Government Actuary's Department

Police pension schemes (England & Wales)

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

Date: 11 December 2014

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Contents

1 Executive summary

This report is addressed to the Home Secretary and provides the results of the actuarial valuation of the police pension schemes carried out as at 31 March 2012.

1.1 At the request of the Home Office, we have carried out an actuarial valuation of the police pension schemes 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*, which specify certain assumptions and require other assumptions to be the Home Secretary's best estimates. HM Treasury has confirmed its consent to the assumptions proposed by the Home Secretary.

1.2 This report is addressed to the Home Secretary 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*** for the ***implementation period***: 22.1% of pensionable pay. This is the total amount required to be paid by employers into the Schemes. It is formed of a regular contribution rate equal to 21.3% of pensionable pay and separate charges paid on ill-health retirement, which are expected to provide 0.8% of pensionable pay.[2]

> ***Employer cost cap***: 12.8% of pensionable pay

> Total Scheme liabilities for service to the ***effective date*** of £74.3 billion and ***notional assets*** of £72.8 billion, giving a notional past service deficit of £1.5 billion.

[1] In accordance with Section 12 of the *Public Service Pensions Act 2013* ('the Act').
[2] Employers pay a charge equal to twice the retiree's average salary on ill-health retirement.

2 Background

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

2.1 The police pension schemes ('the Schemes') provide pensions to police officers in England and Wales. The Schemes are unfunded statutory public service pension schemes with the benefits underwritten by the Government. The Schemes are financed by payments from the employers and from those current police officers who are members of the Schemes, who pay contributions at different rates which depend on their salaries and scheme membership. Employers currently contribute 24.2% of pensionable pay plus charges paid on ill-health retirement (originally estimated to be equivalent to 1.3% of pensionable pay).

2.2 GAD has been appointed as ***Scheme Actuary***[3] by the Home Secretary to carry out an actuarial valuation of the Schemes as at 31 March 2012 (the ***effective date***). This report on the valuation is addressed to the Home Secretary 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* dated 11 March 2014 as amended[4] ('the Directions'). Terms defined in the Directions are shown in ***bold italics*** when used in this report.

2.4 The Directions require the existing schemes and the new scheme being introduced for police officers on 1 April 2015 under Section 1 of the 2013 Act[5] ('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 schemes and 2015 scheme.[6]

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***,[7] both of which are to be set in regulations. Direction 22 requires a number of results relating to 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.

[3] In accordance with Direction 4 of *The Public Service Pensions (Valuations and Employer Cost Cap) Directions 2014*.
[4] Amendments are the *Public Service Pensions (Valuations and Employer Cost Cap) (Amendment) Directions 2014*, the *Public Service Pensions (Valuations and Employer Cost Cap) (Amendment) (No. 2) Directions 2014*, and the *Public Service Pensions (Valuations and Employer Cost Cap) (Amendment) (No. 3) Directions.*
[5] *The Public Service Pensions Act 2013*.
[6] Police officers can pay money purchase AVCs under *The Police Pensions (Additional Voluntary Contributions) Regulations 1991*. 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.
[7] In accordance with Section 12 of *The Public Service Pensions Act 2013*.

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.

> *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on membership data* draft dated 1 July 2013

> *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on data used for experience analysis* draft dated 4 October 2013

> *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Advice on assumptions* draft dated 27 January 2014

> *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on methodology* draft dated 8 July 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 reports have been signed on 11 December 2014 alongside this report. Other than changes made to the report on membership data following late data submissions, 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 section 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 around 134,400 contributors to the Schemes with a total payroll of around £5.1 billion[8] and around 138,500 pensions in payment with total annual pensions amounting to around £2.3 billion.[9] There were around 23,200 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 *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on membership data* dated 11 December 2014.

Benefits

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

3.3 The Schemes currently consist of two final salary schemes, the PPS (or 1987 scheme) and NPPS (or 2006 scheme). The PPS has an accrual rate of 1/60 and doubled accrual for service after the first twenty years (with lump sum provided through commutation). Officers in the PPS typically retire after serving for 30 years.[11] The NPPS has an accrual rate of 1/70 (and no double accrual) with an automatic lump sum of four times pension. Officers in the NPPS can retire at age 55. Officer contribution rates for both schemes are currently tiered in relation to members' salaries.

3.4 The 2015 scheme is a career average scheme with a normal retirement age of 60, an accrual rate of 1/55.3, and revaluation of CPI+1.25% a year while in service and CPI out of service.

[8] Full-time equivalent. Actual payroll is about £5.0 billion.
[9] Including pension increases awarded to 9 April 2012.
[10] *The Police Pensions Regulations 1987* (SI 1987/257) and *The Police Pensions Regulations 2006* (SI 2006/3415).
[11] Most officers are able to retire after serving for 25 years (provided they are aged 50 or over) or at age 55, whichever comes first.

3.5 From 1 April 2015, officer contributions to the Schemes are expected to be on average equal to 13.7% of pay,[12] but specific rates and tiers are not yet known.

3.6 Appendix B gives a summary of the benefits provided under the existing schemes 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 benefits and the membership of the two existing schemes from 1 April 2015 is provided in the report *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on membership data* dated 11 December 2014.

Notional assets

3.7 The Schemes are financed by contributions from employers and officers. The contributions paid to the Schemes 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 Schemes. The notional fund stood at £72.8 billion as at the ***effective date***. Appendix C provides further information on the development of the notional fund since the assessment of the Schemes' liabilities as at 31 March 2008[13] (the '2008 Assessment'). Appendix D sets out the rates of contribution paid and summarises other events affecting the Schemes since that assessment.

Assumptions

3.8 The Directions specify certain assumptions to be used for the valuation whilst requiring certain other assumptions to be set as the Home Secretary'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 Schemes' demographic experience), is set out in the reports:

> *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Advice on assumptions* dated 11 December 2014.

> *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on data used for experience analysis* dated 11 December 2014.

3.9 The Home Secretary 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.

[12] Reform Design Framework, published 4 September 2012, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/117692/reform-design-framework.pdf.
[13] Details of the 2008 Assessment can be found in our report *Assessment of actuarial liabilities as at 31 March 2008,* dated 3 April 2012.

Methodology and calculations

3.10 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***.[14]

3.11 To calculate the ***employer contribution rate***, we have placed a net present value on the 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 scheme, and no deficit contributions apply.

3.12 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 *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on methodology* dated 11 December 2014. Appendix F also summarises the calculations undertaken to determine the ***valuation results*** in more detail.

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

Analysis of result

3.14 Section 5 of this report provides a reconciliation of the financial position at the ***effective date*** of this valuation with the result of the assessment of the Schemes' liabilities as at 31 March 2008.

3.15 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 Home Secretary. The most significant of these are post-retirement mortality, family statistics and promotional pay increases.

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

[14] 31 March 2019.

4 Valuation results

This section 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[15] 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 from the assessment of the Schemes' liabilities as at 31 March 2008 are shown for comparison purposes. However, that assessment used a different valuation method, the Entry Age method, so not all results are directly comparable.

Table 4.1: Valuation balance sheet

	£ billion 31 March 2012	***Direction***	**£ billion** 31 March 2008
Aggregate scheme assets	72.8	*25*	59.4[16]
Aggregate scheme liabilities[17] in respect of:			
Active members	32.4		29.5[18]
Deferred pensioners	2.2		1.2
Pensioners	39.8		28.7
Total aggregate scheme liabilities	74.3	*24*	59.4
Surplus (Shortfall) as at valuation date	(1.5)		0.0

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

[16] Starting balance of SCAPE fund as at 31 March 2008.

[17] Includes liabilities relating to added years paid for by additional officer contributions.

[18] Calculated as the total liability for service before and after the valuation date less the value of future contributions in respect of the members in the group (the entry age method).

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[19] member contributions expected to be payable during the ***implementation period***.

[19] Excluding additional voluntary contributions (added years and money purchase AVCs) and contributions for any other options exercised.

4.4 The relevant ***valuation results***, expressed as a percentage of pensionable payroll, are summarised in Table 4.2.

Table 4.2: Contribution rates

	%	%		*Direction*
Contribution rate required to be paid for 15 years from 1 April 2015 to correct shortfall at 31 March 2012		2.6	A	*27(1)(a)*
Contribution rate required to cover the cost of benefits accruing between 1 April 2012 and 31 March 2015[20]	42.8			*27(1)(b)*
Less normal[21] member contribution rate expected between 1 April 2012 and 31 March 2015[22]	13.1			*28(a)*
Less employer contribution rate[23] expected between 1 April 2012 and 31 March 2015	25.0			*28(b)*
Net contribution shortfall between 1 April 2012 and 31 March 2015	4.7			
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		1.1	B	*27(1)(c)*
Contribution rate required to cover cost of benefits accruing over implementation period[20]	32.1		C	*27(1)(d)*
Less normal[21] member contribution rate expected over implementation period[24]	13.7		D	*28(c)*
Employer contribution rate required for cost of accrual of benefits over implementation period		18.4	C-D	
Employer contribution rate required over implementation period (A + B + C) - D		22.1		*29*

Capital charges for ill-health early retirements

4.5 For each ill-health early retirement, police forces and other employers are required to pay a capital charge equal to twice the retiring officer's average salary. These charges form part of the employers' overall contributions to the scheme and the regular contributions payable are reduced to allow for this.

4.6 When ill-health charges were introduced in 2006, this allowance was estimated to be 1.3% of pensionable pay. Following a reduction in the rate of ill-health retirements, we now expect that ill-health retirement capital charges paid over the ***implementation period*** will be approximately equal to 0.8% of pensionable pay per year. As a result, <u>employers should pay 21.3% of pensionable pay in regular contributions</u> to cover the ***employer contribution rate*** required under Direction 29.

[20] Cost of accrual excludes added years and other options paid for by member contributions.
[21] Excluding additional voluntary contributions (added years and money purchase AVCs) and contributions for any other options exercised.
[22] Allows for the expected impact of increases to member contributions over 2012-15.
[23] Includes an allowance of 0.8% for ill-health charges expected to be paid over 2012-15. See paragraphs 4.5 and 4.6 for more detail.
[24] Target overall rate as set out in Reform Design Framework dated 4 September 2012 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/117692/reform-design-framework.pdf.

Employer cost cap

4.7 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***.

4.8 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[25]	26.5	A	
Less normal member contribution rate expected over implementation period[26]	13.7	B	
Proposed employer cost cap (A - B)	12.8		*53*

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

[25] This is the total contribution rate required and has not been reduced for the expected payment of ill-health capital charges.
[26] Target overall rate as set out in Reform Design Framework dated 4 September 2012 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/117692/reform-design-framework.pdf.

5 Reconciliation of result with 2008 Assessment

This section looks at how the valuation results have changed since the assessment of the Schemes' liabilities as at 31 March 2008.

5.1 An assessment of the Schemes' liabilities was carried out as at 31 March 2008. The framework for that assessment 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 2008 Assessment. 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 2008 Assessment

	£ billion	Note
Surplus (shortfall) at 31 March 2008	**-**	
Change in actuarial method	0.8	1.
Adjusted surplus (shortfall) as at 31 March 2008	**0.8**	
Interest on surplus (shortfall)	0.2	
Shortfall in return on notional assets	(0.4)	2.
Shortfall of contributions against cost of benefits accruing 2008 to 2012	(0.7)	
Experience effects		
Pay increases lower than expected	3.2	3.
Demographic experience	0.1	4.
Negative inflation in 2009 (pensions held level in 2010)	(0.6)	
Change in long-term financial assumptions	(11.2)	5.
Impact of short term variations in the assumptions	5.4	6.
Impact of change in demographic assumptions	1.7	7.
Unattributed	(0.0)	
Surplus (shortfall) at 31 March 2012	**(1.5)**	

Table 5.2: Explanation of analysis

Note	Explanation
1.	The Directions require the use of the Projected Unit methodology for the current valuation. The Entry Age method was used for the 2008 Assessment. The net effect of the change in method for the Schemes is that the liability attributed to past service is lower.
2.	At the 2008 Assessment 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 2008 Assessment.
3.	Pay increases over the period between the 2008 Assessment and current valuation have been lower than anticipated. This is largely as a result of the pay restraint policy applied to public service workers during the period.
4.	The impact shown for deviations in scheme experience from the assumptions adopted for the 2008 Assessment is the net result of differences in pre- and post-retirement mortality, retirement on grounds of age and ill-health, withdrawals and the number of dependants' pensions.
5.	The financial assumptions are set by HMT. Appendix E summarises the financial assumptions set for the current valuation and the 2008 Assessment. 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%.[27]
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 2008 Assessment.
7.	The impact of the change in demographic assumptions is the net result of a number of changes; the largest of these related to changes to assumptions for life expectancy, promotional pay awards and proportions married/partnered.

[27] Assuming a long-term difference between RPI and CPI of 0.75% a year, as used under the Public Expenditure System to account for the change to CPI revaluation at the time the change was made (see PES(2010)17).

5.2 Table 5.3 illustrates how the employer regular[28] contribution rate has changed following this 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 rate

	% pensionable pay
Employer contribution rate payable as at 31 March 2008	**24.2**
Change in actuarial method	1.5
Change in financial assumptions	9.3
Change in demographic assumptions	(0.7)
Adjustment for past service effects[29]	3.7
Increase in member contributions	(2.8)
Change in membership profile	(1.3)
Introduction of 2015 scheme	(13.1)
Recognising cost of Public Sector Transfer Club[30]	0.5
Unattributed	0.0
Employer contribution rate payable from 1 April 2015	**21.3**

[28] After allowance for capital charges for ill-health retirements.
[29] Including contribution shortfall between ***effective date*** and ***implementation date***.
[30] Costs arise because the transfer value received is usually less than the liability in respect of the service credit granted. These costs previously came through as items of deficit but will now be charged on an ongoing basis.

6 Sensitivity of valuation results to assumptions

This section 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 Home Secretary.[31] 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 main risks which could result in some variations in the ***valuation results*** at subsequent valuations.

Table 6.1: Sensitivity of valuation results to Home Secretary set assumptions

	Addition to past service liabilities	Addition to contribution rate for future accrual	Combined addition to employer contribution rate[32]	Addition to proposed employer cost cap
(i) **New entrant profile***: new joiners assumed 2 years older on average	No impact	0.1%	0.1%	0.1%
(ii) **Mortality rates***:				
(a) pensioners subject to mortality rates 5% heavier than assumed[33]	(£650m)	(0.2%)	(1.4%)	(0.2%)
(b) 5% more deaths before retirement than currently assumed	Nil[34]	Nil	Nil	Nil
(iii) **Age retirement rates***:				
All members without full or tapered protection to retire at 55	Nil[35]	(0.3%)	(0.2%)	(0.9%)

[31] As specified in Direction 19(e).
[32] Combined effect of additions for past service, underpayment of contributions over 2012-15 (not shown separately) and future accrual. This is the impact on the total employer contribution rate before any reduction for ill-health capital charges.
[33] Broadly speaking this is equivalent to assuming members spend half a year less in retirement.
[34] 'Nil' indicates that there is an impact but this appears to be zero to the level of rounding used, ie nearest £50m for past service liabilities and nearest 0.1% for contribution rates.
[35] Slight increase in past service liabilities due to the earlier retirement age of unprotected NPPS members.

	Addition to past service liabilities	Addition to contribution rate for future accrual	Combined addition to employer contribution rate[32]	Addition to proposed employer cost cap
(iv) **Commutation*** (other than as directed): all unprotected members of the PPS section commute 15% of 2015 scheme pension	No impact	(0.6%)	(0.6%)	No impact
(v) **Ill health retirements***				
(a) Rate of ill health retirements: 20% higher numbers of members assumed to retire on ill health grounds than currently assumed	Nil	0.4%	0.4%	0.2%
(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	£300m	0.1%	0.7%	0.1%
(b) age difference between member and partner: dependants assumed to be 1 year older than that based on current assumption	(£350m)	(0.1%)	(0.8%)	(0.1%)
(vii) **Withdrawal***: withdrawal rates 5% higher than assumed	(£50m)	Nil	(0.1%)	Nil
(viii) **Promotional pay increases***: promotional pay increases 0.5% per annum higher on average than assumed	£1,450m	0.3%	3.4%	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 section 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 Home Secretary. 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***[36]) 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 items in the table is given in the remainder of this section.

[36] 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[37, 38]

Item		**Employer contribution rate**[39]	**Cost cap cost of the scheme**[39]
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	✓✓	✓
	Unanticipated membership changes	✓✓	✓
	Assumption changes:		
	- demographics set by the Home Secretary	✓✓	✓

Key[40, 41]: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% of pay,

✓✓ = impact may well be more than 2% of pay

[37] 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.

[38] 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.

[39] 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.

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

[41] 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 Schemes 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.[42]

> **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 7% of pensionable pay.

> **Scheme membership:** The distribution of future scheme membership may differ from that projected at this valuation. For example, if the Schemes' membership unexpectedly grows[43] by 10% by 2016 then this might reduce the ***employer contribution rate*** by about ¾% of pensionable pay and the ***cost cap cost of the scheme*** by about ¼% of pensionable pay.

> **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 more than ½% of pay whereas the pay experience was equivalent to a contribution impact of about 5½% of pensionable pay.

[42] This impact may be offset by future reviews of the 2015 scheme's normal pension age. See Appendix G.
[43] 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 10% of pensionable 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 all 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 section 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*** for the ***implementation period***: 22.1% of pensionable pay. This is the total amount required to be paid by employers into the Schemes. It is formed of a regular contribution rate equal to 21.3% of pensionable pay and separate charges paid on ill-health retirement, which are expected to provide 0.8% of pensionable pay.[44]

> ***Employer cost cap***: 12.8% of pensionable pay

> Total scheme liabilities for service to the valuation date of £74.3 billion and ***notional assets*** of £72.8 billion, giving a notional past service deficit of £1.5 billion.

8.2 The next valuation of the Schemes 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.

Matt Wood
Fellow of the Institute and Faculty of Actuaries
11 December 2014

George Russell
Deputy Government Actuary
11 December 2014

[44] Employers pay a charge equal to twice the retiree's average salary on ill-health retirement.

Appendix A: Summary of membership data and comparison with data as at 31 March 2008

Table A1: Actives

PPS (1987 Scheme)

	2008				2012			
	Number of members	Total pensionable salary (i) (£m)	Average age (ii) (years)	Average service (iii) (years)	Number of members	Total pensionable salary (iv) (£m)	Average age (ii) (years)	Average service (iii) (years)
Male	100,069	3,523.1	40.8	15.8	80,368	3,208.6	42.6	17.6
Female	31,332	1,027.4	37.0	11.5	27,861	1,063.9	39.9	14.3
Total	131,401	4,551.5	39.9	14.8	108,229	4,272.5	41.9	16.7

NPPS (2006 Scheme)

	2008				2012			
	Number of members	Total pensionable salary (i) (£m)	Average age (ii) (years)	Average service (iii) (years)	Number of members	Total pensionable salary (iv) (£m)	Average age (ii) (years)	Average service (iii) (years)
Male	7,473	184.3	29.8	1.8	16,530	496.1	31.9	4.6
Female	4,752	115.9	28.6	1.6	9,644	288.8	31.3	4.6
Total	12,225	300.2	29.3	1.7	26,174	784.9	31.7	4.6

(i) Full-time equivalent annual rate of pensionable pay at 31 March 2008.
(ii) Weighted by full-time equivalent pensionable pay at the relevant date.
(iii) Active service in the Schemes plus transferred-in service.
(iv) Full-time equivalent annual rate of pensionable pay at 31 March 2012.

All members

	2008				2012			
	Number of members	**Total pensionable salary (i) (£m)**	**Average age(ii) (years)**	**Average service (iii) (years)**	**Number of members**	**Total pensionable salary (iv) (£m)**	**Average age(ii) (years)**	**Average service (iii) (years)**
Male	107,542	3,707.4	40.2	14.9	96,898	3,704.7	41.2	15.4
Female	36,084	1,143.3	36.1	10.2	37,505	1,352.7	38.1	11.8
Total	143,626	4,850.7	39.2	13.7	134,403	5,057.4	40.3	14.4

(i) Full-time equivalent annual rate of pensionable pay at 31 March 2008.
(ii) Weighted by full-time equivalent pensionable salary at the relevant date.
(iii) Active service in the Schemes plus transferred-in service.
(iv) Full-time equivalent annual rate of pensionable pay at 31 March 2012.

Table A2: Deferreds

PPS (1987 Scheme)

	2008 (i)			2012		
	Number of members	Total deferred pension (ii) (£m)	Average age (iii) (years)	Number of members	Total deferred pension (iv) (£m)	Average age (iii) (years)
Male	12,525	71.7	45.2	13,420	103.9	47.9
Female	7,500	35.7	45.1	8,652	52.6	47.7
Total	20,024	107.4	45.2	22,072	156.5	47.8

NPPS (2006 Scheme)

	2008 (i)			2012		
	Number of members	Total deferred pension (ii) (£m)	Average age (iii) (years)	Number of members	Total deferred pension (iv) (£m)	Average age (iii) (years)
Male	32	0.1	38.8	690	1.2	35.8
Female	31	0.1	38.4	399	0.6	35.4
Total	62	0.1	38.6	1,089	1.8	35.7

(i) Figures include an allowance for missing deferred pensioners. Split of allowance across gender and scheme is approximate, and figures may not add up as a result.
(ii) Including pension increases awarded to 7 April 2008.
(iii) Weighted by deferred pension at relevant date.
(iv) Including pension increases awarded to 9 April 2012.

All members

	2008			2012		
	Number of members	Total deferred pension (i) (£m)	Average age (ii) (years)	Number of members	Total deferred pension (iii) (£m)	Average age (ii) (years)
Male	12,556	71.7	45.2	14,110	105.1	47.7
Female	7,530	35.8	45.1	9,051	53.3	47.6
Total	20,086	107.5	45.2	23,161	158.4	47.7

(i) Including pension increases awarded to 7 April 2008.
(ii) Weighted by deferred pension.
(iii) Including pension increases awarded to 9 April 2012.

Table A3: Pensioners

Type of benefit		2008 Number of members	2008 Total pension(i) (£m)	2008 Average age (ii) (years)	2012 Number of members	2012 Total pension(iii) (£m)	2012 Average age (ii) (years)
Age retirement	Male	68,280	1184.4	63.2	78,817	1,557.6	63.9
	Female	2,318	38.2	58.1	4,122	73.2	57.9
	Total	70,598	1222.6	63.0	82,939	1,630.8	63.6
Ill-health retirement	Male	27,585	356.8	61.4	26,019	382.4	64.0
	Female	5,729	47.5	50.5	6,034	58.2	53.6
	Total	33,314	404.3	60.2	32,053	440.6	62.6
Dependants (iii)	Male	152	0.8	59.9	202	1.2	59.2
	Female	20,995	135.2	72.3	21,882	177.7	74.1
	Children	1,342	3.8	15.5	1,430	4.8	18.4
	Total	22,489	139.8	70.7	23,514	183.8	72.5
All	**Male**	**96,688**	**1,543.9**	**62.7**	**105,708**	**1,943.5**	**63.8**
	Female	**29,713**	**222.8**	**64.7**	**32,798**	**311.7**	**66.0**
	Total	**126,401**	**1766.7**	**63.0**	**138,506**	**2,255.2**	**64.1**

(i) Including pension increases awarded to 7 April 2008.
(ii) Weighted by current pensions.
(iii) Including pension increases awarded to 9 April 2012.
(iv) Including pension credit members.

Appendix B: Summary of benefits

B1 The Directions require the existing schemes and the new scheme being introduced for police officers 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 existing schemes 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 *Police pension schemes (England & Wales): Report on membership data as at 31 March 2012* dated 11 December 2014.

Existing schemes

B2 The main benefit provisions of the Schemes for each category of member are shown in Table B1.

Table B1: Main benefit provisions of existing schemes

	PPS (1987 Scheme)	NPPS (2006 Scheme)
Basis of provision	Final salary	Final salary
Contracted out/in prior to 2016+	Contracted out	Contracted out
Normal Retiring Age (NRA)	After 30 years' service at any age, or after 25 years' service at age 50 and above, or otherwise at age 55 (some senior officers have higher retirement ages) NB Deferred pension age 60	55 NB Deferred pension age 65
Pension accrual rate	1/60th for first 20 years of actual service plus 2/60 per year of service in excess of 20 years, subject to a maximum of 30 years of actual service.	1/70th per year of actual service subject to a maximum of 35 years.
Retirement lump sum accrual rate	By commutation at actuarially neutral rates Generally option to commute up to 25% of pension	4/70th per year of actual service subject to a maximum of 35 years. Option to exchange Lump Sum for additional pension
Final Pensionable Pay	Highest of 1 year average of Pensionable Pay in last 3 years	Highest of: 1 year average of Pensionable Pay in last 3 years 3 year average of Pensionable Pay in last 10 years
Dependant benefits	½ x pre-commutation pension The pension paid to female officer's surviving spouses may be reduced in respect of periods of service before 1990 and for male officers in respect of service before 1972	½ x member's pension (excluding amounts awarded in place of lump sum)
Ill health pension	Single tier – unable to perform ordinary duties No reduction for early payment Service enhancements dependent on level of service	2 tiers No reduction for early payment Service enhancements dependent on tier and level of service
Pension increases	Governed by the Pensions (Increase) Act 1971 Pension increases for member's pensions are deferred for age retirements until the attainment of age 55	

+future benefits unaffected by contracting-out status.

2015 scheme

B3 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 of CPI + 1.25% pa whilst in service
Contracted out/in prior to 2016+	Contracted out
Normal Pension Age (NPA)	60, subject to regular review Flexible retirement from age 55 subject to benefits being actuarially reduced NB Deferred pension age is State Pension Age
Pension accrual rate	1/55.3
Retirement lump sum accrual rate	By commutation at £12:£1
Final Pensionable pay	Not required
Dependant benefits	50% of member's post-commutation pension
Ill health pension	2 tiers No reduction for early payment Service enhancements dependent on tier, level of service and previous membership in PPS or NPPS
Pension increases	Governed by the Pensions (Increase) Act 1971

+benefits unaffected by contracting-out status.

Criteria for scheme membership from 1 April 2015

Protected Members

PPS (1987 scheme)

B4 All active members who, as of 1 April 2012, have 10 years or less to age 55, or are at least 38 years old with 10 years or less from a maximum unreduced pension will see no change in when they can retire, nor any decrease in the amount of pension they receive at their Normal Pension Age.

NPPS (2006 scheme)

B5 All active members who, as of 1 April 2012, have 10 years or less to age 55, will see no change in when they can retire, nor any decrease in the amount of pension they receive at their Normal Pension Age.

Tapered Members

B6 Active members who, as of 1 April 2012, are within 4 years of qualifying for protected status will have limited protection so that on average for every month closer to qualifying for transitional protection they gain about 53 days of protection. At the end of the protected period, they will be transferred into the 2015 scheme.

Unprotected members

B7 All other active members will transfer to the new arrangements on 1 April 2015.

B8 Further details on transitional protection after 1 April 2015 can be found in the Reform Design Framework issued on 4 September 2012.

Appendix C: Notional assets and cashflows

C1 The Directions specify the calculation of the ***notional assets*** as at 31 March 2012. The calculation is set out in Table C1. Aggregated income and benefit payments have been received from the police forces through the Home Office, 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 2008	59.4	A	Schedule 2
Change in Scheme Notional Assets since in respect of:			
Income received	7.2	B	25
Benefits Paid	10.2	C	25
Notional Investment Returns	16.4	D	25
Scheme Notional Assets at 31 March 2012 (A + (B – C)) + D	**72.8**		**25**

Table C2: Cashflows

	2008/09[45] £ bn	2009/10 £ bn	2010/11 £ bn	2011/12 £ bn
Income	1.7	1.8	1.8	1.8
Benefit payments	2.3	2.5	2.6	2.9
Notional investment returns[46]	5.1	1.3	4.3	5.7
(%)	8.7%	2.1%	6.7%	8.4%

C2 Future cashflows to the Schemes 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 that cashflow projections based on the valuation data may be required for other purposes.

[45] Income and expenditure figures for this year do not include any payments made in respect of the March 2009 High Court judgement on backdating commutation factors within the 1987 scheme.
[46] 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 2008 Assessment

Member contributions

D1 Between 1 April 2008 and 31 March 2012, active members of the Police Pension Scheme 1987 paid 11.0% of salary and active members of the New Police Pension Scheme 2006 paid 9.5% of salary. Eligibility testing for officers in both schemes is carried out upon entry to the scheme to determine whether members are eligible for ill-health benefits. Officers who were deemed ineligible for ill-health benefits paid contributions at a reduced rate.

D2 Changes to member contributions were introduced after the ***effective date*** as set out in Table D1.

Table D1: Member contribution rates[47] 1 April 2012 to 31 March 2015

		Member contribution rate		
Scheme	**Earnings Tier**	**2012/13**	**2013/14**	**2014/15**
	Tier 1	12.25%	13.50%	14.25%
PPS	Tier 2	12.25%	13.50%	14.25%
	Tier 3	12.50%	14.00%	15.05%
	Tier 1	10.10%	10.70%	11.00%
NPPS	Tier 2	10.50%	11.50%	12.05%
	Tier 3	10.75%	12.00%	12.75%

Where,

- Tier 1 are those members on a basic annual full-time equivalent salary of £27,000 or less;
- Tier 2 are those members on a basic annual full-time equivalent salary of more than £27,000 but less than £60,000;
- Tier 3 are those members on a basic annual full-time equivalent salary of £60,000 or more.

Ill health capital charges

D3 Employers are required to pay a charge to the scheme on ill-health retirements. When this financing arrangement was first introduced in April 2006, it was expected that these payments would be equivalent to 1.3% of pay. There has since been a reduction in the rate of ill-health retirements. We now expect future capital charges to be equivalent to around 0.8% of pensionable pay per year over 2015-19.

[47] Officers deemed ineligible for ill-health benefits pay contributions at a reduced rate.

Pension increases

D4 The Government announced that Consumer Price Index (CPI) rather than the Retail Price Index (RPI) would be used to set pension increases 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 2008 Assessment of the Schemes' liabilities 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 2008 Assessment

Year	Pension Increase
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 valuation and 2008 Assessment

<table>
<tr><th></th><th colspan="4">Current valuation
31 March 2012</th><th>Assessment as at
31 March 2008</th></tr>
<tr><td>Discount rate</td><td colspan="4">3% pa real; 5.06% pa nominal</td><td>3.5% pa real; 6.5% pa nominal</td></tr>
<tr><td>Pension increases</td><td colspan="4">2% pa</td><td>2.9% pa</td></tr>
<tr><td>Long term salary growth</td><td colspan="4">4.75% pa, 2.75% pa in excess of assumed CPI</td><td>4.4% pa, 2% pa in excess of assumed RPI</td></tr>
<tr><td rowspan="8">Short term variations in assumptions</td><td>Year</td><td>Gross discount rate</td><td>Pension increases</td><td>Salary growth</td><td rowspan="8">None</td></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>

Demographic assumptions

E1 Full details of the demographic assumptions are provided in the report *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Advice on assumptions* dated 11 December 2014. Sample rates and values are provided below.

E2 All decrements are assumed to occur mid-year, with the exception of retirements at age 60, which are assumed to occur on the members' birthday.

Pensioner mortality

Table E2: Baseline mortality assumptions

Baseline mortality	Standard table[48]	Adjustment
Males		
Retirements in normal health	S1NMA	103%
Current ill-health pensioners	S1NMA	140%
Future ill-health pensioners	S1IMA	100%
Dependants	S1NMA	100%
Females		
Retirements in normal health	S1NFA	103%
Current ill-health pensioners	S1NFA	140%
Future ill-health pensioners	S1IFA	100%
Dependants	S1NFA	100%

E3 As specified by HMT, future improvements in mortality will be assumed to be in line with those underlying the ONS 2012-based population projections.

E4 Resultant expectations of life are shown in Tables E3 and E4 together with comparative figures for the 2008 Assessment of the Schemes' liabilities.

[48] From the 'S1' series of standard tables published by the CMI and based on the experience of self-administered pension schemes over the period 2000 to 2006. Separate tables are available based on experience of members retiring in normal health (S1NXA) and ill health (S1IXA) and for dependants (S1DFA).

Table E3: Future life expectancy[49] of normal-health pensioners (from age 55, 60 or 65 as indicated)

	2012 assumptions (years)	2008 assumptions (years)
Current pensioners		
Male aged 55	32.8	32.9
Male aged 60	27.8	27.8
Male aged 65	22.9	23.0
Female aged 55	35.3	35.4
Female aged 60	30.3	30.3
Female aged 65	25.4	25.4
Future pensioners - current age 45[50]		
Male life expectancy from age 55	34.1	33.8
Male life expectancy from age 60	29.5	29.3
Male life expectancy from age 65	25.1	25.0
Female life expectancy from age 55	36.6	36.4
Female life expectancy from age 60	32.0	31.9
Female life expectancy from age 65	27.5	27.4

Table E4: Future life expectancy[49] of ill health pensioners (from age 55, 60 or 65 as indicated)

	2012 assumptions (years)	2008 assumptions (years)
Current pensioners		
Male aged 55	29.9	29.9
Male aged 60	25.1	24.9
Male aged 65	20.3	20.3
Female aged 55	32.4	32.4
Female aged 60	27.5	27.3
Female aged 65	22.7	22.6
Future pensioners - current age 45[50]		
Male life expectancy from age 55	30.2	30.8
Female life expectancy from age 55	34.2	33.4

[49] Cohort life expectancies based on the ages shown as at the valuation date, ie allowing for future mortality improvement in accordance with the improvements incorporated in the relevant ONS's principal population projections for the United Kingdom.
[50] Current age 45 is shown as an example to compare with the current pensioners.

Age retirement from service

Table E5: Age retirement rates for PPS members with full and tapered protection

Retirement Age	Entry Age 20	25	30+
48	-	-	-
49	-	-	-
50	0.700	0.030	-
51	0.550	0.015	-
52	0.400	0.015	-
53	0.400	0.015	-
54	0.400	0.015	-
55	0.400	0.900	0.200
56	0.400	0.550	0.200
57	0.400	0.400	0.200
58	0.400	0.400	0.200
59	0.400	0.400	0.200
60	1.000	1.000	1.000

Table E6: Age retirement rates for PPS members with no protection

Retirement Age	Entry Age 20	25	30+
55	0.970	0.900	0.225
56	0.400	0.550	0.100
57	0.400	0.400	0.100
58	0.400	0.400	0.100
59	0.400	0.400	0.100
60	1.000	1.000	1.000

Table E7: Age retirement rates for NPPS members

Retirement Age	All Entry Ages
55	0.292
56	0.033
57	0.033
58	0.033
59	0.033
60	1.000

Table E8: Age retirement rates for new entrants to the 2015 scheme

Retirement Age	All Entry Ages
55	0.250
56	-
57	-
58	-
59	-
60	1.000

Ill-health retirement from service

Table E9: Ill-health retirement rates for all members

Age	Males	Females
20	0.0000	0.0000
25	0.0000	0.0003
30	0.0001	0.0012
35	0.0008	0.0020
40	0.0015	0.0043
45	0.0048	0.0088
50	0.0088	0.0133
55*	0.0129	0.0178
59*	0.0161	0.0215

*rates are zero if above the retirement age of the relevant scheme.

E5 50% of ill-health retirements in the NPPS and 2015 scheme are assumed to qualify for higher tier awards.

Voluntary withdrawal from service

Table E10: Withdrawal rates for all members

Age	Males	Females
20	0.0253	0.0253
25	0.0165	0.0165
30	0.0125	0.0127
35	0.0117	0.0122
40	0.0102	0.0113
45	0.0067	0.0089
50*	0.0050	0.0064
55*	0.0000	0.0000

*rates are zero if eligible to retire without penalty.

Death before retirement

Table E11: Death before retirement rates for all members

Age	Males	Females
20	0.0002	0.0001
25	0.0002	0.0001
30	0.0003	0.0002
35	0.0004	0.0003
40	0.0005	0.0005
45	0.0007	0.0007
50	0.0010	0.0012
55	0.0017	0.0018
60	0.0025	0.0028
65	0.0040	0.0043

Promotional pay increases

Table E12: Promotional salary scales for members

The salary scale shows assumed pay progression in excess of general wage inflation in comparison to an index base of 100 at entry.

Service	All members
0	100
5	121
10	141
15	152
20	158
25	164
30	171
35	171
40	171

Commutation of pension for cash at retirement

Table E13: Proportion of pension commuted for cash at retirement

Members are assumed to commute the following proportions of their pensions for cash

Member with service in the following schemes	PPS/NPPS only	Mixed PPS and 2015 scheme		Mixed NPPS and 2015 scheme		2015 scheme only
Scheme pension commuted from	**PPS/NPPS**	**PPS**	**2015**	**NPPS**	**2015***	**2015***
All members	0%	0%	0%	0%	15%	15%

*as specified in Direction 18(e).

Family statistics

Table E14: Proportion married or partnered at death at retirement for future pensioners

	PPS	NPPS and 2015 scheme
	Proportion married	**Proportion married or partnered**
Males	80%	85%
Females	75%	80%

Table E15: Proportion married or partnered for current pensioners (at the effective date)

	PPS		NPPS and 2015 scheme	
	Proportion married		**Proportion married or partnered**	
Age	**Males**	**Females**	**Males**	**Females**
50	80%	75%	85%	80%
60	80%	74%	85%	77%
70	75%	56%	78%	57%
80	63%	28%	64%	28%
90	36%	8%	36%	8%

E6 Males are assumed to be three years older than their female partners.

Appendix F: Summary of methodology and calculations

Methodology

F1 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.

F2 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.

F3 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 Schemes in order to match the total projected salary roll 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 Schemes. Full details of the membership projection is provided in the report *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on methodology* dated 11 December 2014.

Calculations

F4 The following provides a brief explanation of the actuarial calculations used to derive the ***valuation results***.

Scheme benefits

F5 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 year of the Schemes, 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 Schemes members, and the length of time over which they will receive benefits. (More information about the assumptions is set out in Appendix E.)

F6 Having estimated the benefits as a stream of projected cashflows 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 rate of return which would be earned by the capital sum if it were invested. In the case of the Schemes, 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.

F7 This capital sum is often referred to as the 'present value' of the benefits and is calculated by 'discounting' the future cashflows 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

F8 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

F9 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.

F10 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

F11 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

G1 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

G2 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

G3 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.

G4 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.*

G5 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 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.

G6 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***. The normal pension age of the 2015 scheme (initially 60) is subject to regular review. These reviews will consider increases to State Pension Age, which are intended to vary in line with longevity expectations, but will also consider other factors. Therefore, costs from increasing longevity may well not be exactly met by changes to the normal pension age.

G7 More information about the employer cost cap mechanism can be found in of *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	Appendix A *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on membership data* dated 11 December 2014
21(a)(iii)	Adjustments made to data	*Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on membership data* dated 11 December 2014
	Projections made	*Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on methodology* dated 11 December 2014
21(b)	Average age of active members	Appendix A1
21(c)	Statement of compliance with directions	Paragraph 2.3
21(d)	Summary of regulations, directions and professional standards	Paragraphs 2.3-2.5, GAD website
21(e)	Summary of main provisions of the Schemes	Appendix B *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on membership data* dated 11 December 2014, Appendix C
21(f)	Analysis of demographic experience	*Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Advice on assumptions* dated 11 December 2014
21(g)(i), (ii)	Statement of assumptions, including rationale	*Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Advice on assumptions* dated 11 December 2014 See also Appendix E of this report
21(g)(iii)	Illustration of sensitivity to assumptions	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 4.2
53	***Proposed employer cost cap***	Section 4, Table 4.3

Appendix I: Limitations

I1 This report is intended solely for the use of the Home 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.

I2 We are content for the Home Secretary 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, and
- GAD is notified of such release.

I3 Third parties whose interests may differ from those of the Home Secretary 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.

I4 GAD is not responsible for any decision taken by the Home 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.

I5 GAD relies on the accuracy of data and information provided by police forces. GAD does not accept responsibility for advice based on wrong or incomplete data or information provided by forces.