Universities Superannuation Scheme

2018 Actuarial Valuation

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

2 January 2019

Contents

1. Introduction

This document sets out the Trustee's actuarial assessment of the USS Retirement Income Builder's funding position as at 31 March 2018 and constitutes a formal statutory consultation on the Technical Provisions and the Statement of Funding Principles. The USS Retirement Income Builder is the name for the defined benefit (DB) section of the scheme.

This document forms part of the 2018 actuarial valuation of the scheme, carried out in accordance with the requirements of the Scheme's Trust Deed and Rules, and the Pensions Act 2004. The document also sets out the future contribution requirements including deficit contributions (a formal consultation on the Recovery Plan and the Schedule of Contributions will follow later in the valuation process).

As the last assessment was conducted just 12 months prior (31 March 2017), this document only sets out the material changes identified and applied by the Trustee in that time. Cross-reference to the supporting materials in the 2017 Technical Provisions report may therefore be beneficial.

The Trustee is undertaking a 31 March 2018 valuation as Universities UK (UUK) has written to the Trustee to communicate that the vast majority of employers are supportive of the Joint Expert Panel's recommendations and therefore would (subject to some conditions) wish to see a change in valuation assumptions. The Trustee as part of the valuation will re-evaluate the employers' risk appetite and explore contingent contribution arrangements, in order to reflect the employers' desire to support the JEP's recommendations.

These matters could not be accommodated in the 2017 valuation due to the statutory requirements to complete that valuation by a legal deadline.

Once completed, the outcome of the 2018 valuation will result in a new Schedule of Contributions and deficit recovery plan which will replace those from the 2017 valuation.

2. The current position

An overview of the benefits provided by the scheme and the current contributions payable is provided in Appendix A.

The total contributions currently payable by members and employers sum to 26% of salary. Under the 2017 valuation these will **increase** in three phases between 1 April 2019 and 1 April 2020 to a total of **36.6%** of salary.

3. The 2018 valuation

A valuation as at 31 March 2018 has a statutory deadline for submission to the Pensions Regulator of 30 June 2019. The Trustee proposes, in line with its legal duties, to use the same methodology as adopted for the 2017 valuation with key assumptions and inputs being updated (where permitted by the regulations) for experience, change in outlook and employers' risk appetite.

A description of the methodology adopted for the 2017 valuation is available in the respective Technical Provisions consultation document, and the final assumptions and inputs for the 2017 valuation are contained in the Rule 76.1 report (issued to stakeholders in December 2017 – a summary of which was subsequently published online by the Trustee in April 2018).

The methodology was discussed and consulted upon with stakeholders via a Valuation Discussion Forum in 2016 – a detailed report of which is available on the USS website.

The proposed changes to assumptions and inputs are discussed in the following sections.

4. What has changed since 31 March 2017?

Two key things have occurred since the assumptions and inputs for the 2017 valuation were decided:

- The Trustee has another year of economic and membership experience and new data upon which to base the valuation assumptions and inputs.
- A stakeholder panel was convened to review the 2017 valuation. In its report this Joint Expert Panel (JEP) proposed six "adjustments" to the 2017 valuation.

We address these two developments in turn.

4.1 New experience and data

4.1.1 Interest rates

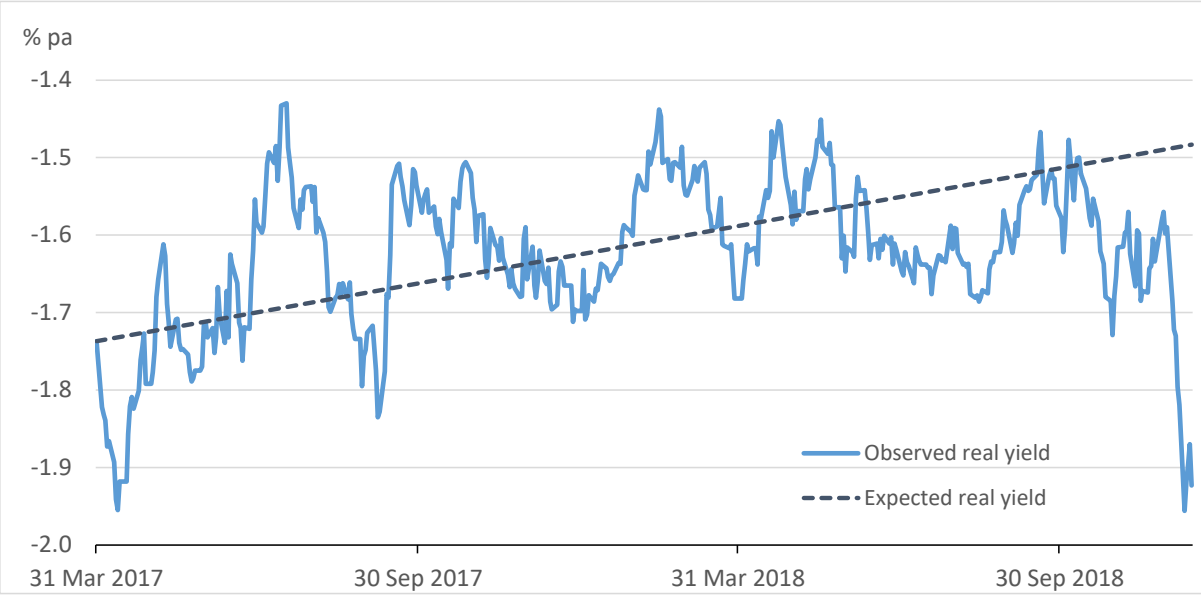
Recall that in the 2017 valuation a core assumption made by the Trustee involved a fundamental belief in the reversion of real interest rates (real gilt yields) over a 10-year period to a level comparable to that prevailing at the time of the 2014 valuation. Specifically, the Trustee's assumption was that 20-year real gilt yields would increase from –1.74% on 31 March 2017 to a level of –0.25% on 31 March 2027.

Figure 1 shows the evolution of 20-year real gilt yields since 31 March 2017 compared with the expected path forecast in the 2017 valuation. There is clearly volatility in the yield level, but until October 2018 a clear upward trend that broadly tracks the expected path is evident.

As at 31 March 2018 the 20-year gilt yield stood at –1.68%, which is just 9 basis points (bps) below its expected level.

Following the market turmoil in October 2018 and the Brexit-related market developments in early December 2018, the real gilt yield is now some way below the expected path: as of the 14 December 2018 it stands at –1.92% some 44bps below its expected level and 18bps lower than at the 2017 valuation date.

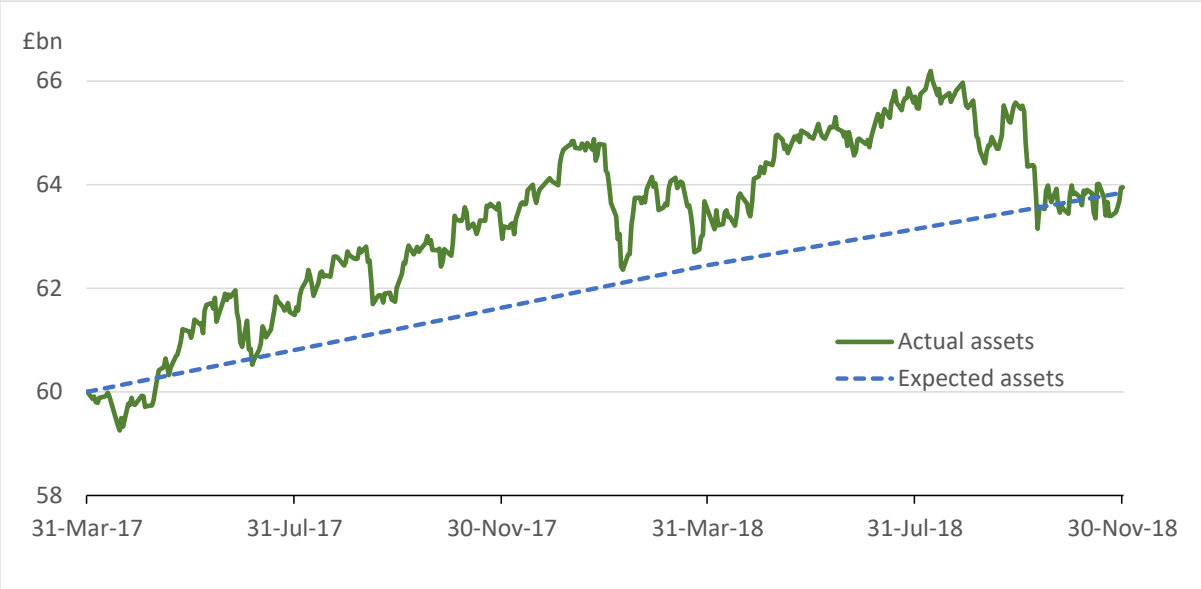
Figure 1: 20-year real gilt yield compared to the expected reversion path assumed in the 2017 valuation. (Data from 31 Mar 2017 to 14 Dec 2018)



4.1.2 Realised asset returns

Since 31 March 2017, realised asset returns have generally been higher than the expected (best estimate) path in the 2017 valuation, as shown in Figure 2. This is reflected in the level of DB assets at 31 March 2018 which stood at £63.7bn, some £1.2bn higher than expected. Since October 2018, experience has not been so positive with DB assets as of 14 December 2018 very close to the expected level forecasted in the 2017 valuation.

Figure 2: Growth in DB assets compared with expected (best estimate) path in the 2017 valuation. (Data from 31 Mar 2017 to 14 Dec 2018).



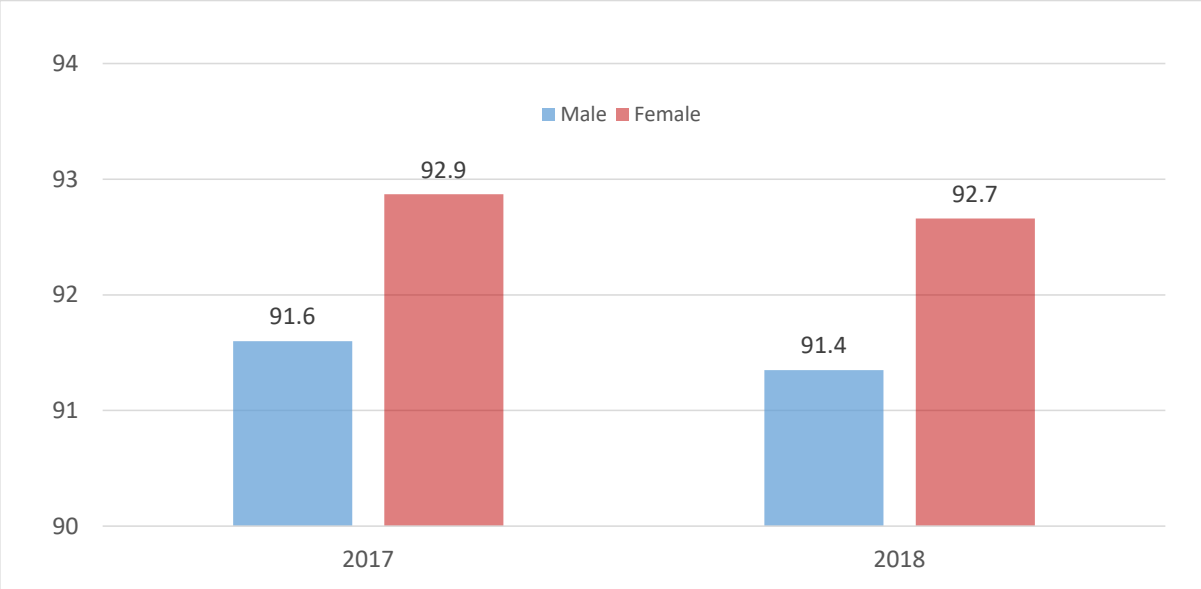
4.1.3 Mortality

Mortality rates have been updated to reflect the one year of additional experience data available for the scheme. The additional year of scheme mortality experience reflects a lower realised improvement in mortality rates than expected from 2017 to 2018. This is broadly consistent with observations in the general population where the slowdown in population mortality rates leads to a lower near-term rate of improvement, albeit this change is less marked for USS because USS member demographics are very different from those of the general population.

The implication of this is a slight fall in the life expectancy of USS members. Figure 3 shows the (cohort) life expectancy for USS members aged 45, assuming they reach retirement age.[1] It is evident from the chart that cohort life expectancy for both male and female members has fallen by 0.2 years (or about two-and-a-half months) over the year.

[1] So-called "cohort life expectancy" measures life expectancy taking account of prevailing mortality rates and projections for future improvements.

Figure 3: Life expectancy of 45-year-old USS members upon reaching age 65 based on 31 March 2017 and 2018 valuations (both shown at consistent dates)



4.1.4 Expected future investment returns

Expected future investment returns on the assets held by the DB section of the scheme have been updated using the Trustee's Fundamental Building Blocks (FBB)[2] approach, which is the same approach that was used for the 2017 valuation.

Expected investment returns are vitally important to the valuation because they form the basis from which discount rates are calculated. (Discount rates are used to establish the scheme's technical provisions (liabilities) and future contribution requirements.)

The updated FBB results for the real expected returns are summarised in Figure 4 for the 2017 Reference Portfolio.

Note as for 2017, the 2018 expected returns are lower in the first 10 years than the subsequent 20 years because of reversion of real gilt yields in that initial 10-year period.

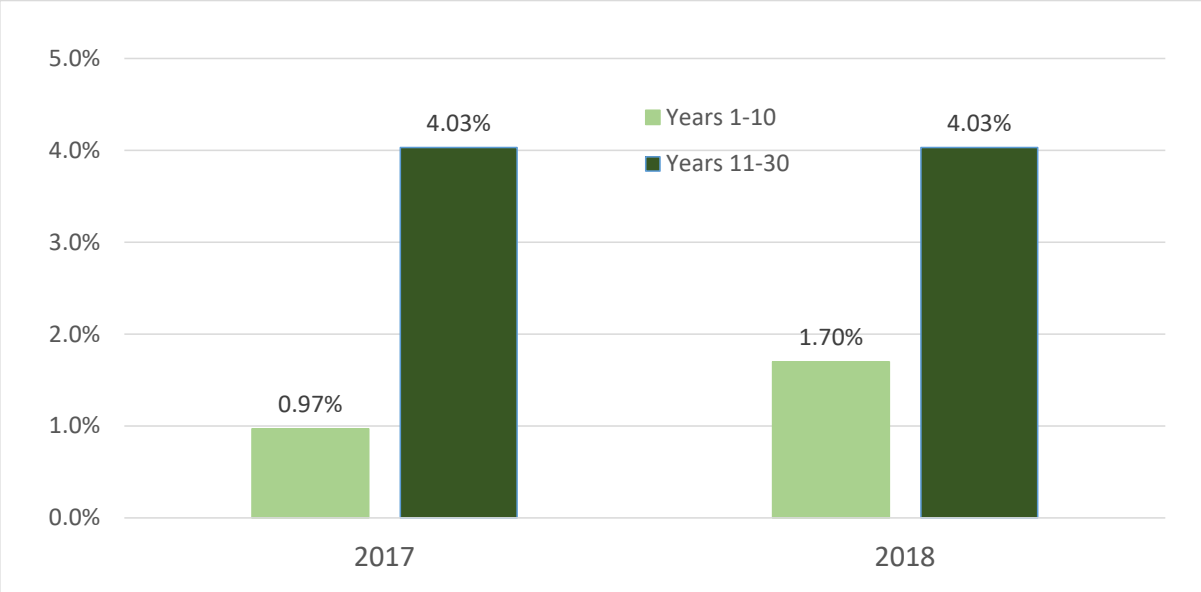
Comparing the expected returns between the two years *for the same portfolio* (the 2017 Reference Portfolio) we see that:

- The 2018 expected returns are higher than 2017 in the first 10 years by 73bps a year.
- The 2018 long term equilibrium returns beyond 10 years are the same as those used for the 2017 valuation.

Note that the 2018 numbers will be different for the 2018 Reference Portfolio, but only slightly.

[2]Details of the FBB approach can be found in "USS Investment Management's Fundamental Building Blocks (FBB) approach to expected returns", March 2018.

Figure 4: Expected real returns on the 2017 Reference Portfolio as of 31 March 2017 and 31 March 2018 (assumes the same portfolio and no de-risking)



4.1.5 Net impact

The observed changes in three of the above variables (realised asset return, mortality rates and expected investment returns) are positive in that they all contribute to reducing the deficit and future contribution requirements. By contrast, the change in real gilt yields acts as a drag on the positive effect of the other three elements, but the overall impact is positive.

4.2 The JEP's suggested adjustments

The Joint Expert Panel (JEP) convened by UCU and UUK proposed six adjustments to the 2017 valuation, namely:

- Incorporate the latest mortality experience data and realised investment returns.
- Use updated future expected investment returns.
- Increase the target reliance on the employers' covenant in 20 years' time from £10bn to £13bn in real terms.
- Reinstate the 10-year delay in de-risking the investment strategy (this was the basis upon which the Trustee consulted in September 2017).
- Allow for future investment outperformance (relative to discount rates) in calculating Deficit Recovery Contributions (DRCs).
- Smooth future service contributions over two valuation cycles.

Starting from the methodology and assumptions of the 2017 valuation, the JEP estimated the impact of these adjustments on the contribution rate. With these adjustment they estimated that current USS benefits (having removed 'the match') could be funded with a contribution rate of approximately 29.2%. (The panel's report also recognised that there were a number of different paths that the Trustee could adopt to reduce the contribution rate to below 30%.)

Together these adjustments significantly increase the risk associated with the valuation as we show below. The JEP report did not explicitly consider or estimate this increase in risk, but suggested this would be addressed in a second phase of the panel. Some pertinent aspects of the Trustee's perspective on risk are dealt with in the next section.

Separately UUK has written to the Trustee indicating that the sponsoring employers are prepared to accept more risk in funding the scheme in order that the JEP adjustments can be implemented, subject to USS providing more information on the additional financial risks involved – and if and how they could be managed, and mitigated: *"UUK's analysis shows that the vast majority of employers that responded to the consultation are supportive of the JEP's recommendations and therefore wish to see a change in valuation assumptions in line with that put forward. There are however conditions attached to this support, in particular that it is subject to acceptance by the USS trustee (and the Pensions Regulator, as appropriate) and the need for further information on what (if any) requirements there may be from the USS trustee to back any additional risk which is associated with the JEP's recommendations."*

5. Managing risk

The Trustee has a statutory duty to take account of risk in the actuarial valuation. This is reflected in the prudence that is required to be incorporated into the technical provisions and the risk considerations relating to the deficit recovery plan.

There are a number of risks in funding any DB pension scheme. The principal ones can be broadly classified as including risks to:

- Covenant strength (i.e. the ability of the employers to provide adequate support to the scheme);
- Demographic assumptions (i.e. longevity risk); and
- Financial assumptions (i.e. investment risk).

Risk is part of all financial decisions, the outcomes of which are never certain.

Whilst it is hoped outcomes will be favourable, there is a need to have credible options available for material downsides.

The potential downside impact on the valuation of the above risks could be a much larger than expected deficit, higher than expected contributions, and higher than sustainable reliance on the employers' covenant.

5.1 Risk and the response to the 2017 Technical Provisions consultation

When the Trustee consulted on the 2017 valuation in September 2017, the response received from UUK indicated that the Trustee should take a more moderate approach to risk.

There was particular concern about the assumption of gilt yield reversion and a desire for the Trustee to reconsider the investment strategy and the role of hedging (i.e. de-risking) within the investment strategy. For example:

- "…a small majority of employers (53%) have a preference to accept the level of risk proposed, with many qualifying that the proposals are at the very edge of what would be acceptable. However… a significant minority (42%) … want less risk to be taken."
- "…the large number of employers who are uncomfortable with the maximum level of risk proposed by the trustee. …UUK believes a path less reliant on … interest rate reversion would reduce the risk of a future call on contingent contributions."
- "Many employers are concerned about the challenges that would be faced if interest rates were not to revert... We ask the trustee to consider carefully whether the proposed investment strategy (including the degree of interest rate hedging) is optimal."

This feedback runs counter to the level of additional risk embodied in the JEP adjustments, to such an extent that the Trustee would need to re-evaluate the risk appetite of employers in order for the panel's proposals to be considered.

A number of third parties also expressed a view on the risk associated with the September 2017 Technical Provisions consultation. In particular, Aon (UUK's actuarial advisor), PwC (the scheme's covenant advisor), the Pensions Regulator and the scheme actuary all indicated that the amount of risk incorporated in the Technical Provisions proposed in September 2017 was close to the maximum acceptable level.

Importantly, in the response to the Trustee's consultation, UUK requested that the views of tPR be reflected in the Trustee's considerations: *"UUK recognises that the views of tPR could have a significant impact on the 2017 valuation, and asks that the trustee considers the important commentary from tPR as it determines its final views on risk capacity."*

This feedback from third parties taken together with the feedback from employers (via UUK as the consultee) confirms the view that the September 2017 Technical Provisions set the benchmark for the maximum level of risk in the valuation.

Note that this maximum level of risk also came with some requirements for contingent support, which are briefly outlined on page 10 of the September 2017 consultation document.

5.2 The final 2017 Technical Provisions and contribution rate

Following the consultation with employers, their concerns about risk described above coupled with their reluctance to provide contingent support led the Trustee to reducing risk through the following two measures:

- Bringing the investment de-risking programme forward to start immediately; and
- Increasing the level of deficit recovery contributions to 6%.

The result is that the overall required contribution (after removal of 'the match') steps up over time to a total of **36.6%** of salary. This is the amount shown in the Schedule of Contributions currently being consulted on for the 2017 valuation that will be prevailing from 1 April 2020.

5.3 Implications for the proposed JEP adjustments

The implications of the issues discussed in the previous two sections are as follows:

For a significant increase in risk beyond the level adopted in the final Technical Provisions (such as that associated with the JEP adjustments), the Trustee requires additional contingent support arrangements.

The potential form of those contingent arrangements are discussed later in this document.

5.4 Measuring risk in the 2017 valuation

Risk is a multifaceted concept. This is reflected in the variety of different metrics for measuring risk and the variety of different perspectives on risk.

5.4.1 Risk measured in terms of reliance on the covenant

A particularly important risk metric for the Trustee is the amount of *reliance* on the employers' covenant, measured in terms of the self-sufficiency deficit.

The reason that the Trustee can take risk in funding the scheme is the fact that the employers stand collectively behind the scheme.

That covenant, however, is not unlimited and employers must decide how much of their risk budget they can – and wish – to be allocated to supporting the scheme. It is for this reason that reliance on the covenant is one of the Trustee's key measures of risk.

One of the ways with which the Trustee manages long-term risk is by setting a long-term target level of reliance that is within the risk capacity and the risk appetite of the employers.

In this context, the Trustee measures reliance as the difference between:

- The assets required under a low-risk investment strategy to pay all accrued benefits with a high probability without requiring any further contributions (i.e. self-sufficiency); and
- The assets currently held by the DB section of the scheme.

The long-term reliance target adopted for the 2017 valuation was £10bn in real terms in 20 years' time. In other words, this is the target level of reliance on the employers' covenant 20 years out from the valuation date.

The realised reliance at 31 March 2017 was £22.4bn, and the 2017 valuation envisaged a target path over 20 years for reliance to fall to £10bn in real terms by 2037. (Note the target path is not the *expected* path, but merely a target against which progress can be measured.) As at 31 March 2018 realised reliance had fallen to £20.8bn, slightly ahead of the target path.

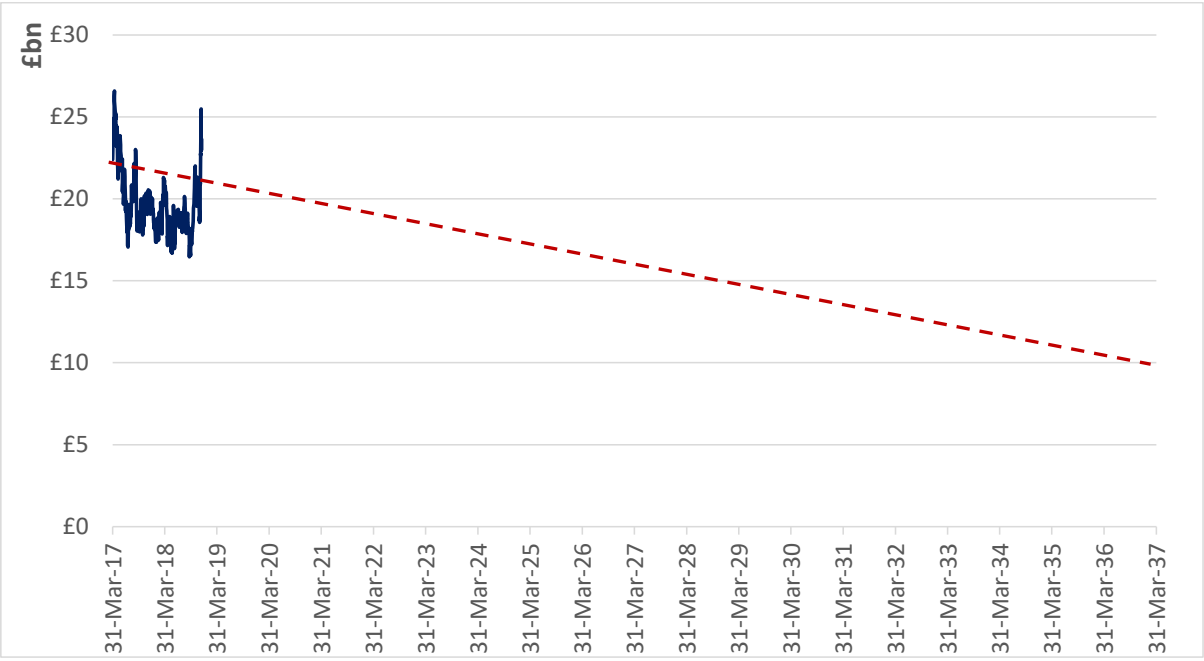
Reliance is volatile, however, as the chart in Figure 5 shows.

In this chart the realised reliance since 31 March 2017 to 14 December 2018 is compared with target path of reliance. So while the £10bn reliance target helps control long-term reliance risk, the valuation is still subject to significant short-term reliance risk. We see that reliance has swung by over £10bn from peak to trough: peaking at £26.6bn and falling as low as £16.6bn.

So while there is a plan for the long-term risk to be kept under control, it is evident that there are credible short-term scenarios which could result in reliance reaching levels which, if sustained, would be difficult for the sector to support.

While we certainly do not expect to have to move to a self-sufficiency strategy in the short term, there are credible scenarios that could make the current risk position difficult to recover from – such that the ability to move to a self-sufficiency strategy in the long term moves out of reach.

Figure 5. Reliance: Actual vs the 2017 target of £10bn in 2037
(Data from 31 Mar 2017 to 14 Dec 2018).



5.4.2 Risk measured in terms of average discount rate spread

Another measure of aggregate risk in any valuation is the average discount rate used to determine the technical provisions. Specifically it is the discount rate expressed as a spread relative to inflation (i.e. CPI) or gilt yields.

This is not a perfect measure of risk (no single risk metric in isolation can be described as perfect), but it does provide an appropriate way to compare the aggregate risk across different valuations and across different DB pension schemes. It is for this reason that we introduce this approach here.

The Trustee considers that measuring discount rates relative to CPI is the most appropriate approach, as the scheme's liabilities for the main part are explicitly linked to CPI. By contrast, the Pensions Regulator prefers measuring discount rates relative to gilt yields. These two ways of quoting discount rates provide similar perspectives on the aggregate risks in different actuarial valuations.

Table 1 below shows the average (liability-equivalent) discount rates relative to CPI and relative to gilts used in the 2017 valuation both for the September 2017 consultation and those adopted for the final 2017 Technical Provisions. Note that the final discount rates are c.20bps lower than those for the September 2017 consultation, reflecting the reduced risk position that resulted from employers' feedback. Both of these are relevant for comparative purposes when considering the proposals for the 2018 valuation discussed later.

Table 1. Discount rates for the 2017 valuation under two bases.

Discount rates relative to	September 2017 TP Consultation	2017 Final Valuation
Spread over CPI ("CPI +")	CPI + 0.91%	CPI + 0.71%
Spread over IL gilts ("Gilts +")	Gilts + 1.41%	Gilts + 1.20%

Note that the view expressed by the Pensions Regulator is that the discount rate used in the September 2017 consultation was at the upper end of the range for a scheme with a "strong" covenant.

Furthermore, the Regulator's view – with which the Trustee disagrees – is that the sponsoring employers of USS provide a covenant that is only "tending-to-strong", as opposed to "strong".

As such, the final discount rate adopted for the 2017 valuation of gilts + 1.20% is still above the level the Regulator views as appropriate for a "tending-to-strong" covenant.

6. Considerations for the 2018 valuation

6.1 Potential updates and changes

The Trustee has reviewed the assumptions and inputs used for the 2017 valuation in order to decide what should be updated for the 2018 valuation.

In terms of the demographic assumptions, with the exception of mortality the Trustee proposes to use the same assumptions as adopted at the 2017 valuation.

Similarly with respect to financial assumptions, the Trustee proposes to use the same approach as in the 2017 valuation. However, an important proposed change is to update the future expected returns on assets, which are derived from the Trustee's Fundamental Building Blocks (FBB) approach.

There are also other changes relative to the 2017 valuation that the Trustee could elect to make when undertaking the 2018 valuation, including the six JEP "adjustments" discussed.

All these changes fall into three broad risk categories, namely:

- *Risk Category 1:* Those which reflect experience and do not necessarily increase risk
- *Risk Category 2:* Those which on some measures do not increase risk, but on other measures do increase risk
- *Risk Category 3:* Those which clearly increase risk

For this purpose, the Trustee considers risk to be increased if there is a change in the implied path for future investment strategy which means that investment risk would be higher and / or because of reduced contributions which in turn reduce the build-up of assets available in the Scheme.

Table 2 lists potential adjustments that have been considered by the Trustee in deciding its approach to the 2018 valuation and classifies them according to the above risk categories.

Table 2: Potential changes in the 2018 valuation relative to the 2017 valuation

Ref. No.	Potential changes in the 2018 valuation (relative to 2017)	Risk category
1	Incorporate realised investment returns	1
2	Incorporate the latest mortality experience data	1
3	Change in retirement age from 65 to 66 from October 2020 *(non-JEP change)*	1
4	Use updated future expected investment returns from the FBB approach	2
5	Increase target reliance at 20 years from £10bn to £13bn in real terms	3
6	Defer de-risking for 10 years	3
7	Smooth contribution rates over two valuation cycles	3
8	Allow for investment outperformance relative to technical provisions discount rate in the deficit recovery contributions	3

Individually each of these potential changes is worthy of consideration and could well be acceptable in the context of the 2018 valuation. However, all changes must be considered collectively in terms of their overall impact on the aggregate risk in the valuation. The Trustee is of the view that changes 1 to 4 in Table 2 could be incorporated in the 2018 valuation without significantly increasing the aggregate risk position. (Note that the increase in discount rate arising from updating of the FBB expected returns will probably be considered by the Pensions Regulator as an increase in risk).

However, the adoption of any of the changes from 5 to 8 in Table 2 would involve increases in risk that would necessitate the introduction of contingent support measures (which are addressed later in this document).

Collectively, the level of additional risk would be very significant.

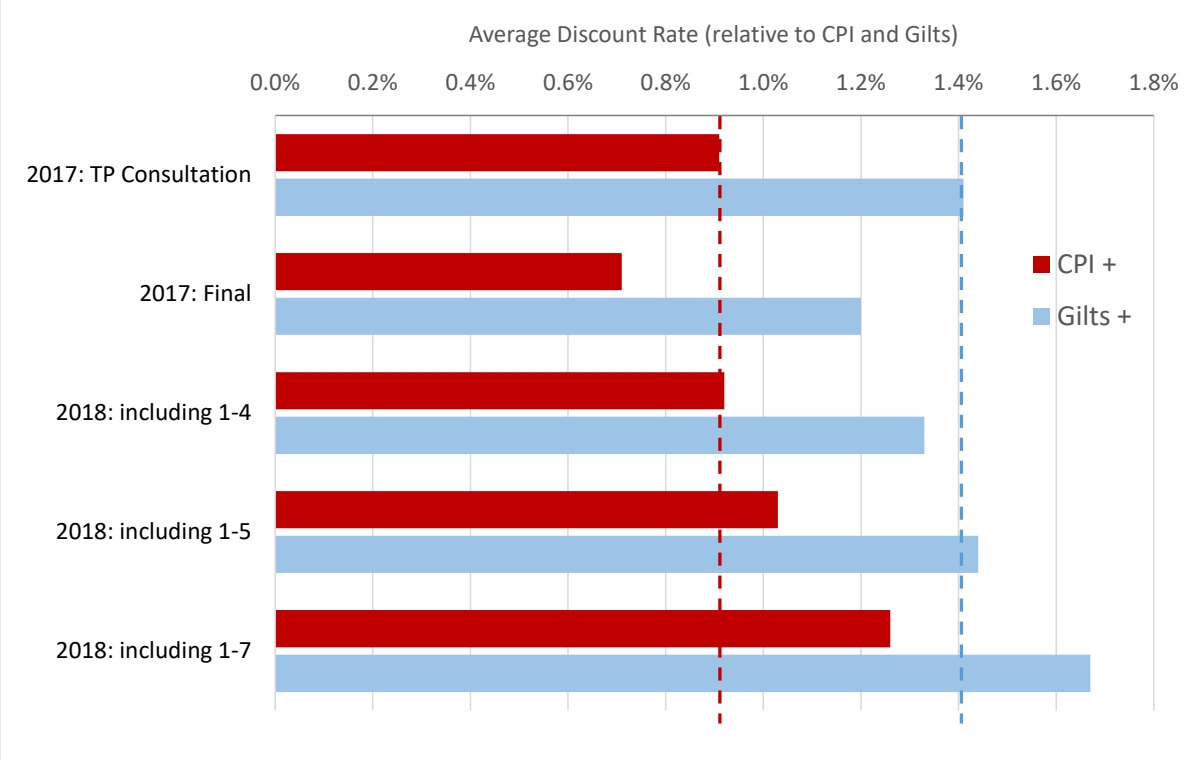
6.2 Risk in the 2018 valuation

As we discussed above, one useful measure of aggregate valuation risk is the single-equivalent discount used for the technical provisions relative to CPI (or relative to the yield on gilts).

Figure 6 below compares the single equivalent discount rates considered in in the 2017 valuation with those that would arise in the 2018 valuation adopting different combinations of the changes in Table 2.

It is instructive to compare the discount rates to those for the September 2017 consultation, which we discussed earlier as being at the maximum acceptable risk level at that time and therefore defining a kind of risk benchmark.

Figure 6. Comparison of different combinations of changes for the 2018 valuation. Chart shows discount rates relative to CPI and relative to gilts.
(The 2017 valuation is included for benchmarking purposes.)



According to Figure 6, using the relative discount rates as risk metrics suggests that changes 1 to 4 from Table 2 yield an aggregate risk level that is comparable to, or slightly below, the benchmark suggested by the September 2017 consultation.

Incorporating changes 1 to 5 results in an aggregate risk level that is slightly above the benchmark, whereas incorporating changes 1 to 7 is significantly above the benchmark.

6.3 Another perspective on risk: Reliance stress tests

As we described above, one of the risks of most concern to the Trustee is the short-term level of reliance. Whilst reliance appears to be moving towards the longer-term desired target, there are some credible event risk scenarios that demonstrate that this could significantly change.

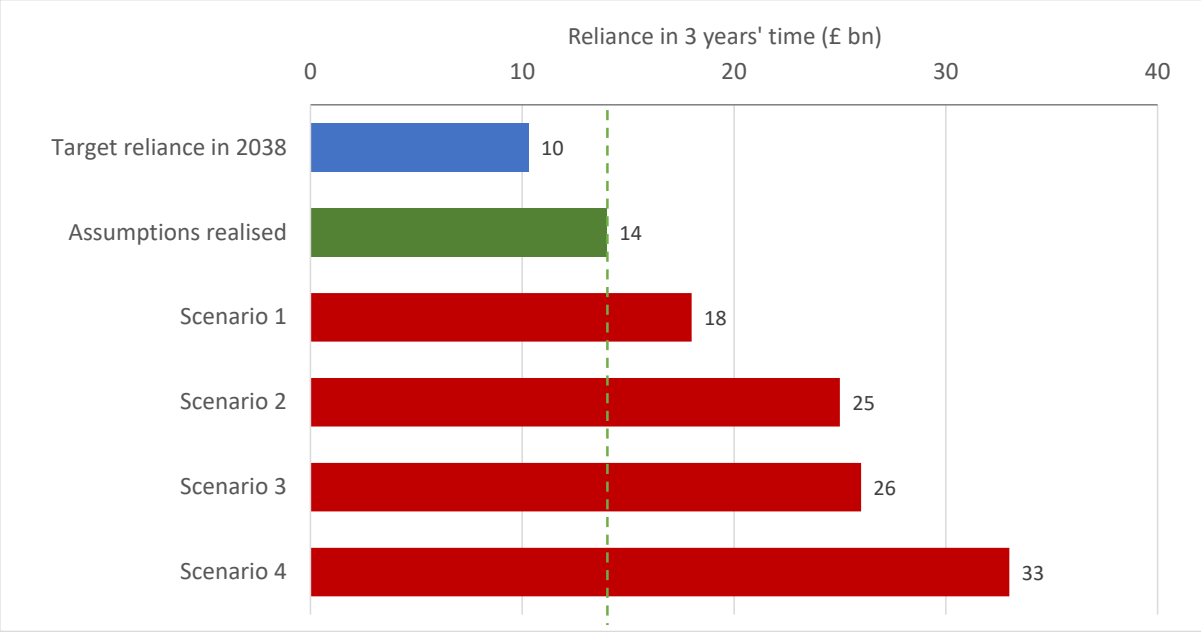
We consider the same four scenarios that we considered in the September 2017 consultation. These are:

- *Scenario 1:* Gilt yield reversion does not materialise as expected, but moves broadly in line with market breakeven levels (forwards).
- *Scenario 2:* Scenario 1 + 10% asset fall.
- *Scenario 3:* Scenario 1 + 50bp fall in gilt yields.
- *Scenario 4:* Scenario 3 + 10% asset fall.

Figure 7 shows the impact of these four scenarios on reliance in 3 years' time in the context of the 2018 valuation (note that the impact on reliance is the same regardless of which of the changes 5 to 8 are incorporated into the 2018 valuation). The impact of these scenarios have been compared to the expected (best estimate) position and to the long-term reliance target of £10bn.

The implications of this event risk scenario analysis are clear: there are credible risk events in which reliance rises significantly (potentially doubling) over the short term.

Figure 7: Impact of four adverse scenarios on reliance in 3 years' time for the 2018 valuation.



7. Technical provisions and contribution requirements for the 2018 valuation

The risk considerations discussed in the previous section have an important bearing on the technical provisions and contribution requirements for the 2018 valuation.

The Trustee is of the view that for the 2018 valuation the overall contribution requirement is dependent on the amount of contingent support provided by employers:

- Without any contingent support arrangements, the overall contribution rate could potentially be slightly lower than that for the 2017 valuation; and
- With sufficient contingent support, the overall contribution rate could potentially be notably lower than that for the 2017 valuation.

The upper and lower ends (or "bookends") of the range of potential acceptable technical provisions and contribution requirements is discussed below.

7.1 Upper bookend assuming no contingent support

The key changes relative to the 2017 valuation that the Trustee proposes to make if **no** contingent support is provided are changes 1 to 4 from Table 2:

- *Change 1:* Updating of assets to allow for actual investment returns realised over the period 31 March 2017 to 31 March 2018;
- *Change 2:* Observed lower rates of mortality improvement;
- *Change 3:* Change in retirement age which increases to 66 for service after October 2020;
- *Change 4:* Higher discount rates than adopted at the 2017 valuation, reflected the higher expected assets returns produced by the FBB approach as at 31 March 2018.

Full details of all the proposed assumptions for the 2018 valuation, highlighting where they differ from the 2017 ones, are provided in Appendix B.

Table 3 details the technical provisions and future service rate as at 31 March 2018 **without** contingent contributions.

*Table 3: Comparison of the 31 March 2017 valuation and 31 March 2018 if **no** contingent support is provided.*

	Rule 76.1 Valuation at 31 March 2017	Valuation at 31 March 2018 with no contingent support
Prudence percentile level:	**67th**	**67th**
Reliance in 20 years:	**£10bn**	**£10bn**
Technical Provisions (TP)	£67.5bn	£67.3bn
Self-sufficiency (SS)	£82.4bn	£84.5bn
Assets	£60.0bn	£63.7bn
Deficit on TP basis	£7.5bn	£3.6bn
SS basis	£22.4bn	£20.8bn
Total contributions:*		
Future service contribution	30.6%	28.7% (NRA 66)
Deficit recovery contribution	6%	See discussion point below
Total contribution	36.6%	See discussion point below
Average discount rate above current gilt yields	**1.20%**	**1.33%**
Average discount rate above CPI assumption	**0.71%**	**0.92%**

In respect of the 2017 valuation, the Trustee is currently consulting on the Schedule of Contributions which includes a deficit recovery contribution of 6%. Allowing for no outperformance in the recovery plan results in a recovery period of 14 years (from 2020). The main reason for the level of deficit recovery contributions was the concern in respect of the short-term reliance position and the lack of contingent support.

Given the improvement in the self-sufficiency position between 31 March 2017 and March 2018, and subject to this being in a similar position at the time the scheme actuary signs off the 2018 valuation Schedule of Contributions, the Trustee is proposing deficit recovery contributions for the 2018 valuation – **without** contingent support, and **not** allowing for any outperformance – of 5%.

Table 4 below details the deficit contribution assuming different levels of investment out-performance allowed for in the recovery plan and term. (Note that a formal consultation on the Recovery Plan and the Schedule of Contributions will follow later in the valuation process.)

Table 4: Deficit Recovery Contributions (DRCs) for different terms and investment outperformance

DRCs required (% of salary)		Deficit recovery period (years from 31 March 2018)							
		14	13	12	11	10	9	8	7
Level of outperformance (proportion of BE returns over TP)	0%	3.5	3.9	4.3	4.8	5.5	6.3	7.5	9.1
	5%	3.0	3.3	3.7	4.2	4.8	5.7	6.8	8.3
	10%	2.5	2.8	3.2	3.6	4.2	5.0	6.1	7.6
	15%	2.0	2.2	2.6	3.0	3.5	4.3	5.3	6.8
	20%	1.4	1.7	2.0	2.4	2.9	3.6	4.6	6.1
	25%	0.9	1.2	1.4	1.8	2.3	3.0	3.9	5.3
	30%	0.4	0.6	0.9	1.2	1.6	2.3	3.2	4.6
	35%	0	0.1	0.3	0.6	1.0	1.6	2.5	3.8
	40%	0	0	0	0	0.3	1.0	1.8	3.1
	50%	0	0	0	0	0	0	0.4	1.5

In summary the required technical provisions and contribution requirements if **no** contingent support is available:

- Technical provisions is **£67.3bn**
- The deficit on the Technical Provision basis is **£3.6bn**
- The required contribution is **33.7%** of salary (being the sum of future contribution requirement of 28.7% and deficit recovery contribution of 5%).

Appendix C sets out the sensitivities of the technical provisions and contribution requirements to changes in the underlying assumptions.

7.2 Lower bookend if sufficiently strong contingent support provided

The other four changes (i.e. changes 5 to 8) lower the total required contribution other things equal, but simultaneously lead to a significant increase in risk. These changes are as follows:

- *Change 5:* Increasing the reliance at 20 years above £10bn in real terms.
- *Change 6:* Deferring when de-risking starts.
- *Change 7:* Smoothing contributions over future valuation cycles.
- *Change 8:* Allowing for outperformance in the recovery plan.

Increasing the risk in funding the scheme by adopting any combination of these *will* require additional contingent support to be put in place.

Adopting them all, even with contingent support, would fall outside the Trustee's risk appetite. Having said this the Trustee believes, subject to an appropriate level of contingent support being put in place, a contribution rate **slightly below 30%** could be acceptable.

No formal decision was made on which of the changes which increase risk would be adopted, but the two elements which the board indicated they were prepared to consider were:

- Increasing the reliance at 20 years from £10bn in line with the employers more recent wishes; and,
- Reducing the deficit recovery contributions (by allowing for investment out-performance or increasing the length of the recovery period).

For example, increasing reliance to £13bn and maintaining the current level of deficit recovery contribution at 2.1% would result in a contribution requirement of **29.7%.**

However, whether or not that quantum of reduction could be achieved would be very much related to the level of contingent support provided.

7.3 Contingent support

The Trustee has considered the range of different types of contingent support that could be provided by the employers, including:

- Negative pledges
- Charge over assets
- Contingent assets
- Contingent contributions
- Escrow accounts
- Ring-fencing of cash reserves
- Surety bonds

The Trustee believes that a combination of contingent contributions and negative pledges would be the most appropriate means of providing acceptable support.

Negative pledges are not discussed further in this document but a high level description of contingent contribution arrangements is given below, and the Trustee would be very willing to discuss how any of these might be constructed to mitigate any further risk taking in the scheme.

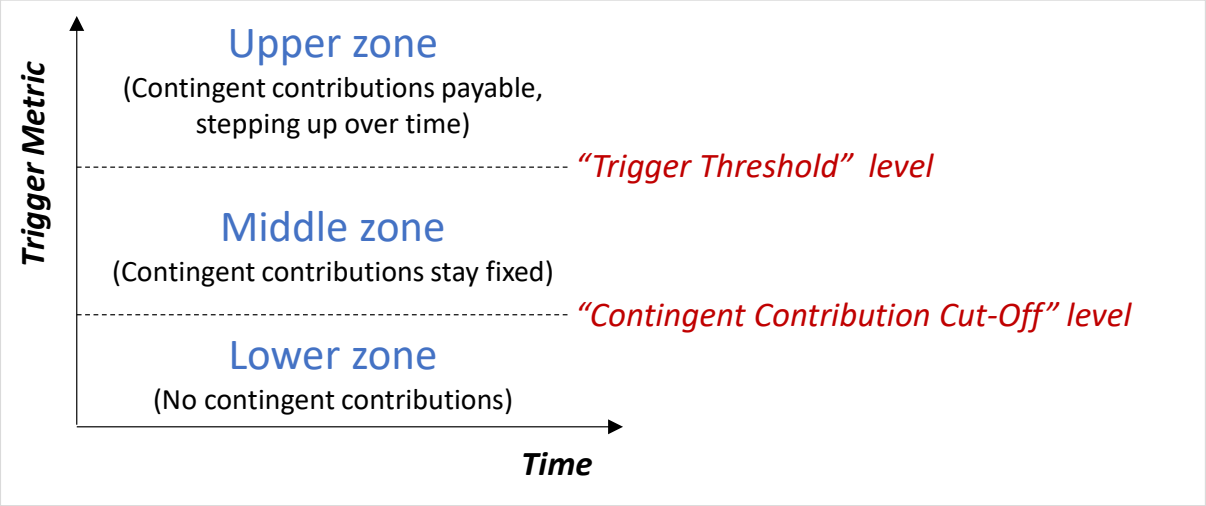
The key features of a contingent contribution arrangement would be:

- Contingent contributions would be triggered by a certain metric (the so-called "trigger metric") moving above a specified level for a sustained period.
- Employers would be given a period of notice before contingent contributions would become payable.
- Contingent contributions would step up over time, up to a maximum, as long as the metric remained above the specified level. There would be a period of 12 months between steps.
- The maximum contingent contribution would be the difference between the contribution required with **no** contingent support and that payable **with** contingent support.
- Should the metric move low enough for a sustained period, contingent contributions would fall to zero.

Essentially there are three zones for the trigger metric (see Figure 8):

- *Upper zone:* If the metric is in this zone for a minimum period then contingent contributions will kick-in and increase in predefined steps up to a maximum.
- *Middle zone:* If the metric is in this zone for a minimum period then contingent contributions remain fixed (i.e. if they are zero they remain at zero, if they are 1.5% they remain at 1.5%).
- *Lower zone:* If the metric is in this zone for a minimum period then contingent contributions are reduced to zero.

Figure 8. The three zones for the trigger metric which are proposed for the contingent contribution approach.



The value of the contingent arrangements are dependent on (among other factors):

- The trigger measure, and the threshold levels
- The time for which the measure must be in the trigger zone
- The quantum and schedule of the triggered contribution increases

Further details are given in Appendix D. The Trustee proposes to agree these details with UUK through the consultation period, and would welcome alternative proposals. The value that can be ascribed to the contingent contributions will determine the degree to which 'normal' contributions can approach the lower end of the contribution range outlined by the Trustee.

8. Statement of Funding Principles

The Trustee's Statement of Funding Principles in respect of the 2018 valuation for consultation is set out in Appendix E.

9. Consultation

This consultation with UUK on Technical Provisions and Statement of Funding Principles commences on 2 January 2019 and runs until 1700 on 28 February 2019.

The Trustee looks forward to receiving comments from UUK on the amount of risk employers are willing to support in funding the scheme and the contingent support they are willing to provide.

The Trustee also looks forward to receiving comments on the Statement of Funding Principles.

Appendix A: Overview of the scheme benefits

Since 1 April 2016, contributions to the scheme have been set at 8% for members and 18% for employers – 26% of payroll.

Currently[3], for that contribution rate, members build up a **set level** of income in retirement for every year they pay in to the USS **Retirement Income** Builder – the defined benefit (or DB) part of the scheme – on salary up to a threshold.

This *defined benefit* is based on 1/75th of annual salary up to a prescribed threshold which increases annually, broadly in line with the Consumer Price Index measure of inflation. (For example, in 2018/19 it is £57,216.50; in 17/18 it was £55,550.)

Every year, members' benefits in this section are calculated and 'banked'. They are then increased each year broadly in line with inflation. Each subsequent year, they earn more benefits and these are added to the benefits they have already earned, which are paid to them when they retire.

At retirement, members also get a tax-free lump sum of three times their annual USS Retirement Income Builder pension.

Contributions to the scheme also secure a number of further benefits, including:

If a member **dies in service**, their beneficiaries would receive three times their salary (regardless of the threshold) as a lump sum, and their spouse or civil partner would also receive a pension for life based on full salary, not limited by the threshold.

For **death in retirement**, the scheme pays a pension to a member's spouse or civil partner of half the pension the member was entitled to when at retirement, plus increases to reflect inflation to the date of their death.

If a member retires through partial or total **incapacity** as a result of long-term illness or injury, they would receive a pension and a tax-free cash lump sum. The benefits would be calculated using their full pensionable salary, rather than being limited by the salary threshold and could be significantly enhanced over what they have built up.

In addition to these benefits, a portion of any member's salary above the threshold automatically goes into the USS **Investment Builder**, the defined contribution (DC) part of the scheme.

A total of 20% of any salary above the threshold (8% from members and 12% from their employer) goes into this section, as do any matched or additional contributions or any funds recently transferred in.

Contributions in this DC part of the scheme are also invested to provide retirement benefits – but there is no guarantee as to the amount.

[3]See: 'Changes to USS that will affect you' - https://www.uss.co.uk/members/members-home/retirement-articles/2018/changes-to-uss-that-will-affect-you

Appendix B: Changes to inputs and assumptions for the 2018 valuation

This appendix set out the changes to the 2017 valuation input and assumptions that the Trustee proposes to make for the 2018 valuation. It is proposed to be undertake the valuation as at 31 March 2018, using the same methodology as the 2017 valuation with key assumptions and inputs being updated where permitted by the regulations for experience, change in outlook and employers' risk appetite. In line with the 2017 valuation, margins for prudence are incorporated into the mortality and discount rate assumptions, with all other assumptions proposed being best estimates.

Appendix E contains the draft Statement of Funding Principles and details of the assumptions used in arriving at the 2018 valuation position set out in the main document. This appendix describes the changes and updates from the assumptions used in the 2017 valuation.

Sensitivities of the valuation results to the main assumptions are set out in Appendix C, from which the relative impact of changes in assumptions can be seen.

Demographic assumptions

The demographic assumptions proposed for the 2018 valuation are the same as used for the 2017 valuation, with the exception of the following:

Mortality

The mortality assumption is made up of two elements: a "baseline" assumption, reflecting the current position, and a "future improvements" assumption for how mortality is expected to evolve. Both elements are proposed to be updated as part of this valuation for post-retirement mortality, and pre-retirement the future improvements are proposed to be updated.

The baseline post-retirement assumption proposed is based on updated scheme experience, to 31 December 2017, and the assumption for future improvements is proposed to be based on the latest model from the Continuous Mortality Investigation (CMI). The long term improvement rates assumed, and used in this model, are in line with the 2017 valuation.

These proposed assumptions are based on a full scheme specific analysis carried out by the Scheme Actuary, which shows that USS members have exhibited higher mortality (i.e. lower life expectancy) than previously expected, albeit still much lower (i.e. higher life expectancy) than the general population and other occupational pension schemes. As previously, the results of this analysis have been expressed using standard mortality tables (determined on a liability-equivalent basis), in order to ease communication of the assumptions and because of the additional robustness of standard tables.

The mortality assumptions proposed are set out below, alongside the 2017 valuation assumption for comparison. Example life expectancies are also set out.

Table 1: Comparison of mortality assumptions used for 2017 valuation with that proposed for 2018

	2017 valuation assumption	2018 proposed assumption
Mortality base table	Pre-retirement: 71% of AMC00 (duration 0) for males and 112% of AFC00 (duration 0) for females Post retirement: 96.5% of SAPS S1NMA "light" for males and 101.3% of RFV00 for females	Pre-retirement: 71% of AMC00 (duration 0) for males and 112% of AFC00 (duration 0) for females Post retirement: 97.6% of SAPS S1NMA "light" for males and 102.7% of RFV00 for females
Future improvements to mortality	CMI_2016 with a smoothing parameter of 8.5 and a long term improvement rate of 1.8% pa for males and 1.6% pa for females	CMI_2017 with a smoothing parameter of 8.5 and a long term improvement rate of 1.8% pa for males and 1.6% pa for females
Life expectancy from age 65	(for comparable members aged as shown in 2018)	
Male age 65	24.6	24.4
Male age 45	26.6	26.4
Female age 65	26.1	25.9
Female age 45	27.9	27.7

The mortality assumption includes a margin for prudence, in line with the Pension Regulator's guidance. This is achieved by a 2% reduction in the weightings applied to the mortality (i.e. the probabilities of death in any given year have been decreased by c2%), which increases liabilities by around 0.5% and is unchanged from 2017.

Retirement age for future service

Currently, new benefits accrued are payable from age 65. For benefits accrued from October 2020, this changes to age 66, in line with the change in State Pension Age, as set out in the Scheme Rules. This reduces the cost of benefits being accrued, and this change has been allowed for when calculating the contribution rates payable.

Financial assumptions

Self-sufficiency

The Trustee considers "self-sufficiency" as the amount of assets that would be required to fund the scheme using a low-risk investment portfolio – one that has less than a 5% chance of ever requiring a further contribution from employers. This is not a target for the Trustee, but it is an important metric that provides a view on the level of risk being taken. As part of the 2017 valuation, the Trustee determined the calculation of this as based on a discount rate of gilts + 0.75% pa, with an inflation assumption based on a RPI / CPI gap of 0.8% pa, and no inflation risk premium. This approach is proposed to be retained for the 2018 valuation.

Currently there is a large gap between the assets held by the scheme and the level required for self-sufficiency. Over time the Trustee expects this position to improve, partly through additional contributions and partly through its expectation that gilt yields rise, decreasing the cost of self-sufficiency.

Reliance

The Trustee defines the reliance on the covenant as the difference between the level of assets required for self-sufficiency, and the level of assets held. In the long term, the assets are taken as being equal to the projected technical provisions liabilities. This is because at each valuation, in line with the Trustee's funding objective, contributions and/or investment strategy will be adjusted to target this.

This ensures that the contribution requirements that arise from a valuation are based on the cost of the defined benefits accruing at that point in time being paid. If the Trustee's assumptions are borne out then these costs, and the resulting contributions, would be expected to reduce at subsequent valuations (held at least every three years). If they are not borne out, the level of short term risk would be exacerbated.

The target level of reliance at the 20 year horizon which was allowed for in the calculation of the technical provisions liabilities and contribution rates at the 2017 valuation was £10bn in real terms (agreed following the February and September 2017 consultations).

In line with this approach, the Trustee's starting point is reliance of £10.3bn (i.e. allowing for the CPI indexation applicable over the 2017/18 year). The Trustee's view is that an increase above this level would require additional contingent support from the employers, given the additional risk which would be borne by the Trustee.

Expected investment returns

The expected investment returns proposed are derived using the Trustee's Fundamental Building Block (FBB) approach, appropriately updated to 31 March 2018. These are used in the derivation of the discount rates, which are the most important valuation assumption.

The FBB model has generated a forecasted best estimate path for real gilt yields that differs from that in the 2017 valuation. This path has a slightly lower amount of yield reversion as it starts from a slightly higher initial real yield level and reverts to a slightly lower reversion level, set out in table 2 below.

Table 2. Real yields on 20-year index linked gilts

Real 20-year gilt yield	Valuation date (t=0 years)	t=10 years	t=20 years
2018 Valuation	-1.68%	-0.37%	-0.37%
2017 Valuation	-1.74%	-0.25%	-0.25%

The expected returns used in the 2018 valuation differ from those used in the 2017 valuation for two reasons: (i) the FBB expected returns for different asset classes have changed, and (ii) the initial Reference Portfolio has changed. These changes also increase the rebalancing & diversification premium relative to 2017. Details of the updated position can be found in Table 3, but the net effect relative to the 2017 position is as follows:

- The expected 30-year annualised return on the portfolio has increased by 26bps (3.26% above CPI from 3.0% above CPI).
- The expected return in the 10 year reversion period is now higher by 64bps (1.61% above CPI from 0.97% above CPI).

Table 3. Expected returns for the 2018 valuation (Geometric return above CPI)

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	60.00%	4.04%	6.27%	2.85%	5.05%	4.64%
Property	7.50%	2.16%	4.35%	2.20%	4.39%	2.14%
Listed Credit	15.00%	1.53%	3.70%	-0.04%	2.10%	2.32%
Index Linked	27.50%	-0.66%	1.47%	-3.39%	-1.32%	0.73%
Cash	-10.00%	-0.30%	1.84%	-0.75%	1.37%	-0.07%
Rebalancing & diversification premium		**0.60%**	**0.60%**	**0.60%**	**0.60%**	**0.60%**
Ref Portfolio		**3.26%**	**5.46%**	**1.61%**	**3.78%**	**4.10%**

De-risking and discount rates

The discount rates used in the valuation drive the technical provisions liabilities and contribution requirements. The target level of reliance described above determines the long term discount rate, and the remainder of the path reflects a prudent investment return developed from the 33rd centile of the distribution of investment returns. This provides a 67% confidence that the discount rate will at least be achieved.

Allowance for the investment strategy to change over time has therefore been incorporated, based on achieving the target level of reliance described above. This results in the investment strategy holding a lower level of return-seeking assets over time.

The resulting best estimate investment returns and technical provisions discount rates over time are set out below. Full details can be found in Appendix E.

Table 4: Financial assumptions as at 31 March 2018

Investment return (Best Estimate) using £10bn Reliance	Years 1-10: CPI + 1.64% reducing linearly to CPI + 0.67% Years 11-21: CPI + 3.51% reducing linearly to CPI + 2.53% by year 21 Years 21 +: CPI + 2.53%
Discount rate for Technical Provisions using £10bn Reliance	Years 1-10: CPI + 0.14% reducing linearly to CPI – 0.73% Years 11-21: CPI + 2.52% reducing linearly to CPI + 1.55% by year 21 Years 21 +: CPI + 1.55%
Investment return (Best Estimate) using £13bn Reliance	Years 1-10: CPI + 1.64% reducing linearly to CPI + 0.79% Years 11-21: CPI + 3.60% reducing linearly to CPI + 2.72% by year 21 Years 21 +: CPI + 2.72%
Discount rate for Technical Provisions using £13bn Reliance	Years 1-10: CPI + 0.14% reducing linearly to CPI – 0.62% Years 11-21: CPI + 2.61% reducing linearly to CPI + 1.75% by year 21 Years 21 +: CPI + 1.75%

Salary cost growth

The Trustee is proposing to retain the assumption of CPI + 2% for the overall growth in total scheme payroll.

Appendix C: Sensitivities of deficit and future service contributions to change in assumptions

Table 1 below details the impact on the deficit and future service contribution requirements of changes to the main assumptions underlying the proposed 2018 valuation assuming no contingent support is available.

Table 1: Sensitivities of deficit and future service contributions to change in assumptions

Assumption to be changed	Impact on deficit	Impact on future service contribution
Reliance increased to £13bn	- £1.4bn	- 1.1%
Self-sufficiency discount rate + 0.25%	- £2.1bn	- 1.6%
Technical Provisions discount rate + 0.1%	- £1.2bn	- 0.8%
RPI – CPI spread + 0.1%	- £0.7bn	- 0.5%
Salary growth + 1%	- £0.4bn	- 0.3%
Withdrawals reduced by 5% *	+ <£0.1bn	Negligible
Impact of all active members retiring at 65	- £0.9bn	n/a
Ill health retirements increased by 10% *	+ <£0.1bn	+ 0.1%
Proportion married + 5% *	+ £0.3bn	+ 0.1%
Long term improvement rate in mortality assumption + 0.25%	+ £0.5bn	+ 0.3%
Mortality base table reduced by 5% (i.e. 5% lower probability of deaths) *	+ £0.8bn	+ 0.2%

*multiplicative changes to probabilities

Appendix D: Contingent contributions overview

This appendix provides more details of how a contingent contribution arrangement could operate.

Listed below are some definitions which will be required for the contingent arrangement:

- **Trigger Metric**: This is the variable that that is monitored to decide if the contingent contributions are triggered and therefore become payable. (This might be, for example, "reliance" or in other words the "self-sufficiency deficit").
- **Trigger Threshold**: This has two components:
  - A specified level which needs to be breached by the Trigger Metric, before contingent contributions become payable.
  - A minimum time period for which the Trigger Metric must remain above (or below) the specified level before the contingent contributions are triggered.

  So, the Trigger Threshold is a combination of the specified level of the Trigger Metric and the minimum time period it must be above or below the level.
- **Contingent Contribution Cut-Off:** This has two components:
  - A specified level which needs to be breached by the Trigger Metric, before contingent contributions cease.
  - A minimum time period for which the Trigger Metric must remain below the specified level before the contingent contributions are ceased.
- **Maximum Contingent Contribution**: This is the maximum contingent contribution rate payable under the arrangement.
- **Contingent Contribution Rate**: The contingent contributions (as a percentage of salary) that are payable at a particular time.
- **Contingent Contribution Commencement Date**: The date from which a new level of contingent contributions are payable.
- **Contingent Contribution Review Date**: The date at which the level of contingent contributions is reviewed.
- **Contingent Contribution Review Process**: The mechanism for determining future contingent contributions once they have started to be paid.

Broadly speaking the contingent contribution arrangement would work as follows:

- The **Trigger Metric** would be monitored against the Trigger Threshold.
- Should the **Trigger Metric** satisfy the **Trigger Threshold** (i.e. exceed the specified trigger level for the minimum time period), contingent contributions would then become payable from the Contingent Contribution Commencement Date.
- The **maximum Contingent Contribution** could be the difference between the contribution requirement with no contingent support and that with contingent support.
- The initial **Contingent Contribution Rate** would be lower than the **Maximum Contingent Contribution,** but increase annually until it reaches the **Maximum Contingent Contribution**. (For example, if the maximum was 4.5%, initially the contribution may be 1.5% of salary, rising to 3% on the first anniversary of the trigger and then to 4.5%, the maximum, on the second anniversary.)
- Once contingent contributions are being paid at a given non-zero rate, this rate is maintained for at least one year. Hence if contingent contributions are being paid, the **Trigger Metric** does not need to be reviewed until a short time (i.e. 3 months) before the anniversary of the most recent increase in contingent contributions.

- At each **Contingent Contribution Review Date** the **Contingent Contribution Level** will be reviewed in accordance with pre-agreed rules. The **Contingent Contribution Level** could increase (if the **Trigger Metric** has been in the upper zone for the minimum time period), remain unchanged (if the **Trigger Metric** has been in the middle zone for the minimum time period) or fall to zero (if the **Trigger Metric** has been in the lower zone for the minimum time period).
- So contingent contributions increase in three steps once the **Trigger Threshold** is satisfied (when the **Trigger Metric** has been in the upper zone for the minimum time period), but fall to zero in one step below the **Contingent Contribution Cut-Off Level** (when the **Trigger Metric** has been in the lower zone for the minimum time period).

Appendix E: 2018 draft Statement of Funding Principles

ACTUARIAL VALUATION AS AT 31 MARCH 2018
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 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 2018. 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 basis

The principles of risk management adopted by the trustee mean that the trustee will have regard to the *self-sufficiency* 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. 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. In the shorter term, the trustee considers the level of any shortfall between the assets held and the self-sufficiency liabilities, as a key risk measure.

The differences between the assumptions used for this basis 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.

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.

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 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 the 31 March 2018 valuation will be met by [XXXX] which is [XX] 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 the appendix.

Contributions payable to the scheme

The contributions payable to the scheme by members and employers, including those to meet the cost of new benefits accruing as well as any other contributions the trustee may require, will be set out in the Schedule of Contributions following each valuation.

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.

GMP Equalisation

As a result of the court case ruling in respect of the Lloyds Banking Group Pension Schemes, Schemes are required to equalise Guaranteed Minimum Pensions accrued between 17 May 1990 and 5 April 1997. There is no explicit allowance for this in the 2018 actuarial valuation and any additional funding costs required to uplift benefits will be met by either the Scheme's assets or future contributions from the Employer, although it is expected that these will be immaterial in the context of the scheme as a whole.

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 2021. In intervening years an actuarial report will be produced.

The trustee will monitor the funding level on a regular basis between valuations in order to determine what action, if any, it needs to take. 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 Trustee of the USS	
Name	
Position	
Revised and effective from date	

Notes to Statement of Funding Principles

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 2018

The method used was the Projected Unit method.

Principal actuarial assumptions for Technical Provisions as at 31 March 2018	
Market derived price inflation	In line with difference between 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
Discount rate *	Years 1-10: CPI + 0.14% reducing linearly to CPI – 0.73% Years 11-21: CPI + 2.52% reducing linearly to CPI + 1.55% by year 21 Years 21 +: CPI + 1.55%
Pension increases in payment	CPI assumption (for both pre and post 2011 benefits)
Mortality base table	Pre-retirement: 71% of AMC00 (duration 0) for males and 112% of AFC00 (duration 0) for females Post retirement: 97.6% of SAPS S1NMA “light” for males and 102.7% of RFV00 for females
Future improvements to mortality	CMI_2017 with a smoothing parameter of 8.5 and a long term improvement rate of 1.8% pa for males and 1.6% pa for females

* Based on the position used if no contingent support is available

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 cash flows 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 2018 valuation, the inflation risk premium is set to be 0.3% pa.

For the self-sufficiency basis 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 2018 valuation the adjustment was a deduction of 1.0% pa.

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

Investment return

The assumed expected investment return for the DB section of the scheme is a best estimate that follows a term structure because:

1. The expected returns on each component asset class vary through time according to two periods: A period during which gilt yields revert from the valuation date until 31 March 2028 followed by an equilibrium period from 1 April 2028 onwards.
2. The investment portfolio is progressively de-risked over 20 years following the valuation.

These expected investment returns are listed for each year following the valuation date in the summary Table below.

Discount rate

The discount rate for liabilities is a prudent forecast investment return developed from the 33rd centile of the distribution of investment returns. This provides a 67% confidence that the discount rate will at least be achieved. From this calculation the discount rate is CPI +0.14% pa in year 1 decreasing linearly to CPI –0.73% in year 10, then CPI + 2.52% pa in year 11 reducing linearly to CPI +1.55% pa over the following 10 years and assumed to stay at CPI +1.55% pa beyond that point. This approach therefore includes the provision for gradual investment de-risking to take place as discussed above.

If, following a review of the investment strategy and any consequential changes to the Statement of Investment Principles after completion of the valuation, or due to a change in the Trustee's view on the outlook for future returns, the assumed rate of best estimate investment return and / or the prudent discount rate in excess of the CPI assumption may also change at subsequent funding updates.

For the "Self-sufficiency" basis 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) with a margin of 0.75% pa added to the fixed interest gilt yield. .

Pension increases

Increases to pensions are assumed to be in line with the CPI inflation assumption described above. In particular, at the 31 March 2018 valuation no adjustment has been made for the fact that pension increases are subject to a minimum of zero, and 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 2018, determined in line with the above approach. The values shown at year 50 are assumed to stay constant after that point.

Term	Investment return (Best estimate) *(forward)*	Discount rate for Technical Provisions *(forward)*	CPI *(forward)*	Term	Investment return (Best estimate) *(forward)*	Discount rate for Technical Provisions *(forward)*	CPI *(forward)*
1	3.33%	1.83%	1.69%	26	4.41%	3.43%	1.88%
2	3.11%	1.62%	1.58%	27	4.28%	3.30%	1.75%
3	2.95%	1.47%	1.53%	28	4.16%	3.18%	1.63%
4	2.88%	1.41%	1.56%	29	4.05%	3.07%	1.52%
5	2.86%	1.41%	1.66%	30	3.94%	2.96%	1.41%
6	2.89%	1.45%	1.79%	31	3.84%	2.86%	1.31%
7	2.94%	1.51%	1.95%	32	3.76%	2.78%	1.23%
8	3.00%	1.58%	2.11%	33	3.70%	2.72%	1.17%
9	3.05%	1.63%	2.27%	34	3.66%	2.68%	1.13%
10	3.07%	1.67%	2.40%	35	3.64%	2.66%	1.11%
11	6.01%	5.02%	2.50%	36	3.64%	2.66%	1.11%
12	5.98%	4.99%	2.57%	37	3.65%	2.67%	1.12%
13	5.92%	4.94%	2.61%	38	3.69%	2.71%	1.16%
14	5.84%	4.85%	2.62%	39	3.73%	2.75%	1.20%
15	5.74%	4.75%	2.62%	40	3.80%	2.82%	1.27%
16	5.62%	4.64%	2.60%	41	3.87%	2.89%	1.34%
17	5.49%	4.51%	2.57%	42	3.96%	2.98%	1.43%
18	5.36%	4.37%	2.53%	43	4.06%	3.08%	1.53%
19	5.21%	4.22%	2.48%	44	4.16%	3.18%	1.63%
20	5.05%	4.07%	2.42%	45	4.28%	3.30%	1.75%
21	4.89%	3.91%	2.36%	46	4.40%	3.42%	1.87%
22	4.82%	3.84%	2.29%	47	4.53%	3.55%	2.00%
23	4.73%	3.75%	2.20%	48	4.67%	3.69%	2.14%
24	4.63%	3.65%	2.10%	49	4.80%	3.82%	2.27%
25	4.52%	3.54%	1.99%	50	4.94%	3.96%	2.41%

Demographic assumptions

Mortality

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

Pre-retirement

AxC00 (duration 0) tables taking 71% for males and 112% for females, and improvements using CMI_2017 with a smoothing parameter of 8.5, and long term rates of 1.8% pa for males and 1.6% pa for females.

Post-retirement

- Males: S1NMA "Light" with 97.6% weighting and improvements using CMI_2017 [1.8%] with smoothing parameter 8.5

- Females: RFV00* with 102.7% weighting and improvements using CMI_2017 [1.6%] with smoothing parameter 8.5
  **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 2018 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.

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 2018, 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	0.04	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. It has been assumed that active members will leave the scheme at the following sample rates:

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.

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

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

Expenses

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

Assumptions used in calculating contributions payable under the recovery plan

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

Investment return on existing assets and future contributions

[This section is provisional]

[The Trustee has determined that it will not allow for additional investment returns in the recovery plan for the 31 March 2018 valuation.]

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, with the exception of retirement age. From October 2020, new benefits being accrued will have a retirement age of 66, in line with the change to State Pension Age. This change has been allowed for from the outset when calculating the cost of future accrual, with a small corresponding impact on the deficit recovery contributions resulting from the underpayment of the service cost in the period prior to that.

The salary threshold has been assumed to increase in line with the CPI assumption.