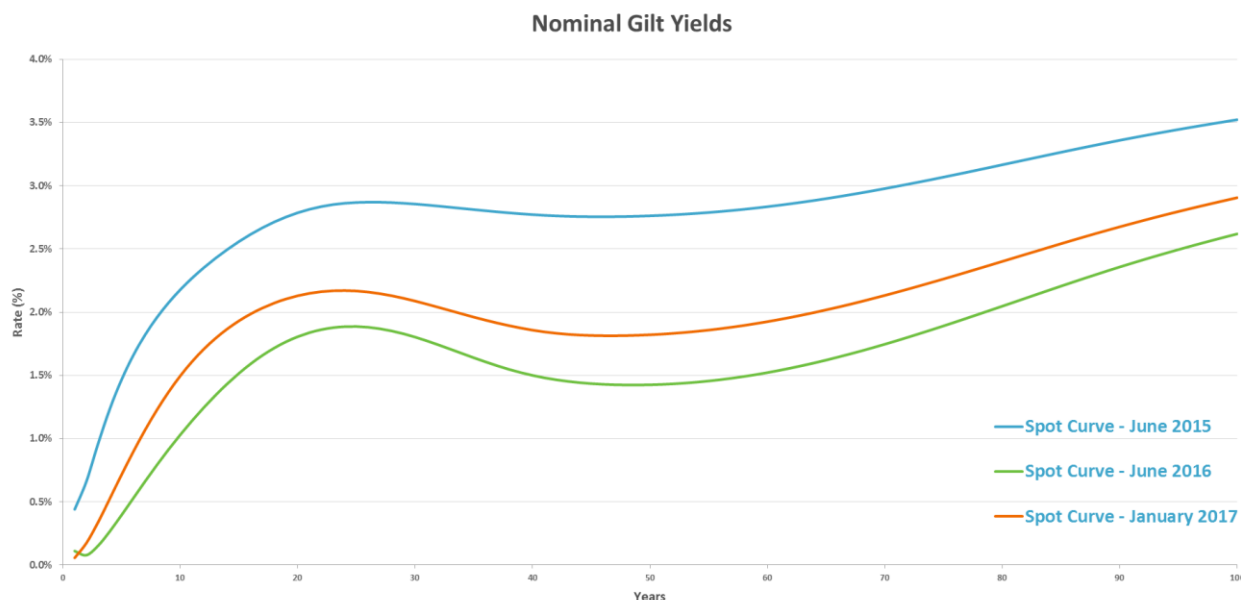


returns required. As shown by the following chart of current gilt yields which, at any period below 60 years, do not appear to provide an attractive 'real' return relative to the government's 2% CPI target.

Chart: Nominal gilt yields at a range of dates



Although the performance of the bond portfolio has been muted since the restructure, the recent suggestion of a turn in the interest rate sentiment suggests these funds are now well positioned to deliver in the future.

The objectives of the portfolio remain very much the same as our last review carried out in late 2015; that is, to help manage overall levels of funding volatility within the Fund by diversifying some of the equity exposure whilst targeting an absolute level of outperformance above cash. Additionally, the allocation to index-linked gilts allows cheap rebalancing of the equity allocation and, at the margin, some inflation sensitivity.

Conclusion

We remain confident that the structure of the bond portfolio is appropriate and recommend no change at this current time.

Alternatives portfolio

The Fund has a long term strategic allocation to alternatives of 31.5%. Although the Fund holds a well-diversified set of investments in alternatives, we believe this requires some maintenance:

- The Fund's **property** mandate with Schroder has delivered returns closely in line with the benchmark over the short- and long- term. However, we have placed Schroder 'on watch' due to the degree of personnel turnover at Schroder and the potential for pooling to damage their business model.

We therefore recommend carrying out a more in-depth review of the Fund's property portfolio once high level strategy agreements have been made.

- The allocations to **infrastructure** and **timber** have been struggling to get up to weight. Brookfield have struggled to fully allocate the committed capital, and the Committee addressed this underweight by reducing the target allocation to timber from 2% to 0.5% following the Fund's strategy review in late

2015. Equally, Partners Group has also found it difficult to allocate the Fund's committed capital to existing brownfield infrastructure opportunities.

The underweight to infrastructure has been addressed through the decision to allocate 2% of the Fund's assets (c.£50m) to M&G's Infracapital Greenfield fund.

We therefore recommend no further changes to the infrastructure and timber allocations for the moment.

- Although the Fund's allocation to **illiquid debt** is close to target, M&G's Debt Opportunities fund (DOF) is maturing and is expected to return significant amounts of cash in the near future. Having reviewed potential options to bring the alternatives allocation nearer to its target, the Committee agreed 1% (c.£25m) allocations to each of M&G's Illiquid Credit Opportunities fund (ICOF) and M&G's Debt Solutions fund (DSF). Both funds attractive target yields with many of the potential assets underlying the funds having a secured nature.

We therefore recommend no further changes to the illiquid debt allocation for the moment.

- The Fund's allocation to **private equity** was reviewed relatively recently and the funding program for Pantheon's private equity fund is in place. Although not fully drawn down, the Fund appears to be performing well (although it is very early days).

We therefore recommend no further changes to the private equity allocation for the moment.

- There are some concerns over the performance of the **hedge funds** in which the Fund is invested. Pyrford's absolute return fund is marginally behind its benchmark since inception in August 2012 and there are doubts over whether the defensive style of the fund can generate the required returns in the short- to medium-term. Winton has also had a very poor run of performance; the managed futures fund was trailing its benchmark by 1.5% over the 3 years to end December 2016, and 8.0% over the 12 months to end December 2016.

We recommend a review be carried out of both hedge fund managers in the near future to address these concerns.

Conclusion

We remain confident that the structure of the alternative portfolio provides a robust degree of diversification and complements the equity and bond allocations. However, we have identified the following issues at a more granular level and recommend that detailed reviews be carried out once high level strategy decisions have been agreed:

- Schroder's property mandate review.
- Hedge fund mandates review.

7 Conclusions

Our broad conclusions from the analysis contained in this report are:

- 1 Although it is for the Committee to decide what is 'prudent' in terms of probability of success measures and timescales for deficit recovery, our experience from working with other LGPS clients is that the current funding/investment strategy approach would be considered sensible and prudent.
- 2 Given a funding deficit remains in the Fund there appears no strong need for immediate change to the investment strategy as the Committee may wish to retain the current level of risk assets in the expectation that it may close the deficit more quickly or at lower cost.
- 3 However, there does appear to be some scope to consider reducing risk by reducing the equity allocation to some extent. This might be viewed as an attractive approach given that it would capture some of the recent equity market strength (with the option to add back the equity allocation if markets have a set-back);
- 4 Given the current strong funding position of the Fund, we actually believe the consideration of highest importance is what to do in reaction to further improvements in the funding position to consolidate that strength. The Committee should discuss whether their preferred approach would be to reduce costs (with an expectation of setting lower contribution rates for employers at the next valuation) whilst maintaining risk levels or reduce levels of investment risk immediately.
- 5 Overall the more granular implementation of the Fund's asset and manager structure appears to remain robust and in line with the Committee's investment beliefs. However, we do believe there is some housekeeping of both the property and hedge fund allocation to be implemented over the coming year.

I look forward to discussing this report with the Committee at their meeting on 22 March 2017.

Matt Woodman, for and on behalf of Hymans Robertson LLP

Appendix A - Reliances and Limitations

Cashflows

In projecting forward the evolution of the Scheme, we have used estimated cash flows generated using our actuarial valuation system, based on information provided as part of the 2016 actuarial valuation of the Scheme.

Cash flows have been generated in line with the Scheme rules.

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.

There are a number of different types of increases applied before and after retirement to benefits payable from the Scheme. We have made some simplifying assumptions when modelling the various types of increases.

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. No inferences should be drawn from the modelling results other than those confirmed by us in writing.

Asset Liability 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, yield curves and asset class returns. Cash flows into and out of the Scheme are projected forward in annual increments and are assumed to occur in the middle of each Scheme year. 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.

In allowing for the simulated economic scenarios, we have used suitable approximations for updating the projected cash flows. The nature of the approximations is such that the 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.

We would emphasise that 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.

Economic Scenario Service

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.

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 31 December 2016. 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											17 year real yield	17 year yield	
		Cash	Index Linked Gilts (medium dated)	UK Equity	Overseas Equity	Private Equity	Property	Senior Loans	Absolute Return Bonds (near zero duration)	Emerging Markets Equity	Infrastructure Equity	Hedge Funds			Inflation
5 years	16th %ile	-0.6%	-2.4%	-4.1%	-6.1%	-6.9%	-4.4%	-2.0%	-3.0%	-7.5%	-6.2%	-4.0%	1.6%	-2.2%	1.2%
	50th %ile	0.6%	0.3%	3.8%	3.5%	4.7%	1.6%	1.8%	1.5%	3.8%	2.5%	1.8%	3.0%	-1.3%	2.5%
	84th %ile	1.8%	3.1%	12.2%	13.9%	17.9%	7.9%	5.8%	6.3%	15.8%	12.0%	7.9%	4.6%	-0.4%	4.2%
10 years	16th %ile	0.0%	-1.4%	-1.2%	-2.9%	-2.8%	-1.9%	-0.3%	-0.9%	-3.6%	-2.8%	-1.5%	1.8%	-1.9%	1.4%
	50th %ile	1.5%	0.3%	4.7%	4.4%	5.6%	2.6%	2.7%	2.5%	4.7%	3.6%	2.8%	3.1%	-0.7%	3.1%
	84th %ile	3.3%	2.3%	11.0%	12.0%	15.1%	7.5%	5.9%	6.0%	13.4%	10.3%	7.3%	4.8%	0.6%	5.2%
20 years	16th %ile	0.8%	-0.7%	1.4%	0.2%	0.4%	0.1%	1.4%	1.0%	-0.4%	-0.1%	0.5%	2.0%	-0.8%	2.2%
	50th %ile	2.7%	0.7%	6.0%	5.6%	7.0%	3.8%	4.0%	3.7%	5.9%	4.7%	4.0%	3.2%	0.8%	4.0%
	84th %ile	4.7%	2.3%	10.9%	11.2%	13.9%	7.7%	6.7%	6.6%	12.3%	9.9%	7.6%	4.7%	2.3%	6.3%
Volatility (Disp) (1 yr)		1%	7%	16%	19%	29%	14%	9%	10%	22%	20%	13%	1%		

HYMANS ROBERTSON LLP

It is important to be aware that the volatilities shown are the first year's volatilities and should only be used as such. The probability distributions for different asset classes are complex and attempting to extrapolate this first year volatility over a longer time period will almost certainly result in significant errors.

Please note that whilst we comment that the returns shown are "expected", this identifies the level at which 50% of all possible outcomes will be above and 50% will be below – this does not mean that the return quoted is in any way the "most likely" outcome.

In addition, 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 -1.7% (1.8%) to 0.8% (4.0%).