

Universities Superannuation Scheme

2017 Actuarial Valuation

A consultation with Universities UK on the proposed assumptions for the scheme's technical provisions and Statement of Funding Principles

Date 1 September 2017

Contents

Section one: Introduction	3
Section two: Overview	5
Section three: The underlying assumptions of the draft technical provisions	13
Section four: The discount rate	18
Section five: 2017 technical provisions and recovery plan: the draft results	22
Section six: The draft recovery plan	24
Section seven: Risk and reliance	26
Section eight: Advice received by the trustee	30
Section nine: Implications of valuation results	31
Appendix A: USS engagement with employers and members	33
<i>Methodology and inputs for the 2017 valuation – technical discussion document</i>	<i>38</i>
Appendix B: Reliance and risk	40
Appendix C: 2017 draft Statement of Funding Principles	45
Notes to Appendix C	48
<i>Method and assumptions used in calculating the technical provisions</i>	<i>48</i>
<i>Assumptions used in calculating contributions payable under the recovery plan</i>	<i>54</i>
Method and assumptions used in calculating the cost of future accrual	55
Appendix D: The underlying assumptions and sensitivity data	56
Appendix E: Glossary	57

Section one: Introduction

This consultation document forms part of the suite of documents that will be produced as part of the 2017 actuarial valuation of the scheme, being carried out in accordance with the requirements of the Scheme's Trust Deed and Rules, and the Pensions Act 2004. It constitutes formal statutory consultation on the Technical Provisions and the Statement of Funding Principles. Formal consultation on the Recovery Plan and the Schedule of Contributions will follow later in the valuation process. A number of technical terms are used to describe the approach taken by the trustee and their meanings are defined in a Glossary in [Appendix E](#).

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, Universities UK (UUK) and the University and College Union (UCU).

Further, under legislation it is the trustee's role to determine the scheme's technical provisions. The trustee also has a duty under legislation to consult with the employer representative as nominated by the scheme rules and take the advice of the Scheme Actuary before it finally determines the scheme's technical provisions. Ultimately, the Scheme Actuary will certify the technical provisions. 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 consultation paper sets out the assumptions which the trustee, having taken advice from the Scheme Actuary and its investment advisers, proposes to make in order to calculate the scheme's technical provisions. These calculations are based on full member data assembled by the trustee, which (for active members) is supported by payroll and other data collected from the employers. The consultation is with UUK on behalf of all employers participating in USS and meets the trustee's statutory requirement to consult with employers and as specified in the USS scheme rules.

In preparing for this valuation the trustee has reviewed its methodology and its principles and funding tests in an ongoing engagement with stakeholder representatives.

The trustee outlined its intended approach in the document, *Proposed Approach to the Methodology for the 2017 Actuarial Valuation: Response to the Valuation Discussion Forum (VDF document)* published on 28 November 2016. Since then, some changes have been made to the articulation, but not the principles, of its first funding test ("Test 1") to improve understanding of its derivation. These changes were outlined in detail in the February paper *Methodology and inputs for the 2017 valuation technical discussion document* and are [summarised in appendix A](#) in this document.

The *Methodology and inputs* document also included some discussion of amendments to Test 2. It is accepted that employers and UUK would like to see Test 2 retained in some form to measure and monitor

the risk that changes to future levels of benefit and/or contributions might be required at future valuations. It is the trustee's view that a model calibrated to the latest view of the expected return on assets will be a more reliable indicator of the change in the employers' long term risk exposure resulting from market movements in between valuations.

This consultation paper, and its appendices, include detailed information about the proposed assumptions to be used to calculate the funding level on a technical provisions basis. This calculation has, as anticipated, shown the scheme continues to have a deficit and this paper therefore also includes a draft recovery plan for consultation. In [appendix C](#) the draft Statement of Funding Principles (SFP) is provided and this includes an explanation of the reasoning behind the assumptions, in line with The Pensions Regulator's best practice, as well as more detailed information about the assumptions themselves.

Specific changes to pensions offered in the future are a matter for the scheme's stakeholders and the detail provided in this paper is based on the scheme arrangements (e.g. the benefits, employer and member contributions, and cost-sharing arrangements) as currently specified in the scheme rules.

Responses to this consultation will help the trustee to progress the formal valuation processes. The statutory deadline for completing the valuation and submitting the relevant paperwork to The Pensions Regulator is 30 June 2018. Alongside the formal valuation processes the scheme's stakeholders are progressing discussions around possible responses. To meet the statutory deadlines these stakeholder discussions about any necessary future benefit and/or contribution changes need to be completed by 1 December 2017, allowing for any required employer consultation with employees to take place in the early part of 2018 and the valuation processes to be finalised over the spring.

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. It is not necessary to conclude those discussions before carrying out this consultation on the technical provisions and Statement of Funding Principles. The underlying assumptions presented in this paper remain broadly the same for most benefit arrangements. Decisions to increase contributions paid by employers beyond the current level of 18% of pensionable pay can impact on the maximum level of risk the trustee can reasonably take, and thus impact on the value placed on the liabilities.

It is hoped that this information proves useful in considering this consultation. Responses should be sent to Universities UK (UUK) pensions@universitiesuk.ac.uk by noon on 29 September so that UUK can consider views submitted and respond on behalf of employers, based on the information you submit.

Section two: Overview

Valuation methodology

The trustee has consulted stakeholders on the methodology to be used in the valuation. The principles and 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 of future conditions and views on sector strength. The valuation process is designed to ensure that there will be enough money in the scheme to pay the benefits members have earned to date as and when they fall due. It also places a price on the accrual of pension for future service.

The trustee has reviewed all financial and demographic assumptions from first principles. The proposed changes to the assumptions from 2014 and the implications for future contribution requirement are discussed below.

Covenant strength and reliance on sponsors

This is the trustee's analysis of the collective financial strength of the participating employers to support the scheme through regular contributions (currently 18% of payroll) and in response to an extreme event – what the trustee terms as '*in extremis*' – by paying additional contributions should it be necessary to secure benefits earned to date.

A comprehensive, updated analysis carried out for the 2017 valuation has reinforced the confidence the trustee believes it can place in the covenant for at least the next 30 years. This supports the trustee's conclusions on the collective ability of sponsoring employers to pay a level of '*in extremis*' contributions. The total value of these assumed contingent contributions – set as an additional 7% of payroll – provides the scheme with an investment risk 'budget'.

The reliance the trustee places on participating employers is the difference, at any one point in time, between the scheme's existing assets and the assets required to move the scheme to a low-risk, 'self-sufficient' portfolio – one that would have a low probability of ever requiring any further employer contributions in respect of benefits earned up to that point in time.

The trustee targets its planned funding so that reliance is no more than the risk budget available – to ensure that moving the scheme to the relative security of a 'self-sufficient' portfolio is within affordable reach.

To assess the maximum level of risk that could be contemplated in the scheme's funding plan, employers were asked for their views on different calibrations for the maximum target reliance the trustee was prepared to consider. Employers preferred no increase to target reliance beyond the parameters adopted in 2014, noting that the same approach updated to 2017 values sees maximum target reliance in 20 years' time increase to £13bn assuming a 20 year payment period for contingent contributions from the range of £7bn-9bn used in 2014 over a 15-20 year period. Employers reaffirmed their desire to stabilise risk in the scheme, and to reduce it where possible over time.

Future interest rates and investment returns

The profile of long-term interest rates and future expectations are important in the trustee's assessment of how and when to reduce the scheme's investment risk exposure. Lower interest rates, relative to inflation, make moving the scheme to a lower risk portfolio more expensive – and potentially increases the level of reliance placed on employers.

The trustee has looked at the likely path for future long term interest rates and the returns it can expect to achieve from holding assets other than index-linked gilts, which remain well-suited to the liability-hedging needs of pension schemes but are very expensive. It concluded that its best estimate is that long-term index-linked gilt yields would not remain at the valuation date's historical low levels, but gradually revert to broadly 2014 levels, over the next 10 years

If long-dated index-linked gilt yields do not increase to the levels forecast then, all other aspects being equal, the level of reliance on employers will be higher than forecast which increases the level of investment risk the scheme is exposed to. To put this into context, the level of reliance on employers as at 31 March 2017 was £23bn (being £60bn assets held versus £83bn of assets required to move to a 'self-sufficient' portfolio). In 2014, reliance was £14bn and the funding plan aimed to reduce this to between £7-9bn over a 20 year period.

The higher level of reliance in 2017 is a material concern for the valuation. The trustee is considering what further steps may be needed to manage reliance in the short term as well as over the long term.

Stakeholder decisions on benefits and contributions for the 2017 valuation will need to consider the implications for both short and long term risk management.

Key assumptions proposed and results

The trustee is required by law to set assumptions prudently for the valuation to allow for a margin of adverse experience relative to best estimate assumptions. This is what is meant when a "level" or "margin" for prudence is referred to in this document – a position more cautious than a best estimate.

Following initial feedback from stakeholder representatives, the trustee proposes to use best estimates for the assumptions, where allowed, and only to make an explicit adjustment for prudence in the calibration of the discount rate and mortality assumptions. In addition the trustee has revised its views on self-sufficiency, future interest rates (as described above) and prudence.

The level of prudence and the reliance target proposed by the trustee in its calibration of the discount rate allows for a degree of uncertainty in the assumptions on forward long-dated index-linked gilt yields whilst retaining the integrity of the trustee's best estimates of future economic conditions. The trustee has chosen to consult on its view of future investment returns and hence its discount rate using:

- The 67th percentile confidence level (2014: 65th);
- A maximum target reliance of £10bn in year 20, lower than maximum reliance capacity of £13bn (2014: £7bn-£9bn);
- Self-sufficiency portfolio assessed using a discount rate of gilts + 0.75% (2014: gilts + 0.5%)

The average discount rate used is CPI + 0.9% which could also be expressed as gilts + 1.4% (the 2014 equivalent was gilts + 1.4% and CPI equivalent was CPI + 2.25%). Alterations to demographic assumptions and to the derivation of CPI means that comparisons of equivalent single discount rates between 2014 and 2017 need careful interpretation.

The results of the valuation under the proposed assumptions are a deficit of £5.1bn and future service contributions (employer plus employee) of 30.5% of pay for the current benefit offer before considering the required amount of deficit recovery contributions which must be paid. The future service contribution rate (plus costs) includes both employer and member contributions and is split as follows:

Table 1

Element of benefit	Contribution required (2014 values)
Defined benefits up to the salary threshold (risk benefits on whole salary*)	27.2% (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

The impact of lower expected future asset returns relative to 2014 has increased the future cost of defined benefit pension by around 35% at the 2017 valuation.

Contributions to recover the deficit are in addition and discussed below.

Impact of proposed assumption changes and views on prudence

The single most significant aspect of the proposed changes to assumptions is the trustee's best estimate of future long term interest rates. In 2014, the best estimate was closely aligned to the forward gilt curve. In 2017, the trustee's best estimate is that rates will revert back to 2014 levels over a ten year period which is c. 1.5% per annum above the forward gilt curve.

The trustee has increased the level of prudence compared to best estimate in the discount rate compared to 2014 as illustrated below.

Table 2

Attribution of changes, including prudence and reliance, between 2014 and 2017

	2017 valuation proposal	2014 valuation
Best estimate liability	£51.7bn	£38.1bn
Technical provisions	£65.1bn	£46.9bn
Amount of prudence as % of best estimate	25.9%	23.1%

The trustee does not directly link its view on investment returns to current market rate for long term interest rates. It believes the most reliable forecast for long term rates can be derived from analysis of fundamental economic building blocks.

In light of the best estimate view incorporating interest rate reversion, the trustee believes that modest additional margins for prudence are appropriate over the best estimate. If interest rates do not in fact revert as forecast to the levels proposed by the trustee, then future contribution requirements could increase and the level of reliance on the employers could remain at a higher level for longer than desired.

Measuring the discount rate relative to the gilt curve provides an assessment which can be used to compare risk levels now versus previous periods. Overall the trustee's proposed assumptions result in a significantly less cautious approach relative to the gilt curve than in 2014. The impact of the adjustments to the 2014 assumptions proposed on the valuation results are summarised below.

Table 3

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	-£2.6bn	-0.9%
Change in financial assumptions:		
Effect of interest rate reversion (including associated investment returns)	-£4.2bn	-6.2%
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 numbers for consultation	£65.1bn	30.5%

A further factor impacting the level of risk associated with the assumptions is how much of the deficit is assumed to be met from investment returns rather than deficit contributions. Asking for deficit recovery contributions rather than relying on higher expected investment returns reduces the risk associated with the approach.

Deficit recovery

The updated assumptions proposed for the 2017 valuation result in a deficit of £5.1bn.

The trustee proposes to maintain deficit recovery contributions at 2.1% giving a total required contribution rate of 32.6% compared to the current 26% (18% employer and 8% employee contributions). The deficit could be recovered after 8 years if the scheme's assets achieve 50% of the additional investment returns expected in excess of the rates assumed in the discount rate. If no additional investment return is assumed, and the recovery plan is comprised solely of additional contributions towards the deficit then the recovery period is estimated at 26 years.

The trustee believes it is important to retain deficit recovery contributions at least at this level, to ensure the scheme is as resilient as possible over the period when gilt yields remain low and the short term risk levels are volatile. The Pensions Regulator is also likely to challenge any proposal to reduce deficit contributions from their current level of 2.1%.

The period for the deficit recovery contributions will be influenced by the level of risk inherent in the path from the valuation date to the 20 year horizon which the scheme's benefits, contributions and investments are being managed over. The trustee is looking at the risks inherent in the journey, taking into account possible adverse scenarios and will settle on the period it wishes deficit recovery contributions to be paid over later in the valuation process. The overall risk management plan for the valuation is referred to as the "Journey plan" and is discussed further below.

Journey plan

In 2014, the trustee expected to reduce the scheme's absolute level of investment risk exposure by gradually moving to a lower risk portfolio over 20 years so that investment volatility remains proportionate to the pensionable payroll. Between valuations, long-dated index-linked gilt yields have fallen from already historically low levels by a further 1.5%, making them more expensive than in 2014. As a result, the trustee could not de-risk the portfolio under the funding triggers agreed at the 2014 valuation.

Based on the trustee's view of interest rate reversion, the economically optimal course of action would be not to de-risk until year 11– consistent with its best estimate view that gilt yields will revert to broadly 2014 levels over the first 10 years. Under this approach, steps to reduce risk exposure by investing in lower risk portfolios will then be taken from year 11 in order to arrive at the targeted level of reliance of £10bn by year 20. The trustee seeks views on this approach.

The reliance placed on the sector's employers as at 31 March 2017 was £23bn. The trustee's proposed funding approach targets reducing reliance from £23bn to £10bn in 20 years' time should its assumptions be realised. This is less than the £13bn the trustee believes could be supported '*in extremis*', which provides a margin for any deviation from the assumptions.

The current level of reliance is within acceptable limits of risk for the trustee but the path to its long term target is inherently uncertain. Given where interest rates are today, there is more risk inherent in the long term view than there was in 2014. It is important for employers to understand the short term risk profile and the implications for future benefit and contribution decisions.

Short-term risk profile

Based on current benefit levels, reliance on employers – essentially the scheme’s investment ‘risk budget’ – is expected to reduce from £23bn to £20bn by the 2020 valuation and to £17bn by 2023 under the trustee’s proposed assumptions.

Reliance is a very volatile measure with actual assets invested in 50% equity-like instruments and a low risk investment portfolio being heavily weighted towards bond-like investments. Reliance at the end of July 2017 had reduced to c. £19bn – a £4bn improvement in three months, due to a favorable trend in interest rates over that period. It had peaked briefly at close to £27bn during that period and is conceivable that such volatility could also see future levels of reliance worsen in the short-term.

While the size and scale of the sector’s employers supporting the scheme allows USS to take a long-term, 20-year approach, to managing the scheme’s funding plan, the trustee needs to be sure that the relative security of moving the scheme to a ‘self-sufficient’ portfolio of assets is a credible option.

Discipline against this measure provides employers with a clear sight of the risk to which they are exposed.

The trustee has stress-tested the short-term reliance position that could arise over the next two valuations if further extreme events occur. There are some credible scenarios – such as gilts falling further, or asset values declining - that could see reliance exceed a sensible current ‘risk budget’ that the sponsoring employers should collectively be asked to support. The trustee will consider these limits for short term reliance and the actions required to respond to them at its September board meeting.

The levers available to respond are:

- Increase the required contributions;
- Ask the JNC to consider changes to future benefit levels;
- Change the investment portfolio.

In practice, any solution is likely to involve aspects of all three and require some form of valuation process and consultation with stakeholders to address. However, it may be necessary to consider the need for a more rapid pre-agreed short-term response.

Estimating the likelihood of various future reliance levels is challenging involving many judgments on the possible paths for future interest rates and investment returns. The trustee has built a stochastic model to estimate the probability of reliance exceeding certain tolerance levels.

The trustee’s assessment of probabilities is very sensitive to the input assumptions and work continues to consider the most appropriate basis. The trustee has shared its initial views with stakeholders and will ensure Universities UK has the latest information to share with employers to accompany the consultation.

The probabilities are influenced to a notable degree by stakeholder decisions on future benefit and contributions. The trustee believes that the implications for risk should be considered alongside benefit and

contribution decisions. The timescale for making benefit changes limits the impact in the very short term to the next valuation date.

The trustee will work with the scheme's stakeholder representatives over the coming months to establish the steps that would be taken should routine monitoring indicate that further action such as an interim valuation is necessary.

The trustee would expect to finalise a view on how to respond to such a position alongside the decisions taken by stakeholders on benefits and to reflect these in its proposed statement of investment principles and schedule of contributions. In practice, these issues need to be resolved iteratively alongside each other during the autumn period leading to a JNC decision on benefits/contributions by December. The statement of investment principles and schedule of contributions will be consulted upon after any proposed benefit/contribution changes have been agreed following employers' consultation with affected employees.

Implications for benefits

Decisions on future benefits and who pays for the cost of increased contributions are for the Joint Negotiating Committee to consider and decide upon. The results under the proposed assumptions including continuing deficit recovery contributions are that the current scheme benefit levels require contributions some 6.6% of pay higher than at present. Looking at the 65%:35% split that would fall to employers/members to pay by default under current cost sharing agreements, results in employer contributions of 21.8% of pay, a level which the employers have indicated they would not wish to pay. Members would see contributions rise to 10% of pay as well as the loss of matching employer contributions to the USS Investment Builder.

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 '*in extremis*' contributions that could be supported – as the investment 'risk budget' would effectively be reduced. Lower target reliance could require a more cautious investment approach to reduce risk exposure, which in turn would increase the cost of future accrual of defined benefit (DB) pension further.

The trustee has provided stakeholders through the Funding and Benefits Sub-committee of the JNC with guidance on the cost of various elements of the current pension offer to help them to consider options for responding to the valuation's findings.

As noted above, the level of current reliance means that benefit/contribution decisions taken at this valuation may need to be re-visited outside of the usual valuation cycle should the trustee need to consider increasing the contribution requirements to respond to adverse developments in the short term risk position.

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 sector;
- USSIM and Mercer Investment Consulting as its investment advisors in respect of investment return assumptions;
- Ali Tayyebi, the Scheme Actuary.

The Scheme Actuary has indicated that the approach proposed to be adopted by the trustee is within the range which he can support albeit close 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.

The Pensions Regulator

The trustee has shared its emerging proposals throughout the process with the regulator as well as stakeholders. The regulator has provided feedback on its concerns with the emerging trustee position over recent months. It plans to provide its view of these proposals to the trustee and stakeholders once the formal consultation period commences.

Section three: The underlying assumptions of the draft technical provisions

The technical provisions are a prudent estimate of the assets needed to pay the pensions earned up to the valuation date (accrued pensions). The technical provisions calculation requires the trustee to make a number of demographic and financial assumptions and apply an appropriate level of prudence. These assumptions are reviewed at least every three years as part of the formal valuation process to ensure they remain relevant to the scheme's experience and are in-keeping with wider trends.

The inputs required for the valuation fall in to three groups namely:

- Reliance on participating employers: these are inputs to Test 1;
- Financial inputs;
- Demographic inputs.

The 2017 technical provisions are developed by reference to the assumptions used for the previous formal valuation in 2014. In February, the trustee published a technical discussion document entitled, *Methodology and Inputs for the 2017 Valuation* which discussed the range of inputs for the 2017 valuation, and set out the sensitivities for each of the assumptions.

The trustee has elected to adopt a *best estimate* approach to the majority of the financial and demographic inputs with the exception of the discount rate, and mortality assumptions, where an adjustment has been made for prudence. Stakeholder representatives want to see margins for prudence made explicit and concentrated in as few areas as possible to aid understanding. The trustee took the most significant financial and demographic assumptions, the discount rate and mortality, to allocate suitable levels of prudence to the valuation approach. The trustees' method also manages risk by explicitly linking the degree of investment risk taken to the employers' collective ability to bear risk and lowers, if necessary, the discount rate to keep within these limits.

The proposed inputs for the calculation of technical provisions as at 31 March 2017 are detailed in the table overleaf. For ease of reference a comparison with the assumptions adopted for the 2014 valuation is also provided.

Table 4

Summary of input assumptions for 2017 valuation

Issue	2017 assumption	2017 assumption compared to 2014 assumption	Impact on the liabilities at 2017 compared to 2014
Reliance on participating employers: inputs to determine maximum reliance			
Reliance Horizon	20 years	Same as 2014	Neutral
Maximum reliance at reliance horizon	£13bn in real terms	Same as 2014 when updated for current data.	Neutral
Target reliance at reliance horizon	£10bn in real terms	£13bn when updated for current data.	Increases liabilities
Level of contingent contributions used to calibrate maximum reliance	7% of pensionable salaries	Same as 2014	Neutral
Period over which contingent contributions are payable	20 years	Upper end of the range consider in 2014 (which was 15 to 20 years).	Neutral
Growth in maximum reliance over time	CPI inflation	Same as 2014	Neutral
Discount rate on a <i>self-sufficient</i> , low-risk investment portfolio	Gilts plus 0.75%	An increase in the margin above gilts of 0.25%.	Reduces liabilities.
Gilts yield in 20 years' time	Assumed to have reverted to a similar level as observed at the 2014 valuation.	A higher level of reversion than implied by the forward gilt curve which was used in 2014.	Reduces liabilities as a higher level of future yields reduces the future self-sufficiency liability and hence the impact of Test 1. However, as the reversion is only to a level similar to the level of yields in 2014, the net

			effect is neutral relative to 2014 in absolute terms.
Financial inputs			
Discount rate assumptions	<p>Best estimate asset returns allowing for increase gilt reversion to occur in the first 10 years to levels similar to those at the 2014 valuation.</p> <p>No de-risking in the level of growth assets held during the first ten years but with greater de-risking in years 11 to 20 to allow for Test 1.</p> <p>Expected returns are then reduced for prudence at the 67th percentile confidence level.</p>	<p>Increased gilt reversion over and above that factored into the forward yield.</p> <p>Lower de-risking in the first 10 years followed by an increase in years 11 to 20.</p> <p>Increased prudence to the 67th percentile and reduced target reliance using 77% of the maximum reliance on employers, (£10bn versus £13bn maximum).</p>	<p>Allowing for a higher rate of gilt yield reversion reduces liabilities.</p> <p>Planning de-risking for years 11 to 20 rather than assuming a linear de-risking path reduces the liabilities.</p> <p>Increasing prudence on returns and reducing the allowance for reliance each increase the liabilities.</p> <p>Overall, the liabilities are reduced.</p>
Inflation assumptions in respect of CPI	Market implied inflation for RPI adjusted by a constant gap to reflect the difference in the construction of the two indices and the market willingness to over pay for inflation protection (the inflation risk premium).	As 2014 but an increase in the gap between RPI and CPI (from 0.8% to 1%) and the inflation risk premium (from a decreasing assumption in 2014 of 0.2% to 0.1%, to 0.3% in 2017).	Reduces liabilities
Salary cost growth* assumptions	In line with general economic growth (CPI+ 2%) adjusted for short term views.	Similar approach to 2014	Neutral

*Salary cost is the pensionable pay paid to members of the scheme by employers it does not include any additional payroll costs such as national insurance or pension contributions.

Demographic assumptions			
Mortality assumptions (Interim)	The trustee has yet to finalise its view. It is proposed to use tables based on 2015 CMI experience. Moving to 2016 CMI experience would further reduce liabilities and future service cost slightly but not materially.	This approach assumes higher mortality than adopted for the 2014 valuation resulting in lower liabilities and contribution requirements.	Reduces liabilities

Retirement assumptions	Revised to reflect scheme experience for normal health retirements giving a distribution between 60 and 65, no change for ill-health.	Members previously assumed to retire at age 62	Reduces liabilities
Dependants' pension assumptions	Revised to assume pensions payable to fewer dependents of female pensioner members but that all dependents are 1 year younger.	The overall impact is a small reduction in liabilities and contribution rates.	Reduces liabilities
Withdrawal assumptions	Revised to reflect scheme experience	Not a major change	Reduces liabilities

Overall, the impact of the changes to the assumptions proposed for 2017 valuation is to lower the value placed on liabilities by £7.6bn and to reduce the required future contribution rate by 7.4%.

The breakdown of the changes can be summarised as follows:

Table 5

Area of change	Accrued Liabilities	Future contribution rate
Demographic assumptions	Reduced by £2.6bn	Reduced by 0.9%
Updated CPI and investment return expectations based on market conditions	Reduced by £1.6bn	Reduced by 0.7%
Discount rate calibration: <ul style="list-style-type: none"> Impact of best estimate moving from following forward gilt curve Impact of additional prudence relative to best estimate 	<p>Reduced by £4.2bn</p> <p>Increased by £0.8bn</p>	<p>Reduced by 6.2%</p> <p>Increased by 0.4%</p>
<i>Total impact</i>	Reduced by £3.4bn	Reduced by 5.8%

Detailed discussion for each of the assumptions can be found in the *Methodology and Inputs for the 2017 Valuation technical discussion document*, which was published in February 2017 a summary of which is provided in [appendix A](#). The trustee has made a change to one of the assumptions provided in that document – that is the proportion of women leaving a surviving spouse when they die. The trustees intends to assume a lower proportion of women leaving a surviving spouse when they die than previously adopted. The

proposed assumption more closely matches the scheme experience, this results in a small reduction in the scheme's liabilities and future service costs.

The trustee welcomes comments on all aspects of its calibration of the assumptions for the valuation and particularly the area of future salary cost growth albeit it is a much less significant an assumption now versus 2014 when the scheme offered final salary benefits.

The discount rate is the single most sensitive and important assumption. Its construction is multi-faceted and is discussed in more detail in section four.

Section four: The 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.

A detailed description of the process used to determine the expected investment return on the existing assets as defined by the trustee's "reference portfolio" for its target asset class allocation and how this is adjusted over time to allow for Test 1 is in the *Methodology and Inputs for the 2017 Valuation technical discussion document*, which is summarised in [appendix A](#).

An overview of the key aspects is given below. The process used to arrive at an appropriate discount rate is the same as in 2014 and involves:

- Determining a central "best estimate" of the expected investment returns of the current reference portfolio;
- Adjusting the expected returns to allow for changes in the required asset allocation held over time to remain within the parameters of Test 1;
- Subtracting an appropriate margin for prudence from the expected returns.

There are some important differences in the way this has been constructed in 2017 compared to 2014 and different conclusions drawn from a review of current market conditions.

The trustee has calibrated its expected returns on asset classes relative to future levels of CPI inflation. The scheme's liabilities are indexed by CPI. Previously, the trustee calibrated its expected returns by reference to returns on gilts.

In 2017, the trustee does not believe the forward gilt curve presents the best view of future asset returns and gilt yields over the long term. Its best estimate is that gilt yields will increase by around 1.5% above the rates contained within the forward gilt curve. The trustee has concluded that future interest rates will be higher than implied by the forward gilt curve whereas in 2014 the trustee was satisfied that the forward gilt curve provided a good central view of the path of future interest rates. The approach used and conclusions reached are explained in more detail below.

Central best estimates for future interest rates

The trustee has to form a view on the anticipated path of future interest rates and the returns it expects to achieve from the assets it envisages it will hold at any given point in time.

For the 2017 valuation, the trustee has constructed its view from a fundamental building blocks (FBB) approach which includes analysis of macro-economic factors as well as short and long-term trends. Note in particular that this is not based on a "gilts plus" approach.

In 2014, the trustee took the forward gilt curve for gilts plus a small amount of reversion above the forward gilt curve as the central path for future interest rates. In forming its view for the 2017 valuation, it has considered the arguments for and against assuming rates will follow the current forward gilt curve. The assumptions made for future interest rates are significant to the valuation assumptions. Not only do they impact on the assumed returns over the next 20 years they also determine the level of gilt yields in 20 years'

time which is the driver for determining the self-sufficiency liability. The self-sufficiency liability in 20 years' time less the maximum level of reliance the trustee can place on employers determines the technical provisions at that point of time and the required investment return ([this is explained further in appendix B](#)).

The FBB approach, and associated analysis, results in a central best estimate view that gilt yields will revert over a 10-year period to levels similar to those prevailing at the 2014 valuation, after which an equilibrium position is reached. This means interest rates and expected returns will remain lower for the first 10 years of the 20-year reliance horizon compared to those assumed in 2014.

The table below summarises the expected return for the reference portfolio in years one to 10 and thereafter.

Table 6

Expected returns as of 31 March 2017

Asset class	Reference portfolio weight	30-yr Exp real return	30-yr Exp nominal return	10-yr Exp real return	10-yr Exp nominal return	10-yr Fwd 20-yr Exp real return
Equities	62.51%	3.64%	5.97%	1.91%	4.20%	4.52%
Property	7.50%	3.23%	5.56%	2.56%	4.86%	3.57%
Listed Credit	10.00%	1.45%	3.73%	-0.14%	2.11%	2.25%
Index Linked	25.00%	-0.76%	1.47%	-3.82%	-1.66%	0.80%
Cash	-5.00%	-0.56%	1.68%	-1.10%	1.12%	-0.29%
Rebalancing & diversification premium*		0.50%	0.50%	0.50%	0.50%	0.50%
Reference Portfolio		3.00%	5.30%	0.97%	3.23%	4.03%

*This describes portfolio effects due to rebalancing and diversification of investments.

Impact of Test 1

Test 1 requires the trustee to hold assets that, together with the maximum reliance it can place on participating employers, are sufficient to allow the trustee (or the sponsoring employers) to move to a low-risk portfolio. This is an investment portfolio which has a low probability of requiring further contributions from employers to pay for the accrued pensions.

Under Test 1 the trustee first establishes the maximum reliance it can place on the sponsoring employers at the end of a 20-year projection period referred to as the reliance horizon. The trustee has determined the value of this maximum reliance as £13bn in real terms though it chooses to target a lower level of reliance of £10bn. The trustee calculates the maximum reliance in 20 years' time as 7% of pensionable salaries paid in extremis over a period of 20 years allowing for future salary growth, this amount is then expressed in real terms by adjusting to allow for CPI inflation to the end of the reliance horizon used for Test 1 (20 years). The way in which maximum reliance in 20 years is calculated is the same as in 2014 though using 2017's new assumptions and data means the amount is higher in absolute terms.

The next step is to determine the amount of assets the trustee would need to hold at the end of the reliance horizon (20 years) so that there is a low probability of requiring any further contributions from employers to pay the pensions accrued at that point. This is known as adopting a *self-sufficiency approach*.

The trustee has undertaken extensive stochastic modelling to determine the amount, and type, of assets it would need to hold in such a “low” risk portfolio (one which has less than a 5% chance of requiring further contributions). The outcome of this work is that the trustee has established a *self-sufficiency* portfolio calculated assuming a discount rate of gilts plus 0.75% and assuming prudent CPI inflation achieves this aim. The prudent CPI assumption is calculated as market-implied inflation (i.e., market-implied RPI) less 0.80%. This prudent CPI assumption is 0.5% higher than the central best estimate. This provides sufficient assets to achieve this low risk of requiring further contributions. This does not correspond to building additional prudence into the valuation, because by definition, self-sufficiency is a low cost, high confidence portfolio. This actually corresponds to our best estimate for self-sufficiency.

At the reliance horizon (20 years), the technical provisions are determined by establishing the required assets for *self-sufficiency* at that point and deducting the target amount of reliance provided by the sponsoring employers at that time, which must be no more than the maximum long term reliance of £13bn in real terms. The trustee proposes to set a higher funding target by using a lower value for target reliance in 20 years of £10bn. So the technical provisions in 20 years’ time are less than the self-sufficiency liabilities at that time by the amount of target reliance. There is no expectation that the value of the difference between *self-sufficiency* and the technical provisions would be paid in full immediately.

In order to reduce investment risk over time, and thereby ensure that reliance is at the desired target level at the end of year 20, asset risk is reduced on a uniform basis from the end of year 10. No de-risking is undertaken in years one to 10 when long-term interest rates are assumed to remain low but are nonetheless reverting to levels prevailing in 2014. In 2014, assets were assumed to de-risk uniformly over the 20 years period from the valuation date.

Adjustment for prudence

The central best estimate view of future interest rates places a higher degree of risk, and therefore potential reliance on the sponsoring employers, into the approach than if the trustee had simply chosen to follow the forward gilt curve more closely. The trustee has considered this extra risk and chosen to make changes relative to the assumptions it adopted for the 2014 valuation to the level of prudence it applies to its central best estimate and to the target level of reliance. Specifically:

1. *Prudence*: In years one to 20 instead of using best estimate investment return as the discount rate, the 67th percentile return is used, increasing the probability that return is achieved compared with that adopted in 2014 when the 65th percentile was used;
2. *Target reliance*: At year 20 the trustee has decided to use a long term target reliance of £10bn (i.e. £3bn less than the maximum of £13bn). Using lower than maximum target reliance has an impact equivalent to reducing the expected investment return assumptions by 0.25% in year 20.

The trustee has considered alternative lower central estimates for the path of future interest rates that are closer to the forward gilt curve and taken advice from its independent investment advisers. The trustee has looked at the alternative approach adjusted by prudence at both the 65th percentile and allowing for the maximum reliance employers can support.

As noted above, the trustee does not follow a “gilts plus” method for setting the discount rate. It has though tracked the funding position since 2014 assuming a fixed margin over gilts and shared this information regularly with stakeholders and members through its annual report. It will be helpful for stakeholders to

understand the total impact of changes to the calibration of the discount rate discussed above and the changes from the monitoring “gilts plus” approach that arises from assessing market conditions in 2017.

Overall, the changes made in 2017 compared to 2014 can be summarised as follows:

Table 7

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	-£2.6bn	-0.9%
Change in financial assumptions:		
Effect of interest rate reversion (including associated investment returns)	-£4.2bn	-6.2%
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 numbers for consultation	£65.1bn	30.5%

The discount rate proposed for consultation is as follows:

Years 1-10: CPI – 0.53%

Years 11-20: CPI + 2.8% de-risking linearly to CPI + 1.7% by year 21

Years 21+: CPI + 1.7%

The 2014 discount rates were:

Years 1- 20: Gilts + 1.7% de-risking linearly to Gilts + 1.2% by year 21

Years 21+: Gilts + 1.2%

Section five: 2017 technical provisions and recovery plan: the draft results

The table below summarises the technical provisions and required contribution rate based on the trustee's proposed basis for the 2017 valuation. For comparison the table also provides details of the liabilities on the:

- best estimate basis;
- 2014 assumptions keeping the discount rate at the same fixed margin over gilt yields as used to monitor funding since 2014; and
- Updating all assumptions for 2017 review but using the forward yield for interest rates and 2014 calibration of self-sufficiency in the derivation of the discount rate ("2014 approach with fully updated assumptions").

Table 8

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

	Best Estimate	Monitoring Basis***	2014 approach with fully updated assumptions	Proposed Basis
Accrued liability (TP)	£51.7bn	£72.7bn	£68.5bn	£65.1bn
Assets	£60.0bn	£60.0bn	£60.0bn	£60.0bn
Deficit on TP basis	-£8.3bn*	£12.7bn	£8.5bn	£5.1bn
Self-sufficiency (SS)	£82.6bn	£87.4bn	£82.6bn	£82.6bn
Total contributions (employer + employee):				
<i>Future service cost</i>	22.5%	37.9%	36.3%	30.5%
<i>Deficit contribution**</i>	0%	6.6%	2.1%	2.1%
<i>Total contribution</i>	22.5%	44.5%	38.4%	32.6%
Average discount rate above CPI assumption	2.14%	0.48%	0.66%	0.91%
Average discount rate above gilt yield (for comparison purposes)	2.65%	0.96%****	1.15%	1.41%

* Corresponds to a surplus, which results if no prudence is incorporated in the valuation.

** See next section for explanation

*** The results use the actual data and full valuation calculations and as such are different to the estimated figures previously disclosed. The deficit is assumed to recover over 17 years in this illustration

**** This has been adjusted to be based on a consistent CPI assumption with the other columns. Without this adjustment the rate would be 1.35%.

It will be readily appreciated from the above variations that the scheme's funding position varies considerably according to the view taken on the assumptions. Further details of our sensitivity analyses of the above proposed technical provisions and contribution rates relative to each assumption are provided in appendix D.

The table below provides a split of the future service costs under the Proposed Basis:

Table 9

Split of future service costs	2014	2017
DB cost	20.4%	27.2%
Expenses	0.4%	0.4%
DC benefits	2.3%	2.1%
DC Match	0.8%	0.8%
Total	23.9%	30.5%

The future DB cost of 27.2% can be compared with that emerging from the 2014 valuation of 20.4%. The proposed basis results in an increase of 35% in required contributions for defined benefit accrual from that arising from the 2014 valuation.

The difference between the proposed basis and the 2014 approach results largely from the changes made to the self-sufficiency discount rate and interest rate reversion. In 2014, a self-sufficiency discount rate of gilts plus 0.50% was used to give the required low probability of further contribution being required. In 2017, with a revised low-risk asset portfolio a self-sufficiency discount rate of gilts plus 0.75% achieves the requirement of a low probability of needing additional contributions.

The assumptions that have the most impact on these results are the discount rate and the amount of target reliance assumed. The trustee is aware that employers have expressed a strong consensus against any significant rise in employer contributions. If, however, employers did wish to pay higher regular contributions then this could impact the maximum level of reliance that the trustee can place on the participating employers which in turn could require a lower-risk approach to investments and thus funding, resulting in higher contribution rates. Further details are given in section seven on risk and reliance.

Section six: The draft recovery plan

Based on the trustee’s proposed assumptions, there is a deficit between the value of the scheme’s assets and the value of the liabilities, as calculated on a technical provisions basis. Accordingly, the trustee must set out a plan for returning to a fully funded position by reference to the statutory funding objective under legislation. This is known as a recovery plan.

The trustee’s starting point for the 2017 recovery plan is to consider the current deficit contribution of 2.1% of pensionable salaries. The trustee assumes a prudent level of investment returns to determine the liabilities. It expects some additional investment returns over the long term to contribute to recovering the deficit. The possible outcomes depending on the assumed level of expected investment returns relative to the discount rate are shown below.

Table 10

Percentage of expected asset return above discount rate used in recovery plan	Period over which current deficit contribution (2.1%) clears deficit
0%	26 years
25%	12 years
50%	8 years
75%	6 years
100%	5 years

In 2014, the trustee calculated the deficit contributions by including an assumption of additional investment return above the discount rate. This “outperformance” was assumed to be 50% of the difference between the best estimate investment return and the discount rate over the 17-year recovery period. Adopting the same approach now would see the deficit cleared in eight years if the assumed investment returns occurred, as highlighted in the table above.

The trustee, mindful of its central best estimate for gilt yields being higher than the forward gilt curve, also considered what level of funding was required to recover the deficit assuming no additional investment return outperformance occurred. As shown in the table below, assuming no outperformance leads to a deficit contribution rate of 3.3% over a 17-year recovery period to clear the deficit.

Table 11

Deficit contribution rate required to repair the deficit over different horizons

Percentage of expected asset return above discount rate used in recovery plan	5 years	10 years	15 years	17 years
0%	12.5%	5.8%	3.8%	3.3%

The trustee proposes to keep the current level of deficit contributions at 2.1% of pensionable salaries. If the level of outperformance of 50% assumed in 2014 is achieved then the deficit will be recovered in eight years, i.e. before the 10-year date the trustee has assumed in its central best estimate for the reversion of future interest rates.

The trustee considers that despite the calculations showing the deficit could be cleared by anticipated investment returns alone over the period of the current recovery plan, it is inappropriate to reduce deficit contributions when the deficit is broadly similar to that in 2014. Instead, setting a shorter timeframe in which to recover the deficit is a proportionate measure which works well alongside the trustee's view of future interest rates. This approach also delivers stability of deficit funding for employers. Having lower assumed investment returns to recover the deficit is more prudent than assuming the same level of deficit funding is paid for a shorter period with higher assumed investment returns. The trustee expects that the Pensions Regulator would also strongly challenge any proposal to reduce the deficit recovery contributions.

In addition to recovering the shortfall on the long term funding of the scheme, the trustee has also considered the risks inherent in the scheme's funding position over the short term. The trustee proposes to maintain a deficit contribution of 2.1% with the recovery period to be finalised later in the valuation process when employers will be consulted on the schedule of contributions to be paid.

Section seven: Risk and reliance

The trustee's approach to funding relies on the collective ability of the sponsoring employers to be able to support the scheme by providing additional contributions should it become necessary to respond to an extreme event to increase the security of accrued pensions at any given point of time.

Reliance is the difference between the assets held at a given point in time and those assets required to allow the scheme to be self-sufficient, i.e. a low probability of requiring further contributions to secure accrued pensions.

The trustee would not wish reliance to be so great that it exceeds levels that can reasonably be supported by the employers.

The value of these contingent, '*in extremis*' contributions is known as the scheme's reliance capacity and it is, effectively, the scheme's risk budget.

Calibration of reliance capacity

The trustee commissioned PWC and EY to conduct a thorough covenant analysis of the scheme's participating employers, and the factors affecting their finances. The approach adopted, and the conclusions reached, are summarised in [appendix A](#).

Following engagement with employers earlier in the year, the level of reliance capacity which the employers were willing to support in the longer term was equivalent to the present value of the 7% contingent contributions that the trustee's covenant assessors indicated could be levied. The figure of £13bn in real terms is the maximum level of reliance capacity the trustee can place on the sponsoring employers in 20 years' time. It is the present value of contingent contributions paid over 20 years in real terms (as measured by CPI inflation). In 2014, the trustee agreed a 15-20 year payment period with employers resulting in maximum reliance capacity of £7bn-9bn.

The trustee has determined that it will limit the target reliance it places on employers to £10bn in 20 years' time. It is an explicit margin to help manage the funding plan to stay within the risk capacity of participating employers should actual events be worse than assumed.

Reliance variations

The trustee has considered the reliance placed on the employers today and how it might vary if assumptions are not met.

Under the trustee's proposed assumptions, reliance at the valuation date was £23bn. Given the visibility of the covenant is over 30 years, the maximum reliance the trustee is willing to accept in the short term is much higher than it is willing to accept in 20 years.

The trustee is considering where the limits for short term reliance lie. The value of contingent contributions, assuming 7% of pensionable payroll, over periods up to 40 years from the valuation date are noted below.

Table 12

Maximum acceptable reliance at valuation date for different contribution periods					
No. years over which additional contingent contributions payable	15yrs	20yrs	25yrs	30yrs	40yrs
Present value at valuation date of contingent contributions of 7% of payroll	£9bn	£13bn	£17bn	£21bn	£31bn

In addition to the 7% in extremis contingent contributions, the trustee also considers the 2.1% deficit contributions as providing support to the short-term reliance provided by the employers. Taking these deficit contributions into account increases the maximum acceptable reliance figures in Tables 12 and 13 by 30%.

Table 13 below illustrates some potential levels of reliance at the next two valuations under expected and some adverse scenarios where interest rates do not revert in line with the best estimate view.

- The assumptions on interest rates in the 2014 approach updated are realised exactly. This means that the assumed gilt yield reversion does not materialise. Instead real yields follow a forecast only slightly above the forward yields, consistent with the 2014 approach. Similarly lower expected returns are realised as expected in that case. As a result discount rates are significantly lower;
- The impact of additional stress events (an abrupt fall in asset values of 10% and a sharp fall in real yields of 0.50%).

Table 13

Stress test impact in 3 years' time (figures in real terms)	Realised reliance*	20 years' contributions	30 years' contributions	40 years' contributions
A. Experience follows assumptions	£20bn	£13bn	£21bn	£30bn
B. Experience follows "Limited reversion" of gilt yields**	£24bn	£13bn	£22bn	£32bn
C. (B) + Asset values fall 10%	£30bn	£13bn	£22bn	£32bn
D. (B) + Real yields fall 0.5%	£34bn	£14bn	£24bn	£35bn
E. (B) + Assets fall 10% + real yields fall 0.5%	£41bn	£14bn	£24bn	£35bn

Stress test impact in 6 years' time (figures in real terms)	Realised reliance*	20 years' contributions	30 years' contributions	40 years' contributions
F. Experience follows assumptions	£17bn	£13bn	£21bn	£29bn
G. Experience follows "Limited reversion" of gilt yields**	£24bn	£14bn	£23bn	£33bn
H. (B) + Asset values fall 10%	£31bn	£14bn	£23bn	£33bn
I. (B) + Real yields fall 0.5%	£35bn	£15bn	£25bn	£37bn
J. (B) + Assets fall 10% + real yields fall 0.5%	£41bn	£15bn	£25bn	£37bn

* Realised reliance calculated at the relevant dates assumed stress test applied instantaneously. In the stress test an extra margin of 1.8% of the liabilities has been added to cover mortality risk. These figures are to be compared with 7% of pensionable salary paid over 20, 30 and 40 years.

** Limited reversion means 2014 valuation approach with limited yield reversion and fully-updated assumptions.

Reliance management

The trustee already monitors funding levels on a daily basis and monitors developments in the employer's covenant on a monthly basis. The scheme's position in relation to each of the three funding tests is formally reviewed at each trustee board meeting. The trustee is well placed to take action should the level of reliance realised increase towards the limits of its tolerance.

Reliance is volatile because the assets invested are c. 50% in equity-like instruments and whilst assets required for in a low risk portfolio are predominantly bond-like and assessed by reference to gilt yields plus a margin (0.75%).

Since the valuation date, reliance peaked briefly at just under £27bn, was as low as just under £18bn and was just under £19bn at the end of July due to favourable movements in gilt yields.

The strength of the sponsoring employers supporting the scheme allows the trustee to take a long term (20 year) view for funding pension benefits. However, the risks inherent in the funding position at any given point on that journey cannot be ignored.

Table 13 notes that the self-sufficiency position could in the very short term worsen considerably to the point where the trustee would have no choice but to take further action to keep the risks within reasonable levels.

Risk mitigation

The trustee will consider limits for short term reliance and the actions required to respond to them at its September board meeting.

The levers available to respond are:

- Increase the required contributions;
- Ask the JNC to consider changes to future benefit levels;
- Change the investment portfolio.

In practice, any solution is likely to involve aspects of all three and require some form of valuation process and consultation with stakeholders to address. However, it may be necessary to consider the need for a more rapid pre-agreed short-term response.

Estimating the likelihood of various reliance levels is challenging involving many judgments on the possible paths for future interest rates and investment returns. The trustee has built a stochastic model to estimate the probability of reliance exceeding certain tolerance levels.

The trustee's assessment of probabilities is very sensitive to the input assumptions and work continues to consider the most appropriate basis. The trustee has shared its initial views with stakeholders and will ensure Universities UK has the latest information to share with employers to accompany the consultation.

The probabilities are influenced to a notable degree by stakeholder decisions on future benefit and contributions though the timescale for changing benefits means it has less impact before the next valuation in 2020. The trustee believes that the implications for risk should be considered alongside benefit and contribution decisions.

The trustee will work with the scheme's stakeholder representatives over the coming months to establish the steps that would be taken should the trustee's monitoring indicate that further action such as an interim valuation is necessary in future.

The trustee would expect to finalise a view on how to respond to such a position alongside the decisions taken by stakeholders on benefits and to reflect these in either or both of the schedule of contributions and its statement of investment principles. In practice, these issues need to be resolved iteratively alongside each other during the autumn period leading to a JNC decision on benefits/contributions by December.

The schedule of contributions and recovery plan will be consulted upon after any proposed benefit/contribution changes have been agreed following employers' consultation with affected employees. Consultation on any revised statement of investment principles will follow in due course after that.

Section eight: Advice received by the trustee

In forming its view on the assumptions to arrive at the appropriate level of technical provisions the trustee has received and considered advice from:

- Covenant advisors, PwC and EY Parthenon;
- USSIM and Mercer Investment Consulting as its investment advisors in respect of investment return assumptions; and
- The Scheme Actuary, Ali Tayyebi.

In his advice to the Trustee, the Scheme Actuary has noted the following key points:

There are a number of areas where the proposed approach for the 2017 valuation is more optimistic than the approach adopted in 2014:

- Gilt yields are assumed to revert to a higher level than is implied by the market forward gilt curve;
- No explicit allowance for investment de-risking is included over the first 10 years;
- The margins of prudence in other areas of the basis, notably the inflation related assumptions, have been removed;
- The discount rate adopted for the self-sufficiency basis that is used to measure the reliance on covenant has been increased from gilts + 0.5% to gilts + 0.75%.

As a result, the margin of prudence is now concentrated in the confidence level associated with the discount rate and the level of reliance targeted at 20 years.

Therefore, in his view, the confidence level for the choice of the discount rates should be towards the upper end of the range which might be considered in isolation (60-70%) and in particular that it would appropriate to set this to be close to 70%.

The Trustee's package of assumptions as detailed in this document includes a discount rate based on a confidence level of 67%. The Scheme Actuary has advised the trustee that this package of assumptions is close 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.

The Pensions Regulator has seen the key documents relating to the valuation and attended a number of meetings with USS, UUK and both USS and UUK. It has expressed concerns with the trustee's view of the covenant's strength, in particular the combined ability and willingness of institutions to pay more *in extremis* contributions in future than the current regular rate of 18%. These doubts, in turn, inform its concern on the level of overall prudence proposed by the trustee. It questions whether the assumptions carry the appropriate amount of prudence relative to the strength of the covenant. The Pensions 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 Pensions Regulator plans to provide its view of these proposals in writing to the trustee and stakeholders once the formal consultation period commences.

Section nine: Implications of valuation results

The required aggregate contribution rate of 32.6% of pensionable salaries resulting from the assumptions proposed in the consultation would, if agreed by the trustee after consultation and considering the regulator’s feedback, require the JNC to consider how this cost should be met. If the additional contributions over the current joint contribution rate of 26% were simply split in the proportion 65:35 employer to members after removing the 1% employer matching contribution to the DC section (as documented in the scheme rules), then this results in a required contribution for employers of 21.8% of pensionable salary and employees paying 10%.

If employers expressed a desire to pay 21.8% of contributions as the long term regular contribution rate and this level persisted then it necessarily reduces the employers’ ability to pay higher in extremis contingent contributions in future. As a result the trustee would need to reconsider the level of reliance that it could place on employers. In the absence of any alternative forms of security, a reduction in maximum reliance would see the required contribution rate increase from the proposed levels.

An increase in regular contributions from 18% of pay to c 22% of pay, reduces the ability to pay contingent contributions by 4% of pay and so reduces the maximum reliance that can be supported. The consequences of reducing the contingent contributions to this degree would need careful consideration given the complex iterative calculations required. A possible impact is illustrated below.

Table 14

Regular contribution	Reduction in contingent contribution	Reduction in target reliance in year 20	Impact on deficit	Impact on future service contributions
22% of pay	4% of pay	£7.5bn	+ £2.7bn	c. 2.5% of pay

To fund an extra £2.7bn deficit over 8 years could add a further 4% of pay to the contribution rate shown in section five.

The options for stakeholders in dealing with the challenges posed by the proposed valuation results to immediate affordability and long term risk considerations are:

- Increase contributions;
- Employers could look to pledge some form of additional security to the trustee to augment the reliance capacity associated with the (reduced) contingent contributions; and/or
- Benefit levels would need to be reduced now or at some defined future time.

The trustee acknowledges the challenges for the employers of an increase in contributions and/or to collectively pledge alternative security to the scheme given its mutual structure. The trustee has provided UUK with costs of various benefit options so that employers can see the potential impact on benefits for differing levels of employer contributions.

The trustee cannot become a party to the negotiations between stakeholder groups but will engage constructively with UUK's response to the consultation and provide such technical support as it is able to help the valuation process conclude before 30 June 2018.

Appendix A: USS engagement with employers and members

The trustee is committed to a transparent and effective engagement with employers throughout the 2017 valuation process. It has therefore provided a number of technical briefings and informal engagement events for employers ahead of this statutory consultation on the assumptions underpinning the technical provisions. This section summarises that preparatory activity and the feedback we have received from employers to date.

The trustee's engagement on valuation matters began in May 2016 when it wrote to all employers outlining the activities it planned to carry out ahead of the valuation.

This was followed by a questionnaire, issued to all employers, through which the trustee gathered employer-specific information to support the trustee's assessment of the employer covenant – i.e. the degree to which the trustee can rely upon the sponsoring employers' ability to support the scheme – 116 employers responded to the questionnaire. The data provided, along with our wider monitoring of sector finances, and the independent analysis carried out by PWC and EY, informed the trustee's initial conclusions around the strength of the covenant. The trustees and group risk team also met a number of employers on an individual basis to discuss the factors which affect employer finances, and scheme funding matters. The trustee's initial conclusions on the employer covenant were shared with employers for comment in September 2016, and employer meetings were arranged in Liverpool and London to encourage discussion of the findings. Twenty employers attended those meetings and 13 provided a written response to the consultation, in addition to that provided by Universities UK in its role representing the sponsoring employers.

Alongside the activity the trustee has undertaken to prepare for the valuation Universities UK has been carrying out a piece of work to consider the longer term strategy for pension provision across the higher education sector. USS is supportive of this work, and indeed it chimes well with the emphasis the trustee has placed on tailoring the pension offer to the evolving needs of employers and members. As part of this work USS representatives presented at a series of Employers Pension Forum town hall events in September 2016, providing the funding context in which this longer term strategy would be formed.

On 1 December 2016, the Chief Risk Officer, supported by the scheme actuary, provided a funding update to the Institutions' Meeting attended by around 160 employers. The presentation also explained the valuation processes and timetable.

Following the 2014 valuation the employer and member representatives formed a Valuation Discussion Forum (VDF) to explore and develop a shared understanding of the methodology adopted by the trustee. USS has provided the VDF with a number of documents providing a detailed description of the trustee's approach to the valuation, how it forms the assumptions it makes, and the sensitivity of those assumptions to external factors. The work culminated in a document *Proposed Approach to the Methodology for the 2017 Actuarial Valuation: Response to the Valuation Discussion Forum (VDF)* published on 28 November 2016.

These documents were supplemented by a technical discussion document shared with employers in February 2017 setting out the trustee's initial assessment of the methodology and inputs to be used in the 2017 valuation.

This document set out the trustee's emerging thinking, and asked for employers' views on the relevant trends and drivers which impact the trustee's initial assessment of the methodology and inputs. The discussion focused on three key areas that have the most impact on the results, namely:

1. How to calibrate the maximum amount of reliance the trustee can place on the employers as a whole. Reliance being defined as the difference between the actual/target level of assets held at any given point in time and the level of assets needed were a low risk investment portfolio used so that the risk of asking for further contributions from employers is very low (c. 5%).
2. Assumed level for expected return on asset classes and future long term interest rates.
3. Given the above two points, what level of prudence was appropriate to produce a coherent approach that balanced managing the various risks involved.

To support understanding and gather feedback from employers on these three points the trustee organised a series of open employer meetings in Edinburgh, London, Manchester, and Birmingham. These events were attended by around 120 employers. USS representatives also met with Cambridge colleges at their request. The trustee received 44 written responses in addition to the over-arching response received from Universities UK in its role as employer representative.

The trustee will continue this active, open engagement with employers and their representatives during the valuation period, both in the formal setting of the Joint Negotiating Committee and through more informal information sharing in employer meetings. The trustee has ensured that the JNC received regular updates on the likely outcome of the 2017 valuation as the trustee develops its thinking on the assumptions. The trustee has met with UUK, UCU and their respective actuarial advisers to discuss the method and assumptions being used and considered. Ensuring employers understand the assumptions being made to support the valuation, and therefore how much reliance is being placed upon them, is an important part of the trustee's role as we complete the valuation process. Employers can find all previously issued 2017 valuation documentation on the employer portal here: <https://www.uss.co.uk/employers/employer-dashboard/employer-resources/2017-valuation>, alternatively employers can request a copy from valuation@uss.co.uk.

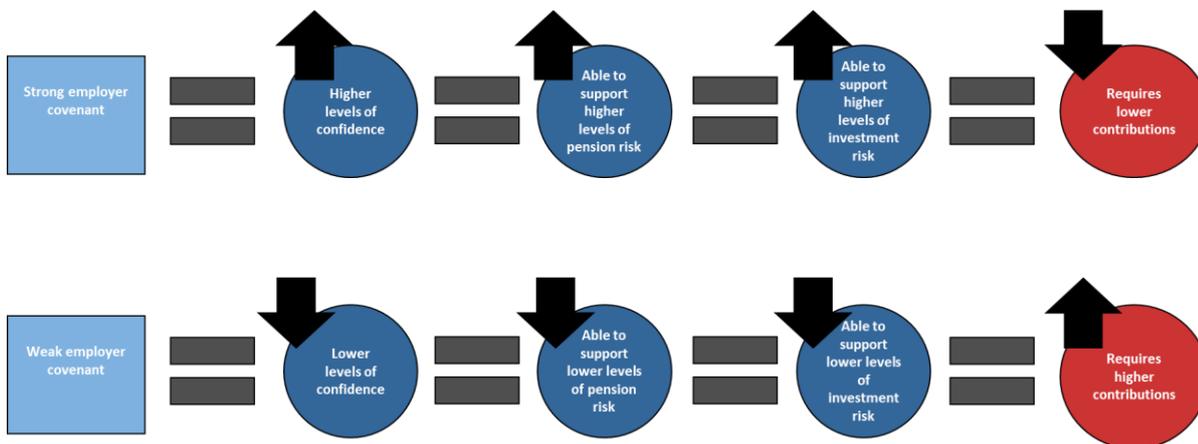
In May 2017 the trustee supported a further round of employer events, organised by Universities UK. At these events the trustee shared a summary of the feedback following the February discussion document and engagement meetings held with employers. The trustee's emerging views, following initial analysis of data from 31 March 2017, the valuation date, were also shared. This included confirmation of the trustee's best estimate of future returns and interest rate reversion, its judgments around appropriate levels of prudence, and related views of the appropriate levels of reliance the scheme can place on the participating employers. These sessions were attended by almost 100 people from 76 different employers.

The trustee has also provided a number of materials to support member understanding of the valuation processes. A new section of USS's public website was launched in April 2017 containing a number of short videos, written explanations, and a question and answer section, aimed at members. Employers are encouraged to direct members to this material, which is available here: <https://www.uss.co.uk/how-uss-is-run/valuation> if they have any questions about the valuation. The trustee will be monitoring any member queries received through the Member Service Desk and the *Contact us* form on uss.co.uk and updating this section of the website to address any emerging themes as the valuation progresses.

Employer covenant review

The covenant review was the first step towards completing the 2017 valuation. The covenant of the scheme’s sponsoring employers is fundamental to the funding of the scheme, it is the foundation on which the valuation is built. The covenant reflects the degree to which the sponsoring employers’ collective ability to support the scheme can be relied upon. This support is not just the ability of employers to make contributions into the scheme on a regular, planned basis, but also on a contingent basis should adverse events materialise.

Broadly speaking, the stronger the employer covenant, the more risk can be taken in the funding of the scheme.



The work undertaken in this year’s covenant review builds upon the work completed ahead of the previous triennial valuation in 2014. Since then the trustee has put in place a detailed covenant monitoring framework, and developed an internal group risk team, which has enabled ongoing monitoring of the covenant and a deeper understanding of the operational and financial position of the sponsoring employers.

The trustee has carried out a comprehensive analysis of the higher education market, both global and domestic, the key economic, social, political and competitive trends impacting the market, and the collective ability of the scheme’s sponsoring employers to continue to prosper within it. This analysis draws on data collected from the inputs you provided to the covenant questionnaire issued in May, combined with the data we have gathered from the Higher Education Funding Councils (HEFC) and the Higher Education Statistics Agency (HESA). The trustee was supported in its assessment of the employer covenant by PWC, with additional specialist support on the development of higher education matters provided by EY.

The key conclusions from the review of the covenant provided by the sponsoring employers are summarised in the following four points:

1. **The covenant is uniquely robust**

The covenant is very different from that of a typical commercial corporation. This is for many different reasons, including but not restricted to the following: UK higher education institutions have far greater international brand recognition than UK corporations. Their performance objectives are also very different, being not profit-oriented and with a much longer term horizon. The crystallisation of any potential insolvency event will be very different from a corporate insolvency. Sponsoring employers face “right-way risk” in relation to the covenant meaning that, because contributions scale with the size of the payroll, the burden on employers that are forced to contract their operations diminishes over time.

Moreover, the mutuality of the covenant means that the scheme is supported by a large number of diverse institutions, a large proportion of which have strong covenants on an individual basis.

2. ***The covenant strength is rated “strong” by PwC***

This is the highest possible covenant rating used by PwC. The UK higher education sector, with its strong international brand, is well placed to exploit positive market dynamics with global demand expected to outstrip supply over the long term. The sponsoring employers collectively are in a strong financial position, with a large balance sheet relative to the self-sufficiency liability, even in a stressed market. Threats from different sources (such as the growth of on-line learning, new entrants into the higher education market, the developing reputation of overseas universities, the growth of apprenticeships, changes to immigration policy, research consolidation, etc.) are expected to have a relatively limited impact on the sector as a whole, although particular employers may be vulnerable. Employers have diversified sources of funding and an established track record in managing costs to revenues, even in difficult times.

3. ***The covenant horizon is at least 30 years***

The time period over which there is visibility of the continued strength of the covenant is at least 30 years. This is supported by global and domestic demographic projections, the projected growth of global demand, the time required for new competitor institutions to develop the reputation necessary to compete effectively on the international stage, and the UK sector’s historical record of resilience going back hundreds of years. Moreover, the market view of university credit ratings is strong over the long term, with several having high long-term credit ratings and some having issued 50-year unsecured debt.

4. ***Employers have the ability to increase contributions***

Any increase in contributions would be more manageable if implemented over a two-to-four year period. Most employers could afford an increase in contributions from the current 18% of pensionable salary to 21%, albeit not without changes to business plans and/or prioritisation of pension contributions. Many would also be able to afford up to 25%; however, coming at a time when many employers are trying to increase investment and offset falling grant funding, this would impact investment opportunities to varying degrees and require significant strategic change. It is important to emphasise that this affordability analysis reflects the assessment of the sponsoring employers’ ability to pay increased contributions, not the willingness to make the required trade-offs to do so.

The review of the sponsoring employers’ covenant also considered the impact of Brexit. The UK’s higher education sector is resilient; it has a strong global reputation, is able to attract students from countries beyond the EU, and is well-positioned to make the most from the continuing strong demand for student places. Additionally, the sector’s capacity for, and capability to deliver, outstanding research performance means it will continue to attract funding. There may be short-term uncertainty, and significant difficulty for individual employers, but over the medium to long term the trustee was advised the higher education sector should remain strong.

Two additional areas for discussion emerged from the covenant review in the context of risk management. The first of these relates to contingent assets. Whilst acknowledging that the provision of contingent assets is a potential method of allowing the trustee to take more risk, there is a general reluctance to use them, and there are challenges in terms of implementation. The second concerns a specific medium-to-long term risk

to the covenant. Future large-scale debt issuance by employers, if not used for revenue increasing investment, could lead to a weakening of the covenant provided to the scheme. In order to protect the scheme's position, the trustee will continue to monitor the debt position of employers.

The trustee's initial conclusions from the covenant review were shared with employers in September 2016 through further employer engagement. The board considered the feedback received from that engagement at its meeting in November 2016. The feedback received was largely supportive of the initial conclusions drawn from the covenant review whilst emphasizing the short term risks identified in the review were real. Two areas of feedback required further clarification, firstly, employers were keen to understand how the covenant horizon had been assessed, and in particular, what had changed to lead to the increased horizon of 30 years (up from 20 years in 2014). The conclusion in 2014 was that the trustee had visibility over the covenant for *at least* 20 years. The review carried out for the 2017 valuation was explicitly designed to explore the limits of the covenant horizon, and specifically whether the trustee could have visibility over the covenant for a period of 30 years. It is worth noting that the analysis for the 2014 valuation was completed by EY and the analysis for the 2017 valuation was completed by PWC, supporting the 2014 conclusions, and delivering further independent analysis to form a view to support the 2017 valuation.

Additionally, employers were keen for the trustee to explain in greater detail the findings around the affordability of contributions set at 25% of pensionable salaries and specifically what the '*in extremis*' nature of these contributions meant in practical terms. Employers were also keen to understand how reliance might develop in the short term, this was explained at the employer events held in May 2017 and is summarised in [appendix B: Risk and reliance](#).

Methodology and inputs for the 2017 valuation – technical discussion document

This technical document set out the trustee's initial assessment of the methodology and key inputs to be used in the 2017 actuarial valuation. In particular, it explained the trustee's initial view of the approach it intended to take to determine the reliance it can place on the employers' ability to support the scheme over the long term. It also set out the range of values the trustee was considering using for the key inputs for the valuation assumptions. This discussion document built on information shared in two earlier publications the Proposed Approach to the Methodology for the 2017 Actuarial Valuation: Response to the Valuation Discussion Forum (VDF) and the Covenant Review for the 2017 Valuation.

In the discussion document the trustee set out how it intended to approach the 2017 valuation, which is broadly the same as that adopted for the 2014 valuation. This included the following aspects:

1. The methodology will continue to use a measure for the maximum reliance on the employer covenant based on contingent contributions expressed as a percentage of USS pensionable pay;
2. The basis for measuring the amount of reliance on the sponsoring employers will be measured as the difference between the technical provisions and the assets required for self-sufficiency;
3. Self-sufficiency will be measured in terms of a low-risk investment portfolio, with the discount rate assumed to be in the range of gilts plus 0.5% to gilts plus 0.75%;
4. The maximum amount of reliance that can be supported by the sponsoring employers, will be calculated as the value of 7% (= 25% – 18%) of pensionable pay over a 20 year period;
5. The amount of reliance placed on the employers will increase over time in line with either general salary growth or RPI or CPI (the 2014 assumption), to be determined following feedback.

Building on the experience of the 2014 valuation, some refinements to the process were to occur but it would not be materially different to the approach adopted previously. These refinements are explained elsewhere in this document, specifically in [appendix B: risk and reliance](#).

In addition, the discussion document indicated the trustee's emerging thinking around each of the inputs to the valuation. These inputs are updated at each valuation following a fresh look at market and sector data. Although a consistent logic to these inputs is applied, the values change as they are affected by external factors, and as the trustee's ability to interpret changes becomes more sophisticated. In many cases these inputs were provided in the discussion document as a series of ranges, rather than a single view, which reflected the point the trustee had arrived at in its thinking. By setting out the potential range of responses, and inviting employer views on those ranges, the trustee intended to show the complexity of the judgements it must make, and encourage wider discussion of these judgements to further inform its decision making.

The trustee specifically asked for feedback on three areas linked to the trends and drivers which impact our initial assessment of the methodology and inputs. They were:

- i) The approach to determining the maximum reliance which can be placed on the employer covenant in future when funding the scheme, and in particular the inputs that are used to determine the reliance. The trustee has assessed that contingent contributions, paid over a time horizon of 20-40 years from now, of 7% of pensionable pay (being the difference between 25% maximum in extremis contribution and the regular contribution of 18%), consistent with the 2014 view is still reasonable;
- ii) The view on future investment returns, and in particular whether employers prefer to rely on the current forward gilt curve for long term interest rates, or whether they prefer the view that long term interest rates will revert to higher levels than the forward gilt curve implies;
- iii) The degree of confidence required that the assumed pension costs will prove a reliable forecast, and how much risk the employers prefer to take out of the maximum risk possible. Specifically, is the risk appetite different for funding benefits earned to date versus the benefits the participating employers' wished to promise in future?

All these factors feed into the judgment the trustee must make on the level of prudence to apply in its valuation assumptions. The trustee confirmed that it would apply its best estimate to all assumptions except the discount rate and mortality where a prudent approach would be taken. The bulk of the prudence to be applied in the valuation lies in the calibration of the discount rate and a range of confidence between 60% and 70% was proposed.

Employer feedback on the discussion document reiterated the broad support for the initial findings from the covenant review. Concerns were expressed around the detrimental effect increasing actual employer contributions paid could have on the financial stability of participating employers, and therefore the covenant. Employer views where provided on interest rate reversion was evenly split, with a marginal preference for moderate reversion and concern to understand better the implications for future risk and benefit changes.

The feedback received from employers has informed the trustee's consideration of the valuation inputs, and has been reflected in the formation of the technical provisions detailed in this formal consultation.

Appendix B: Reliance and risk

Understanding the amount of reliance the scheme places upon the sponsoring employers, and the level of risk they are able to support, is fundamental to managing scheme funding.

Reliance

The trustee is keen to ensure that the reliance it places on the employers in funding the scheme is not greater than that which the employers can support, or wish to provide. Reliance can be defined as the overall level of risk employers take in funding the scheme. The different types of risk associated with funding the scheme, and how the trustee manages them, are defined below.

The trustee's principle is that its maximum reliance on employers should not be greater than the sponsoring employers' ability to support it. For the 2014 valuation the trustee devised a set of principles and funding tests which were designed to measure reliance and place a value upon it so that we could track this value over time and have informed discussions with employers about the maximum amount of risk they could support, and the levels of reliance they felt comfortable with.

Reliance is measured by the trustee as the difference between the assets held by the scheme to fund the promised benefits, and those required by a low risk investment portfolio (a funding approach known as *self-sufficiency*), which would provide a high level of security of all future benefit payments in respect of accrued benefits being met without any further contributions from employers. The trustee establishes the maximum reliance that it is willing to place on the employers collectively. Should employers wish the trustee to adopt a lower level of reliance, a funding strategy must be adopted which reflects that lower level of reliance. Adopting a lower level of reliance will generally result in higher costs.

The articulation of this measurement is set out in Test 1 of the trustee's principles and tests, following discussions with UUK on the findings of the covenant review, the trustee proposed to retain Test 1 in the same structural form as in 2014 but to amend its articulation to improve understanding of its derivation. The revised text was provided in the technical discussion document shared with employers for comment in February. Subsequently, further discussion has taken place with employer representatives and it has been agreed that the maximum reliance should be equivalent to that in 2014 fixed in real CPI terms going forward. This results in a maximum reliance of £13bn.

The trustee is comfortable with this figure by considering the amount of contingent contributions it could obtain from the employers in extremis. The trustee uses the term *in extremis* to mean a future situation when either the sponsoring employers or the trustee wish, or are required, to significantly reduce the risks associated with funding the promised benefits by moving to a lower investment risk portfolio to secure the accrued benefits.

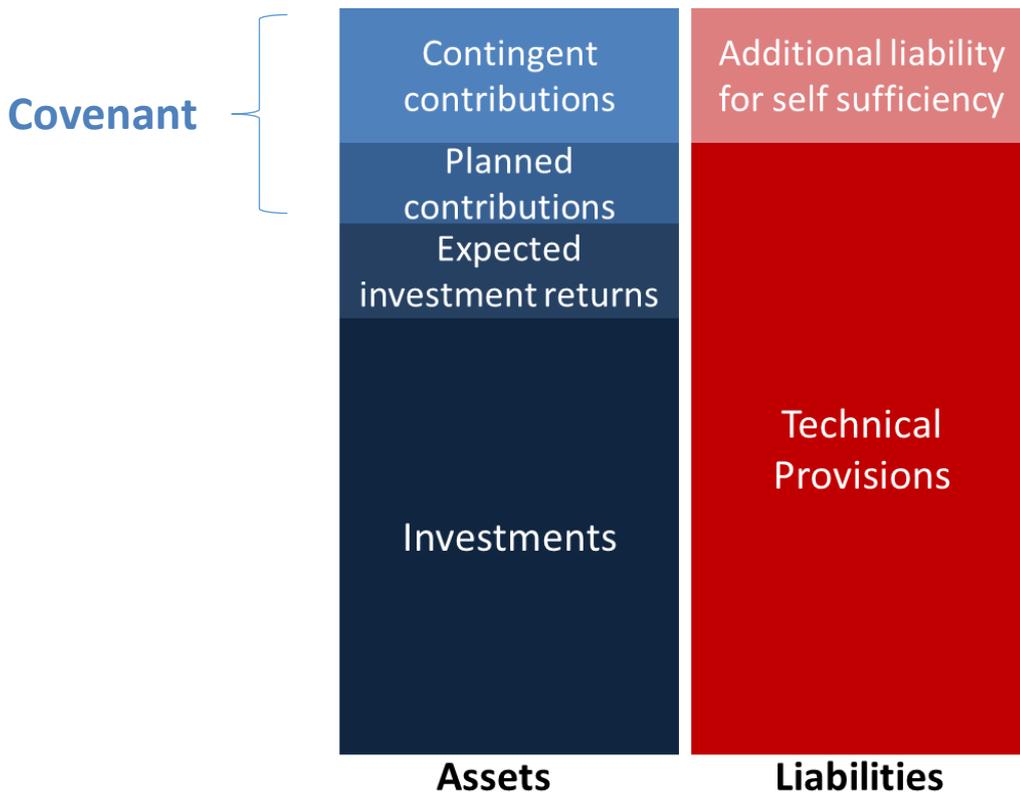
Contingent contributions are equal to the difference between the maximum level of contributions assessed by the covenant review and the required contributions to provide the benefits (these were agreed as 25% and 18% of pension salary respectively in 2014 meaning the value of contingent contributions was 7%). In the trustee's methodology the acceptable level of reliance is measured at the end of a 20-year period after the valuation date. A level of *contingent contributions* payable *in extremis* over a period of time (20 years in the 2014 valuation) is valued at this point. The trustee needs to be confident that the long term collective strength of the sponsoring employers' and employers' business models can support this level of contribution.

The measure of *contingent contributions in extremis* paid over a time horizon of 20 years in the future should not be confused with a measurement of affordability over the short-term or indeed with those contributions required to support any given level of benefit. The term *regular contributions* is used to mean the affordable level of contributions expected to be required to fund the agreed level of benefits at a particular point in time.

If it was agreed to increase employers' *regular contributions* beyond the current level of 18% of pensionable salary then this would reduce the level of *contingent contributions* available in future as a funding buffer. A lower funding buffer means lower ability to take investment risk and higher required *regular contributions* for any given level of pension benefit. A decision taken to increase *regular contributions* beyond a certain level could produce lower benefits than those that could be afforded by the existing level of *regular contributions*.

The first test (Test 1) requires the difference between the scheme's technical provisions and the *self-sufficiency* approach to be capable of being covered by the employer covenant, and specifically by contingent contributions payable in extremis. The relationship between technical provisions, *self-sufficiency* and covenant is summarised in the diagram below.

The relationship between the technical provisions and *self-sufficiency* liabilities, along with the actual and target (i.e. required) levels of assets.



The greater the level of reliance placed on employers, then the lower amount of technical provisions that are required to be sought. In isolation, this allows a greater degree of risk to be taken in funding the benefits leading to a lower predicted cost but increasing the risk of higher contributions being called upon in future.

Self-sufficiency for the purposes of the valuation is intended to be a measure of the value of assets required by the trustee to meet all accrued pension benefits with only a “low” probability of requiring further contributions from employers. For the 2014 valuation the trustee adopted a low-risk (less than 5%) investment portfolio approach to determining *self-sufficiency*, with the assets required being measured on a basis of gilts plus 0.50%.

In the period since the 2014 valuation a prolonged period of historically low gilt yields has arisen. Thirty year inflation-linked gilt (real) yields have fallen from around zero at 31 March 2014 to below -1.6% at the end of March 2017, defying a great many market forecasters. Quantitative easing – the buying of gilts by the Bank of England – has put downward pressure on gilt yields. Similarly with insurance companies and pension funds competing with other investors to buy limited supplies of gilts, their price has been driven up to record highs and their expected future returns (yields) have consequently been driven much lower. Other asset classes have been similarly impacted, increasing in value and providing high realised returns, but at the cost of lower expected future returns. Lower expected returns translate into a lower discount rate for liabilities.

Importantly, lower expected future returns on gilts result in a significant increase in the cost of buying a low risk portfolio. As a result the gap between actual assets held and the required level of low risk assets that would be needed to secure scheme benefits (i.e. *self-sufficiency*) has widened significantly. After scheme changes the gap (between the low risk portfolio and the actual total assets) was £14bn in 2014 and has grown to £23bn as at 31 March 2017.

Test 2 and Test 3

In addition to Test 1, alongside the completion of the 2014 valuation, USS implemented two further funding tests. Test 2 aims to measure the degree of stability in contributions (and by corollary benefit levels) inherent in the funding approach. It is desired that there is a high level of confidence that contributions can be kept within reasonable bounds. However, Test 1 requires the trustee to keep within a defined distance of a *self-sufficiency* measure based on a portfolio of assets of much lower risk. That limits the ability to manage contribution/benefit volatility over the short term when – as is the case now – Test 1 is at its extreme and employers are already paying contributions at the very limit of its desired budget levels. The levels of confidence are highly sensitive to different probability models as well as different assumptions.

USS intends to supplement Test 2 by ongoing monitoring of the required contribution rate for the current benefit using a model that calibrates to the underlying internal rate of return assumptions used by the trustee rather than a fixed margin over gilts. The 2014 approach which assesses a probability of contributions needing to increase is not a sufficiently helpful indicator of future contribution requirements being simply a prediction involving many unknown elements. Estimating the required contribution using a model calibrated to the latest view of the expected return on assets will be a more reliable indicator of the employers’ short term risk exposure. Employers still wish to see the probability of future contribution or benefit changes being required at future valuations, and the trustee will continue to work with UUK to find a suitable approach.

Test 3 manages the extreme tail risks outside those covered by Test 1 to make sure that the employers' collective balance sheet is sufficient to cover the benefits promised to date. Test 3 remains unaltered.

Risk

There are different types of risk involved in managing a pension scheme. Risk is inherent in the funding of the scheme, in particular in the investment of the scheme's assets and has an impact on the contribution requirements associated with providing a particular level of benefits.

The trustee's role is to assess the risks and make sensible judgements so that we can have a high degree of confidence that the sponsoring employers will be able to meet their pension commitments, even if faced with a set of adverse circumstances.

The key risks around scheme funding are:

Funding risk - This is the risk that the amount needed to fund the defined benefits promised to members (our liabilities) is higher than the trustee has estimated it will be.

Investment risk - This is the risk that we do not achieve the returns anticipated from our investments.

Solvency risk - This is the risk that employers are no longer able to fund the scheme.

Managing risk

The trustee has a comprehensive approach to assessing, monitoring and managing these risks.

Funding risk covers the estimates made for longevity, inflation, salary increases and other factors contributing to the value of our liabilities. To form assumptions around each of these a wide range of historic data, independent expert opinion and market predictions are reviewed to form a best estimate given the information available. For matters linked to the development of the higher education sector, the trustee works closely with employer and member representatives to understand likely developments in the sector, to identify trends, and predict future developments. The proposed inputs into the liability assumptions are set out in the main body of this paper. Funding risks can be predicted and a level of prudence applied so that the actual outcomes are never too far from the trustee's estimates.

Investment risk impacts scheme funding as the trustee assumes a certain amount of investment return in its funding plans. The risk for employers is that if those return expectations are not met there may be shortfall which needs to be made good. The amount of investment return the trustee is able to assume depends upon the expected performance of the markets more generally, and specifically the returns our investments are expected to deliver. The trustee applies a 'discount rate' to the liabilities which is set based on assumed returns from current and planned future asset allocations. This does not adopt a formulaic approach to setting the discount rate linked to gilt yields. The approach is scheme specific, and is based on the value of the scheme's assets, and the likely returns from them.

Solvency risk is assessed through the formal covenant review, as described in [appendix A](#).

As part of its work to complete the 2014 valuation the trustee set out its view that the level of risk in the scheme – and therefore the reliance placed upon employers – would grow over time.

Development of reliance over time depends on four factors:		
• Size of benefit accruing	↑	The greater the benefit accruing for a given level of contributions, the greater the <u>increase</u> in reliance ↑
• Contributions size	↑	Higher contributions for a given level of benefits <u>reduces</u> the reliance ↓
• Investment returns achieved	↑	Higher investment returns than assumed in the contribution rates <u>reduces</u> reliance ↓
• Path of future gilt yields	↑	Rising gilt yields <u>reduce</u> the cost of self-sufficiency and reliance ↓

Working from the principle that the level of reliance should not increase to more than employers can support it, the trustee therefore set out its intention to manage the size of the gap so that it falls within the desired range over an acceptable period of time. In 2014 that period was set at 20 years, as the period over which the trustee had visibility of the employer covenant (that is the availability of financial support from employers).

The trustee is satisfied that this gap can be closed over time through a combination of managing the future levels of regular contributions and benefits; allowing for expected future investment returns. However, current reliance on the employers is towards the upper end of the range it can reasonably be allowed to lie and employers must decide whether they are comfortable with this level of risk.

The feedback from the February discussion paper and series of employer events was that broadly employers did not wish to increase the level of risk taken from that agreed as part of the 2014 valuation process.

Appendix C: 2017 draft Statement of Funding Principles

ACTUARIAL VALUATION AS AT 31 MARCH 2017 STATEMENT OF FUNDING PRINCIPLES

Universities Superannuation Scheme (the scheme)

This statement of funding principles (SFP) sets out the policies of Universities Superannuation Scheme Limited (the trustee) for securing that the statutory funding objective is met.

It has been prepared by the trustee to satisfy the requirements of section 223 of the Pensions Act 2004, after obtaining the advice of Ali Tayyebi, the scheme actuary appointed under s47 of the Pensions Act 1995. It reflects the guiding principles on risk management adopted by the trustee as set out in its published funding principles and tests. It has been taken into account in the actuarial valuation as at the effective date of 31 March 2017. The SFP will be reviewed and, if necessary, revised, before being taken into account at subsequent valuations under Part 3 of the Pensions Act 2004.

In accordance with legislation and the scheme rules, the trustee has consulted with Universities UK over the content of this statement of funding principles.

The statutory funding objective

The statutory funding objective is that the scheme has sufficient and appropriate assets to meet the amount required, on actuarial calculation, to make provision for the scheme's liabilities (the technical provisions).

Calculation of the technical provisions

The principal method and assumptions to be used in the calculation of the technical provisions are set out in the [notes to this appendix](#).

The general principles adopted by the trustee are that the assumptions used, taken as a whole, will be chosen sufficiently prudently for pensions and benefits already in payment to continue to be paid, and to reflect the commitments which will arise from members' accrued pension rights. The basis will include appropriate margins to allow for the possibility of events turning out worse than expected and will only be adopted after considering how it compares with the assumptions used to assess the scheme's solvency position.

However, the trustee does not intend for the method and assumptions to remove completely the risk that the technical provisions could be insufficient to provide benefits in the future.

As part of its process for choosing the assumptions and determining the size of the margins to include, the trustee will take into account its objective assessment of the employer covenant and the level of risk present in the investment strategy of the scheme.

Self-sufficiency and Economic bases

The principles of risk management adopted by the trustee mean that the trustee will have regard to the *self-sufficiency* basis and the *economic* basis when setting the technical provisions basis. In particular, the trustee takes into account the projected difference between the *self-sufficiency* basis and the technical provisions basis over time in order to ensure that it is within a range which is considered acceptable, taking into account the trustee's assessment of the scope of potential employer contributions beyond those agreed in the schedule of contributions. This means that the choice of the discount rate may be impacted by the level of future benefit accrual as the latter will affect the projected quantum of liabilities over time.

The differences between the assumptions used for these two bases and the technical provisions assumptions are highlighted in the [notes to this appendix](#).

Policy on discretionary increases and funding strategy

No allowance has been included in the assumptions for paying discretionary benefits or making increases to benefits that are not guaranteed under the scheme rules.

Rectifying a failure to meet the statutory funding objective

If the assets of the scheme are less than the technical provisions at the effective date of any actuarial valuation, a recovery plan will be put in place, which may require additional contributions from the employers (and potentially the members) to meet the shortfall. The trustee has agreed that any such funding shortfalls should be met over an appropriate period and tailored to both Scheme and Employer circumstances.

Additional contributions will be expressed as a percentage of pensionable payroll.

In determining the actual recovery period at any particular valuation, the trustee will take into account the following factors:

- The size of the funding shortfall and the scheme's current asset and liability structure;
- The trustee's future investment strategy, as set out in the Statement of Investment Principles;
- The trustee's objective assessment of the financial covenant of the employer.

Based on the principles and assuming the assumptions are borne out in practice, the shortfall calculated at 31 March 2017 valuation will be met by 2025 which is 8 years from the effective date of the valuation. The assumptions to be used in these calculations are set out in the [notes to the appendix](#) below.

Calculating the normal cost of the scheme

Contributions required to meet the cost of benefits accruing by members after the valuation date will be calculated using the method and assumptions set out in the [notes to this appendix](#).

Arrangements for other parties to make payments to the scheme

There is no provision except in specific, limited circumstances in the scheme rules to allow someone other than the employers or a scheme member to make contributions to the scheme.

Policy on reduction of cash equivalent transfer values (CETVs)

At each valuation, the trustee will ask the actuary to report on the extent to which assets are sufficient to provide CETVs for all members. If the assets are insufficient to provide 100% of benefits on that basis, so that payment of full CETVs would adversely affect the security of the remaining members' benefits, and the employers are unable or unwilling to provide additional funds, the trustee will consider reducing CETVs as permitted under legislation.

If, at any other time, the trustee is of the opinion that payment of CETVs at a previously agreed level could adversely affect the security of the remaining members' benefits, the trustee will commission a report from the actuary and will use the above criteria to decide whether, and to what extent, CETVs should be reduced.

Payments to the employer

There is no provision in the scheme rules for employers to request a refund of the excess assets over the cost of buying out benefits of all beneficiaries with an insurance company, when the scheme is not being wound up.

There are no funding objectives provided for in the rules of the scheme or which the trustee has adopted in addition to the Statutory Funding Objective.

Frequency of valuations and circumstances for extra valuations

Subsequent valuations will in normal circumstances be carried out every three years, the next being due on 31 March 2020. In intervening years an actuarial report will be produced.

The trustee will monitor the funding level on a quarterly basis between valuations. If the trustee decides that it is appropriate, it may commission a full actuarial valuation, when after considering the actuary's advice, it is of the opinion that it is necessary to do so and is an effective use of its resources.

This statement of funding principles, revised from [effective date] has been agreed by the trustee of the USS after obtaining advice from the scheme actuary.

**Signed on behalf of the
Universities Superannuation
Scheme Limited as Trustee of
the Scheme**

Name

Position

Revised and effective from date

Notes to Appendix C

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 method used was the Projected Unit method.

Table 15

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% Years 11-20: CPI + 2.8% 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: 98% of SAPS S1NMA “light” for males and 99% of SAPS S1NFA “light” with a -1 year adjustment for females Post retirement: 96.2% of SAPS S1NMA “light” for males and 100.9% of RFV00 for females
Future improvements to mortality*	CMI_2015 with a long term rate of 1.5% pa

* These are provisional only at this stage

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.

Method

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

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 -0.53% pa in years 1-10, 2.8% pa in year 11, then assumed to reduce linearly to 1.7% pa over the following 10 years and assumed to stay at 1.7% pa beyond that point. This approach therefore implicitly includes a provision for gradual investment de-risking to take place.

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 and discount rate and CPI assumptions as at 31 March 2017, determined in line with the above approach.

Table 16

Term	Discount rate (forward)	CPI (forward)	Term	Discount rate (forward)	CPI (forward)
1	2.00%	2.53%	26	3.61%	1.91%
2	0.74%	1.27%	27	3.46%	1.76%
3	0.73%	1.26%	28	3.31%	1.61%
4	0.88%	1.41%	29	3.17%	1.47%
5	1.04%	1.57%	30	3.05%	1.35%
6	1.23%	1.76%	31	2.96%	1.26%
7	1.41%	1.94%	32	2.90%	1.20%
8	1.60%	2.13%	33	2.86%	1.16%
9	1.76%	2.29%	34	2.84%	1.14%
10	1.90%	2.43%	35	2.85%	1.15%
11	5.35%	2.55%	36	2.88%	1.18%
12	5.34%	2.65%	37	2.93%	1.23%
13	5.32%	2.74%	38	2.99%	1.29%
14	5.27%	2.80%	39	3.07%	1.37%
15	5.21%	2.85%	40	3.17%	1.47%
16	5.12%	2.87%	41	3.27%	1.57%
17	5.01%	2.87%	42	3.39%	1.69%
18	4.88%	2.85%	43	3.51%	1.81%
19	4.72%	2.80%	44	3.64%	1.94%
20	4.54%	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 [provisional only at this stage]

The mortality assumptions will be 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

S1NxA “Light” Year of Birth tables taking 98% with no age adjustment to the table for males and 99% with a -1 year age adjustment to the table for females and improvements using CMI_2015 [1.5%]

Post-retirement

- Males: S1NMA “Light” with 96.2% weighting and improvements using CMI_2015 [1.5%]
- Females: RFV00* with 100.9% weighting and improvements using CMI_2015 [1.5%]

**At ages below 50, the RFV00 table will be 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 17

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 18

	% 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 19

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 20

Age	% spouse / partner		
	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 is provisional and will be finalised later in the process]

The trustee proposes to maintain a deficit contribution of 2.1% with the recovery plan and recovery period to be finalised following the valuation.

As at 31 March 2014, the trustee agreed to allow for additional investment returns in the recovery plan. As at 31 March 2014 the additional investment was equal to 50% of the excess return between the best estimate assumed return and the return assumed in the technical provisions.

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.

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.

Appendix D: The underlying assumptions and sensitivity data

The table below summaries the effect on the technical provisions and contribution rate of changing the inputs.

Table 21

Sensitivities in the proposed technical provisions and contribution rates

Proposed consultation case		
<i>Assumption to be changed</i>	<i>Deficit</i>	<i>Future service cost</i>
Reliance in 20 years + £3 bn real (increase to £13 bn original level)	-£1.1bn	-1.0%
Self-sufficiency discount rate + 0.25%	-£1.6bn	-1.2%
Investment return + 0.10%	-£1.2bn	-0.8%
RPI – CPI spread + 0.10%	-£0.5bn	-0.4%
Long-term salary growth + 1%	-£0.2bn	-0.2%
Short-to-medium salary growth + 1%	-£0.1bn	-0.1%
Merit scale for salary growth + 1%	Nil effect	Nil effect
Withdrawals from scheme reduced by 5%	+ £<0.1bn	Nil
Retirement age + 1 year for active members	-£0.4bn	Nil
Ill-health retirements increased by 10%	+ <£0.1bn	+ <0.1%
Proportion married for male members + 5%	+ £0.2bn	+0.1%
Proportion married for female members + 5%	+ £<0.1bn	+ <0.1%

Appendix E: Glossary

Term	Definition
Accrued pension	The amount of pension earned up to a given point in time and based on service up to that date.
Best estimate	The trustee's unbiased view of the future outcome for different variables, without adjustment with margins of any kind. It is consistent with the median (or 50 th percentile) outcome.
Contingent contributions	Unplanned contributions payable at some future date (in addition to regular contributions), which are required to respond to an 'in extremis' event.
Deficit	The amount by which the value of liabilities exceeds the value of assets.
Discount rate	The rate of interest used to determine the value of the scheme's future accrued benefit payments through the process of discounting. The discount rate for technical provisions is determined by the expected investment return less a margin for prudence.
Employer covenant	The financial ability that USS' employers have to collectively support the scheme.
Forward gilt curve	The forward gilt curve is a set of <i>breakeven</i> yields at future dates such that a long-term gilt investment and a series of rolling short-term gilt investments will have exactly the same investment returns. The forward gilt curve can be calculated directly from the current (or "spot") gilt curve. Because it reflects the breakeven yields in the gilt market, it is sometimes referred to as the market's forecast of future yield levels. However, it is no more accurate than other yield forecasts.
Fundamental building blocks (FBB)	This is a term used to refer to an approach for developing forecasts for future investment returns based on a detailed analysis of macro-economic factors, and short and long-term economic trends. In contrast to a "gilts-plus" approach, this approach does <i>not</i> involve applying a fixed risk premium above gilt returns for each asset class.
Gilt curve	The set of yields on gilts of different maturities which are observed in the market at any time.
Gilts-plus	This is a term used to refer to an approach for developing forecasts for future investment returns based on estimating a fixed risk premium for each asset above the performance of low-risk government bonds (gilts).
In extremis	Circumstances associated with a low-probability, extreme event that would require additional (contingent) contributions to be paid in order to protect the scheme's funding position and ensure promised benefits are paid.
JNC	Joint Negotiating Committee.
Maximum reliance capacity	The maximum level of reliance the scheme's sponsoring employers can support through 'in extremis' contributions.
Prudence	Prudence is an allowance, or margin, that is factored into the valuation relative to the best-estimate forecast in order to increase the probability that the contributions are adequate to finance the promised benefits to above 50%. The trustee defines prudence, insofar as it relates to technical provisions, as the percentage by which the technical provisions measurement is greater than the best estimate measurement of the liabilities.
Recovery plan	The component of a pension scheme's financial management plan designed to repair its deficit over a period of time known as the recovery period.
Reference portfolio	A hypothetical investment portfolio that is expected to deliver the investment returns assumed in the actuarial valuation at a level of risk consistent with the trustee's risk appetite. It is a portfolio that could largely be implemented passively at low cost and

	is reviewed at least annually. The expected return on the reference portfolio is the starting point for determining the discount rate for the valuation.
Regular contributions	The contributions that are made on a regular basis to meet (i) ongoing accrual of new benefits plus (ii) any contributions required to fund deficit recovery.
Reliance	The level of support that the sponsoring employers provide to the scheme. The trustee measures reliance as the difference between the current value of the scheme's assets and the value of assets required for self-sufficiency.
Self-sufficiency	The value of assets that are required to meet the scheme's accrued defined benefit liabilities while adopting a low-risk investment strategy. By a low-risk investment strategy, we mean one for which there is a low probability of ever requiring additional employer contributions to fund benefits earned to date.
Stakeholders	This term collectively refers to the sponsoring employers, UUK and UCU.
Target reliance	The level of reliance the trustee has set, with the agreement of the employers, as the target over the long term (i.e., 20 years).
Technical provisions	The value of assets that are required, based on an actuarial calculation, to meet the scheme's accrued defined benefit liabilities and pay the associated pension benefits as they fall due. This is the measure of liabilities used for funding purposes. ¹
Test 1	A test designed to measure whether or not the long-term risk in the DB section of the scheme is within the risk appetite agreed between the trustee and sponsoring employers. The test checks that the difference between self-sufficiency and technical provisions in 20-years' time does not become too large for the employers to support.
Test 2	A test designed to measure the probability of requiring future increases in contribution levels.
UCU	University and College Union.
UUK	Universities UK, the representative organisation for the UK's universities.

¹ We recognise that the statutory funding objective in PA 2004 (s. 222) is that the scheme must have sufficient and appropriate assets to cover its technical provisions; and that "technical provisions" in this context means "the amount required, on an actuarial calculation, to make provision for the scheme's liabilities". The technical provisions are made up of a set of actuarial assumptions including: inflation, longevity, and the discount rate reflecting future investment returns.