Government Actuary's Department

Principal Civil Service Pension Scheme

Actuarial valuation as at 31 March 2012
Report by the Scheme Actuary

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Contents

1 Executive summary

This report is addressed to the Minister for the Civil Service and provides the results of the actuarial valuation of the Principal Civil Service Pension Scheme carried out as at 31 March 2012.

1.1 At the request of the Cabinet Office, we have carried out an actuarial valuation of the Principal Civil Service Pension Scheme as at 31 March 2012 (the ***effective date***). The valuation has been undertaken in accordance with *The Public Service Pensions (Valuations and Employer Cost Cap) Directions 2014* dated 2 June 2014, which specify certain assumptions and require other assumptions to be the Minister's best estimates. HM Treasury has confirmed its consent to the assumptions proposed by the Minister.

1.2 This report is addressed to the Minister for the Civil Service and sets out the results of the valuation. The ***valuation results*** specify the rate of employer contribution payable for the four year period from 1 April 2015 (the ***implementation period***) and the ***employer cost cap***[1], both of which are to be set in regulations.

1.3 The key results of the valuation are as follows:

> ***Employer contribution rate*** payable for the ***implementation period***: 20.9% of pensionable pay

> ***Employer cost cap***: 18.5% of pensionable pay

> Total Scheme liabilities for service to the ***effective date*** of £132.7 bn and ***notional assets*** of £127.3 bn, giving a notional past service deficit of £5.5 bn.

1.4 An addition of 0.15% of pensionable pay is added to the ***employer contribution rate,*** to cover the cost of central administration expenses, giving a rounded total recommended employer contribution rate of 21.1% of pensionable pay from 1 April 2015.

1.5 The Minister has determined that, in line with current practice, the actual contribution rates which will be paid by employers will vary depending on members' salaries. The rates payable are summarised in Table 1.1 below, and include the 0.15% addition to cover central administration expenses.

[1] In accordance with Section 12 of the Public Service Pensions Act 2013 ('the Act').

Table 1.1: Contribution rates payable by employers

Member group	Pay range in 2014/15 (£) *	% pay
Salary band 1	22,000 and under	20.0
Salary band 2	22,001 to 44,500	20.9
Salary band 3	44,501 to 74,500	22.1
Salary band 4	74,501 and over	24.5
Pre-Fresh Start Prison Officers	n/a	27.9

*a revalorisation exercise will be completed before the new contribution rates are introduced, in order to set the salary bands for 2015/16

1.6 The average of the contribution rates outlined in Table 1.1 above is expected, over the implementation period, to equal the total recommended employer contribution rate of 21.1% (when expressed to the nearest 0.1% of pensionable pay). A revalorisation exercise will be completed each year, where the salary bands will be adjusted to ensure that the target yield of 21.1% is achieved.

2 Background

The valuation has been carried out in accordance with the HMT Directions.

2.1 The Principal Civil Service Pension Scheme (PCSPS or 'the Scheme') provides pensions to civil servants in Great Britain. The Scheme is an unfunded statutory public service pension scheme with the benefits underwritten by the Government. The Scheme is financed by payments from the employer and from those current employees who are members of the Scheme, who pay contributions at different rates which depend on their salaries and the section of the Scheme of which they are a member. The rate of employer contributions is typically set following an actuarial valuation. The previous valuation of the Scheme was carried out as at 31 March 2007[2] and this recommended an employer contribution rate of 18.9% of pensionable pay (this rate included an allowance of 0.15% of pensionable pay to cover the cost of central administration expenses). The previous valuation was carried out by Hewitt, who were the previous ***Scheme Actuary*** for the PCSPS.

2.2 GAD has been appointed as ***Scheme Actuary***[3] by the Minister for the Civil Service to carry out an actuarial valuation of the Scheme as at 31 March 2012 (the ***effective date***). This report on the valuation is addressed to the Minister for the Civil Service and is also being made available to HM Treasury (HMT).

2.3 The valuation has been undertaken in accordance with *The Public Service Pensions (Valuations and Employer Cost Cap) Directions 2014* ('the Directions') dated 2 June 2014. Terms defined in the Directions are shown in ***bold italics*** when used in this report.

2.4 The Directions require the existing PCSPS and the new scheme being introduced for the civil service workforce on 1 April 2015 under Section 1 of the 2013 Act[4] ('the 2015 Scheme') to be taken into account in aggregate for the purposes of the current valuation. The results shown in this report relate to 'the aggregate scheme' that is the combination of the existing PCSPS and 2015 Scheme[5].

2.5 The main requirements of the valuation are set out in the Directions. These are to determine the rate of employer contribution payable from 1 April 2015 (***the implementation date***) for the four year period from 1 April 2015 (the ***implementation period***) and the initial ***employer cost cap***[6], both of which are to be set in regulations[7]. Paragraph 22 of the Directions requires a number of results relating to

[2] A valuation as at 31 March 2010 was started but not completed and so did not lead to a change in the contribution rate.
[3] In accordance with direction 4 of *The Public Service Pensions (Valuations and Employer Cost Cap) Directions 2014.*
[4] *The Public Service Pensions Act 2013.*
[5] Civil Servants can pay money purchase AVCs under the Civil Service Additional Voluntary Contributions Scheme. This is not a connected scheme for the purpose of Section 11 of the *Public Service Pensions Act 2013* and so is not part of the aggregate scheme.
[6] In accordance with Section 12 of *The Public Service Pensions Act 2013.*
[7] The Directions specify the ***implementation date*** for the purpose of the valuation calculations. However, the decision on the actual contribution rate to be implemented and from when is to be taken by the Minister.

the liabilities, ***notional assets***, and contribution rates to be prepared and reported. These results are set out in section 4 of this report. Appendix H sets out where other information as required by the Directions is provided in this, or related, valuation reports.

2.6 The ***employer contribution rate*** is expected to be reassessed at the actuarial valuation to be carried out as at 31 March 2016 (and each subsequent four yearly valuation). The next revision to the ***employer contribution rate*** is expected to take effect from 1 April 2019. The financial position relative to the ***employer cost cap*** will also be reconsidered at each four yearly valuation.

2.7 We have previously provided advice and information on certain aspects of the valuation. The following reports were issued in draft.

> *Principal Civil Service Pension Scheme: Report on membership data as at 31 March 2012* draft report dated 16 June 2014

> *PCSPS actuarial valuation as at 31 March 2012: Report on data used for experience analysis* draft report dated 18 September 2013

> *Principal Civil Service Pension Scheme: Valuation as at 31 March 2012: Advice on assumptions* draft report dated 28 October 2013

> *Principal Civil Service Pension Scheme: Valuation as at 31 March 2012: Report on methodology* draft report dated 16 January 2014

The reports were not signed off in case further information came to light before the conclusion of the valuation process, including changes to the Directions. The final versions of the reports have been signed on 14 July 2014. The last Appendix in each report provides details of any changes compared to the drafts which were previously issued. Other than changes required by the final Directions, changes to the reports are not substantive. The finalised reports should be read in conjunction with this report.

2.8 Throughout this report the totals given for summed data may not be exactly the same as the sum of the components shown due to rounding effects.

2.9 Appendix I sets out the limitations of this report.

3 Key inputs

This chapter summarises what calculations were carried out, including the data, methodology and assumptions used, and the analysis performed on the results.

Data

3.1 At the ***effective date***, there were 532,000 contributors to the Scheme with a total payroll of £15.0 billion[8] and 610,000 pensions in payment with total annual pensions amounting to £4.4 billion. There were a further 377,000 ex-contributors who had not yet started to receive their pension. Appendix A provides a summary of the membership data. Further details on the data, including the checks carried out on that data, the limitations of those checks and adjustments made, are provided in the report *Principal Civil Service Pension Scheme: Report on membership data as at 31 March 2012* dated 14 July 2014.

Benefits

3.2 The benefits provided to members of the PCSPS are set out in the Rules of the Scheme[9]. A new scheme ('the 2015 Scheme') is being introduced from 1 April 2015 under separate regulations[10]. Most existing Scheme members will transfer to the 2015 Scheme on 1 April 2015. Under transitional arrangements aimed at providing protection for those nearest retirement age, some older members will continue in the existing scheme until they leave due to retirement or otherwise, while others will transfer to the new Scheme at a later date.

3.3 The PCSPS currently has three main sections called Classic, Premium and Nuvos. The Classic section is a final salary scheme with a normal pension age (NPA) of 60, and an accrual rate of 1/80 (with an automatic lump sum of three times the accrued pension plus the option of additional lump sum by commutation). The Premium section is also a final salary scheme with an NPA of 60, but has an accrual rate of 1/60 (with lump sum by commutation only). The Nuvos section is a career average (CARE) scheme. It has an NPA of 65 and an accrual rate of 2.3% of salary (with lump sum by commutation only) and revaluation occurs in line with the Pensions Increase (PI) Act while in service (currently CPI). In addition, members of the Classic Plus section of the Scheme currently accrue the same benefits as for the Premium section but historically some of their benefits were accrued in the Classic section. The 2015 Scheme is a career average scheme with NPA equal to State Pension Age (SPA), an accrual rate of 2.32%, and revaluation for active members in line with prices, as defined by HMT Order (currently CPI). Benefits are increased annually in deferment and in payment by the PI Act (currently CPI). Member contribution rates are tiered in relation to members' salaries and the same tiered rates apply to all members except for members earning less than £15,000 who were previously

[8] Full time equivalent payroll.
[9] The PCSPS is a statutory scheme under the *Superannuation Act 1972.*
[10] *The Public Service (Civil Servants and Others) Pensions Regulations 2014.*

members of the Classic section of the Scheme who will temporarily contribute at a lower rate.

3.4 Appendix B gives a summary of the benefits provided under the PCSPS and of those to be provided under the 2015 Scheme. It also sets out the criteria by which scheme membership will be determined from 1 April 2015 when the 2015 Scheme is introduced. Further details on the membership of the two schemes from 1 April 2015 is provided in the report *Principal Civil Service Pension Scheme: Report on membership data as at 31 March 2012* report dated 14 July 2014.

Notional assets

3.5 The Scheme is financed by contributions from employers and current members of the Scheme. The contributions paid to the Scheme fall into general government revenues. There is no actual fund of assets but an account is maintained of a notional fund made up of contributions paid by employers and members, supplemented by a return on the notional fund at a pre-determined rate and reduced by benefits as and when they are paid to retired and former members of the Scheme. The notional fund stood at £127.3 billion as at the ***effective date***. Appendix C provides further information on the development of the notional fund since the previous valuation as at 31 March 2007. Appendix D sets out the rates of contribution paid since the previous valuation and summarises other events affecting the Scheme since that valuation.

Assumptions

3.6 The Directions specify certain assumptions to be used for the valuation whilst requiring certain other assumptions to be set as the Minister's best estimates, after taking the advice of the ***Scheme Actuary***. Actuarial advice on the scheme specific assumptions (including variations appropriate for the purposes of determining the ***employer cost cap***), and other relevant information (including an analysis of the Scheme's demographic experience), is set out in the reports:

> *PCSPS actuarial valuation as at 31 March 2012: Report on data used for experience analysis* report dated 14 July 2014.

> *Principal Civil Service Pension Scheme: Valuation as at 31 March 2012: Advice on assumptions* report dated 14 July 2014.

3.7 The Minister has consulted relevant stakeholders and instructed us to adopt the best estimate assumptions recommended in our advice, having obtained HMT consent to those assumptions. Appendix E summarises the key assumptions made.

Methodology and calculations

3.8 The Directions specify that the Projected Unit Methodology should be used. Application of this methodology to determine the ***valuation results*** as specified requires some assumptions to be made about the size and make-up of the workforce up to the end of the ***implementation period***[11].

3.9 To calculate the ***employer contribution rate***, we have placed a net present value on the extra annual benefit accrual over the four-year ***implementation period*** and then adjusted for the repayment of the deficit over 15 years and member contributions. The ***employer cost cap*** is a measure of the cost of the 2015 Scheme only. The calculation of the ***employer cost cap*** is similar to that of the ***employer contribution rate*** but is based on all members being in the 2015 Scheme in April 2015, with assumptions reflecting members' likely behaviour had they never been members of the existing schemes, and no deficit contributions apply.

3.10 Appendix F summarises the actuarial methodology adopted for the valuation in more detail. Further details on methodology, including the approach taken to projecting the workforce and the rationale for that approach, are provided in the report *Principal Civil Service Pension Scheme: Valuation as at 31 March 2012: Report on methodology* dated 14 July 2014. Appendix F also summarises the calculations undertaken to determine the ***valuation results***.

3.11 Section 4 of this report sets out the ***valuation results***.

Analysis of result

3.12 Section 5 of this report provides a reconciliation of the financial position at the previous valuation date, 31 March 2007, and at the ***effective date*** of the current valuation.

3.13 Section 6 provides further information which is intended to assist in the interpretation of the results shown. In particular, this section shows the main sensitivities of the ***valuation results*** to the assumptions set by the Minister. The most significant of these are post-retirement mortality and promotional pay increases.

3.14 Section 7 comments on the main risks which could result in some variations in the ***valuation results*** at subsequent valuations.

[11] 31 March 2019.

4 Valuation results

This chapter provides the valuation results required by the Directions.

4.1 Direction 22 requires certain numerical ***valuation results*** to be reported. This section provides the information required by the Directions.

Valuation balance sheet at 31 March 2012

4.2 The assets and past service liabilities of the aggregate scheme[12] as at the ***effective date*** calculated in accordance with the Directions, and otherwise as specified in this report, are set out in Table 4.1. The liabilities valued include all benefits currently or prospectively payable under the aggregate scheme to pensioners and deferred pensioners as at 31 March 2012 and to active members as at 31 March 2012 in respect of service completed to the ***effective date***. In the case of active members, liabilities arising from future pay inflation to the assumed future date of cessation of pensionable service are included in the liability shown. Corresponding figures at the previous valuation date are shown for comparison purposes.

Table 4.1: Valuation balance sheet

	£ billion 31 March 2012	***Direction***	**£ billion** 31 March 2007[13]
Aggregate scheme assets	127.3	*25.*	97.7
Aggregate scheme liabilities[14] in respect of:			
Active members	49.9		42.0
Deferred pensioners	22.2		14.5
Pensioners	60.6		40.1
Total aggregate scheme liabilities	132.7	*24.*	96.6
Surplus (Shortfall) as at valuation date	(5.5)		1.1

[12] The results shown in this report relate to 'the aggregate scheme' that is the combination of the existing PCSPS and 2015 Scheme. All liabilities in respect of service to the ***effective date*** relate to the existing PCSPS.

[13] Valuation as at 31 March 2007 was carried out by Hewitt.

[14] Includes liabilities relating to past added years and additional pension and other options paid for by member contributions.

Contribution rates

4.3 Whilst the ***effective date*** of the actuarial valuation is 31 March 2012, the ***employer contribution rate*** determined is that payable in respect of the period 1 April 2015 to 31 March 2019 (the ***implementation period***). The ***employer contribution rate*** required over the ***implementation period*** is determined from the following components

> The contribution rate, payable from 1 April 2015 for a period of 15 years, required to meet the shortfall between assets and liabilities as shown in Table 4.1

> Plus the contribution rate, payable from 1 April 2015 for a period of 15 years, required to meet any shortfall in the expected cost of benefits accruing between the ***effective date*** and 31 March 2015 and the actual contributions paid by employers and members over the same period

> Plus the contribution rate, payable from 1 April 2015, required to cover the expected cost of benefits accruing by members over the ***implementation period***

> Less normal[15] member contributions expected to be payable during the ***implementation period***.

4.4 The relevant ***valuation results***, expressed as a percentage of pensionable payroll, are summarised in Table 4.2a. The Minister has determined that, in line with current practice, the actual contribution rates which will be paid by employers will vary depending on members' salaries. The rates payable are summarised in Table 4.2b below, and include the 0.15% addition to cover central administration expenses. The average of the contribution rates outlined in Table 4.2b below is expected, over the implementation period, to equal the total recommended employer contribution rate of 21.1% (when expressed to the nearest 0.1% of pensionable pay). A revalorisation exercise will be completed each year, where the salary bands will be adjusted to ensure that the target yield of 21.1% is achieved.

[15] Excluding additional voluntary contributions (past added years, additional pension, money purchase AVCs) and contributions for any other options exercised

Table 4.2a: Contribution rates*

	%	%		*Direction*
Contribution rate required to be paid for 15 years from 1 April 2015 to correct shortfall at 31 March 2012		3.6	A	*27(1)(a).*
Contribution rate required to cover cost of benefits accruing between 1 April 2012 and 31 March 2015	23.9			*27(1)(b).*
Less normal member contribution rate expected between 1 April 2012 and 31 March 2015[16]	4.8			*28(a).*
Less employer contribution rate expected between 1 April 2012 and 31 March 2015	18.7			*28(b).*
Net contribution shortfall between 1 April 2012 and 31 March 2015	0.4			
Contribution rate required to be paid for 15 years from 1 April 2015 to correct underpayment of contributions between 1 April 2012 and 31 March 2015		0.1	B	*27(1)(c).*
Contribution rate required to cover cost of benefits accruing over implementation period	22.8		C	*27(1)(d).*
Less normal member contribution rate expected over implementation period[17]	5.6		D	*28(c).*
Employer contribution rate required for cost of accrual of benefits over implementation period		17.2		
Employer contribution rate required over implementation period (A + B + C) - D		20.9		*29.*

* The contribution rates quoted in Table 4.2a exclude the 0.15% of pensionable pay allowance for central administration expenses.

Table 4.2b: Contribution rates payable by employers

Member group	Pay range in 2014/15 (£) *	% pay
Salary band 1	22,000 and under	20.0
Salary band 2	22,001 to 44,500	20.9
Salary band 3	44,501 to 74,500	22.1
Salary band 4	74,501 and over	24.5
Pre-Fresh Start Prison Officers	n/a	27.9

*a revalorisation exercise will be completed before the new contribution rates are introduced, in order to set the salary bands for 2015/16

[16] Target overall rate expected when member contribution tiers were set.
[17] Target overall rate as set out in Proposed Final Agreement dated 9 March 2012. http://resources.civilservice.gov.uk/wp-content/uploads/2012/03/ProposedFinalAgreement090312.pdf

Employer cost cap

4.5 The ***proposed employer cost cap*** is determined from the following components.

> The contribution rate, payable from 1 April 2015, required to cover the expected cost of benefits accruing by members over the ***implementation period*** (determined using data, methodology and assumptions adjusted in accordance with Direction 53 (3) to (6))

> Less normal member contributions expected to be payable over the ***implementation period***.

4.6 The relevant valuation results, expressed as a percentage of pensionable payroll, are summarised in Table 4.3.

Table 4.3: Employer cost cap

	%		*Direction*
Contribution rate required to cover expected cost of benefits accruing over implementation period, assuming all members are accruing benefits in the 2015 Scheme	24.1	A	
Less normal member contribution rate expected over implementation period[18]	5.6	B	
Proposed employer cost cap (A - B)	18.5		*53.*

4.7 The ***valuation results*** have been determined in accordance with the requirements as to data, assumptions and methodology as specified in the Directions.

[18] Target overall rate as set out in Proposed Final Agreement dated 9 March 2012. http://resources.civilservice.gov.uk/wp-content/uploads/2012/03/ProposedFinalAgreement090312.pdf

5 Reconciliation of result with previous valuation results

This chapter looks at how the valuation results have changed since the previous valuation as at 31 March 2007.

5.1 The previous valuation of the PCSPS was carried out as at 31 March 2007. The framework for that valuation was different to that under which the current valuation has been carried out. This has resulted in some considerable movements in the calculation of the liabilities. Table 5.1 shows how the valuation balance sheet has changed since the previous valuation. Some figures have been calculated in an approximate manner but are sufficient to show the general size of the impact on the balance sheet. Table 5.2 provides further information on the items identified. Impacts are considered in the order listed. Using a different order could change the intermediate figures significantly, though there is no impact on the final shortfall.

Table 5.1: Valuation balance sheet - Comparison with previous valuation

	£ billion	Note
Surplus (shortfall) at 31 March 2007	**1.1**	
Change in actuarial method	0.0	1.
Adjusted surplus (shortfall) at 31 March 2007	**1.1**	
Interest on surplus (shortfall)	0.4	
Shortfall in return on notional assets	(0.6)	2.
Excess of contributions paid against cost of benefits accruing 2007 to 2012	0.3	3.
Experience effects		
Pay increases lower than expected	6.5	4.
Ill health retirements fewer than expected	0.2	
Age retirements earlier than expected	(0.2)	
Withdrawals higher than expected	1.8	
More commutation than expected	0.2	
Pensioner mortality lighter than expected	(0.4)	
Fewer dependant pensions payable than expected	(0.1)	
Negative inflation in 2009 (pensions held level in 2010)	(1.1)	
Change in long term financial assumptions	(18.0)	5.
Impact of short term variation of assumptions	8.8	6.
Impact of change in demographic assumptions	(3.9)	7.
Unattributed	(0.5)	
Surplus (shortfall) at 31 March 2012	**(5.5)**	

Table 5.2: Explanation of analysis

Note	Explanation
1.	The Directions require the use of the Projected Unit Methodology for the current valuation. This method was used at the previous valuation and so there is no change in methodology and so no surplus or deficit arises.
2.	At the previous valuation the return on the ***notional assets*** was anticipated to be 3.5% a year above pension increases. This rate applied until 31 March 2011 but was reduced to 3% above pension increases after that date, see Direction 25 (4). The impact of this change means the ***notional assets*** are lower than anticipated at the previous valuation.
3.	This impact has been assessed on the financial assumptions applying to the 2007 valuation. If the cost of accrual had instead been assessed on the financial assumptions applying to the 2012 valuation then the contributions paid would have been less than the cost of accrual.
4.	Pay increases over the period between the previous and current valuations have been lower than anticipated. This is largely as a result of the pay restraint policy applied to public service workers during the period.
5.	The financial assumptions are set by HMT. Appendix E summarises the financial assumptions set for the current and previous valuations. The most financially significant change in the long term financial assumptions is the reduction in the rate of discount net of pension increases from 3.5% a year to 3.0% a year. This includes the impact of changing from RPI to CPI revaluation of pensions in payment and deferment, which in isolation would reduce liabilities by about 10%[19].
6.	The Directions for the current valuation specify some variation in financial assumptions for the period between the ***effective date*** and the end of the ***implementation period***. The short term assumptions specified result in lower assessed liabilities. No short term variations were assumed for the previous valuation.
7.	The impact of the change in demographic assumptions is the net result of a number of changes but is dominated by an increase in life expectancy.

[19] In line with 2010/11 Annual Accounts which assumed an annual difference between CPI and RPI of 0.75%.

5.2 Table 5.3 illustrates how the employer contribution rate has changed since the previous valuation. Again, some figures have been calculated in an approximate manner but are sufficient to show the general size of the impact on the contribution rate. Impacts are considered in the order listed. Using a different order could change the intermediate figures significantly, though there is no impact on the final contribution rate.

Table 5.3: Employer contribution rate* - Comparison with previous valuation

	% pay
Employer contribution rate determined at 31 March 2007	**18.7**
Change in financial assumptions	4.4
Change in demographic assumptions	(0.6)
Change in adjustment for past service effects[20]	3.8
Increase in member contributions	(3.4)
Introduction of 2015 Scheme	(2.6)
Change in Membership profile	0.2
Unattributed	0.4
Employer contribution rate determined at 31 March 2012	**20.9**

* The contribution rates quoted in Table 5.3 exclude the 0.15% of pensionable pay allowance for central administration expenses.

[20] Including contribution shortfall between ***effective date*** and ***implementation date.***

6 Sensitivity of valuation results to assumptions

This chapter illustrates how the valuation results would change if different assumptions were used.

6.1 This section illustrates the sensitivities of the ***valuation results*** to the assumptions determined by the Minister[21]. Sensitivities are not shown for assumptions specified in the Directions since these are fixed for the purpose of this valuation.

6.2 Table 6.1 shows the sensitivities relative to the past service liabilities, the cost of future accrual, the ***employer contribution rate*** and the ***proposed employer cost cap***. The sensitivities shown are intended to illustrate a range of reasonable outcomes which might have been determined at this valuation. They are not intended to show the possible range of variation in assumptions which might be considered at future valuations and in light of future experience. Section 7 and Appendix G comment on the mains risks which could result in some variations in the ***valuation results*** at subsequent valuations.

Table 6.1: Sensitivity of valuation results to Minister set assumptions

	Addition to past service liabilities	**Addition to contribution rate for future accrual**	**Combined addition to employer contribution rate[22]**	**Addition to proposed employer cost cap**
(i) **New entrant profile***: new joiners assumed 2 years older on average	No impact	0.2%	0.2%	0.2%
(ii) **Mortality rates***:				
(a) pensioners subject to mortality rates 5% heavier than assumed[23]	(£1½bn)	(0.2%)	(0.9%)	(0.2%)
(b) 5% more deaths before retirement than currently assumed	Nil	Nil	Nil	Nil
(iii) **Age retirement rates***: members without full protection to retire (on average) one year later than currently assumed	(£½bn)	Nil	(0.2%)	Nil
(iv) **Commutation*** (other than as directed): all eligible members of the Classic section commute 2% of pension more than assumed	(£½bn)	Nil	(0.2%)	No impact

[21] As specified in direction 19(e).
[22] Combined effect of additions for past service, underpayment of contributions over 2012-15 (not shown separately) and future accrual.
[23] Broadly speaking this is equivalent to assuming members spend 0.5 years less in retirement.

	Addition to past service liabilities	**Addition to contribution rate for future accrual**	**Combined addition to employer contribution rate**[22]	**Addition to proposed employer cost cap**
(v) **Ill health retirements***				
(a) Rate of ill health retirements: 5% higher numbers of members assumed to retire on ill health grounds than currently assumed	Nil	Nil	Nil	Nil
(b) Severity of ill health retirements: 5% more members assumed to receive upper tier benefits than currently assumed	No impact	Nil	Nil	Nil
(vi) **Members' dependants***				
(a) proportions partnered: 5% more members assumed to have qualifying partners at death	£½bn	0.1%	0.3%	0.1%
(b) age difference between member and partner: dependants assumed to be 1 year older than that based on current assumption	(£½bn)	(0.1%)	(0.4%)	(0.1%)
(vii) **Withdrawal***: withdrawal rates a third higher	(£½bn)	Nil	(0.2%)	Nil
(viii) **Promotional pay increases***: promotional pay increases 0.5% per annum higher on average than assumed	£2½bn	0.2%	1.6%	No impact

* Opposite changes in the assumptions will produce approximately equal and opposite changes in the valuation results.

6.3 In each variant of Table 6.1 the sensitivity shown is in relation only to the change in assumption described. The impact of a combination of assumption changes will not necessarily equate to the sum of the relevant rows above.

7 Uncertainties around possible outcomes of the next valuation

This chapter considers some of the risks relating to the outcomes of the next valuation.

7.1 The results of this valuation are set out in Section 4. Section 6 outlines the sensitivity of the results to those assumptions set by the Minister. The sensitivities shown in that section are intended to illustrate a range of reasonable outcomes which might have been determined at this valuation had different assumptions been used. The range of reasonable outcomes at this valuation is different to, and not necessarily related to, the possible range of outcomes at future valuations.

7.2 The results of the next valuation (both the ***employer contribution rate*** and the ***cost cap cost of the scheme***[24]) will differ from the results shown in this report for many reasons. Table 7.1 shows some of these reasons. These differences can be split into three categories:

> those that are expected

> those that are likely to occur due to short term variations between experience and assumptions

> those that are possible but less likely and result from more significant experience variations leading to changes in assumptions or from data errors

7.3 The results of future valuations might affect the level of contributions payable by both employers and members and/or the amount of benefits payable to members for future service. Further information on the cost cap mechanism and how this may affect member benefits and/or contributions after future valuations is provided in Appendix G.

7.4 More explanation relating to the items in the table is given in the remainder of this section.

[24] This will be compared to the ***employer cost cap*** at the next valuation. See Appendix G for further details.

Table 7.1: Items that may affect the next valuation[25, 26]

Item		Employer contribution rate[27]	Cost cap cost of the scheme[27]
Expected:	Reduction in proportion of membership accruing benefits in existing schemes	✓	o
	Partial deficit repayment	✓	N/A
	Short term mortality improvements & increases in members' average SPA	o	o
	Run-off of short term financials up to the next valuation date (Final Salary schemes only)	✓	N/A
Likely:	Short term experience effects:		
	- demographic	✓	✓
	- financial	✓✓	✓
	Assumption changes:		
	- short term financials after the next valuation date	✓✓	✓✓
	- mortality improvements	✓✓	✓✓
Possible:	Errors found in data sets from previous valuations	✓✓	✓
	Unexpected membership changes	✓✓	✓
	Assumption changes:		
	- demographics set by the Minister	✓✓	✓

Key[28, 29]:N/A = not applicable,

o = impact is likely to be less than 0.5% of pay,

✓ = impact may well be more than 0.5% of pay but, although possible, is quite unlikely to be more than 2.0% of pay,

✓✓ = impact of more than 2.0% of pay would be quite possible

[25] All cost pressures are assumed to feed through to the ***employer contribution rate*** and the ***cost cap cost of the scheme*** in line with the Directions; more detail on how the Directions treat cost pressures is set out in paragraphs 2.31 to 2.35 of *Public service pensions: actuarial valuations and the employer cost cap mechanism* published by HMT in March 2014.

[26] We have ignored items such as changes to the Directions (apart from those described as "likely" in paragraph 2.39 of *Public service pensions: actuarial valuations and the employer cost cap mechanism*), benefit changes or changes to relevant law (including European law), because it is impossible for us to form any judgement on the likelihood or quantum of such changes.

[27] Each item is considered separately; a combination of these items could have a larger impact than is considered likely for any of those items individually.

[28] Showing relative importance of items in the table, in our judgement at the time of signing

[29] Shown in increasing order.

7.5 As explained above, some of the factors affecting the results of the next valuation are relatively predictable. For example:

> **Scheme membership:** There will be fewer members of the existing sections of the Scheme as protected members retire and tapered members move across. This will impact on the cost of future accrual.

> **Deficit:** Part of the existing deficit will be paid off through the deficit contributions payable before the next ***implementation date***.

> **Mortality improvements:** Life expectancies are expected to continue to increase though the impact of this will be offset to an extent by increases in the average SPA of active members.

> **Short term financials:** The short term financial assumptions up to the effective date of the next valuation will determine some of the experience effects at the next valuation but otherwise will not be relevant to the determination of the valuation results of the next valuation.

7.6 It would be possible to calculate the expected contribution rate at the next valuation allowing for these more predictable effects. However, any estimate would still be subject to considerable uncertainty, not least because of the long period over which the membership would need to be projected.

7.7 Other impacts on the results of the next valuation are less predictable. These include:

> **Data:** If the data used for this valuation is later shown to be materially incorrect, a gain or loss will emerge when it is corrected. For example, if the next valuation reveals that the accrued pensions at this valuation are found to be 5% underreported, all other things being equal, the employer contribution rate could increase by around 4½% of pay.

> **Scheme membership:** The distribution of future scheme membership may differ from that projected at this valuation. For example, if the scheme membership unexpectedly grows[30] by 10% by 2016 then this might reduce the ***employer contribution rate*** by about 1% and the ***cost cap cost of the scheme*** by about ½%.

> **Short term experience effects:** If experience is not in line with the assumptions made, a gain or loss will emerge over an inter-valuation period. Although the scale of the experience effects seen over the current inter-valuation period is not necessarily indicative of the scale of the effects for future periods, it is reasonable to infer that the impact of demographic experience effects is likely to be considerably lower than the potential impact of financial experience effects. For example, at this valuation none of the items of demographic experience resulted in an impact on the ***employer contribution rate*** of significantly more than 1% of pay whereas the pay experience was equivalent to a contribution impact of about 4¼% of pay.

[30] Growth due to a surge of new entrants with characteristics in line with the current valuation assumptions.

> **Longer term experience effects:** Assumption changes at future valuations in light of scheme experience may have more substantial effects on the results than actual experience effects. The greater sensitivity to assumption changes is because the assumptions typically apply to longer periods than the experience effects are measured over.

> **Other assumption changes:** Assumptions may change for reasons other than scheme experience, and paragraph 2.39 of *Public service pensions: actuarial valuations and the employer cost cap mechanism* flags that some of the assumptions set in the Directions (including short term financial assumptions) are likely to change. The ***employer contribution rate*** is particularly sensitive to the short term financial assumptions (the use of short term rather than long term assumptions up to March 2019 for this valuation reduced the ***employer contribution rate*** by about 6.5% of pay). ***Valuation results*** are also sensitive to other assumptions set in the Directions, such as the discount rate, mortality improvements and commutation take up. It is expected that any changes to assumptions in the Directions will impact on the ***employer contribution rate***. The impact of changes in assumptions on the cost cap mechanism is described in paragraphs 2.31 to 2.35 of *Public service pensions: actuarial valuations and the employer cost cap mechanism*.

8 Conclusion

This chapter summarises the valuation results.

8.1 Based on the detailed analysis as set out in this report, the key results of the valuation are as follows:

> ***Employer contribution rate*** payable for the ***implementation period***: 20.9% of pensionable pay

> ***Employer cost cap***: 18.5% of pensionable pay

> Total Scheme liabilities for service to the valuation date of £132.7 bn and ***notional assets*** of £127.3 bn, giving a notional past service deficit of £5.5 bn.

8.2 An addition of 0.15% of pensionable pay is added to the ***employer contribution rate,*** to cover the cost of central administration expenses, giving a rounded total recommended employer contribution rate of 21.1% of pensionable pay from 1 April 2015*.*

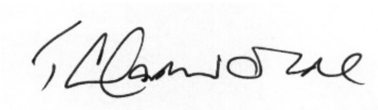
8.3 The Minister has determined that, in line with current practice, the actual contribution rates which will be paid by employers will vary depending on members' salaries. The rates payable are summarised in Table 8.1 below, and include the 0.15% addition to cover central administration expenses.

Table 8.1: Contribution rates payable by employers

Member group	Pay range in 2014/15 (£) *	% pay
Salary band 1	22,000 and under	20.0
Salary band 2	22,001 to 44,500	20.9
Salary band 3	44,501 to 74,500	22.1
Salary band 4	74,501 and over	24.5
Pre-Fresh Start Prison Officers	n/a	27.9

*a revalorisation exercise will be completed before the new contribution rates are introduced, in order to set the salary bands for 2015/16

8.4 The next valuation of the Scheme is due to be undertaken as at 31 March 2016. This will set the ***employer contribution rate*** payable from 1 April 2019, determine the opening value of the ***cost cap fund*** and provide the cost cap analysis as required by the Directions for future valuations.



Trevor Llanwarne
Government Actuary
17 July 2014

Sandra Bell
Fellow of the Institute and Faculty of Actuaries
17 July 2014

Appendix A: Summary of membership data and comparison with data at previous valuation

Table A1: Actives

		2007				2012					
Salary Band	**Gender**	**Number of members**	**Average pensionable pay (£)**	**Average age**	**Average service (years)**	**Number of members**	**Total pensionable pay (i) (£m)**	**Average pensionable pay (i) (£)**	**Average age (ii)**	**Average service (ii) (years)**	**Total accrued pension (£m)**
Salary Band 1	Male	94,244	15,217	41.3	7.8	68,416	1,240.0	18,124	44.2	10.4	181.9
	Female	162,306	15,480	40.3	8.4	122,923	2,241.7	18,236	43.8	10.8	331.2
Salary Band 2	Male	160,827	26,111	43.9	14.5	144,560	4,321.0	29,891	46.0	16.5	953.1
	Female	159,398	24,600	42.3	13.8	141,619	4,026.5	28,432	44.2	15.3	817.8
Salary Band 3	Male	31,641	47,600	48.1	19.4	27,983	1,542.9	55,136	48.2	18.9	391.4
	Female	17,498	47,149	43.9	14.2	18,946	1,036.3	54,696	44.7	15.1	212.8
Salary Band 4	Male	4,837	80,201	51.5	19.8	3,429	317.5	92,582	51.8	18.4	79.6
	Female	1,923	79,302	48.8	16.6	1,558	140.1	89,936	49.2	16.6	31.8
Prison Officers	Male	5,438	30,597	52.7	18.6	2,720	86.1	31,659	54.4	23.8	25.6
	Female	336	30,388	48.9	22.0	200	6.4	32,183	51.9	28.9	2.3
Total		**638,448**	**23,675**	**42.6**	**12.1**	**532,354**	**14,958.5**	**28,099**	**45.4**	**15.0**	**3,027.5**

(i) Full time equivalent pay

(ii) Weighted by full time equivalent pay

Table A2: Deferreds

	2007			2012			
Gender	**Number of members**	**Average deferred pension (£ pa)**	**Average age**	**Number of members**	**Total deferred pension (i) (£m pa)**	**Average deferred pension (i) (£ pa)**	**Average age (ii)**
Male	149,700	3,689	47.5	165,395	673.3	4,071	52.0
Female	179,169	2,247	46.3	211,445	635.5	3,005	49.9
Total	**328,869**	**2,903**	**46.9**	**376,840**	**1,309**	**3,473**	**51.0**

(i) Including pension increases awarded in April 2012
(ii) Weighted by pension

Table A3: Pensioners

		2007			2012			
Type of Pensioner	**Gender**	**Number of members**	**Average Pension (£ pa)**	**Average age**	**Number of members**	**Total pension (i) (£m pa)**	**Average pension (i) (£ pa)**	**Average age (ii)**
Age retirement	Male	161,728	7,740	74.4	173,627	1,616.2	9,309	73.2
	Female	130,441	3,538	75.0	149,969	670.5	4,471	73.0
Early retirement	Male	43,640	12,720	67.8	58,882	910.7	15,466	68.4
	Female	25,601	6,131	67.4	43,269	335.4	7,751	65.9
Ill health retirement	Male	35,261	6,489	64.9	31,342	254.7	8,126	67.1
	Female	32,161	4,324	64.5	30,105	164.2	5,455	66.2
Dependants	Male	8,982	1,340	58.0	12,002	20.9	1,743	56.5
	Female	117,553	3,080	78.2	110,804	448.3	4,046	79.1
Total		**555,367**	**5,704**	**73.1**	**610,000**	**4,420.9**	**7,247**	**72.3**

(i) Including pension increases awarded in April 2012
(ii) Weighted by pension

Appendix B: Summary of benefits

B.1 The Directions require the PCSPS and the new scheme being introduced for the civil service workforce on 1 April 2015 ('the 2015 Scheme') to be taken into account in aggregate for the purposes of the current valuation. The summary of benefits provided is shown separately for the PCSPS and the 2015 Scheme. The criteria by which scheme membership will be determined from 1 April 2015 are also shown. A full summary of the Schemes' provisions is set out in the report *Principal Civil Service Pension Scheme: Report on membership data as at 31 March 2012:* dated 14 July 2014.

PCSPS

B.2 The main benefit provisions of the Scheme for each category of member are shown in Table B1. Members of the Classic Plus section have some benefits which were accrued in the Classic section but they are now accruing the same benefits as members of the Premium section. Pre-Fresh Start Prison Officers are entitled to a modified version of the benefit structures set out below. In particular, unreduced pensions are payable from age 55 and service after 20 years counts double.

Table B1: Main benefit provisions of PCSPS

	Classic	Premium	Nuvos
Basis of provision	Final salary	Final salary	Career average
Contracted out/in prior to 2016+	Contracted out	Contracted out	Contracted out
Normal Pension Age (NPA)	60	60	65
Pension accrual rate	1/80	1/60	2.3%
Retirement lump sum accrual rate	3 x pension plus commutation at £12:£1pa	Cash by commutation only (£12: £1pa)	Cash by commutation only (£12: £1pa)
Final Pensionable pay	Best 12 months in last 3 years	Better of: a) last 12 months' pensionable pay b) best pensionable pay in last 4 scheme years c) average of best 3 consecutive years' pensionable pay in last 13 years (revalued in line with the PI Act to date of exit)	Nuvos is CARE rather than final salary scheme with revaluation in service using the same increase as produced by the PI Act (currently CPI)
Dependant benefits	50% of member pension (pre-commutation)	37.5% of member pension (pre-commutation)	37.5% of member pension (pre-commutation)
Ill health pension	Benefits payable immediately without reduction for early retirement. Benefits are based on enhanced service as follows: Actual service: 2 to 5 years – no enhancement 5 to 10 years – service doubled (subject to maximum of potential service to 65) More than 10 years – greater of 6 and 2/3 years (subject to maximum of potential service to 60) or service enhanced to 20 years (subject to maximum of potential service to 65)	Benefits payable immediately without reduction for early retirement. Benefits are based on enhanced service as follows: Lower tier (likely to be able to work in some employment): 2-5 years – service doubled 5 to 10 years – service enhanced to 10 years Over 10 years – no enhancement Upper tier (unlikely to work in any capacity in future): full potential service to age 60 Subject in all cases to a maximum enhancement of ½ potential service to 60	Benefits payable immediately without reduction for early retirement. Benefits are based on enhanced service as follows: Lower tier (likely to be able to work in some employment): Accrued pension only Upper tier (unlikely to work in any capacity in future): Enhancement = (accrued pension/contributing years) x (years to age 65)
Pension increases	In payment – increased in line with the PI Act (currently CPI), on excess over GMP In deferment – total pension increased in line with the PI Act (currently CPI)		

2015 Scheme

B.3 The main benefit provisions of the 2015 Scheme are shown in Table B2.

Table B2 - Main benefit provisions of 2015 Scheme

	2015 scheme
Basis of provision	Career average with revaluation each year whilst in service in line with prices as defined by HMT Order (currently CPI)
Contracted out/in prior to 2016+	Contracted out
Normal Pension Age (NPA)	Higher of a member's State Pension Age and 65
Pension accrual rate	2.32% each year
Retirement lump sum accrual rate	Cash by commutation only (£12: £1pa)
Final Pensionable pay	Not applicable
Dependant benefits	37.5% of member pension (pre-commutation)
Ill health pension	Consistent with the benefits on ill health retirement in the Nuvos section of PCSPS
Early Retirement	Benefits reduced for early payment. The reduction is actuarially neutral on a deferred benefit basis.
Pension increases	In payment – increased in line with the PI Act (currently CPI), on excess over GMP In deferment – total pension increased in line with the PI Act (currently CPI)

+benefits unaffected by contracting-out status

Criteria for scheme membership from 1 April 2015

Protected Members

B.4 All active members who, as of 1 April 2012, have 10 years or less to their current NPA (i.e. Classic, Premium and Classic Plus section members who are aged 50 and over on 1 April 2012, and Nuvos section members who are aged 55 or over on 1 April 2012) will see no change in when they can retire, nor any decrease in the amount of pension they receive at their current NPA. This protection will be achieved by the member remaining in their current scheme until they retire.

Tapered Members

B.5 Active members who, as of 1 April 2012, are between 10 and 13½ years of their NPA (i.e. Classic, Premium and Classic Plus section members who are aged between 46½ and 50 on 1 April 2012, and Nuvos section members who are aged between 51½ and 55 on 1 April 2012) will have the option of limited protection (by remaining in their current scheme) with linear tapering so that for every month of age that they are beyond 10 years from their NPA, they lose two months of protection. At the end of the protected period, they will be transferred into the new pension arrangements. Alternatively, these members can opt to transfer into the 2015 Scheme with effect from 1 April 2015.

Unprotected members

B.6 All other active members will transfer to the new arrangements on 1 April 2015.

Appendix C: Notional assets and cashflows

C.1 The Directions specify the calculation of the ***notional assets*** as at 31 March 2012. The calculation is set out in Table C1. Income and benefit payments have been derived from the PCSPS Annual Accounts for each year and the relevant information is summarised in Table C2. The notional return credited each year in line with the return specified in the Directions is also shown. Income and expenditure is assumed to occur mid-year for the purposes of crediting the notional return.

Table C1: Notional assets

	£ billion		**Direction**
Scheme Notional Assets at 31 March 2007	97.7	A	Schedule 2
Change in Scheme Notional Assets in respect of:			
Income received	16.2	B	*25*
Benefits Paid	22.7	C	*25*
Notional Investment Returns	36.1	D	*25*
Scheme Notional Assets at 31 March 2012 (A + (B – C)) + D	**127.3**		*25*

Table C2: Cashflows

	07/08 £ bn	**08/09 £ bn**	**09/10 £ bn**	**10/11 £ bn**	**11/12 £ bn**
Income	3.3	3.2	3.4	3.3	3.1
Benefit payments	4.0	4.3	4.6	4.8	5.1
Notional investment returns[31]	7.3	9.0	2.3	7.6	9.9
(%)	7.5%	8.7%	2.1%	6.7%	8.4%

C.2 Future cashflows to the Scheme will comprise income and benefit payments. The liabilities set out in this report are based on the overall cashflows expected to arise in all future years based on the assumptions used. Over shorter time periods it is likely that actual cashflows will differ from those taken into account when considering the longer term. Given the sensitivity of cashflow projections to particular time periods they are required for, none are provided in this report. It is recognised cashflow projections based on the valuation data may be required for other purposes.

[31] Calculated in accordance with direction 25(4). In basic terms, the rate of return is the measure of price inflation (which can be negative) compounded with the net discount rate applying at the time.

Appendix D: Events since the 2007 actuarial valuation

Changes to Scheme benefits from 30 July 2007

D.1 The Nuvos section of the Scheme was introduced for new members and some returning members, depending on the period of absence, on 30 July 2007. The sections for existing members (Classic, Premium and Classic Plus) remained in place. Nuvos included provision for pension on a career average salary, rather than final salary, basis. The benefits provided from all sections are summarised in Appendix B.

Member contributions

D.2 Between 1 April 2007 and 31 March 2012, member contributions were payable at the rate of 1.5% in Classic and 3.5% in Premium, Classic Plus and Nuvos.

D.3 Changes to member contributions were introduced after the ***effective date*** as set out in Table D1.

Table D1: Member contribution rates 1 April 2012 to 31 March 2015

Classic:

	Member contribution rate		
Earnings	**2012/13**	**2013/14**	**2014/15**
Up to £15,000	1.5%	1.5%	1.5%
£15,001 - £21,000	2.1%	2.7%	3.0%
£21,001 - £30,000	2.7%	3.88%	4.48%
£30,001 - £50,000	3.1%	4.67%	5.27%
£50,001 - £60,000	3.5%	5.46%	6.06%
Over £60,000	3.9%	6.25%	6.85%

Premium, Classic Plus and Nuvos:

	Member contribution rate		
Earnings	**2012/13**	**2013/14**	**2014/15**
Up to £15,000	3.5%	3.5%	3.5%
£15,001 - £21,000	4.1%	4.7%	5.0%
£21,001 - £30,000	4.7%	5.88%	6.48%
£30,001 - £50,000	5.1%	6.67%	7.27%
£50,001 - £60,000	5.5%	7.46%	8.06%
Over £60,000	5.9%	8.25%	8.85%

Employer contributions

D.4 Between 1 April 2007 and 31 March 2009, employer contributions were payable at an average rate of 19.4% of pensionable pay. From 1 April 2009, employer contributions have been paid at an average rate of 18.9% of pensionable pay. Both of these rates of employer contribution contained an allowance of 0.15% of pensionable pay in respect of administration expenses.

Pension increases

D.5 The government announced that Consumer Price Index (CPI) rather than the Retail Price Index (RPI) would be used to set pension increases under the PI Act with effect from the April 2011 increase. The financial assumptions were amended accordingly as set out in Appendix E. The actual rate of increase awarded since the 2007 valuation are set out in Table D2. The known rates of increase awarded since the ***effective date*** are also shown. These have been taken into account in the valuation.

Table D2: pension increases since the previous valuation

Year	Pension Increase
April 2007	3.6%
April 2008	3.9%
April 2009	5.0%
April 2010	0.0%
April 2011	3.1%
April 2012	5.2%
April 2013	2.2%
April 2014	2.7%

Appendix E: Summary of assumptions

Table E1: Financial assumptions at current and previous valuation

<table>
<tr><th></th><th>Current valuation
31 March 2012</th><th>Previous valuation
31 March 2007</th></tr>
<tr><td>Discount rate</td><td>3% pa real; 5.06% pa nominal</td><td>3.5% pa real; 6.0% pa nominal</td></tr>
<tr><td>Pension increases</td><td>2% pa</td><td>2.4% pa</td></tr>
<tr><td>Long term salary growth</td><td>4.75% pa, 2.75% pa in excess of assumed CPI</td><td>3.9% pa, 1.5% pa in excess of assumed RPI</td></tr>
<tr><td>Short term variations in assumptions</td><td>
<table>
<tr><th>Year</th><th>Gross discount rate</th><th>Pension increases</th><th>Salary growth</th></tr>
<tr><td>2012/13</td><td>5.27%</td><td>2.2%</td><td>1.8%</td></tr>
<tr><td>2013/14</td><td>5.78%</td><td>2.7%</td><td>0.5%</td></tr>
<tr><td>2014/15</td><td>5.27%</td><td>2.2%</td><td>1.5%</td></tr>
<tr><td>2015/16</td><td>5.16%</td><td>2.1%</td><td>2.0%</td></tr>
<tr><td>2016/17</td><td>n/a</td><td>n/a</td><td>2.5%</td></tr>
<tr><td>2017/18</td><td>n/a</td><td>n/a</td><td>3.0%</td></tr>
<tr><td>2018/19</td><td>n/a</td><td>n/a</td><td>3.0%</td></tr>
</table>
</td><td>None</td></tr>
</table>

Demographic assumptions

E.1 Full details of the demographic assumptions are provided in the report *Principal Civil Service Pension Scheme: Valuation as at 31 March 2012: Advice on assumptions* dated 14 July 2014. Sample rates and values are provided below.

E.2 Retirements on or after NPA are assumed to occur on a member's birthday. Other decrements are assumed to occur mid-year.

E.3 Some demographic assumptions vary by salary band. The salary bands applicable as at the ***effective date*** were:

Salary Band	Salary
Salary Band 1	£21,500 and under
Salary Band 2	£21,501 to £44,500
Salary Band 3	£44,501 to £74,500
Salary Band 4	£74,501 and above

Pensioner mortality

Table E2: Baseline mortality assumptions

Baseline mortality	Standard table[32]	Adjustment
Males		
Retirements in normal health	S1NMA	93%
Current ill health pensioners	S1IMA	99%
Future ill health pensioners	S1IMA	100%
Dependants	S1NMA	111%
Females		
Retirements in normal health	S1NFA	96%
Current ill health pensioners	S1IFA	105%
Future ill health pensioners	S1IFA	100%
Dependants	S1DFA	93%

E.4 As specified by HMT, future improvements in mortality will be assumed to be in line with those underlying the ONS 2012-based population projections.

E.5 Resultant expectations of life are shown in Table E3 together with comparative figures for the 2007 and 2010 (uncompleted) valuations.

[32] Expressed by reference to the S1 series of mortality tables published by the CMI, adjusted to 2012 to take account of improvements in population mortality derived using rates from the UK Interim Life Tables.

Table E3: Comparison of life expectancies (years)[33] (normal health retirement)

	2007 valuation	2010 valuation	2012 valuation
Current pensioners			
Male aged 60	26.3	28.4	28.7
Male aged 65	21.4	23.6	23.8
Female aged 60	28.0	30.4	31.0
Female aged 65	23.1	25.6	26.0
Future pensioners – current age 45			
Male life expectancy from age 60	28.2	29.9	30.5
Male life expectancy from age 65	23.8	25.5	26.0
Female life expectancy from age 60	29.2	31.9	32.7
Female life expectancy from age 65	24.6	27.5	28.2

Age retirement from service

Table E4: Age retirement rates for members with full protection in Classic, Premium and Classic Plus

Age	Salary band 1		Salary band 2		Salary band 3		Salary band 4	
	Males	Females	Males	Females	Males	Females	Males	Females
60	0.17	0.38	0.27	0.39	0.39	0.34	0.37	0.34
61	0.10	0.17	0.14	0.17	0.21	0.24	0.25	0.29
62	0.11	0.18	0.13	0.19	0.20	0.21	0.22	0.30
63	0.12	0.18	0.14	0.19	0.18	0.20	0.22	0.28
64	0.32	0.28	0.27	0.26	0.26	0.25	0.23	0.28
65	0.46	0.35	0.40	0.31	0.35	0.35	0.29	0.33
66	0.20	0.20	0.23	0.17	0.23	0.09	0.24	0.11
67	0.18	0.19	0.20	0.21	0.16	0.22	0.30	0.80
68	0.14	0.15	0.19	0.14	0.07	0.31	0.18	0.87
69	0.14	0.15	0.19	0.19	0.07	0.66	0.59	0.93
70	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

[33] Cohort life expectancy, based on age at relevant valuation date with future improvements in line with assumptions used in the relevant valuation.

Table E5: Age retirement rates for pre-Fresh Start prison officers

Age	Males	Females
55	0.64	0.71
56	0.14	0.09
57	0.19	0.09
58	0.14	0.16
59	0.10	0.25
60	0.08	0.21
61	0.06	0.27
62	0.03	0.29
63	0.04	0.31
64	0.01	0.33
65	1.00	1.00

E.6 Nuvos members with full protection are assumed to retire at age 65.

Table E6: Age retirement rates for Salary Band 1 members with service in existing NPA 60 and 2015 Schemes

Age	SPA 65		SPA 66		SPA 67		SPA 68	
	Males	Females	Males	Females	Males	Females	Males	Females
60	0.17	0.38	0.17	0.38	0.17	0.38	0.10	0.21
61	0.10	0.17	0.10	0.17	0.10	0.17	0.07	0.11
62	0.11	0.18	0.11	0.18	0.08	0.14	0.06	0.10
63	0.12	0.18	0.12	0.18	0.09	0.14	0.06	0.10
64	0.32	0.28	0.06	0.07	0.05	0.07	0.04	0.05
65	1.00	1.00	0.16	0.24	0.06	0.07	0.05	0.07
66	1.00	1.00	1.00	1.00	0.16	0.24	0.06	0.07
67	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.24
68	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table E7: Age retirement rates for Salary Band 2 members with service in existing NPA 60 and 2015 Schemes

Age	SPA 65		SPA 66		SPA 67		SPA 68	
	Males	Females	Males	Females	Males	Females	Males	Females
60	0.27	0.39	0.27	0.39	0.27	0.39	0.15	0.22
61	0.14	0.17	0.14	0.17	0.14	0.17	0.09	0.11
62	0.13	0.19	0.13	0.19	0.10	0.15	0.07	0.10
63	0.14	0.19	0.14	0.19	0.11	0.15	0.07	0.10
64	0.27	0.26	0.06	0.07	0.05	0.07	0.04	0.05
65	1.00	1.00	0.16	0.24	0.06	0.07	0.05	0.07
66	1.00	1.00	1.00	1.00	0.16	0.24	0.06	0.07
67	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.24
68	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table E8: Age retirement rates for Salary Band 3 members with service in existing NPA 60 and 2015 Schemes

Age	SPA 65		SPA 66		SPA 67		SPA 68	
	Males	Females	Males	Females	Males	Females	Males	Females
60	0.39	0.34	0.39	0.34	0.39	0.34	0.21	0.20
61	0.21	0.24	0.21	0.24	0.21	0.24	0.12	0.15
62	0.20	0.21	0.20	0.21	0.15	0.16	0.09	0.10
63	0.18	0.20	0.18	0.20	0.13	0.15	0.08	0.10
64	0.26	0.25	0.06	0.07	0.05	0.07	0.04	0.06
65	1.00	1.00	0.16	0.24	0.06	0.07	0.05	0.07
66	1.00	1.00	1.00	1.00	0.16	0.24	0.06	0.07
67	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.24
68	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table E9: Age retirement rates for Salary Band 4 members with service in existing NPA 60 and 2015 Schemes

Age	SPA 65		SPA 66		SPA 67		SPA 68	
	Males	Females	Males	Females	Males	Females	Males	Females
60	0.37	0.34	0.37	0.34	0.37	0.34	0.20	0.20
61	0.25	0.29	0.25	0.29	0.25	0.29	0.14	0.17
62	0.22	0.30	0.22	0.30	0.16	0.22	0.10	0.14
63	0.22	0.28	0.22	0.28	0.16	0.21	0.10	0.14
64	0.23	0.28	0.06	0.07	0.05	0.07	0.04	0.05
65	1.00	1.00	0.16	0.24	0.06	0.07	0.05	0.07
66	1.00	1.00	1.00	1.00	0.16	0.24	0.06	0.07
67	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.24
68	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table E10: Age retirement rates for Nuvos members with service in existing and 2015 Schemes

Age	SPA 65		SPA 66		SPA 67		SPA 68	
	Males	Females	Males	Females	Males	Females	Males	Females
65	1.00	1.00	0.67	0.67	0.50	0.50	0.25	0.25
66	1.00	1.00	1.00	1.00	0.25	0.25	0.06	0.07
67	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.24
68	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table E11: Age retirement rates for new entrants to the 2015 Scheme

Age	SPA 65		SPA 66		SPA 67		SPA 68	
	Males	Females	Males	Females	Males	Females	Males	Females
60	0.03	0.05	0.03	0.05	0.03	0.05	0.03	0.05
61	0.04	0.05	0.03	0.05	0.03	0.05	0.03	0.05
62	0.05	0.07	0.04	0.05	0.03	0.05	0.03	0.05
63	0.06	0.07	0.05	0.07	0.04	0.05	0.03	0.05
64	0.16	0.24	0.06	0.07	0.05	0.07	0.04	0.05
65	1.00	1.00	0.16	0.24	0.06	0.07	0.05	0.07
66	1.00	1.00	1.00	1.00	0.16	0.24	0.06	0.07
67	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.24
68	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Ill health retirement from service

Table E12: Ill health retirement rates for all members

Age	All salary bands		Pre-Fresh Start prison officers	
	Males	Females	Males	Females
20	0.0001	0.0001	0.0001	0.0011
25	0.0001	0.0001	0.0001	0.0015
30	0.0002	0.0002	0.0003	0.0020
35	0.0005	0.0004	0.0008	0.0030
40	0.0008	0.0007	0.0018	0.0045
45	0.0012	0.0010	0.0039	0.0070
50	0.0019	0.0020	0.0072	0.0107
55	0.0034	0.0034	0.0107	0.0187
60	0.0054	0.0062	0.0142	0.0287
65*	0.0074	0.0087	0.0177	0.0387

*rates are zero if above NPA (where NPA is assumed to be that which would apply in the 2015 scheme for those members who are unprotected or have tapered protection).

E.7 In all scheme sections other than Classic, 42% of male ill health retirements and 67% of female ill health retirements are assumed to qualify for upper tier awards. There is a single tier for ill health retirements in Classic so no assumption is needed.

Voluntary withdrawal from service

Table E13: Withdrawal rates (net of re-entry) for all members (excluding pre-Fresh Start prison officers)

Age	Salary band 1		Salary band 2		Salary band 3		Salary band 4	
	Males	Females	Males	Females	Males	Females	Males	Females
20	0.130	0.121	0.060	0.059	0.044	0.059	0.035	0.039
25	0.099	0.100	0.038	0.050	0.032	0.050	0.035	0.032
30	0.080	0.060	0.027	0.035	0.026	0.030	0.034	0.020
35	0.063	0.050	0.022	0.024	0.020	0.020	0.030	0.023
40	0.053	0.045	0.017	0.017	0.018	0.020	0.025	0.025
45	0.047	0.035	0.015	0.016	0.015	0.020	0.025	0.025
50	0.045	0.038	0.020	0.025	0.022	0.023	0.030	0.040
55	0.050	0.043	0.030	0.035	0.040	0.045	0.050	0.060
60	0.041	0.032	0.020	0.025	0.030	0.035	0.040	0.050
65	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.025

*rates are zero if above NPA (Where NPA is assumed to be that which would apply in the 2015 scheme for those members who are unprotected or have tapered protection).

Table E14: Withdrawal rates (net of re-entry) for pre-Fresh Start prison officers

Age	Males	Females
20	0.005	0.005
25	0.005	0.005
30	0.005	0.005
35	0.005	0.005
40	0.006	0.005
45	0.010	0.013
50	0.015	0.025
55	0.015	0.030

Commutation of pension for cash at retirement

Table E15: Proportion of pension assumed commuted for cash

	Classic	Non-Classic*	2015 scheme*
Males	5%	15%	15%
Females	5%	15%	15%

* As specified in direction 18(e)

E.8 Classic Plus members are assumed to commute 15% of their post 1 October 2002 pension.

Death before retirement

Table E16: Death before retirement rates for all members

Age	Males	Females
20	0.0003	0.0001
25	0.0003	0.0001
30	0.0004	0.0002
35	0.0005	0.0003
40	0.0007	0.0004
45	0.0010	0.0007
50	0.0014	0.0011
55	0.0023	0.0016
60	0.0035	0.0025
65	0.0055	0.0039

Promotional pay increases

Table E17: Promotional salary scales for all members

Age	Salary band 1		Salary band 2		Salary band 3		Salary band 4		Prison Officers	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
20	111.6	128.7	110.7	120.4	134.6	128.7	134.6	128.7	110.0	121.0
25	133.7	148.9	134.1	158.8	208.6	173.4	208.6	173.4	135.0	160.4
30	159.3	164.8	169.1	187.6	277.7	219.7	277.7	219.7	168.0	190.9
35	186.4	177.3	199.4	203.2	329.0	251.8	329.0	250.3	199.0	210.0
40	205.4	183.5	221.0	215.2	370.5	274.3	370.5	275.1	220.0	222.9
45	211.7	187.5	234.8	226.0	406.9	294.0	412.0	297.1	233.0	233.4
50	216.2	190.2	243.8	232.6	438.3	309.3	453.5	321.9	240.0	239.7
55	220.7	191.7	249.8	236.6	467.4	321.5	495.0	343.9	245.0	244.2
60	225.2	192.0	253.3	238.0	488.7	329.0	521.1	357.1	250.0	249.0
65	229.7	192.0	255.8	238.0	498.3	331.5	533.8	363.1	251.0	251.2

Family statistics

Table E18: Proportion married or partnered at retirement for future pensioners

	Classic members	All non-Classic members
	Proportion married	Proportion married or partnered
Males	70%	75%
Females	55%	55%

Table E19: Proportion married or partnered for current pensioners (at the effective date)

Age	Classic members Proportion married		All non-Classic members Proportion married or partnered	
	Males	Females	Males	Females
50	72%	56%	76%	58%
60	72%	56%	76%	58%
70	71%	45%	74%	46%
80	60%	22%	61%	22%
90	34%	6%	34%	6%

E.9 Male members are assumed to be three years older than their partners and female members are assumed to be two years younger than their partners.

Appendix F: Summary of methodology and calculations

Methodology

F.1 The Directions specify the use of the Projected Unit Methodology and that benefits should be attributed to periods of service in accordance with the requirements of International Accounting Standard 19: Employee Benefits.

F.2 Since the expected cost of benefits provided to members remaining in the existing Scheme differs from the expected cost of providing those members with benefits in the 2015 Scheme, and the expected cost of providing benefits varies for members with differing benefit provisions within the existing Scheme (notably for members with differing normal pension ages), projecting the membership gives a materially different estimate of the valuation result.

F.3 We have projected the current membership to run off in accordance with the valuation assumptions from the ***effective date*** to the end of the implementation period. We have allowed for new entrants into the Scheme in order to match the projected percentage change in workforce used for the OBR forecasts behind the 2013 Autumn Statement. The profile of new entrants is assumed to be the same as that of recent entrants into the Scheme. Full details of the membership projection is provided in the report *Principal Civil Service Pension Scheme: Valuation as at 31 March 2012: Report on methodology* dated 14 July 2014.

Calculations

F.4 The following provides a brief explanation of the actuarial calculations used to derive the ***valuation results***.

Scheme benefits

F.5 First, an estimate is made of the amount of benefit to be received by each scheme member (and their dependants, where applicable) over each future years of the scheme, from the ***effective date*** onwards. In order to do that, it is necessary to make some assumptions about the future service and salaries of the scheme members, and the length of time over which they will receive benefits. (More information about the assumptions is set out in Appendix E.)

F.6 Having estimated the benefits as a stream of projected cash flows from the ***effective date*** onwards, the second step is to calculate the capital sum which would need to be held at the ***effective date*** in order to pay all of the benefits. This requires an assumption to be made as to the rate of return which would be earned by the capital sum if it were invested. In the case of the Scheme, there is no actual sum of money, but the valuation approach is predicated on the premise that there is a notional fund with a notional investment return.

F.7 This capital sum is often referred to as the 'present value' of the benefits and is calculated by 'discounting' the future cash flows back to the ***effective date*** using the valuation discount rate (see Appendix E). The present value can alternatively be considered as the amount of money which would need to be invested at an assumed interest rate (equal to the discount rate) in order to pay all the benefits. The result of the calculation is, by its nature, a planning or budgeting estimate, not a 'valuation' as such.

Calculations

F.8 For the valuation, it is necessary to separate the capital sum into two parts: (i) the sum needed to pay out benefits which relate to service *prior to* the ***effective date*** ('past service'), and (ii) the sum needed to pay out those benefits which relate to service *after* the ***effective date*** ('future service').

Past Service Position

F.9 In relation to the past service element, we compare the capital sum (or present value) relating to past service with the balance in the notional fund at the ***effective date***. If all the assumptions made during previous reviews had been borne out exactly, and assuming no errors in previous data sets are revealed, the notional fund would exactly equal the capital sum now needed to pay for those past service benefits. But, if actual events have differed from the assumptions made, then the notional fund will exceed, or fall short of, the capital sum now estimated to be needed.

F.10 To the extent that the notional fund is *less* than the capital sum needed to pay out all the benefits relating to past service, the fund is said to be in *deficit*. This deficit needs to be met by additional contributions. If the notional fund *exceeds* the capital sum required for past service benefits, it is said to be in *surplus* and there would be a reduction in the contributions that would otherwise be paid for future service.

Future contributions

F.11 To arrive at the level of contributions required to meet benefits estimated to arise out of future service, we calculate the percentage of total pensionable pay which, if paid from the ***effective date*** onwards, would be sufficient to make up the capital sum needed to pay out the benefits. (Or, using the terminology from above, we calculate the contribution rate which has the same 'present value' as the benefit stream which the contributions will pay for.) In making this calculation, we adopt the same assumptions that we mentioned above regarding the future service and salaries of the scheme members and the rate of return which would be earned by the capital sum if it were invested.

Appendix G: The cost cap mechanism

G.1 This report recommends an ***employer contribution rate*** and proposes an ***employer cost cap*** (the ***valuation results***) based on a number of assumptions about the future. Section 7 outlines the main reasons why future ***valuation results*** may differ from the results shown in this report. This section gives further information on the cost cap mechanism and the factors which may influence the level of contributions payable by, or amount of benefits payable to, members at future valuations.

Allocation of cost savings/increases at future valuations

G.2 The cost cap mechanism specifies that:

a. if the ***cost cap cost of the scheme*** determined at a future valuation differs from the ***employer cost cap*** by more than 2% of pay, then member contributions or benefits will be adjusted.

b. If the ***cost cap cost of the scheme*** is within 2% of the ***employer cost cap***, then member contributions and benefits will not be adjusted.

Liabilities considered for future valuation results

G.3 The ***employer contribution rate*** takes into account the whole of the aggregate scheme's liabilities, ie those attributable to all service in both the existing and 2015 schemes.

G.4 By contrast, only part of the aggregate scheme's liabilities are considered for the calculation of the ***cost cap cost of the scheme***. In particular the ***cost cap fund*** is intended to exclude costs relating to deferred and pensioner members of the existing schemes. More detail is set out in paragraphs 2.24 to 2.27 of *Public service pensions: actuarial valuations and the employer cost cap mechanism*.

G.5 The prior value of the ***cost cap fund*** will be first determined at the actuarial valuation due to be carried out as at 31 March 2016. This will be based on the scheme's liabilities only for members who are active (that is, still in employment) as at 31 March 2015. As members with existing scheme benefits progressively leave active service, their liability will move outside the ***cost cap fund***. Of the liabilities expected to establish the cost cap fund as at 31 March 2015 a significant proportion of the liabilities will relate to members who are in protection (including tapered protection) and who are expected to retire in the relatively short term. Over this period, the cost cap mechanism may therefore be exposed to significant variations in pay experience and retirement patterns.

G.6 Over the longer term, the cost cap mechanism will become relatively more sensitive to other demographic assumptions, particularly rates of voluntary withdrawal and the impact of this on the age profile of the active membership. The ***cost cap cost of the scheme*** is also sensitive to changes in longevity expectations. Initially, this only relates to active members but once members with 2015 Scheme service have retired, then any changes in expectations of their longevity will also have an impact on the ***cost cap cost of the scheme***. Further, although the retirement age of active members is intended to vary in line with longevity expectations, the timing of any legislative changes to retirement age is unlikely to be synchronised with the timing of future valuation cycles.

G.7 More information about the employer cost cap mechanism can be found in *Public service pensions: actuarial valuations and the employer cost cap mechanism* published by HMT in March 2014.

Appendix H: Location of material required by Directions

Direction	Description	Location
21(a)(i), (ii)	Summary of membership data and checks carried out	*Principal Civil Service Pension Scheme: Report on membership data as at 31 March 2012* report dated 14 July 2014
21(a)(iii)	Adjustments made to data	*Principal Civil Service Pension Scheme: Report on membership data as at 31 March 2012* report dated 14 July 2014
	Projections made	*Principal Civil Service Pension Scheme: Valuation as at 31 March 2012: Report on methodology* report dated 14 July 2014.
21(b)	Average age of active members	Appendix A, Table A1
21(c)	Statement of compliance with directions	Paragraph 2.3
21(d)	Summary of regulations, directions and professional standards	Paragraphs 2.3, GAD website
21(e)	Summary of main provisions of the schemes	Appendix B *Principal Civil Service Pension Scheme: Report on membership data as at 31 March 2012* report dated 14 July 2014
21(f)	Analysis of demographic experience	*Principal Civil Service Pension Scheme: Valuation as at 31 March 2012: Advice on assumptions* report dated 14 July 2014
21(g)(i), (ii)	Statement of assumptions, including rationale	*Principal Civil Service Pension Scheme: Valuation as at 31 March 2012: Advice on assumptions* report dated 14 July 2014 See also Appendix E of this report
21(g)(iii)	Illustration of sensitivity to assumptions set by the Minister	Section 6
21 (h)	Other liabilities valued	None
22(a), (b)	Valuation balance sheet	Section 4, Table 4.1
22(c)	Notional asset cashflows	Appendix C, Table C2
22(d), (e), (f)	Contribution rates	Section 4, Table 4.2a
53	***Proposed employer cost cap***	Section 4, Table 4.3

Appendix I: Limitations

I.1 This report is intended solely for the use of the Cabinet Office for the purposes of determining the ***employer contribution rate*** payable for the period 1 April 2015 to 31 March 2019 and the initial ***employer cost cap***, both of which are to be set in regulations. The information and advice in this report should not be relied upon, or assumed to be appropriate, for any other purpose or by any other person. GAD does not accept any liability to third parties, whether or not GAD has agreed to the disclosure of its advice to the third party.

I.2 We are content for the Minister for the Civil Service to release this report to third parties, provided that:

- it is released in full
- the advice is not quoted selectively or partially
- GAD is identified as the source of the report
- GAD is notified of such release.

I.3 Third parties whose interests may differ from those of the Minister for the Civil Service should be encouraged to seek their own actuarial advice where appropriate. GAD has no liability to any person or third party for any act or omission taken, either in whole or in part, on the basis of this report.

I.4 GAD is not responsible for any decision taken by the Cabinet Office, except to the extent that the decision has been made in accordance with specific advice provided by GAD. Advice provided by GAD must be taken in context and is intended to be read and used as a whole, not in parts. GAD does not accept responsibility for advice that is altered or used selectively. No significant action should be taken based on oral advice alone. Clarification should be sought if there is any doubt about the intention or scope of advice provided by GAD.

I.5 GAD relies on the accuracy of data and information provided by Cabinet Office and the Scheme administrators. GAD does not accept responsibility for advice based on wrong or incomplete data or information provided by Cabinet Office and the Scheme administrators.