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# 1 The Integrated Risk Management Framework

The trustee’s Integrated Risk Management Framework (IRMF) ensures that the reliance being placed on the employer covenant in funding the scheme is:

- Within the employers’ aggregate risk capacity.
- Within the risk appetite of the trustee and the employers.

This is on the basis that the trustee believes there is a limit on the amount of reliance that should be placed on the employers in funding the scheme and this reliance should not consume the total risk capacity of the sector.

The IRMF we have adopted for the 2023 valuation is similar to that used at the 2020 valuation, although we have made some changes to the way the metrics are structured as detailed in Section 1.8.

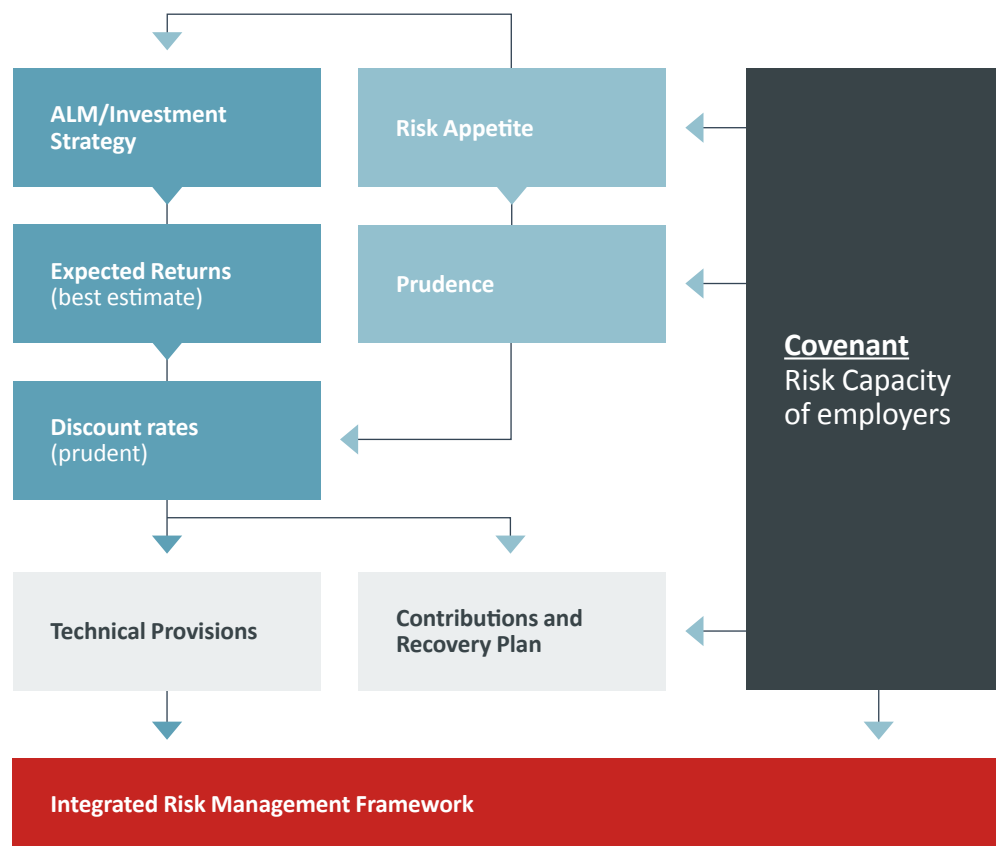
Figure 1 shows how the key elements of the methodology fit together.

The IRMF combines the three different elements of professional advice which the trustee receives in relation to the funding of the scheme, in particular:

- Covenant advice provided by our covenant adviser (PwC), supplemented by sector analysis provided by Nous.
- Investment advice provided by USSIM, with input from Mercer Investment Consulting.
- Actuarial advice provided by the Scheme Actuary.

While we have retained all the key elements of the 2020 IRMF, we have reformulated the metrics to make them more intuitive.

Figure 1: Overview of the proposed valuation methodology



A Recovery Plan is only required where a valuation reveals a Technical Provisions deficit.

## The Integrated Risk Management Framework Continued

### 1.1 Key elements of the IRMF

The IRMF uses a number of key concepts, which are:

- Self-sufficiency which acts as the benchmark against which reliance on the employers is measured.
- Affordable Risk Capacity (AffRC) which is a measure of the trustee’s and employers’ risk appetite.
- Available Risk Capacity (AvRC) which is a measure of the employers’ aggregate risk capacity.
- Limit of Reliance which is a new measure representing the amount of reliance on the employers beyond which the trustee would not wish to go.
- Transition Risk which is a measure of the market risk of moving from the current investment strategy to a self-sufficiency strategy, together with the risk of life expectancies increasing (improving) faster than assumed.
- Technical Provisions which is the target level of funding for the scheme’s liabilities built up before the valuation date.
- Assets which is the value of the investments and other monies the scheme holds, to meet the liabilities.

Each of these elements are discussed in more detail below.

### 1.2 Self-sufficiency as our benchmark for risk

If there were no covenant, to provide benefit security, the trustee has previously concluded that the scheme would need to be funded to at least a self-sufficiency level. Self-sufficiency (as defined by the trustee) is a low-risk investment strategy for funding the scheme in the absence of a covenant.

It corresponds to a confidence level of 95% (equivalent to a 5% failure rate) of passing the following tests without the need for any additional contributions:

1. Being able to pay all benefits when they fall due (that is, not exhausting all capital before the final benefit is paid).
2. Not falling below a 90% self-sufficiency funding level at each triennial valuation.

The resulting notional investment strategy is constructed to meet these criteria via the following principles:

- The strategy should be well-hedged (above 90%) against interest rate and inflation risk, and it should retain sufficient collateral to support any leverage.
- The strategy must be able to organically meet cash flows, allowing for periodic rebalancing.
- The strategy must provide a reasonable return margin over gilts.

For the 2023 valuation, the trustee has adopted the following notional self-sufficiency investment strategy:

<b>Notional self-sufficiency asset allocation<sup>1</sup></b>	Growth assets exposure	7.5%
<b>(Initial assumed portfolio weights)</b>	Credit assets exposure	50% (split broadly equally between public and private credit)
	Liability hedge ratios (on a self-sufficiency basis)	95% Interest Rate Hedge Ratio 70% Rising to 90% Inflation Hedge by 2030 <sup>2</sup>

#### Notes

- 1 Please note that these percentage allocations, do not add up to 100%, because we show liability matching assets separately, in terms of their hedge ratios.
- 2 The inflation hedge ratio increases to the long-term target of 90% to coincide with RPI reform.

#### **We are content that this investment strategy will support a self-sufficiency discount rate at 31 March 2023 of gilts + 0.5%, noting the following:**

While this investment strategy and discount rate comfortably passes the capital exhaustion test with a 95% confidence level, it does not quite pass the funding test at the same level.

However, we note that the modelling for the funding test is:

- Highly sensitive to the input assumptions.
- Particularly binding in the early years of the simulation.

For instance, slight (and reasonable) adjustments to any of the following assumptions materially impact the results of the funding test:

- The level of interest rate hedging (for example, reducing it from 95% to 90%).
- Changing the 90% funding threshold (for example, to 87.5% or 85%).
- Changing the time taken to reach 90% inflation hedging (for example, from 6 to 10 years).

As a result, the trustee believes it is inappropriate to lower the self-sufficiency discount rate further to precisely meet the 95% confidence level for both tests.

This leads to a self-sufficiency liability value of **£78.2bn** (as advised by the Scheme Actuary).

## The Integrated Risk Management Framework

### Continued

The deficit on a self-sufficiency basis is a key metric as it illustrates the amount of reliance being placed on the employer covenant. At this valuation, the self-sufficiency deficit is much smaller than it was at the 2020 valuation (a decrease from £35.5bn in 2020 to £5.1bn in 2023).

Note that we do not plan to pursue a self-sufficiency funding strategy, but we wish to ensure that the employers could support a move to self-sufficiency should that become necessary.

### 1.3 Affordable Risk Capacity (AffRC)

The reliance placed on the covenant should be within our risk appetite and the risk appetite of employers (on which we are consulting UUK). Whilst it would be acceptable to us for the scheme to be funded at a lower risk appetite than our risk appetite if the employers so wished, it would not be acceptable to us to fund the scheme above our risk appetite.

For the 2020 valuation the trustee's risk appetite was defined in terms of the AffRC and calculated as:

- Present Value of 10% of Pensionable Payroll over 30 years +/- 5% (with the range intended to acknowledge uncertainty).

We have adopted the same approach for the 2023 valuation having tested the parameters in the formula with our covenant adviser. PwC have provided advice on the appropriateness of the input assumptions for affordability of 10% of eligible payroll over 30 years within the calculation of the IRMF and commented on the appropriateness of the payroll growth assumption over the 30-year period (CPI+1% p.a.). USSIM provided investment analysis to support the discount rate used in calculating the central estimate of the AffRC.

### 1.4 Available Risk Capacity (AvRC)

The AvRC is a measure of the maximum aggregate amount of risk that the employers can support including the risk from funding the scheme and that from their wider operations. While we are not using AvRC explicitly within the 2023 IRMF metrics, we do use it for calibration of the Limit of Reliance and to help calibrate the RAG status of the IRMF metrics.

PwC provided advice on AvRC.

### 1.5 Limit of Reliance

The Limit of Reliance is intended to be the maximum reliance we would be prepared to tolerate before needing to take action to address the funding position. The Limit of Reliance sits within the range between AffRC and AvRC.

We have set the Limit of Reliance for the 2023 valuation at the value of 15% of eligible pay over a 30-year period. This is consistent with the threshold for the Red RAG status for the Reliance Risk Metric used in the monitoring of the 2020 valuation.

### 1.6 Transition Risk

Transition risk measures the risk exposure of moving the assets from the current investment strategy (the Valuation Investment Strategy, or VIS) to a self-sufficiency investment strategy over time as well as the exposure to demographic risk (notably mortality).

In deciding on the allowance to be made for Transition Risk we take advice from our investment adviser and the Scheme Actuary on the investment and demographic elements respectively.

#### 1.6.1 Investment Transition Risk

Investment transition risk is the additional allowance (in £ terms) required over the self-sufficiency liability to protect against the risk associated with a theoretical de-risking of the current VIS to the self-sufficiency investment strategy.

Our investment adviser takes a balanced view across a range of inputs to arrive at an appropriate Investment transition Risk allowance, noting that:

- There is no industry standard for calculating investment transition risk.
- There are many ways of potentially calculating it.

They therefore take a balanced view of a range of inputs – but rely more heavily on their stochastic analysis.

Based on our approach to setting the investment transition risk (and allowing for a self-sufficiency discount rate of gilts + 0.50% p.a.), the investment transition risk allowance, based on the advice from our investment adviser, has been set to £7bn for the 2023 valuation.

#### 1.6.2 Mortality Transition Risk

The Scheme Actuary has advised that in his experience with other schemes an allowance for demographic transition risk of around 5% of liabilities (that is, c.£4bn on the self-sufficiency basis) is in line with market practice and consistent with the approach adopted at the 2020 valuation. We have allowed for this in our overall Transition Risk.

#### 1.6.3 Combined Transition Risk

If asset transition risk and longevity risk are assumed to be independent (that is, uncorrelated) then it is not necessary to add the two risk numbers; it is common to allow for the diversification of independent risks. Allowing for that diversification, including the longevity risks (£4bn) in combination with the investment transition risk of £7bn, would give a total transition risk of £8bn.

## The Integrated Risk Management Framework

### Continued

### 1.7 Technical Provisions

The Technical Provisions are the level of assets which the trustee is seeking to hold in respect of accrued benefits having received actuarial advice from the Scheme Actuary on discount rates, inflation, mortality, and demographic assumptions.

### 1.8 Risk Metrics within the IRMF

The IRMF adopted for the 2020 valuation used three metrics and measured risk relative to self-sufficiency. We continue to measure risk relative to self-sufficiency, but we have reduced the number of metrics from three to two, reformulating them to create metrics which we believe are more intuitive.

The IRMF metrics for the 2023 valuation are:

- **Actual Reliance:** being the current level of reliance on the employers given the assets currently held by the scheme.
- **Target Reliance:** being the level of reliance we are aiming to be below, when the scheme is fully funded on the Technical Provisions basis.

The formulae for establishing Actual and Target Reliance are given in Table 1 and Table 2 sets out the RAG status for the IRMF metrics.

Table 1: Metrics within the IRMF

Metric	How the metric is calculated
<b>Actual Reliance</b>	Self-sufficiency liabilities + Transition Risk – Assets
<b>Target Reliance</b>	Self-sufficiency liabilities + Transition Risk – Technical Provisions

Table 2: Proposed IRMF metric RAG status at the valuation date

Metric	Status
<b>Actual Reliance</b>	Actual Reliance < or = Target Reliance
	Target Reliance < Actual Reliance < Limit of Reliance
	Limit of Reliance = or < Actual Reliance
<b>Target Reliance</b>	Target Reliance < or = 95% of Affordable Risk Capacity*
	95% of Affordable Risk Capacity < Target Reliance < 105% of Affordable Risk Capacity*
	105% of Affordable Risk Capacity* = or < Target Reliance

**Note**

\* The central estimate of the Affordable Risk Capacity is used here.

The values of the inputs and the metrics for the IRMF at the valuation date are given in Table 3.

Table 3: The values of the inputs and the metrics for the IRMF

Input/metric	Value
Self-sufficiency liability	£78.2bn
Transition risk	£8.0bn
Assets	£73.1bn
Technical Provisions on consultation basis	£65.7bn
Affordable Risk Capacity (central estimate)	£28.1bn
Available Risk Capacity	£95.0bn
Limit of Reliance	£42.2bn
Actual Reliance	£13.1bn
Target Reliance	£20.5bn
Ratio of Actual to Target Reliance	64%
Ratio Target Reliance to Affordable Risk Capacity	73%

At the valuation date (31 March 2023) Actual Reliance and Target Reliance (on the basis set out in the consultation document) have a RAG status of 'Green'.

The trustee will be considering RAG thresholds for monitoring purposes once the valuation has been agreed.

## 2 Employer covenant analysis – detailed results

The trustee has assessed the covenant provided by employers to the scheme to be Strong in 2023. In arriving at this assessment, the trustee received advice from external consultants:

- PwC is adviser to the trustee on covenant matters and provided its assessment of covenant strength and horizon to the trustee Board.
- Nous Group has advised the trustee on the outlook for the UK higher education sector. Nous' report on the sector has informed PwC's covenant assessment.

More than 330 employers participated in USS as at 31 March 2023. However, more than 90% of the aggregate income of USS employers, and more than 95% of scheme liabilities, are accounted for by the 125 degree-awarding higher education institutions (HEIs) that submitted financial data for the 2020/21 financial year to the Higher Education Statistics Agency (HESA). Analysis of covenant for the 2023 valuation therefore focused primarily on this group.

### 2.1 How the covenant has been assessed

The fieldwork and analysis undertaken to assess the strength of the covenant was conducted between January and May 2023 and included:

- Desktop review and analysis of historical financial information up to and including employers' 2020/21 financial year.

- A report by Nous Group assessing the UK higher education landscape, outlining key risks and opportunities for the sector, and providing a projection of income and payroll cost for the USS HEI employers out to 2053.
- Interviews to review current and prospective financial performance with a sample of 20 HEIs selected to provide a reasonably representative sample of the university employer base as a whole, taking into account coverage within the sample of liabilities, geographic location and different HEI types and sizes.
- Review of financial forecasts (in most cases covering expectations out to 2027) provided by 16 of the HEIs interviewed, and stress-testing of forecasts for 14 of these for downside risks.
- Estimation, using a discounted cash flow model, of USS employers' total capacity (as at 31 December 2022) to support risk of all types ('Available Risk Capacity'). Comparison of this with the scheme's self-sufficiency deficit is one way to compare the 'size' of the scheme with the overall financial 'size' of its supporting employer group.

### 2.2 Key conclusions of the covenant assessment

PwC has advised the trustee that, in its opinion, the employer covenant is 'Strong'. This is the highest rating in the 4-point scale (Weak, Tending-to-weak, Tending-to-strong and Strong) that it, and The Pensions Regulator (TPR), uses to assess covenant strength.

PwC believes the covenant has strengthened since their assessment for the 2020 valuation (when it was also rated 'Strong').

PwC's assessment methodology considers covenant along seven dimensions. These dimensions, and PwC's conclusions on them, are summarised in the dashboard set out at the end of this section. PwC has rated the USS employer covenant as strong in six of these seven dimensions and assessed that six dimensions have strengthened since the 2020 valuation. The key drivers of PwC's 2023 covenant assessment can be summarised as:

- The substantial improvement in the scheme's funding position since the 2020 assessment (as reflected, for example, in the reduction of the scheme's self-sufficiency deficit from £35.5bn in 2020 to £5.1bn in 2023), which has significantly reduced the scheme's reliance on the employer covenant.
- The positive structural characteristics that have underpinned previous assessments (sector-wide coverage, its joint-and-several, mutual nature, its single contribution rate linked to eligible payroll, and the strong international competitiveness of USS employers) from which the scheme and employer covenant continue to benefit.
- Since PwC completed their assessment of the covenant for the 2020 valuation, these structural factors have been strengthened by the covenant support measures agreed with employers at the end of the 2020 valuation which mitigate the potential risks

of exit by financially significant employers and of rising financial leverage identified in previous valuations.

- The growth and financial performance of USS employers, and their liquidity and balance sheet position since the 2020 covenant assessment have been stronger than expected, despite the considerable obstacles to performance presented over that period by the COVID-19 pandemic. This illustrates the substantial financial and operational flexibility and resilience of the USS employer group.
- The robust outlook for the UK HE sector outlined by Nous, who advised that the UK higher education sector remains well-positioned in the global market, expects the sector (and most USS university employers) to continue to grow by capitalising on strong international demand over the next 30 years, and sees capacity within the sector to implement cost savings to mitigate potential future shocks.

PwC rated the seventh covenant dimension – 'Forecast performance' – as Tending-to-strong, noting that, while the financial position and performance of the USS employer group has improved compared with the 2020 valuation, sampled employer forecasts indicate a period of declining profitability and moderately negative cash flow over the medium term, reflecting inflationary pressures, the unwinding of COVID-era cost control measures and the reinstatement of investment plans put on hold during the pandemic.

## Employer covenant analysis – detailed results

### Continued

#### 2.3 Downside risks

The outlook for any part of the economy over the long term, including the higher education sector, is not without risks. Our advisers identified three main risks which were explored with our HEI sample as potential downside scenarios within PwC’s analysis of employers’ expected future performance:

- Disruption to the ability of Chinese students to attend UK universities.
- Disruption to the ability of international students in general to attend UK universities.
- An extended period of higher-than-expected increases in staff rates of pay.

HEIs were also asked to consider a combined scenario involving both disruption to international student mobility and higher-than-expected pay increases.

All the HEIs that modelled these scenarios found that, while there would be challenges, the institutions had the means to mitigate them and remain viable in all cases – a finding that underscores the resilience of the USS employer group.

#### 2.4 Other ways the covenant assessment supports the 2023 valuation

PwC’s covenant assessment also supports the key assumptions the trustee uses to estimate Affordable Risk Capacity (‘AffRC’), the key covenant-related input to the trustee’s Integrated Risk Management Framework.

##### 2.4.1 Affordability of contributions

Our AffRC model assumes, in a downside scenario, that employers can sustainably afford contributions to USS of 15% of payroll to cover future service and 10% to underwrite risk or repair a deficit (25% total employer

contributions). PwC considered the affordability to employers of contributions to USS of 25% of eligible payroll, taking into account:

- The strong cash generation that employers were able to achieve in response to the COVID pandemic.
- Nous’ conclusion that employers in general are capable of realising savings on operating costs over the long term if required.
- Their own assessment that most employers could, if the circumstances required it, afford contributions of 25% (by implementing savings equivalent to less than 1.5% of costs, based on financial year 2020/21 data).

PwC’s conclusion is that most employers have the capacity to pay contributions of 25% or more over the long term and over the scheme’s covenant horizon of 30 years.

That said, we recognise that affordability varies across the employer group. It is likely to be the case that some institutions have less capacity to make material efficiency savings to sustainably enhance affordability if required in the future and could find an employer contribution rate of 25% or higher challenging over a sustained period.

##### 2.4.2 Covenant horizon

Our AffRC model assumes that employers will be able to make contributions to USS to underwrite risk or repair a deficit if required for at least 30 years into the future. PwC has reviewed this 30-year assumption and considers that there is reasonable visibility of the outlook for the sector to support a covenant horizon of 30 years, noting that it expects the employer group to continue to support the scheme for considerably longer than 30 years but that there is less visibility beyond 30 years.

PwC notes that the same structural characteristics of the scheme and robust sector outlook that contribute to the strength of the employer covenant also support a long covenant horizon, as they have done in previous valuations. Two key developments since the 2020 valuation have reinforced PwC’s conclusion that a 30-year horizon assumption remains appropriate:

- The demonstration of the financial and operational resilience of USS employers provided by their performance during the COVID pandemic.
- The implementation of the covenant support measures agreed towards the end of the 2020 valuation.

##### 2.4.3 Expected payroll growth rate

Our AffRC model assumes that scheme-eligible payroll will on average grow at a rate of CPI+1% p.a. over the covenant horizon, unchanged from our assumption for the 2020 valuation. PwC notes that this is not materially different to Nous’ projection that overall payroll growth of USS employers will average CPI+0.9% p.a. over the period to 2053 (and the difference in these rates does not have a material impact on the estimated value of AffRC). PwC concludes that an assumption of CPI+1% p.a. in estimating AffRC is reasonable.

##### 2.4.4 Discount rate for estimating Affordable Risk Capacity

As in the 2020 valuation, our AffRC model uses a discount rate to estimate a net present value of future contributions potentially available to support risk that reflects the strong creditworthiness, approximately equivalent to an AA credit rating, of the USS employer group. The rate used, gilts + 0.7% p.a., reflects market-implied credit spreads over UK gilts for rated university-issued debt instruments as at 31 March 2023. PwC notes that, while not an

exact measure, a high investment grade credit rating (around AA) is typically associated with a ‘strong’ covenant and considers that the discount rate used in our AffRC model is reasonable.

#### 2.5 Enduring value of the scheme’s covenant support measures

Our assumption throughout our assessment is that the package of support measures to support the covenant agreed at the end of the 2020 valuation will remain in place. As outlined above, this assumption plays an important role in the 2023 assessment of covenant strength and employer risk capacity.

The trustee believes that the support measures continue to play a vital role in the valuation demonstrating the long-term commitment of employers to the scheme and may become more important should the scheme return to a deficit position at a future valuation. In doing so, they provide significant value to both scheme and employers. Our assessment of the ongoing value and importance of the support measures is summarised in Section 6 below.

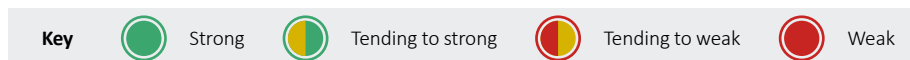
We believe the support measures have to date generally operated smoothly, without burdening employers disproportionately or constraining their operations significantly (helped by the strong financial performance of the employer group since the 2020 valuation). We recognise, however, that the measures are not without cost to employers (mainly administrative), which we continue to monitor. Taking into account feedback received from employers, we will consider the implementation of the support measures in more detail in parallel with the 2023 valuation and will publish our conclusions on the USS website in due course.

























## Employer covenant analysis – detailed results

Continued

### Covenant dashboard



Area of review	Previous rating	Trend	Current rating	Trend since 2020
<b>Access to value</b>				<ul style="list-style-type: none"> <li>The scheme continues to have Strong access to the majority of the UK HE sector.</li> <li>The structure of the scheme means it can rely on the support of the whole employer group and the covenant support measures help to mitigate the risk of the employer’s support deteriorating in the future.</li> </ul>
<b>Historical performance</b>	N/A*			<ul style="list-style-type: none"> <li>Exceptional performance in FY21, reflecting the impact of resilient income and the capacity of universities to implement cost savings and cash protection measures, if required.</li> <li>Improved scheme coverage due to steady income growth and the scheme’s improved funding position.</li> </ul>
<b>Balance sheet and financing</b>				<ul style="list-style-type: none"> <li>The USS university employers’ balance sheet strength and coverage of the scheme has improved since the scheme’s last valuation, driven primarily by positive cash generation during COVID-19.</li> <li>The debt monitoring framework (‘DMF’) provides greater protection over the risk of debt increasing over the long term.</li> </ul>
<b>Market</b>				<ul style="list-style-type: none"> <li>Based on advice from Nous, the UK HE sector remains well positioned in the global market and well placed to grow by capitalising on strong international demand over the next 30 years. Nous is also of the view that the sector has the capacity to find material cost savings to mitigate future shocks.</li> </ul>
<b>Forecast performance</b>	N/A*			<ul style="list-style-type: none"> <li>The employers sampled are forecasting continued growth in income but a return to more normal (low margin) levels of financial performance and negative FCF in aggregate over the forecast period.</li> <li>The employers expect to have capacity to fully mitigate the impact of the downside scenarios selected.</li> </ul>
<b>Affordability</b>				<ul style="list-style-type: none"> <li>The employers positive performance during the pandemic provides evidence of the employers’ capacity to implement measures to materially enhance affordability, when required.</li> <li>The improved scheme funding position means employer contributions are expected to reduce.</li> </ul>
<b>Available Risk Capacity</b>				<ul style="list-style-type: none"> <li>The AvRC has increased by c.22% to £95bn since the last AvRC valuation.</li> <li>Given the improvement in the scheme’s funding position, the relative size of the scheme to the sector has materially reduced, although the level of risk within the scheme remains significant.</li> </ul>
<b>Overall assessment</b>				<ul style="list-style-type: none"> <li>We rate the covenant as Strong and consider it has strengthened since the scheme’s 2020 valuation</li> </ul>

#### Notes

\* Previous ratings for ‘historical performance’ and ‘forecast performance’ are N/A because they were previously characterised as ‘Income’ (rated Strong) and ‘Current and future cash flow’ (rated Tending to strong). We now cover these areas within the historical and forecast performance sections of this report.

## 3 Investment modelling – assumptions and methodology

### 3.1 Alternative portfolio expected returns and pre-retirement percentile returns

To inform the impact of investment strategy on the projections, we show results based on the current VIS as well as two simple and illustrative alternative investment strategies. The table below shows a range of risk and return metrics for each aggregate illustrative investment strategy:

Illustrative alternative investment strategies	More growth, less hedging	Current VIS	Less growth, more hedging
<b>Asset allocation<sup>1</sup></b>			
Growth assets exposure	70%	60%	50%
Credit assets exposure	25%	25%	25%
Liability hedge ratios (on a self-sufficiency basis)	30%	40%	50%
<b>Expected Return<sup>2</sup></b>			
30-year expected real return p.a.	3.8%	3.5%	3.2%
30-year expected return p.a. versus Liability Proxy <sup>3</sup>	3.3%	3.0%	2.7%

#### Notes

- Please note that these percentage allocations do not add up to 100%, because we show liability matching assets separately, in terms of their hedge ratios.
- Expected returns provided from the stochastic Asset-Liability Model (ALM) (Ortec Finance, GLASS) and excludes any allowance for illiquidity premium.
- The Liability Proxy is a blend of six gilt indices which could theoretically be used to hedge the market (interest rate and inflation) sensitivities of the liability cash flows.

The table below shows the expected returns of the derived pre-retirement portfolios for each illustrative investment strategy at different confidence levels:

Pre-retirement percentile returns	More growth, less hedging	Current VIS	Less growth, more hedging
<b>Pre-retirement return percentiles<sup>1,2</sup></b>			
Pre-retirement expected return at 50th centile (gilts +)	4.7%	4.4%	3.9%
Pre-retirement expected return at 67th centile (gilts +)	2.9%	2.8%	2.6%
Pre-retirement expected return at 75th centile (gilts +)	1.9%	2.0%	1.9%

#### Notes

- Expected returns provided from the stochastic ALM model (Ortec GLASS); exclude any allowance for illiquidity premium; and allow for a small adjustment made to the 2023 distribution of returns to achieve consistency across the expected return, discount rate, and CPI assumptions.
- Distributions are derived relative to 30-year tenor index linked gilts.

## Investment modelling – assumptions and methodology

### Continued

### 3.2 Stochastic results projected to the 2026 valuation (relating to the results in Appendix 2 of the consultation document)

The table below shows, for each investment strategy, the probabilities of the total contribution rate exceeding 20.6% and 26% respectively in three years' time, assuming those total contribution rates had been paid from 31 March 2023 onwards.

As per the related results in the consultation document, we note that the two surplus cases under investigation (that is, 'Retains surplus' and 'Does not retain surplus') refer to the provisional Technical Provisions surplus at the 31 March 2023 valuation date. Any scenarios in which a surplus builds up thereafter assume the surplus is retained within the scheme (that is, not used to reduce contributions). However, the required contribution rate in scenarios in which a deficit emerges will include an element of deficit recovery contributions.

Investment strategy	Probability of exceeding a required contribution rate of 20.6% at next valuation (having paid 20.6% from 31 March 2023)		Probability of exceeding a required contribution rate of 26% at next valuation (having paid 26% from 31 March 2023)	
	Retains surplus	Does not retain surplus	Retains surplus	Does not retain surplus
More growth, less hedging	58%	65%	23%	33%
Current VIS	57%	65%	21%	33%
Less growth, more hedging	57%	65%	18%	31%

We see similar features to those set out in the consultation document for the projection at the 2029 valuation:

- A significantly lower chance of contributions exceeding 26% than contributions exceeding 20.6% at the next valuation.
- Reducing investment risk could enhance stability, particularly during 'downside' economic scenarios, though may be less material than actions regarding the potential use of surplus.

Again, the modelling is intended to be indicative of the relative impacts of different courses of action – and as a result, includes simplifying assumptions. Key to these indicative results is the assumption that surplus at the next valuation is not utilised to mitigate the impact of contribution increases.

If, in practice, surplus was available to reduce the future contribution requirement, the probability of contributions exceeding a certain level would be reduced.

As discussed in the consultation document, there are alternative calibrations of starting contribution rates and required total contribution rates that could be considered. As an example, the probability of a starting rate of 20.6% exceeding the current contribution rate of 25.2% (the current future service contribution rate) at the 2026 valuation would be between 24% and 27% if

surplus is retained, or between 38% and 40% if surplus is not retained, depending on the investment strategy being considered. Further scenarios analysis may be developed as part of our further investigations around stability with the JNC stability working group.

### 3.3 Deterministic analysis – Methodology and Key Assumptions (relating to the results in Appendix 2 of the consultation document)

We have modelled a stress scenario where real interest rates fall by 1% p.a. and growth assets fall by 15%. This has been designed to represent a plausible scenario (noting that long-dated real UK interest rates have risen by more than 2% p.a. in the past 12 months).

We've considered the position based on using a constant spread over gilts (that is, not allowing for increases in the return expectations post-stress).

Under these assumptions, the higher-growth/lower-hedging investment strategies lead to higher contribution rates (albeit with a likely higher probability of achieving the assumed discount rate).

We've also considered the position if the scheme was fully funded as at 31 March 2023, as an indication of the future effect if the surplus is used up. This leads to significantly higher contributions, as the surplus would otherwise insulate the scheme against some changes in market conditions.

We might anticipate increased expected returns on return-seeking assets relative to gilts following the modelled stress. This may mean an increased pre-retirement discount rate spread over gilts, however this may be constrained by the IRMF and would be subject to Scheme Actuary advice.

For simplicity we have therefore considered the position based on fixed discount rates for this modelling, noting that allowing for potential changes in the discount rate may narrow the range of future outcomes, and lead to lower contribution requirements. (In practice we would review expected returns and discount rates in light of new circumstances, which may well result in different discount rates expressed relative to gilts.)

#### Key assumptions:

- Figures are based on provisional 2023 valuation results.
- The contributions are based on pre-April 2022 benefits.
- The pre-retirement discount rate is fixed at gilts + 2.5%.
- The post-retirement discount rate is fixed at gilts + 0.9%.
- The deficit recovery contributions assume a 10-year recovery period with no reduction to the rate if there is a surplus.

## Investment modelling – assumptions and methodology

### Continued

### 3.4. Stochastic DB Fund Modelling (relating to results in Appendix 3 of the main document and above, within GLASS platform)

#### 3.4.1 Assumptions and limitations

Financial models in general use a series of assumptions and inputs to enable projections of the distribution of future outcomes, allowing for random variation of one or more variables. These models should be considered a tool to aid decision making, rather than an absolute prediction of future outcomes. It is also worth noting that different models may produce different outputs. We set out below details about the financial modelling our investment adviser has used.

**Scope:** multi-year stochastic ALM projections on a self-sufficiency (SS) and Technical Provisions (TP) basis.

The Ortec Finance Economic Scenario Generator (the GLASS platform), when aligned to USSIM's Capital Market Expectations ('CMEs'), attempts to provide a representation of future states of the world, by simulating 5,000 different paths.

In particular, the model assumes:

- Each simulated path is feasible.
- Each simulation is equally probable.
- The overall distributions of paths reasonably describe the future possible states of the world.
- TP discount rate spreads are static.
- SS discount rate spreads evolve in line with the spreads (in excess of gilt yields) of a basket of investment-grade corporate bonds.

#### Note

<sup>1</sup> Target hedge ratios exclude emerging market debt.

<sup>2</sup> 'VIS Matching' reflects the statistics associated with the self-sufficiency liability, and is a representation of the matching component of the VIS given the self-sufficiency-derived Hedge Ratio.

- At monthly rebalancing points, liability hedging is adjusted to target levels<sup>1</sup>, unless such an adjustment results in excessive leverage.
- The surplus is either fully retained or fully spent at inception without any impacts on our assumptions for future accrual.
- For projecting the Technical Provisions, the CPI expectations are calibrated such that each annual timestep reflects a mean CPI of 3% at every tenor. However, CPI is still modelled stochastically, with a distribution around the mean CPI of 3%.

With these key points in mind, we note that the output of the stochastic modelling (indeed any specific modelling which involves simplifying assumptions) should be treated with due care and considered in the context of these assumptions and used alongside a wide range of analysis and professional judgement.

#### 3.4.2 Inputs

##### Liability cash flows and discount spreads

- Value of £78bn and duration of c.20 years (on a gilts + 0.5% self-sufficiency basis).
- Value of £66bn and duration of c.15 years (on a gilts + 2.5% pre-retirement and gilts + 0.9% post-retirement Technical Provision basis).

##### Starting level of assets

- Value of £73bn.

##### Starting level of Technical Provisions

- Value of £66bn, approximately half from pensioners and c.half from non-pensioners (using pre-retirement discount rate of gilts + 2.5% and post-retirement discount rate of gilts + 0.9% with 20.6%/26% contributions).

#### Composition of the VIS and alternative strategies

- Composition of the VIS as described in Section 7.2 of the consultation document with a level of LDI assets recomputed to achieve a 40% liability hedge ratio (on a self-sufficiency basis) as at 31 March 2023. Alternative strategies are constructed by scaling the growth and LDI allocations, while keeping the 25% allocation to credit fixed.

#### Payroll, adjustments to payroll, payroll growth assumptions

Pensionable payroll assumed to be £10bn per annum before any assumed increase at 1 April 2023 for the purpose of our future service rate/cashflow calculations. In practice the denominator used in our future service rate calculations is a present value of the expected payroll over the next year, i.e., based on total payroll, including an assumed pay increase, but also allowing for withdrawals / retirements etc over the year, discounted to 31 March 2023. Payroll is assumed to grow by CPI+1% per annum. In our stochastic modelling we have assumed DC costs remain fixed as % of payroll.

#### Base case CMEs, including inflation progression

- See capital market expectations below. Note that for use in the valuation the GLASS economic scenario generator is adjusted such that the central paths of key factors are aligned.

#### Contribution strategy

- Stated contributions rates are inclusive of scheme administrative costs and DC contributions. For the purpose of modelling the DB section of the scheme, these elements are removed, since they are not paid into that section. They're then added back on to the contribution rates which are derived from the modelling.

#### Rebalancing constraints such as the degree of leverage which can be taken

- It has been assumed that LDI assets can be geared by a factor of x1.5.

#### 3.4.3 Methodology

- The economic scenario generator of Ortec Finance produces realistic scenarios similar to those used by financial institutions globally to inform investment decisions and manage risks.
- Key features of the scenario methodology:
  - Single integrated approach for short-, medium- and long-term investment horizons and across asset classes and economies.
  - Robust replication of a set of well-known historical relationships (stylised facts) that are relevant for investment decision and risk management. Examples: non-normal distributions, tail risks, time varying volatility and business cycle dynamics.
  - Takes into account the current economic market conditions, such as initial bond yields to value fixed income portfolios and liabilities and the relevant stage of the business cycle.
- Volatility and correlation statistics (shown below) are generated based on the Ortec Finance scenario methodology and the specific asset portfolio set up and currency overlay strategy of USSIM.
- Expected returns are calibrated to the CME expectations of USSIM.

#### 3.4.4 Key Summary Output Statistics

Annual return volatility and correlation over 30-year projection horizon:

	Volatility (p.a.)	Correlation		
		Growth	Credit	VIS Matching (LDI) <sup>2</sup>
Growth	17%	1	X	X
Credit	7%	0.4	1	X
VIS Matching (LDI) <sup>2</sup>	13%	0.2	0.5	1

## 4 Summary of membership data for the 2023 valuation

The membership data used for the valuation of the scheme was extracted from the administration system on 2 May 2023 following the running of the year-end processes. The extract classifies members by their status as at 31 March 2023. The pension figures for pensioners and dependants include the pension increase immediately following the valuation date, the figures for deferred members do not.

	31 March 2020	31 March 2023
<b>Active members</b>		
Number	200,355	214,374
Total salary p.a.	£8,962m	£10,320m
Average salary p.a.	£44,731	£48,140
Average age	44	45
<b>Deferred members</b>		
Number	188,466	227,518
Total pensions p.a.	£441m	£524m
Average pension p.a.	£2,340	£2,303
Average age	45	46
<b>Pensioners and dependants</b>		
Number	90,879	101,978
Total pension p.a.	£1,617m	£1,937m
Average pension p.a.	£17,793	£18,994
Average age	73	73

In addition to the table above there were 1,298 members receiving a child's pension (1,159 in 2020).

## 5 Reconciliation of 2020 valuation and 2023 proposed results

The tables below show reconciliations of the change in the Technical Provisions and future service contribution rate (for current benefits) between the 2020 valuation and the 2023 proposed results. These have been provided by the Scheme Actuary.

### Reconciliation of Technical Provisions funding position between 31 March 2020 and 31 March 2023

Item	Funding position (£bn)	Effect (£bn)
2020 surplus/(deficit) (gilts + 2.75% p.a./gilts + 1% p.a.)	-14.1	
Interest on deficit		-0.9
Contributions vs value of benefits earned		+0.4
Pension increase vs assumed over 2020/23		-6.6
Investment return vs expected		+0.4
Data/miscellaneous		+0.3
Change in assumed inflation and future pension increase expectations		-17.0
Change in discount rates		+44.5
Change in mortality assumption		+0.7
Allowance for potential historic additional liabilities		-0.3
2023 surplus/(deficit) under proposed assumptions	+7.4	

### Reconciliation of required future service contribution rate for current benefits between 31 March 2020 and 31 March 2023

Item	Future service rate (% of salaries)	Effect (% of salaries)
2020 valuation (gilts + 2.75% p.a./gilts + 1% p.a.)	25.2	
Removal of assumed outperformance		+0.7
Unwinding of deferral of 2.5 % increase cap		-0.3
Change in DB cost due to data changes		-0.1
Change in DC cost due to salary changes		+0.4
Change in pension increase expectations		+1.8
Change in discount rates		11.5
Change in mortality assumption		-0.1
Change in expenses allowance		+0.1
2023 valuation	16.2	

## 6 Evaluation of employer covenant support measures

### 6.1 Consideration of the enduring value of covenant support measures in future valuations

When the covenant support measures were agreed towards the end of the 2020 valuation, we committed to continue to take their ongoing value in managing covenant risks into account in future valuations.

The specific risks to the employer covenant, identified in previous valuations, that the support measures are designed to address are:

- The risk of financially significant employers leaving the scheme.
- The risk of the financial leverage of employers growing faster than their ability to support it.
- The risk of subordination of the scheme without an increase in the value of the covenant to offset such subordination.

The covenant support measures agreed with employers to address these risks included:

- A rolling 20-year moratorium on employers withdrawing from the scheme except with trustee approval.
- A Debt Monitoring Framework setting out mechanisms for USS to:
  - monitor employer debt levels and engage with employers where individual leverage exceeds agreed thresholds.
  - seek ‘pari passu’ (matching) security where employers pledge assets as security for their debt beyond agreed thresholds, save where the security is being granted to fund covenant enhancing activity.

The points below summarise the trustee’s assessment of the value of the support measures in the 2023 valuation and their continuing importance to the scheme in the future, noting that a final evaluation of the support measures could only be made once the parameters of the 2023 valuation have been agreed. The hypothetical position in the absence of these support measures would also require further detailed consideration by the trustee, taking account of any wider ramifications for example, on future investment strategy.

### 6.2 The covenant support measures remain highly valuable

For the purposes of providing an indicative value of the support measures, we base our analysis on a starting set of discount rates in line with our proposed assumptions for this consultation. That is, pre/post-retirement discount rates for Technical Provisions in the 2023 valuation of gilts + 2.5%/gilts + 0.9%.

On this basis and without the support measures in place, we estimate that future service contributions (FSCs) would be 1.7% of pay higher (for current benefits) or 3.2% of pay higher (for pre-April 2022 benefits).

This is equivalent to an additional £175m/£330m p.a. of contributions for the employer group based on the 2023 valuation position.

Similar analysis for the 2020 valuation concluded FSCs would be 3.4% of pay (or approximately £300m p.a.) higher without (similar but not identical) support package.

With the scheme in surplus in 2023, the impact of not having support measures in place on deficit recovery contributions (DRCs) is not relevant. However, deficit repair was a material additional consideration in 2020, as discussed below, and could become relevant again at future valuations.

We used the same methodology and assumptions to value the support measures in 2023 as was used to assess support scenarios in 2020. That is, increased risk associated with future contributions, in the absence of the support measures, would warrant a discount rate 100 basis points higher in the calculation of Affordable Risk Capacity (AffRC), with the consequent reduction in AffRC passed through to higher Technical Provisions. We have then used that to establish the assumptions consistent with those higher Technical Provisions, resulting in higher required contributions.

## Evaluation of employer covenant support measures

### Continued

#### 6.3 The covenant support measures are a key element in delivering stability of valuation outcomes

As well as being an important factor in our assessment that the covenant is strong, the support measures:

- clearly demonstrate the long-term commitment of employers to the scheme
- enable a long-term approach to funding and investment strategy by the Trustee, which helps with future stability
- potentially allow a greater weighting towards growth assets in the scheme's investment strategy (where that is considered appropriate). Whilst this does not necessarily contribute to future stability, it does tend to result in higher expected future investment returns, and lower contribution requirements, all else equal.

#### 6.4 The covenant support measures support a 30-year covenant horizon assumption

A longer recovery period has been helpful to employers (and members) in the past: analysis of alternative hypothetical covenant support scenarios in 2020 assessed the impact on DRCs of having no covenant support measures in place to be an additional 10.7% of pay (c.£1bn p.a.), primarily due to a 5 year shorter deficit recovery period (10 years without support measures and 15 years with). This took the difference in total contribution rate due to the presence of these covenant support measures (including the impact of DRCs and FSCs together) to 14.1% of pay/c.£1.3bn p.a.

The difference in total contributions in 2020 between the hypothetical scenario without the covenant support measures and the final 2020 valuation outcome was even larger because of the longer moratorium (20 years) and recovery period (18 years) ultimately agreed, compared with the scenarios initially considered. The final 2020 valuation outcome was of course also influenced by the changes made to benefits and by post-valuation experience.

The support measures may become more significant in future valuations if a revised TPR funding code is more restrictive in defining the covenant's 'reliability' period (a similar concept to horizon), which could influence the assessment of scheme maturity and therefore affect assumptions about investment strategy and required contributions.

#### 6.5 The combination of the exit moratorium and debt monitoring reinforce mutuality

The moratorium protects the scheme and financially less well-endowed employers from 'flight risk' of financially stronger employers.

The Debt Monitoring Framework is important in protecting interests of employers that are constrained by the moratorium from leaving the scheme from potential moral hazard in the form of fellow employers who may have a greater appetite for elevated gearing levels, particularly if competitive pressure on employers to increase spending and investment increases post-COVID.

Retention of both the moratorium and Debt Monitoring Framework is therefore important in maximising the overall risk mitigation they provide.