Aon Hewitt
Retirement & Investment

# Actuarial valuation at 31 March 2016

## The University of Oxford Staff Pension Scheme

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|---|---|
| Prepared for | OSPS Trustee Limited |
| Prepared by | J M Harvey FIA |
| Date | 28 April 2017 |
| Signed | |

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Scheme Actuary
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# Executive Summary

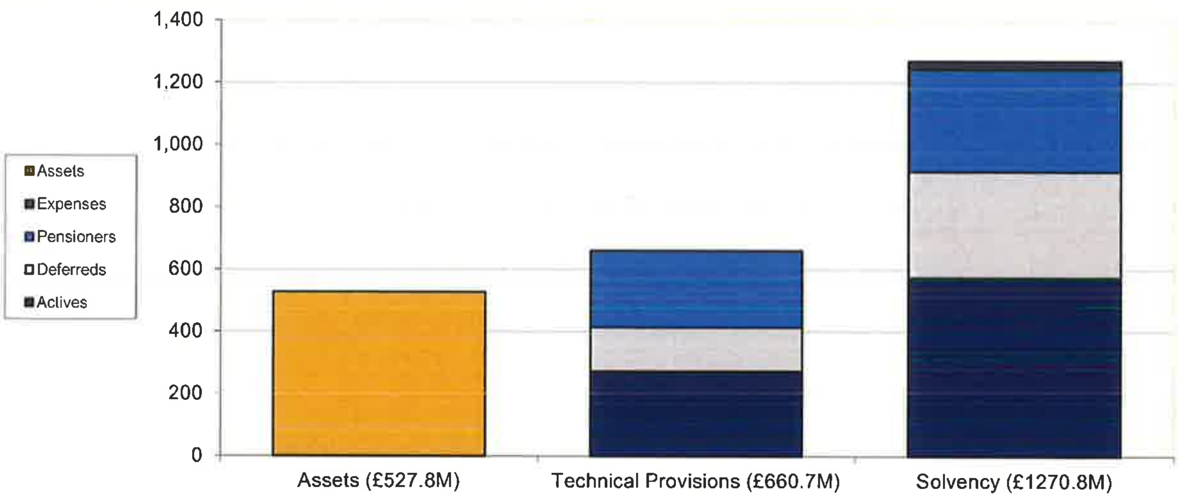
*The key results of the valuation at 31 March 2016 are set out below.*

### There was a deficit of £132.9M relative to the technical provisions

(ie the level of assets agreed by the Trustee and the University as being appropriate to meet member benefits, assuming the Scheme continues as a going concern).

### There was an estimated deficit of £743.0M relative to the solvency liabilities

(ie the estimated level of assets needed to buy insurance policies for benefits earned to the valuation date).




Following discussions, the Employers will pay:

- 22.5% of Pensionable Salaries to 31 July 2016;
- 23.0% of Pensionable Salaries for the period from 1 August 2016 to 31 July 2017; followed by
- 19.0% of Pensionable Salaries thereafter.

The above contributions are expected to be sufficient to eliminate the shortfall relative to the technical provisions by 30 June 2027, as well as meeting the cost of the future accrual of benefits and the expenses of administering the Scheme, allowing for the recently agreed benefit changes.

In addition, the Employers will continue to reimburse the Scheme in respect of Pension Protection Fund (PPF) and other levies collected by the Pensions Regulator.

# Actuarial valuation at 31 March 2016 The University of Oxford Staff Pension Scheme

## Contents

# Introduction

*This report has been prepared for the Trustee. It sets out the results and conclusions of the valuation as at 31 March 2016.*

- This is a scheme funding report. It relies on and draws together other pieces of work and advice from throughout the valuation process which are listed in Appendix 1.
- Appendix 1 also sets out the legal framework within which the valuation has been completed.
- Throughout the body of this report, defined contribution (DC) benefits (including DC AVCs) have been excluded from the valuation results because in my view this provides a clearer picture. In order to comply formally with the legislation, an alternative presentation of the valuation results is shown in Appendix 1 which includes DC benefits in both the asset and liability measures.
- Some shorthand used in this report is explained opposite. Some technical pensions terms are explained in the glossary in Appendix 7.

## Shorthand

**Scheme**

The University of Oxford Staff Pension Scheme

**Trustee**

OSPS Trustee Limited

**University**

University of Oxford

**Rules**

The Scheme's Trust Deed and Rules dated 25 April 2014, and amending legal documents

**Pensionable Salary**

As defined in the Rules

**Pensionable Service**

As defined in the Rules

## Snapshot view

The report concentrates on the Scheme's financial position at the valuation date. As time moves on, the Scheme's finances will fluctuate. If you are reading this report some time after it was produced, the Scheme's financial position could have changed significantly.

# Update since the previous valuation

**The key results from the previous valuation at 31 March 2013 were:**

The Scheme's assets were £424.3M and the technical provisions were £597.7M, which corresponded to a deficit of £173.4M and a funding level of 71%.

The Scheme was 44% funded using a solvency measure.

Following discussions between the Trustee and the University, it was agreed that the Employers would increase their contribution rate to the Scheme to 23.5% of Pensionable Salaries, with this increase being implemented in steps of 0.5% of Pensionable Salaries over the three years to 1 August 2017.

Together with the contributions paid by the members and an allowance for the Scheme's assets to return 2.5% per annum above gilt yields over the period of recovery plan, these contributions were expected to be sufficient to:

- Meet the cost of the CARE benefits continuing to be accrued by the active members;
- Meet all administration expenses as they fell due; and
- Eliminate the above shortfall by 30 June 2026, a period of 12 years from the conclusion of the valuation.

The underlying recovery plan calculations took into account the estimated improvement in the funding position over the period to 31 May 2014.

# Other key developments since the previous valuation

The University has recently completed a consultation with active members of the Scheme regarding the benefits payable from the Scheme in future. Following the conclusion of the consultation, the following changes have been agreed with the Trustee, all of which are reflected in the results shown in this report:

- From **1 April 2017**, indexation under the Scheme will be based on the average of RPI and CPI, with the exception of:
  - Deferred and CARE revaluation of benefits accrued between 1 January 2013 and 31 March 2018 for members who joined OSPS before 1 February 2013 which will continue to be based on RPI as currently; and
  - The implementation of revaluation based on the average of RPI and CPI for current active members who joined OSPS after 1 February 2013 will be deferred until 1 April 2018.
- From **1 October 2017**, the Scheme in its current form will close to new entrants, with new employees automatically enrolled into a new Defined Contribution (DC) section of OSPS.
- From **1 April 2018**, active members' benefits will change as follows:
  - Previously accrued final salary benefits will no longer be linked to salary at retirement (or earlier exit) and instead will be based on salary at 31 March 2018 and revalued in line with other CARE benefits in the Scheme (based on the average of RPI and CPI).
  - CARE benefits accrued in future will be subject to indexation (in service, deferment and payment) in line with CPI capped at 5% pa.
  - Member contributions for CARE benefits in the standard cost plan will increase to 8% of salary (from 6.6% of salary currently) with consistently calculated increases for other cost plans.

# Membership data

***This valuation is based on membership data as at 31 March 2016 supplied to us by the University's Pensions Office.***

A summary of the membership data is included in Appendix 2.

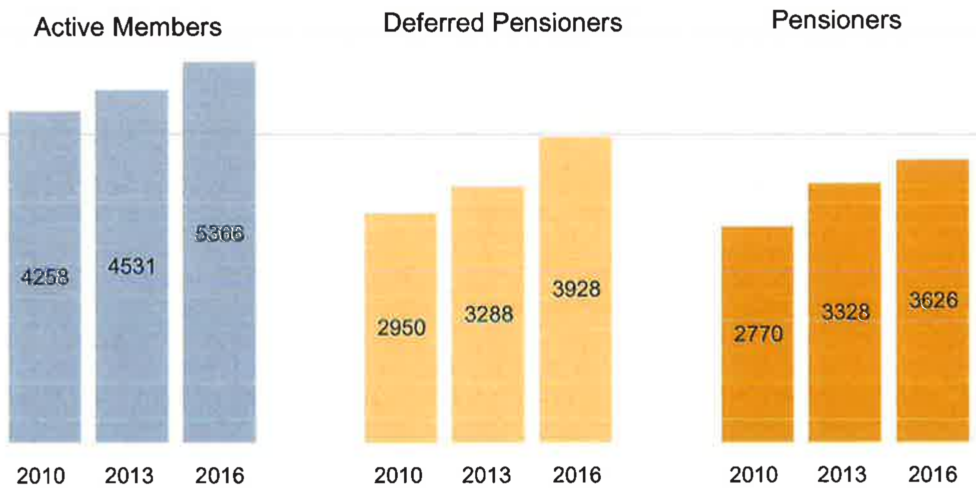
The chart below shows how the membership profile of the Scheme has changed over the last three valuations. During this period, the total membership has grown by around 4% a year, with increases in the number of active, deferred and pensioner members.

I have carried out some general checks to satisfy myself that:

- The information used for this valuation is sensible compared with the information used for the previous valuation and also with that shown in the Scheme's Trustee Report and Accounts.
- The results of this valuation can be traced from the results of the previous valuation.

However, the results in this report rely entirely on the accuracy of the information supplied. If you believe the data I have used may be incomplete or inaccurate, please let me know.

### Membership profile of the Scheme



# Benefits valued

## *Members are entitled to benefits defined in the Rules.*

- **Discretionary benefits**

  The Scheme has a history of allowing active members who joined the Scheme before 1 August 2004 to retire from age 60 on unreduced benefits. Allowance for this discretionary practice was made in the valuation. Further details of the assumptions are set out in Appendix 4.

  I am not aware of the Scheme having history of paying any other discretionary benefits and no allowance was made at this valuation for any such benefits.

- **Benefit changes**

  As discussed on page 4, I have made full allowance for the recently agreed benefit changes, which primarily relate to the rate of indexation applied to Scheme benefits.

- **GMP equalisation**

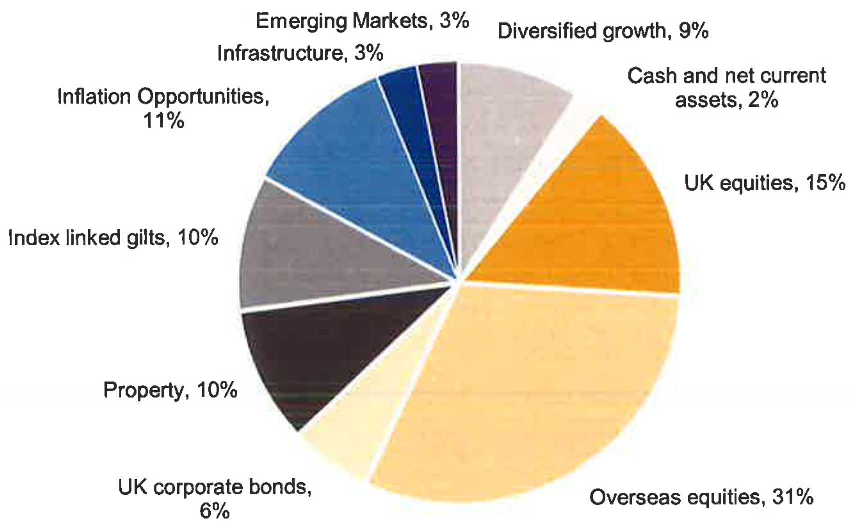
  In July 2014 the Government stated an intention to develop fully considered proposals and to publish guidance on equalising Guaranteed Minimum Pensions (GMPs) between men and women. No target date was given for publication. Therefore, at this stage, I have made no allowance for the equalisation of GMPs in the valuation.

A summary of the benefits valued is set out in Appendix 3.

# Asset data

***The audited accounts for the Scheme for the year ended 31 March 2016 show the assets were £527.8M which excludes £2.4M related to Money Purchase and AVC assets.***

The assets of £527.8M are invested as follows:



# Funding objective

## Terminology

**Technical provisions**

The funding target for a scheme agreed as part of the actuarial valuation.

**Statutory funding objective**

To hold sufficient and appropriate assets to meet the technical provisions.

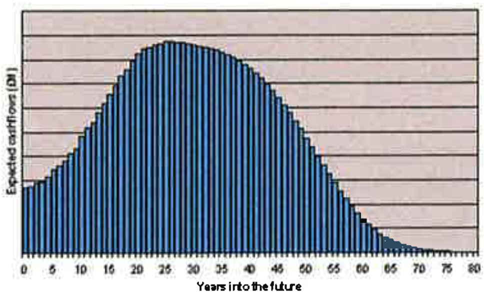
**Statement of funding principles**

Sets out the Trustee's policy for meeting the statutory funding objective

The Trustee's funding objective is to hold assets which are at least equal to the technical provisions i.e. to meet the statutory funding objective.

In order to calculate the technical provisions and the cost to the Employers of future benefit accrual, the benefits paid out by the Scheme are estimated for each year into the future. The estimated benefit payments are then 'discounted back' to the valuation date using an agreed rate of interest known as the discount rate.

The benefit payments from the Scheme are expected to be made for a very long period – the chart below shows the cashflow pattern for a typical scheme. Some cashflows will be fixed but the majority will be linked to future levels of inflation.




A key factor in setting the funding objective is the Trustee's assessment of the employer covenant. This has been taken into account in setting the assumptions to be adopted for technical provisions and in agreeing the recovery plan.

# Summary of method and assumptions for technical provisions

*The Trustee and the University have agreed the assumptions that will be used to calculate the technical provisions and the cost of future benefit accrual. The table below summarises the key assumptions, together with those used for the previous valuation, and the reasons for any change. Further details of all of the assumptions are set out in Appendix 4.*

| Assumption | This valuation | Previous valuation | Rationale for change |
|---|---|---|---|
| **Discount rate** | 'Gilts' + 1.2% p.a. | 'Gilts' + 1.2% p.a. | No change |
| **RPI inflation** | 'Break-even' RPI – 0.15% p.a. | 'Break-even' RPI – 0.15% p.a. | No change |
| **CPI inflation** | RPI inflation - 1.0% p.a. | Not applicable | Not required at previous valuation |
| **Pensionable Salary Increases** | RPI inflation + 1.0% pa | RPI inflation + 1.0% pa | No change |
| **Post-retirement mortality assumption – base table** | S2PXA tables with below scaling factors:<br><br>Pensioners:<br>100% (M) / 95% (F)<br><br>Non-pensioners:<br>105% (M) / 100% (F) | S1PXA tables with below scaling factors:<br><br>Pensioners:<br>100% (M) / 95% (F)<br><br>Non-pensioners:<br>105% (M) / 100% (F) | Updated to reflect the latest available tables |
| **Post-retirement mortality assumption – future improvements** | CMI 2016 Proposed 2015 Core projections with long-term improvement rate of 1.5% p.a. | CMI 2013 Core projections with long-term improvement rate of 1.5% p.a. | Updated to reflect the latest research |

As for the previous valuation, the technical provisions have been calculated using the projected unit method. This method, with a two year control period, has also been used to calculate the cost of future benefit accrual.

# Technical provisions

*The Scheme's technical provisions as at 31 March 2016 are shown below. They have been calculated using the assumptions in the previous section.*

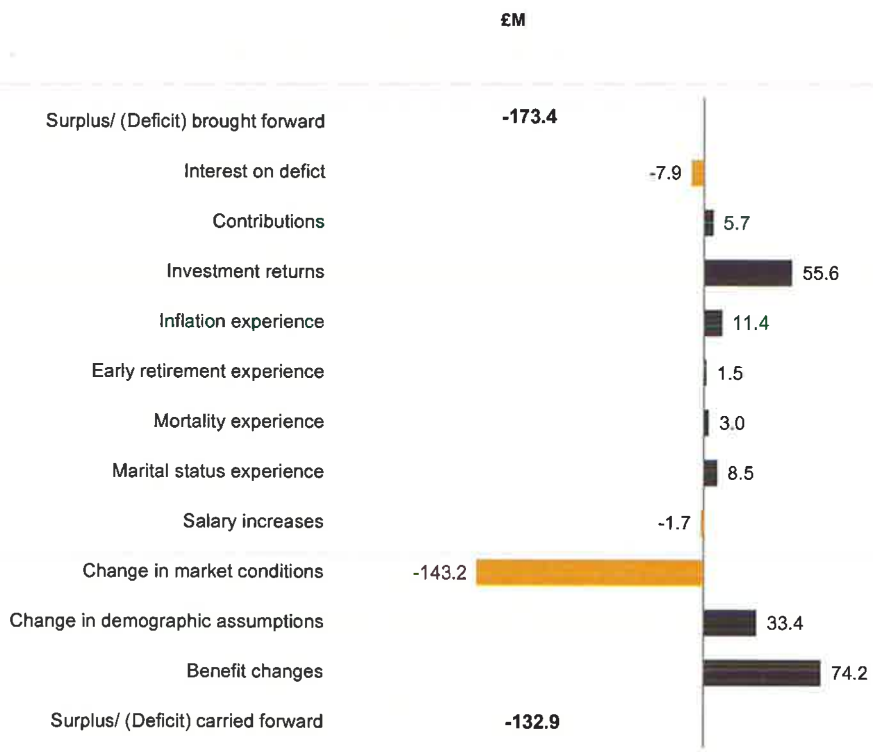
| | £M |
|---|---|
| Value of past service benefits for | |
| Actives | 273.5 |
| Deferreds | 140.2 |
| Pensioners | 247.0 |
| Total i.e. technical provisions | 660.7 |
| Value of assets | 527.8 |
| Past service surplus (deficit) | (132.9) |
| **Funding ratio** | 80% |

My statutory certification of the Scheme's technical provisions is attached as Appendix 6.

# Reasons for change in past service position

*At the previous valuation, the Scheme had a deficit of £173.4M. The funding position has therefore improved by £40.5M over the period.*

The chart below shows the key reasons for the change in funding position.




The analysis shows that the main factors affecting the funding position since the previous valuation have been:

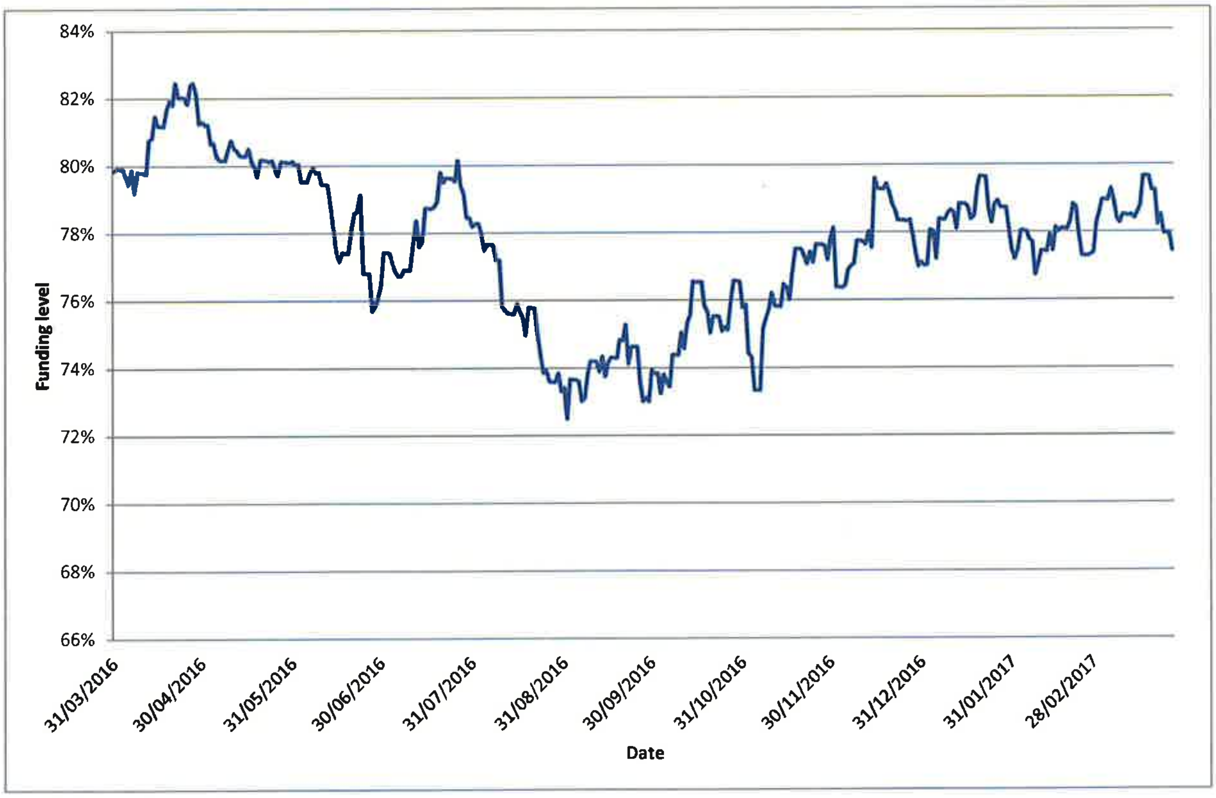
- Gilt yields falling significantly, increasing the value of the liabilities.
- Better than expected asset returns and lower than expected inflation have acted to offset this to some extent.
- The benefit changes have also reduced the liabilities.

# Update since the valuation date

## *Since the valuation date, the funding position is estimated to have deteriorated slightly.*

The chart below is based on assumptions consistent with those used to calculate the technical provisions, with financial assumptions updated to reflect changes in market conditions. The main reason for the deterioration is further falls in long-term interest rates.

The Trustees and University have agreed to not reflect experience since the valuation date when dealing with the shortfall.



# Cost to the University of future benefit accrual

*The table below shows the cost at the valuation date of benefits that members will earn in the Scheme in future.*

This has been calculated using the same assumptions as for the technical provisions.

| | % of Pensionable Salaries |
|---|---|
| Value of benefits accruing | 27.6 |
| Death in service lump sum | 0.55 |
| Expenses | 0.85 |
| Less member contributions | (6.9) |
| **Net cost to the University** | **22.1** |

Following the change in active members' benefits with effect from 1 April 2018 described on page 4, the net cost to the University is projected to fall to 17.3% of Pensionable Salaries for the remainder of the recovery period.

# Recovery plan

## *Following discussions, the Trustee and University have agreed a recovery plan.*

The Trustee and the University have agreed to decrease the employer contribution rate to the Scheme to 19.0% of Pensionable Salaries with effect from 1 August 2017 in light of the agreed benefit changes.

This contribution rate will be payable in respect of both DB and DC members, with the excess contributions above those needed to provide benefits for DC members being used to help eliminate the deficit relative to the technical provisions.

These contributions, together with an allowance for the Scheme's assets to return 2.5% per annum above gilt yields are expected to eliminate the deficit by 30 June 2027.

In calculating the above recovery period I have made the following additional assumptions:

- The Scheme continues to remain open to new entrants, with new entrants replacing leavers on a 1:1 basis;
- New entrants from 1 October 2017 join the DC Section, with 2/3rds remaining in the 4% Cost Plan and the remaining 1/3rd joining the 6% Cost Plan and the 8% Cost Plan in equal proportions (with subsequent withdrawals from service being in line with the assumptions underlying the technical provisions); and
- The proportion of members electing for different levels of accrual in the DB Section remains constant over the period.

### Recovery plan

A plan for making good any deficit relative to the technical provisions.

# Solvency

*The solvency estimate below represents the cost of purchasing annuities at the valuation date from an insurance company to meet the Scheme's benefits.*

The assumptions include an allowance for the expenses of winding-up the Scheme. Further details and the assumptions used in the solvency estimate are summarised in Appendix 5. Please note that the figures below do not allow for the impact of the recently agreed changes to benefit indexation, as these were not in place at the valuation date.

| | £M |
|---|---|
| **Value of past service benefits for** | |
| Actives | 574.6 |
| Deferreds | 340.2 |
| Pensioners | 329.5 |
| **Expenses** | 26.5 |
| **Value of liabilities (solvency estimate)** | 1,270.8 |
| **Value of assets** | 527.8 |
| **Deficit (statutory estimate of solvency)** | (743.0) |
| **Solvency ratio** | 42% |

In practice, if the Scheme were to be discontinued with no solvent employer then the assets are unlikely to be sufficient to provide the benefits in full. If this were the case then:

- Benefits corresponding to those covered by the PPF would be met first (either through the PPF or, if there were sufficient funds, by securing these benefits with an insurance company).
- Any remaining assets would be used to secure part of the remaining benefits with an insurance company.

The proportion of full benefits provided will vary from member to member and may be higher or lower than the statutory estimate of solvency ratio quoted above.

# Risks and uncertainties

## *The Scheme faces a number of key risks which could affect its funding position.*

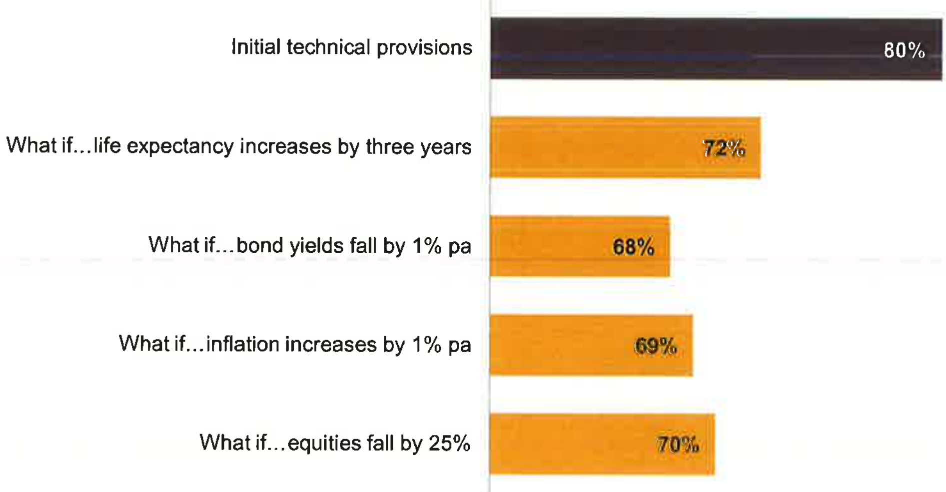
These risks include:

- Funding risk – the risk that the technical provisions are set too low and prove insufficient to meet the liabilities (e.g. in the event of discontinuance).
- Sponsor covenant risk – the risk that the University is no longer willing or able to support the Scheme, if things go wrong.
- Investment risks – the risk that investment returns are lower than assumed in the valuation, and also that the assets are volatile and move out of line with the liabilities, so the funding position is not stable.
- Longevity risk – the risk that Scheme members live for longer than assumed and that pensions would therefore need to be paid for longer.
- Inflation risk – the risk that inflation is higher than assumed, increasing the pensions that need to be paid.

To quantify some of these risks, the chart on the following page shows the approximate impact of the following one-off step changes on the Scheme's funding position on the technical provisions basis:

- Life expectancy at age 65 is three years longer than anticipated (with corresponding increases at other ages).
- Yields on both gilts and corporate bonds decrease by 1% pa (with no change in equity markets).
- Real yields on index-linked gilts decrease by 1% pa (with fixed-interest gilt yields, corporate bond yields and equity markets unchanged)—this is equivalent to a 1% pa increase in the assumed rate of inflation (measured by both RPI and CPI).
- The market value of equities falls by 25% (with no change in bond markets).

# Risks and uncertainties




The analysis emphasises that the Scheme is highly susceptible to:

- Equity markets falling or bond yields falling; and
- Rising inflation expectations.

The scenarios considered are not 'worst case' scenarios, and could occur in combination (rather than in isolation).

The Solvency measure is also highly sensitive to these factors.

# Agreed contributions

## *Following discussions between the Trustee and the University, it has been agreed that the Employers will pay the following contribution rates in respect of both DB and DC members of the Scheme:*

- 22.5% of Pensionable Salaries to 31 July 2016;
- 23.0% of Pensionable Salaries for the period from 1 August 2016 to 31 July 2017; followed by
- 19.0% of Pensionable Salaries thereafter.

The above contributions are expected to be sufficient to eliminate the shortfall relative to the technical provisions by 30 June 2027, as well as meeting the cost of the future accrual of benefits and the expenses of administering the Scheme, allowing for the recently agreed benefit changes.

In addition, the Employers will continue to reimburse the Scheme in respect of Pension Protection Fund (PPF) and other levies collected by the Pensions Regulator.

Contributions are payable monthly, with the contributions due in respect of a particular month payable within 7 days of the end of the calendar month to which they relate.

A full review of the Employers contributions will be completed no later than following the next valuation, which is due to take place at 31 March 2019.

Member contributions for members of the DB Section will be as follows:

Lower Cost Plan Members:

- 5.6% of Pensionable Salaries for the period 1 April 2016 to 31 March 2018; followed by
- 6.6% of Pensionable Salaries thereafter.

Standard Cost Plan Members:

- 6.6% of Pensionable Salaries for the period 1 April 2016 to 31 March 2018; followed by
- 8.0% of Pensionable Salaries thereafter.

Higher Cost Plan Members:

- 7.8% of Pensionable Salaries for the period 1 April 2016 to 31 March 2018; followed by
- 9.6% of Pensionable Salaries thereafter.

The contributions above are set out in the schedule of contributions. As agreed, my certification of the schedule will be based on the position at the valuation date.

### Terminology

**Schedule of contributions**

Specifies the amounts and dates of contributions payable by the Employers and the members over the next five years or the recovery period, if longer. I am required to certify that the contributions in the schedule are expected to remove the deficit over the period stated based on the agreed assumptions.

# Agreed contributions

I estimate that, by the next valuation, these contributions will have:

- Increased the technical provisions funding ratio to about 84%; and
- Increased the solvency level to about 43%.

These estimates assume that:

- The experience of the Scheme is in line with the assumptions underlying the technical provisions and recovery plan (including that the return on the Scheme's assets is 2.5% pa above gilts);
- The assumptions underlying the technical provisions and solvency bases remain unchanged; and
- Market conditions remain unchanged to those at 31 March 2016.

**Contribution certificate requirements**

As a consequence of the modification of the requirements in the Scheme's Rules by pensions legislation, I am required to certify that any rates of contributions set out in the schedule of contributions which the Scheme requires me to determine are not lower than those I would have provided for had I had responsibility for preparing for schedule of contributions, the statement of funding principles and any recovery plan. I confirm that, at the date of this report, I am able to provide the required certification, based on agreed contributions set out above.

# Next steps

*As part of the valuation, the Trustee and the University have already agreed a statement of funding principles.*

The next steps are:

- For the Trustee to provide a copy of this report to all participating employers within 7 days.
- To submit the valuation summary and supporting documentation to the recovery plan to the Pensions Regulator via Exchange.
- To provide a summary funding statement to members within a reasonable period (usually within three months of the conclusion of the valuation process).
- I need to give a certificate on the adequacy of the schedule of contributions.

## Checklist

The valuation process is complete when all of the following have been agreed and are in place:

- Statement of funding principles
- This scheme funding report
- Recovery plan
- Schedule of contributions
- Actuarial certification of the schedule of contributions

The statutory deadline for completing the valuation process is 30 June 2017, i.e. 15 months after the valuation date.

# Appendix 1: Legal framework and alternative presentation

*It is a legal requirement to carry out a full valuation at least once every three years.*

This report is produced in compliance with:

- Clause 22 of the Scheme's rules.
- Section 224 of the Pensions Act 2004.
- The terms of the Scheme Actuary Agreement between the Trustee and me, on the understanding that it is solely for the benefit of the addressee.

Unless prior written consent is given by me or Aon Hewitt Limited, this report should not be disclosed to or discussed with anyone else unless they have a statutory right to see it. Notwithstanding such consent, neither Aon Hewitt limited nor I accept or assume responsibility to anyone other than the addressee of this report.

Actuaries who provide written advice on scheme funding matters are under a professional obligation to ensure that their advice is reviewed by another actuary. This is called 'compliance review'. The reviewing actuary is required to have the necessary experience to have given the original advice. This valuation report has been reviewed by another actuary within Aon Hewitt Limited, before it was issued.

### Alternative presentation including defined contribution benefits

Defined contribution benefits (including DC AVCs) amounted to £2.4M at the valuation date. If these benefits are included in the valuation:

- The value of the assets is £530.2M.
- The technical provisions are £663.1M (funding ratio 80%).
- The value of the solvency liabilities is £1,273.2M (solvency ratio 42%).

# Appendix 2: Membership data

| Active members | | Number | Average age | Total pensionable salaries (£000 pa) | Average pensionable salaries (£ pa) | Average service (years) |
|---|---|---|---|---|---|---|
| Men | 2016 | 2,090 | 44.1 | 48,267 | 23,094 | 6.8 |
| | *2013* | *1,757* | *44.9* | *38,470* | *21,895* | *7.7* |
| Women | 2016 | 3,276 | 42.7 | 75,233 | 22,965 | 6.0 |
| | *2013* | *2,774* | *43.5* | *54,330* | *19,585* | *6.6* |
| Total | 2016 | 5,366 | 43.3 | 123,500 | 23,015 | 6.3 |
| | *2013* | *4,531* | *44.1* | *92,800* | *20,481* | *7.1* |

*Note:*
*The average ages shown in these tables are unweighted.*
*Pay is actual (i.e. not full time equivalent) Pensionable Salary at the valuation date.*
Average service includes transferred-in (and other) service.

| Deferred pensioners | | Number | Average age | Total pension (£000 pa) | Average pension (£ pa) |
|---|---|---|---|---|---|
| Men | 2016 | 1,252 | 44.7 | 2,155 | 1,721 |
| | *2013* | *1,050* | *45.0* | *1,764* | *1,680* |
| Women | 2016 | 2,676 | 46.1 | 3,901 | 1,458 |
| | *2013* | *2,238* | *46.0* | *3,033* | *1,355* |
| Total | 2016 | 3,928 | 45.7 | 6,056 | 1,542 |
| | *2013* | *3,288* | *45.7* | *4,797* | *1,459* |

*Note:*
*The deferred pension amounts shown above are at date of valuation.*
*In addition there were 1,007 'suspended' members for whom a refund of contributions or cash transfer sum was due.*

# Appendix 2: Membership data

| Pensioners | | Number | Average age | Total pension (£000 pa) | Average pension (£ pa) |
|---|---|---|---|---|---|
| **Men** | 2016 | 1,288 | 71.4 | 5,993 | 4,653 |
| | *2013* | *1,187* | *70.9* | *5,194* | *4,376* |
| **Women** | 2016 | 1,893 | 70.3 | 6,090 | 3,217 |
| | *2013* | *1,730* | *69.4* | *4,940* | *2,855* |
| **Dependants** | 2016 | 445 | 70.1 | 1,247 | 2,802 |
| | *2013* | *411* | *69.2* | *1,029* | *2,504* |
| **Total** | 2016 | 3,626 | 70.7 | 13,330 | 3,676 |
| | *2013* | *3,328* | *69.9* | *11,162* | *3,354* |

*Note: The pension amounts shown above include the increase awarded in April of the appropriate year.*

# Appendix 3: Benefits

| | |
|---|---|
| **Normal Pension Age** | Pre 2013 pension: 31 July immediately preceding 66th birthday.<br><br>Post 2013 pension: The later of the member's 65th birthday and the member's birthday immediately preceding their State Pension Age. |
| **Pensionable Salary** | Basic salary or wages from the Employer, including regular overtime and any other pensionable recurrent additions, but excluding other overtime and fluctuating emoluments. |
| **Member Contributions** | Lower Cost Plan Members:<br>▪ 5.6% of Pensionable Salaries for the period from 1 April 2016 to 31 March 2018; followed by<br>▪ 6.6% of Pensionable Salaries thereafter.<br>Standard Cost Plan Members:<br>▪ 6.6% of Pensionable Salaries for the period from 1 April 2016 to 31 March 2018; followed by<br>▪ 8.0% of Pensionable Salaries thereafter.<br>Higher Cost Plan Members:<br>▪ 7.8% of Pensionable Salaries for the period from 1 April 2016 to 31 March 2018; followed by<br>▪ 9.6% of Pensionable Salaries thereafter. |
| **Final Pensionable Salary** | The highest Pensionable Salary in any period of 12 consecutive months in the 5 years before membership ceases. |
| **Normal Retirement Benefits** | Pre 2013 pension: A pension of 1/80 of a member's Final Pensionable Salary for each year of Pensionable Service, plus a lump sum of 3/80 of Final Pensionable Salary for each year of Pensionable Service.<br><br>Post 2013 pension: A CARE pension of either 1/80, 1/85 or 1/90 of a member's Pensionable Salary for each year of Pensionable Service, plus a lump sum of 3 times the CARE pension. The pension accrued each CARE scheme year will be increased in line with the Retail Prices Index (RPI) capped at 8% per annum. From 1 April 2018 the pension accrued will be increased by the average of the RPI and the Consumer Prices Index (CPI) for members who joined the Scheme after 1 February 2013. |
| **Early Retirement Pension** | With the Employer's consent a pension and lump sum is provided on retirement after the age of 55, based on Pensionable Service |

completed to the actual date of retirement. For members who joined the Scheme prior to 1 August 2004, this pension is payable unreduced if retirement is after age 60.

**Incapacity and Ill Health Pensions**

In the event of premature retirement due to serious ill health or incapacity, an immediate pension may be paid based on prospective Pensionable Service to Normal Pension Age plus a lump sum of three times the pension with no reduction being applied due to early payment.

**Leaving Service**

- A deferred pension payable from Normal Pension Age; or
- A transfer payment to either another employer's scheme or a suitable insurance policy, equivalent in value to the deferred pension; or
- Members with less than three months of Pensionable Service are entitled to a return of their contributions; or
- Members with between three months and two years of Pensionable Service are entitled to either a return of their contributions, or a cash

**Pension increases in deferment**

Pre 2013 pension: Pensions in deferment are subject to increases in line with the average of the RPI and the CPI.

Post 2013 pension: Pensions in deferment are subject to increases in line with the RPI capped at 8% per annum for members who joined the Scheme before 1 February 2013 and the average of the RPI and the CPI for members who joined the Scheme on or after that date.

Post 2018 pension: Pensions in deferment are subject to increases in line with the CPI capped at 5% per annum.

**Pension increases in payment**

Pre 2018 pension: Pensions in payment are subject to increases in line with the average of the RPI and the CPI.

Post 2018 pension: Pensions in payment are subject to increases in line with the CPI capped at 5% per annum.

**Death Benefits**

If a member dies in service, the following benefits may be paid:

Pre 2013 pension: A dependant's pension of two-thirds of the member's pension at date of death, or revalued to date of death if the member is in deferment, plus the member's revalued lump sum.

Post 2013 pension: A dependant's pension of half of the member's pension at the date of death, or revalued to date of death if the member is in deferment, plus the member's revalued lump sum.

If a member dies after retiring, the following benefits may be paid:

Pre 2013 pension: If the member dies within five years of retiring, a lump sum equal to the balance of five years' pension payments, plus a dependant's pension of two-thirds of the member's pension (before any commutation for an additional lump sum).

Post 2013 pension: If the member dies within five years of retiring, a lump sum equal to the balance of five years' pension payments, plus a dependant's pension of half of the member's pension (before any commutation for an additional lump sum).

**Children Benefits**

Children's allowance of 25% of prospective pension for each child, up to a maximum of two at any one time. Allowances are paid until the attainment of age 17, or a higher age if the child remains in full-time education

# Appendix 4: Assumptions for technical provisions

*The assumptions used for calculating the technical provisions are summarised below. Different assumptions are used for the solvency estimate, as set out in Appendix 5.*

## Financial Assumptions

| | |
|---|---|
| Discount rate | Equal to the UK nominal gilt curve at the valuation date plus 1.2% p.a. at each term |
| Rate of (RPI) price inflation | The assumption is derived from the geometric difference between the UK nominal gilt curve and the UK index-linked curve at the valuation date, less 0.15% p.a. at each term. |
| Rate of (CPI) price inflation | The assumption is derived from the RPI inflation assumption, less 1.0% p.a. at each term. |
| Increases to pensions in payment | For pension increases linked to inflation, a pension increase curve is constructed based on either the RPI, CPI or the average of the RPI and CPI inflation curves described above, adjusted to allow for the different maximum and minimum annual increases that apply, and the Scheme Actuary's best estimate of inflation volatility as applies from time to time. The inflation curves used depend on the period over which the benefits were accrued, as follows:<br>▪ For all benefits accrued up to 31 March 2018 – the average of the RPI and CPI inflation curves.<br>▪ For all benefits accrued from 1 April 2018 – the CPI inflation curve. |
| Revaluations of deferred pensions in excess of GMP | The assumption used depends on the period over which the benefits were accrued, as follows:<br>▪ For all benefits accrued up to 31 December 2012 – the average of the RPI and CPI inflation assumptions.<br>▪ For benefits accrued between 1 January 2013 and 31 March 2018 – the RPI inflation assumption for members who joined the Scheme before 1 February 2013 and the average of the RPI and CPI inflation assumptions for members who joined the Scheme on or after that date.<br>▪ For all benefits accrued from 1 April 2018 – the CPI inflation assumption. |
| Salary inflation | Each member's Pensionable Salary is assumed to increase in line with the assumed rate of RPI inflation plus 1.0% p.a. at all terms.<br>*NB – Previously accrued final salary benefits will be assumed to be based on salary at 31 March 2018 and revalued in line with other CARE benefits in the Scheme thereafter.* |
| CARE revaluation | A revaluation curve is constructed based on either the RPI, CPI or the average of the RPI and CPI inflation curves described above, adjusted to allow for the maximum and minimum annual increases that apply, and the Scheme Actuary's best estimate of inflation volatility as applies from time to time. The inflation curves used depend on the period over which the benefits were accrued, as follows:<br>▪ For all benefits accrued up to 31 December 2012 – the average of |

the RPI and CPI inflation curves.

- For benefits accrued between 1 January 2013 and 31 March 2018 – the RPI inflation curve for members who joined the Scheme before 1 February 2013 and the average of the RPI and CPI inflation curves for members who joined the Scheme on or after that date.
- For all benefits accrued from 1 April 2018 – the CPI inflation curve.

*NB – The CARE revaluation increase applied at 1 April 2017 will be assumed to be based on the RPI inflation curve for all members.*

# Appendix 4: Assumptions for technical provisions

The table below shows the main financial assumptions that applied as at 31 March 2016, determined in line with the above approach. Please note the following:

- The figures shown are the annual forward rates that apply from time t-1 to time t in each case, where t = 0 at 31 March 2016.
- LPI (0,5) is shorthand for the increase in CPI subject to a minimum of 0% and a maximum of 5% in each year.

| Term | Discount rate (% pa) | RPI Inflation (% pa) | CPI Inflation (% pa) | Average of RPI and CPI (% pa) | Pay increases (% pa) | LPI (0,5) (% pa) |
|---|---|---|---|---|---|---|
| 1 | 1.52% | 1.69% | 0.69% | 1.19% | 2.69% | 0.74% |
| 2 | 1.57% | 1.96% | 0.96% | 1.46% | 2.96% | 0.98% |
| 3 | 1.95% | 2.34% | 1.34% | 1.84% | 3.34% | 1.35% |
| 4 | 2.34% | 2.15% | 1.15% | 1.65% | 3.15% | 1.19% |
| 5 | 2.68% | 2.22% | 1.22% | 1.72% | 3.22% | 1.27% |
| 6 | 2.97% | 2.37% | 1.37% | 1.87% | 3.37% | 1.44% |
| 7 | 3.23% | 2.58% | 1.58% | 2.08% | 3.58% | 1.65% |
| 8 | 3.45% | 2.80% | 1.80% | 2.30% | 3.80% | 1.86% |
| 9 | 3.65% | 3.01% | 2.01% | 2.51% | 4.01% | 2.07% |
| 10 | 3.83% | 3.22% | 2.22% | 2.72% | 4.22% | 2.27% |
| 11 | 3.99% | 3.42% | 2.42% | 2.92% | 4.42% | 2.44% |
| 12 | 4.14% | 3.61% | 2.61% | 3.11% | 4.61% | 2.60% |
| 13 | 4.27% | 3.77% | 2.77% | 3.27% | 4.77% | 2.75% |
| 14 | 4.39% | 3.91% | 2.91% | 3.41% | 4.91% | 2.86% |
| 15 | 4.47% | 4.02% | 3.02% | 3.52% | 5.02% | 2.95% |
| 16 | 4.53% | 4.08% | 3.08% | 3.58% | 5.08% | 3.01% |
| 17 | 4.55% | 4.11% | 3.11% | 3.61% | 5.11% | 3.04% |
| 18 | 4.55% | 4.11% | 3.11% | 3.61% | 5.11% | 3.03% |
| 19 | 4.51% | 4.07% | 3.07% | 3.57% | 5.07% | 2.99% |
| 20 | 4.44% | 3.99% | 2.99% | 3.49% | 4.99% | 2.93% |
| 21 | 4.35% | 3.90% | 2.90% | 3.40% | 4.90% | 2.84% |
| 22 | 4.23% | 3.78% | 2.78% | 3.28% | 4.78% | 2.73% |
| 23 | 4.10% | 3.64% | 2.64% | 3.14% | 4.64% | 2.61% |
| 24 | 3.96% | 3.50% | 2.50% | 3.00% | 4.50% | 2.48% |
| 25 | 3.81% | 3.35% | 2.35% | 2.85% | 4.35% | 2.35% |
| 26 | 3.65% | 2.94% | 1.94% | 2.44% | 3.94% | 2.00% |
| 27 | 3.49% | 2.72% | 1.72% | 2.22% | 3.72% | 1.82% |
| 28 | 3.33% | 2.49% | 1.49% | 1.99% | 3.49% | 1.64% |
| 29 | 3.18% | 2.67% | 1.67% | 2.17% | 3.67% | 1.79% |
| 30 | 3.03% | 2.67% | 1.67% | 2.17% | 3.67% | 1.79% |
| 31 | 2.90% | 2.67% | 1.67% | 2.17% | 3.67% | 1.79% |
| 32 | 2.79% | 2.62% | 1.62% | 2.12% | 3.62% | 1.75% |
| 33 | 2.69% | 2.53% | 1.53% | 2.03% | 3.53% | 1.68% |
| 34 | 2.62% | 2.52% | 1.52% | 2.02% | 3.52% | 1.68% |
| 35 | 2.56% | 2.42% | 1.42% | 1.92% | 3.42% | 1.61% |
| 36 | 2.53% | 2.43% | 1.43% | 1.93% | 3.43% | 1.62% |

| Term | Discount rate (% pa) | RPI Inflation (% pa) | CPI Inflation (% pa) | Average of RPI and CPI (% pa) | Pay increases (% pa) | LPI (0,5) (% pa) |
|---|---|---|---|---|---|---|
| 37 | 2.52% | 2.45% | 1.45% | 1.95% | 3.45% | 1.63% |
| 38 | 2.53% | 2.45% | 1.45% | 1.95% | 3.45% | 1.63% |
| 39 | 2.56% | 2.45% | 1.45% | 1.95% | 3.45% | 1.63% |
| 40 | 2.61% | 2.64% | 1.64% | 2.14% | 3.64% | 1.75% |
| 41 | 2.98% | 2.88% | 1.88% | 2.38% | 3.88% | 1.92% |
| 42 | 2.98% | 2.92% | 1.92% | 2.42% | 3.92% | 1.95% |
| 43 | 2.98% | 3.47% | 2.47% | 2.97% | 4.47% | 2.34% |
| 44 | 3.08% | 3.48% | 2.48% | 2.98% | 4.48% | 2.35% |
| 45 | 3.49% | 3.47% | 2.47% | 2.97% | 4.47% | 2.34% |
| 46 | 3.49% | 3.47% | 2.47% | 2.97% | 4.47% | 2.34% |
| 47 | 3.49% | 3.52% | 2.52% | 3.02% | 4.52% | 2.37% |
| 48 | 3.50% | 3.53% | 2.53% | 3.03% | 4.53% | 2.37% |
| 49 | 3.49% | 3.52% | 2.52% | 3.02% | 4.52% | 2.36% |
| 50 | 3.49% | 3.52% | 2.52% | 3.02% | 4.52% | 2.36% |

# Appendix 4: Assumptions for technical provisions

## Demographic Assumptions

| | |
|---|---|
| **Pre-retirement mortality** | ▪ Males: 105% of standard table AMC00<br>▪ Females: 100% of standard table AFC00 |
| **Post-retirement mortality** | Standard tables S2PMA and S2PFA adjusted by means of a scaling factor for each category of members determined using the Aon Hewitt Longevity Model based on the members' dates of birth, sex and socio-economic information inferred from their postcodes. In determining the scaling factors, allowance was made for the Scheme's own mortality experience over the period from 1 August 2004 to 31 July 2015.<br><br>**Category** / **Males** / **Females**<br>Actives / 105% / 100%<br>Deferred / 105% / 100%<br>Pensioners / 100% / 95%<br><br>Improvements from 2007 are assumed to be in line with the CMI 2016 proposed 2015 Core projections, based on a long-term rate of improvement of 1.5% p.a. |
| **Withdrawals** | Allowance is made for withdrawals from service (see sample rates below). |
| **Early retirements** | Allowance has been made for early retirement, in respect of active members who joined the Scheme before 1 August 2004 (see sample rates below).<br><br>**Age** / **Rate**<br>< 55 / 0%<br>55 – 59 / 5%<br>60 - 64 / 15%<br><br>The remaining members (including all deferred members) are assumed to retire at age 65.<br>In addition, allowance is made for a proportion of active members to retire due to ill-health (see sample rates below) |
| **Commutation** | No allowance |
| **Family details** | ▪ A man is assumed to be three years older than his wife.<br>▪ 75% of male members and 65% of female members are assumed to be married at retirement or earlier death.<br><br>These assumptions include allowance for pensions payable to other |

Post-retirement mortality scaling factors:

| Category | Males | Females |
|---|---|---|
| Actives | 105% | 100% |
| Deferred | 105% | 100% |
| Pensioners | 100% | 95% |

Early retirement rates:

| Age | Rate |
|---|---|
| < 55 | 0% |
| 55 – 59 | 5% |
| 60 - 64 | 15% |

| | |
|---|---|
| | dependants (including civil partners). |
| **Expenses** | 0.85% of Pensionable Salaries. This allowance excludes provision for the PPF and other levies collected by the Pensions Regulator, which are met in addition by the Employers. |

The table below illustrate the allowance made for withdrawal from service or ill-heath retirement at various ages.

| Current age | Percentage leaving the Scheme each year as a result of withdrawal from service | | Percentage leaving the Scheme each year as a result of ill-health retirement | |
|---|---|---|---|---|
| | Men | Women | Men | Women |
| 20 | 16 | 21 | 0.06 | 0.015 |
| 30 | 11 | 15 | 0.04 | 0.020 |
| 40 | 8 | 9 | 0.08 | 0.045 |
| 50 | 2 | 3 | 0.21 | 0.110 |
| 60 | - | - | 0.66 | 0.290 |

# Appendix 5: Assumptions for solvency estimate

The solvency estimate has been calculated in line with statutory requirements.

However, this estimate is only a guide. The true position can only be established by conducting a competitive buy-out auction and fully defining the scope and likely cost of a wind-up process for the Scheme.

The basis used is described on the next page.

## Solvency estimate

This considers the position if:

- The Scheme were discontinued on the valuation date.
- Member benefits were crystallised and, for final salary benefits, were based on their Pensionable Service and Salary at the valuation date.
- Discretionary benefits were suspended permanently.
- The assets were used to buy immediate and deferred annuities from an insurance company, with an extra margin needed to cover the expenses of shutting down the Scheme.

The solvency estimate is a regulatory requirement and also provides a useful benchmark against which the Trustee and others can assess the prudence of other funding measures.

# Appendix 5: Assumptions for solvency estimate

The table below shows the main assumptions used in calculating the solvency estimate, where these are different from those used for the technical provisions.

| | |
|---|---|
| **Pensioner discount rate** | Aon Hewitt Bulk Annuity Market Monitor yield curve for pensioners, which is constructed from swap and UK corporate bond market curves |
| **Non-pensioner discount rate (before and after retirement)** | Aon Hewitt Bulk Annuity Market Monitor yield curve for non-pensioners, which is constructed from swap and UK corporate bond market curves |
| **Increase in RPI** | Term-dependent rates derived from the RPI swap markets |
| **Increase in CPI** | Not applicable |
| **Pension increases** | Derived from the price inflation assumptions with allowance for caps and floors and with the aim of approximately reflecting the cost of hedging these increases using LPI-linked swaps |
| **Withdrawals** | All members assumed to immediately withdraw from service with entitlement to deferred pension |
| **Discretionary benefits** | No allowance |
| **Post-retirement mortality** | As for the technical provisions basis except improvements from 2007 are assumed to be in line with the CMI 2014, based on a long-term rate of improvement of 1.5% p.a. |
| **Expenses** | The reserve for expenses allows for deductions to allow for the cost of forced sales of assets, an allowance for the management expenses associated with winding up and an estimate of the per member charges expected to be levied by an insurance company on buy-out.<br><br>All of these allowances for expenses are presented as additions to the liabilities as the regulations require the assets to be shown at audited market value. |

# Appendix 6: Certificate of technical provisions

## *Actuarial certificate given for the purposes of Regulation 7(4)(a) of the Occupational Pension Schemes (Scheme Funding) Regulations 2005*

**University of Oxford Staff Pension Scheme**

**Calculation of technical provisions**

I certify that, in my opinion, the calculation of the Scheme's technical provisions as at 31 March 2016 is made in accordance with regulations under section 222 of the Pensions Act 2004. The calculation uses a method and assumptions determined by the Trustee of the Scheme and set out in the statement of funding principles dated 28 April 2017.

| | |
|---|---|
| J M Harvey | 28 April 2017 |
| Fellow of the Institute and Faculty of Actuaries | Aon Hewitt Limited |

# Appendix 7: Glossary

## Attained age method

This is one of the methods used by actuaries to calculate a contribution rate to the scheme. This method calculates the present value of the benefits expected to accrue to members over their expected remaining membership of the scheme expressed as a percentage of their expected future pensionable pay. It allows for projected future increases to pay through to retirement or date of leaving service. The method is based on the current membership and takes no account of the possibility of further members joining the scheme. If there are no new members, this method would be expected to result in a stable contribution rate, once surpluses or shortfalls are taken into account, and if all the other assumptions are borne out. However, if more members join the scheme to replace older leavers, the contribution rate can be expected to fall.

## Cash transfer sum

This is a benefit available to early leavers who have between three months and two years of pensionable service. It is calculated in the same way as the cash equivalent transfer value payable to longer serving early leavers, and is calculated at the date of leaving pensionable service.

## Deficit

This is the funding target less the value of assets. If the value of assets is greater than the funding target, then the difference is called the surplus.

## Discount rate

This is used to place a present value on a future payment. A 'risk-free' discount rate is usually derived from the investment return achievable by investing in government gilt-edged stock. A discount rate higher than the 'risk-free' rate is often used to allow for some of the extra investment return that is expected by investing in assets other than gilts.

## Funding ratio

This is the ratio of the value of assets to the funding target.

## Funding target

An assessment of the present value of the benefits that will be paid from the scheme in the future, normally based on pensionable service prior to the valuation date. Often, the funding target is equal to the technical provisions.

## Guaranteed Minimum Pensions (GMPs)

Most schemes that were contracted out of the State Earnings Related Pension Scheme (SERPS) before April 1997 have to provide a pension for service before that date at least equal to the Guaranteed Minimum Pension (GMP). This is approximately equal to the SERPS pension that the member would have earned had the scheme not been contracted out. GMPs ceased to build up on 6 April 1997 when the legislation changed.

## Limited Price Indexation (LPI)

The Pensions Act 1995 required schemes to provide a minimum level of annual increase to pensions in payment. The minimum level is the smaller of 5% and the increase in inflation* and applies to the pension earned from 6 April 1997 to 5 April 2005. With effect from 6 April 2005, the cap for statutorily required LPI for future service was reduced from 5% to 2.5%.

*Until 2010, inflation for the purpose of this minimum was defined with reference to changes in the Retail Prices Index. From 2011, inflation was defined with reference to changes in the Consumer Prices Index.

# Appendix 7: Glossary (continued)

## Pension Protection Fund (PPF)

The PPF was established with effect from 6 April 2005. The PPF will normally take over the assets of a pension scheme in the event of its employer becoming insolvent and the scheme having insufficient assets to provide the PPF benefits. The PPF will not provide the scheme benefits in full. The PPF is financed by a levy on most defined benefit pension schemes.

The PPF benefits are broadly 100% of benefits for pensioners over normal retirement age and 90% of benefits up to a cap for all other members. Pension increases granted on benefits are at lower levels than apply in many schemes, in particular, benefits earned before a 1997 would not be given any pension increases within the PPF.

## Present value

Actuarial valuations involve projections of pay, pensions and other benefits into the future. To express the value of the projected benefits in terms of a cash amount at the valuation date, the projected amounts are discounted back to the valuation date by a discount rate. This value is known as the present value. For example, if the discount rate was 6% a year and if we had to pay a lump sum of £1,060 in one year's time the present value would be £1,000.

## Projected Unit Method

One of the common methods used by actuaries to calculate a contribution rate to a scheme.

This method calculates the present value of the benefits expected to accrue to members over a control period (often one year) following the valuation date. The present value is usually expressed as a percentage of the members' pensionable pay. It allows for projected future increases to pay through to retirement or date of leaving service. Provided that the distribution of members remains stable with new members joining to take the place of older leavers, the contribution rate calculated can be expected to remain stable, if all the other assumptions are borne out. If there are no new members however, the average age will increase and the contribution rate can be expected to rise.

## Protected Rights

Prior to April 2012, schemes could contract out of SERPS/S2P on a protected rights basis. The accumulated National Insurance rebates in respect of each member as a result of being contracted out (known as protected rights) must be applied as an underpin to the member's benefits. Schemes that were contracted out on this basis before 6 April 1997 provided this underpin instead of GMPs.

## Prudent

Prudent assumptions are assumptions that, if a scheme continues on an ongoing basis, are more likely to overstate than understate the amount of money actually required to meet the cost of the benefits.

## Recovery plan

Where a valuation shows a funding shortfall against the technical provisions, trustees must prepare a recovery plan setting out how they plan to meet the statutory funding objective.

# Appendix 7: Glossary (continued)

## Schedule of contributions

Trustees of pension schemes must prepare and maintain a schedule of contributions. This shows the dates and amounts of contributions due from the employer and members. Under the Pensions Act 2004 the schedule must be put in place within 15 months of the valuation date.

## Solvency ratio

This is the ratio of the market value of a scheme's assets to the estimated cost of securing a scheme's liabilities in the event of the discontinuance of the scheme.

## The Statement of Funding Principles

The Pensions Act 2004 requires trustees to prepare (and from time to time review and if necessary revise) a written statement of their policy for securing that the statutory funding objective is met. This is referred to as a statement of funding principles.

## Statutory estimate of solvency

This is the difference between the market value of a scheme's assets and the estimated cost of securing a scheme's liabilities in the event of the discontinuance of the scheme.

## Statutory funding objective

Under the Pensions Act 2004, every scheme is subject to the statutory funding objective, which is to have sufficient and appropriate assets to cover its technical provisions.

## Surplus

This is the value of assets less the funding target. If the funding target is greater than the value of assets, then the difference is called a deficit.

## Technical provisions

This is the present value of the benefits members are entitled to based on pensionable service to the valuation date, assessed using the assumptions agreed between a scheme's trustees and the University. It generally allows for projected future increases to pay through to retirement or date of leaving service.

## Transfer value

Members generally have a legal right to transfer their benefits to another pension arrangement before they retire. In taking a transfer, members give up their benefits in a scheme, and a sum of money (called the transfer value) is paid into another approved pension scheme; this is used to provide pension benefits on the terms offered in that scheme.

# Report Framework

*This report has been prepared in accordance with the framework below.*

## TAS compliant

'Technical Actuarial Standard R: Reporting Actuarial Information' ('TAS R'), 'Technical Actuarial Standard D: Data' ('TAS D'), 'Technical Actuarial Standard M: Modelling' ('TAS M') and the 'Pensions Technical Actuarial Standard' ('Pensions TAS') apply to this report and the work relating to it, and have been complied with.

The compliance is on the basis that the Trustee of the University of Oxford Staff Pension Scheme are the addressee and the only users and that the report is only to be used as a summary of the Scheme valuation results and contribution requirement. If you intend to make any other decisions after reviewing this report, please let me know and I will consider what further information I need to provide to help you make those decisions.

The report has been prepared under the terms of the *Scheme Actuary* Agreement between *the Trustee* and me on the understanding that it is solely for the benefit of the addressee.

This report should be read in conjunction with:

- My terms of reference paper, dated 18 December 2015.
- "Actuarial valuation at 31 March 2016 – Financial assumption advice" dated 20 July 2016.
- "Actuarial valuation at 31 March 2016 – Demographic assumptions advice" dated 7 April 2016.
- "Actuarial valuation at 31 March 2016 – initial results" dated 28 September 2016.
- "Actuarial valuation at 31 March 2016 – Updated results and illustrative recovery plan" dated 22 December 2016.
- "Actuarial valuation at 31 March 2016 – Updated results" dated 31 March 2017.

If you require further copies of any of these documents, please let me know.