



Government Actuary's Department

Police pension schemes (England & Wales)

Actuarial valuation as at 31 March 2012
Advice on assumptions

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1 Executive summary

This report contains our recommendations for the best estimate assumptions to be set by the Home Secretary for the 2012 valuation of the police pension schemes (England and Wales).

- 1.1 HM Treasury's *Public Service Pension (Valuation and Employer Cost Cap) Directions 2014* require that a valuation of the Police Pension Scheme, the New Police Pension Scheme and the 2015 scheme is carried out as at 31 March 2012. The assumptions to be adopted for this valuation will be set by the Home Secretary, having obtained advice from the scheme actuary. The assumptions must be the Home Secretary's best estimates and not include margins for prudence or optimism.
- 1.2 This report sets out GAD's formal advice to the Home Secretary on the actuarial assumptions to be adopted. The advice covers the main assumptions to be set by the Home Secretary and is summarised in Table 1. Assumptions may also be required in other areas and we will provide separate advice on additional assumptions as required.
- 1.3 We consider that recent experience generally provides the most reliable evidence when determining best estimates of future experience and have adopted this approach throughout this advice unless noted otherwise.
- 1.4 There is little recent experience available to determine some assumptions. In these cases we have recommended assumptions having regard to the assumptions adopted previously and other relevant data, as set out in Table 1.
- 1.5 The actuarial valuation of the police pension schemes as at 31 March 2008 was started, including an analysis of experience and a proposed set of assumptions, but it was not completed. An assessment of the actuarial liability of the Schemes as at 31 March 2008¹ was carried out based on the assumptions proposed for the 2008 valuation, with a small number of changes. Most of the assumptions put forward in this report differ from those adopted for the 2008 Assessment. The most significant changes are:
 - > New and later age retirement assumptions for members joining or moving to the 2015 scheme
 - > A flattening of the promotional salary scale
 - > A specific assumption for commutation rates in the 2015 scheme, as members of this scheme commute pension at a rate that is no longer cost neutral to their benefits
 - > A decrease in proportions married/partnered

¹ See *Police pension schemes in England and Wales: Assessment of actuarial liability as at 31 March 2008* dated 3 April 2014



- 1.6 The following chapters and appendices provide more detail on the advice, supporting analysis and the financial impact of the assumptions on the results. They also contain important background information about the context of this advice and its limitations.
- 1.7 The Home Secretary is now asked to set the actuarial assumptions to be adopted for the valuation as required by the Directions, consulting with HM Treasury as appropriate, and to confirm those assumptions to GAD. We would be happy to provide further analysis to the Home Secretary, if required.



Table 1: Summary of recommended assumptions consistent with the 'best estimate' requirement

Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 Assessment	
			Past service ²	SCR (2015-19)
Pensioner baseline mortality³	Aligned to standard SAPS table ^{4, 5}			
Normal health	103% x S1NXA	In line with 2008-2012 male ⁸ member experience ⁹ <i>see graphs C4 and C5, page 52</i>		
Ill-health (current)	140% x S1NXA			
Ill-health (future)	100% x S1IXA	In line with experience of UK self-administered pension schemes due to lack of Scheme experience on which to base this assumption.	-0.6% ⁶	Immaterial ⁷
Dependants	100% x S1NXA	In line with 2008-2012 female ¹⁰ dependant experience <i>see graph C6, page 53</i>		

² Deficit contribution required over 15 years from 2015.

³ As directed by HMT, improvements in mortality from 2012 are assumed to be in line with those underlying the ONS 2012-based population projections.

⁴ SAPS tables are published by the Actuarial Profession and based on the experience of self-administered pension schemes over the period 2000 to 2006. The 'S1' series has separate standard tables based on experience of members retiring in normal health (S1NXA) and in ill health (S1IXA) and for dependants (S1DFA).

⁵ Adjusted to 2012 to take account of improvements in population mortality using rates derived from the UK Interim Life Tables (and ONS population projections from 2012).

⁶ Includes the baseline changes for all pensioner groups and the change to future mortality improvements.

⁷ Changes are considered immaterial if their expected impact on the contribution rate is less than 0.05%.

⁸ Assumptions for both genders based on male member experience as insufficient female member data on which to base an assumption.

⁹ Scheme experience was compared to relevant SAPS tables adjusted to take account of improvements in population mortality between 2002 (the base year for the tables) and 2009/2010 (the central years of our period of analysis).

¹⁰ Assumptions for both genders based on female dependant experience as insufficient male dependant data on which to base an assumption.



Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 Assessment	
			Past service ²	SCR (2015-19)
Age retirement				
PPS protected and tapered	Age and service based rates, with many retiring on reaching 30 years' service and all retiring by age 60	In line with 2008-2012 experience <i>see graph D1, page 56</i>	Immaterial	Immaterial
PPS unprotected	No retirements before age 55. Age and service based rates, with many retiring at age 55 or 30 years' service if later. For example, for members entering at 20/25/30, 97%/90%/22.5% are assumed to retire at age 55. All assumed to retire by age 60.	PPS provides a sizeable tax-free lump sum benefit of nearly four times pay (for full service in PPS) which can be available before age 55. However, there is a significant disincentive of leaving the 2015 scheme before age 55 (retirement age effectively increases from 60 to SPA). The minimum past service in 2015 for these members is 9 years so the potential lump sum is still a very sizeable amount even if only linked to service up to 2015 from which point accruals will be under the 2015 scheme. So it is very reasonable to expect high take-up of age retirement at 55 for these people. There is, however, no relevant evidence yet.	-0.1%	New assumption



Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 Assessment	
			Past service ²	SCR (2015-19)
NPPS (all members)	About 29% retire at 55, 2% retire each year between 56 and 59 and about 62% retire at 60	<p>Unlike PPS, the lump sum at age retirement for pre-2015 service might only be half the equivalent under PPS for equivalent service. Also, these members have less past service than PPS members. It is, therefore, to be expected that there will be much lower take up of earlier retirement than for PPS who move to the 2015 scheme and instead more akin to the 2015 scheme but perhaps slightly earlier.</p> <p>There is no relevant evidence yet. We have therefore opted for part way between the 2008 assumptions and the assumptions for new entrants from 2015, weighted 5/6 towards the latter to reflect approximate periods of service in the two schemes.</p>	Immaterial	Immaterial / New assumption ¹¹
New entrants from 2015	About 25% retire at 55 and remainder retire at 60	No relevant evidence. Proposal makes a reasonable allowance for the take up of benefits at the earliest time at which they become available and is in line with the cost ceiling assumption. To be kept under review.	No past service	New assumption

¹¹ Immaterial for protected members and new assumption for unprotected members.



Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 Assessment	
			Past service ²	SCR (2015-19)
Ill-health retirement				
Incidence	Increasing by age: 0.01%/0.1% (M/F) at age 30, 0.1%/0.4% at age 40, 0.9%/1.3% at age 50, 1.6%/2.1% at age 59	25% higher than 2008-2012 experience to allow for forces no longer placing officers on back office duties, not adjusted for further improvements in health <i>see graphs E3 and E4, page 63</i>	+0.1% ¹²	+0.3% ¹²
Upper/lower tier ¹³ split	Half on upper tier, half on lower	Pragmatic assumption given very little relevant evidence. In line with cost ceiling assumption. To be kept under review.		
Withdrawal	Decreasing by age: < 3% at all ages, < 1.5% above age 25, <1% above age 38(M)/42(F)	In line with 2005-2012 experience <i>see graphs F5 and F6, page 69</i>	-0.3%	-0.3%
Death before retirement				
	Aligned to UK Interim Life Tables 2008-2010 ('ONS tables')			
Males	29% of ONS tables	In line with 2008-2012 experience, not adjusted for future improvements in mortality	Immaterial	Immaterial
Females	50% of ONS tables	<i>see graphs G3 and G4, page 73</i>		

¹² Combined impact of changes to incidence and split between tiers.

¹³ Ill-health benefits in the NPPS (and in the 2015 scheme) operate on a two-tier basis. Upper-tier benefits contain a top-up pension and are awarded to members unable to engage in any regular employment. Ill-health benefits in the PPS operate on a single tier.



Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 Assessment	
			Past service ²	SCR (2015-19)
Promotional salary scale	Service based scale: about 4% a year in years 0 to 5, 2-3% a year in years 6 to 12 and 1% per year to 29 years and 0% per year thereafter	In line with scheme data at 31 March 2008 and 31 March 2012 <i>see graph H1, page 76</i>	-0.6%	-0.3%
Commutation				
PPS protected	0% of pension commuted	Cost neutral commutation terms	No change	No change
NPPS protected	0% of pension commuted	Commutation unavailable	No change	No change
New entrants from 2015	15% of pension commuted	HMT Directions	No past service	New assumption
PPS unprotected and tapered	0% of both 2015 scheme and PPS pension commuted	Reasonable approach given that PPS offers a significantly greater lump sum for pension given up	No change	New assumption
NPPS unprotected and tapered	15% of 2015 scheme pension commuted and 0% of NPPS pension commuted	HMT Directions for 2015 scheme Commutation unavailable in NPPS	No change	New assumption



Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 Assessment	
			Past service ²	SCR (2015-19)
Family statistics				
Proportion married	80% (M), 75% (F) at retirement (consistent assumptions for existing pensioners)	Comparative level of scheme experience against ONS statistics <i>see graph J1, page 79</i>	-1.0% ¹⁴	-0.2% ¹⁴
Proportion partnered	85% (M), 80% (F) at retirement (consistent assumptions for existing pensioners)	Comparative level of scheme experience against ONS statistics		
Age difference	Males 3 years older than female partners	In line with 2008-2012 experience <i>see graph J2, page 81</i>	No change	No change
Remarriage	No allowance	Simplification on grounds of materiality	No change	No change

¹⁴ Combined impacts of changes to proportions married and partnered.



2 Introduction

This report contains our advice to the Home Secretary but will be of interest to other parties who should note the limitations.

- 2.1 HM Treasury's *Public Service Pension (Valuation and Employer Cost Cap) Directions 2014* require that a valuation of the Police Pension Scheme (PPS), the New Police Pension Scheme (NPPS) and the 2015 scheme, referred to jointly in this report as 'the Schemes', is carried out as at 31 March 2012. The assumptions to be adopted for this valuation will be set by the Home Secretary, having obtained advice from the scheme actuary. The assumptions must be the Home Secretary's best estimates and not include margins for prudence or optimism.
- 2.2 GAD is the appointed scheme actuary to the Schemes. This report is addressed to the Home Secretary and contains our formal advice on the appropriate assumptions to be adopted for the 2012 valuation, as required by the Directions. The purpose of this advice is to enable the Home Secretary to determine the required best estimate assumptions.
- 2.3 The advice is provided in accordance with the HM Treasury (HMT) Directions.
- 2.4 The advice also has regard to HMT's suggested approach¹⁵ for setting assumptions in the absence of direct evidence.
- 2.5 The advice covers the main assumptions to be set by the Home Secretary. In particular, we consider eight sets of assumptions in this report:
- > Pensioner mortality
 - > Age retirement from service
 - > Ill-health retirement from service
 - > Voluntary withdrawal from service
 - > Death before retirement
 - > Promotional pay progression
 - > Commutation of pension for cash at retirement
 - > Family statistics
- 2.6 Assumptions may also be required in other areas, eg relating to the projection of the membership to 2015. We will provide separate advice on additional assumptions as required.

¹⁵ Set out in Annex A of HM Treasury's *Public service pensions: actuarial valuations and the employer cost cap mechanism* dated March 2014.



- 2.7 The Home Secretary is now asked to set the actuarial assumptions (listed in paragraph 2.5) to be adopted for the valuation as required by the Directions, consulting with HMT as appropriate, and to confirm those assumptions to GAD. We would be happy to provide further analysis to the Home Secretary, if required.
- 2.8 Each of the 46¹⁶ police forces in England and Wales provided us with data on the experience of the Schemes' membership over the four-year period to 31 March 2012. We have used this data to analyse the Schemes' experience in order to develop our advice on the assumptions. Our report, *Police pension schemes (England & Wales): Actuarial valuation as at 31 March 2012: Report on data used for experience analysis* dated 11 December 2014, provides information about this data and should be read in conjunction with this advice. The report includes details of the checks carried out on the data, the amendments made to the data and our residual concerns about the quality of the data. In preparing our advice, we have relied upon the general completeness and accuracy of the data provided.
- 2.9 We received a late submission of active membership data from Northumbria, which we did not include in the analysis of experience as it would not materially impact on the resulting assumptions proposed in this report. However, these members have been included in our valuation calculations and we do not expect the impact on the valuation results to be material.
- 2.10 We consider that recent experience generally provides the most reliable evidence when determining best estimates of future experience and have adopted this approach throughout this advice unless noted otherwise. The Home Secretary should consider whether there is any reason why this approach would be inappropriate. We would be happy to revisit our advice to take account of any evidence relevant to the expected future experience of the Schemes' membership.
- 2.11 The report is also being made available to:
- > Police Negotiating Board
 - > HMT as part of the process for granting their approval to the assumptions proposed by the Home Secretary.
- 2.12 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.

¹⁶ 43 police forces, plus the organisations; College of Policing, Her Majesty's Inspectorate of Constabulary and Serious Organised Crime Agency.



- 2.13 Third parties whose interests may differ from those of the Home Secretary should be encouraged to seek their own actuarial advice where appropriate. Other than the Home Secretary, 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.



3 General considerations

This chapter sets out a number of general considerations common to the setting of the different assumptions considered in this report.

- 3.1 The key considerations taken into account in formulating the advice in this paper are explained in this section.

HMT Directions

- 3.2 The advice in this report reflects the requirements of the HMT Directions that assumptions should be set as the Home Secretary's 'best estimates' of future experience and should contain no margin for prudence or optimism. They should be set having regard to the:
- > assumptions set for the previous valuation
 - > analysis of demographic experience up to the valuation date, taken as experience over the four-year period up to the valuation date for the purposes of our advice
 - > relevant data from any other source (including relevant data that becomes available after the relevant date)
 - > historic long-term trends and emerging evidence which may illustrate long-term trends in the future

Setting assumptions where there is insufficient evidence

- 3.3 Since all the reformed public service schemes have certain characteristics for which there is no, or insufficient, direct evidence on which to base assumptions, HMT issued a document setting out the approach that schemes should take when setting these assumptions.¹⁷

Different populations

- 3.4 Section 11 of the *Public Service Pensions Act 2013* requires actuarial valuations to be undertaken in accordance with the HMT Directions and to cover both the new schemes established under the Act and any existing schemes which are connected to it. This means the 2012 valuation needs to consider assumptions appropriate to both the existing schemes and the new scheme. It also needs to cover the assessment of the employer contribution rate payable over the period 2015 to 2019 and the employer cost cap. Setting the employer contribution rate requires assumptions about anticipated member behaviour and characteristics during 2015 to 2019 as well as assumptions about member behaviour and characteristics in the longer term.

¹⁷ Set out in Annex A of HM Treasury's *Public service pensions: actuarial valuations and the employer cost cap mechanism* dated March 2014.



3.5 From 2015 there will be 3 distinct groups of members:

- > Those with full protection and thus remaining in one of the existing schemes to retirement. The introduction of the 2015 scheme is not expected to have any impact on this group's behaviours.
- > New members to the 2015 scheme. These members' behaviours are expected to be influenced only by the provisions of the new scheme.
- > Members with service in both the existing and 2015 schemes (including members with tapered protection). Over time, as the proportion of 2015 scheme service increases, the behaviours are expected to become increasingly influenced by the provisions of that scheme.

2008 valuation

3.6 The actuarial valuation of the police pension schemes in England and Wales as at 31 March 2008 was started, including an analysis of experience and a proposed set of assumptions, but it was not completed. An assessment of the actuarial liability of the Schemes as at 31 March 2008¹⁸ was carried out based on the assumptions originally proposed for the 2008 valuation, with a small number of changes. This assessment is referred to in this document as 'the 2008 Assessment' and the assumptions used in the assessment as 'the 2008 assumptions'.

Relative importance of assumptions

3.7 The HMT Directions require the employer contribution rate and employer cost cap to be determined to the nearest 0.1% of pensionable payroll. This is a required level of accuracy for a particular calculation and based on a particular set of assumptions. In each of the remaining chapters in this report we conclude by providing an indication of the impact on results of the change being recommended to the assumptions¹⁹ and, in some cases, possible alternative assumptions. These figures also indicate the potential magnitude of future changes in calculated employer contribution rates and the employer cost cap which may emerge if experience indicates the assumptions should be amended. The figures are approximate and are not independent so the impact of multiple changes will not necessarily be the sum of the individual impacts. Changes are considered immaterial if their expected impact on the contribution rate is less than 0.05%.

3.8 Where relevant, we also indicate in each of the following chapters the relative importance of each set of assumptions to each of the three groups of members identified in paragraph 3.5.

¹⁸ See *Police pension schemes in England and Wales: Assessment of actuarial liability as at 31 March 2008* dated 3 April 2014

¹⁹ In many cases we show the impact of the recommended assumptions relative to the 2008 assumptions.



4 Pensioner mortality

This chapter sets out our recommendation for the pensioner mortality assumptions, the rationale for those assumptions and their financial impact.

Proposed assumptions for 2012 valuation

- 4.1 The assumptions we recommend for baseline pensioner mortality for the 2012 valuation may be summarised as follows:

Table 4.1: Recommended mortality assumptions

Baseline mortality	Standard table ²⁰	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%

- 4.2 As specified by HMT, future improvements in mortality will be assumed to be in line with those underlying the most recent ONS population projections.

Previous assumptions

- 4.3 For the 2008 Assessment, baseline mortality was similarly based on adjusted standard tables with future improvements based on the 2008-based ONS population projections.

²⁰ 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).



Comparison of expected pensioner longevity

- 4.4 The tables below give a comparison of the resulting life expectancies²¹ adopted for the 2008 Assessment and recommended for the 2012 valuation.

Table 4.2: Future life expectancy 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 45²²		
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

²¹ 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.

²² Life expectancy varies by current age (ie age at 31 March 2012). Current age 45 is shown as an example to compare with the current pensioners.



Table 4.3: Future life expectancy 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 45²²		
Male life expectancy from age 55	30.2	30.8
Female life expectancy from age 55	34.2	33.4

Use of the assumption

- 4.5 Pensioner mortality is a key valuation assumption and is a measure of how long members retiring in normal or ill-health, or their dependants, expect to live and receive benefits.

Results of analysis

- 4.6 The proposed assumptions are based on analysis of past mortality experience for the scheme. We have analysed the pensioner mortality experience over the four-year period to 31 March 2012 on a 'lives' basis. A 'lives' basis gives an equal weighting to every member of the population being analysed. Further information on the data analysed and the results of that analysis are shown in Appendix C.
- 4.7 In order to make a recommendation of the most appropriate baseline assumption for pensioner mortality we have compared the actual mortality experience over the four-year period with that expected based on the most appropriate S1 standard tables.²³ We considered what adjustment to the standard table is required to provide the closest comparison with actual experience. The results are as shown in Table 4.1. Appendix C shows this comparison by age. There is insufficient data to carry out a credible analysis for male dependants, female normal-health retirements and female ill-health retirements. For these groups we have proposed use of the same adjustment as that applying to members of the opposite sex.

²³ Adjusted to the period the deaths occurred by applying adjustments broadly in line with the improvements applying to the UK population over the relevant period derived using rates from the UK Interim Life Tables.



Financial impact

- 4.8 The approximate financial impact of the proposed change to the mortality basis (both baseline and update of the improvement basis) compared to that used in 2008 Assessment is set out in Table 4.4.

Table 4.4: Approximate financial impact of proposed change in assumptions

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Changes in mortality assumptions (baseline and improvements) from 2008 to 2012 proposed assumptions	-0.6%	Immaterial	Immaterial

*(adjustment to contribution rate for 15 years from 2015)

- 4.9 The changes in mortality assumptions have the greatest impact for pensioner members, which make up the majority of the past service effect. The changes for active members are immaterial.



5 Age retirement from service

This chapter sets out our recommendation for the assumed patterns of retirement on grounds other than ill-health, the rationale for those assumptions and their financial impact.

Proposed assumptions for 2012 valuation

- 5.1 We recommend that rates of age retirement are set separately for members who will continue in the existing schemes after April 2015, for new entrants after 2015 and for those who will have service in the existing and 2015 schemes. Sample age retirement rates are provided in Appendix B.

Members remaining in the PPS

- 5.2 We recommend that protected members are assumed to retire in line with recent retirement patterns. Both age and service are taken into account in the retirement rates. Many members are assumed to retire on reaching 30 years' service and all are assumed to retire by age 60.

New entrants after April 2015

- 5.3 Our recommended assumption is:
- > 25% of members reaching age 55 are assumed to retire immediately; and
 - > all remaining members will retire at age 60.
- 5.4 The assumption is intended to make a reasonable allowance for the take-up of benefits at the earliest time at which they become available (with reduction for early payment) and is the same assumption that was adopted for costing the 2015 scheme.
- 5.5 In the 2015 scheme, an actuarial uplift will be applied to the pension payable on retirement after age 60. Therefore, no allowance is required for late retirement after age 60.

Unprotected members with service in the PPS and 2015 schemes

- 5.6 For PPS members that joined the scheme before age 30, we recommend assuming no members will retire before age 55. Instead, we recommend that most members will retire at the later of age 55 and reaching 30 years of service.
- 5.7 For PPS members that joined the scheme after age 30 (and so cannot retire before age 55), we recommend merging between the patterns of retirement for members remaining in the existing scheme and those applying to new entrants to the 2015 scheme. To allow for reasonable implementation, we propose that a single set of assumptions applies to all members of this group based on their average characteristics.



Tapered members with service in the PPS and 2015 schemes

- 5.8 We recommend that PPS tapered members are assumed to retire in line with recent retirement patterns, ie the same assumption as for protected members remaining in the PPS (see paragraph 5.2).

Members remaining in the NPPS or with service in both the NPPS and 2015 schemes

- 5.9 We recommend merging between the assumed pattern of retirement for NPPS members in the 2008 Assessment and that applying to new entrants to the 2015 scheme. Given the small group, we recommend that all members with NPPS service are assumed to retire under a single set of assumptions based on their average characteristics.
- 5.10 Further information, including the recommended approaches to merging patterns of retirement (as noted in 5.7 and 5.9 above), are contained in Appendix D.

Previous assumptions

- 5.11 For members of the PPS, the retirement rates adopted for the 2008 Assessment were dependent on age and service. They were the same as those recommended for the 2012 valuation in all cases except at age 55 for those entering the scheme after age 25. The recommended assumption at age 55 for these members is around half of that previously assumed.
- 5.12 For members of the NPPS, the retirement rates adopted for the 2008 Assessment were dependent on age and service. The recommended retirement rates for all NPPS members for the 2012 valuation reference these 2008 assumptions (which were unchanged from those set by HM Treasury for costing the scheme on its introduction in 2006) except:
- > There is no increase in the retirement rate for members reaching 35 years' service. In the NPPS 35 years was the maximum accrual, but in the 2015 scheme there is no cap on service and so it is no longer appropriate to have higher retirement rates related to the completion of 35 years' service.
 - > All members are expected to retire at age 60 if they have not already done so (90% of members would be expected to have retired at or before age 60 under the rates adopted for the 2008 Assessment). This improves alignment of the NPPS and new entrant assumptions.

Use of the assumption

- 5.13 Age retirement rates specify the rate at which members are assumed to retire on grounds other than ill-health.



- 5.14 There are no provisions for early retirement from active service in the PPS and NPPS.²⁴ However, in the 2015 scheme, members will be able to retire from active service from age 55, with an actuarial reduction applied to the pension payable if retirement occurs before age 60. The actuarial reduction is set to give the early retirement pension the same value as deferred benefits payable following withdrawal at the same age (but with reference to payment age 60 rather than the usual deferred payment age of SPA). As the deferred benefits are expected to be less valuable than the benefits payable had the member stayed in service and retired at 60, early retirement will represent a saving to the Scheme.
- 5.15 In the PPS and NPPS the pension payable on late retirement²⁵ is not subject to actuarial adjustment. This means that late retirements from the PPS or NPPS typically reduce the costs to the Scheme (ie the value of the benefit payable to a member is typically lower). The rates of retirement of members of the PPS and NPPS are therefore financially significant assumptions. In the 2015 scheme, an actuarial uplift will be applied to the pension payable on retirement after age 60. No allowance for late retirement of 2015 scheme members will be made in the valuation.

Results of analysis

- 5.16 We analysed the pattern of age retirements from active membership over the four-year period to 31 March 2012 for members of the PPS. There was insufficient data to perform a credible analysis of the NPPS experience. In total we analysed around 13,500 age retirements from the PPS over the period. The analysis compared the numbers of actual retirements to the expected number of retirements under the 2008 assumptions. Further information on the data analysed and the results of that analysis are shown in Appendix D.
- 5.17 The analysis showed that experience over the period has been broadly in line with the assumptions adopted for the 2008 Assessment. There was a decrease in retirements at age 55 for later entrants to the scheme, so we have recommended a reduction in the assumed retirement rate at this age.

²⁴ Members who leave active service without being qualified for immediate payment of pension benefits will become entitled to a deferred pension with a deferred pension age of 60 (PPS) or 65 (NPPS).

²⁵ Late retirements are those after age 55 or after 30 years' service, if earlier, in the PPS.



Financial impact

- 5.18 The approximate financial impact of alternative retirement assumptions is set out in Table 5.1. Except for the first line, the impacts are shown relative to using the assumptions recommended above.

Table 5.1: Approximate financial impact of variation in assumed rate of age retirements

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Changes in age retirement assumptions from 2008 to 2012 proposed assumptions	-0.1%	-0.3%	New assumption
Impact of assuming all unprotected members retire in line with assumption for fully protected members	+0.1%	only past service effects considered	
Impact of assuming all tapered members retire in line with assumption for unprotected members	-0.1%	only past service effects considered	
Impact of assuming all new entrants retire at age 55	Only 2015 scheme accrual considered		-0.9%

*(adjustment to contribution rate for 15 years from 2015)

- 5.19 Although the assumed rates of age retirement are financially significant they are also quite predictable within the PPS, with most members retiring close to when they reach 30 years of service. The majority of the Schemes' accrued liabilities are in respect of protected or tapered members and we do not expect much change in behaviour amongst these groups.



6 Ill-health retirement from service

This chapter sets out our recommendation for the assumed rates of retirement on grounds of ill-health, the rationale for those assumptions and their financial impact.

Proposed assumptions for 2012 valuation

- 6.1 We recommend that a single set of assumptions (separate for men and women) is used to allow for the incidence of ill-health retirement, ie applying both to those members who remain in the existing scheme and to those who join the new scheme. Assumed rates of ill-health retirement increase with age up to around 1.5% for men and 2% for women at the highest ages. Sample rates are provided in Appendix B.
- 6.2 We also recommend assuming that half of those retiring from the NPPS and the 2015 scheme on ill-health grounds will receive the upper-tier benefit and the other half will receive the lower-tier benefit.

Previous assumptions

- 6.3 Unisex rates of ill-health retirement were adopted for the 2008 Assessment. The overall number of retirements expected under the 2012 assumptions is about a third higher than under the 2008 assumptions for men. For women, the expected number under the 2012 assumptions is more than double that under the 2008 assumptions.
- 6.4 For the 2008 Assessment, it was assumed that two in three of those retiring from the NPPS on ill-health grounds would receive upper-tier benefits.

Use of the assumptions

- 6.5 Ill-health retirement rates specify the rate at which members are assumed to retire on grounds of ill health. The assumed eligibility for upper or lower tier awards specifies the benefits which will be provided. The rates of mortality experienced after ill-health retirement are also relevant to the valuation calculations. Post-retirement mortality is addressed in Chapter 4.

Results of analysis

- 6.6 We analysed around 1,350 ill-health retirements over the four-year period to 31 March 2012. The analysis compared the numbers of actual retirements to the expected number of retirements under the 2008 assumption. Details of the analysis are shown in Appendix E.



Ill-health retirement rates

- 6.7 The analysis showed more ill-health retirements than expected under the 2008 assumptions, particularly for females (around 105% and 180% of expected for males and females respectively).
- 6.8 The rates of ill-health retirement amongst women significantly exceeded those amongst men, which has led to our recommendation to apply separate, gender-specific tables.
- 6.9 Numbers of ill-health retirements increased each year over 2008-12. This is understood to relate, at least partially, to the removal of officers from back office duties via ill-health retirement, following on from the Winsor review's recommendations that officers should not be given back office roles if they are no longer fit to perform their duties. The Home Office has suggested assuming ill-health retirement rates that are 25% higher than over 2008-12, which we consider reasonable.

Split between tiers

- 6.10 There was insufficient data to analyse the split of NPPS retirements between the two tiers. In determining an assumption, we have assumed that most of the change in ill-health rates would relate to members who are less severely ill (and so on the lower tier).

Financial impact

- 6.11 The approximate financial impacts of the proposed changes to ill-health retirement assumptions and an alternative assumption about the split between tiers are set out in Table 6.1.

Table 6.1: Approximate financial impact of proposed change in ill-health retirement assumptions and alternative assumptions

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Changes from 2008 to 2012 proposed assumptions	+0.1%	+0.1%	+0.3%
Two thirds, rather than a half, of NPPS and 2015 scheme members on upper tier	Immaterial	Immaterial	+0.1%

* (adjustment to contribution rate for 15 years from 2015)



7 Voluntary withdrawal from service

This chapter sets out our recommendation for the assumed rates of withdrawal from active service, the rationale for those assumptions and their financial impact.

Proposed assumptions for 2012 valuation

- 7.1 We recommend that a single set of rates of withdrawal (separate for men and women) is used for the purposes of the valuation, applying equally to those members who remain in the existing scheme and those who join the new scheme. The recommended rates decrease with age and are typically between 0.5% and 1.5% a year. The same rates apply regardless of the length of the member's service, except that no withdrawal will be assumed for members entitled to immediate benefits. Sample rates are provided in Appendix B.

Previous assumptions

- 7.2 For the 2008 Assessment, separate assumptions were adopted for members who had recently entered the scheme. Although there is quite clear evidence that members with shorter service are more likely to withdraw, the impact of allowing for this on the valuation results is small.
- 7.3 For members with at least two years' service, the 2008 assumptions are typically higher than the 2012 assumptions for younger members but lower for older members.

Use of the assumption

- 7.4 Withdrawal rates specify the rate at which members are assumed to leave voluntarily before retirement becoming entitled to either deferred benefits or, for those with less than two years' service, a refund of contributions or a transfer value.
- 7.5 There is very little evidence of members rejoining the Schemes after leaving. For the avoidance of doubt, all members assumed to withdraw are assumed not to rejoin.

Results of analysis

- 7.6 We have analysed the pattern of withdrawals from active membership over the four-year period to 31 March 2012 for the PPS and NPPS combined. In total there were about 5,000 withdrawals over the period.
- 7.7 We have also analysed the pattern of withdrawals in the three-year period to 31 March 2008, which were broadly similar to the later period. The recommended withdrawal rates have been derived by combining the two separate analyses and smoothing the results.
- 7.8 Further information on the data analysed and the results of that analysis are shown in Appendix F.



Financial impact

- 7.9 The approximate financial impact of the change to the withdrawal rates compared to the 2008 Assessment is set out in Table 7.1.

Table 7.1: Approximate financial impact of proposed change in withdrawal assumptions

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Changes from 2008 to 2012 proposed assumptions	-0.3%	-0.4%	-0.2%

*(adjustment to contribution rate for 15 years from 2015)



8 Death before retirement

This chapter sets out our recommendation for the assumed rates of death before retirement, the rationale for those assumptions and their financial impact.

Proposed assumptions for 2012 valuation

- 8.1 We recommend a single set of assumptions (separate for men and women) is used to allow for the possibility of death before retirement, ie applying equally to those members who remain in the existing scheme and those who join the new scheme. Assumed rates of death before retirement increase with age but fewer than 0.5% of members are assumed to die each year, even at the highest ages. Sample rates are provided in Appendix B.

Previous assumptions

- 8.2 Single sets of rates (separate for men and women) were adopted for the 2008 Assessment to allow for the possibility of death before retirement. The rates were based on experience prior to the valuation date and when compared to those recommended for the 2012 valuation they were significantly higher for males and slightly higher for females. The 2012 rates are approximately 70% of the 2008 rates for males and broadly the same as the 2008 rates for females.

Use of the assumption

- 8.3 Death before retirement rates are used to allow for the possibility of deaths whilst in active service or whilst entitled to a deferred pension. The numbers of deaths observed annually, and the recommended rates to be assumed, are low and thus this assumption has relatively little financial significance.

Results of analysis

- 8.4 We have analysed the deaths of active members over the four-year period to 31 March 2012. The recommended assumptions for both deaths in service and in deferment are based on this analysis. In total there were 278 deaths of active members over the period. The analysis compares the number of actual deaths to the expected number of deaths under both the 2008 assumptions and the UK Interim Life Tables 2008-2010 as produced by the ONS ("ONS tables"). Further information on the data analysed and the results of that analysis are shown in Appendix G.
- 8.5 The analysis showed there were significantly fewer male deaths and slightly fewer female deaths than expected under the 2008 assumptions. There were significantly fewer deaths than expected under the ONS tables for both genders.
- 8.6 To formulate a recommended assumption we considered what adjustment to the ONS tables would provide the closest comparison with actual experience. The 'best fit' was achieved by taking 29% of the ONS tables rates for men and 50% of the ONS tables rates for women.



Financial impact

- 8.7 The approximate financial impact of the proposed change to assumed rates of death before retirement is set out in Table 8.1.

Table 8.1: Approximate financial impact of proposed change in death before retirement assumptions

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Changes from 2008 to 2012 proposed assumptions	Immaterial	Immaterial	Immaterial

* (adjustment to contribution rate for 15 years from 2015)



9 Promotional pay increases

This chapter sets out our recommendation for the assumed promotional pay increases of active members, the rationale for those assumptions and their financial impact.

Proposed assumption

- 9.1 We recommend assuming a single combined scale of promotional increases for men and women. The increases are dependent on members' length of service and are steeper at lower service periods. Sample values from the scale are provided in Appendix B.

Previous assumption

- 9.2 The assumptions adopted for the 2008 Assessment differ from those recommended for the 2012 valuation. The 2008 and 2012 scales are similar for low service periods, but the 2012 scale is lower for service periods above around 15 years. For members remaining in the scheme for 30 years, the promotional increases from entry to retirement are assumed to be 3.7% lower than under the 2008 assumptions.

Use of the assumption

- 9.3 For the existing schemes, benefits are linked to salary at, or near, retirement. Members' salaries can increase through a combination of annual general pay awards and promotional pay increases. To calculate an estimate of the level of benefit payable in the future requires assumptions for both these components. The assumption for general pay awards is directed by HMT. The assumption for promotional pay increases is set by the responsible authority.
- 9.4 Future pay progression will be more significant (in terms of expected pension) for those members with either full or tapered protection because they will continue to have benefits linked to final pensionable pay for service beyond 31 March 2015. A significant proportion of the past service liability for active members (about three-quarters) relates to members with full or tapered protection and thus the impact of experience differing from the assumptions used is likely to be most material over the next couple of valuation cycles as it relates to older existing members. This experience will impact future employer contribution rates and the cost cap mechanism via the cost cap fund.
- 9.5 As a result of the Winsor review of policing salaries, new joiners and current members may see a greater proportion of their salary increases earlier in their service. This is unlikely to have a material impact on the valuation results because these members have little service and most will move to the new scheme in 2015. However, if you consider that Winsor will lead to a significant change in pay progression for other members, particularly for members who will be partially or fully protected from 2015, then the assumption should be revisited to take account of this. We would be happy to consider any further information that you can provide.



Results of analysis

- 9.6 We analysed the promotional increases implied by the current pay structure of the membership. Details of the analysis are contained in Appendix H.
- 9.7 The analysis of the pay structure of the membership as at 31 March 2012 suggested that the pay structure is broadly consistent with that observed in the analysis carried out as at 31 March 2008. The consistent pay structures seen in these two analyses provide evidence for a change in the assumption. Therefore, the recommended scale for the 2012 valuation has been based on the observed rates in the 2008 and 2012 analyses.
- 9.8 The analysis showed that promotional pay increases have been lower than the 2008 assumption for members with service of around 15 years or more. For members with less service, the 2008 scale broadly matched experience.
- 9.9 The results of this analysis should be treated with some caution. It is, in general, difficult to identify promotional increases separately from other differences in the membership profile.
- 9.10 The recommended assumption makes no allowance for the impact of the freeze on progression increases, the removal of competency threshold payments or other changes to police pay resulting from the Winsor review. Given the significant uncertainty around future levels of pay, both from progression/promotional increases and general earnings increases, we consider that the existing pay profile provides the most relevant evidence in setting assumptions about future pay progression.

Financial impact

- 9.11 The approximate financial impact of the proposed change to the promotional salary increase assumption is set out in Table 9.1.

Table 9.1: Approximate impact of proposed change in promotional salary increase assumption

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Changes from 2008 to 2012 proposed assumptions	-0.6%	-1.1%	Not a feature of the scheme

* (adjustment to contribution rate for 15 years from 2015)



10 Commutation of pension for cash at retirement

This chapter sets out our recommendation for the assumed levels of pension commutation at retirement, the rationale for those assumptions and their financial impact.

Proposed assumptions for 2012 valuation

- 10.1 We recommend that members are assumed to commute the following proportions of their 2015 scheme pensions for cash. The assumptions are the same for men and women.

Table 10.1: Recommended commutation assumptions for the 2012 valuation

Member with service in the following schemes	PPS/NPPS only	Mixed PPS and 2015 scheme		Mixed NPPS and 2015 scheme		2015 scheme only
		PPS	2015	NPPS	2015	
Scheme pension commuted from	PPS/NPPS	PPS	2015	NPPS	2015	2015
All members	0%	0%	0%	0%	15% ²⁶	15% ²⁶

Previous assumptions

- 10.2 In the PPS, members have the option to commute pension for a cash lump sum at retirement. In the NPPS, members receive an automatic lump sum but have the option to exchange some of this for higher annual pension payments. Under both schemes the terms under which these options are offered are actuarially equivalent to the benefits (and so the rate of commutation within these schemes is not expected to impact the cost of providing the schemes). As such, for simplicity no allowance for members exercising these options was made in the 2008 Assessment.
- 10.3 When carrying out the cost ceiling work it was assumed (on direction by HMT) that all members would commute 19.6% of their 2015 scheme pension for cash at retirement.

²⁶ Specified by HMT Directions



Use of the assumption

- 10.4 In the 2015 scheme, members may commute part of their pension for a lump sum at a rate of £12 for each £1 of pension given up. In this scheme, the assumption about the amount of pension commuted is important because the value of the pension given up, as assessed using the actuarial assumptions underlying the valuation is, on average, more than £12 and so commutation has a significant impact on total liabilities, contribution rates and the cost cap. Differences between assumed and actual commutation experience in the 2015 scheme will feed through into the cost cap fund but commutation experience in the PPS and rates of exchange of lump sum for pension in the NPPS will not.

Derivation of proposed assumptions

- 10.5 The assumption for commutation of 2015 scheme service by new entrants to that scheme and NPPS members who move across is directed by HMT.
- 10.6 The recommended assumption for members with mixed PPS and 2015 scheme service is based on reasonable arguments about the behaviours of these members, in the absence of experience.
- 10.7 Details of the derivation of the recommendations are contained in Appendix I.

Financial impact

- 10.8 The approximate financial impact of the proposed change to the commutation assumption compared to that used for the cost ceiling work is set out in Table 10.2.

Table 10.2: Approximate financial impact of proposed change in commutation assumption

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Change from cost ceiling assumption to 2012 proposed assumption	No change in assumption	No change in assumption	+0.4%

* (adjustment to contribution rate for 15 years from 2015)

- 10.9 As commutation is cost neutral in the PPS (as is exchange of lump sum for pension in the NPPS), the only assumption that can be set by the Secretary of State that will impact upon the valuation results is the level of commutation of 2015 pension by PPS members who join the 2015 scheme. If these members also commuted 15% of their 2015 scheme pension then the contribution rate over 2015-19 would be about 0.6% lower than under the recommended assumption that they do not commute any 2015 scheme pension.



11 Family statistics

This chapter sets out our recommendation for the assumptions around dependants' pensions, the rationale for those assumptions and their financial impact.

Proposed assumptions for 2012 valuation

11.1 We recommend the following assumptions.

Table 11.1: Recommended proportions married/partnered

	PPS		NPPS and 2015 scheme	
	Proportion married		Proportion partnered	
	Males	Females	Males	Females
Current pensioners age 65 or above	100% ONS rates	100% ONS rates	100% ONS rates	100% ONS rates
Current pensioners below age 65	Based on 105% ONS rates	Based on 105% ONS rates	Based on 105% ONS rates	Based on 105% ONS rates
Future pensioners at retirement	80%	75%	85%	80%

- > Male members are assumed to be three years older than their female partners and female members are assumed to be three years younger than their male partners.
- > No allowance is made for remarriage on the grounds of materiality.

Previous assumptions

- 11.2 The assumed proportions married/partnered are lower than adopted for the 2008 Assessment, particularly for older members.
- 11.3 Assumptions for proportions married/partnered were previously framed around the members' age at death. The recommended approach for the 2012 valuation is to assume a proportion married/partnered at the valuation date, for current pensioners, or at retirement, for future pensioners. (The financial impact of the change in assumption, see Table 11.2, is driven by the general reduction in the proportions assumed to be married/partnered and not this change in approach.)
- 11.4 Males were assumed to be three years older than females.
- 11.5 No allowance was made for remarriage in the 2008 Assessment.



Use of the assumption

- 11.6 Dependants' pensions²⁷ are provided to qualifying dependants on the death of a member. In the PPS, dependants' pensions are payable to legal spouses and civil partners only. In the NPPS and 2015 schemes, dependants' pensions are payable to qualifying partners as well as to legal spouses and civil partners. Assumptions are required for the proportion of members who are married or partnered to determine how many dependants' pensions will be paid. Assumptions are required about age differences between members and partnered as this affects how long dependants' pensions will be paid for.
- 11.7 In the PPS, a surviving dependant's pension ceases upon remarriage. In the NPPS and the 2015 scheme, this is not the case and benefits continue to be paid following remarriage. Remarriage experience does not impact the cost cap mechanism.

Results of analysis

- 11.8 Approximately 7,300 pensioners died during the four-year period to 31 March 2012. Data provided for around 4,900 deaths of male former PPS members is suitable for analysis of proportions married. We analysed the proportion of deaths giving rise to the payment of a surviving dependants' pension. Data provided for around 4,300 deaths of male former PPS members is suitable for analysis of the age differences between members and their surviving dependants. Details of the analyses are contained in Appendix J.
- 11.9 Our analysis was carried out on PPS male members, where only legal spouses or civil partners qualify for dependants' pensions. The analysis showed significantly fewer members left a surviving dependant than expected under the assumption adopted for the 2008 Assessment.
- 11.10 Analysis showed that the PPS male member experience was more closely aligned with the population proportions married,²⁸ particularly at older ages.
- 11.11 To formulate a recommended assumption we considered what adjustment to the population proportions married would provide the closest comparison with actual experience. One particular advantage of this approach is that it leads to a straightforward way of setting the assumption for the proportion married or partnered (required for NPPS and 2015 scheme members) by making use of the ONS statistics on cohabitation.
- 11.12 The recommendations for age differences between members and their partners are consistent with the results of the analysis. As such, we have not recommended any change from the assumptions adopted for the 2008 Assessment.

²⁷ Pensions are also payable to dependent children on a member's death but the costs are not material overall.

²⁸ Published by the Office for National Statistics (ONS).



11.13 There were only 131 reported remarriages of around 23,000 dependants (0.1% per year) over the four-year period to 31 March 2012. Detailed analysis has not been carried out on the remarriage experience because remarriage at this level will have only a small impact on the valuation results. Not allowing for remarriage will slightly overstate liabilities, possibly resulting in an increase in the contribution rate of 0.1% of salaries from 2015 compared to allowing for remarriage at its recent level (though note that additional contributions in the short term would be offset by lower contributions as small profits emerge on remarriage going forward). The impact on the standard contribution rate would be immaterial.

Financial impact

11.14 The approximate financial impact of the proposed changes to the family statistics assumptions compared to the 2008 assumptions are set out in Table 11.2.

Table 11.2: Approximate financial impact of proposed changes in family statistics assumptions

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Change in proportion married/partnered	-1.0%	-0.2%	-0.2%

* (adjustment to contribution rate for 15 years from 2015)



Appendix A: Summary of assumptions

Table A1: Summary of recommended assumptions consistent with the 'best estimate' requirement

Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 Assessment	
			Past service	SCR (2015-19)
Pensioner baseline mortality²⁹	Aligned to standard SAPS table ^{30, 31}			
Normal health	103% x S1NXA	In line with 2008-2012 male ³⁴ member experience ³⁵ <i>see graphs C4 and C5, page 52</i>		
Ill-health (current)	140% x S1NXA			
Ill-health (future)	100% x S1IXA	In line with experience of UK self-administered pension schemes due to lack of Scheme experience on which to base this assumption.	-0.6% ³²	Immaterial ³³
Dependants	100% x S1NXA	In line with 2008-2012 female ³⁶ dependant experience <i>see graph C6, page 53</i>		

²⁹ As directed by HMT, improvements in mortality from 2012 are assumed to be in line with those underlying the most recent ONS population projections.

³⁰ SAPS tables are published by the Actuarial Profession and based on the experience of self-administered pension schemes over the period 2000 to 2006. The 'S1' series has separate standard tables based on experience of members retiring in normal health (S1NXA) and in ill health (S1IXA) and for dependants (S1DFA).

³¹ Adjusted to 2012 to take account of improvements in population mortality using rates derived from the UK Interim Life Tables (and ONS population projections from 2012).

³² Includes the baseline changes for all pensioner groups and the change to future mortality improvements.

³³ Changes are considered immaterial if their expected impact on the contribution rate is less than 0.05%.

³⁴ Assumptions for both genders based on male member experience as insufficient female member data on which to base an assumption.

³⁵ Scheme experience was compared to relevant SAPS tables adjusted to take account of improvements in population mortality between 2002 (the base year for the tables) and 2009/2010 (the central years of our period of analysis) derived using mortality rates from the UK Interim Life Tables.

³⁶ Assumptions for both genders based on female dependant experience as insufficient male dependant data on which to base an assumption.



Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 Assessment	
			Past service	SCR (2015-19)
Age retirement				
PPS protected and tapered	Age and service based rates, with many retiring on reaching 30 years' service and all retiring by age 60	In line with 2008-2012 experience <i>see graph D1, page 56</i>	Immaterial	Immaterial
PPS unprotected	No retirements before age 55. Age and service based rates, with many retiring at age 55 or 30 years' service if later. For example, for members entering at 20/25/30, 97%/90%/22.5% are assumed to retire at age 55. All assumed to retire by age 60.	PPS provides a sizeable tax-free lump sum benefit of nearly four times pay (for full service in PPS) which can be available before age 55. However, there is a significant disincentive of leaving the 2015 scheme before age 55 (retirement age effectively increases from 60 to SPA). The minimum past service in 2015 for these members is 9 years so the potential lump sum is still a very sizeable amount even if only linked to service up to 2015 from which point accruals will be under the 2015 scheme. So it is very reasonable to expect high take-up of age retirement at 55 for these people. There is, however, no relevant evidence yet.	-0.1%	New assumption



Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 Assessment	
			Past service	SCR (2015-19)
NPPS (all members)	About 29% retire at 55, 2% retire each year between 56 and 59 and about 62% retire at 60	<p>Unlike PPS, the lump sum at age retirement for pre-2015 service might only be half the equivalent under PPS for equivalent service. Also, these members have less past service than PPS members. It is, therefore, to be expected that there will be much lower take up of earlier retirement than for PPS who move to the 2015 scheme and instead more akin to the 2015 scheme but perhaps slightly earlier.</p> <p>There is no relevant evidence yet. We have therefore opted for part way between the 2008 assumptions and the assumptions for new entrants from 2015, weighted 5/6 towards the latter to reflect approximate periods of service in the two schemes.</p>	Immaterial	Immaterial / New assumption ³⁷
New entrants from 2015	About 25% retire at 55 and remainder retire at 60	No relevant evidence. Proposal makes a reasonable allowance for the take up of benefits at the earliest time at which they become available and is in line with the cost ceiling assumption. To be kept under review.	No past service	New assumption

³⁷ Immaterial for protected members and new assumption for unprotected members.



Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 Assessment	
			Past service	SCR (2015-19)
Ill-health retirement				
Incidence	Increasing by age: 0.01%/0.1% (M/F) at age 30, 0.1%/0.4% at age 40, 0.9%/1.3% at age 50, 1.6%/2.1% at age 59	25% higher than 2008-2012 experience to allow for forces no longer placing officers on back office duties, not adjusted for further improvements in health <i>see graphs E3 and E4, page 63</i>	+0.1% ³⁸	+0.3% ³⁸
Upper/lower tier ³⁹ split	Half on upper tier, half on lower	Pragmatic assumption given very little relevant evidence. In line with cost ceiling assumption. To be kept under review.		
Withdrawal	Decreasing by age: < 3% at all ages, < 1.5% above age 25, <1% above age 38(M)/42(F)	In line with 2005-2012 experience <i>see graphs F5 and F6, page 69</i>	-0.3%	-0.3%
Death before retirement				
	Aligned to UK Interim Life Tables 2008-2010 ('ONS tables')			
Males	29% of ONS tables	In line with 2008-2012 experience, not adjusted for future improvements in mortality	Immaterial	Immaterial
Females	50% of ONS tables	<i>see graphs G3 and G4, page 73</i>		

³⁸ Combined impact of changes to incidence and split between tiers.

³⁹ Ill-health benefits in the NPPS (and in the 2015 scheme) operate on a two-tier basis. Upper-tier benefits contain a top-up pension and are awarded to members unable to engage in any regular employment. Ill-health benefits in the PPS operate on a single tier.



Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 Assessment	
			Past service	SCR (2015-19)
Promotional salary scale	Service based scale: about 4% a year in years 0 to 5, 2-3% a year in years 6 to 12 and 1% per year to 29 years and 0% per year thereafter	In line with scheme data at 31 March 2008 and 31 March 2012 <i>see graph H1, page 76</i>	-0.6%	-0.3%
Commutation				
PPS protected	0% of pension commuted	Cost neutral commutation terms	No change	No change
NPPS protected	0% of pension commuted	Commutation unavailable	No change	No change
New entrants from 2015	15% of pension commuted	HMT Directions	No past service	New assumption
PPS unprotected and tapered	0% of both 2015 scheme and PPS pension commuted	Reasonable approach given that PPS offers a significantly greater lump sum for pension given up	No change	New assumption
NPPS unprotected and tapered	15% of 2015 scheme pension commuted and 0% of NPPS pension commuted	HMT Directions for 2015 scheme Commutation unavailable in NPPS	No change	New assumption



Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 Assessment	
			Past service	SCR (2015-19)
Family statistics				
Proportion married	80% (M), 75% (F) at retirement (consistent assumptions for existing pensioners)	Comparative level of scheme experience against ONS statistics <i>see graph J1, page 79</i>	-1.0% ⁴⁰	-0.2% ⁴⁰
Proportion partnered	85% (M), 80% (F) at retirement (consistent assumptions for existing pensioners)	Comparative level of scheme experience against ONS statistics		
Age difference	Males 3 years older than female partners	In line with 2008-2012 experience <i>see graph J2, page 81</i>	No change	No change
Remarriage	No allowance	Simplification on grounds of materiality	No change	No change

⁴⁰ Combined impacts of changes to proportions married and partnered.



Appendix B: Details of assumptions

B.1 This appendix contains details of the recommended assumptions including sample rates and values.

Pensioner mortality

Table B1: Baseline mortality assumptions

Baseline mortality	Standard table ⁴¹	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%

B.2 As specified by HM Treasury, future improvements in mortality will be assumed to be in line with those underlying the 2012-based ONS population projections.

⁴¹ 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 and ill health and for dependants.



Age retirement from service

Table B2: 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 B3: 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 B4: 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 B5: 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



III-health retirement from service

Table B6: III-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

Voluntary withdrawal from service

Table B7: 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



Death before retirement

Table B8: 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 B9: Promotional salary scales for all 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 B10: Recommended commutation assumptions for the 2012 valuation

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
	PPS/NPPS	PPS	2015	NPPS	2015	2015
All members	0%	0%	0%	0%	15%	15%

Family statistics

Table B11: Recommended proportion married or partnered at retirement for future pensioners

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

Table B12: Recommended proportion married or partnered for current pensioners (at the valuation date)

Age	PPS		NPPS and 2015 scheme	
	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%

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



Appendix C: Analysis of pensioner mortality

Type of analysis

- C.1 Provided adequate data is available, mortality can be analysed on either a 'lives' basis or an 'amounts' basis:
- > A 'lives' basis gives an equal weighting to every member of the population being analysed.
 - > An 'amounts' basis weights the experience by the size of each member's pension (with the longevity of those with larger pensions given more of a weighting).
- C.2 There is much evidence⁴² to demonstrate that the size of pension is positively correlated with longevity, ie on average those with bigger pensions live longer. For a population with significant variation in the characteristics of the membership and in the amounts of pension being paid, an 'amounts' mortality analysis is generally expected to show lower rates of mortality than a corresponding 'lives' analysis.
- C.3 The valuation data supplied by the administrators of each of the police forces provided data on the number of deaths that occurred during the four-year observation period, but did not include the pension amounts at death (which would be needed for an 'amounts' analysis). Hence, we have carried out our analysis on a 'lives' basis. We consider this to be a suitable method for the Schemes, as the underlying population in the Schemes is largely homogeneous, and so pension amounts are less widely spread than would be the case in a more diverse scheme. However, if the amounts data were available it is likely that analysis would lead to different mortality rates.

Method – comparisons made with the observed deaths

- C.4 We have compared the observed mortality experience of the Schemes between 1 April 2008 and 31 March 2012 with:
- > the expected experience, had the assumptions used for the 2008 Assessment been borne out in reality; and
 - > the expected experience under the most appropriate standard S1 mortality table.
- C.5 Since the S1 tables do not include allowance for improvements in mortality, in comparing with the Schemes' experience we have adjusted the standard tables to be applicable to the period over which the deaths occurred. The adjustments applied are derived using mortality rates from the UK Interim Life Tables published by the ONS, and so reflect historical mortality improvements between 2002 and 2010.
- C.6 The comparison of the number of deaths observed to the number expected was carried out at each age.

⁴² For example see CMI self-administered Pension Schemes Mortality Committee, Working Paper 65: *Analysis of the mortality experience of pensioners of self-administered pension schemes for the period 2004 to 2011, April 2013*.



Results

- C.7 The results of this analysis are shown in tables and graphs. The figures shown in the tables set out a comparison of the observed death experience, expected deaths under the assumptions adopted for the 2008 Assessment and the ratios of observed deaths to expected deaths.
- C.8 The tables show the ratios of observed deaths to expected deaths. A ratio lower than 100% implies fewer deaths occurred than expected. A ratio over 100% indicates more deaths occurred than expected. Therefore, an adjustment to the standard tables of less than 100% represents lower assumed mortality rates than in the standard table, and vice versa.
- C.9 Individual member data was provided by the police forces. Where appropriate, we have grouped this data by age.

Comparison 1: Observed number of deaths compared to the 2008 assumptions

Table C1: Observed and Expected deaths over period 2008 – 2012

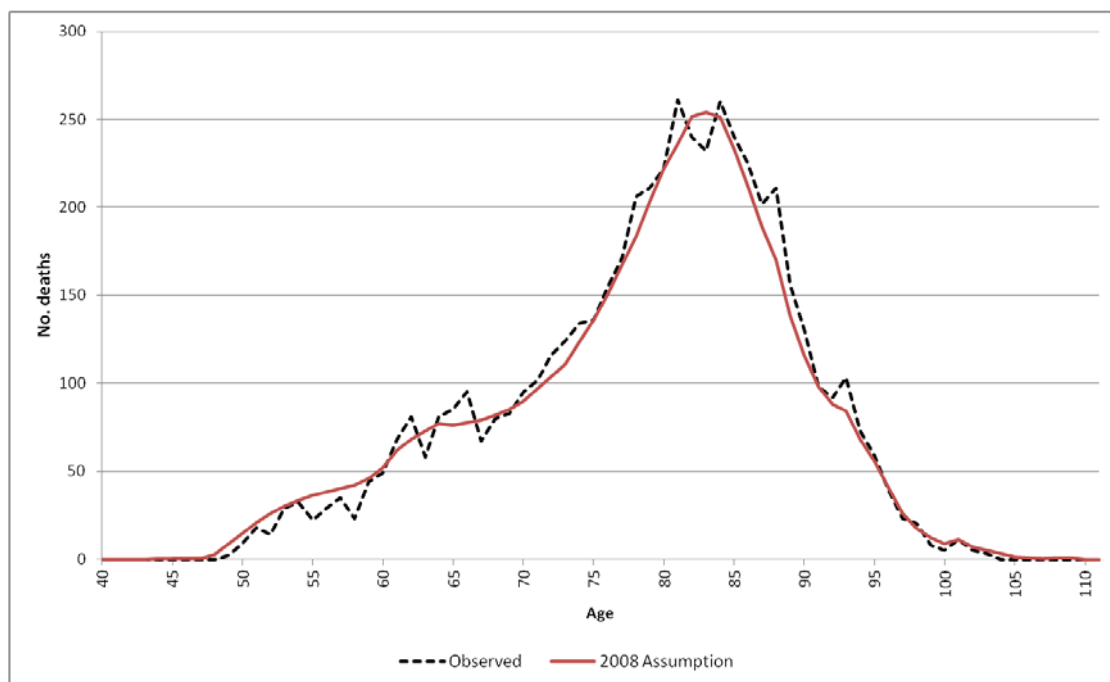
Member category	Observed deaths 2008-2012	Expected deaths 2008-2012 (based on 2008 assumptions)	Observed deaths ÷ expected deaths
Males			
Normal health	5,372	5,235	103%
Ill-health	1,688	1,624	104%
Dependants	16	Dataset too small	Dataset too small
Females			
Normal health	128	Dataset too small	Dataset too small
Ill-health	96	Dataset too small	Dataset too small
Dependants	3,853	3,868	100%

- C.10 There is insufficient data to carry out a credible analysis for male dependants, female normal-health retirements and female ill-health retirements.
- C.11 The graphs below show the results as above by age. These demonstrate that mortality experience for male normal-health retirements (graph C1) has been broadly similar to the previous assumption at most ages. For male ill-health retirements (graph C2), experience has been heavier than expected, particularly at younger and older ages. For female dependants (graph C3), experience has been broadly as expected.



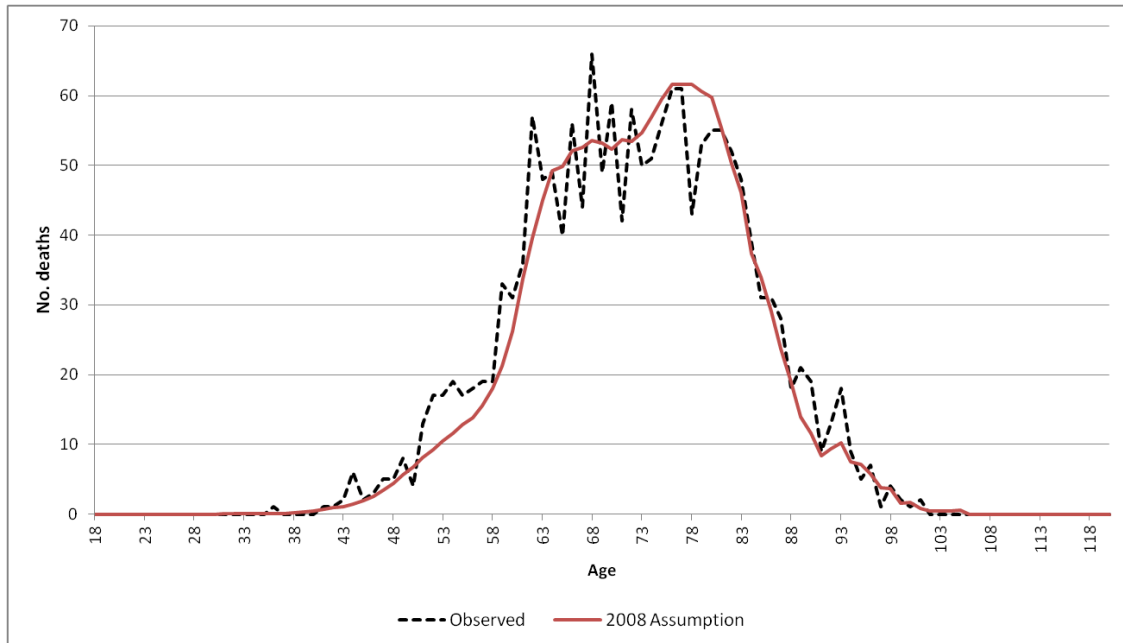
- C.12 Table C1 above considers the whole mortality experience. It is appropriate to consider the age range over which the experience is most relevant. It is also appropriate to consider whether there are any reasons why the whole range of experience may not form an appropriate measure of future expectations.
- C.13 In the case of ill-health retirements, the above comparison ignores the impact of the “select” mortality basis adopted for the 2008 Assessment (whereby a heavier rate of mortality was assumed in the first year after retirement). Thus for this group the implied heavier mortality experienced relative to the assumptions is slightly misleading. In addition, there has been a significant reduction in ill-health awards in recent years and changes to the basis of award - in particular the introduction of the two-tier ill-health arrangements in the NPPS. We do not hold sufficient data on those retiring under the current ill-health arrangements to carry out a credible mortality analysis for these alone but these changes are likely to mean that the experience of more recent retirements (typically younger pensioners) is unlikely to be aligned to experience at older ages which relate to those who retired under the previous provisions.

Graph C1: Male normal-health retirements

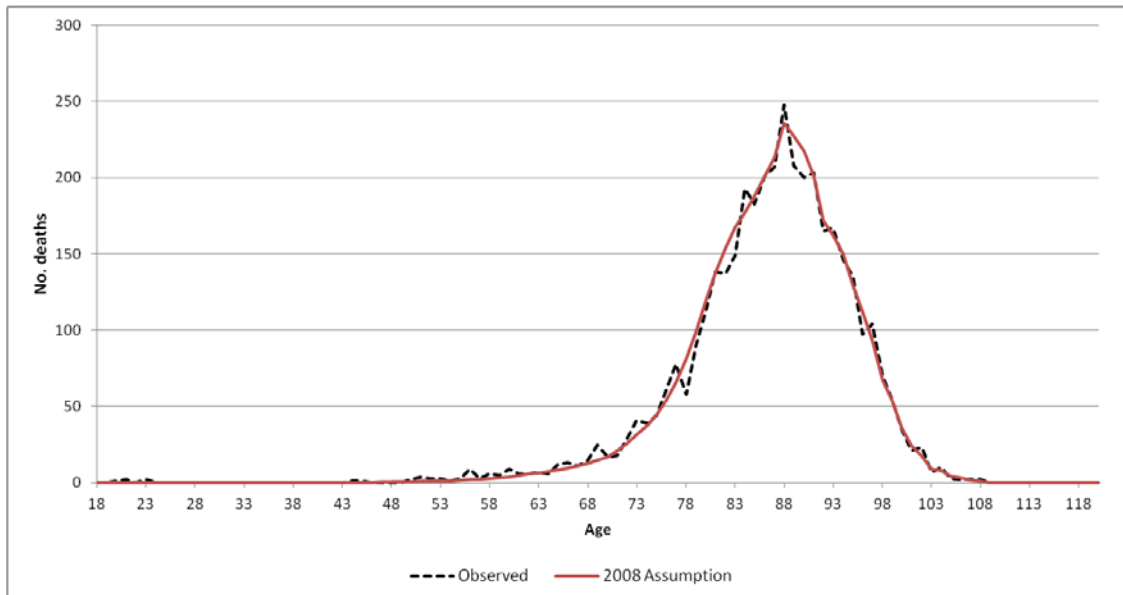




Graph C2: Male ill-health retirements



Graph C3: Female dependants



Comparison 2: Observed experience compared to the most appropriate standard table

- C.14 In the second of our two comparisons, we compared the mortality experience of the Schemes, between 1 April 2008 and 31 March 2012 (again on a 'lives' basis), with that of the most appropriate S1 table.



- C.15 In comparing experience to the standard tables we have sought the 'best fit', ie the adjustment, if any, required to the standard tables' rates to provide the best match of experience to assumptions. The results are as shown in Table C2 below.

Table C2: Adjustment to S1 tables to provide best fit to experience

Member category	Standard table	Adjustment
Males		
Normal health	S1NMA	103%
Ill-health	S1NMA*	140%
Dependants	Dataset too small	Dataset too small
Females		
Normal health	Dataset too small	Dataset too small
Ill-health	Dataset too small	Dataset too small
Dependants	S1NFA**	100%

* A comparison against the ill-health table (S1IMA) was also carried out but the normal life table (S1NMA) proved a better comparator to the experience.

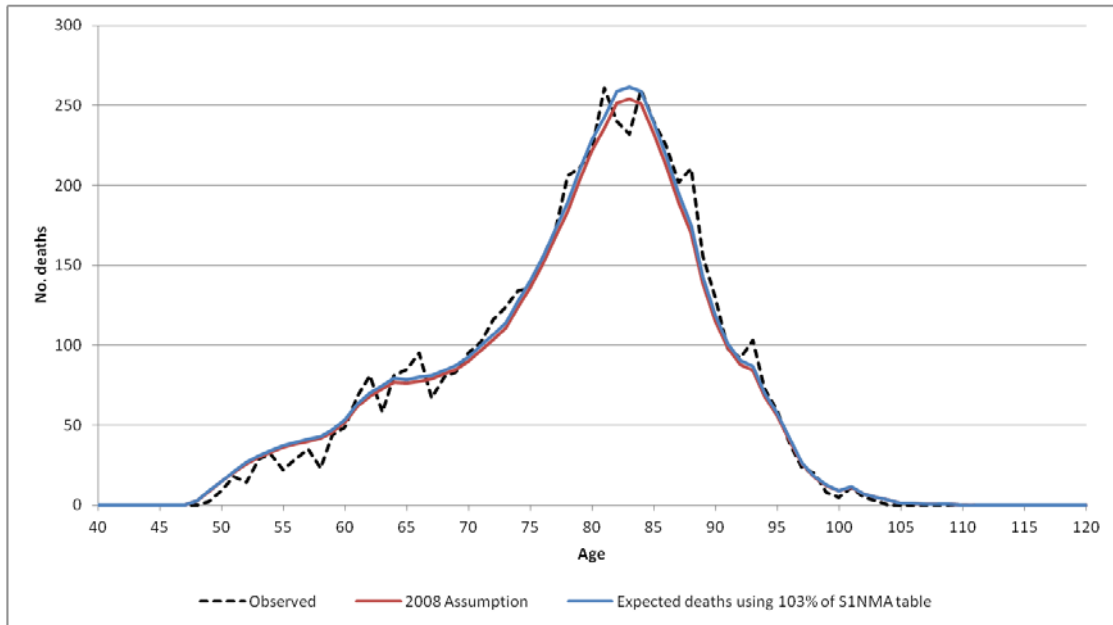
** A comparison against the dependant table (S1DFA) was also carried out but the normal life table (S1NFA) proved a slightly better comparator to the experience.

- C.16 The graphs below show how the experience over 2008 to 2012 compares to the adjusted standard tables as above by age⁴³ as well as the 2008 assumption discussed above.
- C.17 For normal-health retirements, the proposed adjustment fits reasonably well with experience, particularly over the age range 65 to 85, where the majority of the pensioner population and deaths lie (see graph C4)
- C.18 For ill-health retirements (graph C5), the proposed adjustment fits reasonably well with the experience at ages over normal pension age. The spread of deaths appears more volatile than that for the normal health retirements; this is because there are fewer deaths overall. At earlier ages there is evidence of heavier mortality than expected: presumably as a result of the more stringent criteria now applied for medical retirements.
- C.19 For female dependants (graph C6), the proposed adjustment fits reasonably well with experience for all ages.

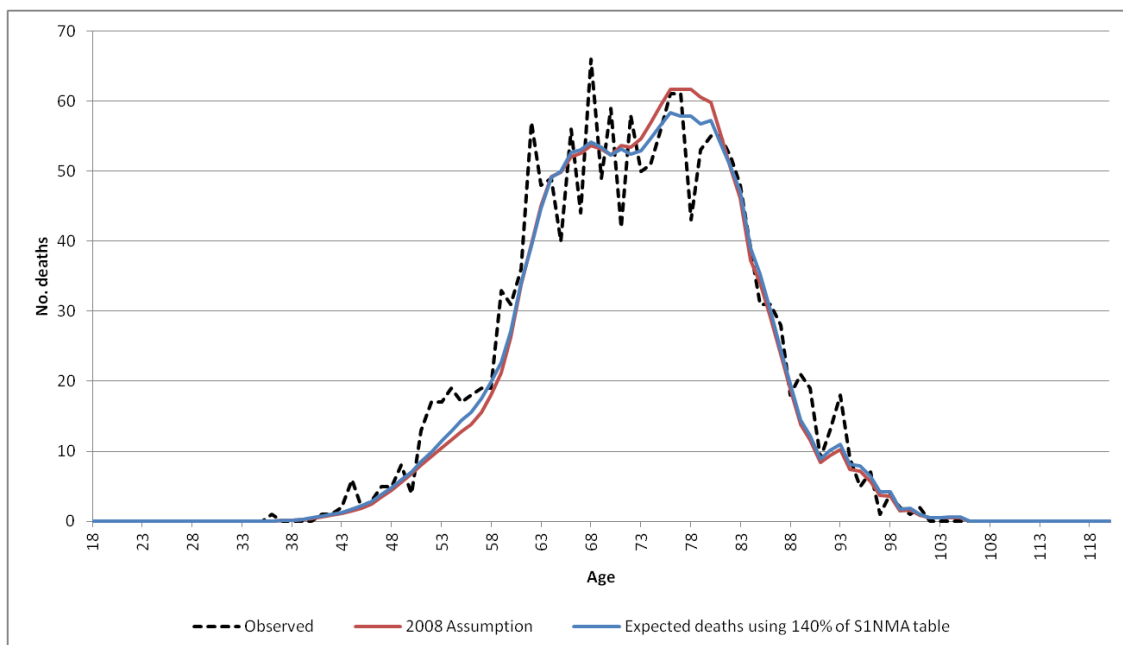
⁴³ Adjusted to those applicable to the period the deaths occurred by applying adjustments broadly in line with the improvements applying to the UK population over the relevant period.



Graph C4: Male normal-health retirements

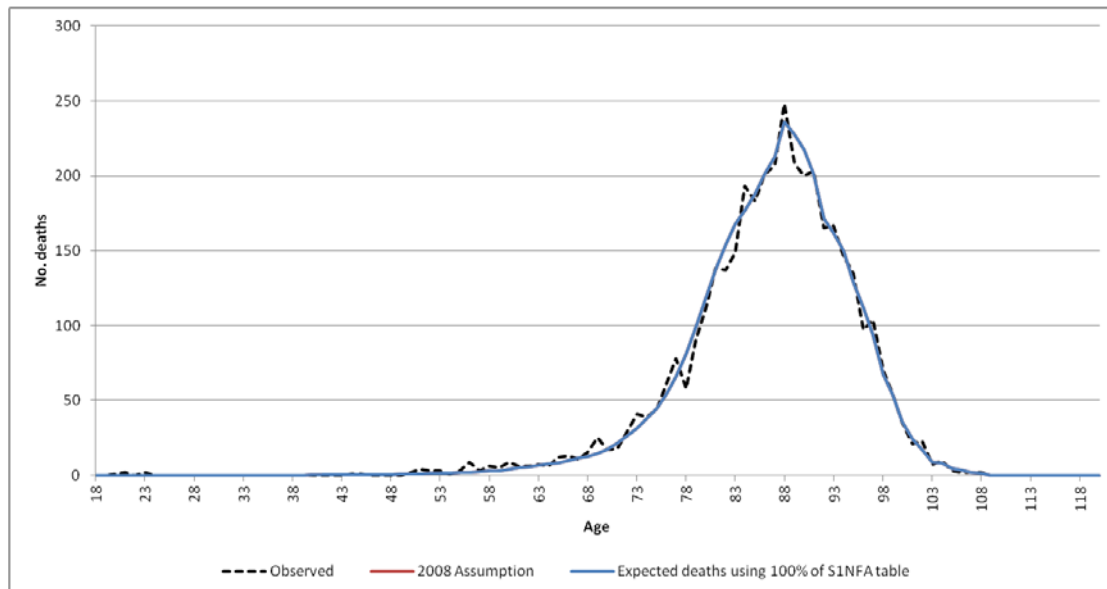


Graph C5: Male ill-health retirements





Graph C6: Female dependants



NB the 2008 Assumption (red line) is hidden below the blue line since these two assumptions are the same

Baseline mortality

- C.20 We recommend adopting assumptions of baseline pensioner mortality in line with the best fit against the standard S1 tables, as set out in Table C2 above, for current pensioners.
- C.21 There is insufficient data to carry out a credible analysis for male dependants, female normal-health retirements and female ill-health retirements. We recommend applying the same adjustment to the relevant gender-specific standard table for all members of the same category (eg 103% applies to S1NMA and S1NFA for normal retirements).
- C.22 We do not hold sufficient data on those retiring under the current ill-health arrangements to carry out a credible mortality analysis. Therefore, we need to take a pragmatic approach to setting the assumption for the mortality of future ill-health pensioners.
- C.23 Two possible approaches are:
- > Assume mortality in line with the S1IA tables (which are based on the ill-health experience of certain private sector pension schemes).
 - > Adjust the S1IA tables by the same proportion as S1NA tables are adjusted for normal health pensioners.
- C.24 A justification for the first approach is that the ill-health criteria in the public and private sector pension schemes are now likely to be similar. Ill-health mortality is likely to be driven primarily by the illness rather than the type of work the people were doing. If we have a similar set of illnesses in the Schemes and the private sector then the mortality should be broadly similar.



- C.25 A justification for the second approach is that we know mortality differs between workforces. We might reasonably expect to see differences between groups of ill-health pensioners. In the absence of other evidence, the difference between groups of normal-health pensioners might provide a guide to the difference between corresponding groups of ill-health pensioners.
- C.26 The relatively low level of ill-health retirement means that the choice of assumption is not particularly material. We recommend using the first approach.



Appendix D: Analysis of age retirement from service

Process for setting assumptions

D.1 A reasonable process is:

- > Set assumptions for members with full protection by reference to the recent retirement experience in the Schemes.
- > Set assumptions for new entrants to the 2015 scheme by considering any relevant evidence. This is not simple. The available experience in the Schemes relates to benefits with different payment ages: unreduced pensions are available from age 48 in the PPS, dependant on service, and from both current schemes from age 55 regardless of service compared with age 60 in the 2015 scheme. In addition, there are no early retirement provisions from active service in the existing schemes but these do exist in the 2015 scheme.
- > Set assumptions for members with mixed service (ie service in one of the existing schemes and the 2015 scheme) relative to the assumptions for members with service in only one of the schemes. Again this is not a simple task because there are many factors that could affect the relative behaviours of the groups.

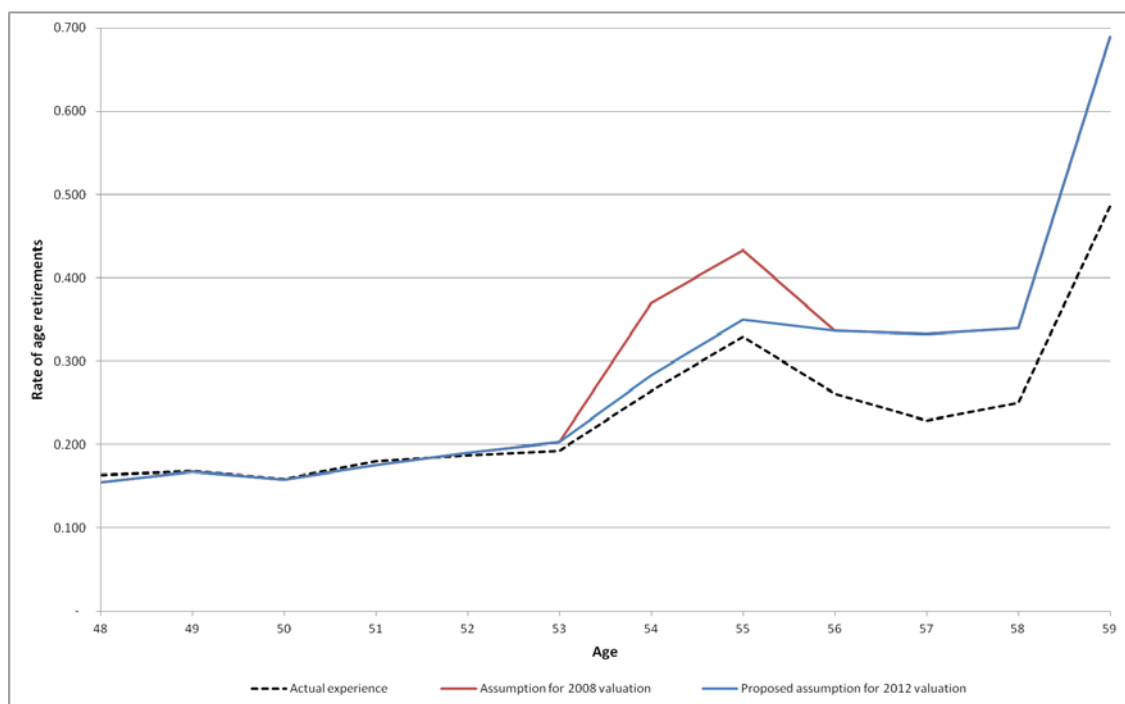
Members with full protection

- D.2 We have analysed the pattern of age retirements from active membership over the four-year period to 31 March 2012 for members of the PPS. The analysis compares the actual rates of age retirement to the expected rates under the assumptions adopted for the 2008 Assessment.
- D.3 Insufficient data exists to perform a credible analysis of the NPPS experience.
- D.4 The graph below shows the actual rate of age retirements (grouped by age nearest at the start of the year of retirement) compared with the 2008 assumption.
- D.5 The experience over the period has been in line with the 2008 assumption for ages below 55. However, actual age retirement rates have generally been lower than expected under the 2008 assumption between ages 55 and 58, and higher than expected at age 59.
- D.6 The retirement rate at age 55 under the 2008 assumption is consistent with the experience over the three-year period to 31 March 2008. However, in the last four years the actual retirement rate has reduced for members with less than 30 years' service. It is not clear why the rate has reduced or whether it will remain at the lower rate, but we consider the more recent experience to be the most relevant in the absence of a specific reason to believe it will not be representative of future experience.



- D.7 The provisions of the PPS mean that many members have retired by the age of 55, so that the data underlying the actual rates at higher ages is more sparse, and so we see more volatile experience. Although there is some deviation in the actual rates of retirement against those expected under the 2008 assumption, the differences in the expected numbers of retirements is small. Therefore, we have not recommended any changes to the rates above age 55.
- D.8 The recommended assumption for the 2012 valuation is shown below.

Graph D1: Age retirement rates (PPS males and females)



New entrants to the 2015 scheme

- D.9 In the absence of directly relevant experience, a pragmatic approach to setting this assumption is required. There are a number of ways that this assumption could be set and no approach is clearly better than all others. Our recommended assumption is:
- > 25% of members reaching age 55 are assumed to retire immediately; and
 - > all remaining members will retire at age 60.
- D.10 The assumption is intended to make a reasonable allowance for the take-up of benefits at the earliest time at which they become available (with reduction for early payment) and is the same assumption that was adopted for costing the 2015 scheme.
- D.11 As experience in this Scheme develops the assumption will be reviewed.



Members with service in the existing schemes and the 2015 scheme

- D.12 Lack of evidence or relevant experience makes it difficult to predict members' future retirement patterns. A pragmatic approach allowing for the evidence that is available and reasoning about members' future behaviour is therefore required. The approach outlined below is intended to be unbiased.
- D.13 As is currently the case, both age and service are likely to influence members' retirement decisions. The relative levels of service in the two schemes is also likely to influence the age of retirement.
- D.14 HM Treasury advice is to assume that retirement patterns will generally change smoothly and gradually over time. However, the advice acknowledges that less smooth changes may be expected when active and deferred pension ages differ, as is the case for the police pension schemes. This particularly affects the consideration of retirements before age 55 (see paragraph D.16 below). Where members would not be expected to retire before age 55, we consider a gradual change to be a reasonable approach. However, applying this directly would result in very complicated assumptions. Where we do apply this approach, we propose that a single set of assumptions applies to all members of a particular group based on their average characteristics.
- D.15 It is appropriate to consider separately the PPS and NPPS members who will join the 2015 scheme because of the different structures of the existing schemes and the different characteristics of their existing memberships, eg NPPS members have relatively little service compared to PPS members.
- D.16 For members with PPS service, the attainment of 30 years' service (and the associated attainment of the maximum accrual rate and entitlement to convert 25% of pension to lump sum) is currently a significant trigger for members to retire between ages 48 and 54. A small proportion of members also retire before age 55 with between 25 and 30 years' service. In the future, there are two main disincentives for members to retire before age 55:
- > Immediately available income will be lower. Retirement before age 55 will only give members access to their PPS pension; benefits accrued in the 2015 scheme will not be payable until age 55 at the earliest.
 - > Retirement before age 55 will significantly reduce the value of benefits accrued in the 2015 scheme. Retirement from the PPS can only occur with simultaneous withdrawal from the 2015 scheme. Withdrawal from the 2015 scheme results in a pension age for 2015 scheme pension of SPA, rather than age 60.
- D.17 Members who retire from active service at age 55 or above will be eligible for early retirement from the 2015 scheme with reduction for early payment with reference to age 60. This will act as an incentive for members to remain in the Scheme until age 55.



- D.18 The NPPS retirement rates adopted for 2008 Assessment (which were unchanged from those set by HM Treasury for costing the scheme on its introduction in 2006) vary by age at joining. There was an increase in the retirement rate for members reaching 35 years' service as this is the maximum accrual in the NPPS. In the 2015 scheme there is no cap on service, so it is appropriate to consider the set of retirement rates that applied to members who do not reach 35 years' service.
- D.19 In the NPPS retirement rates adopted for 2008 Assessment there was an assumption that a small number of members (approximately 10%) would retire after age 60. In order to align the NPPS and new entrant assumptions it has been assumed that any member reaching age 60 will retire immediately.
- D.20 We recommend the following assumptions for members who transfer to the 2015 scheme.
- Unprotected PPS members:*
- D.21 No members will retire before age 55. For the reasons given above it is reasonable to assume that the majority of members with PPS service will wait until age 55 to retire. Whilst some members may choose to retire before age 55 it is difficult to predict how many. Allowance for members retiring earlier would significantly decrease the value of 2015 scheme accrual and would place a slightly higher value on accrued PPS benefits.
- D.22 Members that joined the scheme before age 25 (and so reach 30 years' service before age 55): Assume that all members who would be expected to retire by age 55 under the protected member assumptions will wait and retire at age 55. On reaching age 55, 97% of these members will be assumed to retire. Retirements after age 55 will be in line with the protected member assumptions.
- D.23 Members that joined the scheme between ages 25 and 29 (and so reach 25 years' service before age 55): Assume that members will wait until age 55, and so there will be no retirements before age 55 (few of these members were previously assumed to retire before 55 in any case). Retirements on or after age 55 will be in line with the protected member assumptions.
- D.24 Members that joined the Scheme on or after age 30: Blend the current PPS assumption with the 2015 scheme assumption in a 1:1 ratio, based on the average levels of PPS and 2015 scheme service.
- PPS members with tapered protection:*
- D.25 Assume that members will retire in line with the protected member rates. Whilst some members may choose to delay retirement to age 55 it is difficult to predict how many. Allowance for members delaying retirement would significantly increase the value of 2015 scheme accrual and would place a slightly lower value on accrued PPS benefits.



D.26 Tapered members will have accrued a greater proportion of their benefits in the PPS than the unprotected members, so it is reasonable to assume that retirement decisions will be more focused on the availability of PPS benefits for tapered members than for unprotected members.

D.27 The impact of not allowing for some members with tapered protection retiring later is the opposite of not allowing for some of the unprotected members retiring before age 55. Therefore, there will be an offsetting effect between these two simplifications.

All NPPS members

D.28 Blend the 2008 NPPS assumption for members that do not reach 35 years' service before age 60 with the 2015 scheme assumption in a 1:5 ratio, based on the average levels of NPPS and 2015 scheme service.

D.29 There are very few NPPS members with full or tapered protection and so it is not necessary to make separate assumption for these members.



Appendix E: Analysis of ill-health retirement from service

Rates of ill-health retirement

- E.1 We have considered the experience of ill-health retirements over the four-year period to 31 March 2012 for the PPS and NPPS separately. The analysis compares the actual rate of ill-health retirements to the expected rate of ill-health retirements based on the assumptions adopted for the 2008 Assessment.
- E.2 The table below shows the actual number of ill-health retirements in the PPS compared with the expected number of ill-health retirements based on the 2008 assumptions.

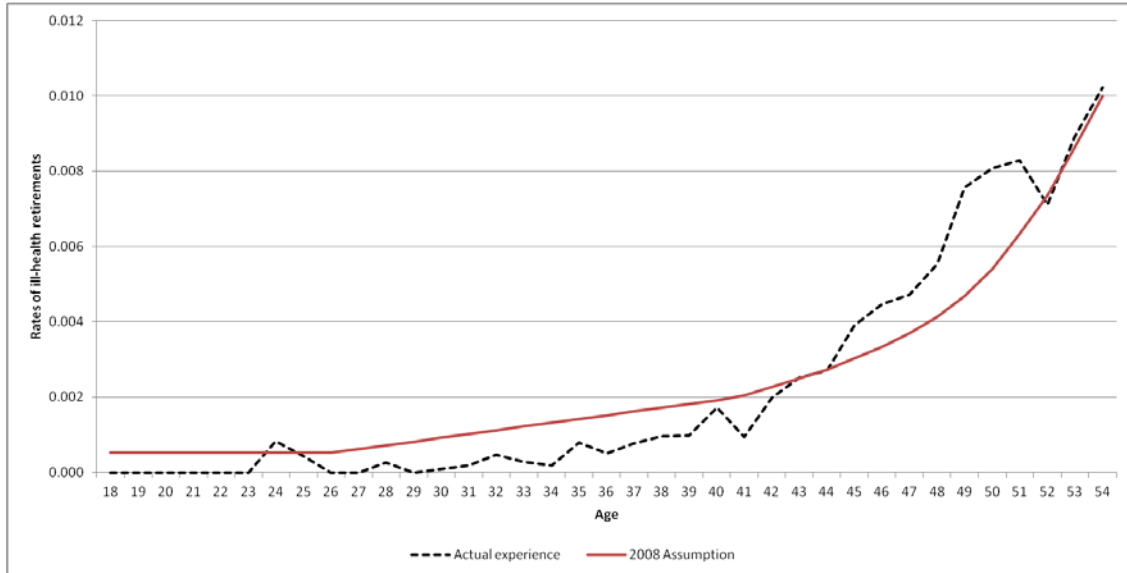
Table E1: Ill-health retirement experience 2008-12 (PPS members)

	Actual retirements	Expected retirements	Actual/Expected
Males	946	901	105%
Females	401	222	180%

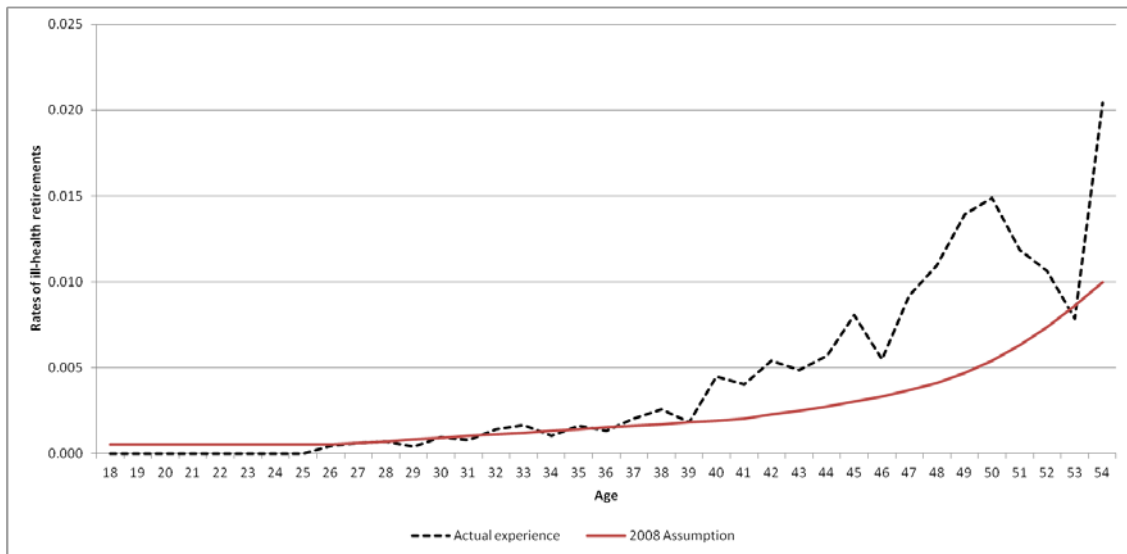
- E.3 Only 9 members retired on ill-health grounds from the NPPS, which was considerably lower than anticipated under the 2008 assumptions and in comparison to the numbers retiring in ill health from the PPS. This is expected to be due to the effect of the introduction of the NPPS from 2006. There is an explicit service requirement of 2 years before a member becomes eligible for ill-health benefits and additionally there is likely to be a lag before health issues result in retirement and award of ill-health benefits. These factors will mean the experience over the period 2008-12, for the NPPS in isolation, are not representative of longer-term expectations. For this reason we have only analysed the PPS experience when determining a recommendation.
- E.4 The graphs below show the actual rates of ill-health retirements of PPS members by age for men and women respectively compared with the 2008 assumptions.
- E.5 For males, graph E1 shows that the general pattern of ill-health retirement rates by age under the 2008 assumptions is not a particularly good fit to the observed rates. The observed ill-health retirement rates were typically lower than under the 2008 assumptions at younger ages but higher at older ages.
- E.6 For females, graph E2 again shows that the general pattern of ill-health retirement rates by age under the 2008 assumptions is not a particularly good fit to the observed rates. Below the mid-20s the observed ill-health retirement rates are lower than under the 2008 assumptions and from the mid-30s they are higher.



Graph E1: Male ill-health retirement experience 2008-12 (PPS)



Graph E2: Female ill-health retirement experience 2008-12 (PPS)



E.7 The number of ill-health retirements increased each year in the four-year period to 31 March 2012. Table E2 shows the number of ill-health retirements in each year.

Table E2: Ill-health retirement experience 2008-12 (all members)

Year	2008/09	2009/10	2010/11	2011/12
Number of retirements	247	298	338	473

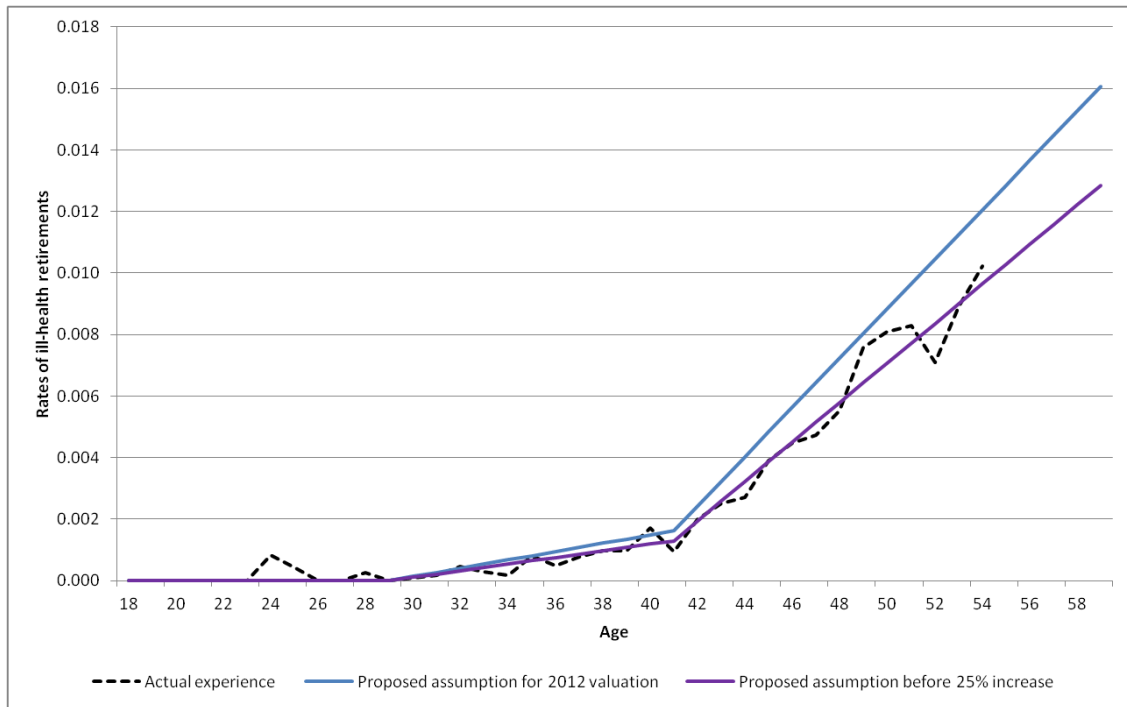


- E.8 Additional data provided by forces indicates that there were around 600 ill-health retirements in 2012/13.
- E.9 It is not clear from the data available whether this increase represents a longer-term trend or whether it is a temporary feature. However, in England and Wales, the Home Office believes that there have been a number of incentives (such as disability discrimination legislation and ill-health capital charges) for forces to place officers in back office roles rather than retire them on ill-health grounds and that the recent increase in ill-health cases is at least partly a result of these officers being removed from back office duties via ill-health retirement, following the Winsor review's recommendation that officers should not be given back office roles if they are no longer fit to perform their duties. This suggests that at least part of the increase will be temporary with rates in the longer-term likely to be below peak levels of retirement but higher than the levels when officers could be placed in back office roles.
- E.10 The average ill-health retirement rate over 2006-2013 was broadly similar to the average over 2008-12 (rates in 2006-8 were similar to the earlier part of the inter-valuation period). If the backlog of ill-health cases from officers on back office duties had been largely cleared by the end of 2012/13 then the average level of ill-health retirement seen over the intervaluation data might be a reasonable estimate of longer-term rates. However, it is also possible that the number of cases shortly after the capital charge was introduced may have been kept down by some retirements being pushed through before the introduction of the charge.
- E.11 It is very difficult to say at this stage whether the backlog has cleared and how future ill-health retirement rates will develop. The Home Office has indicated that they consider it more reasonable to assume a higher level in future than seen over 2008-12 to allow for fewer retentions on back office duties, even if the backlog is largely cleared, and have suggested assuming rates that are 25% higher than over 2008-12. We consider this to be reasonable. The impact of this adjustment on contribution rates and the cost cap is relatively small, with both increasing by 0.1% of salaries compared to assuming future experience in line with 2008-12 experience.
- E.12 Very few members above age 55 in the current schemes qualify for an ill-health pension so we need to extend the rates derived from experience below that age. We recommend that the rates be extended by extrapolating the broadly linear trends in the years running up to ages 53 and 47 for men and women respectively. This is consistent with the approach adopted for the cost ceiling work for rates between ages 55 and 59.
- E.13 For any members eligible to retire on an unreduced maximum pension the assumed rate of ill-health retirement will be set to zero.
- E.14 We recommend that the assumptions as derived above are applied to members in all schemes. We do not recommend any allowance for future falls in ill-health retirement rates because of general improvements in the health of the population, eg through medical advances. Any such allowance would be small compared to the overall uncertainty about future rates. Additionally, rates are at a historically low level overall so that small changes would not have very significant effects on the valuation results.

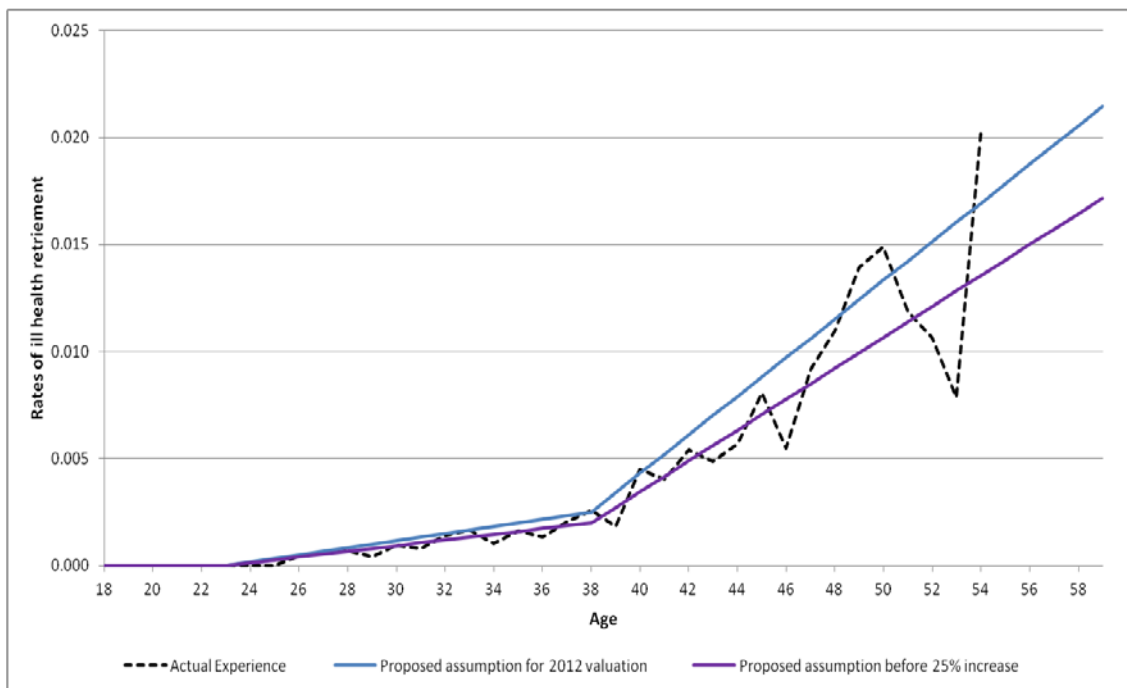


E.15 The graphs below show the proposed rates of ill-health retirements by age for men and women respectively compared with the actual experience and the proposed assumption before the 25% increase.

Graph E3: Male ill-health retirement



Graph E4: Female ill-health retirement





Proportion of upper-tier ill-health benefit awards

- E.16 In the NPPS, ill-health retirement can occur on two tiers depending on the severity of ill health. Members retiring on the 'upper' tier receive more generous benefits. For the purposes of the valuation, separate assumptions are required in respect of:
- > a combined rate of ill-health retirement– used for PPS members and used to correspond to the upper and lower tiers together for members of the NPPS and the 2015 scheme.
 - > an assumed proportion of those NPPS and 2015 scheme retirements which relate to the upper tier.
- E.17 There have only been 9 ill-health retirements of NPPS members over the four-year period to 31 March 2012. Of these, 7 were upper tier and 2 were lower tier.
- E.18 The 2008 assumption was that two in every three ill-health retirements would be on the upper tier and one in every three would be on the lower tier.
- E.19 When the ill-health retirement assumptions were considered for the cost ceiling work and the 2008 Assessment, it was supposed that the bulk of the change in the incidence of ill-health retirements would come from those with less severe conditions and the split between tiers was chosen to keep the number of upper-tier awards broadly constant. This is a reasonable approach and, in line with this, we now propose that half of the ill-health retirements are assumed to be on the upper tier and half on the lower tier.
- E.20 Given the lack of evidence on which to set this assumption, it would also be reasonable to maintain this approach and keep the assumption under review as more evidence emerges.
- E.21 The effect of assuming that two thirds, rather than half, of NPPS ill-health retirements are awarded upper tier benefits is immaterial to the cost of the existing scheme, largely because of the relatively small membership of the NPPS. The impact is greater for the 2015 scheme, where assuming two thirds, rather than half, of ill-health retirements are on the upper tier increases the cost of the scheme (and so the cost cap) by around 0.1% of pensionable salaries.



Appendix F: Analysis of voluntary withdrawal from service

Comparison of numbers of withdrawals with 2008 assumption

- F.1 We have analysed the pattern of withdrawals from the active membership over the four-year period to 31 March 2012 for the PPS and NPPS combined.
- F.2 Table F1 below shows the number of actual withdrawals with the expected number of withdrawals based on the 2008 assumptions. The 2008 assumptions (separate for males and females) split the members into two sections:
- > Members with less than 2 years' service (2 years being the 'select' period adopted for the 2008 Assessment).
 - > Members with 2 or more years of service.
- F.3 The terms 'service' and 'duration' are used interchangeably throughout this section.

Table F1: Voluntary withdrawals over the period 2008-12

Member category	Actual number (A)	Expected number (E)	A/E
Male members			
Service <2 years	684	991	69%
Service ≥ 2 years	2,782	3,172	88%
All durations	3,466	4,163	83%
Female members			
Service <2 years	311	548	57%
Service ≥ 2 years	1,241	1,808	69%
All durations	1,552	2,355	66%
All members			
Service < 2years	995	1,539	65%
Service ≥ 2years	4,023	4,980	81%
All durations	5,018	6,518	77%

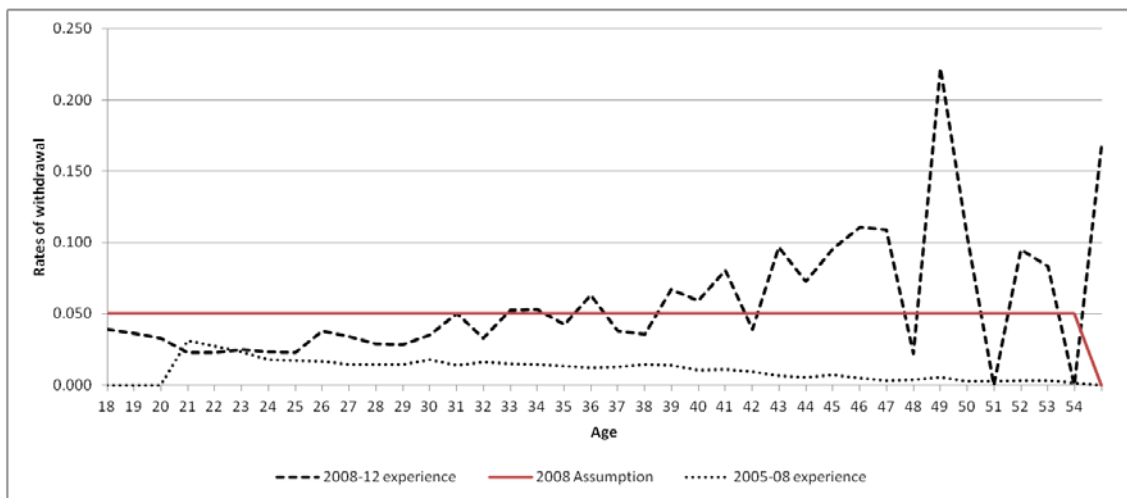
- F.4 The table above indicates that the observed withdrawal experience is significantly lower than expected under the assumptions adopted for the 2008 Assessment. For example, only 66% of the expected number of females and 83% of the expected number of males actually withdrew over the period when comparing to the 2008 assumption.



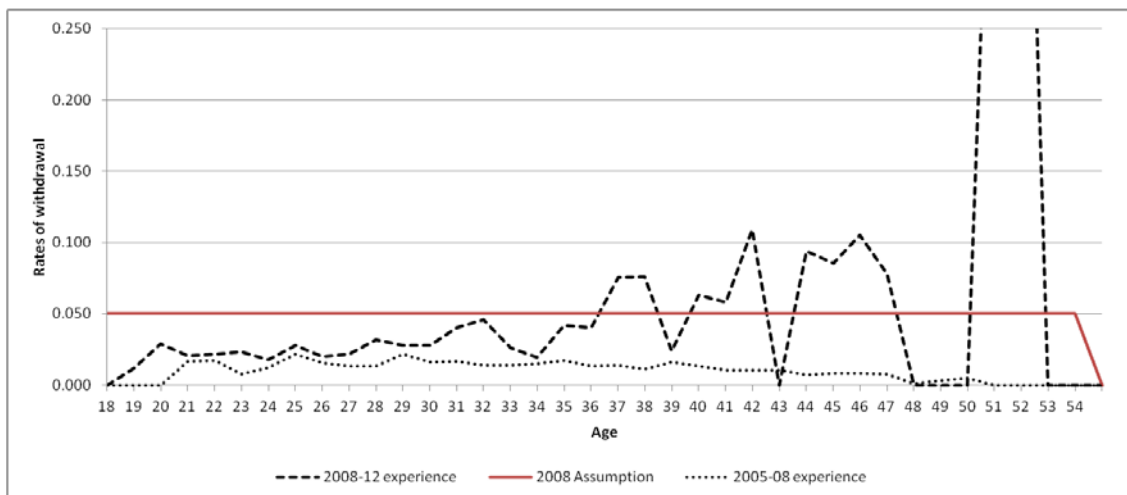
Comparison of observed withdrawal rates 2008-12 and 2005-08 with the 2008 assumption

F.5 The graphs below show a comparison of observed rates of voluntary withdrawals over 2005-08 and 2008-12 with the 2008 assumption, split into males and females and split further by durations (ie less than 2 years' service and at least 2 years' service).

Graph F1: Voluntary withdrawal rates over 2005-08 and 2008-12 – male members with less than 2 years' service

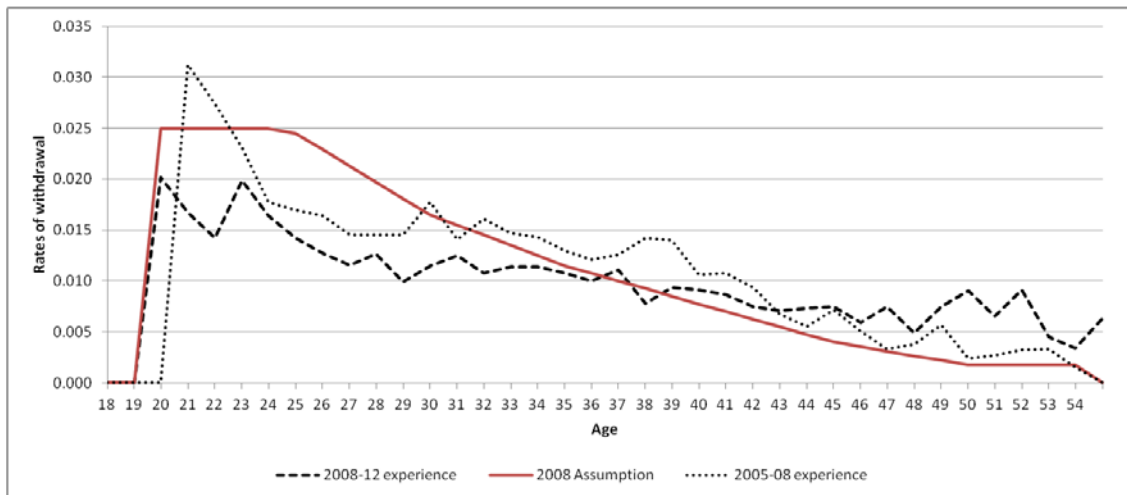


Graph F2: Voluntary withdrawal rates over 2005-08 and 2008-12 – female members with less than 2 years' service

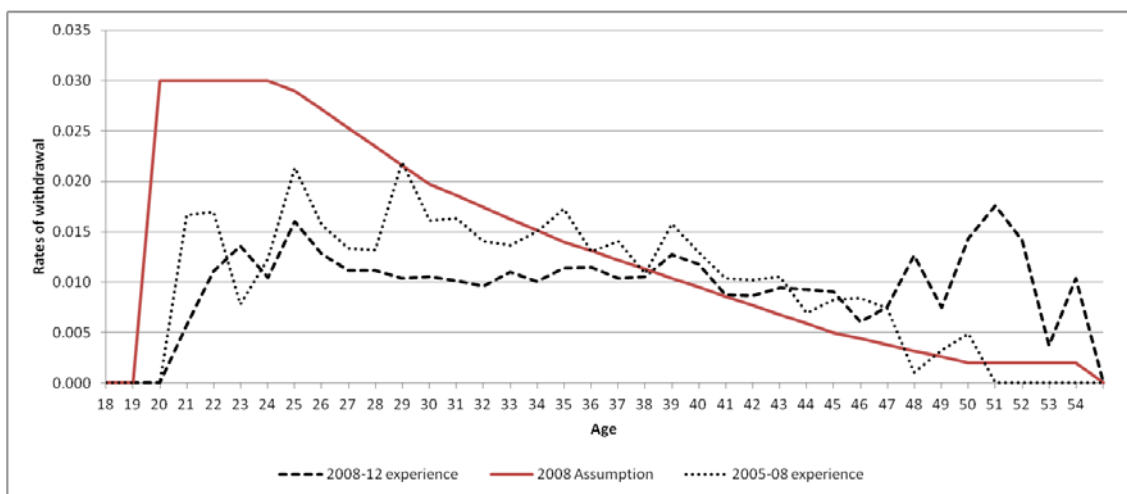




Graph F3: Voluntary withdrawal rates over 2005-08 and 2008-12 – male members with at least 2 years' service



Graph F4: Voluntary withdrawal rates over 2005-08 and 2008-12 – female members with at least 2 years' service



F.6 The following conclusions can be drawn from the above graphs:

- > Firstly, that the experience observed at the previous valuation (ie over 2005-08) is broadly similar to the more recent experience (ie over 2008-12), particularly for members with 2 or more years' service.
- > Secondly, that the 2008 assumption is not a particularly good fit to the Schemes' experience.



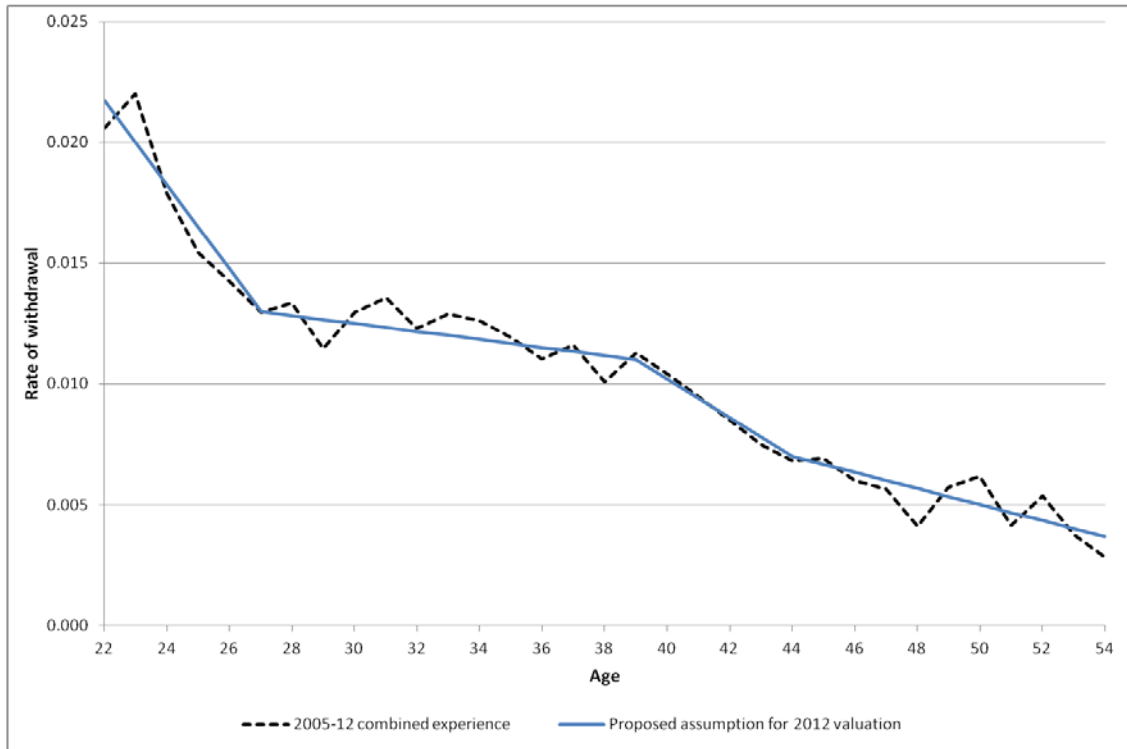
- F.7 Further to the first point above, the broadly consistent experience over both periods 2005-08 and 2008-12 gives evidence to support using an assumption based purely on the Schemes' recent experience. The recommended 2012 assumption is based on the combined experience over the whole period 2005-12.
- F.8 There is quite clear evidence that members with shorter service are more likely to withdraw (the above graphs show higher withdrawal rates for these members). However, the impact of allowing for this difference on the valuation results is small. Firstly, members with less than two years' service have relatively little past service liability and so will have little impact here. Secondly, we expect that such a simplification (ie not separating out the 'select' period of up to 2 years' service) would not affect the assessment of the employer cost cap or employer contribution rate by more than 0.1% of salaries. Additionally, so long as the same approach is used at future valuations, the impact would be similar at each valuation so the simplification would not be expected to be a determining factor in whether the cap has been breached.
- F.9 Therefore, we recommend that the 2012 assumptions are based on the combined experience of members with at least two years' service only. These recommended assumptions will apply to all members.

Proposed assumptions for 2012 valuation

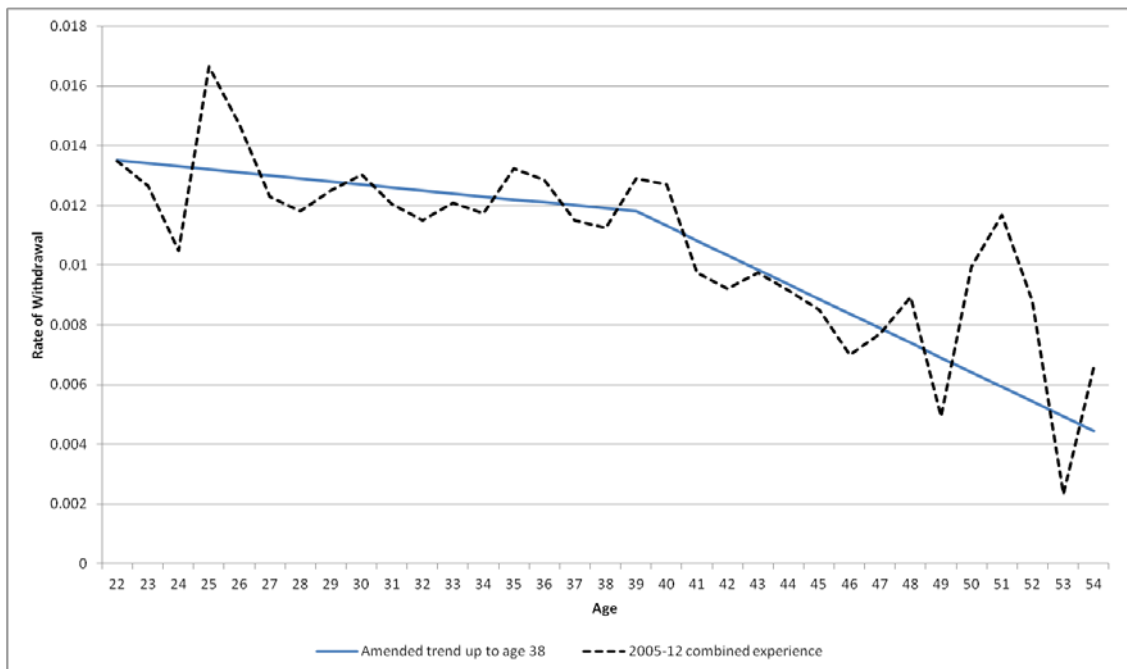
- F.10 The graphs below show the combined withdrawal rates over the seven-year period to 31 March 2012, together with the smoothed rates that are being recommended for the 2012 valuation.



Graph F5: Proposed voluntary withdrawal rates – male members



Graph F6: Proposed voluntary withdrawal rates – female members





- F.11 Graphs F5 and F6 above shows that the proposed assumptions are a relatively close fit at all ages (though the female experience is more volatile than the male experience). There is limited experience upon which to base an assumption for members from age 50. The proposed rates at these ages have been partly derived by extrapolating the broadly linear trends seen up to age 50.
- F.12 We recommend that no allowance is made for withdrawal after age 55 due to the benefit structure of the Schemes:
- > For PPS and NPPS, members are entitled to an immediate unreduced pension on leaving service after age 55 and the pension would not be enhanced for later payment.
 - > For the 2015 scheme, members retiring directly from active service would receive a reduced pension equivalent to a deferred pension payable from age 60, whereas on withdrawal they would be entitled to a deferred pension payable from SPA



Appendix G: Analysis of death in service

- G.1 We have considered the experience of death in service over the four-year period to 31 March 2012 for the PPS and NPPS combined. The analysis compares the actual rate of death in service to the expected rate based on the 2008 assumptions and the UK Interim Life Tables 2008-2010 as produced by the ONS ("ONS tables").
- G.2 The results of the experience analysis over the four-year period to 31 March 2012 show that the actual number of deaths versus those expected on the 2008 assumptions were significantly lower for males and slightly lower for females.
- G.3 There were significantly fewer deaths than expected under the ONS tables for both genders.
- G.4 The table below shows the number of actual and expected deaths split by gender.

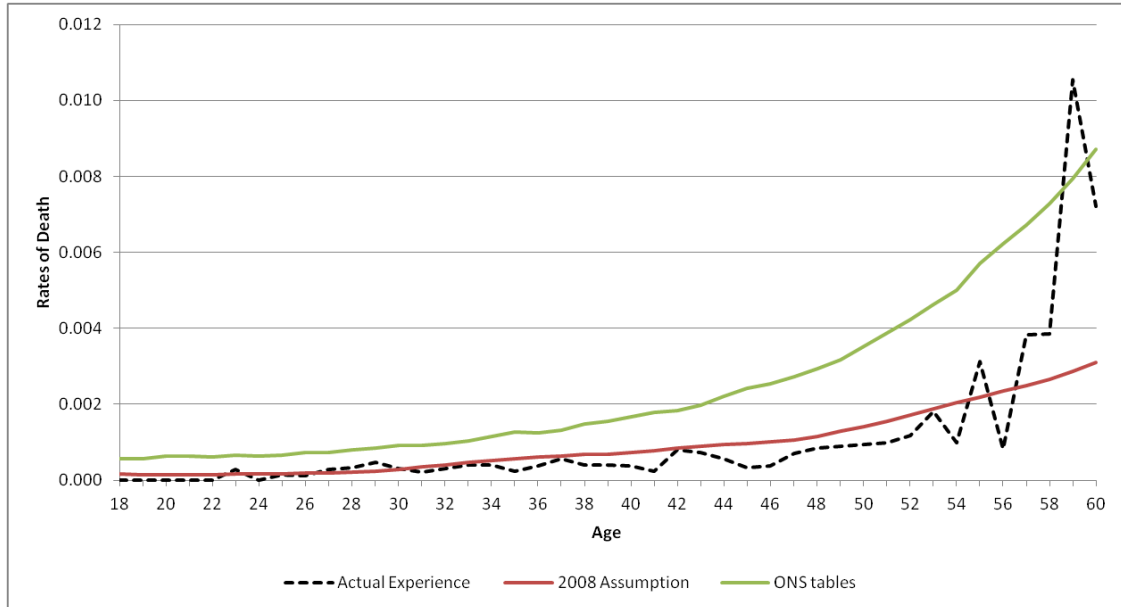
Table G1: Death in service experience 2008-12 (PPS and NPPS)

	2008 assumption			ONS tables	
	Actual deaths	Expected deaths	Actual/Expected	Expected deaths	Actual/Expected
Males	218	311	70%	764	29%
Females	60	61	98%	120	50%

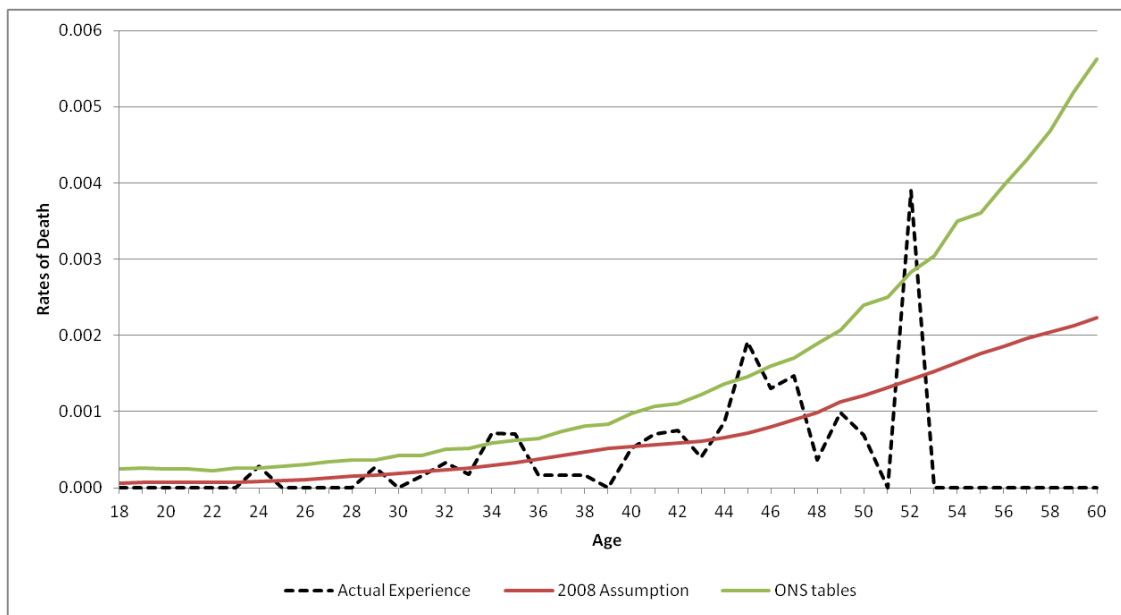
- G.5 The graphs below show the rates of the actual and expected deaths by age for men and women respectively.



Graph G1: Male death in service experience 2008-12



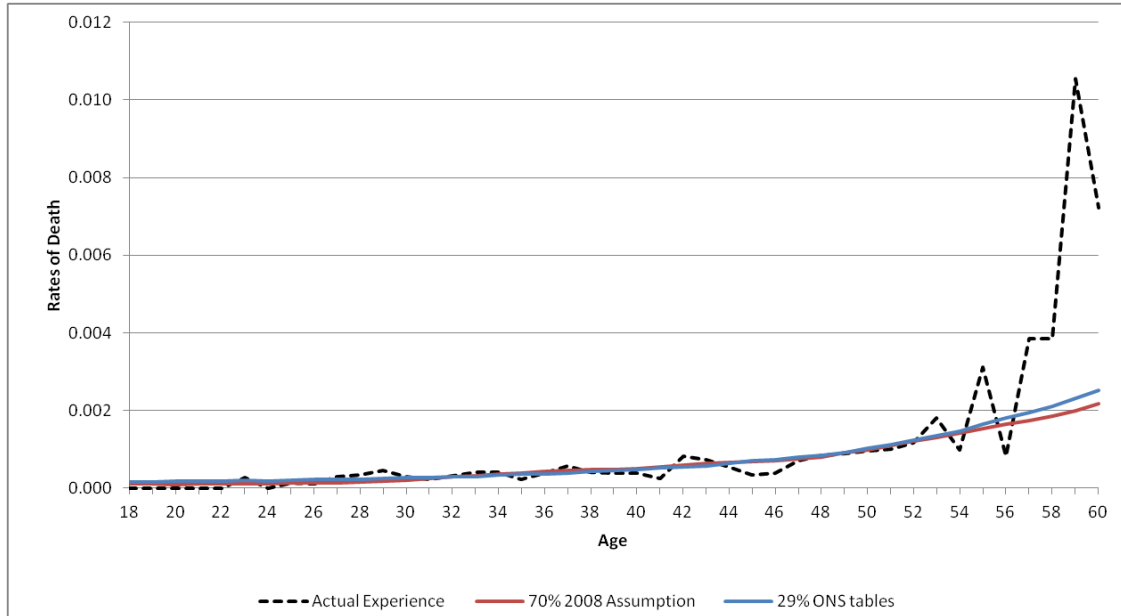
Graph G2: Female death in service experience 2008-12



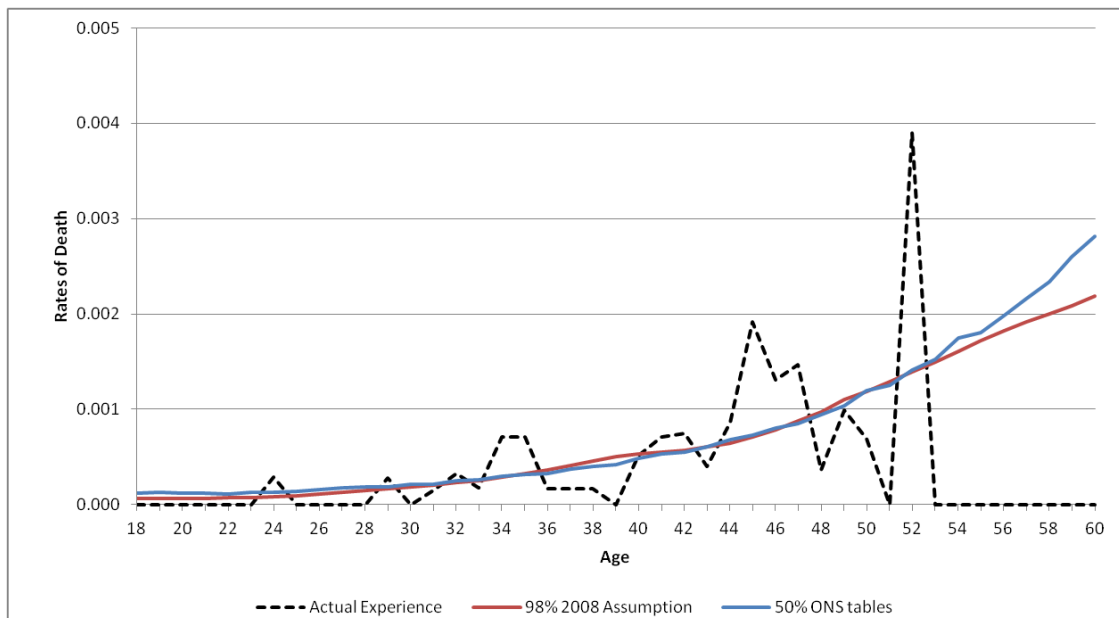
- G.6 When considering our recommended assumption, we looked at the distribution of rates of death before retirement versus the distributions implied by the 2008 assumption and the ONS tables.
- G.7 The graphs below show actual rates of death versus the rates under the 2008 assumption and the ONS tables after application of the Actual/Expected ratings shown in Table G1.



Graph G3: Male death in service experience 2008-12



Graph G4: Female death in service experience 2008-12



G.8 It can be seen from Graphs G3 and G4 that the distribution of rates of death before retirement are similar whether the 2008 assumptions or the ONS tables are taken as the reference. Expected rates of death are very low under either approach.



- G.9 The greatest deviation in the distribution of rates of death before retirement are at older ages. The ONS tables imply a higher number of deaths at older ages than the 2008 assumptions. However, the rates of death are very low under both assumptions and so the impact on the valuation results would not be material. For simplicity, we recommend assuming rates of 29% and 50% of the ONS rates for men and women respectively for the purposes of the 2012 valuation



Appendix H: Analysis of promotional pay increases

Approach to the analysis

- H.1 Promotional pay increases were analysed for members of the PPS and NPPS combined. We looked at the profile of the active membership as at 31 March 2012 in terms of average pensionable pay at each length of service (years) and how this compares with the next year of service (the 'profile analysis'). This approach is explained below.

Profile analysis

- H.2 We calculate the implied pay increases by comparing the average full-time equivalent pensionable pay for each year of service as at 31 March 2012 to the corresponding average at the next year of service. These differences are then compared to the assumed increases adopted for the 2008 Assessment.

Experience analysis for the uncompleted 2008 valuation

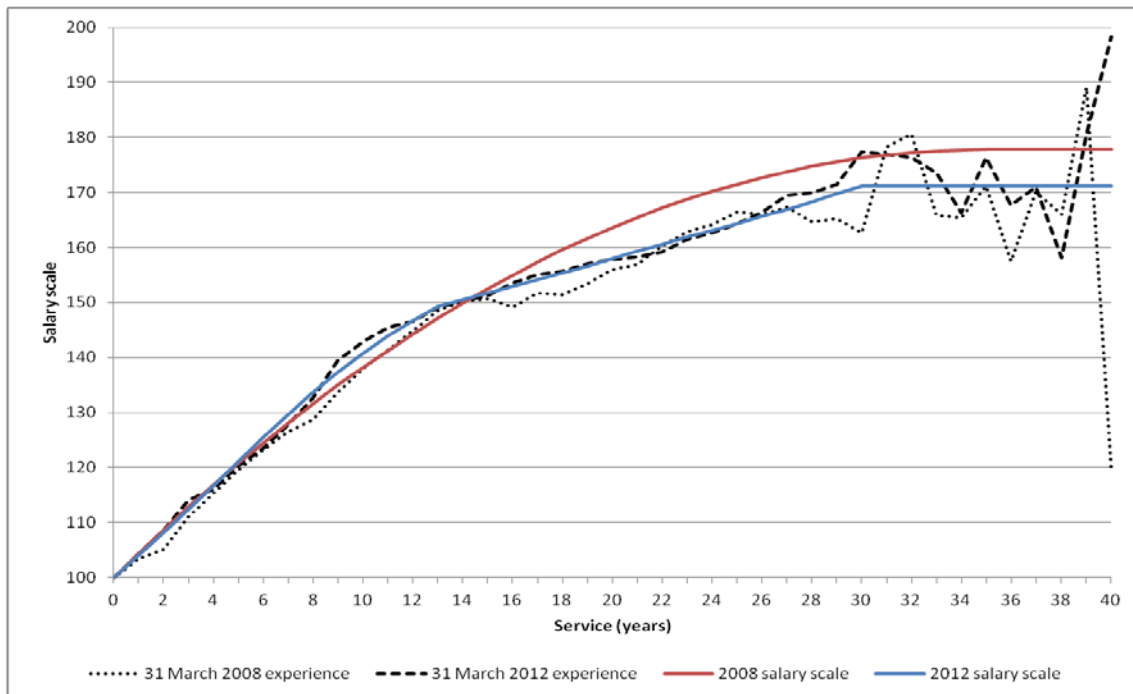
- H.3 A similar profile analysis was undertaken for the uncompleted 2008 valuation. This showed similar pay profile to that seen in the profile analysis at 31 March 2012
- H.4 The 2008 assumption was based on the assumption used for a previous financing review in 2006 since it was not clear that the profile seen in the analysis at 31 March 2008 was indicative of long-term trends.

Results of 2008-12 experience analysis

- H.5 As part of the analysis we looked separately at male and female data only. At short periods of service there was very little difference between male and female pay profiles. At longer periods of service there was evidence that male promotional pay increases exceed those for females. However, the differences are quite small and there are relatively few longer servicing female members. Our analysis concentrated on all data, to derive a unisex promotional pay scale. Use of a unisex promotional pay scale (rather than scales by gender) is not expected to have a material impact on the valuation results.
- H.6 Data for London forces for members with zero and one years' service looked inconsistent. This may be due to a change in the recruitment methods used in recent years. We have removed these from the analysis to prevent any bias entering the analysis. For non-London forces, increases for members with these low levels of service matched the assumptions adopted for the 2008 Assessment.
- H.7 The graph below shows the implied and expected annual increases in promotional pay. The implied promotional pay increases are derived using the two profile analyses explained above.



Graph H1: Promotional pay increases



H.8 This graph shows that the implied salary increases derived from the membership profile as at 31 March 2012 are inconsistent with those adopted for the 2008 valuation at longer periods of service. However, the implied increases derived from the membership profile as at 31 March 2012 are broadly consistent with those derived from the membership profile as at 31 March 2008.

H.9 The proposed scale is based on the profiles as at 31 March 2008 and 2012. The scale is flattened from 30 years' service as observed experience is volatile due to a lack of data.

Future changes to pay arrangements

H.10 Competence-related threshold payments are being removed from the pay structure as part of the second round of reforms following the Winsor review. In isolation this would be expected to reduce levels of pensionable pay. However, the second round of reforms includes other changes to pay arrangements that will increase levels of pay for certain groups of members. Overall the round of reforms is expected to be broadly cost neutral. Without much greater detail about how the combination of reforms will affect future police pay, which may take several years to become apparent, we consider that the existing pay profile provides the most relevant evidence in setting assumptions about future pay progression.



- H.11 There is a freeze on pay progression starting in 2012/13 and continuing until 2014/15. Pay increases relating to promotions will not be affected. Although the freeze will affect salaries in the next few years, the impact on pensions coming into payment is likely to be somewhat smaller. Only members retiring in the next few years who have not already reached the top of their pay scale will be affected. Given the relatively small effect in the context of significant uncertainty around future levels of pay, both from progression/promotional increases and general earnings increases, we recommend that no allowance for the progression freeze is made in the valuation assumptions.



Appendix I: Analysis of commutation

Setting assumptions for 2015 scheme members

- I.1 The choice of commutation assumption is significant for the 2015 scheme, as members do not accrue a separate lump sum benefit and lump sum derived from commutation at retirement will generally be of lower value than the pension given up. The assumption about commutation in the 2015 scheme will therefore have a material impact on future contribution rates and the employer cost cap.
- I.2 HMT has specified this assumption via the Directions, with members assumed to commute 15% of their pension. We understand that this is based on experience in other major public sector schemes where commutation is offered on similar terms.

Setting assumptions for members with service in the existing schemes and 2015 scheme

- I.3 We understand that members who have service in one of the existing schemes as well as the 2015 scheme will be able to make separate commutation decisions in the two schemes (within the limits relevant to each scheme). In particular, members will be able to choose to commute their benefits in one scheme but not in the other.
- I.4 For former NPPS members, HMT has specified this assumption via the Directions, with members assumed to commute 15% of their pension.
- I.5 PPS members are not entitled to an automatic lump sum, but they are entitled to commute up to a quarter⁴⁴ of their pension on actuarially equivalent terms. The terms available in the PPS offer a significantly greater lump sum than would be available under the commutation terms of 12:1 offered in the 2015 scheme. We would expect this to act as a substantial disincentive to commute pension in the 2015 scheme, especially for those members with significant amounts of service in the PPS (where the lump sum available from the PPS is large). Even members with the least PPS service are likely to be able to commute a lump sum from their PPS benefits alone which is as large as the amount of lump sum assumed to be taken by new entrants into the 2015 scheme. As such, we do not expect that former PPS members will commute pension from the 2015 scheme.

Setting assumptions for protected members (ie only existing scheme service)

- I.6 The commutation option terms offered to PPS members and the exchange of lump sum terms offered to NPPS members are such that the valuation of the benefits would be the same whether or not allowance was made for members exercising them. As such, for simplicity, we recommend making no allowance for members exercising these options.

⁴⁴ In general but alternative limits apply to some members.

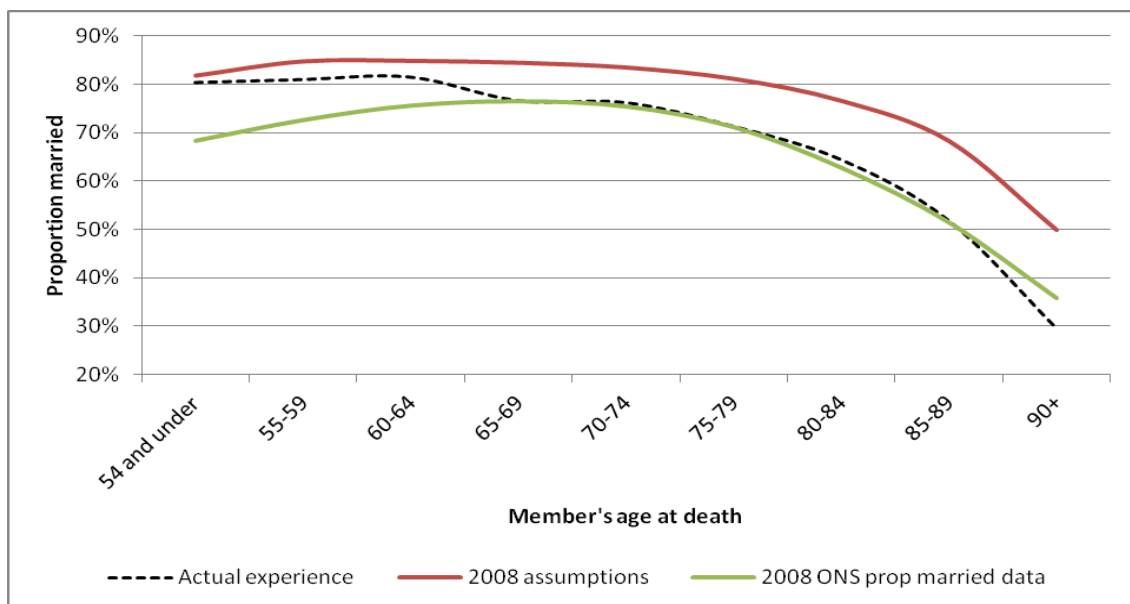


Appendix J: Analysis of family statistics

Proportions married/partnered

- J.1 Our experience analysis looked at the pensioners who died over the four-year period to 31 March 2012. Approximately 7,300 pensioners died during the four-year period to 31 March 2012. Data provided for almost 4,900 deaths of male former PPS members was suitable for analysis. Since our analysis was carried out on male PPS members, where only legal spouses (including civil partners) qualify for dependants' pensions, analysis was restricted to proportions married. We compared the proportion giving rise to the payment of a surviving dependant's pension with the proportions married assumption adopted for the 2008 Assessment.
- J.2 The Office for National Statistics (ONS) publishes England & Wales population data on the proportions of people at various ages that are married, cohabiting or 'other'. We have also compared the proportion of deaths of male PPS pensioners that gave rise to a dependant's pension with the proportion who are married according to the ONS' 2008 tables. The graph below shows the results of this analysis.

Graph J1: Proportions married for male pensioners (PPS)



- J.3 Our analysis shows that the number of dependants' pensions that became payable following pensioners' deaths over the four-year period to 31 March 2012 was significantly lower than the number expected under the 2008 proportions married assumption. However, experience was closely aligned with the ONS 'married' tables at older ages, when the significant majority of pensioner deaths occur. Below age 65 there is evidence of higher proportions married for the Scheme's members than the general population.



Setting assumptions

- J.4 As the shape of the 2008 ONS rates provides a better fit to the actual experience than the 2008 assumptions, we have prepared our recommendation for the assumptions based on adjustments to the 2008 ONS rates. One particular advantage of this approach is that it leads to a straightforward way of setting the proportions married or partnered assumption, required for NPPS and 2015 scheme members.
- J.5 Based on the results of our analysis for male PPS pensioners, looking in particular at ages above 65, it would be reasonable to assume proportions married for current male PPS members above age 65 are equivalent to 100% of those implied by the ONS's 'married' tables.
- J.6 The analysis for current male PPS pensioners below age 65 suggests a higher proportion married than population statistics. While the reasons for this difference are unclear, there is sufficient data for the result to be credible. Therefore, we recommend that for current male PPS pensioners below age 65 the assumption is 80% married.
- J.7 There is too little experience for female PPS pensioners to carry out a credible analysis. We have no reason to believe that the experience for PPS females (relative to the ONS's female 'married' tables) would differ from that seen for PPS males. Therefore, we recommend an assumption of 100% of ONS's 'married' tables for female PPS pensioners above age 65.
- J.8 Similarly as for males, we recommend assuming a higher proportion of the current PPS female pensioners below age 65 are married than population statistics. Applying the same uplift to the female table as the male table (105% of the ONS table) implies a rate of 75% for current female PPS pensioners below age 65.
- J.9 For current NPPS pensioners, there is too little experience to carry out a credible analysis. We have no reason to believe that the experience for NPPS pensioners (relative to the ONS 'co-habiting or married' tables) would differ from that seen for PPS males (relative to the ONS's male 'married' tables). For these members, for whom the definition of a qualifying dependent is broader, we recommend using 100% of ONS's 'co-habiting or married' tables above age 65. Again we recommend uplifting rates below age 65 by 105% which gives rates of 85% and 80% for current male and female NPPS pensioners respectively.
- J.10 For future pensioners, the proportion married at retirement will be used in our calculations, rather than the proportion married at the valuation date. The analysis of experience shows a greater proportion of the observed deaths at younger ages having a surviving dependant than the ONS data would predict. We recommend using the same proportions recommended for current younger pensioners for all future pensioners. The proposed assumptions for future pensioners are summarised in Table J1 below.



Table J1: Recommended proportion married or partnered at retirement for future pensioners

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

Age difference between member and spouse/partner

J.11 We analysed the average age difference between male PPS members and their dependants at the date of the member's death over the four-year period to 31 March 2012. The graph below shows the results of this analysis.

Graph J2: Age difference between member and spouse/partner (PPS males)



Setting assumptions

J.12 The graph shows that when a member dies below age 60 and leaves a dependant the age difference is greater. This may be due to the data including details of child dependants rather than only adult dependants. Due to uncertainties about the credibility of the data for these young deaths we have not placed too much emphasis on experience for these members.



- J.13 The analysis suggests that where a member dies above age 90 and leaves a surviving partner then that partner is relatively younger than when the member dies earlier. This is not unexpected as older partners are likely to have died before the member, so increasing the average age difference. When considering an appropriate assumption we have focussed more on deaths of pensioners in the age range 60 to 90 since these will result in partners' pensions paid for longer periods.
- J.14 We propose that the partner is an older male if the member is female and a younger female if the member is male. This is consistent with the 2008 assumption. For simplicity, we propose that the age difference is constant at all ages. The analysis shows that males are broadly 3 years older than their female partners at the ages where most deaths occur.

Remarriage

- J.15 There were only 131 reported remarriages of around 23,000 dependants (0.1% per year) over the four-year period to 31 March 2012. Detailed analysis has not been carried out on the remarriage experience because remarriage at this level will have only a small impact on the valuation results. Not allowing for remarriage will slightly overstate liabilities, possibly resulting in an increase in the contribution rate of 0.1% of salaries from 2015 compared to allowing for remarriage at its recent level (though note that additional contributions in the short term would be offset by lower contributions as small profits emerge on remarriage going forward). The impact on the standard contribution rate would be immaterial. Making no allowance for remarriage is consistent with the approach used in the 2008 Assessment.



Appendix K: Record of changes since 27 January 2014 draft

K.1 This advice was issued in draft on 27 January 2014. The table below records the changes made since that draft.

Reference	Change
Various	Minor drafting changes to correct spelling, grammatical and other errors or to clarify previous wording. Report amended to be in line with updated GAD standard format.