London Borough of Tower Hamlets Pension Fund

Review of Council Contribution Strategy

For Council & Pension Fund officers only
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Barry Dodds FFA Douglas Green FFA

January 2023
For and on behalf of Hymans Robertson LLP

Executive summary – 1 of 2 – Main results

- This paper sets out the results of contribution rate modelling for the London Borough of Tower Hamlets for contributions coming into effect from 1 April 2023 (the results will also apply to LEA schools).
- The results are very positive and suggest that the current rate of contributions is broadly the "right level". We have therefore focused on keeping rates at the current level or looking at a one off reduction in monetary amount (rather than increases)
- Freezing rates for 3 years, and freezing rates for 3 years combined with a £2m reduction in the annual monetary amount, both give acceptable results although it should be appreciated there is a reasonable chance that reductions would need to be reversed later.
- The fixed strategies are shown for comparison purposes and indicate whether increases in rates would be expected in the future.
- Reducing contributions would almost certainly attract a flag from GAD in the next Section 13 valuation, although we shouldn't let this drive our decision. In any case the results over a shorter horizon of 17 years are still acceptable and we could probably use that to mollify GAD's concerns.
- In January 2023 the contribution rates to take effect from 1 April 2023 were confirmed by Fund officers, after discussion with Council officers, to be:
- (non-schools) – 18.6% of pay plus £13,650,000 per year, i.e. same as current year, an effective rate of c.29.5% of pay
- (schools) – 24.3% in 2023/24, 25.3% in 2024/25, 26.3% in 2025/26, ie increasing towards non-schools rate as previously agreed.

Executive summary – 2 of 2 – Other issues

- We have generally used the current investment strategy. We modelled two additional strategies being considered, however neither of these alternatives would invalidate any of the conclusions on contributions.
- We have tested the impact of a large investment market shock (10% fall in assets) and this doesn't change any of our conclusions.
- We have stress tested the recommendations under three climate change scenarios which show that the recommended strategies are sufficiently resilient to climate risk.
- We will continue to monitor the impact of the Russian invasion of Ukraine and its impact on inflation and global investment markets, and if necessary carry out additional analysis to ensure the strategy remains appropriate.
- Prepayment of monetary amounts is still an option and can be discussed in more detail if this is of interest.

Addressee, purpose & audit trail

Addressee & Purpose

This paper has been requested by, and is addressed to, the London Borough of Tower Hamlets ("the Council") **in its capacity as Administering Authority** to the London Borough of Tower Hamlets Pension Fund ("the Fund").

The modelling results contained within are in respect of the London Borough of Tower Hamlets, **in respect of its participation as an employer** in the Fund.

As part of the 2019 formal valuation of the Fund, the long-term funding strategy for the Council was reviewed. The results of that review were formalised in the Funding Strategy Statement ("FSS") at that time.

The purpose of this report is to carry out a review of the previously agreed funding strategies for the Council to ensure they remain appropriate given the Fund's long term funding objectives, its view of funding and investment risk, and progress against its objectives since 2019.

As contributions and investment returns are the sole sources of funding members' benefits, a long-term funding strategy should be considered in tandem with a long-term investment strategy. Note that this paper has not been prepared for the purpose of reviewing or advising on the Fund's long-term investment strategy; however we have considered potential alternative investment strategies (as provided by Mercer) to ensure that any change would not invalidate the chosen funding strategy.

Any changes to the agreed funding strategy should be documented in the FSS and consulted on in line with Local Government Pension Scheme (LGPS) Regulations and guidance.

This paper may be shared with Council officers and the Council's Pensions Committee. However it should not be disclosed to any other third parties (e.g. advisers to the Fund or Council, other Fund employers) without our prior written permission and then only in full. We accept no liability to third parties and/or for any other purpose than above, unless expressly accepted in writing.

Version Control

Version	Date	Comment
1	16 May 2022	Version to discuss with Fund officers on 16 May 2022
2	25 May 2022	Version following formal peer review by Barry Dodds
3	4 January 2023	Confirms contribution rates agreed between Fund & Council; This version is also for sharing with Pensions Committee

Audit Trail

Date	Decision(s) made	Decision makers
16 May 2022	Results noted	Fund actuary, Fund officers
4 January 2023	Confirmed contribution rates to apply for both schools & non-schools	Fund officers, Council officers

Methodology and inputs

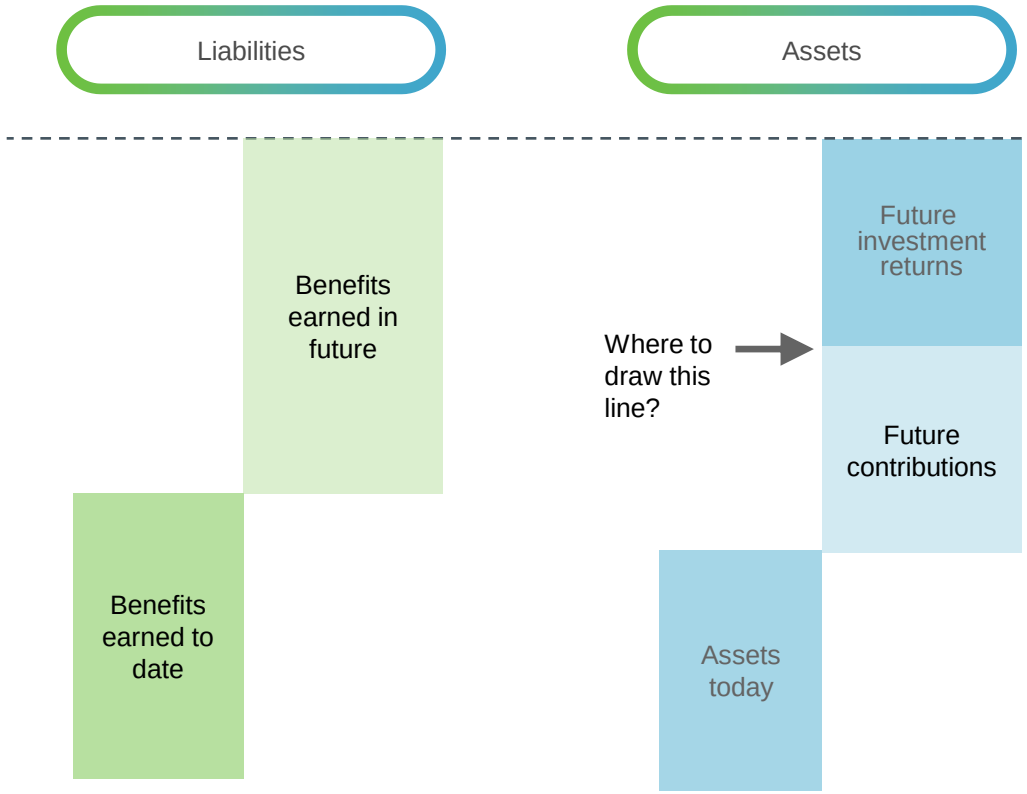
Setting funding strategy

The funding of members' benefits is achieved by a combination of contributions and investment returns.

It is therefore critical to consider how much a particular funding strategy (i.e. contribution rates) relies on future investment returns.

This modelling considers four strategies for future contribution rates, and 5,000 scenarios for future investment returns as these are unknown and volatile. It is important to understand how much reliance is being placed on investment returns, and therefore how much risk is involved in the funding strategy, as this may impact on future contribution requirements.

This modelling looks at total contributions required (i.e. primary plus secondary) to meet the funding objective.



Methodology: 5,000 scenarios gives a distribution of outcomes

This modelling is a form of asset-liability modelling ("ALM").

Assets are projected forward from March 2021 using membership data at that date under 5,000 different outcomes for future market and economic conditions. For each outcome (5,000 per scenario), we calculate the funding position annually throughout the projection period.

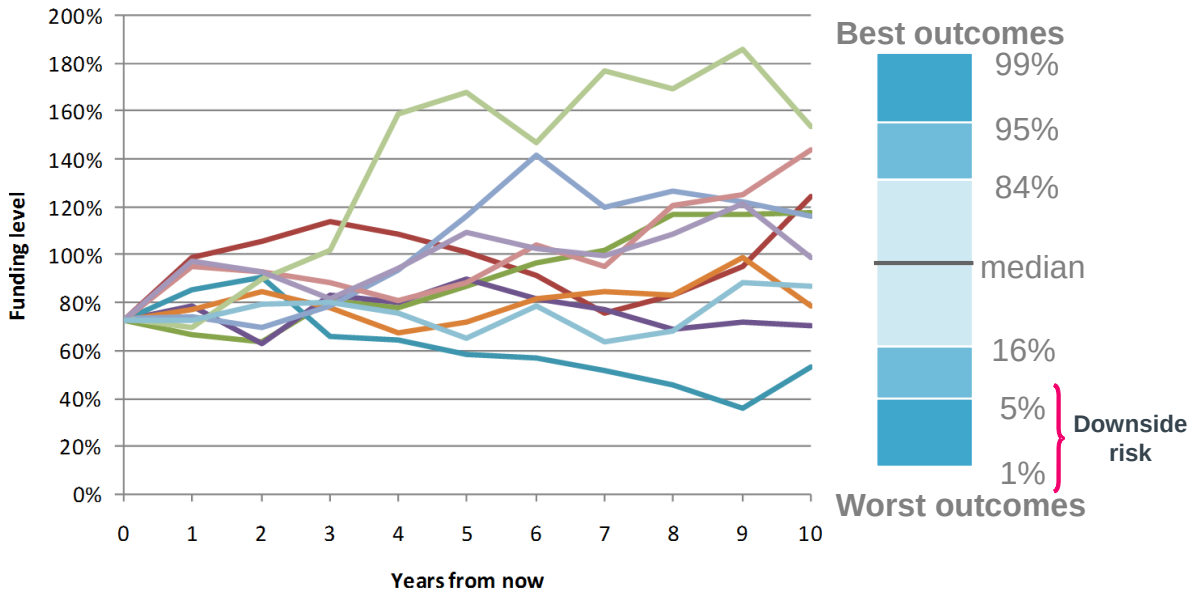
The funding position uses the same methodology as at the 2019 formal valuation.

We then rank the 5,000 outcomes from best to worst and we plot the outcomes graphically (as shown in the following two pages).

We can then compare the range of outcomes with other scenarios.

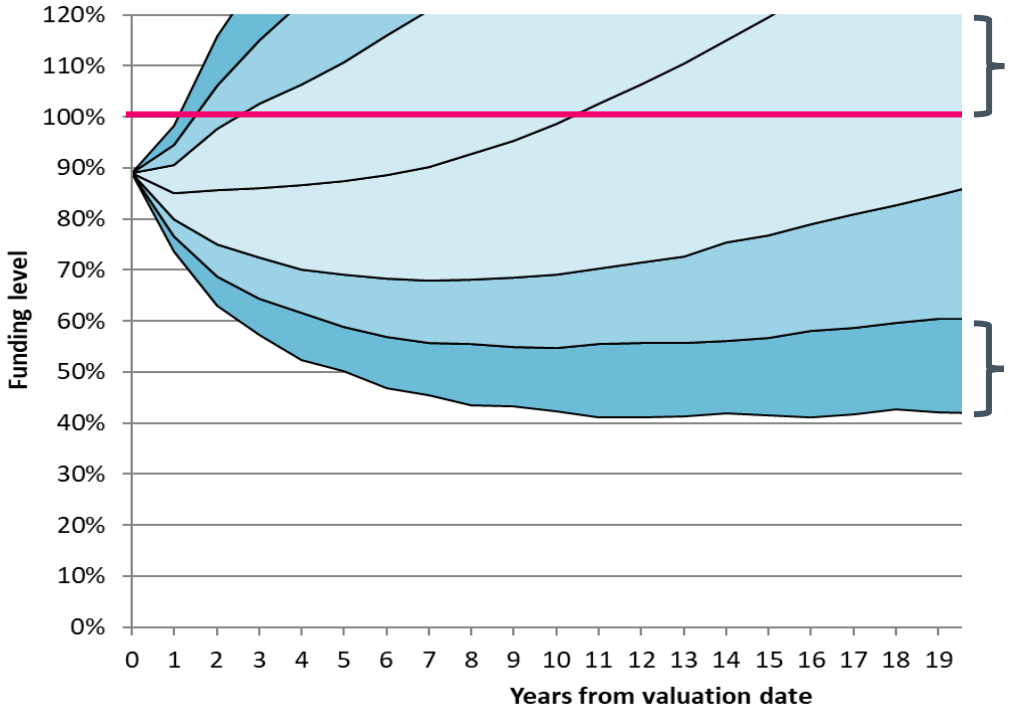
The following likelihoods are adopted for each graph:

- Lightest coloured ranges represent middle 2/3rds of the outcomes
- The range above and below this shows 1 in 6 outcomes each
- This range is further split into 1 in 10 for the next lightest range and 1 in 20 for the darkest range of outcomes
- The best and worst 1% of outcomes are not shown on the graphs



Assess the likelihood of success (LoS) of different outcomes

Methodology: Understanding and comparing risk



Likelihood of success: what proportion of the 5,000 projections achieve full funding at the end of the time horizon

Downside risk: the average of the worst 5% of funding outcomes at the end of the time horizon

(chart shows illustrative results, not London Borough of Tower Hamlets Fund)

Compare and contrast the outcomes (risk measures) for different contribution and investment strategies

Model inputs: Contribution Scenarios

For each scenario, we have modelled the contribution rate expressed as a percentage of pay and monetary amount.

The contributions payable in 2021/22 and 2022/23 are based on the rates certified at the 2019 valuation.

The contribution patterns modelled make no allowance for any changes resulting from the LGPS Cost Cap mechanism.

To explore changes to investment strategy, we have also modelled a fixed contribution rate so that we can isolate the differences in outcomes when investment strategy is varied. This can also be helpful when considering contribution strategy and long-term cost of benefits.

The contribution strategies are detailed on the following slides.

Model inputs: Council contribution patterns

Rate Pattern	2021-22	2022-23	2023-24	2024-25	2025-26	Thereafter
Fixed current	Current contributions exactly as certified in Rates and Adjustments certificate (in 2022-23: 18.6% of pay plus £13,650,000)		18.6% of pay plus £13,650,000	18.6% of pay plus £13,650,000	18.6% of pay plus £13,650,000	Fixed forever
Fixed current less £2m			18.6% of pay plus £11,650,000	18.6% of pay plus £11,650,000	18.6% of pay plus £11,650,000	Fixed forever
Freeze 3y			18.6% of pay plus £13,650,000	18.6% of pay plus £13,650,000	18.6% of pay plus £13,650,000	Allowed to vary by up to +/- 1% of pay each year
Freeze 3y less £2m			18.6% of pay plus £11,650,000	18.6% of pay plus £11,650,000	18.6% of pay plus £11,650,000	Allowed to vary by up to +/- 1% of pay each year

The above relate to non-schools staff: the schools staff rate would be expressed in % terms only, at an equivalent rate. To the extent that the schools rate is lower, the non-schools rate would need to be higher to compensate (and vice versa).

The rates in the table above include expenses of 0.5% of pay. In the model we ignore expenses so the modelled rates are actually 0.5% of pay lower.

Employee contributions are modelled as payable in addition to the above.

We can interpolate between modelled strategies to analyse variants of these scenarios.

Model inputs: Schools/Non School split

Pool name	Total Contribution Rate 2022/2023
London Borough of Tower Hamlets Pool	
London Borough of Tower Hamlets (non-schools)	18.6% plus £13,650,000
London Borough of Tower Hamlets (schools)	23.3%

The rates in the table above reflect the current split of contributions between schools and non-schools. Once we have been provided with the payroll figure for the Council as at 31 March 2022, we can provide further details on the updated split.

Model inputs: member data, assets, liabilities and assumptions

Member data

Benefit projections are based on membership data provided as at 31 March 2021.

Liabilities

The assumptions used to value each of the Employer's liabilities as at 31 March 2021 are shown in Table 1

All future liability values are calculated using the ongoing funding target which uses the financial assumptions as per Table 2 (updated for financial conditions at 31 March 2021) and the same demographic assumptions as applied at the 2019 formal funding valuation.

The liabilities include an allowance for changes to members' benefits resulting from the McCloud case. However, no allowance has been made for the Cost Cap valuation (which currently remains unknown) or any of the recent court cases where we consider the outcome to be immaterial (e.g. Sergeant and Goodwin).

Assets

Asset values are taken from the 31 March 2021 IAS19 Accounting Standard reports.

Table 1 – Assumptions for initial liabilities (for info)

% p.a.	31 March 2019	31 March 2021
Discount rate	4.0%	3.8%
Salary increases	2.5%	2.5%
Pension increases	2.3%	2.3%

Table 2 – Assumptions used in liability projections

	Funding target assumption
Discount rate	2.0% above risk free market rate
Salary increases	Consumer Price Index Inflation plus 0.2%
Pension increases	Consumer Price Index inflation

Model inputs: investment strategies

For the purpose of exploring the contribution rate strategies in this modelling, we have considered the following investment strategies provided by the Fund's investment consultant (Mercer):

- Current Strategy
- Alternative 1 (under consideration)
- Alternative 2 (under consideration)

The table to the right details the asset allocations of the investment strategies we have modelled.

	Current Strategy	Alternative 1	Alternative 2
Overseas equities	47.5%	42.8%	38.0%
UK Equity	2.5%	2.3%	2.0%
Infrastructure equities	3.0%	3.0%	5.0%
Private equity	3.0%	3.0%	5.0%
Commercial Property	12.0%	9.0%	9.0%
Residential Property	0.0%	3.0%	3.0%
Diversified Growth Fund	20.0%	15.0%	15.0%
Multi Asset Credit	6.0%	6.0%	6.0%
Private Debt	0.0%	5.0%	6.0%
Long Index Linked Gilts	6.0%	6.0%	6.0%
Inflation Plus Fund	0.0%	5.0%	5.0%
Total	**100%**	**100%**	**100%**

Figures may not sum exactly due to rounding

Decision making framework

Decision making framework

Time horizon	We have considered the position after 20 years. 17 years has also been considered as this may be of interest for the 2022 valuation Section 13 valuation by the Government Actuary's Department (GAD).
Likelihood of success (LoS)	What is the "risk" tolerance? i.e. how likely is the employer to be fully funded at the end of the time horizon? Likelihoods are shown as a snapshot at the chosen time horizon.
Downside risk	How "bad" is the worst case scenario? i.e. how low could the funding level get by the end of the time horizon? Threshold is 40% funding level, but ideally 50% at least. We wouldn't "let" funding levels get this bad in practice, but the metric gives us another way to compare different options.
Investment strategy	Unless otherwise stated the contribution patterns have been modelled using the Fund's long-term target strategy – see later for comparison of strategies. The Fund's investment consultants will use these modelling results to consider other investment strategy options at a later date
Wider considerations	
Budgets	What has been budgeted by the Council for the next few years? If contributions are reduced now, will there be difficulty increasing contributions in the future if that is required? Impact on the Fund's cashflow position if contributions are reduced
Stand up to scrutiny?	Choice of funding and investment strategies need to be justified to Pensions Committee as well as external bodies e.g. GAD
Recent legal rulings	Uncertainty around possible benefit changes. Ideally contribution changes should be flexible enough to absorb benefit changes. The liabilities include an allowance for changes to members' benefits resulting from the McCloud case. However, no allowance has been made for the Cost Cap valuation.
Climate risk	We have considered how the results might change in three climate change scenarios as a way of testing the resilience of the funding strategy to climate risk

Context for results

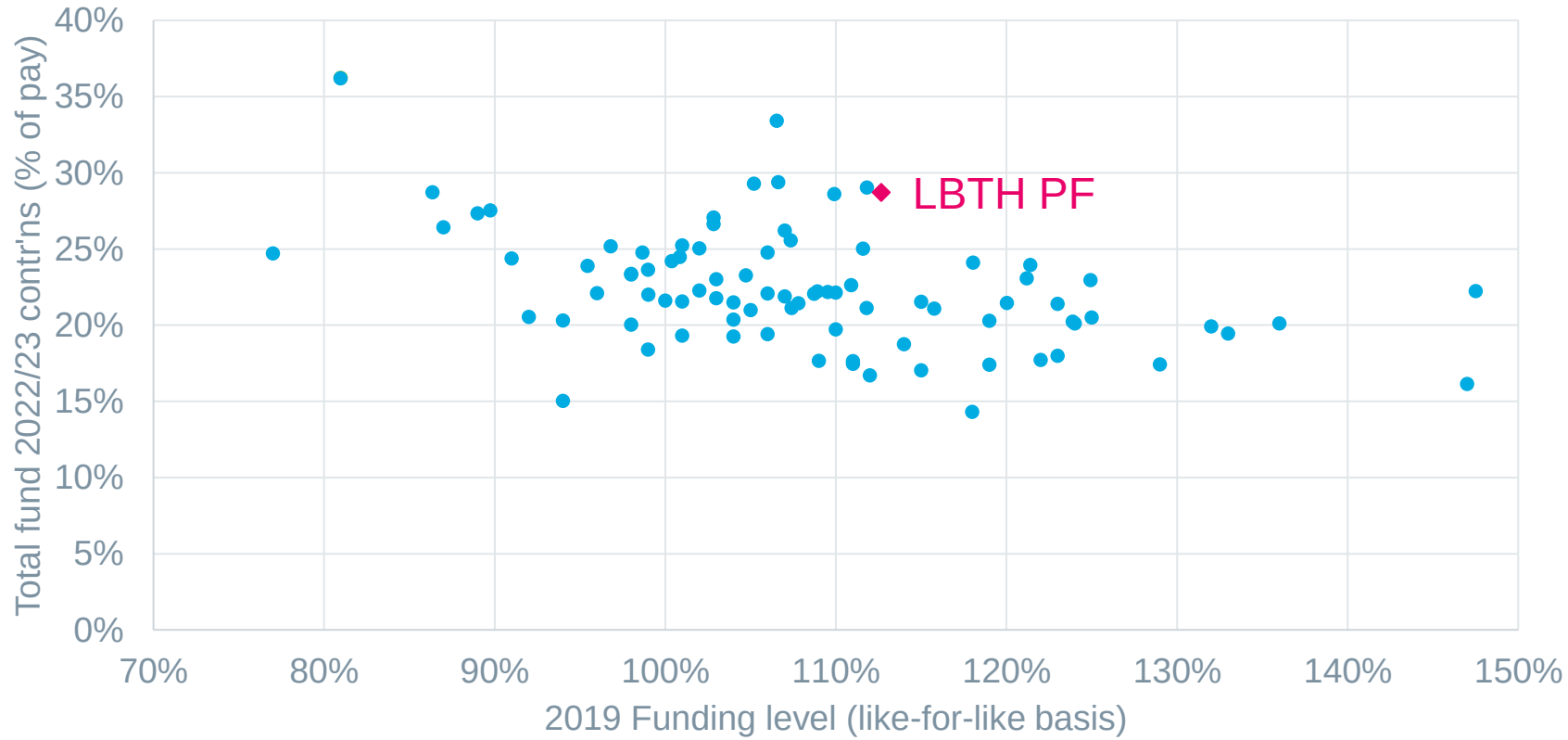
Assets & liabilities

London Borough of Tower Hamlets (£m)	31 March 2019 (last valuation)	31 March 2021 (modelling exercise)
Liabilities		
Actives	386	455
Deferreds	323	322
Pensioners	671	710
Total liabilities	**1,380**	**1,487**
Asset share	**1,359**	**1,705**
Surplus/(deficit)	(21)	218
Funding level	98%	115%

Figures may not sum exactly due to rounding

The initial liabilities and funding level do not directly affect the modelling results but have been shown to give context to the results

LBTH contributions are towards the higher end in the LGPS, resulting in a strong funding position



Improvement in funding position may mean there is scope to reduce rates at this valuation

Based on 2019 valuation Section 13 analysis from GAD

Results

Impact of investment strategy

- We have included three different investment strategies in the modelling which tie in with the ongoing investment strategy review being carried out by Mercer
- We have not considered the strategies in detail, nor are we giving investment advice
- The rest of the results in this paper are based on the **current** strategy
- The two alternative strategies tend to give more favourable results (mainly lesser downside risk) so moving to either of these would not invalidate any of our recommendations

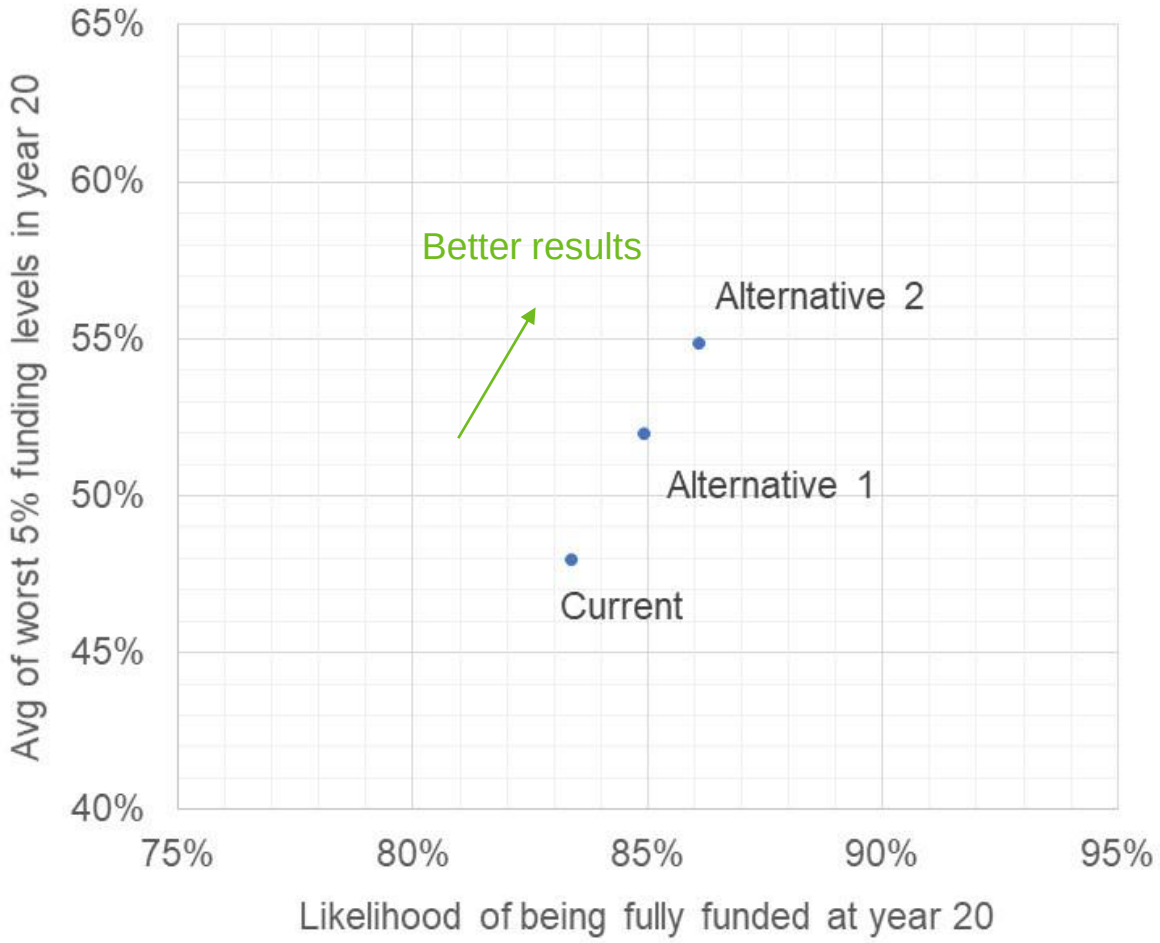


Chart based on current contributions continuing indefinitely

Changes to investment strategy would be viable and support funding plans

Contribution rate options

- Compared to freezing rates at 18.6% plus £13,650,000 for three years, reducing rates (obviously) gives worse results
- The model does expect rates to increase in future years **on average**, as shown by the fact that the two freeze stabilised strategies give better results than the two fixed strategies (fixed strategies shown for comparison)
- This doesn't mean rates actually will increase, especially as the LoS is generally very healthy
- However all four strategies give very healthy results with LoS well in excess of 80% and downside better than 45%
- Either of the freeze strategies is ultimately acceptable at 2022

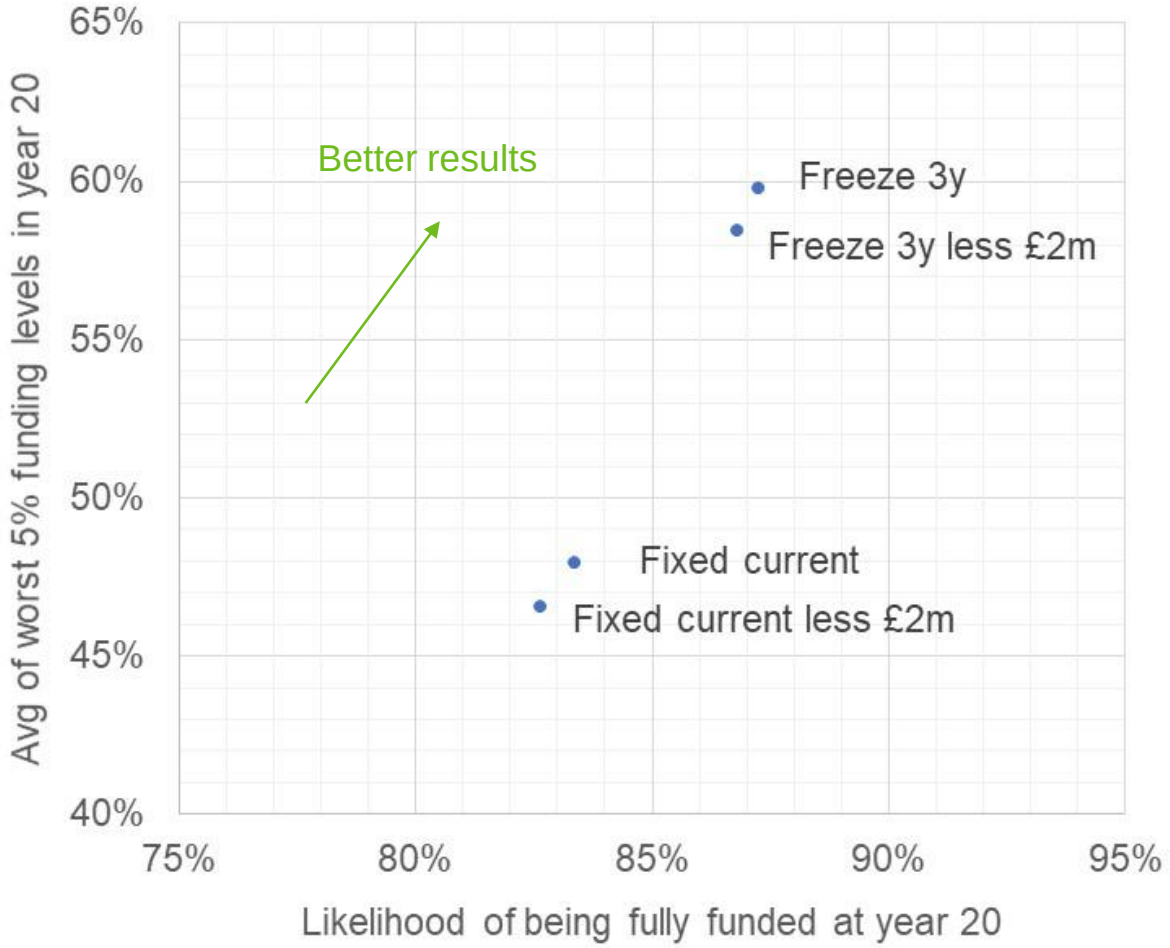


Chart based on current strategy

Modelling results support contribution reductions

Contribution rates at 17 years

- We have considered the results on a 17 year horizon as these may be of interest to GAD as part of their Section 13 review of the 2022 valuations
- We recommend basing funding strategy decisions on the 20 year horizon results
- The 17 year results are not as good as after 20 years, which is expected, e.g. LoS has fallen 3-4%
- However all the strategies still achieve a healthy LoS and downside risk measure, therefore the Fund could justify the continued use of a 20 years time horizon on the basis that applying a 17 year horizon instead would still be sufficiently prudent

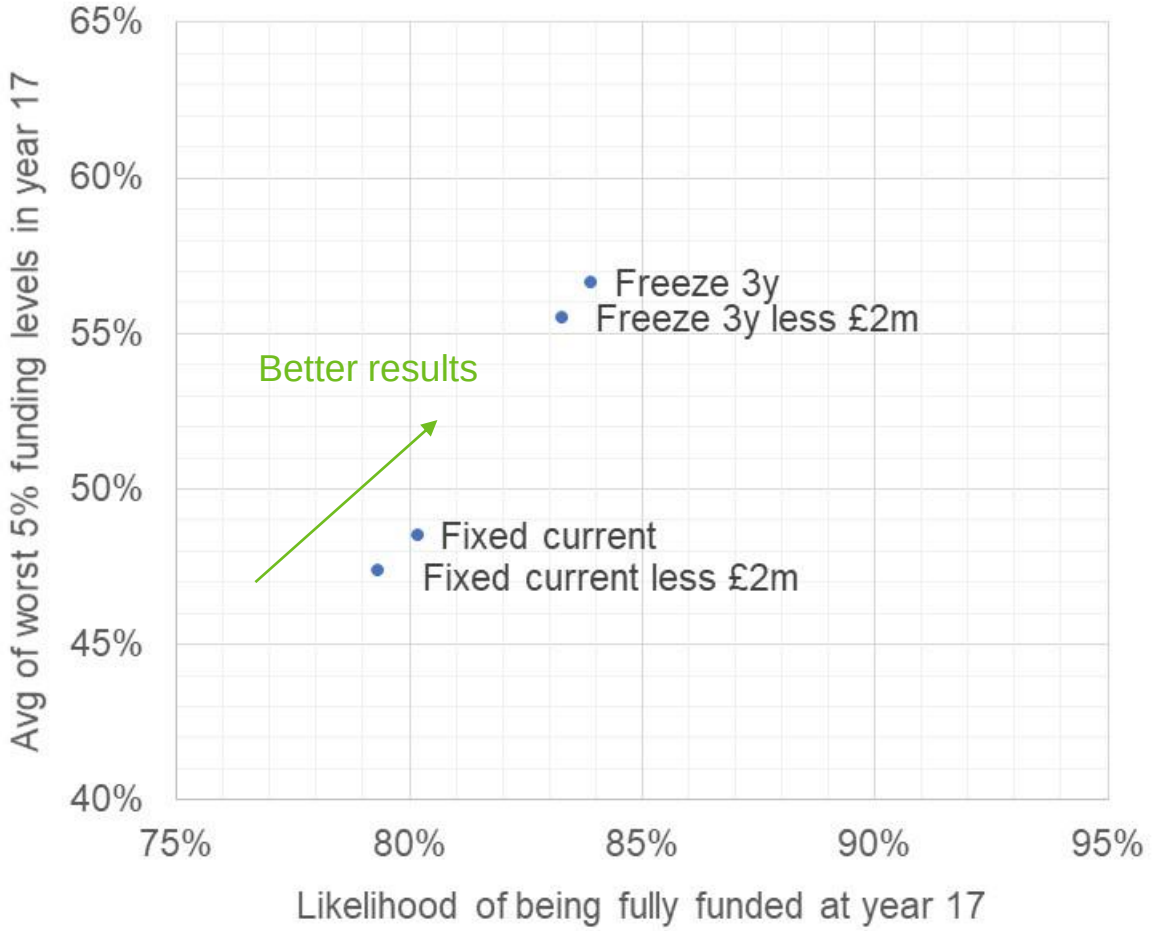


Chart based on current strategy

We would not expect 17 year results to raise concerns from GAD

Impact of an asset shock

- We have recalculated the results of the two freeze scenarios, combined with a 10% reduction to the starting assets, representing a permanent asset re-statement (as opposed to a 10% fall which is recovered soon after)
- In both cases the LoS and downside risk are worse by 3-5%
- However both strategies remain with an LoS above 80% and downside risk still acceptable
- This gives us confidence that our conclusions (from modelling run at 31 March 2021) will not be derailed by recent events such as the invasion of Ukraine, even if that proved to be a permanent market re-statement

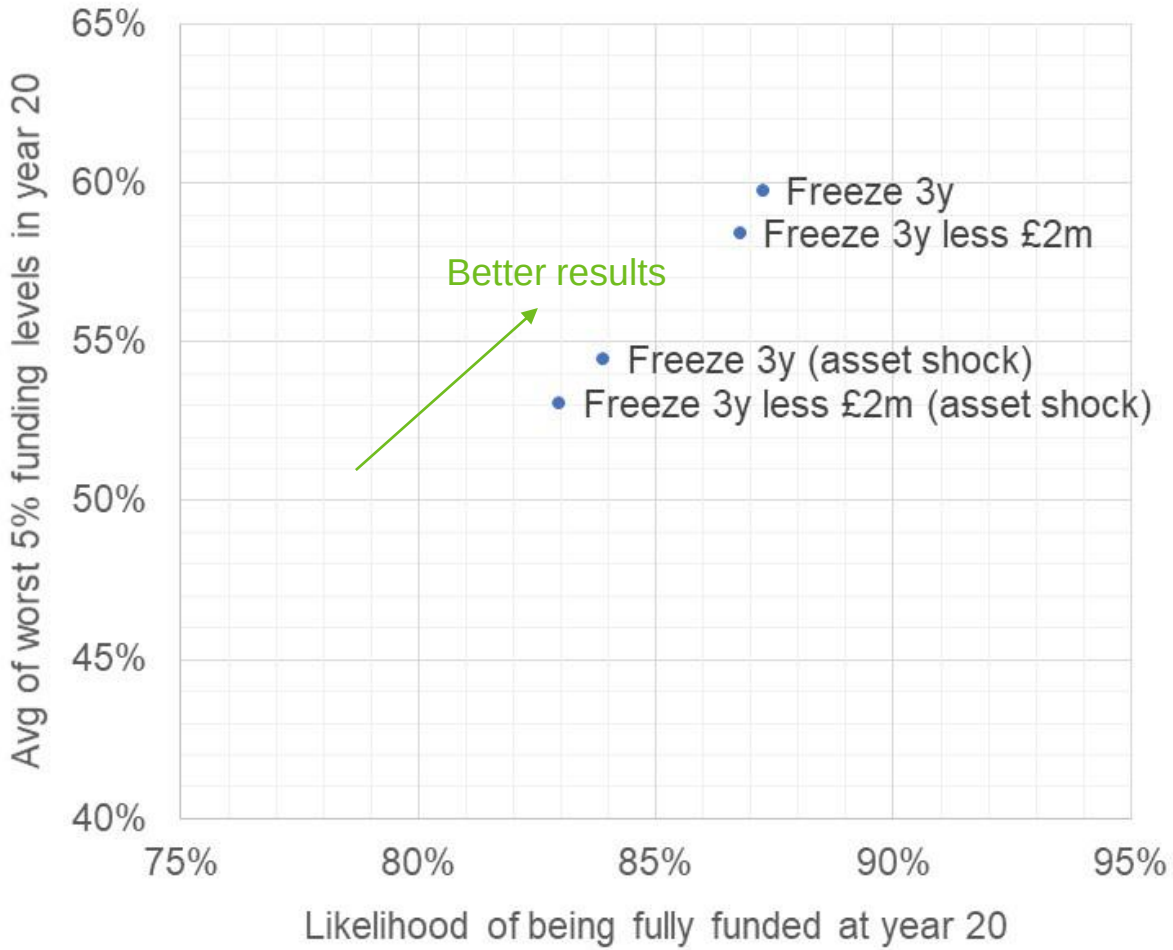


Chart based on current strategy

The stabilised strategies are resilient to a large short-term asset shock

HYMANS # ROBERTSON

Exploring climate change risk

Climate change risk

Exploring the impact of climate change risk

Climate change is too uncertain to "build in" to our model directly like we do with e.g. inflation risk.

Instead we see how the results change if we stress the model in three different scenarios.

Given it is a stress test, all three scenarios are "bad". Therefore need to consider all three scenarios to understand the strategy's resilience

Purpose is to test resilience, not re-run all the previous analysis.

Climate scenarios give us extra information to help make our decision, they don't replace existing modelling results

Testing "resilience" (TCFD requirement)

What could this mean?

- Does the chosen strategy still meet the chosen targets under all scenarios?
- Does it miss them by an acceptable margin (they are stress tests after all)?
- Does it satisfy other risk measures (e.g. short term downside risk)?
- Is it still the 'best' option even when compared against other options under the climate scenarios?

Judgement required when deciding how to test resilience

Our scenarios are based on the speed and strength of the response to climate change

Green revolution

Concerted policy action starting now e.g. carbon pricing, green subsidies

Public and private spending on "green solutions"

Improved disclosures encourage market prices to shift quickly

Transition risks in the short term, but less physical risk in the long term

High expectation of achieving <2°C

Delayed transition

No significant action in the short-term, meaning response must be stronger when it does happen

Shorter and sharper period of transition

Greater (but delayed) transition risks but similar physical risks in the long term

High expectation of achieving <2°C

Head in the sand

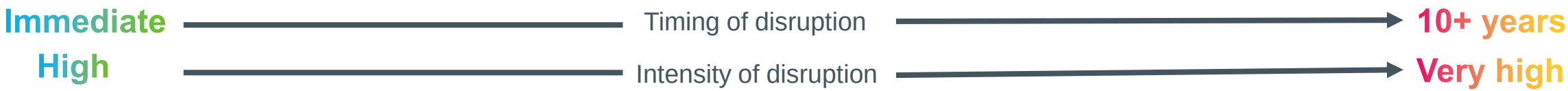
No or little policy action for many years

Growing fears over ultimate consequences leads to market uncertainty and price adjustments

Ineffective and piecemeal action increases uncertainty

Transition risks exceeded by physical risks

Low/no expectation of achieving <2°C



All three scenarios are difficult – they are not "good, medium and bad" options

In each scenario we assume a disruptive period of high volatility

Our scenarios assume that

- There will be a period of disruption linked either to the response to climate risk (transition risks) or the effects of it (physical risks)
- This disruption will lead to high volatility in financial markets
- The later the period of disruption, the more pronounced it will be

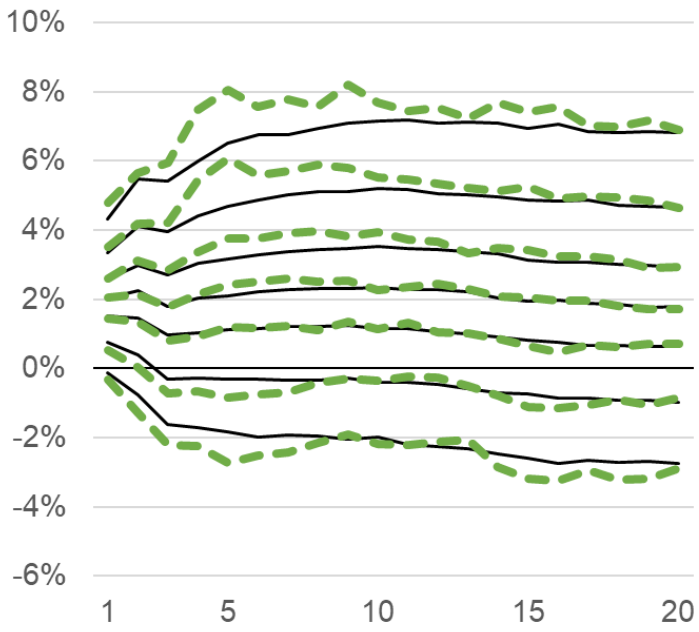
Scenario	Volatility criteria*			
	Years 1-5	Years 6-10	Years 11-15	Years 16-20
Green revolution	Very high	Moderate	Moderate	
Delayed transition		Very high	High	
Head in the sand			High	Very high

*Volatility criteria: Moderate = 60th percentile, High = 75th percentile, Very high = 85th percentile

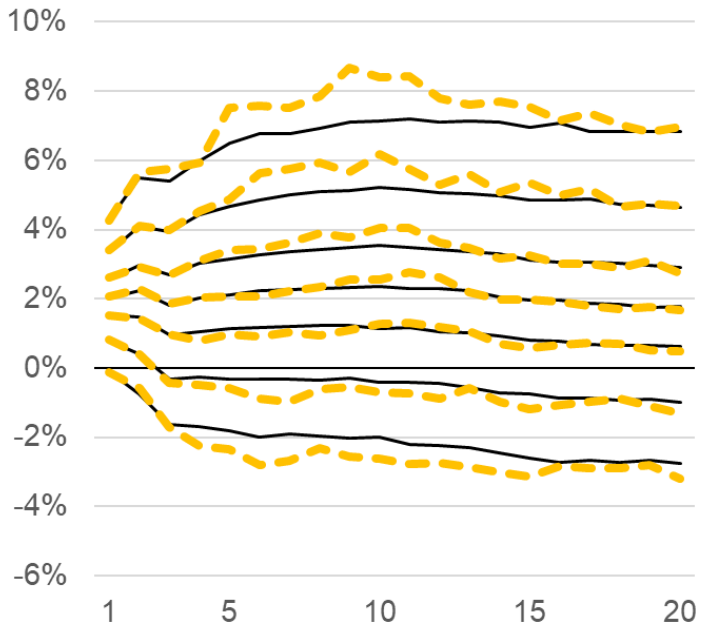
We use volatility criteria to "tilt" the modelling results towards simulations with higher volatility in the periods in question

Example of scenario impact: CPI inflation

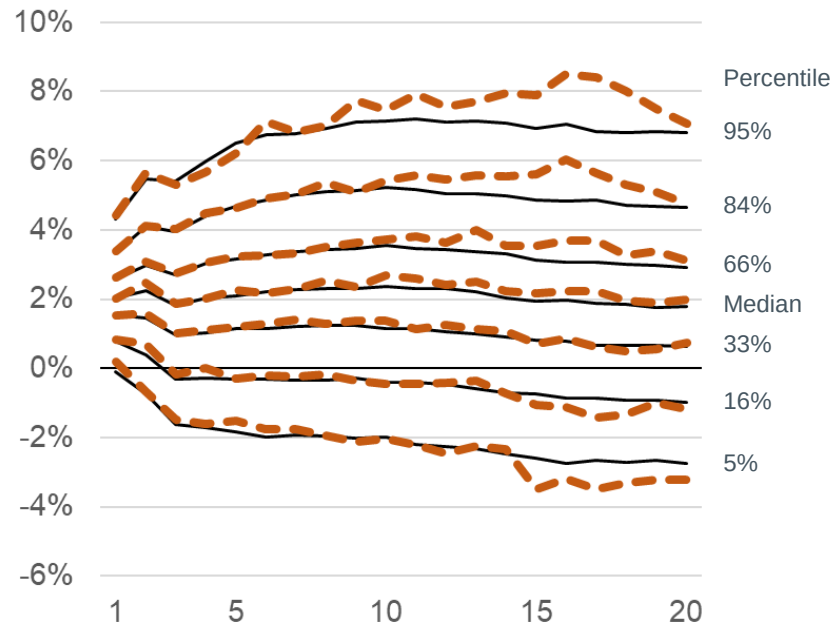
Green revolution



Delayed transition



Head in the sand

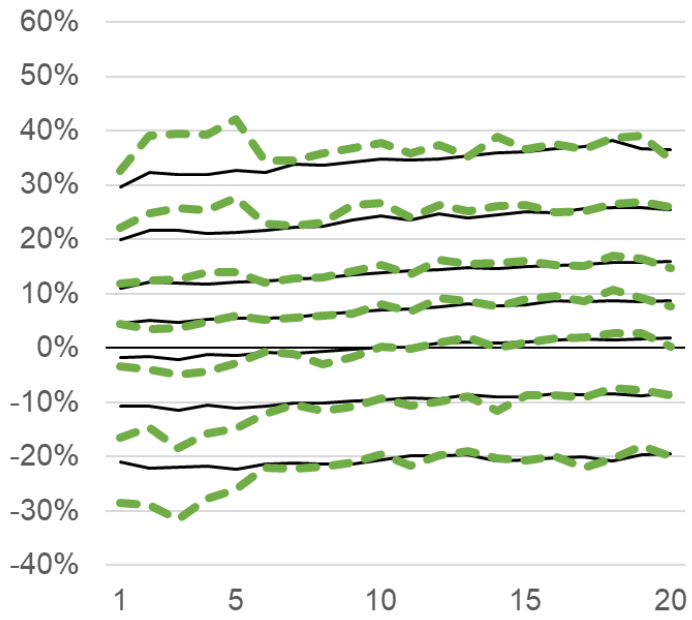


Scenario views widen the distribution of key variables in different time periods

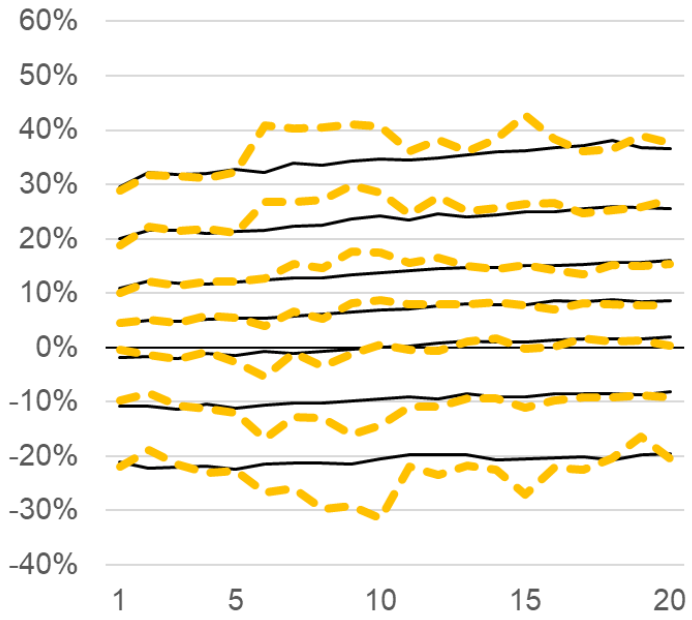
Solid black lines are the unweighted base case

Example of scenario impact: Global equity returns

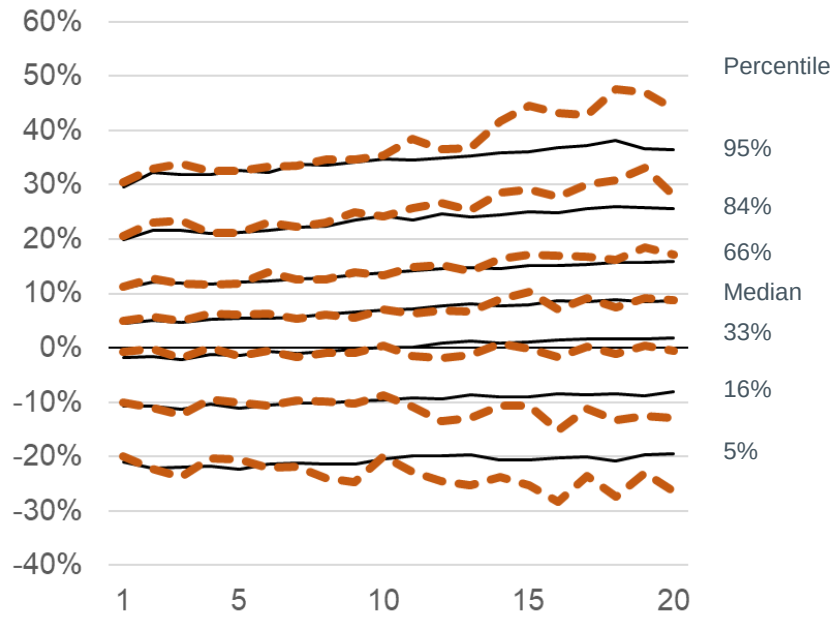
Green revolution



Delayed transition



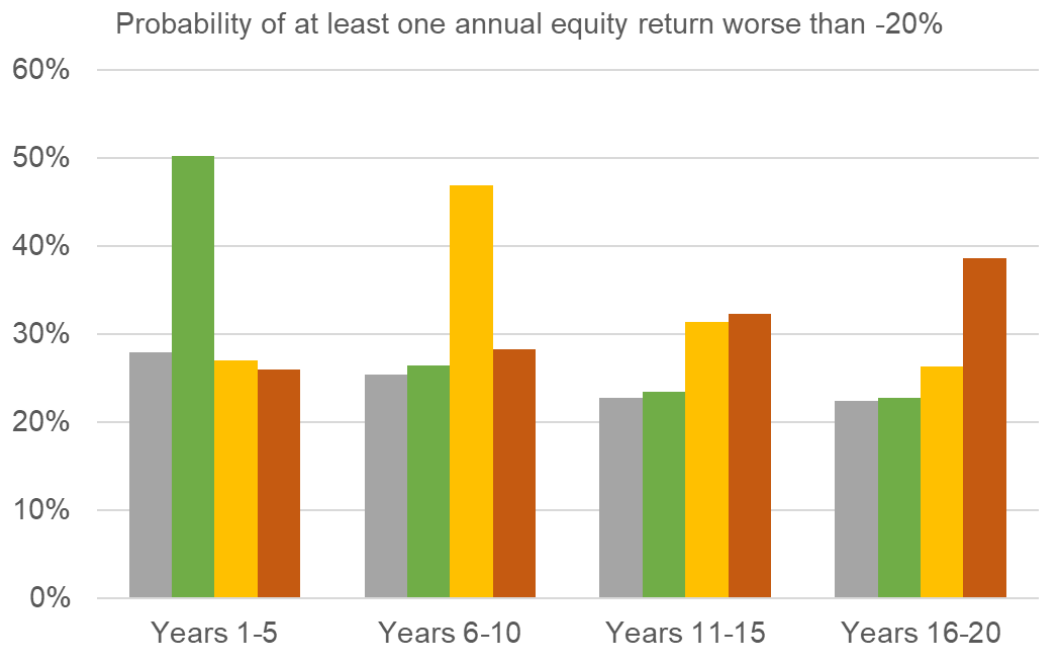
Head in the sand

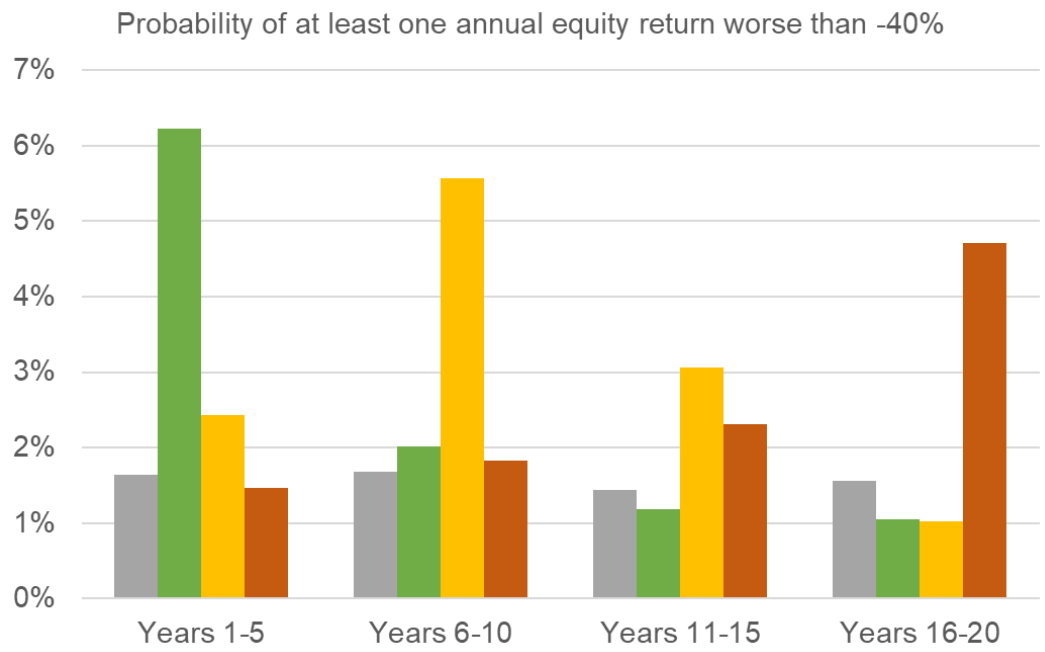


Scenario views widen the distribution of key variables in different time periods

Solid black lines are the unweighted base case

Example of scenario impact: equity shock





Bars from left to right: Unweighted base case (grey), Green revolution, Delayed transition, Head in the sand

Increased volatility gives a much higher chance of significant equity shocks

Climate stress test results

- The LoS is 4% lower in the climate scenarios compared to the unweighted base results
- This is not negligible but the results are still strong enough to support the freeze for 3 years less £2m strategy
- The impact on downside risk is greatest for the Green Revolution scenario which has the most immediate disruption
- Again, the results are still sufficiently strong to suggest that both Step Down strategies are resilient to climate risk
- These results are reassuring – they tell us that the core model does not appear to be significantly underestimating climate risk

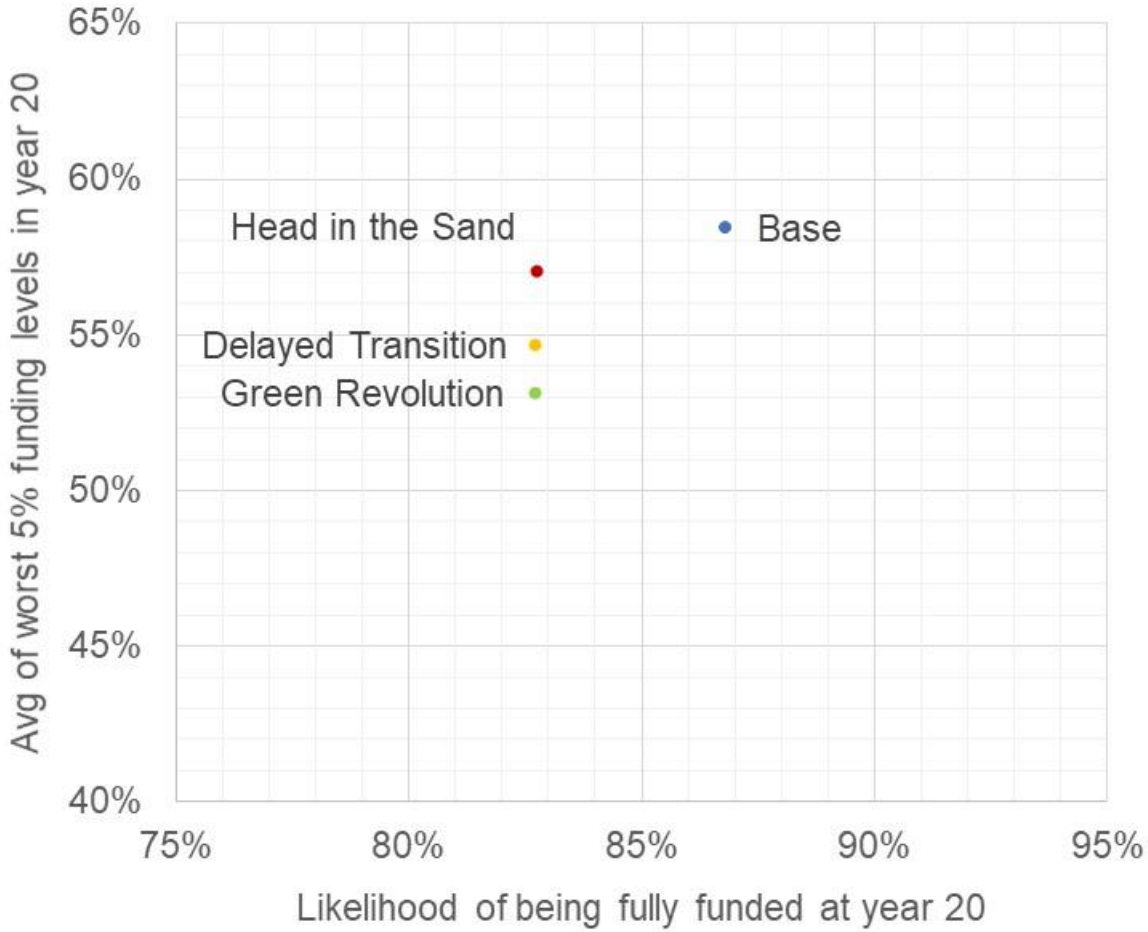


Chart based on current strategy and Freeze 3y less £2m contribution pattern.

The stress test results suggest that the Step Down strategies are resilient to climate risk

Conclusions and next steps

Overall conclusions

The modelling results are very positive and show that the stabilisation mechanism is still fit for purpose. They also support the two potential alternative investment strategies modelled, although we are not giving investment strategy advice here.

The modelling would support a freeze or reduction in Council contribution rates over the next three years. A freeze for the next 3 years or a reduction of £2m pa have been tested and both are acceptable. Note that contributions beyond March 2026 could be higher or lower.

The results are slightly worse when stressed under the three climate scenarios, but the impact is small enough to suggest that the model does not materially understate climate risk and that reducing contributions is an acceptable strategy.

The proposed contribution rates outlined on page 2 are acceptable to the Fund Actuary, Pension Fund & Council.

Next steps

- Advise the Pensions Committee of the modelling process and conclusions.
- Confirm the final rates, including any monetary component, to relevant Council officers & schools by 31 March 2023.
- Include in formal valuation report, within Rates & Adjustments Certificate, to be signed off by 31 March 2023 as required by LGPS Regulations.

Appendices

APPENDIX 1

Economic Scenario Service (ESS)

The ESS uses statistical models to generate a future distribution of year-on-year returns for each asset class e.g. UK equities. This approach is also used to generate future levels of inflation (both realised and expected). The ESS is also designed to reflect the correlations between different asset classes and wider economic variables (e.g. inflation).

In the short-term (first few years), the models in the ESS are fitted with current financial market expectations. Over the longer-term, the models are built around our long-term views of fundamental economic parameters e.g. equity risk premium, credit-spreads, long-term inflation etc.

The ESS is calibrated every month with updated current market expectations (a minor calibration). Every so often (annually at most), the ESS is updated to reflect any changes in the fundamental economic parameters as a result of change in macro-level long-term expectations (a major calibration). The following table shows the calibration at 31 March 2021.

		Annualised total returns														
		Cash	Index Linked Gilts (medium)	Index Linked Gilts (long)	Private Equity	Property	Emerging Market Debt	Infrastructure Equity	Global Equity	Multi Asset Credit (sub inv grade)	Absolute Return Bonds (inv grade)	Inflation (RPI)	17 year real yield (RPI)	Inflation (CPI)	17 year real yield (CPI)	17 year yield
5 years	16th %'ile	-0.3%	-3.2%	-4.4%	-7.1%	-3.5%	-3.3%	-5.0%	-3.4%	0.5%	1.1%	2.0%	-2.4%	1.0%	-2.2%	0.8%
	50th %'ile	0.4%	-0.3%	-0.8%	5.1%	2.5%	1.9%	4.1%	4.5%	3.3%	2.0%	3.6%	-1.6%	2.6%	-1.4%	1.9%
	84th %'ile	1.2%	2.6%	2.9%	18.9%	8.8%	7.2%	14.1%	12.3%	5.2%	2.9%	5.2%	-0.7%	4.1%	-0.4%	3.1%
10 years	16th %'ile	0.1%	-2.5%	-3.7%	-3.1%	-1.3%	-1.3%	-1.8%	-0.8%	1.8%	1.3%	1.9%	-1.8%	1.0%	-1.7%	1.0%
	50th %'ile	1.1%	-0.5%	-1.4%	5.8%	3.2%	2.6%	4.9%	5.1%	3.7%	2.5%	3.5%	-0.5%	2.6%	-0.5%	2.4%
	84th %'ile	2.3%	1.6%	1.2%	15.6%	8.0%	6.6%	12.0%	10.7%	5.3%	3.7%	5.2%	0.7%	4.3%	0.7%	4.1%
20 years	16th %'ile	0.6%	-2.0%	-3.1%	0.4%	0.8%	0.7%	0.9%	1.6%	3.0%	2.2%	1.2%	-0.7%	0.8%	-0.7%	1.3%
	50th %'ile	2.0%	-0.3%	-1.4%	6.8%	4.2%	3.7%	5.9%	5.9%	4.6%	3.6%	2.8%	1.0%	2.3%	1.0%	3.2%
	84th %'ile	3.6%	1.5%	0.4%	13.6%	8.1%	6.9%	11.0%	10.3%	6.3%	5.1%	4.4%	2.7%	3.9%	2.7%	5.7%
	Volatility (Disp) (1 yr)	0%	7%	9%	28%	14%	12%	21%	17%	6%	2%	1%		1%		

APPENDIX 2

Reliances, limitations and additional details

Asset liability modelling

We undertake 5,000 simulations of the future for each scenario. The outcomes of the simulations are ranked from "best" to "worst". The spread of outcomes at a given point in time for a given strategy can be illustrated in charts as follows.

The "median" funding level can be considered to be the average outcome. It should be noted that this is not the same as saying this is the most likely outcome, rather it represents the value with which we would expect all outcomes to have a 50% chance of being above and a 50% chance of being below.

The bottom 16th percentile – approximately 1 outcome in 6 is worse than this level.

The top 16th percentile – approximately 5 outcomes in 6 would be expected to be below this level.

The bottom 5th percentile can be considered a "bad" outcome – 1 outcome in 20 of the simulations is expected to be worse than this.

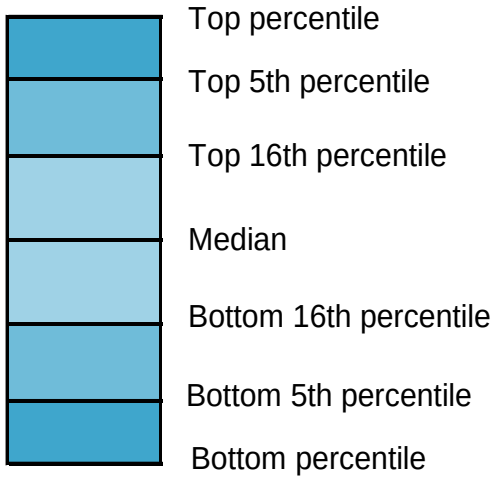
The top 5th percentile can be considered a "good" outcome – 19 outcomes in 20 of the simulations are expected to be below this level.

The bottom percentile can be considered an "extremely bad" outcome, which occurs with a probability of 1 in 100.

The top percentile can be considered an "extremely good" outcome, which occurs with a probability of 1 in 100.

When plotting the distribution of contribution rates, rather than funding levels, the description of any outcome as 'bad' or 'good' is reversed.

In all the charts we consider, there will be some outcomes above and below the highest and lowest levels shown.



APPENDIX 2

Reliances, limitations and additional detail

Data – Cashflows

In projecting forward the evolution of the Fund, we have used estimated cashflows generated using our actuarial valuation system. This is based on the benefits as set out in the LGPS regulations and the demographic assumptions adopted for the 2019 actuarial valuation, with updated financial assumptions based on 2019 methodology as well as updated membership data at 31 March 2021.

Data – 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. Target rates for CPI (inflation and inflation expectations) are RPI – 1% p.a. pre 2030, and RPI – 0% p.a. post 2030, which trends towards a long-term CPI assumption of 2% p.a.
- The output of the model is also affected by other more subtle effects, such as the correlations between economic and financial variables.
- We expect that long-term real interest rates will gradually rise from their current low levels. 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 unless the Fund is fully hedged.

APPENDIX 2

Reliances, limitations and additional detail

Data ESS – continued

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 further on in this document. We would be happy to provide fuller information about the scenario generator, and the sensitivities of the results to some of the parameters, on request.

Model

Except where stated, we do not allow for any variation in actual experience away from the demographic assumptions underlying the cash flows. 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. Cash flows into and out of the Scheme are projected forward in annual increments, are assumed to occur in the middle of each Scheme year and do not allow for inflation lags. Investment strategies are assumed to be rebalanced annually.

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.

Investment strategy is also likely to change with significant changes in funding level, but unless stated otherwise we have not considered the impact of this.

The returns that could be achieved by investing in any of the asset classes will depend on the exact timing of any investment/disinvestment. In addition, there will be costs associated with buying or selling these assets. The model implicitly assumes that all returns are net of costs and that investment/disinvestment and rebalancing are achieved without market impact and without any attempt to 'time' entry or exit.

For the purposes of modelling very low investment risk strategies or matched bond portfolios, we have constructed an LBP (liability benchmark portfolio) that is a hypothetical portfolio that exactly matches the changes in value and cash flows of the liabilities (with a particular allowance for accrual) under all states of the world. It is generally not possible in practice to construct a portfolio with the same high quality of matching as the LBP but major financial and investment risks can be broadly quantified. However, a more detailed analysis is required to understand fully the implications and appropriate implementation of a very low risk or ‘cash flow matched’ strategy.

APPENDIX 2

Reliances, limitations and additional detail

Assumptions

We have estimated future service benefit cash flows 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 much simplified set of assumptions compared with the modelling of existing members. 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.

TAS Compliance

The models used to carry out this modelling, and this presentation, comply with Technical Actuarial Standards 100 (Principles for Technical Actuarial Work) and 300 (Pensions).