Universities Superannuation Scheme

31 March 2017 Actuarial Valuation

Assumptions approved for the scheme's technical provisions to value current benefits offered.

Date 8 December 2017 issued for 11 December Funding and Benefit Sub-committee meeting

Introduction

The 31 March 2017 actuarial valuation (2017 valuation) of the scheme is being carried out in accordance with the requirements of the Scheme's Trust Deed and Rules, and the Pensions Act 2004.

Every scheme providing defined benefits such as USS is subject to a requirement that it must have sufficient and appropriate assets to cover its technical provisions. The technical provisions are a scheme-specific measure of the liabilities - this is a prudent estimate of the assets needed to pay the pensions accrued, both for pensions already in payment and those which will become payable in the future.

The primary duty of the scheme's trustee is to ensure that there are sufficient funds available to pay the pensions promised, as they fall due. The trustee fulfils this role alongside the scheme's stakeholders, formally represented by Universities UK (UUK) and the University and College Union (UCU).

It is the trustee's role to determine the aggregate contribution rate to be paid for the current benefits. The stakeholders, through the Joint Negotiating Committee (JNC), decide on any revision to future benefits and/or how the cost of any required change to the aggregate contribution rate is to be met, subject to consultation with employees by the employers.

This document summarises the results of the valuation of current benefits using the assumptions approved by the USSL board following consultation with Universities UK. Details on these conclusions have already been shared with stakeholders during the process who have asked that the conclusions be summarised in a single document for ease of reference.

The summary does not represent the final results for the valuation which requires a decision on the future benefits to be provided. The method used by the trustee means the assumptions vary according to the level of benefits promised in future. Specific changes to pensions offered in the future are a matter for the scheme's stakeholders who are currently in negotiation.

The trustee continues to support these ongoing discussions, providing information and modelling to enable the stakeholders, and through them the employers and members, to understand the impact of any proposed changes.

The determination of future benefit and contribution levels can be iterative and the valuation assumptions cannot be finalised until a decision on future benefit and contribution levels has been reached.

Key results

The structure of the methodology used in 2014 remain in place. The trustee has recalibrated some of the funding tests to reflect current economic conditions, forecasts on future conditions and views on sector strength. The trustee has reviewed all significant financial and demographic assumptions from first principles.

The results of the 2017 valuation of current benefits are summarized below on range of relevant bases.

Table 1: Summary of Technical Provisions and Contribution Requirements as of 31 March 2017.

	Best Estimate**	Monitoring Basis***	Consultation Basis ****	Approved Basis
Accrued liability (TP)	£54.8bn	£72.7bn	£64.9bn	£67.5bn
Assets	£60.0bn	£60.0bn	£60.0bn	£60.0bn
Deficit on TP basis	–£5.2bn*	£12.7bn	£4.9bn	£7.5bn
Self-sufficiency (SS)	£82.4bn	£87.4bn	£82.4bn	£82.4bn
Total contributions (employer + employee):				
*Future service cost ** *	23.9%	37.9%	30.1%	31.4%
Average discount rate above CPI assumption	1.81%	0.48%	0.91%	0.71%
Average discount rate above gilt yield (for comparison purposes)	2.31%	0.96%	1.40%	1.20%

** Corresponds to a surplus, which results if no prudence is incorporated in the valuation. The best estimate reflects the revised investment strategy approved and differs from the calculation consulted upon.*

*** Contributions to recover any deficit or allow for any surplus are an additional adjustment to these figures*

**** These use the 2014 assumptions with the discount rate adjusted simply for the movement in gilt yields. The average discount rate above gilt yield quoted has been adjusted to use a CPI assumption consistent with the other bases, without this adjustment the rate would be 1.35%*

***** This uses the updated mortality assumptions subsequently consulted upon*

The future service cost includes both employer and member contributions and is split as follows:

Table 2: split of future service cost

Element of benefit	Contribution required (2014 values)
Defined benefits up to the salary threshold (risk benefits on whole salary*)	28.1% (20.4%)
Defined contribution above the salary threshold	2.1% (2.3%)
Employer matching contributions	0.8% (0.8%)
Expenses	0.4% (0.4%)

*benefits paid on death before retirement and ill health early retirement are fully defined benefit with no defined contribution element for those paid above the salary threshold

Key assumptions, and prudence, in the funding plan

The assumptions used in the Approved basis are detailed in Appendix A. The inputs are the same as used in the Consultation except for the rate at which the scheme is assumed to change the composition of its investments over time. Both start and finish at the same point in year 20 but the consultation approach was that no change occurred in the first 10 years and that all the change happens in years 11-20; whereas in the approved basis, the change occurs linearly through the 20 years. Consequently, the discount rate is different.

The assumptions put forward initially for consultation were based on provisional mortality assumptions. Mortality assumptions were consulted upon later in isolation. The figures and assumptions shown under the "Consultation" approach reflect the final mortality assumptions.

Stakeholders asked the trustee to use best estimates for the assumptions where allowed and to make an explicit adjustment for prudence in the calibration of the discount rate, and the trustee has adopted these principles. In addition the trustee has revised its views on self-sufficiency, future interest rates and prudence. There are therefore a number of areas where the approach differs from that used in 2014.

The impact of the adjustments to the 2014 assumptions on the valuation results are summarised below.

Table 1: Comparison of approved assumptions with 2014 assumptions

Basis	TP Liability	Future Service Contribution Rate
2014 Valuation approach	**£72.7bn**	**37.9%**
Update from market outlook including moving to best estimate CPI assumption	-£1.6bn	-0.7%
Change in demographic assumptions	-£2.8bn	-1.3%
Change in financial assumptions:		
Effect of interest rate reversion (including associated investment returns)	-£1.6bn	-4.9%
Moving from 65% confidence level on discount rate to 67% (increased prudence)	£1.3bn	0.6%
Real target reliance reduction to £10bn from £13bn	£1.1bn	1.0%
Self-sufficiency discount rate change	-£1.6bn	-1.2%
2017 Valuation approved approach	**£67.5bn**	**31.4%**

The main cause for the increase in future contributions is the substantially lower expected investment returns across all asset classes and long-term index-linked gilt yields falling by around 1.6% per annum since 2014 increasing the cost of moving to a self-sufficient portfolio. Defined benefit (DB) pension is now expected to cost around 40% more to provide than three years ago.

The increase in cost would be more significant if the trustee felt that its best estimate for the future was that future gilt yields are likely to follow the levels implied by current market forward prices. The trustee's best estimate is that gilt yields will revert to closer to the levels seen in 2014. If that expectation proves reliable then future valuation results will (all other aspects being equal) show an improved funding position and a reduced cost for future DB pension. If, though, the expectation does not occur then a deficit is likely to remain for longer than planned and further DB accrual costs will remain high for much longer.

The impact of the trustee's view on gilt yield reversion means that our best estimate is more optimistic compared to current and forward gilt yields than in 2014. We have though maintained the ratio of prudence as measured by the ratio of Technical Provisions to Best Estimate as can be seen below.

Table 4: Comparison of best estimate with prudent Technical Provision valuation

	2017 valuation approved	2014 valuation
Best estimate liability	£54.8bn	£38.1bn
Technical provisions	£67.5bn	£46.9bn
Amount of prudence as % of best estimate	**23.2%**	**23.1%**

Discount rate

The discount rate is effectively a prudently chosen allowance for future investment returns which is used in the calculation of the technical provisions. It enables the trustee to place a present day value on the assets needed to pay the accrued pensions.

It is the most significant assumption in the valuation. In 2017, the assumption was derived from an analysis of expected returns relative to future levels of CPI inflation. In 2014, the approach was to develop expected returns relative to gilt yields. The trustee's central assumption that gilt yields will revert over the first 10 years of the period after the valuation date gives a very different shape for the discount rate over time compared to that used in 2014. The assumed discount rate and CPI rate is set out in more detail in Appendix A and summarized in the table below.

Table 5: Summary of discount rate used

Time period after valuation date	2017 valuation	2014 valuation
Years 1 to 10	CPI minus 0.53% reducing linearly to CPI minus 1.32%	Gilts plus 1.7% decreasing linearly to Gilts plus 1.475%
Years 11 to 20	CPI plus 2.56% reducing linearly to CPI plus 1.7% at year 21	Gilts plus 1.45% decreasing linearly to Gilts plus 1.2% at year 21
Years 21 onwards	CPI plus 1.7%	Gilts plus 1.2%

Deficit recovery

The trustee proposes to link deficit recovery contributions to the future benefits decided upon by the JNC for two reasons. Firstly, under the iterative nature of the valuation approach, the deficit could be different under different future benefit scenarios. Secondly, differing levels of defined benefit accrual have differing impact on the development of risk levels measured by the reliance (self-sufficiency deficit) over time leading to a differing need for recovery contributions.

Deficit recovery contributions need to rise now given employers are unwilling to agree to automatic increases to contributions if reliance levels worsen. If benefits are maintained at the current level then deficit recovery contributions need to rise to 6% of pay. If no defined benefits accrue then the trustee is willing to accept deficit recovery contributions of 3.5% of pay. Changes are assumed to occur alongside benefit reform from 1 April 2019.

The precise period for the deficit recovery contributions and the assumed level of investment returns to repair the deficit will be settled later in the valuation process but it is anticipated that a period no longer than 17 years would be agreed. The trustee is reluctant to consider reducing the prudence in the approach by allowing for further investment returns but is willing to consider a modest allowance in scenarios where future DB accrual is low.

Implications for benefits

Decisions on future benefits and contributions are for the Joint Negotiating Committee to consider. The results under the proposed assumptions suggest that the current scheme benefit levels require contributions some 11.4% (31.4% future service cost plus 6% deficit recovery, compared with 26% currently being paid) of pay higher than at present.

If employers wished to pay higher *regular* contributions than the current 18% of pay to maintain the current level of pension then the trustee would need to re-consider the level of contingent contributions that could be supported. If future contingent contributions reduce from the current level of 7% of pay then this could compromise the maximum target reliance of £10bn used in the valuation. Lower maximum target reliance could lead to a more cautious approach being required with a higher cost for a £1 of defined benefit (DB) pension resulting.

To keep to current contribution levels, significant changes need to be made to the current benefit offer. The trustee has provided stakeholders with guidance on the cost of various elements of the current pension offer to help them to consider options for benefit and contribution changes.

The trustee will set out its views on benefit options requiring employer contributions higher than 18% of pay should a firm proposal be developed for serious consideration within the JNC. Thus 37.4% of pay is the minimum contribution required to maintain current benefits.

Advice received by the trustee

In forming the trustee's approach advice has been received:

- PwC and EY Parthenon in respect of the covenant of the sponsoring employers;
- USSIM as its investment advisors;
- Ali Tayyebi, the Scheme Actuary.

The Scheme Actuary has indicated that the approach adopted by the trustee is within the range which he can support albeit towards to the upper end (i.e. most optimistic end) of the range which he would consider to be reasonable for funding the current level of benefits for an employer covenant judged to be strong.

The Pensions Regulator's feedback

The trustee has shared its decisions with the regulator. The regulator has provided some initial feedback on the consultation approach. It is concerned that some outcomes it sees potentially being considered would lie outside the range it considers acceptable. It has questioned the strength of the employer covenant rating, in particular the ability and willingness of employers to pay in extremis contingent contributions higher than 18% of pay. Its doubts on the covenant informs its concern on the level of prudence relative to gilt yields proposed by the trustee in the consultation basis which is lower than in 2014.

The regulator shares the trustee's concern on the short-term risk that reliance on employers could, if further extreme events occur, rise to exceed the levels employers could reasonably afford over the long term.

The trustee has informed the Pensions Regulator of the change in approach following the consultation with UUK and will continue to discuss these issues as the JNC agrees its position on future benefits.

Appendix A

Method and assumptions used in calculating the technical provisions

Summary of decisions made as to method and key assumptions used for calculating technical provisions as at 31 March 2017

The actuarial method to be used in the calculation of the technical provisions is the Projected Unit method with a one-year control period. The key assumptions are summarized below.

Table 6: Summary of key assumptions

Principal actuarial assumptions for Technical Provisions as at 31 March 2017	
Market derived price inflation	In line with the difference between the Fixed Interest and Index-Linked yield curves
Inflation risk premium	0.3% pa
Price inflation – Retail Prices Index	Market derived price inflation less Inflation risk premium
RPI / CPI gap	1.0% pa
Price inflation – Consumer Prices Index	RPI assumption less RPI / CPI gap
Investment return	Years 1-10: CPI – 0.53% reducing linearly to CPI – 1.32% Years 11-20: CPI + 2.56% reducing linearly to CPI + 1.7% by year 21 Years 21 +: CPI + 1.7%
Pension increases in payment	CPI assumption (for both pre and post 2011 benefits)
Mortality base table	Pre-retirement: 71% of AMC00 (duration 0) for males and 112% of AFC00 (duration 0) for females Post retirement: 96.5% of SAPS S1NMA “light” for males and 101.3% of RFV00 for females
Future improvements to mortality	CMI_2016 with a smoothing parameter of 8.5 and a long term improvement rate of 1.8% pa for males and 1.6% pa for females

The derivation of these key assumptions and an explanation of the other assumptions to be used in the calculation of the technical provisions are set out below.

Financial assumptions

The financial assumptions shall be determined using a 'yield curve approach', with different assumptions applying at different points in time, reflecting the term structure of financial instruments. The particular approach to be used in determining each of the financial assumptions is set out below.

Inflation (RPI)

The assumption for the rate of increase in the Retail Prices Index (RPI) will be taken as a term structure derived from the investment market's expectation for inflation as indicated by the difference between an estimate of the yields available on conventional and index-linked UK Government bonds appropriate to the date of each future cash flow (extrapolated for cashflows beyond the longest available gilts), as advised by the Scheme Actuary. An adjustment may be made to the assumption to reflect market views that the prices of index-linked gilts include a 'risk premium' to reflect, for example, future inflation uncertainty. This adjustment may be limited by the existing or prospective level of inflation hedging targeted by the Scheme. For the 31 March 2017 valuation, the inflation risk premium is set to be 0.3% pa.

For the self-sufficiency and economic bases the inflation risk premium is assumed to be nil.

Inflation (CPI)

The assumption for the rate of increase in the Consumer Prices Index (CPI) will be derived from the RPI inflation assumption with an appropriate adjustment to recognise the difference between expectations of future RPI increases and future CPI increases. The adjustment will be reviewed at each valuation; at the 31 March 2017 valuation the adjustment was a deduction of 1.0% pa.

For the self-sufficiency and economic bases the adjustment to expected RPI is a deduction of 0.8% pa.

Investment return (discount rate)

A term structure derived from the expected CPI as above, plus a varying spread based on the allowance the Trustee has agreed for additional investment returns based on the investment strategy as set out in the applicable Statement of Investment Principles. The spread is CPI -0.53% pa decreasing linearly to CPI –1.32% in years 1-10, CPI +2.56% pa in year 11 reducing linearly to CPI +1.7% pa over the following 10 years and assumed to stay at CPI +1.7% pa beyond that point. This approach therefore includes a provision for gradual investment de-risking to take place over years 1 to 20.

As explained earlier, the choice of the discount rate may be impacted by the level of the future benefit accrual. For the 2017 valuation the discount rate takes into account the current benefit structure.

If, following a review of the investment strategy and any consequential changes to the Statement of Investment Principles after completion of the valuation then the assumed rate of investment return may also change at subsequent funding updates to reflect the different expected investment returns from the new asset mix.

For the "Self-sufficiency" and "economic" bases the discount rate assumes a term structure derived from the yield of fixed interest gilts appropriate to the date of each future cash flow (extrapolated for cash flows beyond the longest available gilts), as advised by the Scheme Actuary. For the "self-sufficiency" basis a margin of 0.75% pa is added.

Pension increases

Increases to pensions are assumed to be in line with the CPI inflation assumption described above. In particular, at the 31 March 2017 valuation no adjustment has been made for the fact that pension increases on benefits accrued after 30 September 2011 do not fully reflect inflation once CPI exceeds 5% pa.

Summary

The table below shows the Technical Provisions discount rate and CPI assumptions as at 31 March 2017, determined in line with the above approach.

Table 7: Assumed discount rate and CPI rate by term

Term	Discount rate *(forward)*	CPI *(forward)*	Term	Discount rate *(forward)*	CPI *(forward)*
1	2.00%	2.53%	26	3.61%	1.91%
2	0.65%	1.27%	27	3.46%	1.76%
3	0.56%	1.26%	28	3.31%	1.61%
4	0.61%	1.41%	29	3.17%	1.47%
5	0.69%	1.57%	30	3.05%	1.35%
6	0.79%	1.76%	31	2.96%	1.26%
7	0.89%	1.94%	32	2.90%	1.20%
8	0.98%	2.13%	33	2.86%	1.16%
9	1.06%	2.29%	34	2.84%	1.14%
10	1.11%	2.43%	35	2.85%	1.15%
11	5.11%	2.55%	36	2.88%	1.18%
12	5.13%	2.65%	37	2.93%	1.23%
13	5.12%	2.74%	38	2.99%	1.29%
14	5.10%	2.80%	39	3.07%	1.37%
15	5.06%	2.85%	40	3.17%	1.47%
16	5.00%	2.87%	41	3.27%	1.57%
17	4.92%	2.87%	42	3.39%	1.69%
18	4.81%	2.85%	43	3.51%	1.81%
19	4.68%	2.80%	44	3.64%	1.94%
20	4.52%	2.73%	45	3.77%	2.07%
21	4.34%	2.64%	46	3.91%	2.21%
22	4.22%	2.52%	47	4.05%	2.35%
23	4.09%	2.39%	48	4.19%	2.49%
24	3.94%	2.24%	49	4.33%	2.63%
25	3.78%	2.08%	50	4.47%	2.77%

Demographic assumptions

Mortality

The mortality assumptions is based on scheme-specific experience analysis, expressed as liability-equivalent adjustments to standard tables published by the Continuous Mortality Investigation (CMI), making allowance for future improvements in longevity. The mortality tables are as follows:

Pre-retirement

AxC00 (duration 0) tables taking 71% for males and 112% for females, and improvements using CMI_2016 with a smoothing parameter of 8.5, and long term rates of 1.8% pa for males and 1.6% pa for females.

Post-retirement

- Males: S1NMA "Light" with 96.5% weighting and improvements using CMI_2016 [1.8%] with smoothing parameter 8.5

- Females: RFV00* with 101.3% weighting and improvements using CMI_2016 [1.6%] with smoothing parameter 8.5
  **At ages below 50, the RFV00 table will extended by blending into the RFC00 table*

Early retirement

The allowance for early retirements will reflect emerging experience of retirements as monitored at each actuarial valuation and any adjustment for future expectations which is considered appropriate. For the 31 March 2017 valuation it has been assumed that ex-final salary active members will retire in line with the following decrement table (with all others assumed to retire at 65). Benefits relating to service accrued prior to 1 October 2011 are assumed to be paid with no reduction, and an allowance has been made for benefits accrued after 30 September 2011 to be reduced from the payable age of 65.

Table 8

Age	% leaving per annum
60	30
61	10
62	15
63	15
64	20

All other members of the scheme are assumed to retire at 65 and allowance is built in for the appropriate adjustment to each relevant tranche of benefit applicable to members in line with the benefit age or associated Contractual Pension Age.

Ill health retirement

A small proportion of the active members will be assumed to retire owing to ill health. As an example of the rates assumed at the valuation with effective date 31 March 2017, the following is an extract from the decrement table used:

Table 9

	% leaving per annum	% leaving per annum
Age	Males	Females
35	0.01	0.01
45	0.04	0.05
55	0.14	0.25

Withdrawals

This assumption relates to those members who leave the Scheme with an entitlement to a deferred pension or transfer value. It has been assumed that active members will leave the Scheme at the following sample rates:

Table 10

Age	% leaving per annum
25	18.28
35	9.11
45	5.38

Commutation

No allowance has been made for the option that members have to commute part of their pension at retirement in return for an additional lump sum (or indeed exchange part of their additional lump sum for pension) on the basis that the overall effect of these options is not expected to be material to the Scheme.

Proportion of beneficiary pensions payable and age difference

It has been assumed that a proportion of members will have an eligible beneficiary at the time of retirement or earlier death based on the following:

Males:
All: 109% of the ONS 2008 table for males

Females:
Non-pensioners: 84% of ONS 2008 table for females
Pensioners: 68% up to and including age 59, 56% at 60 to 64 and 73% of ONS 2008 over age 64

Sample rates as shown in the table below.

Table 11

	% spouse / partner		
Age	**Male**	**Female pre retirement**	**Female post retirement**
45	69.8	54.6	68.0
55	77.4	58.8	68.0
65	83.9	57.1	49.6
75	79.6	n/a	35.0
85	61.0	n/a	14.6

The surviving beneficiary of male members is assumed to be four years younger, on average, than the deceased scheme member, and the beneficiary of female members two years older.

Expenses

Expenses including PPF Levies are met by the fund. A provision for this is included by adding 0.4% of salary to the total contribution rate. This addition is reassessed at each valuation. The future level of the PPF levy in particular is very uncertain. Investment expenses have been allowed for implicitly in determining the discount rates.

Assumptions used in calculating contributions payable under the recovery plan

The contributions payable under the recovery plan will be calculated using the same assumptions as those used to calculate the technical provisions, with the exception of the following during the period of the recovery plan:

Investment return on existing assets and future contributions

[This section will be finalised later in the process]

Salary increases

The growth in the aggregate payroll of the scheme's membership, used in the recovery plan, is assumed to be CPI + 2% pa. Because of the methodology used for the valuation it is not necessary to specify assumptions for individual members' pay growth

Method and assumptions used in calculating the cost of future accrual

The cost of future accrual was calculated using the same assumptions as those used to calculate the technical provisions. The salary threshold has been assumed to increase in line with the CPI assumption, and an assumption has been made of an 80% take up for the 1% of salary matched contribution.