity markets) was more likely than not to occur, then a modest (+10%) increase in protection assets could be justified.
- **We do not currently hold this belief and therefore do not recommend increasing the allocation to protection assets at the present time, purely based on the ALM analysis.**

Assessing an increase in protection assets

- The results of our ALM analysis do not provide a compelling case for increasing protection assets at the present time:
 - ✓ An increased allocation might improve probability of success and downside risk, but only marginally so, and the benefits would be reduced/reversed if the increase led to a reduction in valuation basis.
 - ✓ More protection assets would help in tail risk scenarios, but they would not eliminate the risk of material deficits re-opening.
 - ✓ Maintaining a reasonable level of contributions and investment risk/return in order to maintain a healthy funding surplus is we believe a better approach to mitigating tail risk.
 - ✓ An increased allocation to protection assets would also be more helpful in the event of sustained equity underperformance, but we do not recommend tailoring investment strategies to specific scenarios, unless there is a strong conviction that they will happen over the longer term.
- Equally the results do not rule out increasing protection assets if there was another (qualitative) reason for doing so. We identify potential reasons in the table overleaf and consider their applicability to the Fund.

Assessing an increase in protection assets

Reason	Rationale	Applicability to LCCPF
Modelling risk	<ul style="list-style-type: none"> • Like all models, our ALM has limitations, notably a reliance on assumptions. • Key assumptions are the long-run expected returns, volatilities and correlations between different asset classes and the choice of valuation basis. • These assumptions are subject to uncertainty, and the degree of uncertainty is higher for riskier assets such as equities. • This may lead the optimal allocation to growth and certain income assets to be over/under-stated. 	<p>Low</p> <ul style="list-style-type: none"> • The ALM is carefully calibrated against decades of economic/market experience. • Whilst the future is uncertain, it is likely that the impact of future market/economic developments will have been experienced in the past and captured in the range of scenarios considered.
Risk appetite	<ul style="list-style-type: none"> • Although the market value of protection assets is subject to material volatility, they are inherently lower risk and they do tend to match the fluctuations in the value of the Fund's liabilities. • If the Fund's risk appetite fell and/or it had a strong conviction that one of the tail risks was likely to occur, then a modest increase in protection assets could be justified. 	<p>Low</p> <ul style="list-style-type: none"> • We are not aware the Fund's risk appetite has changed, nor do we have strong conviction that tail risks such as sustained period of equity underperformance or a reversion to ultra low interest rates are likely.

Assessing an increase in protection assets

Reason	Rationale	Applicability to LCCPF
Tactical opportunities	<ul style="list-style-type: none"> Government bond yields have fallen back from their 2022 highs, but lower interest rates (expected from later this year), may put further downward pressure on yields All other things equal, lower yields would mean positive returns from many classes of protection asset An increased allocation to protection assets would enable the Fund to take advantage of their cheapness relative to recent historical values. 	<p>Low</p> <ul style="list-style-type: none"> The Fund has historically not sought to take advantage from short-term, tactical investment opportunities directly preferring to leave them to its investment managers to exploit.
Net Zero	<ul style="list-style-type: none"> The range of scenarios considered by ALM include those that might be expected from climate change and society's different responses to it. Calibrating such scenarios is inherently challenging because there are few, if any true precedents in modern economies/financial markets. It is possible to envisage scenarios in which the impacts are more severe than the most likely range of outcomes in our modelling (e.g. failure in key financial markets, civil unrest, dramatic reduction in economic activity). Protection assets are expected to be somewhat more resilient to the most severe climate change outcomes, so an increased allocation could be justified if such outcomes were considered more likely than not. 	<p>Medium</p> <ul style="list-style-type: none"> The ALM results indicate a level of downside risk which we consider acceptable. Our current expectations are that the most severe climate change outcomes will be avoided by appropriate policy action. We believe the action the Fund can take, and is already taking, to mitigate climate risk through the implementation of its investment strategy should be sufficient. But if the ISC considered the more severe outcomes more likely than not, then an increased allocation to protection assets could be justified. Net Zero implications are considered in more detail later in this pack.

What level of protection
assets best supports the aim
of maintaining stable, lower
contribution rates over time?

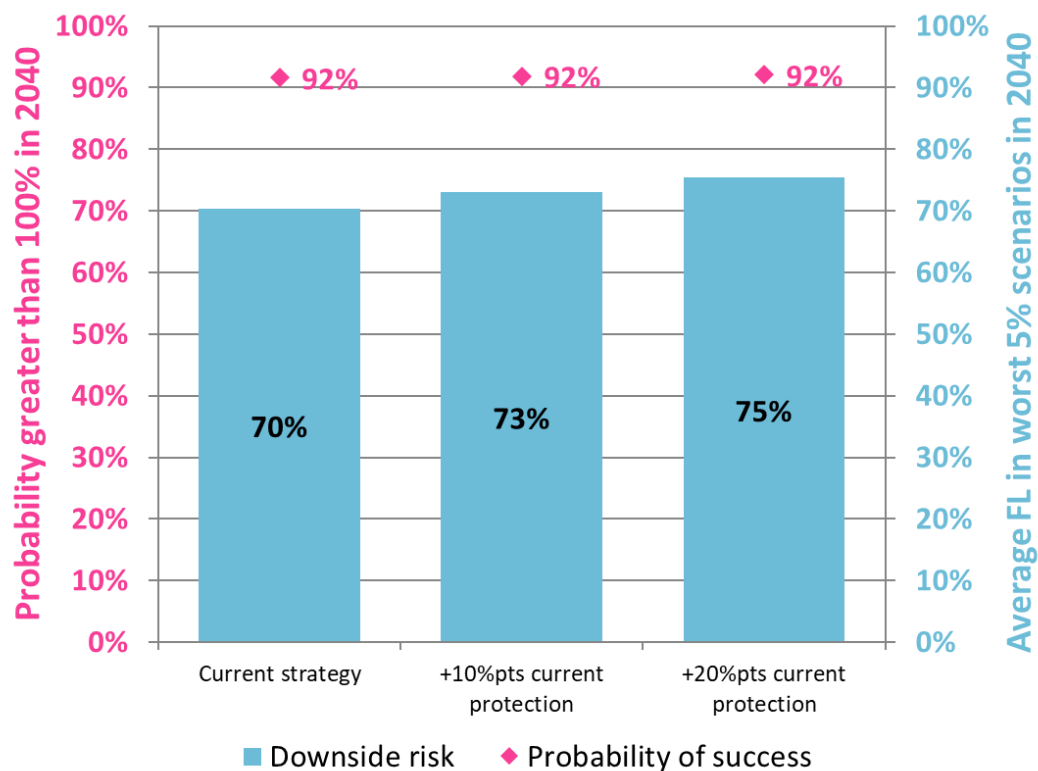
Maintaining stable and lower contribution rates

Background

- The Fund is expected to be on a downward trajectory in relation to contribution rates from the 2025 valuation.
- We have considered whether changes in investment strategy would be expected to have any consequences, positive or negative, in relation to contributions e.g. would any increase in protection assets prevent contributions moving onto this downward trajectory or reduce the risk of a material deficit arising which would necessitate an increase in contribution rates.
- Overleaf we model the same investment strategies, but under a “fixed 21%” contribution rate (in a modelling simplification, we actually model 27% contributions until 2027 followed by a stepdown to 21% contributions, as a proxy for continued 1% of pay reductions in contributions each year for the next 6 years).
- We also show the downside risk over a 17 year period here, as opposed to a 3 year period used previously, to draw out the differences in contribution rates (which otherwise wouldn’t be seen due to the simplification above).
- Note we haven’t attempted to include the impact of changing investment strategy on the funding basis here. As mentioned earlier, an increase in the allocation to protection assets would lead to a lower discount rate and, all other things equal, lower funding levels, thus reducing or even reversing the impact of the reallocation.

Maintaining stable and lower contribution rates

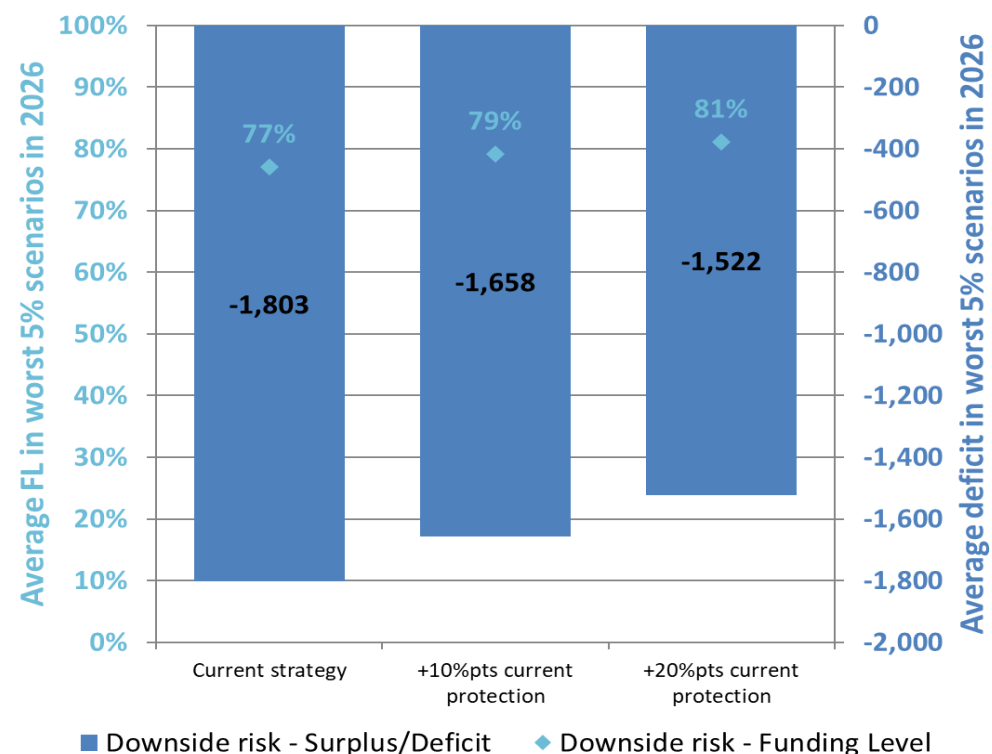
Probability of success and downside risk over 17 years (fixed 21% contributions)



- Reducing contribution rates reduces probability of success, but only modestly (92% for the current strategy with contributions fixed at 21% vs 94% shown earlier for the current total contribution rate of 27%).
- This is because funding outcomes, even over a 17 year period, are driven not just by future service accruals but also the out-turn on existing liabilities and expected investment returns.
- Increasing protection assets does not materially affect the probability of success which remains well above the threshold level of 75%.
- We conclude that increasing protection assets (in isolation) would not impede the ability to reduce contribution rates gradually over the next few years.
- At the same time, increasing protection assets does not materially reduce the size of the deficit which could open up in a downside scenario (-25% with +20% protection assets vs -30% for the current strategy).
- A material and sustained deficit may require the introduction of secondary contributions (which is considered further on the next slide).

Maintaining stable and lower contribution rates

Downside risk over 3 years (fixed 27% contributions)



Deficit vs Current	-	-£137m	-£262m
Deficit / 14 years (difference)	£129m	£118m (-£11m)	£109m (-£20m)

- Here we take a closer look at downside risk over a 3-year period; this being the typical gap between valuations and hence re-assessments of contributions requirements.
- With the current strategy, we estimate there is a 5% chance of a deficit of £1,800m (equivalent to 23% liabilities) opening up over one valuation period.
- It is difficult to assess the impact of such a deficit on contribution rates because of the stabilisation mechanism the Fund has adopted. But a material and sustained deficit would, in general, require greater secondary contributions.
- Purely for illustrative purposes and not to be taken as funding advice, we note that this deficit is equivalent to c£140m for each year of a 14-year deficit recovery period.
- Adding protection assets reduces downside risk but only modestly so:
 - a 10% increase in protection assets could see the deficit reduced by c2% of liabilities or £137m.
 - a 20% increase in protection assets could see the deficit reduced by c4% of liabilities or £262m.
- **We therefore conclude that increasing protection assets would not materially improve the stability of future contribution rates at the present time.**
- We further note that the higher returns that could be expected over the long-term by maintaining the allocation to growth and income assets should increase the funding surplus, which should help to protect against downside risk and improve contribution rate stability.

Is there a case for
introducing alternative
protection assets?

Assessing the benefits of alternative protection assets

- Whilst the current Protection Assets (ILB and IGC) do reduce funding level volatility, the mark to market value of these assets can fluctuate materially. This has been brought into light over the last 2 years where rising interest rates have led to material falls in the value of both ILB and IGC assets. Looking at the asset values in isolation, these assets would therefore appear to have performed poorly recently.
- Given the increased focus on protection assets, and the potential to increase the allocation to them, it is appropriate to consider whether other types of protection asset could be introduced to improve the resilience of the portfolio particularly with respect to tail risks.
- The ideal protection asset would reduce volatility (i.e. the normal fluctuations in asset values or funding level from year to year) and tail risk (i.e. the fall in asset values or funding level in extreme downside scenarios), whilst protecting against a range of specific risk factors (e.g. high inflation or credit default). Unfortunately, no such asset exists; most protection assets offer good protection against some of these risks, with at best limited or indirect protection against the rest. Finding the right protection asset therefore depends on your priorities i.e. what are you looking to protect against the most.
- In the 2024 SAA review, we recommended carrying out a further investigation into the case for certain alternative protection assets. These included:
 - Gold – due to its expected inflation linkage over the long-term and historic protection in adverse market conditions.
 - Real Asset Backed Senior Debt – due to the downside protection afforded by security over tangible asset as well as its return premium and diversification benefit.
 - Investment Grade ABS – for similar reasons.
- These are considered further in the next slide.

Assessing the benefits of alternative protection assets

	Real asset backed senior debt	Asset-Backed Securities	Gold
Description	Investment grade loans to asset financing vehicles or operating companies that own underlying real estate / infrastructure related assets. Loans may be floating rate, fixed rate or inflation-linked.	Investment grade securities (usually bonds) backed by a pool of underlying, cashflow generating debt. Underlying debt often takes the form of residential mortgages or consumer loans, but a wide variety of other assets can be financed. Securities typically pay a floating rate coupon.	Physical gold, held directly or via a fund, or derivatives linked to the price of gold.
What protection is provided?	<p>Lower mark to market volatility (relative to current protection assets).</p> <p>May reduce funding level volatility (if fixed rate).</p> <p>May protect against rising inflation (if floating rate, as higher inflation typically leads to higher interest rates).</p> <p>Low risk of default.</p> <p>May diversify equity risk.</p>	<p>Lower mark to market volatility (relative to current protection assets).</p> <p>May protect against rising inflation (as typically floating rate).</p> <p>May diversify equity risk.</p>	<p>Protects asset value against tail risks (e.g. failure of capital markets).</p> <p>Partly protects against funding level volatility as price typically negatively correlated with real yields.</p> <p>Moderate protection against inflation over the long-term.</p> <p>May diversify equity risk.</p> <p>Protects against liquidity risk.</p>
How does the solution provide protection?	Typically senior debt and secured against the underlying assets, leading to higher expected capital recovery in the event of default.	<p>Securities are backed by a diversified pool of collateral, and are typically over-collateralised. Securities are typically tranching, with the senior (investment grade) tranches being protected by the subordinated tranches which absorb losses first.</p> <p>Lower liquidity means that prices can fall rapidly at times of market stress, so the asset class offers little protection against tail risks.</p>	Generally considered to be a “store of value” due to limited physical supply, underpinned by a range of industrial applications. Traditionally viewed as “safe haven” asset at times of economic/market crisis. Diversification benefits through lower correlation with other classes, but these may fail when gold and equity markets are correlated.

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Assessing the benefits of alternative protection assets

	Real asset backed senior debt	Asset-backed securities	Gold
What additional risks does the solution introduce?	Credit risk Liquidity risk	Credit risk Complexity risk Liquidity risk (especially at times of market stress).	High price volatility. Basis risk vs liabilities Typically an opportunity cost when interest rates rise due to no yield, though this hasn't held true over the last couple of years. Counterparty / political risk, albeit reduced if UK-based physical holding.
What are the governance / Implementation implications?	Existing asset class – the Fund has exposure to higher yield real asset backed debt through the LGPSC Private Debt fund (Real Asset sleeve). Implementation through new vintage of LGPSC Private Debt fund (Stable Return sleeve).	New and relatively complex asset class, at least in terms of a direct investment – material governance implications. We explored with LGPS Central whether they could increase ABS exposure within the existing IGC mandate. However, it would require Central to deviate materially from their benchmark index, which they are unwilling to do. LGPS Central do not offer a standalone solution, but are open to exploring one. Alternatively this could easily be implemented outside of the pool.	New asset class for the Fund, at least in terms of a direct investment) – material governance implications. If derivatives based, this could potentially be implemented through LGPS Central via their derivatives team. However, there would likely need to be a significant investment / sufficient demand from other partner funds. Third-party solutions, based on physical gold or derivatives, exist.

- The historic performance of each asset class is explored on the next slide.
- All three asset classes offer downside protection and are therefore potentially of interest.
- The most straightforward from a governance and implementation perspective is real asset-backed senior debt.
- Significant allocations to ABS and gold would be needed to have a material impact on funding outcomes and to justify the additional governance burden.

Historic performance/volatility

	ILB	IGC	Gold	ABS	Leveraged loans *	Equities (reference)
Return p.a.	2.8%	3.4%	7.6%	4.3%	8.8%	10.4%
Volatility p.a.	12.3%	6.9%	17.8%	6.7%	8.9%	15.0%
Correlation with equities	0.22	0.38	-0.09	0.18	0.46	-
Correlation with IL Gilts	-	0.79	0.16	0.75	0.06	0.22
Max drawdown	-46%	-30%	-42%	-27%	-15%	-32%
Index used	<i>FTSE British Gov't Fixed Over 15 Years £</i>	<i>iBoxx £ Corporates AA</i>	<i>S&P GSCI Gold \$</i>	<i>iBoxx £ ABS</i>	<i>Credit Suisse Leveraged Loan US \$</i>	<i>FTSE World Equity £</i>

Notes

* There is no clear proxy for real asset backed senior debt. We've used the US leveraged loan index which is generally higher yielding because it covers less creditworthy borrowers (typically B-rated) and typically does not have the same level of security.

- Statistics are total returns over period April 2004 to February 2024.
- The max drawdown statistic is peak to trough market value. It is worth noting that an investor would not actually be losing money unless they had to sell at the low point; long term investors such as the Fund are therefore unlikely to be as concerned by such falls.

Source: Bloomberg (leveraged loan), Datastream (rest)

Historic performance/volatility

ILB

- Seen lowest returns, relatively high volatility and highest max drawdown
- Reflective of the fact they have the highest interest rate sensitivity, given the backdrop of strongly rising rates environment seen over the last 2 years.

IGC

- Seen higher returns than ILB.
- Lower volatility than ILB due to lower interest rate sensitivity.
- Higher correlation with equities is expected given the link to individual company performance and prospects.

Gold

- Seen strong returns.
- Very high volatility and max drawdown.
- Lowest correlation with equities (slightly negative) – strengthens the argument that it could offer good protection against material equity market shocks.
- Low correlation with current protection assets (represented by ILB).
- Therefore, it could offer diversification to the existing protection assets.

ABS

- Similar returns and volatility to IGC.
- Slightly higher returns than IGC and lower correlation with equities.
- They are traded less frequently so the volatility may be understated in comparison to other asset classes.

Which alternative protection assets to consider further?

Gold

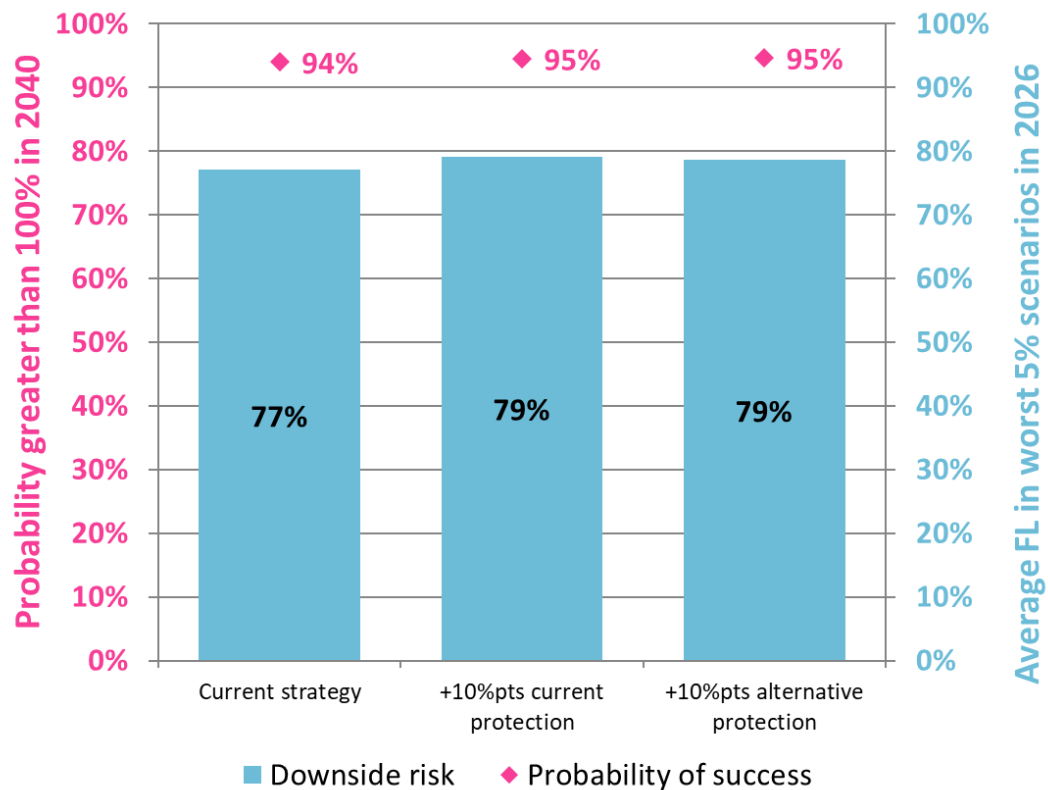
- Gold potentially has some of the qualities we would be looking for in an alternative protection asset. This is backed up by the detailed analysis presented in our SAA review, and also the more general analysis on the previous pages.
- However, this would be a new asset class for the Fund. As with all new managers / funds, this would bring additional governance issues:
 - There is no current solution available via the pool (albeit LGPS Central has expressed a willingness to explore a derivatives-based solution via their internal team).
 - Ongoing governance burden may also be seen due to the highly volatile nature of the asset class and the need to explain movements.
- It is hard to see gold having sufficient impact to justify the additional governance burden unless there was a significant increase in protection assets above the current level. We make the assumption here that the Fund would not be keen on a highly leveraged solution.
- **We therefore recommend that further consideration of gold be deferred until the next SAA review (in early 2025), by which time a decision will have been taken on whether to increase the allocation to protection assets.**

Real Asset Debt/ABS

- The case for adding real asset-backed senior debt or ABS is not as clear cut, but governance and implementation would be more straightforward (particularly in the former case).
- We therefore used the ALM to assess whether floating rate, investment grade debt such as these two asset classes would improve funding outcomes. We did so by increasing the allocation to protection assets, firstly using the existing asset classes and secondly using a combination of these two alternatives.

ALM results

Probability of success, downside risk and tail risk

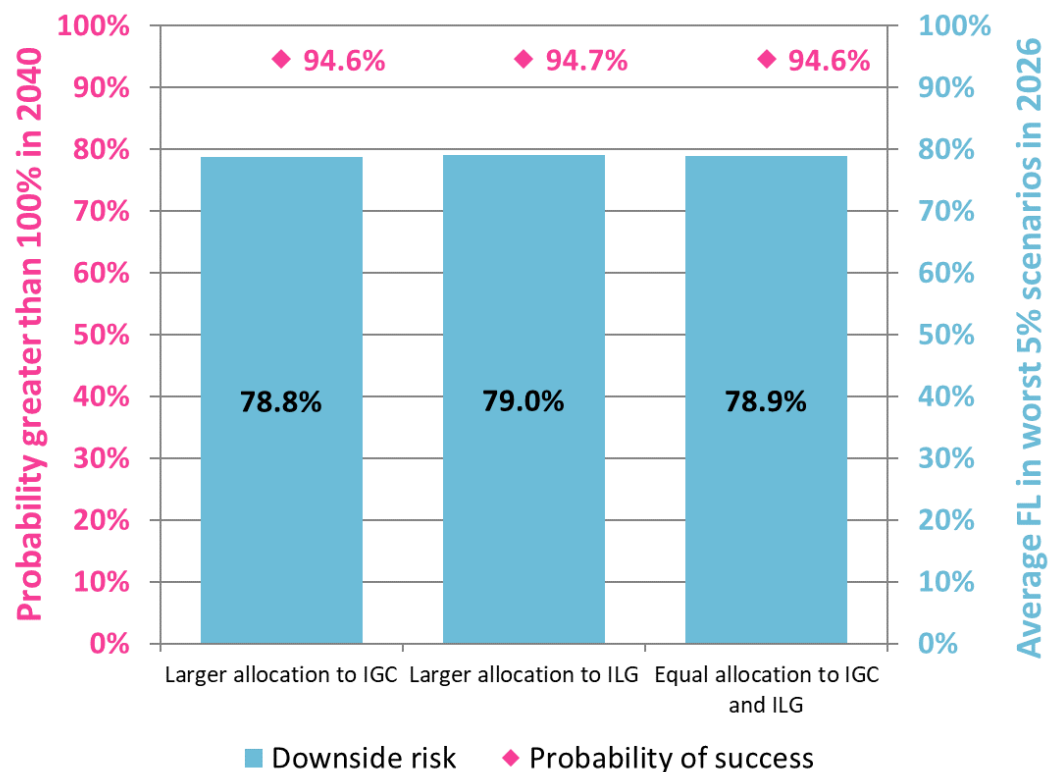


- The model indicates that using alternative protection assets leads to similar outcomes to using the current protection assets, both in terms of probability of success and downside risk.
- Given the additional complexity and/or governance burden, **we don't see a strong case for adding either Real Asset Backed Senior Debt or ABS into the protection assets portfolio at this stage.**

What is the optimal combination of new/existing protection assets?

Optimal combination of the protection assets

Probability of success and downside risk over 3 years



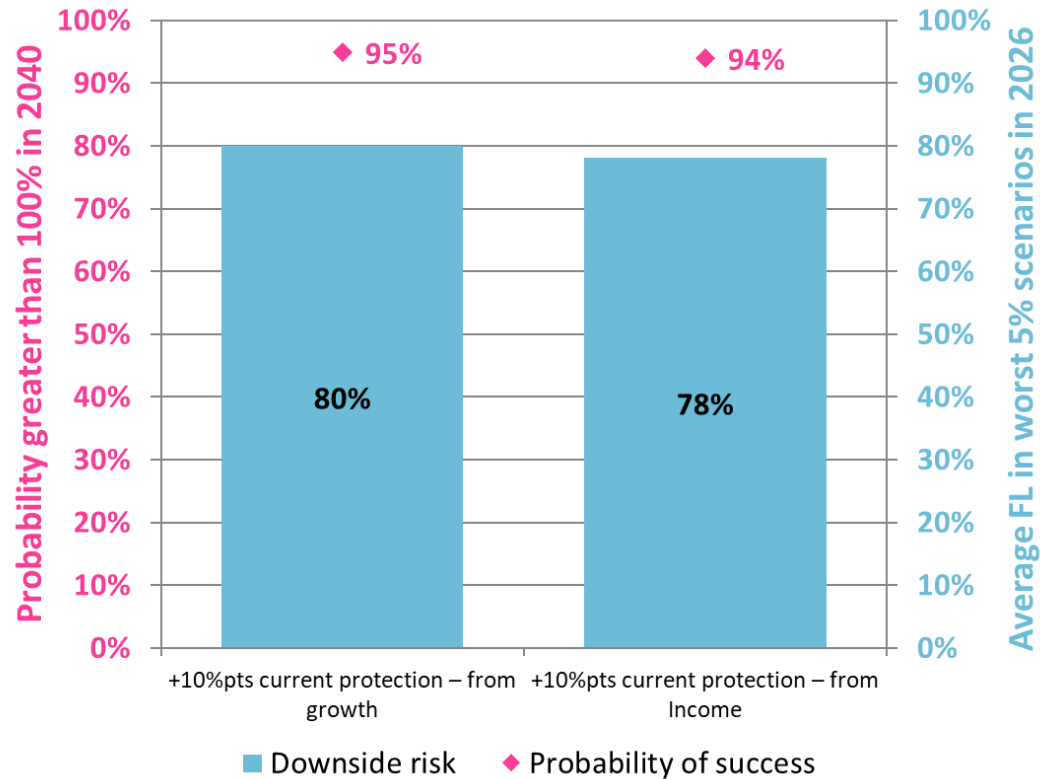
- At the protection asset review in July 2023, we recommended a balanced exposure to ILB (3.5%) and IGC (3.75%), as at 31 December 2023 the allocations were 3.9% and 3.6% respectively. (Note: the Fund's ILB portfolio includes some exposure to corporate exposure which is why the headline allocations are not identical).
- The modelling output opposite compares strategies with different allocations to each of these assets. As can be seen, allocating to either ILB or IGC (or a combination) does not lead to a material difference in modelling outcomes.
- In the absence of other (qualitative) arguments for preferring one asset class over the other, **we remain comfortable with a balanced allocation.**
- We have been keeping the implementation of the July 2023 recommendation under review i.e. waiting for the right market conditions to proceed with the reallocation.
- Our current tactical views on the short-term outlook for these asset classes remain broadly unchanged, i.e. we retain a slight preference for ILB over IGC.
- **We therefore recommend continuing to wait before proceeding with rebalancing the protection portfolio to its target weights.** As part of this we will inform Officers when our tactical views on the asset classes have changed materially enough to proceed, and the Officers will enact the change at that point.

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How should any increase in
protection assets be funded?

Funding an increase in protection assets

Probability of success and downside risk over 3 years



- If an increase was proposed, consideration will need to be given to the source of funding the increase.
- Here we compare the impact of funding a 10% increase in protection assets either entirely from growth assets, or entirely from income assets (earlier modelling assumed it was taken from both proportionally).
- The ALM results show that funding the contribution to protection assets from the growth portfolio both has a higher probability of success and a lower downside risk than funding from income assets. This is likely due to the additional diversification benefits and protection-like characteristics (e.g. inflation-linkage) offered by the income assets, as well as the fact that the expected returns for some of the income assets are not too far below that of listed equities.
- However, these benefits are marginal and there are other practical considerations that need to be addressed.
- There are currently underweight positions in income assets, so reducing the allocation to income assets would be more straightforward (although overweight positions in growth assets may still need to be reduced to actually fund more protection assets).
- The ALM does not directly model liquidity risk and income assets are typically less liquid, so the results may be overstating the benefits of retaining income assets.
- We therefore conclude that taking proportionally would make sense, as this combines modelling output with non-modelling considerations.

How would an increase in protection assets impact on the Fund's aims of achieving NZ?

Climate risk considerations

Introduction

- In this section, we consider the implications of any increase in protection assets on the Fund's management of both climate risks (notably transition and physical risks) and climate opportunities (i.e. the investment opportunities generated by the decarbonisation process).
- The table overleaf provides an assessment of the impact of climate change on gilts and investment grade corporate bonds as well as on equities and real assets, the asset classes from which any increase in protection assets would be funded. The impact is assessed qualitatively using a "RAG" rating system; quantifying the impact is challenging given the lack of available data across all asset classes and is outside the scope of this report.
- The assessment considers the impact on each asset class as a whole, and over the long-term. It is possible, and indeed the Fund already does, mitigate climate risk and increase its exposure to climate opportunities via its choice of manager/strategy. For example, transition risk in a climate-tilted passive global equity fund is assessed to be far lower than for equities generally.

Climate risk considerations

Exposure to:	Transition risk	Physical risk	Climate opportunities
<p>Gilts (Protection)</p>	<p>Low: financing the transition may require more borrowing from the UK government, but we would expect some of this to be priced into markets already.</p>	<p>Low: there would be no direct impact, although serious damage to e.g. infrastructure may lead to additional borrowing being required, possibly pushing down gilt prices to some extent.</p>	<p>Low: green gilts available, although limited ability to influence government through gilts purchase. Opportunity to engage on climate risks/opportunities through ASCOR project.</p>
<p>Investment Grade Credit (Protection)</p>	<p>Medium: companies who do not prepare adequately for the transition may suffer more than others, albeit the risks are less than with owning the equity due to position in the capital structure, fixed (often short to medium term) lending terms and re-pricing in of risks upon reinvestment (companies not aligned or aligning to the transition risk facing increased cost of capital/borrowing costs).</p>	<p>Medium: possible direct impact in terms of disruption to business operations (e.g. through supply chains); companies in certain sectors or geographies may be more exposed. Bonds of a company expected to suffer less than equity.</p>	<p>Medium: green bonds (use of proceeds to fund projects that have positive environmental and/or climate benefits) and Sustainability Linked Bonds (linked to climate KPIs) offer some ability for investors to gain exposure to decarbonisation opportunities and/or influence companies. Opportunity to influence/engage for positive environmental outcomes at point of reissuance.</p>
<p>Infrastructure / Property (Income)</p>	<p>Medium: property which does not meet evolving standards may find itself obsolete, although we would expect most managers are preparing for this. Some assets in this class may see improvements in value e.g. renewable energy infrastructure.</p>	<p>Medium: possibility of direct damage to assets depending on geographical location, though may be mitigated through insurance / avoiding assets in areas exposed to the worst physical impacts.</p>	<p>High: ability to participate in the low carbon transition e.g. through building renewable infrastructure, retrofitting existing properties to highest standards etc.</p>
<p>Global Equities (Growth)</p>	<p>High: companies who do not prepare adequately for the transition may suffer greater falls than others, though some may already be reflected in the current share price.</p>	<p>High: possible direct impact in terms of disruption to business operations (e.g. through supply chains); companies in certain sectors or geographies may be more exposed. Equity of a company expected to suffer more than bonds.</p>	<p>High: high scope for investment in climate opportunities. Ability to engage where investing for impact or in private markets.</p>

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Climate risk considerations

Implications for the Fund

- In general, gilts and investment grade corporate bonds are assessed to have lower exposure to climate risks than equities and most (but not all) real assets. As senior debt obligations, bonds are less exposed than equities to the adverse impacts of climate change on the underlying businesses/wider economy.
- Gilts are considered to have lower exposure than corporate bonds generally because:
 - Climate risks are diversified across the whole economy.
 - The UK government has control over its own climate change policies and regulations, and a bit more influence over those of other countries.
 - The UK is further advanced on climate change mitigation/adaptation than others, at least in terms of targets.
- At the same time, gilts offer less direct exposure to climate opportunities although there is an embryonic market in green gilts (proceeds earmarked to address climate change).
- In addition, bondholders have less scope to accelerate the decarbonisation process through effective engagement.
- The Fund's Net Zero strategy aims to strike a balance between reducing climate risk and maintaining exposure to climate opportunities, and is committed to remaining invested and engaging with companies particularly exposed to climate change.
- Given the Fund's current NZ strategy and risk appetite, we do not believe that a material increase in protection assets could be justified solely on the basis of climate change.
- Rather we believe that the asset allocation should be optimised to deliver the best funding outcomes taking climate change into account along with other risk factors.
- The ALM results presented earlier indicate a level of downside risk, taking into consideration climate change and other risk factors, which we consider acceptable.
- Our current expectation is that the most severe climate change outcomes will be avoided by appropriate policy action.
- Climate risk will continue to be reviewed as part of the annual SAA review process, and it is recognised that increased climate risk may give reason to re-consider factors such as asset allocation decisions in the future.

Appendix: Modelling assumptions, reliances and limitations

Impact on future returns

- The table below shows the impact of increasing protection assets on future returns at different levels of confidence. The Fund currently sets the discount rate used to value its liabilities based on the 75%ile returns.

	Current Strategy	10% increase in protection assets	20% increase in protection assets
Future investment returns with a (%) likelihood of being achieved*			
75% likelihood	6.12%	5.93%	5.73%
80% likelihood	5.62%	5.52%	5.36%
85% likelihood	5.11%	5.05%	4.92%
90% likelihood	4.39%	4.41%	4.40%
95% likelihood	3.40%	3.50%	3.58%
99% likelihood	1.64%	1.89%	2.11%

*annualised returns over next 20 years

Asset Liability Modelling approach

The ALM combines benefit cashflows, an investment strategy including any hedging, contributions into the Fund and stochastic economic scenarios from our economic model (ESS) to create stochastic projections of the funding position.

Cashflows

In projecting forward the evolution of the Fund, we have used estimated cashflows generated using our actuarial valuation system, based on information provided as part of the 2022 actuarial valuation of the Fund including the LGPS Regulations.

Except where stated, we do not allow for any variation in actual experience away from the demographic assumptions underlying the cashflows. Variations in demographic assumptions (and experience relative to those assumptions) can result in significant changes to the funding level and contribution rates. We allow for variations in inflation (RPI or CPI as appropriate), inflation expectations (RPI or CPI as appropriate), interest rates and asset class returns. Cashflows into and out of the Fund are projected forward in annual increments, are assumed to occur in the middle of each year and do not allow for inflation lags. Investment strategies are assumed to be rebalanced annually.

There are a number of different types of increases applied before and after retirement to benefits payable from the Fund. We have made some assumptions when modelling the various types of increases. In particular, the Fund Actuary assumes a fixed CPI assumption of 2.7% p.a., whereas the ALM assumes an RPI-CPI gap of broadly 1% p.a. before 2030, and 0% p.a. post-2030. All else being equal this will result in the value of the ALM liabilities being slightly different than in the valuation.

We have estimated future service benefit cashflows and projected salary roll for new entrants after the valuation date such that payroll remains constant in real terms (i.e. full replacement). There is a distribution of new entrants introduced at ages between 25 and 65, and the average age of the new entrants is assumed to be 40 years. All new entrants are assumed to join and then leave service at SPA, which is a simplified set of assumptions compared to the modelling of the existing membership. The base mortality table used for the new entrants is an average of mortality across the LGPS and is not client specific, which is another simplification compared to the modelling of existing members. Nonetheless, we believe that these assumptions are reasonable for the purposes of the modelling given the highly significant uncertainty associated with the level of new entrants.

In modelling some of the LGPS benefits, we have assumed:

- Salary growth is assumed to have a floor of 0% and to be modelled in line with inflation plus (or minus) any additions applied.
- S148 salaries / national average earnings is assumed NOT have a floor and is projected in line with our projections of national average earnings and valued in line with inflation plus any additions applied.
- Non-accruing and accruing CARE benefits increase in line with CPI (no floor).

Asset Liability Modelling approach

ESS

The distributions of outcomes depend significantly on the Economic Scenario Service (ESS), our (proprietary) stochastic asset model. This type of model is known as an economic scenario generator and uses probability distributions to project a range of possible outcomes for the future behaviour of asset returns and economic variables. Some of the parameters of the model are dependent on the current state of financial markets and are updated each month (for example, the current level of equity market volatility) while other more subjective parameters do not change with different calibrations of the model.

Key assumptions include:

The average excess equity return over the risk free asset and its volatility which affects growth asset returns.

The level and volatility of yields, credit spreads, inflation and expected (breakeven) inflation, which affect the projected value placed on the liabilities and bond returns.

The gap between CPI and RPI. The market for CPI-linked instruments is not well developed and this is based on our judgement. Expected long-term RPI and CPI rates are in line with the current Bank of England targets. The RPI-CPI wedge, that is the average difference between projected RPI and CPI rates, is set to 1% p.a. over the short-term ultimately transitioning to zero after early 2030, when the RPI measure will switch to CPIH.

The output of the model is also affected by other more subtle effects, such as the correlations between economic and financial variables.

Real interest rates are assumed to (on average) gradually trend towards a long-term rate. This is based on a selection of yield normalisation levels (which can be interpreted as representing low, medium and high economic growth scenarios) reflecting the fundamental uncertainty around long-term average yield levels. Higher long-term yields would mean a lower value placed on liabilities and hence an improvement in the current funding position (and vice versa) unless the Fund is fully hedged. The Expected Rate of Returns and Volatilities table below details the direction of interest rate movements based on the current calibration of the ESS.

While the model allows for the possibility of scenarios that would be extreme by historical standards, including very significant downturns in equity markets, large systemic and structural dislocations are not captured by the model. Such events are unknowable in effect, magnitude and nature, meaning that the most extreme possibilities are not necessarily captured within the distributions of results.

A summary of economic simulations used is included on the next slide.

Asset Liability Modelling approach

The following figures have been calculated using 5,000 simulations of the Hymans Robertson Economic Scenario Service, calibrated using market data as at 31 December 2023. All returns are shown net of fees. Percentiles refer to percentiles of the 5,000 simulations and are the annualised total returns over 5, 10 and 20 years, except for the yields which refer to the (simulated) yields in force at that time horizon.

31 December 2023

	Annualised total returns																			Inflation (RPI)	17 year real yield (RPI)	Inflation (CPI)	17 year real yield (CPI)	17 year yield
	Cash	Index Linked Gilts (medium)	Index Linked Gilts (long)	Fixed Interest Gilts (medium)	Private Equity	Property	Credit Overlay	UK Infrastructure Debt	Emerging Market Debt (local currency)	Cash (1yr maturity)	Unlisted Infrastructure Equity	Diversified Growth Fund (low equity beta)	Multi Asset Credit (sub inv grade)	All World Equity GBP Unhedged	Asset Backed Securities (A rated) GBP	Direct Lending (private debt) GBP Hedged	Corporate Bonds (Short duration, A rated)	Corporate Bonds (Short duration, Medium liquidity)						
5 years	16th %ile	2.7%	0.4%	-0.2%	1.1%	-3.2%	-1.0%	-1.2%	0.3%	-1.6%	2.7%	0.7%	2.6%	2.3%	-0.8%	2.9%	2.8%	3.0%	3.8%	2.0%	0.3%	0.9%	0.4%	3.5%
	50th %ile	3.4%	3.3%	3.3%	3.3%	11.6%	6.1%	0.7%	4.3%	5.2%	3.4%	7.6%	4.8%	5.3%	7.5%	4.3%	7.1%	4.3%	5.3%	3.5%	1.2%	2.5%	1.3%	4.6%
	84th %ile	4.2%	6.5%	7.0%	5.4%	26.5%	13.7%	1.9%	7.8%	12.5%	4.1%	15.1%	7.1%	7.9%	15.7%	5.5%	11.2%	5.3%	6.4%	5.1%	2.1%	4.0%	2.2%	5.9%
10 years	16th %ile	2.6%	1.2%	1.0%	2.7%	0.6%	1.1%	-0.5%	2.5%	0.5%	2.6%	2.5%	3.2%	3.9%	1.5%	3.1%	4.7%	3.5%	4.2%	1.3%	0.2%	0.7%	0.2%	3.0%
	50th %ile	3.6%	3.2%	3.3%	3.9%	11.4%	6.4%	0.6%	5.0%	5.5%	3.6%	7.8%	5.1%	5.8%	7.6%	4.5%	7.4%	4.6%	5.3%	3.0%	1.4%	2.4%	1.4%	4.4%
	84th %ile	4.8%	5.5%	5.8%	5.1%	22.3%	11.7%	1.5%	7.2%	10.9%	4.7%	13.2%	7.0%	7.6%	13.6%	5.9%	10.1%	5.6%	6.4%	4.7%	2.6%	4.0%	2.6%	6.2%
20 years	16th %ile	2.4%	1.5%	1.4%	3.7%	3.8%	2.8%	-0.1%	4.0%	2.3%	2.4%	4.0%	3.6%	4.7%	3.3%	3.1%	5.8%	3.7%	4.3%	0.9%	-0.4%	0.6%	-0.4%	1.5%
	50th %ile	3.8%	3.2%	3.2%	4.5%	11.5%	6.5%	0.6%	5.6%	6.1%	3.8%	8.0%	5.3%	6.4%	7.8%	4.7%	7.8%	5.0%	5.6%	2.5%	1.3%	2.18%	1.3%	3.5%
	84th %ile	5.5%	5.0%	5.0%	5.2%	19.3%	10.5%	1.3%	7.1%	10.0%	5.5%	12.1%	7.3%	7.9%	12.5%	6.6%	9.9%	6.4%	7.0%	4.1%	3.0%	3.8%	3.0%	6.0%
Volatility (Disp) (1 yr)		0%	7%	8%	6%	31%	19%	5%	9%	14%	0%	15%	5%	7%	17%	3%	11%	3%	4%	1%		1%		

31 March 2021

	Annualised total returns																	Inflation (RPI)	17 year real yield (RPI)	Inflation (CPI)	17 year real yield (CPI)	17 year yield
	Cash	Cash (Libor)	Index Linked Gilts (medium)	UK Equity	Overseas Equity	Private Equity	Property	Emerging Market Debt	Cash (1yr maturity)	Emerging Markets Equity	Infrastructure Equity	Diversified Growth Fund	Multi Asset Credit (sub inv grade)	Senior Loans (sub inv grade)	CorpMedi um A							
5 years	16th %ile	-0.3%	0.0%	-3.2%	-3.9%	-3.6%	-7.1%	-3.5%	-3.3%	-0.3%	-7.0%	-5.0%	-2.2%	0.5%	1.2%	-2.8%	2.0%	-2.4%	1.0%	-2.2%	0.8%	
	50th %ile	0.4%	0.7%	-0.3%	4.3%	4.4%	5.1%	2.5%	1.9%	0.4%	4.6%	4.1%	3.2%	3.3%	3.7%	0.1%	3.6%	-1.6%	2.6%	-1.4%	1.9%	
	84th %ile	1.2%	1.5%	2.6%	12.3%	12.4%	18.9%	8.8%	7.2%	1.1%	16.5%	14.1%	8.5%	5.2%	5.2%	2.8%	5.2%	-0.7%	4.1%	-0.4%	3.1%	
10 years	16th %ile	0.1%	0.2%	-2.5%	-0.9%	-1.0%	-3.1%	-1.3%	-1.3%	0.1%	-3.2%	-1.8%	-0.3%	1.8%	2.0%	-1.0%	1.9%	-1.8%	1.0%	-1.7%	1.0%	
	50th %ile	1.1%	1.2%	-0.5%	4.8%	5.0%	5.8%	3.2%	2.6%	1.1%	5.3%	4.9%	3.6%	3.7%	3.9%	0.6%	3.5%	-0.5%	2.6%	-0.5%	2.4%	
	84th %ile	2.3%	2.4%	1.6%	10.7%	10.9%	15.6%	8.0%	6.6%	2.2%	13.7%	12.0%	7.5%	5.3%	5.7%	2.1%	5.2%	0.7%	4.3%	0.7%	4.1%	
20 years	16th %ile	0.6%	0.7%	-2.0%	1.4%	1.3%	0.4%	0.8%	0.7%	0.7%	0.0%	0.9%	1.7%	3.0%	3.2%	0.5%	1.2%	-0.7%	0.8%	-0.7%	1.3%	
	50th %ile	2.0%	2.0%	-0.3%	5.8%	5.8%	6.8%	4.2%	3.7%	2.1%	6.0%	5.9%	4.5%	4.6%	4.9%	1.6%	2.8%	1.0%	2.3%	1.0%	3.2%	
	84th %ile	3.6%	3.6%	1.5%	10.4%	10.3%	13.6%	8.1%	6.9%	3.6%	12.5%	11.0%	7.4%	6.3%	6.8%	2.5%	4.4%	2.7%	3.9%	2.7%	5.7%	
Volatility (Disp) (1 yr)		0%	0%	7%	17%	17%	28%	14%	12%	0%	25%	21%	12%	6%	5%	8%	1%		1%			

Asset Liability Modelling approach

Investment strategy and contributions

The investment strategies and contributions modelled have been agreed as part of the scoping process and documented above.

The most important assumption for the assets is which asset class to use for each of the assets. We have therefore agreed this during the scoping stage and further details are in the 'What we have modelled' section.

Investment strategy is likely to change with significant changes in funding level, but unless stated otherwise we have not considered the impact of this in order to focus on the high-level investment strategy decision.

The returns that could be achieved by investing in any of the asset classes will depend the exact timing of any investment/disinvestment, the costs associated with buying or selling these assets and liquidity of the asset classes. The model implicitly assumes that all returns are net of fees and ignores these other factors.

Unless stated otherwise, we have assumed that all contributions are made and not varied throughout the period of projection irrespective of the funding position. In practice the contributions are likely to vary especially if the funding level changes significantly.

Asset Liability Modelling approach

Investment strategies modelled (%)

Asset Class	Current Strategy	Increase protection assets by 10%	Increase protection assets by 20%	Increase protection assets by 10% taken from the growth portfolio	Increase protection assets by 10% taken from the income portfolio	Increase alternative protection assets by 10%	Increase protection assets by 10% equally split between alternative protection assets and IGC	Increase protection assets by 10% equally split between alternative protection assets and ILB
Listed equities	37.50	33.43	29.35	30.00	37.50	33.43	33.43	33.43
Private equity	7.50	6.68	5.87	6.00	7.50	6.68	6.68	6.68
Targeted return	5.00	4.46	3.91	4.00	5.00	4.46	4.46	4.46
Infrastructure (incl. timber)	12.50	11.14	9.78	12.50	9.52	11.14	11.14	11.14
Property	10.00	8.91	7.83	10.00	7.62	8.91	8.91	8.91
Global credit – multi-asset credit	9.00	8.02	7.04	9.00	6.86	8.02	8.02	8.02
Global credit - private debt (inc M&G/CRC)	10.50	9.36	8.22	10.50	8.00	9.36	9.36	9.36
Inflation-linked bonds	3.50	8.50	13.50	8.50	8.50	3.50	3.50	8.50
Investment grade credit	3.75	8.75	13.75	8.75	8.75	3.75	8.75	3.75
Currency hedge	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Alternative protection	-	-	-	-	-	10.00	5.00	5.00
Total	100%	100%	100%	100%	100%	100%	100%	100%

Reliances and Limitations

Reliances and limitations

The actuarial profession introduced Technical Actuarial Standard (TAS) 100 with effect from 1 July 2017. As part of our internal compliance regime, Hymans Robertson has chosen to apply the principles of TAS100 in the delivery of investment advice. TAS100 applies to work where actuarial principles and/or techniques are central to the work and which involves the exercise of judgement.

In this report we have provided our estimate of expected asset class returns. The expected returns are based upon 20-year median returns derived from our proprietary economic scenario generator (ESS) asset model. As with all modelling, the results are dependent on the model itself, the calibration of the model and the various approximations and estimations used. These processes involve an element of subjectivity. This model uses probability distributions to project a range of possible outcomes for the future behaviour of asset returns and economic variables. Some of the parameters of the model are dependent on the current state of the financial markets and are updated to reflect metrics that can be measured in markets, such as yields, while other more subjective parameters do not change with different calibrations of the model.

Risk warning

Please note the value of investments, and income from them, may fall as well as rise. This includes equities, government or corporate bonds, and property, whether held directly or in a pooled or collective investment vehicle. Further, investments in developing or emerging markets may be more volatile and less marketable than in mature markets. Exchange rates may also affect the value of an investment. As a result, an investor may not get back the amount originally invested. Past performance is not necessarily a guide to future performance.

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