UNIVERSITIES SUPERANNUATION SCHEME LIMITED

Universities Superannuation Scheme

2014 Actuarial Valuation

A consultation on the proposed assumptions for the scheme's technical provisions and recovery plan

October 2014

Contents

Introduction

The trustee of Universities Superannuation Scheme is carrying out the actuarial valuation of the scheme's assets and liabilities as at 31 March 2014. This actuarial valuation is a legal requirement and must be completed every three years. The valuation is conducted by the trustee with the support of the scheme actuary, an appointed specialist who reports to the board, as required by law and under the scheme rules.

The trustee, as explained in previous correspondence, anticipates a substantial deficit will be recorded when this formal valuation is complete and believes action must be taken now to ensure the level of risk inherent in the scheme remains proportionate to the support available from the participating employers. The trustee has been preparing for this valuation for some time, and over the past 12 months has been in dialogue with the scheme's participating employers both at an individual institution level and through Universities UK as the employers' formal representative within the scheme for these purposes.

This paper continues the trustee's engagement with the scheme's participating employers on funding matters but is also the first of a series of statutory consultations which the trustee must complete as part of the actuarial valuation processes. You will therefore find set out in this paper the principal underlying assumptions and data which the trustee intends to use to determine the value of the scheme's liabilities, and a draft of the updated Statement of Funding Principles.

This consultation paper contains figures based on the member data as at 31 March 2014 which participating employers provided over the summer. It also confirms the assumptions the trustee intends to use for longevity and inflation, estimates of which were previously provided in the December 2013 *Engagement Paper*. Indeed, much of the information contained within this paper has been presented to the scheme's participating employers before, notably in the briefing papers issued to Universities UK in December and July.

This consultation is to seek your feedback on the underlying assumptions which will be used to complete the formal valuation and more broadly the trustee's approach as set out in the Statement of Funding Principles. The trustee would welcome comments from Universities UK and through it from individual participating employers, on this paper by the end of November 2014 to enable the trustee board to consider responses in early December.

Background

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

In its preparations for this valuation the trustee has completed a substantial review of the three pillars of scheme funding upon which the security of the pensions promised depends; those are the support available to the scheme from the participating employers (known as the employer covenant), the investment strategy and the funding strategy.

On employer covenant the trustee commissioned Ernst & Young (EY) to conduct a detailed examination of the financial health of a materially representative sample of the employers that stand behind the scheme. From this work the trustee was able to draw a number of conclusions which were shared with the scheme's participating employers through Universities UK in the *Engagement Paper*. The trustee's conclusions were:

- the covenant assessment confirmed the trustee's long-held belief that the covenant is robust;
- there is good visibility regarding the robustness of the covenant over a 20 year time horizon; beyond which visibility is reduced although the expectation is that the covenant will remain robust
- the majority of employers would be able to pay contributions of up to 25% of salaries albeit changes to operating models would likely be required and there could be some threat to the mutuality of the scheme.

This is important as the amount of support available to the scheme from the employers dictates how much risk the trustee can reasonably take in delivering the benefits. 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.

In broad terms the trustee believes the amount of risk taken should be proportionate to the amount of support available to the scheme from the employers, and specifically that there should be no increase in the reliance placed on the covenant over time. Indeed, it is the trustee's view that, with the right economic conditions, and following appropriate dialogue, opportunities should be taken to reduce the amount of risk within the scheme and therefore the reliance on the covenant. The trustee believes this is the right approach for the scheme as it will ensure that the contributions required from participating employers (and active members under the cost sharing arrangements) do not over time become too burdensome.

After careful analysis of the information and consideration of advice provided by its advisers, and taking into account the views received from the scheme's stakeholders, the trustee developed three guiding principles for scheme funding, which are supported by a series of specific, technical tests. These principles and tests were shared with Universities UK in the July 2014 paper *An Integrated Approach to Scheme Funding* which was shared with the participating employers alongside a Universities UK consultation on the scheme's future funding and benefits. A copy of the principles and tests is available at appendix A.

The feedback the trustee has received from Universities UK has indicated that the participating employers broadly support the application of the principles and welcomed the trustee's transparency around this framework. However, some employers voiced concerns about how stringently the principles and tests will be applied. The scheme's stakeholders can be reassured that the trustee’s intention is to use these tools as a reference and a guide to determine the nature and timing of any responses that might be required, rather than to produce prescriptive, binary decisions. The principles and tests will be used to analyse scheme risk over time and to highlight potential issues which can then be investigated further and discussed with employer and stakeholder representatives as appropriate.

In preparing for this valuation the trustee has applied the principles and tests to the current funding arrangements. This analysis has indicated that the current arrangements require some revision and necessitate an updated recovery plan. 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, member contributions, and cost-sharing arrangements) as currently specified in the scheme rules. The trustee has, both in this document and in the earlier *Engagement Paper,* indicated the quantum of change required to maintain the current level of risk within the scheme over a 20 year period, whilst recognising the contribution parameters advised by the participating employers. This information is intended to support the scheme’s stakeholders in their ongoing discussions around the shape of future benefit and contribution structures.

The trustee continues to support these ongoing discussions, providing information and modelling to enable the stakeholders, and through them the institutions and members, to understand the impact of proposed changes. It is not necessary to conclude those discussions before carrying out this consultation on the technical provisions, recovery plan and Statement of Funding Principles. The underlying assumptions presented in this paper remain broadly the same for most arrangements, and where there is an impact from potential changes to future benefit structures these have been explained below.

A guide to this document

This consultation paper sets out the assumptions which the trustee, together with the appointed actuary, must make in order to calculate the scheme's liabilities – that is the amount needed to pay the pension rights already accrued, both for pensions already in payment and those which will become payable in the future. 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 trustee takes a scheme-specific measure of the liabilities, known as the technical provisions, which includes a prudent allowance for future investment returns, and compares it with the assets currently held by the scheme in order to derive the contribution requirements.

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 substantial 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 Pension Regulator's best practice, as well as more detailed information about the assumptions themselves.

This paper is the first in a series of formal consultations which the trustee will carry out as part of the valuation processes. Subsequent consultations will be completed on the Schedule of Contributions, Statement of Investment Principles and, depending on the nature of any proposal coming out of the current discussions[1], an employer consultation with affected employees on changes to future benefits, for which the trustee will provide guidance and practical support.

In addition to the statutory requirements the trustee has also provided further information about its integrated approach to scheme funding, the development and application of the principles and tests – which were presented to the participating employers in July – and some additional information about the valuation timeline. There is also a glossary of technical terms towards the back of the document.

It is hoped that this information proves useful in preparing any response to the consultation. The trustee looks forward to receiving your comments.

[1]Notably whether those changes are identified in statutory regulations as requiring a formal consultation with affected employees

The underlying assumptions of the draft technical provisions

The technical provisions are a prudent estimate of the assets needed to pay the pensions promised. The technical provisions calculation requires the trustee to make a number of demographic and financial assumptions. 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 2014 technical provisions are developed by reference to the assumptions used for the previous formal valuation in 2011, details of which are available in the Statement of Funding Principles (SFP) dated 15 June 2012 which is available on the USS website http://tinyurl.com/l29mvar.

The key adjustments to the assumptions proposed for the 2014 Valuation (compared to the 2011 SFP) are as follows:

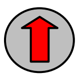
- A strengthening of the mortality assumptions to include (i) an update from the 2009 Continuous Mortality Investigation (CMI) table to the 2012 CMI table alongside the maintenance of the same scheme-specific adjustments to those tables as used in 2011, and (ii) allowance for future improvements in mortality to incorporate a longer-term improvement trend of 1.5% per annum compared to the 1.25% per annum used in 2011.

- A reduction in the inflation risk premium adjustment applied to the market-implied RPI inflation rate from 0.3% per annum to 0.2% per annum.

- A gradual reduction of investment risk over a 20 year period in order that the scheme's reliance on the employer covenant does not increase. This will be reflected over that same period in (i) a change to the discount rate, and (ii) a change in the inflation risk premium.

The table below provides a commentary on the principal assumptions used for the 2011 valuation and, where a change is proposed a description of the nature of the change and the financial impact it has on the scheme's liabilities.

Change in liabilities	**Assumption**	**Rationale**
	Inflation risk premium	The proposed reduction from 0.3% per annum to 0.2% per annum reflects an allowance for the increased level of inflation hedging which is either already in place or is anticipated. The financial effect of this is to increase the technical provisions by £0.9 billion.
	RPI / CPI gap	Retail Price Index (RPI) and the Consumer Price Index (CPI) are two different measures of inflation. Objective market information is available in relation to the long-term RPI whereas the scheme's benefits typically increase in line with CPI which is generally expected to be lower than RPI. An assumption therefore needs to be made for the long-term RPI / CPI gap. For the 2011 valuation the RPI / CPI gap was assumed to be 0.8% per annum. There has been nothing to suggest the assumption adopted for the 2011 valuation should be amended and therefore no change is proposed.
	Salary increase assumption	The assumption used in the 2011 valuation was based on a general pay growth assumption of RPI + 1% per annum plus an additional allowance for increases above the general pay growth scale. The salary increase assumption needs to be specific to the sector and the membership of the scheme rather than what may be considered appropriate to the economy as a whole. Historic experience is taken into account but ultimately a forward looking assumption needs to be made which is considered appropriate for the very long-term horizon and expected career progression covering all the final salary active membership of the scheme. These long-term, scheme-specific, principles are applied consistently, for example, to the choice of the discount rate as well as the salary increase assumption. Over such long-term time horizons and career progression an individual's salary increase will be a complex aggregation of what could be modelled as "general" pay increases and a variety of other less general elements, including promotional increases, covering an individual's career path through potentially a number of different institutions. The scheme's salary increase assumption, which comprises a general pay increase assumption with an age-related salary scale, therefore represents a simplified representation and it is the combined effect of the two assumptions which is important for calculation of the liabilities.

		It should also be borne in mind that the USS pensionable salary (the salary used to calculate the amount of scheme benefits) is subject to a minimum of a dynamised pensionable salary calculation which takes into account pensionable salaries over the last 10 years increased in line with RPI. The analysis of scheme experience over many years has been shared with Universities UK and University and College Union representatives to support the formation of a continuing long-term assumption for future increases. These data demonstrate that over the 20 year period to 2014, the general pay increase was equivalent to RPI. If we exclude the last three years, the general pay growth experience was RPI + 0.7% per annum. Annual analysis over the last few years indicates additional pay increases over and above the general pay growth assumption have been broadly in line with the age-related salary scale assumption used for the 2011 technical provisions basis. Having considered both the past and future outlook of salary increase data for USS members, and having engaged in substantial dialogue with stakeholder representatives, the trustee is minded to retain the 2011 salary increase assumption of RPI +1% per annum plus the age-related salary scale for this valuation. It should be noted that a lower age-related salary scale assumption is currently used for the calculation of the future service cost (compared to the salary scale used for past-service increases), which reflects the expectation that in the longer-term such increases would be in line with a lower scale excluding some historic factors which it is not anticipated will be repeated. Further details on this assumption are available in the Statement of Funding Principles. The trustee is minded to maintain this approach for the 2014 valuation.
	Life expectancy (base table)	The 2011 assumption was based on a detailed analysis of the scheme membership; experience over the inter-valuation period is broadly consistent with that assumption. The trustee will therefore update the base table used from the 2009 version to the 2012 version alongside maintenance of the same scheme-specific adjustments to these standard tables as were used in 2011. This change leads to an increase in the value of the liabilities of less than 0.25% or £0.1 billion.

	Life expectancy (future improvement rate)	The trustee proposes to strengthen the allowance for future improvements in mortality to reflect emerging trends. The long-term improvement assumption now incorporates a more recent version of the standard mortality table and has also been strengthened to incorporate a higher longer-term improvement trend of 1.5% per annum compared to the 2011 assumption of 1.25% per annum. In this context, it can be noted that the Pensions Regulator's latest survey shows that around 65% of schemes use a long-term improvement rate of 1.5% per annum or more. The financial effect of this is to increase the technical provisions by £0.9 billion.
	Demographic assumptions (covering early retirement, withdrawals from service, ill-heath retirement, and likelihood of beneficiary pension entitlements)	Inter-valuation experience has been analysed where available and compared to the assumptions made for the 2011 valuation. The analysis in relation to withdrawal and ill-health early retirement rates suggests that, to varying degrees, the current assumptions may be conservative compared to recent experience. However taking due account of the level of reliance which can be placed on data over any particular short period, and the limited materiality of any potential changes to the overall valuation outcome, the trustee is satisfied that the 2011 assumptions remain reasonable and no change is proposed.

Further details of the individual actuarial assumptions are included in the proposed draft Statement of Funding Principles which is attached at appendix C.

The discount rate

The discount rate is effectively an 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 pensions already promised.

The initial discount rate is calculated with reference to the specific assets held by the scheme. Different asset classes provide different expected rates of return. A combined overall anticipated rate of return is first determined and then adjusted to provide a prudent discount rate with which to value the scheme's liabilities. This approach allows for the actual range of investments made by USS to be reflected in the technical provisions. In deriving its long-term return expectations, the trustee takes into account the views of USS's internal investment team and its independent investment advisers on the prospects for all major asset classes, including equities and inflation-linked gilts. These assessments are made on both an equilibrium basis (assuming asset markets are fairly valued at present) and on a valuation-adjusted basis (accounting for an assessment of market over – or under – valuation).

The expected returns on each asset class, and the discount rate, used by the trustee are expressed by reference to the gilt yield which allows the scheme's stakeholders to make comparisons, for example, over time, with other asset classes, and with comparator schemes.

The gilt yield is calculated as the average equivalent rate of the gilt yield curve[2] as at 31 March 2014 weighted by the profile of the scheme's projected cash flows. The trustee's view of the long-term best estimate return on its current investments – that is the expected rate of return which might be achieved 50% of the time – as at 31 March 2014 is equivalent to gilts +2.75% per annum.

As mentioned, in determining the discount rate the trustee must also make an allowance for the prospect that investment performance falls below expected levels. For the 2011 valuation the trustee adopted a discount rate equal to gilts +1.7% per annum. For the 2014 valuation the trustee has concluded that it would wish to continue the approach adopted previously in order to calculate the initial discount rate at a gilts +1.7% per annum which therefore contains a margin of prudence of just over 1% per annum compared to the best estimate return; this approach is also in line with the continuing advice of the scheme actuary.

In the longer-term the discount rate is driven by the trustee's desire to manage the scheme's reliance on the covenant of the participating institutions (as defined below) which impacts the amount of investment risk the trustee is comfortable with, and hence the discount rate. Under the risk parameters agreed by the trustee the discount rate in 20 years is determined in order to keep the difference between the technical provisions and the value of the liabilities measured on a self-sufficiency basis within a desired range. It is therefore proposed that the allowance for outperformance, over gilts, of 1.7% per annum is reduced gradually over a 20 year period. The actual amount of reduction in investment risk the trustee will seek and therefore the level of outperformance the trustee will be aiming for at the end of that 20 year period will to some extent depend upon the level of future benefits that are to be provided. The subsequent section of this paper includes further information on the strategy to manage risk as the scheme evolves, and the impact that it has on the assumptions supporting the technical provisions for the 2014 valuation.

Reducing risk within the scheme

In broad terms the trustee believes that the amount of risk taken should be proportionate to the amount of support available to the scheme from its participating employers, and specifically that there should be no increase in the reliance placed on the covenant over time. The reliance on the covenant is measured by comparing the value of the liabilities on a technical provisions basis with a calculation of the liabilities on a self-sufficiency basis[3] – which assumes a low risk investment strategy.

Projections indicate that if the trustee maintained the current investment strategy and hence the same discount rate in 20 years time, there would be a significant increase over that period in the reliance on the covenant. The trustee has therefore proposed a targeted reduction in investment risk and therefore the discount rate in order to maintain the reliance on the covenant within specific parameters. Adopting this targeted approach the trustee would, given the right economic conditions, seek opportunities to reduce the amount of investment risk over time.

[2]This represents the yields on gilts over different time periods
[3]See glossary for complete definition of the self-sufficiency basis

Contingent employer contributions

In the absence of contingent assets, which in many single employer arrangements have been used to provide tangible support for pension funds, the trustee has sought to identify contingent employer contributions. This is the essence of the first principle and relevant supporting test set out by the trustee and has been defined as the difference between the level of contributions the participating employers have indicated is the maximum desirable - which is 18% of salaries - and the level identified by EY, the trustee's covenant assessors, as the rate which the majority of employers would be able to pay - which is 25% of salaries, albeit not without, in some cases, substantial changes to operating models and some threat to the mutuality of the scheme.

In order to estimate the reliance on contingent employer contributions, the value of the scheme's liabilities on both a technical provisions and self-sufficiency basis are projected over a 20 year period. The median outcome is then taken and used to compare the two bases. Within that calculation is an assumption for the level of inflation over the next 20 years and a projected discount rate at the end of that period, the latter (critically) being set to fulfill the trustee's requirement that there is no increase in the reliance on the covenant in real CPI terms.

Based on the above approach, if the current benefit structure were to be maintained going forwards, the trustee would seek to gradually reduce the discount rate (and correspondingly the inflation risk premium) to a level which equates to gilts +1.1% per annum, over a 20 year period. For the 2014 formal valuation, based on the current benefit structure, this means the trustee will adopt:

- A discount rate of gilts +1.7% per annum in year one, reducing linearly (for the purposes of the valuation calculations) to gilts +1.1% per annum in year 20 and beyond
- An inflation risk premium of 0.2% in year one reducing linearly (for the purposes of the valuation calculations) to 0.1% per annum in year 20 and beyond

In reality the trustee would seek appropriate opportunities to make investments in risk-reducing assets. The route the trustee would take in order to reduce risk would be more variable but using a targeted linear route enables sensible calculations to be made.

In developing the approach detailed in this paper, the trustee considered whether the different duration of liabilities for past service benefits and future service accrual would justify the use of a different value for, say, the gilt yield and inflation assumptions. Following further analysis it was felt that any difference in these assumptions would be marginal and therefore the trustee proposes to use the same assumptions for the calculation of the cost of future service benefit accrual as used for the technical provisions, albeit, as noted earlier, a lower age-related salary scale for the future service calculations compared to the technical provisions basis.

It is worth noting that the trustee's plan to gradually reduce risk in the scheme does not result in a 'de-risked' investment approach. The targeted position still means a substantial amount of the scheme's investments would be in return-seeking assets in 20 years time. Taking this approach means that even in 2034, having reached the reduced risk position the trustee has set out, the fund would still contain a significant amount of investment risk which would be consistent with a scheme backed by robust employers such as those which sponsor USS.

The trustee's approach means that the discount rate in 20 years time (reflecting the reduced risk position) depends on the level of future benefit accrual, as that has a significant impact on the quantum of liabilities built up over time and therefore the calculation of the reliance on covenant. This is explored further in the section below on the impact of potential changes to benefit arrangements. Further details of the trustee's approach to the de-risking strategy were set out in the July 2014 paper *An Integrated Approach to Scheme Funding* and the full text of the trustee's principles and tests is available in appendix A.

The draft recovery plan

Based on the trustee's proposed assumptions, there is a shortfall 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. This is known as a recovery plan.

Following the 2011 valuation, which reported a £2.9 billion deficit, the trustee in consultation with the scheme's stakeholders implemented a 10 year deficit recovery plan. There were two components to this recovery plan; firstly the payment of contributions in excess of the value of accruing benefits, and secondly the assumption that the scheme's investments would deliver a return approximately 0.5% per annum greater than the assumption made for the discount rate in the 2011 formal valuation. The first component involved employers making payments in the first six years of the recovery plan period at 16% of salaries, which was broadly 3.4% above the cost of accrual determined at the 2011 valuation. For the remaining four years the employers were due to make payments at 2% of salaries in excess of the (then) estimated future cost of accruals. Since the deficit recovery plan was put in place the participating employers have made deficit contributions of £0.7 billion. In addition the in-house investment team has achieved an additional £2.1 billion investment outperformance, over and about the £0.6 billion anticipated outperformance which had been built into the recovery plan. This would have been enough to return the scheme to an almost fully funded position, if all other elements had remained equal. However, the value of the liabilities has increased substantially since 2011 and this has created a materially larger deficit, with changes in investment outlook (in particular gilt yields) adding £7.6 billion to the scheme's liabilities.

The trustee proposes that a broadly similar approach to that used in 2011 is adopted for the updated recovery plan to be decided upon following the 2014 formal valuation and the estimated cost of employer contributions to the deficit is set out in the section below. The additional assumed outperformance to be included in the updated recovery plan will be aligned to the reduction in risk – and therefore the discount rate – which the trustee proposes to implement gradually over the period of the recovery plan. It is therefore proposed that the additional assumed outperformance during the recovery period will be 50% of the difference between the technical provisions assumed discount rate and the best estimate return from the investment strategy. In year one this would provide an extra investment return of circa 0.5%. This would then gradually reduce in line with the reduction in investment risk and discount rate.

The length of the recovery plan is a further decision point for the trustee, following consultation and taking into account the strength of the employer covenant, the size of the deficit and the level of risk inherent in the scheme. For the deficit identified at the 2011 formal valuation the duration of the recovery plan was 10 years. Based on the detailed work undertaken by the trustee's independent covenant advisers, EY, which in particular considered the potential period of visibility of the covenant, the trustee believes it would be reasonable to agree to a longer recovery period for the 2014 formal valuation. From EY's work the trustee was able to conclude that there was good visibility over the covenant for a period of 20 years. The trustee has some concerns about extending a recovery plan to the full length of the covenant horizon; using the maximum time available now would leave little room to accommodate any future adverse experience. The trustee therefore proposes that a 15 year recovery period is adopted. Future benefit structures are a matter for the scheme's stakeholders. The trustee is aware that one proposal put forward assumes that a 20 year recovery plan is adopted and this has therefore been modelled and the results are set out in the sensitivity analysis in appendix C. However, this should not be read as the trustee's acceptance of this proposal.

2014 technical provisions and recovery plan: the draft results

Taking the updated assumptions as outlined above, including the trustee's plan to reduce risk within the scheme and applying those factors to the current benefit structure, the technical provisions for the 2014 valuation are:

	31 March 2014
Assets	£41.6bn
Liabilities on a technical provisions basis	£53.9bn
Deficit	£12.3bn
Future service contribution rate	28.4% of payroll
Deficit contribution rate (15 year[4] recovery period)	9.8% of payroll
Total contribution rate	38.2% of payroll
Employee contribution rate[5]	
Final salary members	12.7% of payroll
CRB members	11.7% of payroll
Employer contribution rate	25.7% of payroll

The trustee recognises that, on this basis, the contribution requirements for the current benefit package fall above the 25% threshold, which EY identified was the maximum contribution rate that the majority of employers could pay, albeit in some cases not without significant change to operating models and substantial threat to the mutuality of the scheme.

The trustee's priority is to ensure that there are funds available to pay the pensions already promised as they fall due and the backing of a robust and sustainable employer remains a key part of achieving that objective. Ensuring pension arrangements do not have an adverse impact on an employer's ability to achieve sustainable growth is also a key concern for the Pensions Regulator. The trustee's plan to reduce risk within the scheme would, over the long term, deliver increased contribution stability enabling some confidence that contributions would not become unaffordable and that the scheme's reliance on the participating employers would remain proportionate to the support available from them.

[4] It is assumed that the 15 year period is measured from 31 March 2014 but that the current employer contribution rate of 16% is payable until 30 June 2015.
[5] Assuming that the current cost sharing principle is applied

The proposed cost of current benefit arrangements may prove prohibitive for members; the technical provisions show that, under the cost sharing arrangements, members would be required to pay 12.7% and 11.7% for the Final Salary (FS) and Career Revalued Benefits (CRB) sections respectively.

Whilst changes to future benefit structures are a matter for the scheme's stakeholders, the trustee believes that the valuation of the current benefits package on a technical provisions basis demonstrates that these arrangements are unsustainable. In addition to breaching the maximum contribution rate identified by the covenant assessment, the current benefit arrangements, combined with the impact of reducing investment risk over a 20 year period, also puts the funding arrangements beyond the parameters the trustee has set out in the principles and tests. As previously explained, this alone would trigger a discussion with the scheme's stakeholders around scheme funding. As it is, these discussions began some time ago in preparation for the 2014 formal valuation and they are ongoing. The trustee continues to support the scheme's stakeholders in these discussions and in particular to provide guidance around whether proposed changes to future benefits would satisfy the trustee's principles and tests for scheme funding going forward. The subsequent section examines the effect of potential changes to future benefits on the scheme funding arrangements. This information is provided so that there is some transparency around the scale of change potentially required and should not be taken as the trustee advocating a particular approach.

The effect of changes to future benefits

The trustee's approach means that the targeted discount rate (the reduced risk position) depends on the level of future benefit accrual. Changes to future benefit structures could have a significant impact on the quantum of liabilities built up over time and therefore the amount of liability risk within the scheme. The trustee is concerned with managing risk across the whole scheme – if the scheme's stakeholders choose to reduce scheme risk it enables the trustee to take more risk in its investment strategy as long as the overall reliance on the covenant remains in proportion with the employers' ability to support the scheme.

This means that the targeted discount rate in 20 years time depends to some extent on the level of future benefit accrual. Given the inherent sensitivity of projections over a 20 year period to the assumptions made, the trustee does not believe it is appropriate to apply an overly precise relationship between the level of benefit accrual and the targeted discount rate.

It is therefore difficult to provide a precise indication of how a particular quantum of benefit change (either expressed as a percentage of pensionable salary or as a proportion of the overall benefit) may impact the discount rate as different types of benefit design may have a different impact over time. For example, the cost of a scheme design related to a capped pensionable salary would be expected to change over time when that cost is expressed as a percentage of full salary.

In order to give a broad indication of the size of the potential change we can say that if the final salary link for past service was replaced with CPI, and future service benefit accrual was changed such that the cost of future defined benefits accruing fell by the order of approximately 8% of total payroll then the ultimate discount rate could rise from gilts +1.1% to gilts +1.25%. This would result in a lower employer contribution for the new benefit structure of the order of 16.9% compared with 25.7% for the current benefit structure (and lower member contributions).

Stability of contributions

The essence of the trustee's second principle and supporting test is that there should be some confidence that employer contribution rates will fall within certain parameters. The contribution parameters have been determined after consultation with the scheme's participating employers, and focus on two specific employer contribution reference points of 18% of salaries (the amount the employers have indicated is the maximum desirable contribution) and 21% of salaries (the threshold identified by EY as an amount the majority of employers could pay albeit with some changes to operating models).

The trustee believes it is important that the scheme's stakeholders are fully informed of the potential volatility in future contribution requirements by considering the range of possible outcomes in three years time – i.e. at the next actuarial valuation. Once the underlying assumptions behind the technical provisions have been agreed by the trustee, taking into account any feedback from this consultation, further work will be done on future contribution volatility. In particular, as the scheme's stakeholders progress the current discussions around future benefit structures, this modelling can reflect any specific options being considered. The trustee will be pleased to work with stakeholders to share this information as it becomes available. This will help form a view on the likely sustainability of future benefit arrangements.

Comparisons with the net asset value of the participating employers

The final aspect of the trustee's updated funding approach is a comparison between the estimated net asset value of the participating employers compared to the deficit on an economic basis (for this purpose a discount rate equal to the yield on gilts is used) plus the amount of additional assets required to meet a 1 in 100, funding event. The trustee acknowledges that the net asset value of the scheme's participating employers is not precisely quantifiable; however, the trustee is keen to ensure that the scheme does not appear to threaten the solvency of the participating employers. Monitoring the ratio between the scheme's funding position on an economic basis – with an allowance for an extreme shock – and the net asset value of the participating employers enables the trustee to have a sense at a macro level of the size of the scheme relative to the participating employers – ensuring the two continue to remain in proportion. To this end, the trustee would see the ratio exceeding 90% as a point at which there may need to be a further dialogue with the scheme's stakeholders.

Post-valuation experience

The formal valuation is being carried out as at 31 March 2014 and the trustee would not necessarily look to reflect changes in market conditions since then in the outcome of 2014 valuation, if such changes could reasonably be considered to be within the normal volatility which is inevitably associated with the funding position. However, if this post-valuation date experience were considered to be sufficiently material and sustained, i.e. representing a long term shift, then it may be appropriate to consider whether this should be reflected in some way in the outcome of the 2014 valuation.

Since 31 March 2014 there has been a significant reduction in the funding level due to adverse financial experience. The UK equity market has fallen by around 7% between mid-September and mid-October and long-dated government gilt yields have also fallen significantly at the same time. At this stage, the trustee is cognisant that the changes have occurred over a relatively short period, that markets remain volatile and a long-term approach needs to be taken. The trustee therefore intends to continue to monitor closely how the position evolves. The trustee will in due course need to form a better understanding of the circumstances which have led to the recent experience, how sustained this is likely to be in terms of the outlook for the long-term future and the consequences of various future scenarios – and the potential implications for overall scheme risk and therefore the principles and tests. Ultimately whether or not it is necessary to reflect any part of the post-valuation experience in the contribution rates agreed as part of the 2014 valuation will require much fuller consideration and will depend upon further experience.

Next Steps

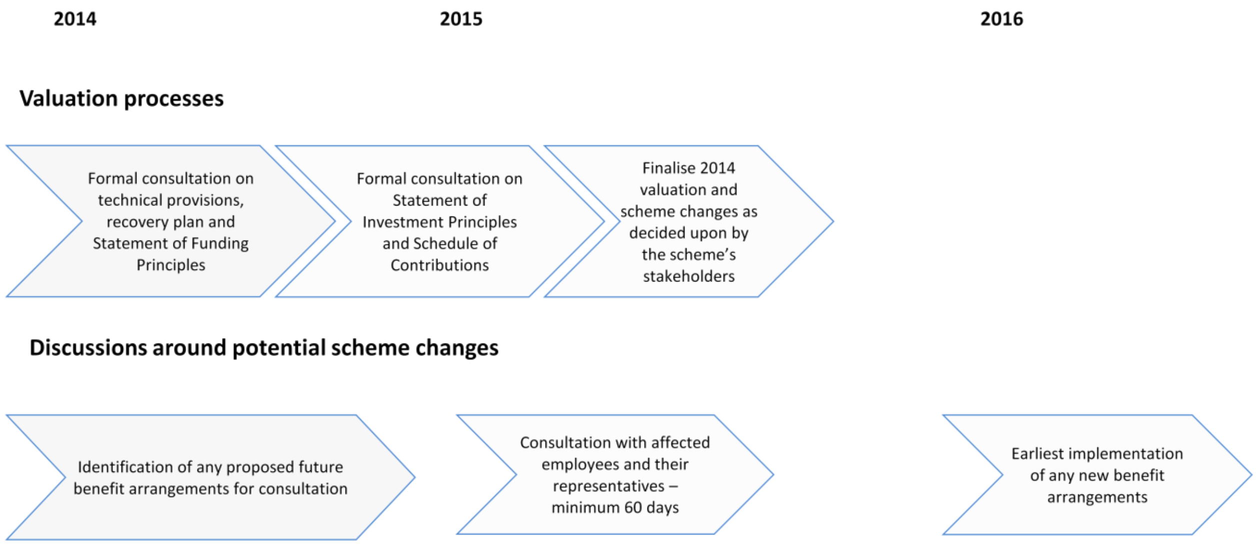
This paper begins the formal valuation processes; that is the consultation on the technical provisions, the recovery plan and the trustee's Statement of Funding Principles. The trustee welcomes feedback from Universities UK and through it individual institutions on any of the matters covered in this consultation. Responses by the 28 November will enable the trustee board to consider participating employers' feedback in early December.

It is hoped that this consultation and its appendices explain the rationale behind some of the judgements the trustee must make about the economic and demographic changes which impact the scheme over many decades. These challenges are certainly not unique to USS; all defined benefit pension schemes are making these adjustments. They are however complex and require constant monitoring to ensure the reliance the scheme places on the participating employers remains proportionate to the support available. The trustee has a duty to take account of the particular characteristics of this scheme, of its operating environment and of the prospects for the participating employers, in its judgement of the appropriate level of investment risk for the scheme – the third principle, the comparison to the net asset value of the sector does this in very broad terms in a manner which is accessible.

Continuing engagement with the scheme's stakeholders is important as the valuation progresses and the trustee envisages further consultation and engagement with both employers and members, and their representatives. The trustee wishes to be as transparent as possible about its approach to scheme funding and will continue to update its website (www.uss.co.uk) as appropriate.

High level timeline

The timeline below sets out some high level activities which will take place during this period, however, it should be noted that there shall continue to be engagement with the scheme's stakeholders outside of these more formal pieces. At present it is difficult to give precise dates as the discussions between the scheme's stakeholders must be able to progress appropriately. As an indication, formal valuations must be completed within 15 months of the valuation date which provides a deadline of 30 June 2015.



Appendix A: The guiding principles adopted by the trustee

The guiding principles, adopted by the trustee in order to manage scheme funding, draw very clear lines between the support available from participating employers and scheme risk over the horizon of the covenant (and the trustee's view is that it has good visibility of the covenant over a period of 20 years). This is in keeping with the trustee's long-term view of the scheme and its approach to funding and investments. These principles will be reviewed and employers will be consulted on a continuing basis. The guiding principles for scheme funding adopted by the trustee can be summarised as follows:

1	**Reliance of the scheme on the sector**
	Over the period for which there is visibility of the covenant (estimated to be 20 years) there should be no increase in USS's reliance on the covenant of the sector and, where opportunities arise, the reliance on the covenant should be reduced if possible. The reliance on the sector will be measured as the additional contributions which would be required if the trustee moved to a relatively low risk approach to investment strategy and therefore could not rely on the same level of investment returns which are anticipated under the current investment strategy.
2	**Stability of contributions**
	There should be a *high* probability that the employer contribution rate will not exceed 18% of salaries over a three year period and there should be a *very high* probability that the employer contribution rate will not exceed 21% of salaries over the same period. In the longer term the stability of the contribution rate should be increased.
3	**Investment risk and tail risk**[6]
	The balance sheet of the scheme's participating employers should be able to cover the impact which a rare set of adverse circumstances (tail risk) may have on the funding position of the scheme. This includes being able to cover both the level of any existing deficit, plus an allowance for a potential increase in this deficit over a one year period if an exceptional economic event were to occur with resulting adverse impacts on investment returns.

[6] The investment strategy being followed by the scheme means that, in extremis, there is a very large range of uncertainty in the potential change in the deficit which could take place over even relatively short periods, such as one year. These changes could take place through, say, a particularly adverse combination of changes to long-term interest rates and / or the level of the stock market. Within this range of uncertainty, there is a long "tail" of outcomes with a relatively low probability but a very high impact on the deficit. Tail risk is therefore a measure of the potential impact of these low probability outcomes – it is often quantified as a single number called the "Value at Risk" or VaR associated with different levels of probability. It is a scheme-specific measure because it depends on the profile of the scheme's liabilities and the investment strategy being followed. Since the tail risk considers relatively unlikely events it is not used as part of the main set of parameters for setting the contribution requirements. However the tail risk cannot be ignored as it is an important element for the trustee in considering the ultimate security of benefits. In practice it needs to be looked at to ensure that the tail risks arising from the scheme's investment strategy are supportable given the potential for changes in contributions or additional mitigating actions. A similar concept is used by financial institutions, such as insurers, in measuring their resilience to "market shocks".

Scheme funding and the trustee's technical tests

The three guiding principles identified above are supported by a number of specific technical tests; this approach enables the trustee both to assess any scheme changes proposed by the employer and member representatives in relation to the current scheme funding challenges, and to manage the scheme going forward.

The tests inform the trustee's decision making on the degree of risk which is acceptable within the scheme and specifically in delivering both the past and future benefits. These decisions are formed by both looking at the risks in the short term but also importantly how these are likely to build up over longer time horizons, particularly the 20 year period over which there is good visibility of the covenant.

The calculations on a technical provisions basis involve placing a current value on commitments which will run for many decades into the future, and the USS trustee – just like other trustees of defined benefit schemes – must make sensible and prudent judgements regarding the rate of return that can be expected in the long term on future investments, along with other appropriate assumptions.

The trustee will use these tests as a reference and guide to determine the nature and timing of any responses that might be required.

Test 1: Benefit security and additional contribution cover
The difference between the liabilities assessed on a self-sufficiency approach (for this purpose a discount rate of gilts +0.5% is used) and the actual technical provisions basis should generally not exceed what we refer to as the amount of contributions payable in extremis, which we will indicatively measure as the difference between (i) the maximum contribution of 18% of salaries stated by the employers as being desirable and (ii) the maximum identified as being affordable by employers (in the independent covenant review undertaken by EY on behalf of the trustee board) of 25% of salaries, over a long period such as 15 to 20 years. The rationale is that, at any given time, the trustee could be required to replace the investment returns assumed in the funding of current benefits with additional contributions from the participating employers, if such a response were needed due to scheme or economic circumstances. In considering the development over time of the relationship between the liabilities measured on a self-sufficiency basis and on the technical provisions basis, the position at the end of a 20 year horizon will be used. The size of the technical provisions at the end of 20 years will be determined so that the difference between it and the self-sufficiency value of liabilities remains broadly constant. This informs the trustee of the size of the technical provisions required, and from that the required investment strategy can be derived. It's the gap to the self-sufficiency funding level that is critical, and that is maintained (and not allowed to grow disproportionately) by keeping the technical provisions value at a sufficient level over time.

Test 2: Stability of contributions

Modelling will be carried out to quantify the scope of the contributions that the scheme might require (using the technical provisions basis) when risk is assessed over a three year horizon.

It is proposed that the contribution levels required to meet (i) the cost of the future benefits accruing, and (ii) any deficit on the technical provisions basis – at the end of a three year period – should have a *high* probability of not exceeding 18% of salaries and a *very high* probability of not exceeding 21% of salaries. In assessing the risk parameters the following will apply:

- A high probability will be broadly 70% or above.
- A very high probability will be broadly 90% or above.

Test 3: Benefit security and the asset base of the participating employers

The net asset value of the participating employers will be compared to the deficit on an economic basis (for this purpose a discount rate equal to the yields on gilts is used) plus the amount of additional assets required to meet a 'tail risk', 1 in 100, funding event.

The 'tail risk' will be measured using a Value at Risk (or VaR) at a 99% level over a one year period. This comparison will be a guide to the extent to which, in all but the most extreme circumstances, the trustee could rely on sufficient funds to secure the benefits promised by the scheme.

The trustee acknowledges that the net asset value of the scheme's participating employers is not precisely quantifiable. As such the trustee will monitor the ratio of (i) the deficit on an economic basis plus VaR at 99% level to (ii) the estimated net asset value of the scheme's participating employers. Should the ratio increase above 90%, then the trustee will commence a discussion with stakeholders as to whether any mitigating responses are required.

If the ratio were to increase above 90% the net asset value of the scheme's participating employers would be assessed on a basis which might include the use of insurance replacement value measures if this is judged to be more representative of fair value than book value.

Appendix B: 2014 Draft Statement of Funding Principles

ACTUARIAL VALUATION AS AT 31 MARCH 2014
STATEMENT OF FUNDING PRINCIPLES

Universities Superannuation Scheme ("the Scheme")

This statement of funding principles (SFP) sets out the policies of the trustee board of the Universities Superannuation Scheme ("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 actuary to the Scheme. 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 2014. 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 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 costs incurred by the trustee in paying its benefits as they fall due (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 employers' 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 requires 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 taking into account the circumstances and needs of the scheme and employers at the relevant time.

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 it 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 2014 valuation will be met by [] which is [] years from the effective date of the valuation. [This section will be completed once the consultation on proposed technical provisions, and recovery plan, is complete and any final decisions taken]

The assumptions to be used in these calculations are set out in the appendix.

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.

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 2017. 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, dated [] has been agreed by the trustee of the USS after obtaining advice from the scheme actuary.

Signed on behalf of the Trustee of the USS	
Name	
Position	
Date of signing	

Notes to appendix B: 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 2014 *[subject to consultation]*

The method used was the Projected Unit method.

Principal actuarial assumptions for valuation as at 31 March 2014	
Investment return pre-retirement	5.2% in year 1, decreasing linearly to 4.6% p.a. over 20 years
Market derived price inflation	3.6% p.a.
Inflation risk premium	0.2% in year 1, decreasing linearly to 0.1% p.a. over 20 years
Price inflation – Retail Prices Index	Market derived price inflation less Inflation risk premium
RPI / CPI gap	0.8% p.a.
Price inflation – Consumer Prices Index	RPI assumption less RPI / CPI gap
Salary increases	
- General pay growth	RPI assumption + 1.0% pa
- Salary scale for past service	Scale adopted reflecting recent experience
- Salary scale for future service	Scale adopted reflecting longer term expectations
Pension increases in payment	CPI assumption (for both pre and post 2011 benefits)
Mortality base table	SAPS S1NA"light" YOB unadjusted for males and with a -1 year adjustment for females
Future improvements to mortality	CMI_2012 with a long term rate of 1.5% p.a.

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, under which, for the Final Salary section members, the salary increases assumed for each member are projected until that member is assumed to leave active service by death, retirement or withdrawal from service.

Financial assumptions

Investment return (discount rate)

This is expressed as an estimate of the yield available on a notional portfolio of UK Government conventional gilt stocks whose cash flows approximately match the scheme's estimated benefit cashflows plus an additional outperformance to reflect the allowance the trustee has agreed for additional investment returns based on the investment strategy as set out in the Statement of Investment Principles dated []. The outperformance is gilts +1.7% in year one and is assumed to reduce linearly to gilts +1.1%

over 20 years and assumed to stay at gilts +1.1% pa beyond 20 years. This approach therefore implicitly allows for gradual investment de-risking to take place over the 20 year period.

If, following a review of the Statement of Investment Principles, the investment strategy of the scheme changes 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 basis the discount rate is assumed to be the gilts +0.5% pa and for the economic basis, the discount rate is assumed to equal the gilt yield.

Inflation (RPI)

The assumption for the rate of increase in the Retail Prices Index (RPI) will be taken to be the investment market's expectation for inflation as indicated by the difference between an estimate of the yields available on notional portfolios of conventional and index-linked UK Government bonds (or gilts) whose cash flows approximately match the scheme's estimated benefit cash flows. An adjustment may be made to the assumption to reflect market views that the prices of nominal 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 2014 valuation, the inflation risk premium is set to be 0.2% in year one and then assumed to reduce linearly to 0.1% in year 20 and assumed to stay at 0.1% pa beyond year 20.

For the self-sufficiency basis and for the economic basis, the inflation risk premium is assumed 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 2014 valuation the adjustment was a deduction of 0.8% per annum.

Salary increases

It has been assumed that general increases in salaries will be 1.0% per annum above the assumed RPI inflation assumption.

In addition to the above general inflationary salary escalation allowance for further salary increases, over and above the sector's inflationary general pay growth, has been made by reference to an age-related scale. Sample rates are shown in the table below.

	% increase per annum	**% increase per annum**
Age	Males	Females
35	3.8	3.1
45	2.0	1.8
55	1.1	1.4

The self-sufficiency and economic bases assume no allowance for salary increases above CPI.

Pension increases

Increases to pensions are assumed to be in line with the CPI inflation assumption described above.

At this valuation we have not made any allowance for the fact that pension increases on benefits accrued after 30 September 2011 do not fully reflect inflation once CPI exceeds 5% per annum.

Demographic assumptions

Mortality

The mortality assumptions will be based on up-to-date information published by the Continuous Mortality Investigation (CMI) and National Statistics, making allowance for future improvements in longevity and the experience of the scheme. The mortality tables are S1NA “Light” Year of Birth tables (with no adjustment to the table for males and a -1 year age adjustment to the table for females) with improvements based on the CMI 2012 model with a long term improvement rate of 1.5% per annum.

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 2014 valuation it has been assumed that for service accrued prior to 1 October 2011, active members will retire from age 62 with no reduction to their benefits. For service accrued after 30 September 2011, it has been assumed that active members will retire at age 65.

Deferred pensioners are assumed to retire at age 60 and allowance is built in for the appropriate reduction for early payment which would apply to each relevant tranche of benefit applicable to members retiring at that age. Allowance has been included for deferred members shown in the valuation data with a Contractual Pension Age prior to age 65 in accordance with the “Contractual Pension Age/Preservation” judgement.

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 2014, the following is an extract from the decrement table used.

	% leaving per annum	**% leaving per annum**
Age	Males	Females
35	0.01	0.01
45	0.06	0.08
55	0.21	0.37

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.

	% leaving per annum	**% leaving per annum**
Age	Males	Females
25	14.42	19.28
35	9.19	11.40
45	3.79	3.83

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 as shown in the table below being 109% of the ONS 2008 tables for males, and that surviving beneficiaries are three years younger, on average, than the deceased scheme member.

Age	% spouse/partner
25	10.9
35	53.4
45	69.8
55	77.4
65	83.9
75	79.6
85	61.0

Expenses

Expenses including PPF Levies are met by the fund. This is allowed for by adding 0.4% of salary to the total contribution rate. This addition is reassessed at each valuation. 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

The trustee has agreed to allow for additional investment returns in the recovery plan, of half of the excess return between the best estimate assumed return and the return assumed in the technical provisions. For the 31 March 2014 valuation, the best estimate return is assumed to be gilts +2.75% in year one and is assumed to reduce linearly to gilts +1.75% per annum in year 20.

If, following a review of the Statement of Investment Principles, the investment strategy of the scheme changes 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.

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, with the exception of a reduced allowance for salary increases in excess of the sector's inflationary general pay growth. Sample increases are given in the table below.

	% increase per annum	**% increase per annum**
Age	Males	Females
35	2.7	2.1
45	1.3	0.7
55	0.7	0.6

Appendix C: The underlying assumptions and sensitivity data

C.1 This appendix provides further details of the preliminary valuation results as at 31 March 2014 based on the proposed assumptions for the technical provisions prepared for the trustee by the scheme actuary. The numbers below include a gradual reduction of investment risk – and therefore the discount rate – reduced linearly for the purposes of these calculations over a 20 year period to the gilts +1.1% as explained above.

C.2 The table below sets out a summary of the key results on the technical provisions bases as at 31 March 2014 with the 2011 assumptions (updated for market conditions to 31 March 2014) shown for comparison purposes.

	Assumptions consistent with 2011 Valuation[7]	2014 technical provisions basis
Past service deficit (£bn)	£6.1bn	£12.3bn
Funding level (%)	87%	77%
Future service contribution rate (% of pensionable salaries)		
- FS members	25.3%	30.3%
- CRB members	15.2%	19.2%
- Combined average	23.6%	28.4%
Deficit contribution rate[8]		
- 15 year recovery period	3.0%	9.8%
- 20 year recovery period	1.3%	6.5%
Total contribution rate		
- 15 year recovery period	26.6%	38.2%
- 20 year recovery period	24.9%	34.9%
Member contribution rate[9]		
FS members		
- 15 year recovery period	8.6%	12.7%
- 20 year recovery period	8.0%	11.5%
CRB members		
- 15 year recovery period	7.6%	11.7%
- 20 year recovery period	7.0%	10.5%
Employer contribution rate		
- 15 year recovery period	18.2%	25.7%
- 20 year recovery period	17.1%	23.6%

C.3 The future service costs shown above represent the contribution rate for the next year of benefit accrual and therefore reflect the current age profile of the membership and, in particular, the mix between Final Salary and CRB members.

[7] Reflecting changes in fixed interest and index-linked gilt yields
[8] The recovery period is assumed to start from 31 March 2014 and we assume the increased contribution rate is payable from 1 July 2015 with the 16% rate payable up to 30 June 2015
[9] Reflecting the current cost-sharing principle

C.4 The cost of each section of the membership and the combined contribution costs would be expected to change for the following reasons:

- The average age of the Final Salary section members would be expected to increase over time as this section is closed to new entrants – this would be expected to increase the future service costs for this section.
- The average age of the CRB section members would also be expected to increase over time as this section matures – this would be expected to increase the future service costs for this section.
- The combined average cost would become more weighted to the cost of the CRB section.
- The impact of the planned reduction of investment risk would be to gradually increase the contribution rate.

Sensitivity to key assumptions

C.5 The tables below shows the sensitivity of the total contribution rate on the technical provisions basis to changes in the key assumptions.

	Technical Provisions deficit (£bn)	Total (employer + employee) contribution rate (% of pensionable salaries 15 year recovery period)	Total (employer + employee) contribution rate (% of pensionable salaries 20 year recovery period)
Liabilities on a technical provisions basis	£12.3bn	38.2%	34.9%

	Change in technical provisions deficit £bn	Change in total (employer + employee contribution rate) % of pensionable salaries 15 year recovery period	Change in total (employer + employee contribution rate) % of pensionable salaries 20 year recovery period
Initial discount rate increased by 0.25% p.a.	-£1.0bn	-0.9%	-0.7%
Discount rate in 20 years time increased by 0.25% p.a.	-£1.6bn	-2.6%	-2.0%
RPI inflation reduced by 0.1% pa	-£1.0bn	-1.7%	-1.4%
Salary increases reduced[10] by 0.5% p.a.	-£1.3bn	-2.4%	-2.1%
Long-term life expectancy improvement trend increased to 1.75% p.a.[11]	+£0.6bn	+1.1%	+0.9%
Future service salary scale also applied for past service benefits	-£1.8bn	-1.9%	-1.4%

NB: A change in the assumptions in the opposite direction would have a broadly opposite effect. Each change is considered in isolation and the impact of multiple changes will not be exactly the same as combining the figures above.

[10] The general pay growth assumption is assumed to reduce from RPI + 1% per annum to RPI + 0.5% per annum
[11] Corresponds to an increase in life expectancy of around a year

Results on Alternative Bases

C.6 In this section we consider the past service funding position on a number of different actuarial bases to assist understanding of the relative level of prudence in the technical provisions assumptions.

Neutral Assumptions

C.7 The legislation requires that the technical provisions assumptions are determined on a prudent basis – in other words using assumptions which incorporate a margin of prudence compared to what could be considered to be the "best estimate" or "neutral assumptions". The calculation of the liabilities on a neutral assumptions basis therefore provides a monetary quantification of the margin of prudence.

C.8 The main area where there is an explicit margin of prudence in the technical provisions assumptions is in the discount rate. In particular the initial discount rate for the proposed technical provisions basis is assumed to be gilts +1.7% compared to the best estimate return from the current investment strategy of gilts +2.75% per annum.

C.9 Over a 20 year period the trustee will reduce investment risk, and there will be a corresponding reduction in the discount rate, it is therefore appropriate to allow for the same reduction in investment risk in the neutral assumptions.

C.10 The scheme's actuary has therefore assumed that, for the current benefit structure, the neutral assumptions use a discount rate of gilts +2.75% in year one declining linearly to gilts +1.75% per annum over a 20 year period.

C.11 The two other areas where the assumptions differ from those used in the proposed technical provisions basis are:

- RPI / CPI gap – where a best estimate assumption of 1% per annum is adopted compared to the 0.8% pa used in the proposed technical provisions, and
- The long-term trend in future improvements in life expectancy – where, arguably, a best estimate assumption could maintain a long term rate of 1.25% per annum compared to the 1.5% per annum used in the proposed technical provisions.

Buy-out basis

C.12 The wind-up position has been estimated using the scheme actuary's experience of recent buyout quotations and an understanding of the factors affecting this market. Detailed analysis of the reserves that would need to be held by an insurance company has not been carried out. Consideration has been given to the market terms for the financial instruments in which insurance companies would be expected to invest. An approximate allowance has been made for the reserves an insurance company would maintain to cover the risks involved and the statutory reserving requirements. The results are, therefore, only a guide to the wind-up position and should not be taken as a quotation. Market changes, both in interest rates and in supply and demand for buy-out business, mean that if a buy-out ultimately proceeds, actual quotations may differ.

Self sufficiency basis

C.13 The self-sufficiency basis used by the trustee for one of the tests it will use to assess the scheme's reliance on the sector. This basis assumes that the final salary link is broken and linkage redefined for active members for future increases through to retirement on their past service benefits to be in line with CPI.

The self sufficiency basis uses the same assumptions as the technical provisions basis except that:-

- The discount rate is equal to the gilts +0.5% per annum throughout
- There is no allowance for an inflation risk premium to be deducted from market-implied inflation
- The liabilities for active members are based on their leaving service entitlement (i.e. no allowance is made for salary increases and revaluation is assumed to be in line with the CPI assumption)

Economic basis

C.14 The economic basis uses the same assumptions as those used for the technical provisions basis except that:-

- The discount rate is equal to gilts throughout
- There is no allowance for an inflation risk premium to be deducted from market-implied inflation
- The liabilities for active members are based on their leaving service entitlement (i.e. no allowance is made for salary increases and revaluation is assumed to be in line with the CPI assumption).

Pension Protection Fund (PPF) basis

C.15 This is a basis prescribed by the PPF and required by regulation to be used in the calculation of the risk based element of the PPF levies. It is known as a Section 179 valuation.

Summary of past service results on alternative bases

C.16 The table below shows a summary of the past service funding position on the various bases discussed above:

	Neutral assumptions	Technical provisions	Self sufficiency (gilts + 0.5% pa)	Economic basis (gilts)	Buy-out	PPF
Assets (£bn)	41.6	41.6	41.6	41.6	41.6	41.6
Past service liabilities (£bn)	44.8	53.9	56.1	61.9	76.4	51.8
Deficit (£bn)	3.2	12.3	14.5	20.3	34.8	10.2
Funding level (%)	93%	77%	74%	67%	54%	80%

C.17 A reconciliation of the change between the technical provisions and the self sufficiency basis is set out below:

	Past Service Liabilities (£bn)
Technical provisions	53.9
Removal of salary link	-6.8
Removal of inflation risk premium	+1.0
Change in discount rate	+8.0
Self sufficiency basis liabilities	56.1

Reconciliation of the 2014 and 2011 Valuation Results

C.18 The table below sets out a reconciliation of the past service deficit on the proposed technical provisions basis as at 31 March 2014 with the technical provisions deficit as at 31 March 2011.

	£bn
Deficit as at 31 March 2011	2.9
- Interest on deficit	0.6
- Deficit contributions	-0.7
- Additional expected out-performance assumed in recovery plan	-0.6
Expected deficit as at 31 March 2014 on assumptions consistent with 2011 valuation technical provisions basis	2.2
- Reduction in gilt yields	7.6
- Change in long-term inflation expectations	-0.9
- Actual increases in pensionable salaries[12]	-0.3
- Actual increases to pensions in payment[13]	Nil
- Other membership experience	-0.4
- Impact of actual investment returns experience[14]	-2.1
Deficit as at 31 March 2014 on assumptions consistent with 2011 Valuation technical provisions basis	6.1
- Reduction in inflation risk premium from 0.3% pa to 0.2% pa	0.9
- Increase in long term life expectancy improvement rate from 1.25% pa to 1.5% pa	0.9
- Reduction in discount rate to 1.1% pa over 20 years	3.6
- Reduction in inflation risk premium to 0.1% pa over 20 years	0.8
Deficit as at 31 March 2014 on proposed technical provisions basis	12.3

C.19 The table below sets out a reconciliation of the combined total future service contribution rate on the proposed technical provisions basis as at 31 March 2014 with the combined total future service contribution rate as at 31 March 2011.

	% of Pensionable Salaries
Total future service contribution rate as at 31 March 2011	20.3
- Reduction in gilt yields	5.3
- Change in long-term inflation expectations	-0.6
- Change in membership profile including mix between final salary and CRB members	-1.4
Total future service contribution rate as at 31 March 2014 on assumptions consistent with 2011 Valuation technical provisions basis	23.6
- Reduction in inflation risk premium from 0.3% pa to 0.2% pa	0.6
- Increase in long term life expectancy improvement rate from 1.25% pa to 1.5% pa	0.5
- Reduction in discount rate to 1.1% pa over 20 years	3.1
- Reduction in inflation risk premium to 0.1% pa over 20 years	0.6
Total future service contribution rate as at 31 March 2014 on proposed Targeted de-risked technical provisions basis	28.4

Summary of the Valuation Data

C.20 Set out below is a summary of the valuation data on which the calculations have been carried out, with figures at the previous valuation shown for comparison.

[12] The average increase in pensionable salary over the inter-valuation period was 11.5% which compares with the expected increase of circa 13%.
[13] The actual pension increases over the inter-valuation period were 5.2%, 2.2% and 2.7% respectively, a total of 10.4% over the period compared with an expectation of 10.6%.
[14] An estimate of the average annual investment return on the Scheme's assets over the three year period is c8% pa

Active members

	Final Salary members		CRB members		Total	
	31/3/2014	31/3/2011	31/3/2014	31/3/2011	31/3/2014	31/3/2011
Number of members	124,380	136,247	43,165	n/a	167,545	136,247
Total Pensionable Salaries (£m)	5,922	5,845	1,237	n/a	7,159	5,845
Average age (yrs)	46.1	43.8	37.2	37 (assumed)	43.8	43.8
Average past service (yrs)	12.5	10.4	n/a	n/a	n/a	10.4

Deferred Pensioners

	31 March 2014	31 March 2011
Number of members	110,430	91,048
Total deferred pensions (at date of valuation) (£m pa)	262	179
Average age (yrs)	45.1	44.5

Pensioners

	31 March 2014	31 March 2011
Number of members	70,380	59,554
Total pensions in payment (£m pa)	1,202	1,002
Average age (yrs)	71.1	70.7

Appendix D: Glossary

Employer Covenant
This is used to refer broadly to the participating employers' ability to continue to support the pension scheme in the long-term and in particular in the event that experience, including investment experience, is worse than the assumptions which have been made for funding purposes. In particular it considers the participating employers' ability to increase contribution requirements should the need arise.
Economic basis
This is a basis for calculating the liabilities of the scheme which uses an assumed rate of future return on assets that most closely matches the nature of the liabilities. As pensions are similar to inflation-linked bonds, in that the level of payments is pre-determined to be subject to inflationary increases, this implies using the interest rate on government bonds (also known as gilts).
Formal valuation
This is the regular process of fully reviewing the scheme's funding position, including all the assumptions which are made for that purpose, and if necessary resetting the contribution requirements. By law it must take place at least once every three years.
Gilts
These are the simplest form of UK government bond. A conventional gilt is a bond issued by the UK government which pays the holder a fixed cash payment (or coupon) every six months until maturity, at which point the holder receives his final coupon payment and the return of his initial investment.
Liability hedging assets
Liability hedging seeks to better align a pension fund's assets with its liabilities by hedging, in whole or part, the fund's exposure to changes in the underlying drivers of liability valuation in interest rates and inflation. Assets are chosen whose values move in the same way as the liabilities, typically by generating similar cash flows to the liabilities.
Return seeking assets
Assets chosen with long term returns expected to exceed risk-free assets – which compensates for their exposure to greater risk. Equities are a return seeking asset.
Self-sufficiency basis
Here the liabilities of the scheme are calculated using a discount rate consistent with a low investment risk approach, where a low level of reliance is placed on the participating employers to provide further financial support to the scheme. A low investment risk approach is one that could, in appropriate scenarios, be adopted by a trustee to reduce the longer term reliance on the participating employer(s) and to reduce the likelihood of the employer not being available to meet funding shortfalls.

Participating employers
All of those employers which contribute to the scheme – also referred to in this document as "the employers" and "institutions".
Technical provisions basis
This is the basis used by the trustee generally for setting the employer (and under the cost-share arrangements, member) contributions to the scheme, and is scheme-specific in that the trustee must decide it by reference to USS's specific characteristics. It is often also referred to as the "ongoing" funding basis as it's used in the regular ongoing funding of the scheme. It must, by law, be a basis that is prudent, which means that in deciding the assumptions it is more likely than not that the assumptions will be borne out in practice (i.e. it is not a neutral assumption which only has a 50% likelihood of being realised).
Value at Risk (VaR)
This is an assessment of the financial impact of a rare event, commonly used measures are the downside risk given a 1 in 20 event (95% VaR), a 1 in 100 event (99% VaR) or even 1 in 200 event (99.5% VaR). This is a methodology for assessing the scale of the economic tail risks (low and very low likelihoods) to which the scheme is subject.