

Pensions Committee

2.00pm, Wednesday, 12 December 2018

Lothian Pension Fund Investment Strategy

Item number	5.4
Report number	
Executive/routine	
Wards	All
Council Commitments	Delivering a Council that works for all

Executive Summary

The purpose of this report is to provide the conclusions of the review of investment strategy of the Lothian Pension Fund and to ask Committee to approve the investment strategy for the next 5 years.

The proposed strategy is broadly unchanged from the current strategy. However, it is proposed to monitor the impact of bond yields on the funding level. Opportunities to reduce risk should be considered if bond yields and funding levels increase significantly.

The review of strategy has been undertaken in collaboration with Falkirk and Fife Pension Funds, working with the Joint Investment Strategy Panel. The review aims for the funds to define high-level strategy in common terms to facilitate greater collaboration and efficiency in the implementation of strategy.

Lothian Pension Fund Investment Strategy

1. Recommendations

Committee is requested to:

- 1.1 Agree amendments to the investment strategy as outlined in paragraphs 3.24 to 3.26.

2. Background

- 2.1 Following the completion of the 2017 actuarial valuation an in-depth review of Lothian Pension Fund's investment strategy has been undertaken.
- 2.2 The investment strategy of a pension fund has a significant impact on its investment performance, funding level and employer contribution rates. Setting strategy is therefore a major decision in the context of the overall pension fund.
- 2.3 The review has been undertaken in collaboration with Falkirk and Fife Pension Funds, working with the Joint Investment Strategy Panel. A joint event was held for the Committees and Boards of the three funds on 19 November to provide background information on, and to discuss, this review.
- 2.4 The three funds agreed common governance arrangements, including the operation of the Joint Investment Strategy Panel. Under these arrangements:
 - 2.4.1 the Pensions Committee of each Fund decides on its investment strategy based on its funding position and appetite for risk;
 - 2.4.2 the Pensions Committee delegates the implementation of investment strategy to the Executive Director of Resources and in turn the Head of Finance under the advice of the Joint Investment Strategy Panel;
 - 2.4.3 the Head of Finance works with the officers from the respective funds to implement the strategies and undertake regular quarterly monitoring through quarterly meetings;
 - 2.4.4 the Pensions Committee retains overall responsibility and monitors the implementation of strategy and its success.
- 2.5 The Joint Investment Strategy Panel has provided advice on investment strategy to the Committees. This has included advice from the internal/Lothian team and the

two independent advisers, Scott Jamieson and Gordon Bagot. Hymans Robertson has also provided advice, including asset liability modelling.

2.6 Anticipated outcomes of this review for the three funds are:

2.6.1 a set of common investment beliefs (addressed elsewhere on the Committee's agenda) and;

2.6.2 a high-level investment strategy expressed in common terms to facilitate greater collaboration and efficiency in the implementation of strategy. (The investment strategies of the three funds may continue to be different given their slightly different starting funding positions and cash flow outlooks).

2.7 In order to provide suitable investment strategies for the differing requirements of employers, the Fund currently operates three investment strategies.

Strategy	Assets (£m)	Weight
Strategy 1	7,014	98%
Strategy 2	63	1%
Strategy 3	90	1%
Total Fund	7,167	100%

At end September 2018

2.8 Most employer liabilities are funded under Strategy 1, which was initially agreed by Committee in 2012 and revisited in 2015. This is shown below:

Asset Category	Investment Strategy	Permitted
	2012-17	Range
	%	%
Equities	65	50 - 75
Index-Linked Assets	7	0 - 20
Alternative	28	20 - 35
Cash	0	0 - 10
Total	100	-

2.9 The strategy reduced the allocation to equities from 71.5% at the end of 2012 to 65% and increased the allocation to Index-Linked Gilts and Alternatives. It recognised a gradually changing risk profile for the Fund, but retained significant exposure to real investments, such as Equities, which have a history of protecting or enhancing purchasing power, after the effects of inflation have been taken into account.

2.10 This review of strategy has focused on Strategy 1. Strategy 2 is invested entirely in index-linked gilts and Strategy 3 is invested in a 50:50 combination of Strategy 1 and Strategy 2.

3 Main report

Funding Position

- 3.1 The investment strategy of a pension fund has a significant impact on its investment performance, funding level and employer contribution rates. Setting strategy is therefore a major decision in the context of the overall pension fund.
- 3.2 The funding positions at the last six actuarial valuations are shown below.

Valuation at 31 March	2002	2005	2008	2011	2014	2017	Trend
Assets (£m)	1,793	2,092	2,903	3,477	4,379	6,598	Increasing
Liabilities (£m)	1,867	2,450	3,259	3,619	4,796	6,743	Increasing
Deficit (£m)	74	358	356	142	417	145	Volatile
Funding Level	96%	85%	89%	96%	91%	98%	Volatile

- 3.3 This review is based on the results of the 2017 actuarial valuation. At 31 March 2017, the funding level was 98%, and at the time the modelling was undertaken in September 2018, the funding level had decreased marginally.
- 3.4 Committee will recall that, for the most financially secure employers, a Contribution Stability Mechanism has been applied at the 2014 and 2017 actuarial valuations. Under this mechanism, employers are currently paying lower than the rate which would be based on the theoretical position based on markets. This is largely due to the low yields. Slide 7 of the Appendix shows how employer contribution rates changes with the assumed investment return.
- 3.5 The table below shows the cashflows into and out of the Fund. It illustrates the reducing net cashflow and more recently, the negative net cashflow position. This reflects the maturing nature of the Fund's liabilities.

CASH FLOW TABLE (Net (withdrawals)/additions from dealing with members)

	2002/03	2005/06	2008/09	2011/12	2013/14	2017/18	Trend
Income	117	154	163	188	186	196	Increasing
Expenditure	84	95	121	151	173	214	Increasing
Net Cash Flow	+33	+59	+42	+37	+13	-17	Falling

Asset Liability Modelling

- 3.6 Asset Liability Modelling is a tool which projects how the Fund's assets and liabilities might perform in the long-term. It provides a framework that aids understanding of how likely the Fund is to achieve its funding objectives under different investment strategies. Investment strategies with higher expected returns are likely to require lower employer contributions. However, such strategies will be accompanied by a more volatile funding level and a risk of larger contributions from employers being required if the investments do not perform as expected.
- 3.7 Asset Liability Models include many assumptions about how the economy and investment markets might change in the future, as well as uncertainty involved. Assumptions are typically based on historic market data. However, some asset classes are easier to model than others, for example due to the availability of data or the homogeneity of the market. As such, the modelling assumptions should be considered as well as the results.

- 3.8 Given the historically low yields and the higher value this places on the liabilities, the assumption for yields in the future is one of the most critical inputs. Hymans Robertson's asset liability model assumes, on average, that index-linked gilts return -0.3% p.a. over the next 20 years, with real yields increasing to +0.8%. This compares with the real yield as at 31 October 2018 of -1.68%.
- 3.9 Also, the model assumes that equities are invested in-line with a market capitalisation weighted index, but the Fund currently invests in lower risk equities, which are estimated to have 10-20% lower risk than the market.
- 3.10 The modelling helps to demonstrate whether the investment strategy is likely to deliver the funding objectives, the associated risks and the impact of changing investment strategy. However, the assumptions need to be borne in mind when interpreting the results, particularly the bond yield and equity assumptions.

The Results

- 3.11 The results of the Asset Liability Modelling are attached as Appendix 1.
- 3.12 The modelling shows that:
- 3.12.1 future funding levels are significantly reliant on the assumption of future gilt yields; and
 - 3.12.2 the risk associated with the investment strategy is largely determined by the amount invested in equities, typically the most volatile asset class over shorter term time periods. Also, relatively large changes in strategy (at least 10% change in equity allocation) are needed to impact on the overall results in a meaningful way.
- 3.13 The modelling has generated estimated probabilities of the Fund being at least 100% and at least 110% funded by 2037 (20 years after the 2017 actuarial valuation) based on several different investment strategies. By targeting the 110% level, the Fund could create a buffer to protect against further adverse outcomes.
- 3.14 The Appendix shows 'Current' investment strategy as 65% invested in equities. Allowing for the lower risk equities held by the Fund (as noted above), by assuming the Fund's current strategy is equivalent to approximately 10% less invested in equities:
- 3.14.1 The probability of reaching 100% funding by 2037 (20 years after the 2017 actuarial valuation) is 85% (slide 36);
 - 3.14.2 There is a 1 in 20 chance (5% likelihood) that the funding deficit in 2020 will be approximately £2.7billion or more (slide 36). In comparison, the total payroll for members of the Fund as at March 2017 was £670million. Hence recovering such a deficit from employers over 20 years would equate to approximately 7% of payroll per annum.
- 3.15 As noted earlier, anticipated increases in bond yields are a critical assumption in the model. Slide 38 illustrates the potential impact on the Fund if yields do not increase to the full extent assumed by the model. This has a meaningful impact (approximately 10-12%) on the probability of achieving a target funding level by

2037. Based on the Strategy 2 (estimated to equate to the Fund's current strategy with lower-risk equities), the probability of exceeding 100% funding by 2037 is 85% assuming full yield increases but only 75% with only limited yield increases. There is a 68% probability of exceeding 110% funded by 2037 with limited yield increases.

- 3.16 The results indicate that there is scope for the Fund to reduce the level of investment risk, with strong probabilities of achieving funding targets, but there is significant reliance on bond yields increasing. It is felt appropriate to wait for such opportunities of increased yields, rather than reducing the Fund's investment risk ahead of such. (As noted earlier, employer contributions being paid are lower than the theoretical rate based on current yields and this is, in effect, anticipating increases in yields).
- 3.17 Therefore, the conclusion is that the Fund should continue with its current investment strategy (65% invested in lower risk equities) whilst continuing to monitor the impact of bond yields. Opportunities to reduce risk, by reducing equities by up to 15%, should be considered if bond yields and funding levels increase significantly.

Policy Groups

- 3.18 The Joint Investment Strategy Panel recommends that the Committee defines the Fund's high-level investment strategy in terms of groups of assets with similar characteristics. The Appendix contains asset return and volatility assumptions used in the modelling. These groups are the key determinants of risk and return for the Fund.
- 3.19 The Joint Investment Strategy Panel have recommended five Policy Groups which condense the vast array of investment choices into a manageable number of investment groups. The proposed Policy Groups are shown in the table below:

Policy Group	Objective	Permitted Assets
Equities	The principal driver of the Fund's growth and, in the long term, expected to outperform liabilities, albeit with periods of volatility	Listed equities; private equity; forward currency contracts; equity futures
Other Real Assets	Real returns with an income stream, in some way, linked to inflation. Likely to deliver diversification from equities	Property; infrastructure; timberlands; agriculture; commodities
Gilts	Assets offering strategic funding level protection	Index-linked gilts; nominal gilts; overseas sovereign bonds; forward currency contracts; gilt/bond futures
Non-Gilt Debt	Assets offering strategic funding level protection and/ or those delivering a superior yield to that available on gilts (where returns may have a positive correlation to bonds).	Investment grade bonds; high yield bonds; loans; private credit; emerging market debt
Cash	Liquidity function avoiding (mostly) credit and duration risk premia	UK Treasury assets; overseas Treasury assets; local authority loans; bank/building society deposits (all short term)

- 3.20 The proposed Policy Groups are the same for Falkirk, Fife and Lothian funds and are designed to facilitate joint working by introducing common terminology, controls and constraints to deliver efficiencies. Hedge funds are not included in the policy groups as none of the funds intends to consider such investments.
- 3.21 Investment strategy is currently defined using four policy groups, and the proposed policy groups split the current 'Alternatives' into two groups, 'Other Real Assets' and 'Non-Gilt Debt'.
- 3.22 Under governance structure of all three Funds, the implementation of the investment strategy within these Policy Groups is delegated by the Pensions Committees to nominated officers with advice from the Joint Investment Strategy Panel.
- 3.23 The modelling results show that the level of equities is by far the key determinant of investment risk and return. Variation in the types of investment managers within each Policy Group is much less significant to the overall risk and return compared to strategic decisions.

Recommended Strategy

- 3.24 The proposed strategy for the next 5 years is set out in the table below.

Asset Category	Current Strategy %	Proposed Strategy 2019 - 24 %
Equities	65	65
Other Real Assets	28*	18
Non-Gilt Debt		10
Gilts	7	7
Cash	0	0
Total	100	100

* Currently defined as Alternatives

- 3.25 Further, it is proposed that the JISP monitor the impact of bond yields on the funding level and take opportunities to reduce risk if bond yields and funding levels increase significantly, with regular reporting to Committee on such implementation. This would be implemented by reducing equities by up to 15%, in favour of other real assets, non-gilt debt and gilts.
- 3.26 Ranges to limit asset allocations under normal financial conditions are proposed. These are shown in the table below. The ranges provide controls within which the nominated officer will implement the strategy and aim to avoid unnecessary and potentially costly rebalancing. The minimum level will allow the Fund's nominated officer to reduce equities by up to 15% if the bond yield increases.

Asset Category	Minimum %	Proposed Strategy 2019 - 24 %	Maximum %
Equities	50	65	70
Other Real Assets	10	18	25
Non-Gilt Debt	0	10	20
Gilts	0	7	20
Cash	0	0	10
Total	100	100	-

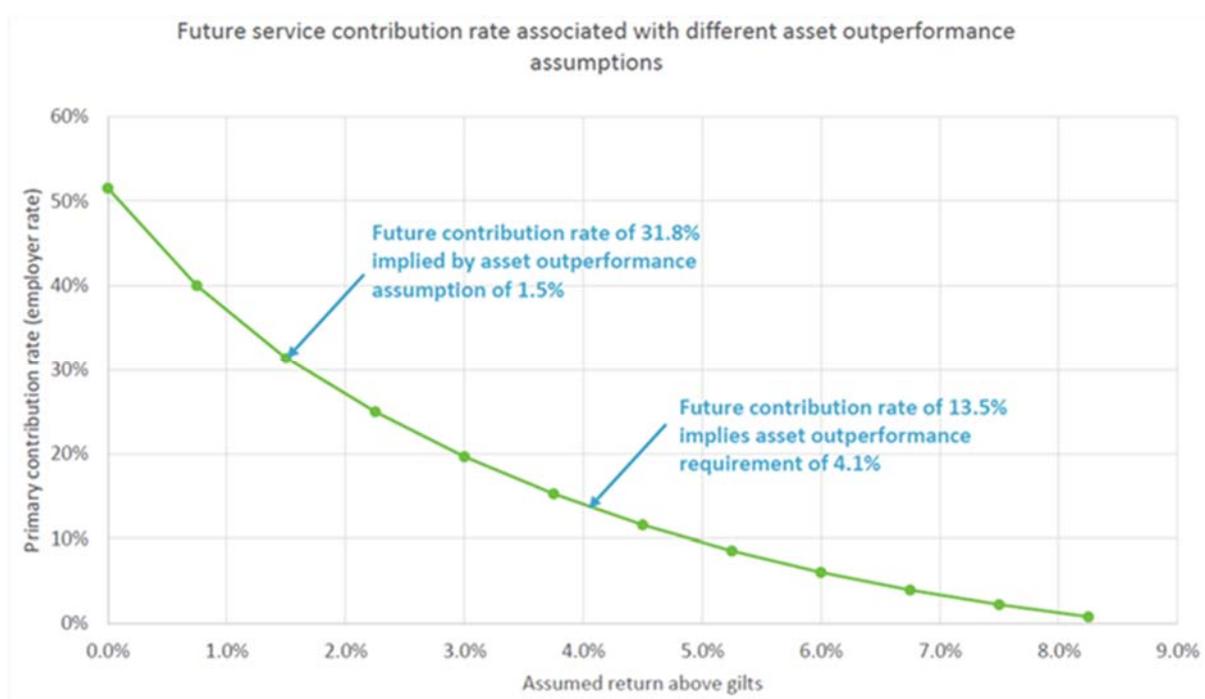
Next Steps

- 3.27 Subject to the approval of strategy reviews by the Fund's partner funds, the Joint Investment Strategy Panel will work with the funds to develop implementation options within the policy groups and monitor funding levels and bond yields to assess opportunities for risk reductions.
- 3.28 Further cashflow projections have been requested from the Fund's Actuary, considering scenarios involving reduction in fund membership. This will help to develop greater understanding of potential flows over the medium term, income requirements from the Fund and help to develop a cashflow strategy.

3.29 Updates will be provided to Committee as the implementation of the strategy, and the options within the policy groups, progresses.

4 Measures of success

4.1 The ultimate measure of success is the ability to pay pensions as they fall due. In the interim, the funding level and employers' contribution rates are key measures of success. This is because the investment return achieved by the Fund directly impacts both the funding level and, subject to the approach to smoothing at the actuarial valuation, employer contribution rates. The relationship between investment return and contribution rates is illustrated in the chart below, which plots the future service contribution rate against the assumed return above the Fund's liability discount rate ("gilts").



4.2 The objectives for the total Fund and the individual Policy Groups are, therefore, stated as long term expected returns relative to gilts in the table below. The objective of the Fund's investment strategy is the achievement of the return assumed by the Actuary in excess of the gilt return that is consistent with acceptable and stable contribution rates. The table below shows this as 2.8% per annum over gilts over the long term. Committee has previously agreed a 20-year deficit recovery period.

Asset Category	Proposed Strategy 2019 - 24	Long Term Expected Return
Equities	65%	Gilts +3.5% p.a.
Other Real Assets	18%	Gilts +2.5% p.a.
Non-Gilt Debt	10%	Gilts +1.0% p.a.
Gilts	7%	Gilts +0.0% p.a.
Total	100%	Gilts +2.8% p.a.

- 4.3 Given the inherent volatility of the non-gilt asset classes relative to gilts, monitoring of actual returns relative to these long-term expected returns should be undertaken on a long-term basis (based on returns over 5 or more years).

5 Financial impact

- 5.1 The investment strategy has a significant impact on the investment returns of the pension fund and hence impacts on the funding levels and employer contribution rates.
- 5.2 The financial implications of investment strategy are outlined in asset liability modelling results shown in the report.
- 5.3 Changes in the investment strategy since 2012 have led to increased allocation to Alternatives as well as a lower-risk approach being adopted within the equity allocation, in order to reduce the overall risk of the Fund.
- 5.4 The direction of change for the investment strategy should reduce the volatility of the funding level. However, this is reliant on increasing funding levels and bond yields.

6 Risk, policy, compliance and governance impact

- 6.1 Investment strategy is a key determinant of funding level, risk and volatility of employer contribution rates.
- 6.2 There is no governance impact as a result of this report. Committee delegates the implementation of investment strategy to the Executive Director of Resources, who in turn delegates to the Head of Finance, who takes advice from the Joint Investment Strategy Panel. The Joint Investment Strategy Panel is an important element of the governance of the Fund's investments.
- 6.3 In addition, active engagement with the companies in which the Fund invests should reduce risk and enhance the sustainability of investment performance.

7 Equalities impact

- 7.1 There are no equalities implications as a result of this report.

8 Sustainability impact

- 8.1 The Statement of Investment Principles sets out the Funds' approach as responsible asset owners, and details how voting, engagement and other Environmental, Social and Governance activity will be undertaken. Compliance with it is expected to contribute to the sustainability of the Fund's investments.

9 Consultation and engagement

- 9.1 The Pension Board, comprising employer and member representatives, is integral to the governance of the Fund and they are invited to comment on the relevant matters at Committee meetings.

10 Background reading/external references

- 10.1 2017 Actuarial Valuation
http://www.edinburgh.gov.uk/lpf1/info/121/actuarial_valuation

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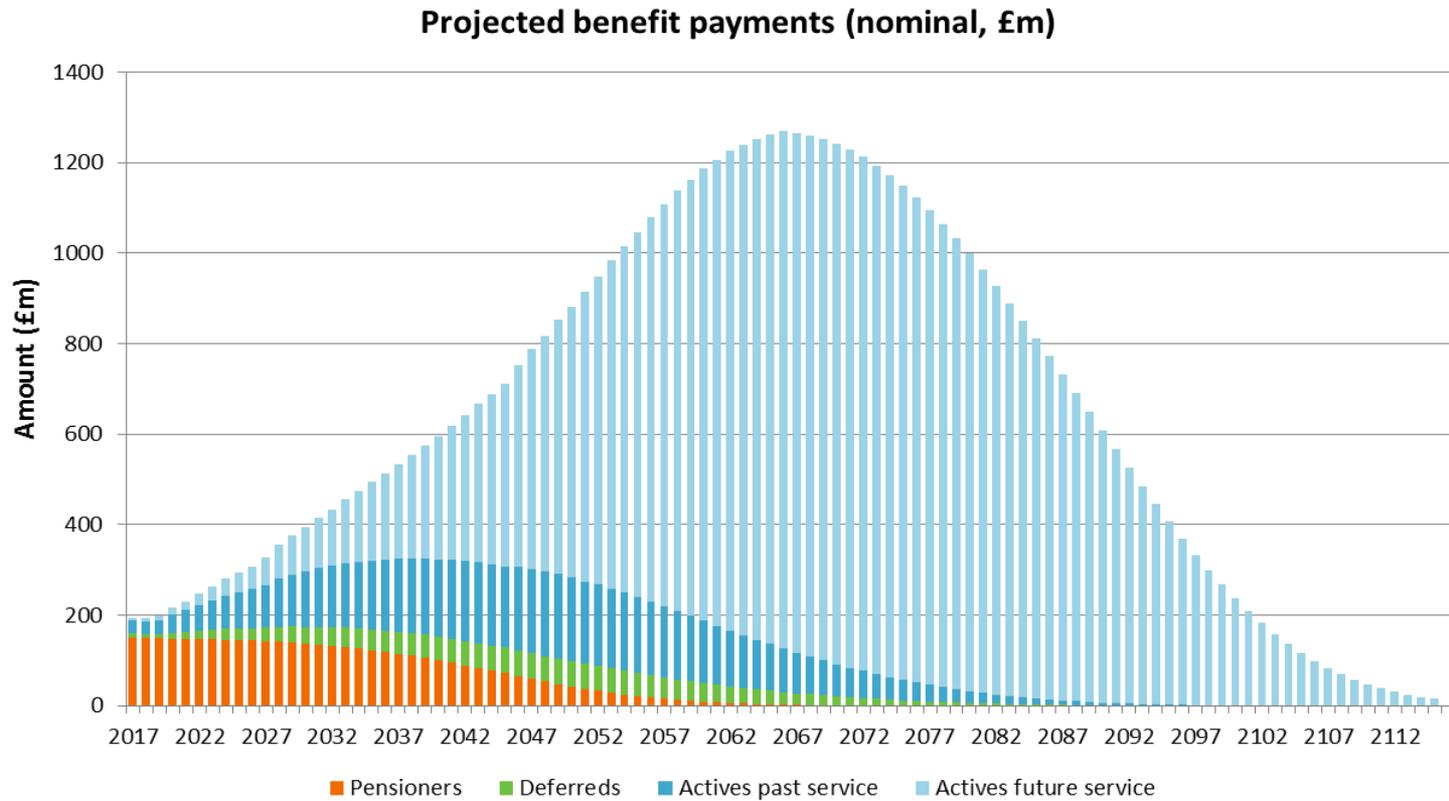
Contact: Clare Scott, Chief Executive Officer, Lothian Pension Fund

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11 Appendices

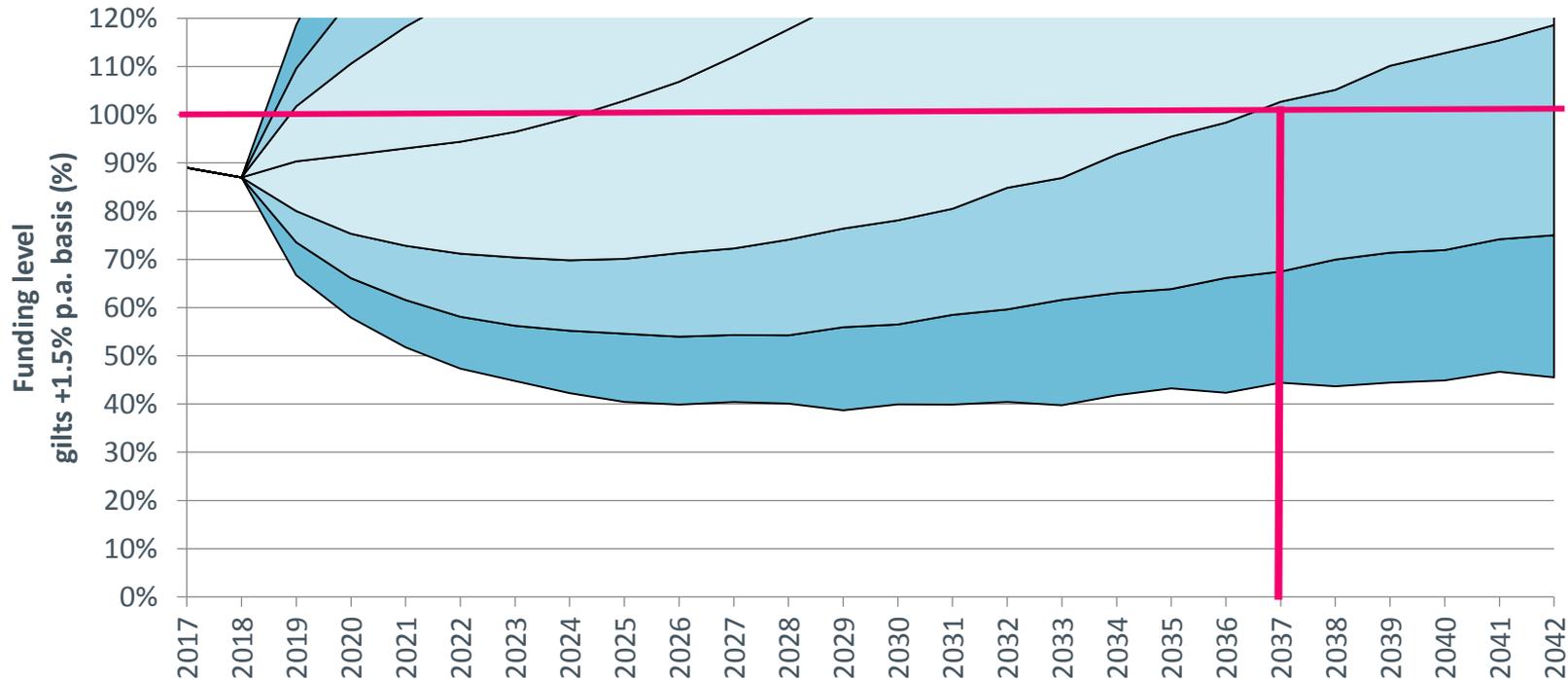
Appendix 1 Asset Liability Modelling results

Cashflow profile



Note: Active future service includes benefit payments in respect of assumed future new entrants

Projecting the current position



- Observations

- Assumes a discount rate of gilts + 1.5% p.a.
- Based on current contribution schedule.
- There is comfortably a greater than 50% chance of achieving full funding by 2037 i.e. 20 years from the valuation date. The median expectation is that the Fund will reach full funding by 2025.

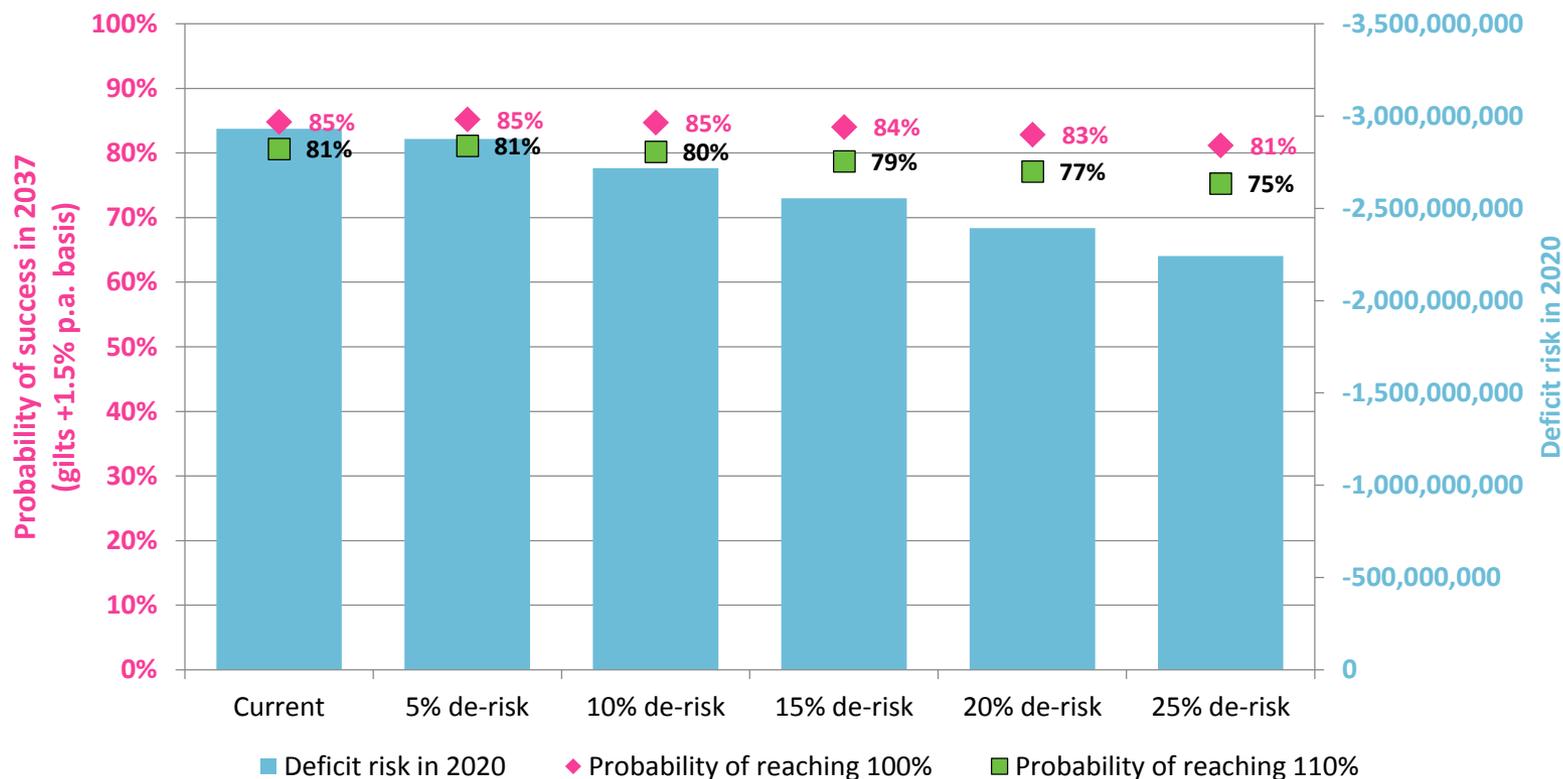
Alternative strategies

We modelled a number of alternative investment strategies. The five investment strategies we would like to focus on are illustrated in the table below.

- **Strategy 1: 5% De-risking** - switching 5% from equities into real long term assets
- **Strategy 2: 10% De-risking** – switching 10% from equities into real long term assets (5%) and bonds (5%)
- **Strategy 3: 15% De-risking** – switching 15% from equities into real long term assets (5%) and bonds (10%)
- **Strategy 4: 20% De-risking** – switching 20% from equities into real long term assets (5%) and bonds (15%)
- **Strategy 5: 25% De-risking** – switching 25% from equities into real long term assets (5%) and bonds (20%)

	Current	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5
Equities	65%	60%	55%	50%	45%	40%
Real Long Term Assets	25%	30%	30%	30%	30%	30%
Bonds (of which credit)	10% (5%)	10% (5%)	15% (5%)	20% (5%)	25% (5%)	30% (5%)
Cash	0%	0%	0%	0%	0%	0%

Impact of de-risking



- Observations

- Assumes a discount rate of gilts + 1.5% p.a. and current contributions.
- The chart shows that there is scope to reduce the downside risk without materially impacting the probability of success.
- As an example, the Fund has scope to switch 15% from equities and reduce the downside risk by over £400m (in 3 years) without a material impact on the probability of success.

Impact of flex in contributions

	Current	30% of pay	25% of pay	20% of pay	15% of pay	10% of pay
Probability of being at least 100% funded in 2037	85%	88%	85%	81%	76%	71%
Probability of being at least 110% funded in 2037	81%	85%	81%	76%	72%	67%
Deficit Risk in 2020 (Median – Tail VaR)	-£2,930m					

- Observations
 - Assumes a discount rate of gilts +1.5% p.a. based on the current investment strategy
 - Reducing the contribution levels has a significant impact on the probability of being fully funded by 2037.

Impact of yield reversion

	Current	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5
Probability of reaching <u>100%</u> in 2037	85%	85%	85%	84%	83%	81%
Probability of reaching <u>100%</u> in 2037 - Lesser impact of yield reversion	75%	75%	75%	74%	73%	70%
Probability of reaching <u>110%</u> in 2037	81%	81%	80%	79%	77%	75%
Probability of reaching <u>110%</u> in 2037 - Lesser impact of yield reversion	69%	70%	68%	67%	65%	63%

- Comments

- Assumes a discount rate of gilts + 1.5% p.a. and based on current contributions
- To assess the impact of our assumption that, on average, gilt yields will rise by more than is currently implied by markets we have considered results which only include the 4th and 5th quintiles of real yields in 20 years. This equates to a median yield of -0.9% p.a.
- Taking a lower level of advance credit for yield reversion reduces the likelihood of success by 10-15%.

Conclusions

Conclusions

- Overall, the results show that there is considerable scope to reduce investment risk (reducing equity exposure by up to 20% for all three Funds) whilst maintaining a strong long-term likelihood of success...
 - ...this applies for the 110% target as well, which would enable the Funds to build up a buffer against future adversity
- The probability remains high even if fixing contributions at levels around 20 to 25%, due to the level of investment return expected.
- However, if the extent of modelled “yield reversion” is limited, so as not to take too much credit for this in advance, the scope to reduce risk is more limited.
- Initial results on this basis still indicate scope to reduce the exposure to equities in favour of bonds and real assets, but by lesser amounts. For example:
 - Falkirk – by perhaps 5 to 10%
 - Fife – by up to 20%
 - Lothian – by perhaps 10 to 15%



Appendix: Reliances & Limitations

Reliances & Limitations

Data – Cashflows

In projecting forward the evolution of the Funds, we have used estimated cashflows generated using our actuarial valuation system, based on information provided as part of the 2017 actuarial valuation of the Funds including the LGPS (Scotland) Regulations.

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 subjective assumptions are the average excess equity return over the risk free asset (tending to approximately 3% p.a. as the investment horizon is increased), the volatility of equity returns (approximately 18% p.a. over the long term) and 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 market for CPI linked instruments is not well developed and our model for expected CPI in particular may be subject to additional model uncertainty as a consequence. The output of the model is also affected by other more subtle effects, such as the correlations between economic and financial variables.

Our expectation (i.e. the average outcome) is that long term real interest rates will gradually rise from their current low levels. Higher long-term yields in the future will mean a lower value placed on liabilities and therefore our median projection will show, all other things being equal, an improvement in the current funding position (because of the mismatch between assets and liabilities). The mean reversion in yields also affects expected bond returns.

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.

Given the context of this modelling, we have not undertaken any sensitivity analysis to assess how different the results might be with alternative calibrations of the economic scenario generator.

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.

Reliances & Limitations

Model

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. Cash flows 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.

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 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 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.

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.

In the modelling we have assumed that the Fund will undergo valuations every three years and a contribution rate will be set that will come into force one year after the simulated valuation date. For 'stabilised' contributions, the rate at which the contribution changes is capped and floored. There is no guarantee that such capping or flooring will be appropriate in future; this assumption has been made so as to illustrate the likely impact of practical steps that may be taken to limit changes in contribution rates over time. We have assumed that the Actuary to the Fund will make his or her calculations using broadly the same methodology as that currently used, but note that this is a source of uncertainty that we have not attempted to measure in the model other than where noted specifically.

Expected Rate of Returns and Volatilities

The following figures have been calculated using 5,000 simulations of the Economic Scenario Service, calibrated using market data as at 30 June 2018. 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.

	Annualised total returns													Inflation	17 year real yield	17 year yield
	Cash	Index Linked Gilts (long)	UK Equity	Overseas Equity	Private Equity	Property	Emerging Market Debt	Emerging Markets Equity	Infrastructure Equity	Multi Asset Credit (sub inv grade)	Investment Grade Credit	Private Lending				
5 Years	16th %ile	-0.2%	-2.9%	-3.9%	-3.8%	-7.0%	-3.3%	-2.9%	-6.8%	-4.6%	1.2%	-2.3%	1.7%	1.5%	-2.3%	0.9%
	50th %ile	1.0%	0.6%	4.2%	4.3%	5.1%	2.7%	2.4%	4.5%	4.4%	4.2%	1.0%	4.4%	3.0%	-1.4%	2.2%
	84th %ile	2.2%	4.3%	13.0%	12.8%	19.1%	9.1%	8.1%	17.3%	14.1%	6.5%	4.2%	6.4%	4.5%	-0.5%	3.8%
10 Years	16th %ile	0.1%	-2.4%	-1.1%	-1.0%	-3.1%	-1.2%	-0.9%	-2.9%	-1.5%	2.2%	-0.6%	2.4%	1.7%	-1.9%	1.3%
	50th %ile	1.6%	-0.2%	4.9%	5.0%	5.8%	3.5%	3.1%	5.3%	5.1%	4.3%	1.2%	4.6%	3.1%	-0.7%	2.8%
	84th %ile	3.3%	2.1%	11.2%	11.1%	15.8%	8.1%	7.2%	14.0%	12.2%	6.2%	2.9%	6.6%	4.7%	0.5%	4.8%
20 Years	16th %ile	0.9%	-1.8%	1.4%	1.5%	0.5%	0.8%	1.2%	0.3%	1.3%	3.6%	0.9%	3.5%	1.9%	-0.7%	2.2%
	50th %ile	2.6%	-0.3%	5.9%	6.0%	7.0%	4.5%	4.2%	6.4%	6.2%	5.3%	2.1%	5.6%	3.1%	0.8%	4.0%
	84th %ile	4.6%	1.3%	10.5%	10.6%	13.8%	8.3%	7.5%	12.7%	11.3%	7.1%	3.2%	7.7%	4.6%	2.3%	6.3%
	Volatility (Disp) (1 yr)	1%	9%	17%	17%	28%	14%	12%	25%	20%	7%	10%	6%	1%		

The current calibration of the model indicates that a period of outward yield movement is expected. For example, over the next 20 years our model expects the 17 year maturity annualised real (nominal) interest rate to rise from -1.6% (1.7%) to 0.8% (4.0%).

Risk warnings

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 overseas 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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