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LPFA Monthly Solvency Report as at 31 October 2016
Preliminary Month End Data Version (1)

Purpose and summary

This report sets out an analysis of LPFA solvency as at 31 October 2016 together with an analysis of change from the end of September 2016. It also gives an indication of the approximate sensitivity of funding level (on both the Triennial valuation and a Swaps Flat basis) to changes in economic and demographic assumptions.

<u>Net Asset Values and LPFA Asset Mix at 31 October 2016:</u>

Investment Perspective:

31 October 2016	Funds		Exposure		Policy Portfolio		
	£m	%	£m	%	Benchmark	Minimum	Maximum
Equities:	2,141.95	42.0%	2,504.95	49.1%	47.5%	40.0%	60.0%
Fixed Income:	0.00	0.0%	0.00	0.0%	2.5%	0.0%	15.0%
Credit:	200.01	3.9%	200.01	3.9%	7.5%	0.0%	10.0%
Private Equity:	472.14	9.2%	472.14	9.2%	7.5%	5.0%	15.0%
Real Estate:	254.13	5.0%	254.13	5.0%	10.0%	5.0%	15.0%
Infrastructure:	390.95	7.7%	390.95	7.7%	7.5%	5.0%	15.0%
Total Return:	709.04	13.9%	709.04	13.9%	15.0%	0.0%	20.0%
Cash:	794.01	15.5%	431.01	8.4%	2.5%	0.0%	10.0%
Diversified Growth Fund:	*144.98*	*2.8%*	*144.98*	*2.8%*	*N/A*	*N/A*	*N/A*
Total	**5,107.21**	**100%**	**5,107.21**	**100%**	**100.0%**		

- The asset values are **provisional, based on <u>preliminary data</u>** from the custodian JP Morgan as at 21 November 2016 and are therefore subject to change. The JPM preliminary data has been manually updated to reflect a more up to date LDI portfolio value.

- In the funds table preliminary asset data from JP Morgan has been grouped by asset class.
    - Total return includes the Insight bonds plus hedge fund and the Blackrock hedge fund
    - Commodities are included in the infrastructure line
    - The Blackrock co-investment is included in credit
    - Cash includes the mark to market of the currency hedge and the Liability Driven Investment (LDI) portfolio

- The data in the exposure table has been produced by adjusting the funds table:
    - Net synthetic equity exposure of £363m has been added to the public equities line (the synthetic equity option positions expired during October).
    - Derivative mark to market values, the Insight LDI fund and the currency hedge remain treated as being functionally equivalent to cash and included within the cash line.

For the purposes of the sensitivity analysis in this report the exposure table is adjusted further to reflect the diversified growth fund assets as follows:

- Diversified growth fund assets split 43% public equities, 37% fixed income, 11% cash, 6% hedge funds, and 3% real estate.

Risk Perspective:

31 October 2016	Risk Exposure		Policy Portfolio		
	£m	%	Benchmark	Minimum	Maximum
Equities:	2,568.07	50.3%	47.5%	40.0%	60.0%
Fixed Income:	53.71	1.1%	2.5%	0.0%	15.0%
Credit:	200.01	3.9%	7.5%	0.0%	10.0%
Private Equity:	472.14	9.2%	7.5%	5.0%	15.0%
Real Estate:	257.79	5.0%	10.0%	5.0%	15.0%
Infrastructure:	390.95	7.7%	7.5%	5.0%	15.0%
Total Return:	718.01	14.1%	15.0%	0.0%	20.0%
Cash:	446.53	8.7%	2.5%	0.0%	10.0%
Total	**5,107.21**	**100%**	**100%**		

- The risk exposure table excludes the interest rate and inflation rate exposure of the LDI portfolio. As at end October 2016 the LDI portfolio has a £0.6m per basis point interest rate exposure (PV01) and a £5.6m per basis point inflation rate exposure (IE01). The risk exposure table and the interest rate and inflation rate exposure of the LDI portfolio have been used to produce the sensitivity information on page 6.

- The LPFA credit portfolio is invested in relatively illiquid sub investment grade credit.

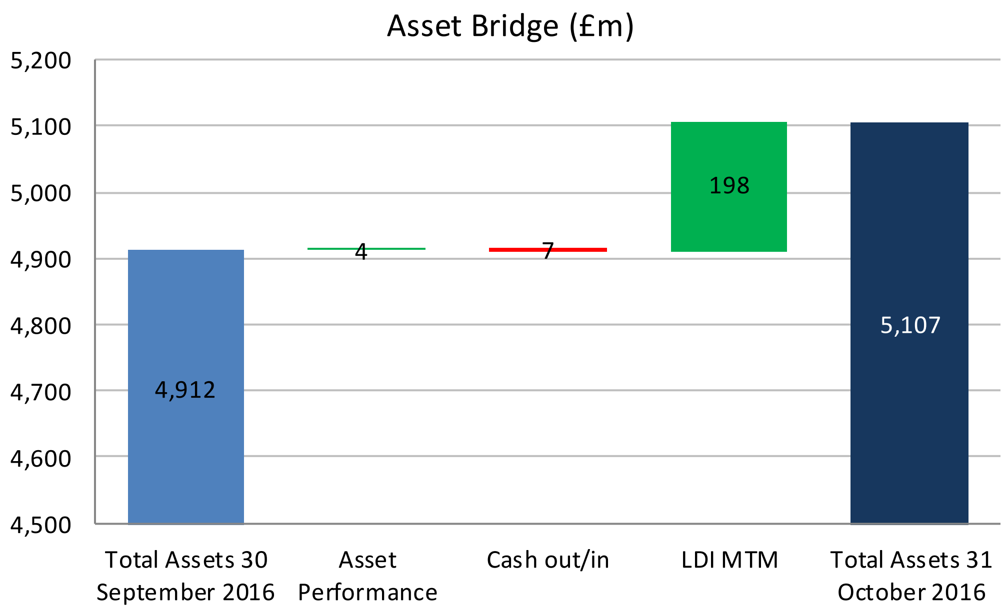
- Around 15% of Public and Private Equity is invested in the UK equity market, with the majority of equity exposure taken in the United States.

- LPFA has established a foreign exchange hedging program to reduce currency risk but overall, after allowance for that program, LPFA is short of around GBP1.6bn Sterling, mainly against USD (GBP 1bn) and EUR (GBP300m).

- In the risk exposure table, over October net cash has increased from 7% to nearly 9% of the Fund. The movements in net cash and cash equivalents are detailed below:

	30 September 2016 £m	**31 October 2016 £m**	**Change over October £m**
Cash at bank and GLA (preliminary data from JPM)	73	53	-20
Currency hedge	-41	-67	-26
Net synthetic equity exposure	-303	-363	-60
Insight LDI sub-portfolio	478	698	220
Diversified Growth Fund cash and cash equivalents	9	16	7
Cash held in Insight synthetic equity account	129	110	-19
Risk Exposure Cash Total	**346**	**447**	**101**

The change in total net asset value over October 2016 is explained as follows:



Inflation Hedging/LDI Portfolio

LPFA previously hedged both interest rates and inflation with the aim to protect the Swaps Flat balance sheet from falling interest rates and/or rising inflation. The interest rate hedge was subsequently closed, with a 25% inflation hedge left in place.

In December 2013 the interest rate exposure of the liability hedging benchmark was close to zero. However, since December 2013 inflation expectations have fallen and as a result interest rate exposure has emerged on the LDI portfolio and this is explored further below.

Insight Investment manage the inflation hedge. The Insight benchmark behaves like a portfolio of inflation swaps designed to hedge inflation. As inflation expectations have fallen since the swaps were traded, the swaps have accrued negative mark to market valuations. This in turn has created a positive PV01. **This means that currently the LDI portfolio falls in value if interest rates fall.**

As at 31 October 2016, if interest rate expectations fall by 0.1% p.a. the LDI portfolio will fall by approximately £6m, compared to £13m in September 2016 (and £6m in December 2015), the decrease in PV01 over the month has been driven by increases in inflation expectations. If inflation falls by 0.1% the LDI portfolio will fall by approximately £56m.

Over October 2016 the majority of the positive movement in the LDI portfolio was caused by an increase in inflation expectations (see asset bridge above).

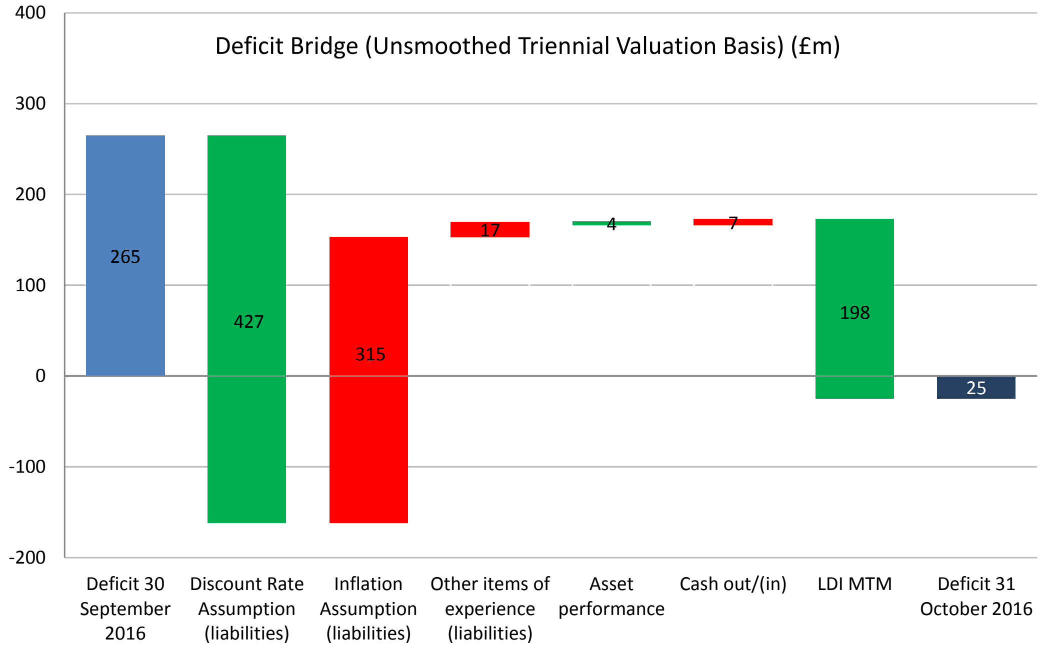
The PV01 of the liabilities on the Triennial valuation basis has not changed significantly over the last six months. The LDI portfolio is more sensitive to interest rate changes than the Triennial liabilities and the impact of the interest rate sensitivity of the LDI portfolio is greater on the Triennial valuation balance sheet than it is on the Swaps Flat balance sheet.

The interest rate sensitivity of the LDI portfolio is being monitored and officers are considering the action to take to manage it.

Balance Sheet Modelling

Triennial Valuation Basis

	31 October 2016	30 September 2016
Estimated liabilities triennial valuation basis	£5,082m	£5,177m
Estimated NAV	£5,107m	£4,912m**
Deficit triennial valuation basis	(£25m)	£265m
Estimated triennial funding level (Barnett Waddingham basis)*	100.5%	94.9%



- **Unsmoothed Triennial valuation assumptions are supplied by Barnett Waddingham and are now based on the proposed 2016 Triennial valuation methodology. In particular the discount rate references the LPFA Fund's long term policy portfolio asset allocation benchmark (see table page 1).**
- During October 2016 the Triennial funding level improved.
- The assumption for long term future RPI inflation, based on the 20 year point of the Bank of England implied inflation curve, increased from 3.40% to 3.80% p.a., increasing the assumption for future CPI inflation.
- This increase in inflation expectations increased the discount rate assumption which reduced the liabilities. Increases in swap, gilt and equity dividend yields over the month and use of the 2016 Triennial valuation methodology also increased the discount rate, although to a lesser extent.
- The increase in the inflation assumption also increased the liabilities, although this increase was offset by positive mark to market movements on the LDI portfolio.
- The other items of experience this month includes the effects of using the new 2016 Triennial valuation demographic and salary increase assumptions. The October liability figures also now allow for up to date membership data following the 2016 renewal data exercise and the effect of these changes are also reflected in this item.

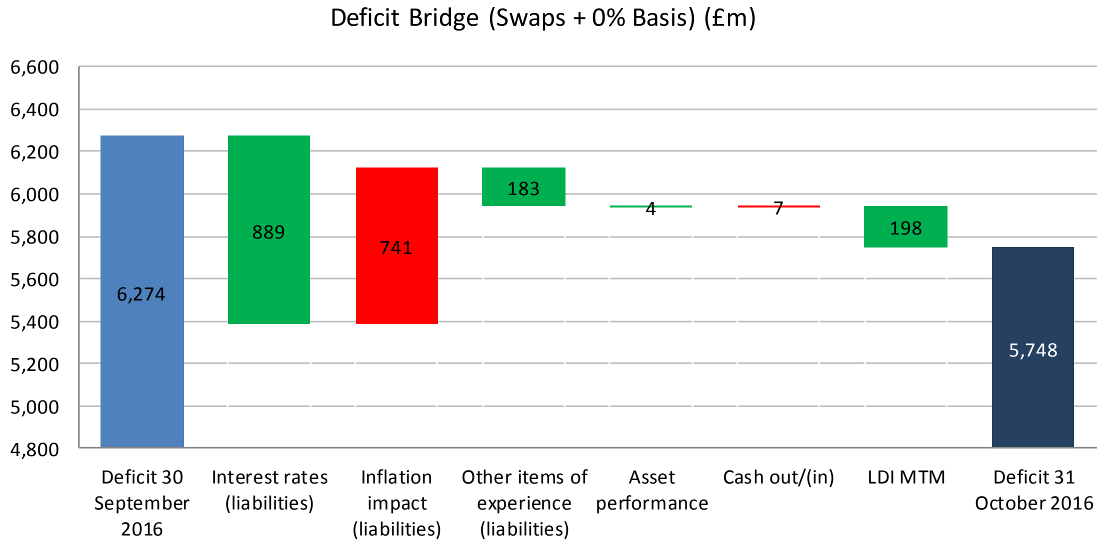
* *Estimated snapshot of funding level using 2016 triennial valuation assumptions updated for changes in market conditions, without smoothing.*

** *Updated post delivery of end September solvency report to reflect final month end assets from the custodian, JP Morgan.*

Swaps Flat (Swaps + 0%) Basis

At the request of the Board, as well as reporting on the Triennial valuation basis, we report results on a Swaps Flat basis. Please note that the primary focus of the Board and the Board's main duty is to manage the Fund's Triennial balance sheet.

	31 October 2016	30 September2016
Estimated liabilities Swaps Flat (swaps +0%) basis	£10,855m	£11,186m
Estimated NAV	£5,107m	£4,912m**
Deficit swaps + 0% basis	£5,748m	£6,274m
Estimated funding level swaps + 0% basis*	47.0%	43.9%



- The Swaps Flat funding level increased by 300bp during October 2016. Swaps Flat (swaps + 0%) discount rates increased by around 0.36% on average across the curve but inflation expectations also increased by around 0.30% on average across the curve (see graphs in appendix 3).
- As for the Triennial balance sheet, the other experience item in October includes the effects of updating assumptions to use 2016 Triennial valuation demographic and future salary increase assumptions and updated membership data reflecting 2016 renewal information.

*** Updated post delivery of end September solvency report to reflect final month end assets from the custodian, JP Morgan.*

Approximate Risk Sensitivities

	Unsmoothed Triennial Valuation Basis	**Swaps Flat Valuation Basis**
Equities fall by 10%		
Assets	decrease by £280m	decrease by £280m
Liabilities	decrease by £95m	unchanged
Deficit	increases by £185m	increases by £280m
Interest rates (swaps and gilts) fall by 1%		
Assets	decrease by £27m	decrease by £27m
Liabilities	increase by £168m	increase by £2,500m
Deficit	increases by £195m	increases by £2,527m
Inflation rises by 1%		
Assets	increase by £560m (LDI portfolio inflation hedge)	increase by £560m (LDI portfolio inflation hedge)
Liabilities	increase by £557m	increase by £2,400m
Deficit	decreases by £4m	increases by £1,840m
Long term rate of mortality improvement increases by 1.0%		
Assets	unchanged	unchanged
Liabilities	increase by £208m	increase by £825m
Deficit	increases by £208m	increases by £825m
10% decrease in member mortality rates		
Assets	unchanged	unchanged
Liabilities	increase by £133m	increase by £460m
Deficit	increases by £133m	increases by £460m
Property decreases by 10%		
Assets	decrease by £26m	decrease by £26m
Liabilities	increase by £7m	unchanged
Deficit	increases by £33m	increases by £26m
Sterling weakens by 10% against all other currencies		
Assets	increase by £160m	increase by £160m
Liabilities	unchanged	unchanged
Deficit	decreases by £160m	decreases by £160m

The analysis is based on the LPFA risk adjusted asset mix at 31 October 2016. As such, the triennial sensitivities shown in the table are slightly inconsistent with the Triennial solvency results shown earlier. If the 2016 Triennial solvency calculation was to be re-performed using the risk adjusted asset mix as at 31 October 2016, it is estimated that the unsmoothed triennial discount rate would be 5.6% rather than the discount rate of 5.8% supplied by Barnett Waddingham which uses the LPFA policy portfolio benchmark. The analysis considers the approximate funding level immediately after each event. Allowance is made for changes to the discount rate as a result of the market movements described and for the discount rate to reflect the immediate effect on asset allocation, before any rebalancing to the long term policy portfolio benchmark.

Recommendations:

[1] Executive Committee is asked to note this report.

Report date: 22 November 2016 **Lead Officer:** Tom Richardson

Compliance Checks

Governance issues:

The monthly solvency report is provided to all Board Members and is published on LPFA's website monthly. It is a key document to track the financial development of the fund.

Equalities impact:

Scheme Members will have the opportunity to request alternative formats as required.

Financial implications:

Implicit in this report.

Social, environmental, health and ethical issues:

The move to greater online publication is in line with LPFA's environmental initiatives.

Legal implications:

None – The production of this report is voluntary in nature.

Communication issues:

The report is published monthly on the LPFA website.

Risk implications:

This report is part of the process to manage and monitor the key investment and financial risks facing the fund.

Other relevant / supporting documentation:

None.

This report has been prepared for the LPFA and LPP Boards and it is for their exclusive use.

Its purpose is to provide an analysis of LPFA Fund solvency. The report has been prepared for the benefit of providing information to LPFA and LPP only. It does not provide advice and should not be relied upon for any other purpose without seeking further advice.

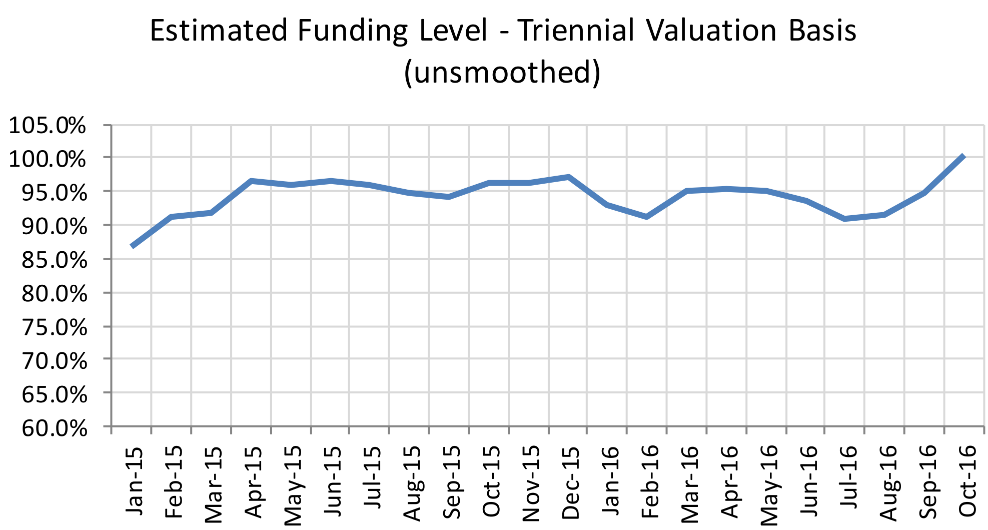
No other parties may rely or make decisions based on the content of this document. LPP and its employees acknowledge no liability to other parties.

The October Swaps Flat and Triennial liabilities were calculated by Barnett Waddingham's internal valuation system. The Valuations on Demand (VoD) system developed for LPFA that is normally used to produce liability values for these reports is being upgraded for use with new style membership data valuation extracts from Altair.

Estimated Funding Position – Triennial Valuation Basis

The triennial funding level was estimated using unsmoothed assumptions **supplied by Barnett Waddingham**, the Scheme actuaries. Barnett Waddingham base their analysis on the LPFA policy portfolio benchmark asset allocation as set out on page 1. The estimated funding position as at the end of October on this basis is **100.5%**, compared with 95.2% at the 1st of April (the start of the LGPS 2016-17 financial year).

The graph below shows the estimated funding level progression since January 2015.



Further details of the liability valuation assumptions are contained in appendix 2.

Estimated Funding Position – Swaps Flat (Swaps + 0%) Basis

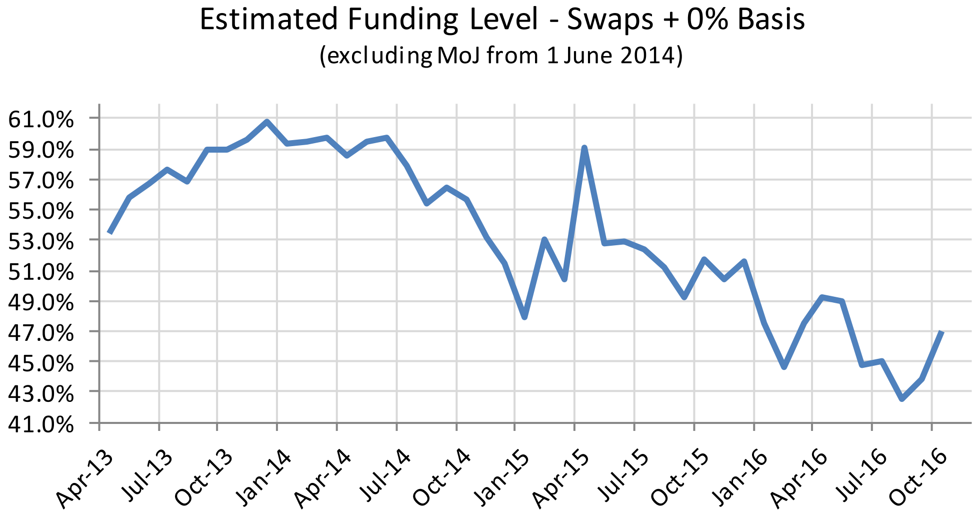
The estimated **Swaps Flat** funding level is **47.0%** as at end October 2016. This compares with a Swaps Flat funding level of **43.9%** at end of September 2016. The deficit decreased over the month from £6,274m to **£5,748m**.

The liabilities were calculated by discounting expected future cashflows using a swap[1] yield curve from Bloomberg and allowing for market expectations of retail and consumer price inflation from Bloomberg. All other assumptions are as per the 2016 Triennial valuation.

At end October 2016 the swap yield curve was higher at all durations than at end September 2016. The overall effect of this change in isolation is to decrease the estimated liabilities. Over the same period market expectations of inflation increased at all durations with the overall effect of these changes in isolation increasing the liabilities. The net effect of these along with other items of experience **decreased the liabilities** by approximately **£331m.** The inflation hedging ratio calculated by Insight is 28%.

[1] A swap is an agreement between two parties to exchange cashflows in the future with the swap rate being the fixed rate paid in exchange for a floating rate

The graph below shows the estimated funding level progression. The funding position after 1 June 2014 excludes the MoJ liabilities and after 1 February 2015 also excludes the Serco liabilities as part of the MoJ transfer.



If the swap yield curve decreased by 0.1% at all durations the valuation of liabilities would **increase** by approximately **£250m,** this effect would be increased by a **decrease** in the LDI portfolio of approximately **£6m**.

If market expectations of inflation increased by 0.1% at all durations the liabilities would **increase** by approximately **£240m,** this would be offset by an **increase** in the value of the LDI portfolio of approximately **£56m**.

Whilst the funding calculations allow for movements in assets and movements in liabilities resulting from changes in interest rates, inflation and membership information, the funding update information must only be viewed as approximate.

Data

October liabilities have been calculated using 31 March 2016 membership data allowing for 31 March 2016 renewal data changes.

Assets

The value of the assets used to calculate the funding level is an estimate provided by JP Morgan of net asset value at the month end. Estimates of the assets used in prior months may be updated once the assets have been reconciled by the custodian.

Assumptions

2016 Triennial Valuation Basis:

For the purposes of estimating the funding position on the triennial valuation basis the financial assumptions and assets have not been smoothed. For the formal triennial actuarial valuation of the Fund at 31 March 2016 the financial assumptions and the assets are smoothed over the six month period from 31 December 2015 to 30 June 2016.

The unsmoothed assumptions at 31 October 2016, **supplied by Barnett Waddingham** were as follows:

Discount Rate	5.8% p.a.
Retail Prices Index Inflation (RPI)	3.8% p.a.
Consumer Prices Index (CPI) Inflation	2.9% p.a.
Long Term Salary Increases post 2020	4.4% p.a.

The asset mix used to calculate the discount rate is based on the LPFA Fund's policy portfolio benchmark as detailed on page 1.

The demographic assumptions are those used for the 2016 Fund valuation. In particular, current post retirement mortality is assumed to be in line with updated 2016 Club Vita tables with improvements in line with the CMI 2015 model using a long term improvement assumption of 1.5% per annum. Members are assumed to commute 50% of their maximum allowance under HMRC rules.

Swaps Flat (Swaps + 0%) Basis:

Future expected cash flows have been discounted using a swap yield curve based on the GBP LIBOR zero curve obtained from Bloomberg. The curve only exists for durations up to 50 years and it is assumed that rates are flat beyond this point. Where rates are not available in earlier years then these have been calculated using linear interpolation.

Retail Price Inflation (RPI) has been based on a swap inflation curve based on the UK RPI swap market, with pricing provided by Bloomberg. The curve only exists for durations up to 50 years and it is assumed that the rates are flat beyond 50 years, where rates are not available in earlier years then these have been calculated using linear interpolation.

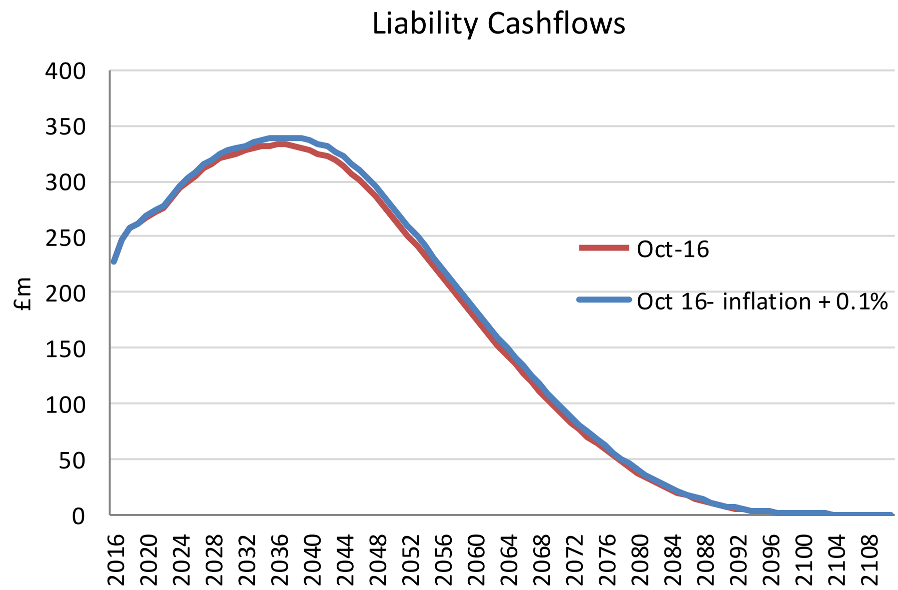
Consumer Price Inflation (CPI) inflation assumption has been based on the RPI assumption with a deduction of 0.9% per annum.

Long term salary inflation is assumed to be 1.5% above the CPI assumption.

The demographic assumptions are those used for the Fund's 2016 Triennial valuation.

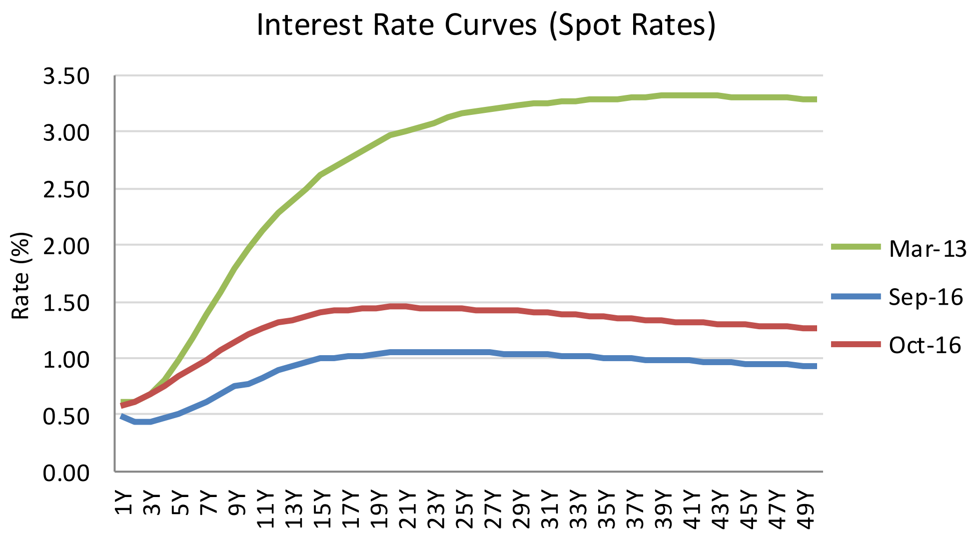
Anticipated Pension Cashflows

The graph below shows undiscounted expected future liability cashflows. These cashflows allow for future expectations of inflation as assumed in the **Swaps Flat basis**. The cashflows if inflation was 0.1% p.a. higher at all points along the curve are also shown in order to show the cashflows' sensitivity to inflation:

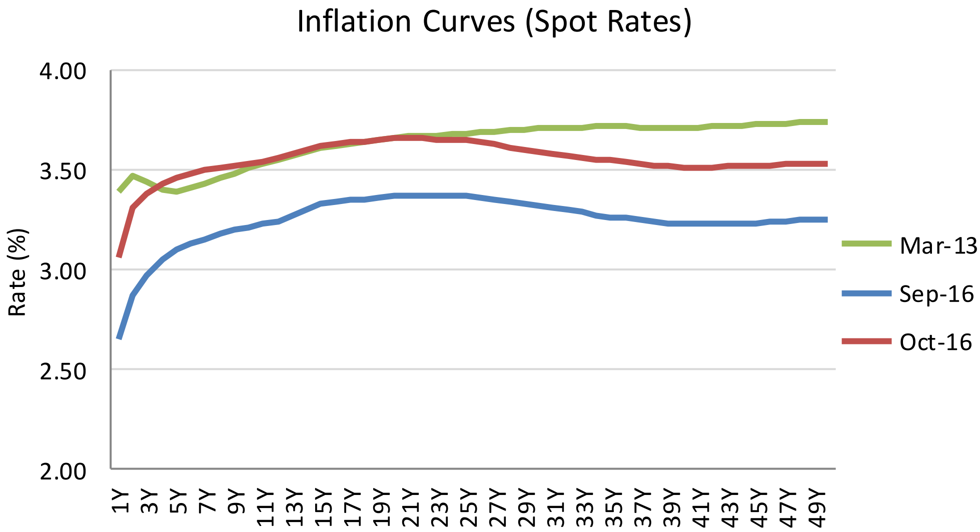


Market Rates – Swaps Flat (swaps + 0%) Basis

The graphs below show the current swap yield and swap inflation curves (used to calculate the liabilities for the Swaps Flat basis) along with the curves from September 2016 and the previous Triennial valuation date for comparison.



Source: Bloomberg



Source: Bloomberg