Government Actuary's Department

Firefighters' Pension Schemes (England)

Actuarial valuation as at 31 March 2012

Advice on assumptions

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Authors: Ian Boonin FIA
Michael Scanlon FIA

Contents

1 Executive summary

This report contains our recommendations for the best estimate assumptions to be set by the Secretary of State for Communities and Local Government for the 2012 valuation of the Firefighters' Pension Schemes.

1.1 HM Treasury's Public Service Pensions (Valuations and Employer Cost Cap) Directions 2014 as amended require that a valuation of the Firefighters' Pension Schemes is carried out as at 31 March 2012. The assumptions to be adopted for this valuation will be set by the Secretary of State for Communities and Local Government, having obtained advice from the scheme actuary. The assumptions must be the Secretary of State's best estimates and not include margins for prudence or optimism.

1.2 This report sets out GAD's advice (in its capacity as the appointed scheme actuary) to the Secretary of State on the actuarial assumptions to be adopted. The advice covers the main assumptions to be set by the Secretary of State 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. This report should be read in conjunction with the report on data used for experience analysis dated 6 March 2015.

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 previous completed actuarial valuation of the Firefighters' Pension Schemes was carried out as at 31 March 2007. Most of the assumptions put forward in this report differ from those used for the 2007 valuation. The most significant changes are:

- A large reduction in assumed ill-health retirements
- New and later age retirement assumptions for members joining or moving to the 2015 scheme
- Reduction in the assumed proportion of pensioners who have a spouse or other qualifying dependent entitled to a pension after their death

1.6 The following sections 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 Secretary of State is now asked to set the actuarial assumptions to be adopted for the valuation as required by the HMT Directions, consulting with HM Treasury as appropriate, and to confirm those assumptions to GAD. We would be happy to provide further analysis to Secretary of State, if required.

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

Assumption[1]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Pensioner baseline mortality[2]	Aligned to standard SAPS table as at 2012[3,4]			
Current pensioners (normal and ill-health)	113% × S1NMA as at 2012	In line with 2007-2012 experience. *See graph C1*		
Future pensioners (normal health)	110% × S1NMA as at 2012	In line with 2007-2012 experience, adjusted to remove allowance for future ill-health pensioners, who are assumed to live less long	-0.6%[5]	-0.1%
Future pensioners (ill-health)	100% × S1IMA as at 2012	In line with experience of UK self-administered pension schemes		
Dependants	100% × S1DFA as at 2012	In line with experience of UK self-administered pension schemes		

[1] Our recommendations are for the same assumptions to be used for males and females in all areas. Because the majority of members are male, there is insufficient data to analyse female members separately.
[2] As directed by HMT, improvement in mortality from 2012 are assumed to be in line with those underlying the most recent ONS population projections
[3] SAPS tables are published by the Continuous Mortality Investigation and are 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 male members retiring in normal health (S1NMA) and in ill-health (S1IMA) and for female dependants (S1DFA).
[4] Adjusted to take account of improvements in mortality applying to the UK population between 2002 (the base year for the SAPS tables) and 2012.
[5] Our recommended 2012 valuation assumption implies shorter life expectancy than the 2007 assumption, which would reduce contribution rates. *See paragraph C10.*

Assumption[1]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Age retirement				
1992 scheme protected, tapered, and unprotected members with more than 16 years' service	Retirement depends on age and service, with many retiring at the earlier of 30 years' service and age 55	In line with 2007-2012 experience *see graph D2*	+0.3%	N/A
1992 scheme unprotected members with less than 16 years' service	No retirements before age 55. Age and service based rates, with many retiring at age 55, for example for members joining before age 25, about 99% retire at age 55, for members joining at age 30, about 79% retire at age 55.	1992 scheme benefits are available before age 55. However, there is a significant disincentive to 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. 1992 scheme benefits are still a relatively sizeable amount even if only in respect of service up to 2015, from which point accruals will be under the 2015 scheme. So it is reasonable to expect high take-up of age retirement at 55 for these members.		

Assumption[1]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Age retirement continued				
2006 scheme (ie generally post-06 entrants)	All retire at age 60	Retirement before age 60 would significantly reduce the value of benefits accrued in the 2006 scheme (retirement age effectively increases from 60 to 65). There is, however, insufficient experience.	No change in assumption	
New entrants from 2015	About 25% retire at age 55[6], 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. Consistent with scheme reform assumptions[7]. To be kept under review.	No past service	New assumption

[6] The age at which 25% of members are assumed to retire reflects the regulations which provide for enhanced terms for retirements at ages 55 and above.
[7] Arguments could be made for other assumptions. Assuming less people would retire at age 55 (and instead at 60) would increase the 2015 cost of accrual. Conversely, assuming more people would retire at age 55 (instead of at 60) would slightly decrease the 2015 cost of accrual.

Assumption[1]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Ill-health retirement				
Incidence	Increasing by age: around 0.02% at age 25, 0.26% at age 45	Shape in line with 2007-2012 experience, but assuming overall levels in line with 2011-12 experience with no further upward trend *see table E2 and graph E2*	+0.4%[8]	-1.6%[9]
Higher/lower tier split	40% on higher tier[10]	In line with 2010-2012 experience *see para E12*		

[8] Does not take account of the reduced ill-health charge adjustment which will arise as a consequence, which will offset the overall impact on employer contributions to the scheme to some extent. It also does not take account of any deficit or surplus which will have emerged as a result of ill-health rates being different to those assumed over the period 2007 to 2012.

[9] This reduction reflects the large drop in ill-health retirement rates compared to the 2007 assumption. The scheme reform assumptions already made some allowance for this reduction.

[10] Higher tier ill-health benefits are granted to those in more serious ill-health than those granted only lower tier benefits.

Assumption[1]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Withdrawal				
1992 scheme (ie generally pre-06 entrants)	Withdrawals decreasing with age: 1.1% at age 25, 0.3% at age 45	Based on 2007-2012 withdrawal experience *see table F1*	No change in assumption	
2006 scheme (ie post-06 entrants), and new entrants from 2015	Regular firefighters: rates decreasing with age: 1.8% at age 25, 1.4% at age 45; Retained firefighters: withdraw at four times these rates	Rates for Regular firefighters are as adopted for 2007 valuation and scheme reform. Little of evidence to support or dispute previous assumption	Immaterial	-0.2%
	or[11]			
	Regular firefighters: rates consistent with 1992 scheme; Retained firefighters: withdraw at nine times these rates	Rates for Regular firefighters in the 1992 scheme and 2006 scheme are similar	+0.1%	+1.3%
Death before retirement	Increasing by age: 0.02% at age 25, about 0.05% at age 45, 0.3% at age 65	In line with 2007-2012 experience, not adjusted for future improvements in mortality *see graph G1*	Immaterial	Immaterial

[11] There is little evidence on the rates of withdrawal of Regular firefighters in the 2006 scheme, although there is evidence of the average overall withdrawal rates in the 2006 scheme (for Regular and Retained firefighters combined). In the light of this uncertainty we provided two possible alternative assumptions, with rationales, and DCLG have chosen to assume that withdrawal rates for Regular firefighters' were the same under both the 1992 and 2006 schemes and nine times as much for Retained firefighters.

Assumption[1]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Promotional salary scale				
Regular firefighters	Service based scale: after 1st year about 6% a year for first four years, 0.7% a year for the following 8 years, then about 1.2% a year up to 30 years, after 30 years a lower scale is used	In line with scheme data as at 31 March 2012 *see graph H1*	-0.6%	Immaterial
Retained firefighters	Age related scale: about 1% a year up to age 50, 0.4% a year thereafter	In line with scheme data as at 31 March 2012 *see graph H2*		
Commutation				
1992 scheme protected (ie generally pre-06 entrants aged 45 and above)	No assumption needed	Actuarially neutral commutation of 1992 scheme pension	No change in assumption	N/A
Former 1992 scheme members in 2015 scheme (ie generally pre-06 entrants aged under 45)	Nil commutation from 2015 scheme	Reasonable approach given that 1992 scheme offers a greater lump sum for pension given up, compared with 2015 scheme	New assumption	
2006 scheme (ie generally post-06 entrants)	15% of pension commuted	Required by HMT directions	Directed	N/A
New entrants from 2015	15% of pension commuted	Required by HMT directions	No past service	Directed

Assumption[1]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Family statistics				
Proportion married/partnered	75% married, 80% partnered at retirement (consistent assumptions for existing pensioners)	In line with ONS statistics for UK population	-3.0%	-0.4%
Age difference	Males 3 years older than partner	In line with ONS statistics for UK population	No change in assumption	
Remarriage	No allowance	In line with 2007 assumptions	No change in assumption	Not a feature of the scheme

2 Introduction

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

2.1 Under section 12 of the Public Service Pensions Act 2013 ('the 2013 Act'), scheme regulations must set an "employer cost cap". This is a rate, expressed as a percentage of pensionable earnings of members of the scheme, to be used for the purpose of measuring changes in the cost of the scheme. The proposed employer cost cap is to be set in accordance with HM Treasury Directions.

2.2 HM Treasury's Public Service Pensions (Valuations and Employer Cost Cap) Directions 2014[12] (the HMT Directions) require that a valuation of the Firefighters' Pension Schemes ('the Schemes') is carried out as at 31 March 2012 for the purpose of setting the employer cost cap. The HMT Directions require that the valuation report includes the following information:

- The proposed employer cost cap (direction 53)
- The employer contribution rate (direction 50, 22(f), 29)

2.3 The Department for Communities and Local Government ("DCLG") intends to set employer contribution rates for the 1992 scheme, the 2006 scheme and the 2015 scheme, and ill-health charges, such that the average of those contributions over 2015-19, expressed to the nearest 0.1% of pensionable pay, is expected to be equal to the employer contribution rate calculated in the 2012 valuation.

2.4 The HMT Directions require that the assumptions to be adopted for this valuation, except for those assumptions specified in the HMT Directions, will be set by the Secretary of State, having obtained advice from the scheme actuary (direction 19(a)). They also require that the assumptions must be the Secretary of State's best estimates and not include margins for prudence or optimism (direction 19(c)).

2.5 GAD is the appointed scheme actuary to the Schemes. This report is addressed to the Secretary of State and contains our formal advice on the appropriate assumptions to be adopted for the 2012 valuation, as required by the HMT Directions. The purpose of this advice is to enable the Secretary of State to determine the required best estimate assumptions.

2.6 The advice is provided in accordance with the HMT Directions. We may revise this advice if material new evidence comes to light.

[12] This report has been prepared in accordance with the HMT Directions 2014 (as amended).

2.7 The advice also has regard to HMT's suggested approach[13] for setting assumptions in the absence of direct evidence.

2.8 The advice covers the main assumptions to be set by the Secretary of State. 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

2.9 Assumptions may also be required in other areas. See in particular the *Report on methodology* dated 6 March 2015.

2.10 The Secretary of State is now asked to set the actuarial assumptions (listed in paragraph 2.8) to be adopted for the valuation as required by the HMT Directions, consulting with HM Treasury as appropriate, and to confirm those assumptions to GAD. We would be happy to provide further analysis to the Secretary of State, if required.

2.11 The previous completed actuarial valuation of the Schemes was carried out as at 31 March 2007, and GAD's report on that valuation is dated 23 October 2009. We have analysed the experience of the Schemes' membership over the five-year period since the previous valuation, between 31 March 2007 and 31 March 2012, in order to inform the advice contained in this report.

2.12 A valuation as at 31 March 2011 was started, but work was suspended before the experience between 2007 and 2011 was analysed and assumptions were proposed.

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

2.13 A new Firefighters' Pension Scheme will be introduced from 1 April 2015. GAD compared the cost of the new scheme design with a reference scheme, and concluded that the new scheme design is within the required cost ceiling in our report dated 22 October 2014[14]. The assumptions adopted in that report were based on the 2007 valuation assumptions, but contained some changes to reflect more recent information. In this report, we refer to these assumptions as the 'scheme reform assumptions'.

2.14 Individual Fire and Rescue Authorities (FRAs) or their appointed administrators supplied data on the experience of the scheme membership over the five-year period to 31 March 2012. We carried out some basic validation checks on the data before using it to analyse the Schemes' experience in order to develop our advice on the assumptions. The data used to arrive at each of the assumptions are summarised in their respective appendices. In preparing our advice, we have relied upon the general completeness and accuracy of the data provided.

2.15 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 Secretary of State 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 expected future experience of the Schemes' membership.

2.16 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 Appendix A.

2.17 A draft version of this report was made available to:

- the Firefighters' Pension Committee, as part of the consultation process relating to the valuation of the Schemes; and
- HMT, as part of the process for granting their approval to the assumptions proposed by the Secretary of State.

The changes that have been made to the previous draft of this report (dated 8 October 2013) are summarised in Appendix J.

2.18 We are content for the Secretary of State 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

[14] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/367644/Fire_Verification_Report_-_Oct_2014_-_Final.pdf

> GAD is notified of such release.

2.19 Third parties whose interests may differ from those of the Secretary of State should be encouraged to seek their own actuarial advice where appropriate. Other than the Secretary of State, 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 section 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 report are explained in this section.

HMT Directions

3.2 The advice in this report reflects the requirements of HMT Directions that assumptions should be set as the Secretary of State'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 previous valuations
- analysis of demographic experience up to the valuation date, taken as experience over the five-year period up to the valuation date for the purposes of our advice
- 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[15].

Different populations

3.4 The HMT Directions require the 2012 valuation to cover both the existing 1992 scheme and 2006 scheme, and the new 2015 scheme established under the 2013 Act. This means the 2012 valuation needs to consider assumptions appropriate to both the existing schemes and the new 2015 scheme. It also needs to cover both 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.

[15] 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 their existing scheme 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.

3.6 The two existing Schemes are the 1992 scheme and the 2006 scheme. Within the 2006 scheme members are separately identified as either Regular firefighters or Retained firefighters. There are no Retained firefighter members of the 1992 scheme.

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 sections in this report we conclude by providing an approximate indication of the impact of the change being recommended to the assumptions[16] on each of:

- **'past service' –** This is the indicative impact on the employer contribution rate of any surplus or deficit created by moving from the 2007 valuation assumption to the proposed 2012 valuation assumption (assuming that the surplus or deficit will be expressed as an employer contribution rate payable over 15 years from 2015). This impact is on employer contribution rates only and does not impact on the cost cap mechanism.
- **'employer cost cap' –** This is the indicative impact on the employer cost cap of adopting the proposed 2012 valuation assumption as opposed to the 2007 valuation assumption.

3.8 The assumptions adopted will also impact on the employer contribution rate payable in respect of future accrual (both for members with or without transitional protection).

[16] In many cases we show the impact of the recommended assumptions relative to those proposed for the 2007 valuation of the scheme. Further details of the assumptions used for the 2007 valuation of the schemes are contained in our final valuation report *Firefighters' Pension Schemes in England: Actuarial valuation as at 31 March 2007.*

3.9 The figures have been calculated using approximate methods and should be used as a guide to the broad magnitude of the impact of the change being considered. Furthermore the impacts of different changes 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%.

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

Cost cap assumptions

3.11 The HMT Directions require the calculation of a proposed employer cost cap using the assumptions adopted for the 2012 valuation, but adjusted as though no members have any benefits accrued in the 1992 or 2006 schemes, and no members have any transitional protection (direction 48).

3.12 Under this requirement, the assumptions used to determine the proposed employer cost cap will be those applicable to new entrants to the 2015 scheme.

3.13 The assumptions adopted for the 2012 valuation are of particular importance as they will be used to set both the employer cost cap (direction 53) and the prior value of the cost cap fund (direction 30), both of which will be used to measure changes in the cost of the Schemes.

3.14 If experience differs from the assumptions adopted to calculate the employer cost cap and prior value of the cost cap fund, then this will feed into the measurement of changes in cost of the Schemes. The relative significance of assumptions in relation to the cost cap mechanism is discussed in each section.

Males and Females

3.15 There are relatively few female firefighters and as such it is not possible to perform any separate robust experience analysis for this group. Our analysis therefore covers both male and female members together. We recommend that the same assumptions are used for male and female firefighters in any given sub-group, based on the analysis of everyone in this sub-group. We do not have any evidence to suggest recommending different assumptions for males and females. On this basis we would not expect using the same assumptions for male and female members to have a material impact on the results.

4 Pensioner mortality

This section 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[17]	Adjustment
Current pensioners (normal and ill-health)	S1NMA	113%
Future pensioners (normal health)	S1NMA	110%
Future pensioners (ill-health)	S1IMA	100%
Dependants	S1DFA	100%

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

Previous valuation assumptions

4.3 At the previous valuation baseline mortality was similarly based on adjusted standard tables with future improvements based on the then most recent ONS population projections. However, the 2007 valuation assumption assumed lighter current rates of mortality (ie people were assumed to live longer) for future pensioners than our recommended 2012 valuation assumption. Table C.2 sets out a comparison of these rates.

[17] SAPS tables are published by the Continuous Mortality Investigation 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 male members retiring in normal health (S1NMA) and in ill-health (S1IMA) and for female dependants (S1DFA). The standard table has been adjusted to broadly allow for overall mortality improvements applying to the UK population from the mid-point of the period covered by the S1 tables to 31 March 2012.

Comparison of expected pensioner longevity

4.4 The table below gives a comparison of the resulting future life expectancies[18] assumed and recommended for the 2007 and 2012 valuations.

Table 4.2: Comparison of future life expectancies (years)

	2007 valuation	2012 valuation	UK Population[19]
Current pensioners (normal and ill-health)			
Member aged 50	36.3	37.2	35.7
Member aged 55	31.6	31.9	30.6
Member aged 60	27.0	27.0	25.8
Member aged 65	22.6	22.1	21.2
Future pensioners (normal health) – current age 45			
Member life expectancy from age 50	39.6	38.1	36.5
Member life expectancy from age 55	34.8	33.4	32.0
Member life expectancy from age 60	30.2	28.9	27.7
Member life expectancy from age 65	25.7	24.5	23.6

[18] Cohort future life expectancies based on the ages shown as at the valuation date, ie allowing for future mortality improvements.

[19] Cohort life expectancies from the 2012-based projections for males in the United Kingdom, produced by the Office for National Statistics.

Table 4.3: Comparison of future life expectancies of ill-health pensioners (years)

	2007 valuation	2012 valuation
Future pensioners – current age 45		
Member life expectancy from age 50	36.7	34.0
Member life expectancy from age 55	32.0	30.2
Member life expectancy from age 60	27.4	26.4
Member life expectancy from age 65	23.0	22.6

4.5 The comparison of future life expectancies given in table 4.2 and 4.3 is complex. It reflects changes to the assumed baseline mortality and mortality improvements, as well as a change to using different mortality assumptions for people born in different years (rather than an average mortality assumption for the relevant population). Further discussion on the comparison of mortality assumptions is given in Appendix C.

Use of the assumption

4.6 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

4.7 The proposed assumptions for pensioner mortality are based on an analysis of past mortality experience for the Schemes. We have analysed the pensioner mortality experience over the five-year period from 1 April 2007 to 31 March 2012. Further information on the data analysed and the results of that analysis are shown in Appendix C.

4.8 In order to make a recommendation of the most appropriate base table for pensioner mortality we have compared the actual mortality experience over the five-year period with that expected based on the most appropriate S1 standard table[20]. This comparison considers the key age ranges for the various types of deaths and identifies what adjustment to the standard table is required to provide the closest comparison with actual experience. The results are as shown in paragraph 4.1. Appendix C shows this comparison by age.

4.9 We have compared the number of dependants as at 31 March 2012 to that implied at this date by the number of dependants at 31 March 2007 and the movements data over the five-year period (ie the number of pensioners who died leaving a dependant, and the number of dependants who died). We were not able to reconcile this comparison to within an acceptable level and as a result, have concluded that a mortality analysis cannot be based on the dependants' movements data.

Rationale for recommended assumptions

4.10 The recommended assumption for pensioner mortality of current pensioners (normal and ill-health) is based on the analysis described above.

4.11 The recommended assumptions for pensioner mortality of future pensioners are consistent with the assumptions for current pensioners, described above. However different assumptions are adopted for members retiring in ill-health and normal health. It is reasonable to assume that members retiring in ill-health will have a lower life expectancy than members retiring in normal health. The assumptions adopted are as follows:

- Future pensioners (ill-health): There has been a significant reduction in the number of ill-health retirements since 2003 (see section 6), so the mortality experience of current ill-health pensioner may not be relevant to future ill-health pensioners. The recommended assumption is based on the experience of UK self-administered pension schemes.
- Future pensioners (normal health): The recommended assumption is based on the analysis of current pensions, with a small reduction to the mortality rates so the aggregate mortality of future pensioners (considering those retiring in normal health and ill-health together) is consistent with the mortality of current pensioners.

4.12 In the absence of robust data, we recommend that the mortality assumption for dependants is in line with the experience of UK self-administered pension schemes.

Financial impact

4.13 Mortality is a key assumption which will have a significant impact on employer contributions and the employer cost cap. Assuming longer (shorter) life expectancy would increase (decrease) costs.

[20] 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.

4.14 Our recommended 2012 valuation assumption implies shorter life expectancy than the 2007 assumption, which would reduce contribution rates. Table 4.4 shows the approximate impact of adopting our recommended assumptions (for both baseline mortality and future improvements) as opposed to those adopted for the 2007 valuation. The impacts shown reflect both the baseline mortality assumption and the assumptions regarding future improvements.

Table 4.4: Approximate impact of recommended change in mortality assumptions

Mortality	Past service effect[1]	Cost of accrual[2]		
		1992 Scheme	2006 Scheme	2015 Scheme[3]
Changes from 2007 to 2012 proposed assumptions	-0.6%	-0.6%	Immaterial	-0.1%

1 - Adjustment to contribution rate for 15 years from 2015 - this will affect the employer contribution rate in all three schemes
2 - This is the impact on the cost of benefits currently being accrued before any addition or subtraction for the past service effect
3 - The employer cost cap will be based on the cost of accrual in the FPS 2015 scheme (without any allowance for any past effects)

5 Age retirement

This section 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 1992 scheme after April 2015, for members who will continue in the 2006 scheme 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.

1992 scheme members

5.2 We recommend that the point at which 1992 scheme members are assumed to retire depends on age and service,

5.3 For protected members (who will remain in the 1992 scheme after 1 April 2015), we recommend rates with many retiring at the earlier of 30 years' service and age 55, in line with recent retirement patterns.

5.4 For members with taper protection and unprotected members with more than that 16 years' service, we recommend the same assumption as protected members above.

5.5 For unprotected members with less than 16 years' service, we recommend rates with no members retiring before age 55, and many members retiring at age 55, for example for members joining before age 25, about 99% retire at age 55, for members joining at age 30, about 79% retire at age 55.

2006 scheme members

5.6 We recommend that 2006 scheme members are assumed to retire at 60. This recommendation applies to members with protection or taper protection, and to unprotected members.

New entrants after April 2015

5.7 We recommend that 25% of members are assumed to retire at 55[21] with the remainder assumed to retire at 60.

[21] The age at which 25% of members are assumed to retire reflects the regulations which provide for enhanced terms for retirements at ages 55 and above.

Deferred members

5.8 We recommend it is assumed that deferred members will take their pension at their deferred pension age.

Previous valuation assumptions

5.9 Broadly similar assumptions about retirements in the 1992 scheme and 2006 scheme were adopted for previous valuations, although assumed retirement in the 1992 scheme was generally a little later under the 2007 valuation assumptions.

Use of the assumption

5.10 Age retirement rates specify the rate at which members are assumed to retire on grounds other than ill-health and therefore potentially include allowance for retirements before and after NPA.

5.11 In the 1992 scheme members can retire on an unreduced pension once they have completed 25 years' service if they are aged 50 or over, and most members can retire from age 55 regardless of service. There is no actuarially reduced early retirement option.

5.12 Members in the 2006 scheme can retire unreduced at age 60 from active service and from age 65 if deferred members. Active members can take actuarially reduced early retirement from age 55 up to age 60; the reduced pension is with reference to the deferred pension from age 65.

5.13 Members in the new scheme will be able to retire from age 60 from active service and from SPA if deferred members. They will be able to take actuarially reduced early retirement from age 55[22], with reference to a pension payable from age 60.

Results of analysis

5.14 We analysed the pattern of age retirements from active membership over the five-year period to 31 March 2012 for the 1992 scheme. In total there were around 4,600 age retirements from the 1992 scheme over the period. The analysis compared the numbers of actual retirements to the expected number of retirements under previous valuation assumptions. Further information on the data analysed and the results of that analysis are shown in Appendix D.

5.15 The analysis of experience over the period showed that members are retiring earlier on average than under the current assumptions. The number of members retiring was higher than expected from 50 to 54 and above age 55 and lower than expected at age 55.

[22] The age at which 25% of members are assumed to retire reflects the offer in Brandon Lewis's letter of 19 June 2013 which provided enhanced terms for retirements at ages 55 and 56 under the proposed 2015 scheme design.

Rationale for recommended assumptions

5.16 Our recommended assumptions for the protected 1992 scheme members reflect the analysis above.

5.17 Our recommendation for 1992 scheme members with taper protection or unprotected members with more than 16 years' service assumes that the 1992 scheme benefits have more influence on retirement rates than the 2015 scheme benefits, because these members have a relatively large amount of service in the 1992 scheme.

5.18 Our recommendation for unprotected members with less than 16 years' service reflects the significant disincentive of leaving the 2015 scheme before age 55 (retirement age effectively increases from 60 to SPA). It is assumed that the 2015 scheme will have more influence on retirement rates than the 1992 scheme for these members, because they have a relatively small amount of 1992 scheme service.

5.19 There was insufficient data to perform a credible analysis of the 2006 scheme experience. Our recommended assumption for 2006 scheme members is the same as that used for the 2007 valuation.

5.20 There is no data to inform the assumption for new entrants after 2015. Our recommended assumption is the same as that used for the scheme reform calculations.

5.21 Deferred members may claim a reduced pension before their deferred pension age, but the reduction is actuarially neutral so allowing for this possibility would not have a material impact on the valuation results.

Financial impact

5.22 The financial significance of the age retirement assumption differs for different groups of members.

5.23 ***1992 scheme protected members*** **–** This assumption can have a relatively significant impact on employer contribution rates via the impact on past service liability and the cost of future accrual in respect of these members. Assuming later (earlier) retirements would generally decrease (increase) costs. This assumption does not impact on the employer cost cap, but would have some impact on the cost cap mechanism if experience was not in line with assumptions.

5.24 ***2006 scheme members*** **–** This assumption has a small impact on employer contribution rates. Assuming earlier retirements would slightly decrease costs. This assumption does not impact on the employer cost cap, but would have a small impact on the cost cap mechanism if experience was not in line with assumptions.

5.25 ***New entrants from 2015*** **–** This assumption has a impact on employer contribution rates and the employer cost cap. Assuming earlier retirements would decrease costs.

5.26 Table 5.1 shows the approximate impact of adopting our recommended assumption as opposed to that adopted for the 2007 valuation. It also shows the impact of adopting different assumption for taper protected and unprotected 1992 scheme members with service in both the 1992 and 2006 schemes, and for new entrants to the 2015 scheme.

Table 5.1: Approximate impact of recommended change in age retirement assumptions

Age Retirement	Past service effect[1]	Cost of accrual[2]		
		1992 Scheme	2006 Scheme	2015 Scheme[3]
Changes from 2007 to 2012 proposed assumptions	+0.3%	+0.4%	No Change in assumption	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 fully unprotected members	-0.2%	Only past service effects considered		
Impact of assuming all new entrants retire at age 55	Only 2015 scheme considered			-2.6%

1 - Adjustment to contribution rate for 15 years from 2015 - this will affect the employer contribution rate in all three schemes
2 - This is the impact on the cost of benefits currently being accrued before any addition or subtraction for the past service effect
3 - The employer cost cap will be based on the cost of accrual in the FPS 2015 scheme (without any allowance for any past effects)

6 Ill-health retirement from service

This section 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 a single set of assumptions for the incidence of ill-health retirement is used for all active firefighters. Further we recommend that these same rates are assumed to apply to members in the 2015 scheme. Assumed rates of ill-health retirement increase with age but less than 1.5% of members are assumed to retire on ill-health grounds each year, even at the highest ages. Sample rates are provided in Appendix B.

6.2 We also recommend assuming that 40% of members retiring on ill-health grounds who have sufficient qualifying service to be assessed for a higher-tier benefit will receive one and the remainder will receive the lower-tier benefit.

Previous valuation assumptions

6.3 Higher rates of ill-health retirement were assumed for the 2007 valuation. The 2012 assumptions are approximately 20% of the 2007 assumptions.

6.4 For the 2007 valuations it was assumed that 25% of those retiring on ill-health grounds would receive higher-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 higher 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. Pensioner mortality is addressed in Section 4.

Results of analysis

Ill-health retirement rates

6.6 We analysed around 260 ill-health retirements over the five-year period to 31 March 2012. The analysis compared the numbers of actual retirements to the expected number of retirements under previous valuation assumptions. Details of the analysis are shown in Appendix E.

6.7 The analysis showed there were substantially fewer ill-health retirements than assumed under the 2007 valuation assumptions (around 15% of the expected number), though the distribution of retirements by age was broadly in line with the rates assumed for the 2007 valuation.

Split between tiers

6.8 We have used the published DCLG statistics for the years 2010-11 and 2011-12 to determine a value for the proportion of higher tier benefit awards made. Details of this analysis are shown in Appendix E.

6.9 We do not have any data to consider whether the split between ill-health tiers varies by age or any other factor.

Rationale for recommended assumptions

Ill-health retirement rates

6.10 The recommended ill-health rates are based on the experience in 2007-12 with an adjustment to account for an upwards trend in the number of ill-health retirements since 2008.

6.11 The number ill-health retirement has increased over the past four years, from 30 in 2008-09 to 69 in 2011-12 (see Table E1 in Appendix E). We recommend that the assumptions reflect the experience in 2011-12. We have done this by rating up to adjust for the difference between the average number of retirements over 2007-12 and the number of ill-health retirements in 2011-12. The effect of this is that our proposed assumptions are about 20% of the 2007 assumptions (ie there are 80% fewer ill-health retirements than expected under the 2007 assumptions).

6.12 There are some differences in the rules for qualifying to receive an ill-health pension between the 2006 scheme and the 1992 scheme but we do not believe this will have a material effect on the number of members retiring on grounds of ill-health.

6.13 There is limited experience on which to base ill-health assumptions at ages 50 to 60, but the evidence available supports retaining the pattern at which ill-health retirements change by age adopted in the 2007 valuation for 2006 scheme members.

Split between tiers

6.14 Our recommended assumption reflects the analysis above.

6.15 There are some differences in the rules for qualifying to receive a higher tier ill-health pension between the 2006 scheme and the 1992 scheme but we do not believe this will have a material effect on the split between tiers.

Financial impact

6.16 The rates of ill-health retirement is an important assumption for the valuation, but the overall financial impact is complicated by the fact that FRAs pay a lump sum charge into their pension account in respect of each ill-health retirement from the scheme, with their ongoing contribution rate being lowered to reflect these expected charges in respect of ill-health retirements.

6.17 Setting aside the lump sum charges, assuming lower (higher) rates of ill-health retirement would tend to decrease (increase) employer contribution rates.

6.18 The employer cost cap is unaffected by the lump sum charges. Assuming lower (higher) rates of ill-health retirement would tend to decrease (increase) the employer cost cap.

6.19 Under the recommended assumptions for rates of ill-health retirement, the assumption for the split between higher and lower tier awards has only a very small financial impact.

6.20 Table 6.1 shows the approximate impact of adopting our recommended assumption as opposed to that adopted for the 2007 valuation. It does not take account of the reduced ill-health charge adjustment which will arise as a consequence, which will offset the overall impact on employer contributions to the Schemes to some extent. It also does not take account of any deficit or surplus which will have emerged as a result of ill-health rates being different to those assumed over the period 2007 to 2012.

Table 6.1: Approximate impact of recommended change in ill-health retirement assumptions

Ill-Health Dec	Past service effect[1]	Cost of accrual[2]		
		1992 Scheme	2006 Scheme	2015 Scheme[3]
Changes from 2007 to 2012 proposed assumptions	+0.4%	-0.7%	-2.0%	-1.6%

1 - Adjustment to contribution rate for 15 years from 2015 - this will affect the employer contribution rate in all three schemes
2 - This is the impact on the cost of benefits currently being accrued before any addition or subtraction for the past service effect
3 - The employer cost cap will be based on the cost of accrual in the FPS 2015 scheme (without any allowance for any past effects)

7 Voluntary withdrawal from service

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

Proposed assumptions for 2012 valuation

7.1 For 1992 scheme members or former 1992 scheme members in the 2015 scheme, we recommend that the 2007 assumptions are retained. The rates are decreasing with age: for Regular firefighters they are 1.1% at age 25, 0.3% at age 45.

7.2 In the absence of robust data, we provided two possible alternative assumptions for the 2006 scheme.

7.3 The first alternative was to use the withdrawal rates assumed for scheme reform work for Regular firefighters in the 2006 scheme, with retained firefighters withdrawing at four times these rates. The rates are decreasing with age: for Regular firefighters they are 1.8% at age 25, 1.4% at age 45.

7.4 The second alternative was to use withdrawal rates for Regular firefighters in the 2006 scheme that are the same as those for Regular firefighters in the 1992 scheme, with retained firefighters withdrawing at nine times these rates.

7.5 DCLG have confirmed that they propose to adopt the second alternative above: that is, to use withdrawal rates for Regular firefighters in the 2006 scheme that are the same as those for Regular firefighters in the 1992 scheme, with retained firefighters withdrawing at nine times these rates.

7.6 We recommend that withdrawal rates in the 2015 scheme are assumed to be the same as those adopted for the 2006 scheme, except with no withdrawals from age 55 onwards[23].

7.7 The choice of withdrawal assumptions between the two alternatives set out above will have a significant impact on employer contribution rates and the employer cost cap.

7.8 Sample rates are provided in Appendix B. The same rates apply regardless of the length of the member's service.

[23] The age at which 25% of members are assumed to retire reflects the offer in Brandon Lewis's letter of 19 June 2013 which provided enhanced terms for retirements at ages 55 and 56 under the proposed 2015 scheme design.

Previous valuation assumptions

7.9 At the previous valuation, two alternative assumptions were given for 2006 scheme members[24]. The two alternatives were: the same assumption as used for 1992 scheme members; and higher rates of 2.5% a year at all ages. In the absence of evidence it was (and continues to be) not clear what impact the different benefit design (including a normal retirement age of 60) might have on member behaviour with regards to voluntary withdrawals. The scheme reform assumption was the average of these two assumptions.

7.10 At the previous valuation, 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 not material, therefore we do not propose to make such an allowance.

Use of the assumption

7.11 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 3 months' service (two years' service in the 1992 scheme), a refund of contributions, or have opted to transfer the value of their pension out of the Schemes. In all cases the withdrawal rates are 'net' rates, ie they are intended to reflect the probability of leaving service and not re-joining within 5 years, and therefore the member's benefits not being linked to their final salary at retirement (or the in-service revaluation rate in the 2015 scheme).

7.12 There is very little evidence of members re-joining the Schemes after leaving. For the avoidance of doubt, all members assumed to withdraw are assumed not to re-join.

Results of analysis

7.13 We have analysed the pattern of withdrawals from active membership over the five-year period to 31 March 2012 for the 1992 scheme.

7.14 The actual number of withdrawals analysed from the 1992 scheme over the five-year period was just above 900. This is higher than the approximately 650 expected based on the 2007 assumptions. However our analysis indicated that around ¼ of the members coded as withdrawals were also present in the active data as at 31 March 2012, which means that they would maintain their final salary link. (It is possible that some members who took inter-authority transfers were coded as withdrawals.) Allowing for these members who are present in the 2012 data, the number of actual withdrawals is in line with the assumption.

[24] The results shown in the 2007 report for the NFPS were the average of results using each of the two alternative assumptions.

7.15 We do not have a credible split of the 2006 scheme membership into Regular and Retained firefighters and data from the Fire and Rescue Service Operational Statistics Bulletin for England indicates there is a material difference in withdrawal rates between Regular and Retained firefighters. Therefore we are unable to produce a credible analysis of 2006 scheme withdrawal rates.

7.16 Further information on the data analysed and the results of that analysis are shown in Appendix F.

Rationale for recommended assumptions

7.17 The recommendation to retain the 2007 valuation assumption for 1992 scheme members is based on the experience in 2007-12.

7.18 We recommend that the same withdrawal assumption is adopted for former members of the 1992 scheme accruing benefits in the 2015 scheme, since we expect that the accrued 1992 scheme benefits will influence member behaviours and, in particular, the increase in accrued benefits to reflect the expectation of double accrual.

7.19 There is little evidence on the rates of withdrawal of Regular firefighters in the 2006 scheme (especially in respect of withdrawals at older ages, where there are currently only small numbers of Regular firefighters in the 2006 scheme) although there is evidence of the average overall withdrawal rates in the 2006 scheme (for Regular and Retained firefighters combined). In the absence of robust data, we have provided two possible alternative assumptions for the 2006 scheme.

7.20 The first alternative was to use the withdrawal rates assumed for scheme reform work for Regular firefighters in the 2006 scheme, which is the average of the two alternative assumptions used in the 2007 valuation. The rationale for this alternative is that there is little evidence to dispute the 2007 assumption. In conjunction with this assumption it would be appropriate to have assumed that Retained firefighters withdraw at four times this rate, so that the overall rate of withdrawal from the 2006 scheme is consistent with the experience in 2007-12.

7.21 The second alternative was to use withdrawal rates for Regular firefighters in the 2006 scheme that are the same as those for Regular firefighters in the 1992 scheme. The rationale for this alternative is that it provides consistency in the assumed behaviour of Regular firefighters in the 1992 and 2006 schemes. In conjunction with this assumption it would be appropriate to have assumed that Retained firefighters withdraw at nine times this rate, so that the overall rate of withdrawal from the 2006 scheme is consistent with the experience in 2007-12.

7.22 We recommend that withdrawal rates in the 2015 scheme are assumed to be the same as those adopted for the 2006 scheme, in the absence of other information and given the similarities between these two schemes.

Financial impact

7.23 The rate of withdrawal is an important assumption for the valuation. The rates for all groups of members impact significantly on employer contributions. The rates for 2015 scheme members are more significant for calculating the employer cost cap. Assuming lower (higher) rates of withdrawal would increase (decrease) costs.

7.24 Table 7.1 shows the approximate impact of adopting the proposed assumptions as opposed to that adopted for the scheme reform work, which was the average of the two alternative withdrawal assumptions set out in the 2007 valuation.

Table 7.1: Approximate impact of recommended change in withdrawal assumptions

Withdrawal	Past service effect[1]	Cost of accrual[2]		
		1992 Scheme	2006 Scheme	2015 Scheme[3]
Changes from scheme reform to 2012 proposed assumptions	+0.1%	No Impact	+0.9%	+1.3%

1 - Adjustment to contribution rate for 15 years from 2015 - this will affect the employer contribution rate in all three schemes
2 - This is the impact on the cost of benefits currently being accrued before any addition or subtraction for the past service effect
3 - The employer cost cap will be based on the cost of accrual in the FPS 2015 scheme (without any allowance for any past effects)

7.25 The first alternative assumption proposes the same assumptions as the scheme reform work for Regular firefighters, and higher withdrawal rates for Retained firefighters. This would result in a slightly lower cost of accrual in the 2015 scheme, compared to retaining the scheme reform assumption for Retained firefighters.

7.26 The second alternative assumption proposes a lower withdrawal assumption than the scheme reform work for Regular firefighters in the 2006 scheme and the 2015 scheme, and higher withdrawal rates for Retained firefighters. This would result in a higher cost of accrual in the 2015 scheme, compared to retaining the scheme reform assumption for Retained firefighters.

8 Death before retirement

This section 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 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 in service increase with age but fewer than ½% of members are assumed to die each year, even at the highest ages. Sample rates are provided in Appendix B.

Previous valuation assumptions

8.2 A single set of rates were used for the 2007 valuation to allow for the possibility of death before retirement. The rates were based on experience prior to the valuation date and were higher than those recommended for the 2012 valuation. The 2012 rates are approximately 20% lower than the 2007 rates.

Use of the assumption

8.3 Death before retirement rates are used to allow for the possibility of death whilst in active service or whilst entitled to a deferred pension. Following such a death, a lump sum is payable plus pensions to qualifying dependants. The number 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 five-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 around 70 deaths of active members over the period. The analysis compares the number of actual deaths to the expected number of deaths under previous valuation assumptions, and with the general UK population, as given in the ONS UK male interim life tables for 2008-10. Further information on the data analysed and the results of that analysis are shown in Appendix G.

8.5 The analysis showed there were fewer deaths than expected. There is only a small amount of experience to consider which means that an in-depth analysis by age is not appropriate.

Rationale for recommended assumptions

8.6 To formulate a recommended assumption we compared the actual experience with the ONS UK male interim life tables for 2008-10. The 'best fit' was achieved by taking around 23% of the ONS table rates. Note that this percentage adjustment is low when comparing to the UK population table because active firefighters are much less likely to die than the UK population as a whole, which includes people who are not in employment and those in ill-health.

Financial impact

8.7 The rate of death before retirement is a relatively insignificant valuation assumption. Using higher or lower rates could lead to either a small increase or small decrease in costs, depending upon how the rates varied with age.

8.8 Table 8.1 shows the approximate impact of adopting our recommended assumption as opposed to that adopted for the 2007 valuation.

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

Mortality	Past service effect[1]	Cost of accrual[2]		
		1992 Scheme	2006 Scheme	2015 Scheme[3]
Changes from 2007 to 2012 proposed assumptions	Immaterial	Immaterial	Immaterial	Immaterial

1 - Adjustment to contribution rate for 15 years from 2015 - this will affect the employer contribution rate in all three schemes
2 - This is the impact on the cost of benefits currently being accrued before any addition or subtraction for the past service effect
3 - The employer cost cap will be based on the cost of accrual in the FPS 2015 scheme (without any allowance for any past effects)

9 Promotional pay increases

This section 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 separate scales of promotional increases for Regular firefighters and Retained firefighters. The increases for Regular firefighters are dependent on service and are steeper at shorter durations of service. The increases for Retained firefighters are assumed to be dependent on age. Sample values of the scales are provided in Appendix B.

Previous assumption

9.2 Different scales of promotional increases were adopted for members of the 1992 scheme and 2006 scheme in the 2007 valuation. Apart from some difference in the early years of service, the main difference between the two scales was that the 1992 scheme scale was steeper at longer service lengths (above 28 years' service) than the 2006 scheme scale.

9.3 The 2007 valuation did not include separate assumptions for Retained firefighters, as they were only eligible to join the scheme from April 2006.

Use of the assumption

9.4 For the existing sections of the 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 Secretary of State.

9.5 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 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. It is relatively unimportant in calculating the costs of the 2015 scheme, which is a career average scheme.

Results of analysis

Regular firefighter members

9.6 We analysed the promotional increases implied by the current pay structure of the membership as at 31 March 2012 (for members with up to 30 years' service). Details of the analysis are contained in Appendix H.

9.7 The analysis suggested that the pay structure is broadly consistent with the 2007 valuation assumption for the 1992 scheme for promotional pay increases at most durations of service (up to 30 years). However, for members with between 5 and 13 years of service the promotional increases implied were lower than those in the 2007 valuation assumption.

Retained firefighter members

9.8 It was not possible to analyse Retained firefighters' pay by length of service, since they were only eligible to join the 2006 scheme, and as such the date they joined the scheme does not correspond to the date they joined the Fire and Rescue Service. Therefore, the experience for Retained firefighter members was analysed by looking at the profile of the Retained firefighter membership as at 31 March 2012 in terms of average pensionable pay at each age. Further details of this analysis can be found in Appendix H.

General

9.9 The results of the analysis should be treated with some caution. It is, in general, difficult to identify promotional increases separately from other elements of pay increase.

Rationale for recommended assumptions

Regular firefighter members

9.10 As there is no compelling evidence to suggest that the promotional pay increase assumptions used previously are no longer appropriate at most durations of service (up to 30 years), we propose to use an adjusted version of the salary scale used in the 2007 valuation assumption at these durations. The adjustment reflects the lower increases observed for members with between 5 and 13 years of service.

9.11 There is relatively little data at durations in excess of 30 years' service. Furthermore, the data available is almost entirely in respect of the subset of the 1992 scheme membership who chose to work beyond 30 years (at which point, if they are aged 50 or over, they could choose to retire immediately with an unreduced pension). This subset of the membership may not display the same characteristics as the membership as a whole. The scheme reforms mean that a much larger proportion of the workforce are expected to work beyond 30 years' service than in the past and therefore the promotional increase assumption at these durations should be suitable for this larger proportion of the workforce. Therefore we do not view it as appropriate to use the data available to inform the assumption for future promotional increases of members with more than 30 years' service.

9.12 This effect was also recognised at the 2007 valuation, which adopted a different salary scale for 2006 scheme members, as it was expected that the higher Normal Pension Age in the 2006 scheme would lead to a higher proportion of less senior Firefighters staying in service after 30 years of service. As a result of the scheme reforms, it is possible that former members of both the 1992 scheme and the 2006 scheme may stay in service beyond 30 years. For this reason we believe it is appropriate to adopt the same salary scale for both the 1992 scheme and the 2006 scheme, and for that scale to reflect a higher proportion of less senior Firefighters staying in service after 30 years of service.

9.13 The level of promotional pay increases after 30 years is uncertain, and arguments could be made for a range of possible assumptions:

- An argument could be made for promotional increases at a similar level to durations from 25 to 30 years' service, on the basis that the general level of promotional increases might be expected to be similar at durations shortly above 30 years as those shortly below 30 years.
- Alternatively, an argument could be made for no promotional increases the after 30 years' service, on the basis that most members might be expected to experience the same overall career progression as the extension of the length of time members serve would not change the number of higher-ranked roles to be filled.

9.14 Our view is that an appropriate assumption for promotional increases would lie somewhere in the range between the two scenarios set out above.

9.15 We recommend an assumption of promotional increases between durations of 30 and 35 years at broadly half of the average assumed rate of promotional increases from durations 25 to 30 years; and no promotional increases for durations of 35 years and above.

Retained firefighter members

9.16 On the basis of the average age to age increases revealed by the analysis above, we have recommended a salary scale with increases about 1% a year up to age 50, 0.4% a year thereafter. The analysis and proposed assumption are shown in Graph H2.

Financial impact

9.17 Assumed promotional pay increases have a significant impact on final salary liabilities but has relatively little impact on CARE liabilities like those accrued in the 2015 scheme. Assuming larger (smaller) promotional increases would increase (decrease) employer contribution rates. It would have relatively little impact on the employer cost cap, but would impact on the cost cap mechanism if experience was not in line with assumptions.

9.18 Table 9.1 shows the approximate impact of adopting our recommended assumption as opposed to that adopted for the 2007 valuation.

Table 9.1: Approximate impact of recommended change promotional pay increase assumption

Promotional Pay	Past service effect[1]	Cost of accrual[2]		
		1992 Scheme	2006 Scheme	2015 Scheme[3]
Changes from 2007 to 2012 proposed assumptions	-0.6%	-0.3%	-2.4%	Immaterial

1 - Adjustment to contribution rate for 15 years from 2015 - this will affect the employer contribution rate in all three schemes
2 - This is the impact on the cost of benefits currently being accrued before any addition or subtraction for the past service effect
3 - The employer cost cap will be based on the cost of accrual in the FPS 2015 scheme (without any allowance for any past effects)

10 Commutation of pension for cash at retirement

This section 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 The HMT directions require that it is assumed that members of 2007 scheme and members of the 2015 scheme will commute 15% of their pension for a lump sum (direction 18(e)). This is with the exception of members of the 2015 scheme with 1992 scheme service, for whom we recommend an assumption below.

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

- 1992 scheme protected members: No assumption needed – actuarially neutral commutation
- 2006 scheme protected members: 15% (as set in the Directions)
- New entrants post-2015: 15% (as set in the Directions)
- Members with 1992 scheme and 2015 scheme service: no commutation of 2015 scheme benefits
- Members with 2006 scheme and 2015 scheme service: 15% (as set in the Directions)

10.3 In the 1992 scheme, members have the option to commute pension for a cash lump sum at retirement. The terms under which this option is offered is such that the valuation of the benefits would be the same whether or not allowance was made for members exercising these options. As such, for simplicity no allowance for members exercising these options is proposed for the valuation.

Previous valuation assumptions

10.4 For simplicity no allowance for members exercising this option was proposed for 1992 scheme members in the 2007 valuation.

10.5 2006 scheme members can take an optional lump sum by commutation at a rate of £12 for every £1 per annum of pension foregone up to a limit of 25% of their pension. It was assumed that 90% of the 2006 scheme membership would commute the maximum of 25% of pension (so an average commutation rate of 22.5% of pension).

Use of the assumption

10.6 In the 2006 scheme and 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, up to a limit of 25% of their pension. In these schemes, 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 experience in the 2015 scheme will feed through into the cost cap fund but experience in the 1992 scheme and 2006 scheme will not.

Results of analysis

10.7 We analysed the commutation experience of 2006 scheme members retiring between March 2007 and March 2012. Details of the analysis are contained in Appendix I.

10.8 About 16% of pension was commuted by 2006 scheme members retiring in normal health over the period. There were few retirements from the 2006 scheme over this period (78) and the members who retired are atypical, having joined the scheme at a later age and retired with shorter service than most members. However, this does not necessarily mean that they will be atypical with regards their commutation experience.

Rationale for recommended assumptions

10.9 Members who have service in the 1992 scheme and the 2015 scheme will be able to choose which scheme to commute pension from (within the limits relevant to each scheme). 1992 scheme members are entitled to commute up to a quarter of their pension on actuarially equivalent terms (in general - alternative limits apply to some members). The terms available in the 1992 scheme offer a significantly greater lump sum than the 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 1992 scheme (where the lump sum available from the 1992 scheme is large). Even members with the least 1992 scheme service are likely be able to commute a lump sum from their 1992 scheme 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 1992 scheme members will commute pension from the 2015 scheme.

Financial impact

10.10 The commutation assumption is particularly significant for assessing costs in the 2006 scheme and the 2015 scheme, including the employer cost cap. Assuming a greater (lesser) proportion of pension is commuted decreases (increases) costs. However this assumption set in the Directions so we have not illustrated the financial impact, as DCLG does not need to set the commutation assumption for the 2015 scheme.

11 Family statistics

This section 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 In the absence of robust data we recommend adopting assumptions based on statistics produced by the Office for National Statistics (ONS) for England and Wales.

- Future pensioners:
  - 75% of 1992 scheme members are assumed to be married or in a civil partnership at retirement; and
  - 80% of 2006 scheme and 2015 scheme members are assumed to be married, in a civil partnership, or have a nominated partner at retirement.
- Current pensioners:
  - 1992 scheme members: The proportion married or in a civil partnership to be in line with male ONS data for proportions married at each age
  - 2006 scheme and 2015 scheme members: The proportions married, in a civil partnership, or who have a nominated partner at retirement to be in line with male ONS data for proportions married or cohabiting at each age.
- Members are assumed to be three years older than their partners.
- No allowance is made for remarriage on the grounds of materiality.

Previous valuation assumptions

11.2 Assumptions for proportions married/partnered and age differences were previously framed around the members' circumstances at death, with separate assumptions for each age. No allowance was made for remarriage.

11.3 The assumed proportions married/partnered are generally lower than adopted for the 2007 valuation, particularly for older members and partners.

Use of the assumption

11.4 Dependants' pensions[25] are provided to legal spouses, civil partners, and (in the 2006 scheme and 2015 scheme) nominated partners (financially dependent and residing together) on the death of a member. 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 partners as this affects how long dependants' pensions are expected to be paid for.

Results of analysis

11.5 We do not have credible data from the Schemes on which to analyse experience.

Rationale for recommended assumptions

11.6 In the absence of scheme specific information, we have recommended assumptions in line with ONS statistic for the UK population for proportions married and partnered; and recommended retaining the 2007 valuation assumptions for age difference and remarriage.

Financial impact

11.7 Table 11.1 shows the approximate impact of adopting our recommended assumption as opposed to that adopted for the 2007 valuation.

Table 11.1: Approximate impact of proposed change in family statistics assumptions

Changes from 2007 to 2012 assumptions	Past service effect[1]	Cost of accrual[2]		
		1992 scheme	2006 scheme	2015 scheme[3]
Proportion Married	-3.0%	-0.6%	-0.2%	-0.4%
Remarriage	No impact	No impact	Not a feature of the scheme	Not a feature of the scheme
Age difference	No impact	No impact	No impact	No impact

1 - Adjustment to contribution rate for 15 years from 2015 - this will affect the employer contribution rate in all three schemes
2 - This is the impact on the cost of benefits currently being accrued before any addition or subtraction for the past service effect
3 - The employer cost cap will be based on the cost of accrual in the FPS 2015 scheme (without any allowance for any past effects)

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

Appendix A: Summary of recommended assumptions

Assumption[26]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Pensioner baseline mortality[27]	Aligned to standard SAPS table as at 2012[28,29]			
Current pensioners (normal and ill-health)	113% × S1NMA as at 2012	In line with 2007-2012 experience. *See graph C1*		
Future pensioners (normal health)	110% × S1NMA as at 2012	In line with 2007-2012 experience, adjusted to remove allowance for future ill-health pensioners, who are assumed to live less long	-0.6%[30]	-0.1%
Future pensioners (ill-health)	100% × S1IMA as at 2012	In line with experience of UK self-administered pension schemes		
Dependants	100% × S1DFA as at 2012	In line with experience of UK self-administered pension schemes		

[26] Our recommendations are for the same assumptions to be used for males and females in all areas. Because the majority of members are male, there is insufficient data to analyse female members separately.
[27] As directed by HMT, improvement in mortality from 2012 are assumed to be in line with those underlying the most recent ONS population projections
[28] SAPS tables are published by the Continuous Mortality Investigation and are 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 male members retiring in normal health (S1NMA) and in ill-health (S1IMA) and for female dependants (S1DFA).
[29] Adjusted to take account of improvements in mortality applying to the UK population between 2002 (the base year for the SAPS tables) and 2012.
[30] Our recommended 2012 valuation assumption implies shorter life expectancy than the 2007 assumption, which would reduce contribution rates. *See paragraph C10.*

Assumption[26]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Age retirement				
1992 scheme protected, tapered, and unprotected members with more than 16 years' service	Retirement depends on age and service, with many retiring at the earlier of 30 years' service and age 55	In line with 2007-2012 experience *see graph D2*	+0.3%	N/A
1992 scheme unprotected members with less than 16 years' service	No retirements before age 55. Age and service based rates, with many retiring at age 55, for example for members joining before age 25, about 99% retire at age 55, for members joining at age 30, about 79% retire at age 55.	1992 scheme benefits are available before age 55. However, there is a significant disincentive to 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. 1992 scheme benefits are still a relatively sizeable amount even if only in respect of service up to 2015, from which point accruals will be under the 2015 scheme. So it is reasonable to expect high take-up of age retirement at 55 for these members.		

Assumption[26]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Age retirement continued				
2006 scheme (ie generally post-06 entrants)	All retire at age 60	Retirement before age 60 would significantly reduce the value of benefits accrued in the 2006 scheme (retirement age effectively increases from 60 to 65). There is, however, insufficient experience.	No change in assumption	
New entrants from 2015	About 25% retire at age 55[31], 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. Consistent with scheme reform assumptions[32]. To be kept under review.	No past service	New assumption

[31] The age at which 25% of members are assumed to retire reflects the regulations which provide for enhanced terms for retirements at ages 55 and above.
[32] Arguments could be made for other assumptions. Assuming less people would retire at age 55 (and instead at 60) would increase the 2015 cost of accrual. Conversely, assuming more people would retire at age 55 (instead of at 60) would slightly decrease the 2015 cost of accrual.

Assumption[26]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Ill-health retirement				
Incidence	Increasing by age: around 0.02% at age 25, 0.26% at age 45	Shape in line with 2007-2012 experience, but assuming overall levels in line with 2011-12 experience with no further upward trend *see table E2 and graph E2*	+0.4%[33]	-1.6%[34]
Higher/lower tier split	40% on higher tier[35]	In line with 2010-2012 experience *see para E12*		

[33] Does not take account of the reduced ill-health charge adjustment which will arise as a consequence, which will offset the overall impact on employer contributions to the scheme to some extent. It also does not take account of any deficit or surplus which will have emerged as a result of ill-health rates being different to those assumed over the period 2007 to 2012.

[34] This reduction reflects the large drop in ill-health retirement rates compared to the 2007 assumption. The scheme reform assumptions already made some allowance for this reduction.

[35] Higher tier ill-health benefits are granted to those in more serious ill-health than those granted only lower tier benefits.

Assumption[26]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Withdrawal				
1992 scheme (ie generally pre-06 entrants)	Withdrawals decreasing with age: 1.1% at age 25, 0.3% at age 45	Based on 2007-2012 withdrawal experience *see table F1*	No change in assumption	
2006 scheme (ie post-06 entrants), and new entrants from 2015	Regular firefighters: rates decreasing with age: 1.8% at age 25, 1.4% at age 45; Retained firefighters: withdraw at four times these rates	Rates for Regular firefighters are as adopted for 2007 valuation and scheme reform. Little of evidence to support or dispute previous assumption	Immaterial	-0.2%
	or[36]			
	Regular firefighters: rates consistent with 1992 scheme; Retained firefighters: withdraw at nine times these rates	Rates for Regular firefighters in the 1992 scheme and 2006 scheme are similar	+0.1%	+1.3%
Death before retirement	Increasing by age: 0.02% at age 25, about 0.05% at age 45, 0.3% at age 65	In line with 2007-2012 experience, not adjusted for future improvements in mortality *see graph G1*	Immaterial	Immaterial

[36] There is little evidence on the rates of withdrawal of Regular firefighters in the 2006 scheme, although there is evidence of the average overall withdrawal rates in the 2006 scheme (for Regular and Retained firefighters combined). In the light of this uncertainty we provided two possible alternative assumptions, with rationales, and DCLG have chosen to assume that withdrawal rates for Regular firefighters' were the same under both the 1992 and 2006 schemes and nine times as much for Retained firefighters.

Assumption[26]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Promotional salary scale				
Regular firefighters	Service based scale: after 1st year about 6% a year for first four years, 0.7% a year for the following 8 years, then about 1.2% a year up to 30 years, after 30 years a lower scale is used	In line with scheme data as at 31 March 2012 *see graph H1*	-0.6%	Immaterial
Retained firefighters	Age related scale: about 1% a year up to age 50, 0.4% a year thereafter	In line with scheme data as at 31 March 2012 *see graph H2*		
Commutation				
1992 scheme protected (ie generally pre-06 entrants aged 45 and above)	No assumption needed	Actuarially neutral commutation of 1992 scheme pension	No change in assumption	N/A
Former 1992 scheme members in 2015 scheme (ie generally pre-06 entrants aged under 45)	Nil commutation from 2015 scheme	Reasonable approach given that 1992 scheme offers a greater lump sum for pension given up, compared with 2015 scheme	New assumption	
2006 scheme (ie generally post-06 entrants)	15% of pension commuted	Required by HMT directions	Directed	N/A
New entrants from 2015	15% of pension commuted	Required by HMT directions	No past service	Directed

Assumption[26]	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2007 valuation assumptions	
			Past service	Employer cost cap
Family statistics				
Proportion married/partnered	75% married, 80% partnered at retirement (consistent assumptions for existing pensioners)	In line with ONS statistics for UK population	-3.0%	-0.4%
Age difference	Males 3 years older than partner	In line with ONS statistics for UK population	No change in assumption	
Remarriage	No allowance	In line with 2007 assumptions	No change in assumption	Not a feature of the scheme

Appendix B: Details of recommended 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[37]	Adjustment
Current pensioners (normal and ill-health)	S1NMA	113%
Future pensioners (normal health)	S1NMA	110%
Future pensioners (ill-health)	S1IMA	100%
Dependants	S1DFA	100%

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

[37] From the 'S1' series of standard tables published by the Continuous Mortality Investigation 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 1992 scheme protected members, tapered members and unprotected members with more than 16 years' service at 31 March 2012.

Age at joining	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30 and over*
Age													
50	0.795	0.795	0.795	0.050	0.050	0.050	0.050	0.050	0.000	0.000	0.000	0.000	0.000
51	0.490	0.490	0.490	0.795	0.020	0.020	0.020	0.020	0.050	0.000	0.000	0.000	0.000
52	0.490	0.490	0.490	0.490	0.915	0.020	0.020	0.020	0.020	0.050	0.000	0.000	0.000
53	0.490	0.490	0.490	0.490	0.490	0.975	0.020	0.020	0.020	0.020	0.050	0.000	0.000
54	0.490	0.490	0.490	0.490	0.490	0.490	0.975	0.020	0.020	0.020	0.020	0.050	0.000
55	0.660	0.660	0.660	0.680	0.705	0.725	0.750	0.975	0.790	0.790	0.790	0.790	0.790
56	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.975	0.410	0.410	0.410	0.410
57	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.975	0.410	0.410	0.410
58	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.975	0.410	0.410
59	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.975	0.410
60 and over	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Age retirement from service - Table B3: Age retirement rates for 1992 scheme unprotected members with less than 16 years' service at 31 March 2012

Age at joining	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30 and over*
Age													
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
53	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	0.995	0. 995	0. 995	0. 992	0.994	0.996	0.994	0.978	0.812	0.808	0.804	0.801	0.790
56	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.975	0.410	0.410	0.410	0.410
57	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.975	0.410	0.410	0.410
58	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.975	0.410	0.410
59	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.655	0.975	0.410
60 and over	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table B4: Age retirement rates for 2006 scheme protected members and new entrants to the 2015 scheme

Retirement Age	2006 Scheme only	Unprotected 2006 Scheme members in the 2015 Scheme	2015 Scheme only
55	-	-	0.250
56	-	-	-
57	-	-	-
58	-	-	-
59	-	-	-
60	1.000	1.000	1.000

Ill-health retirement from service

Table B5: Ill-health retirement rates for all members

Age	Ill-health retirement rate
20	0.00008
25	0.00016
30	0.00031
35	0.00063
40	0.00128
45	0.00260
50	0.00526[38]
55	0.01023
59	0.01139

[38] Rates are zero at age 50 if the member is eligible to retire on an unreduced pension.

Voluntary withdrawal from service

Table B6: Withdrawal rates (net of re-entry within 5 years)

The report include two alterative assumptions. DCLG have confirmed that they propose to adopt the following assumptions:

Age	Withdrawal rate		
	1992 scheme	2006 scheme and New entrants from 2015- Regular Firefighters	2006 scheme and New entrants from 2015- Retained Firefighters
20	0.0106	0.0106	0.0954
25	0.0106	0.0106	0.0954
30	0.0106	0.0106	0.0954
35	0.0098	0.0098	0.0882
40	0.0061	0.0061	0.0549
45	0.0034	0.0034	0.0306
50	0.0019[39]	0.0019	0.0171
55	0.0000	0.0000	0.0000
59	0.0000	0.0000	0.0000

Death before retirement

Table B7: Death before retirement rates for all members

Age	Death before retirement
20	0.00014
25	0.00015
30	0.00021
35	0.00028
40	0.00038
45	0.00054
50	0.00079
55	0.00128
60	0.00196
65	0.00308

[39] Rates are zero at age 50 if the member is eligible to retire on an unreduced pension.

Table B8: Promotional salary scales for Regular firefighter members

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

Service (years)	Promotional Pay for Wholetime Members
0	100.0
5	140.4
10	145.4
15	152.2
20	161.6
25	171.1
30	183.6
35	190.1
40	190.1

Table B9: Promotional salary scales for Retained firefighter members

The proposed salary scale (with an index base of 100 at age 18) is summarised in the table below.

Age	Promotional Pay for Retained Firefighters
20	102.2
25	107.7
30	113.2
35	118.7
40	124.2
45	129.7
50	135.2
55	137.7
60	140.2
65	142.7

Commutation of pension for cash at retirement

Table B10: - Recommended commutation assumptions

Member with service in the following schemes	1992 scheme only	2006 scheme only	Mixed 1992 and 2015 scheme		Mixed 2006 and 2015 scheme		2015 scheme only
Scheme pension commuted from	1992	2006	1992	2015	2006	2015	2015
All members	0%	15%*	0%	0%	15%*	15%*	15%*

*The assumption of 15% as determined by HMT directions.

Family statistics

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

Proportion married	Proportion married or partnered
75%	80%

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

Age	Proportion married	Proportion married or partnered
50	75%	80%
60	75%	80%
70	75%	78%
80	63%	64%
90	36%	36%

Members are assumed to be three years older than their partners.

Appendix C: Analysis of pensioner mortality

Type of analysis

C.1 We have analysed the pensioner mortality experience over the five-year period from 1 April 2007 to 31 March 2012. The analysis compares the actual number of deaths (grouped by age) with the expected number of deaths using the 2007 valuation assumptions and standard mortality tables prepared by the Continuous Mortality Investigation (the 'S1' set of tables).

C.2 A significant number of pensioners in the data supplied are not classified as either ill-health or normal health retirements. This means we are not able to carry out a robust analysis separately for pensioners who retired in ill-health and those who retired in normal health. Therefore we have carried out a combined analysis for all male pensioners. The same approach was taken in 2007.

C.3 There is insufficient data to carry out an analysis for current female pensioners. Again this approach was taken in 2007.

C.4 The valuation data supplied included data on the number of deaths that occurred during the five-year observation period, but did not include the pension amounts at death (which would be needed for an 'amounts' analysis, which takes account of the amount of pension ceasing due to the death). Hence, we have carried out our analysis on a 'lives' basis, which considers the number of deaths without weighting by pension amount. We consider this to be a reasonable method for the Schemes, as the underlying population 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 possible that analysis could lead to different mortality assumptions.

C.5 In the absence of robust data for the number of deaths of dependants, we propose to use an assumption in line with the experience of the UK self-administered occupational pension schemes.

C.6 Therefore we have analysed male pensioners (former firefighters, including both those retiring in normal health and ill-health).

Number of deaths analysed

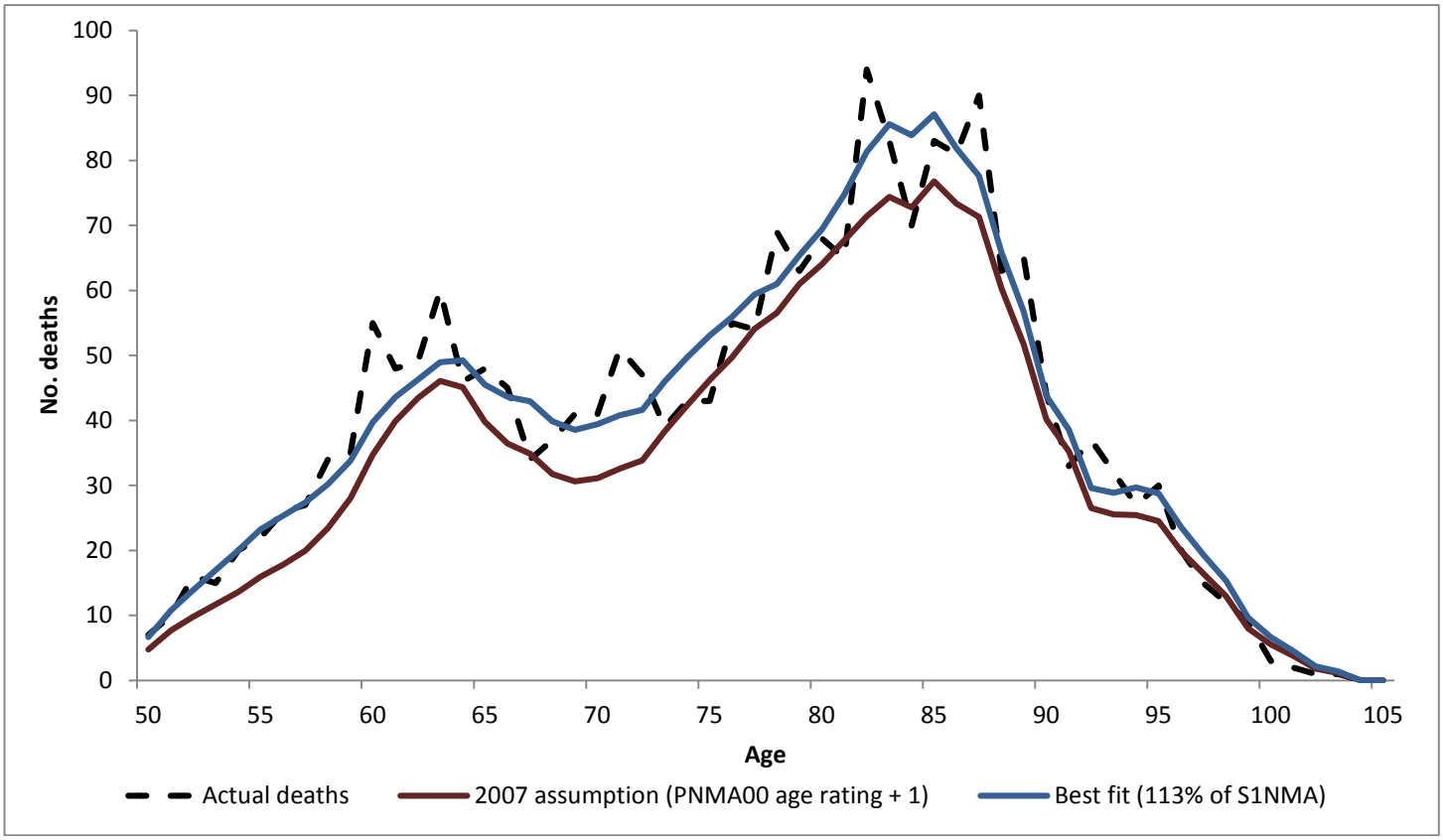
C.7 The total number of actual deaths of male pensioners analysed over the five-year period from 1 April 2007 to 31 March 2012 is 2,223.

C.8 We have carried out validation checks on this data, including a reconciliation with the 2007 valuation data for pensioners. We have worked with the individual FRAs to reconcile the data at 2007, the data at 2012, and the deaths reported during 2007 and 2012. This process uncovered a significant number of extra deaths in 2007 to 2012, included in the total of 2,223 above, which materially affects the results of this analysis. We are grateful to the individual FRAs for their assistance with this exercise.

Mortality analysis: comparison of experience and 'best fit' against S1 tables

C.9 Graph C1 shows a comparison of the actual mortality experience over the five-year period with that expected based on the recommended adjustment to the most appropriate S1 standard table[40]. The expected mortality experience based on the assumption used in the 2007 valuation is shown for comparison.

Graph C1 – Actual vs expected deaths 2007-2012: male pensioners



[40] 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.

C.10 There were 16% more deaths in 2007-12 than expected under the 2007 valuation assumption. This assumption was based on an analysis of pensioner deaths during 2003-07. However it was not possible to perform reconciliation similar to that described in paragraph C8 above, because 2007 was the first valuation of the Schemes and we do not hold data on the pensioner members as at 31 March 2003. As noted, that reconciliation uncovered a significant number of extra deaths in 2007 to 2012. If the deaths in the period 2003-07 had been similarly under-reported, then this would have affected the 2007 valuation assumption, which would explain why the expected number of deaths under that assumption is less than the actual number of deaths.

Comparison of life expectancies on 2007 assumptions and recommended 2012 assumptions

C.11 Table C1 gives a comparison of the resulting future life expectancies[41] assumed and recommended assumptions for the 2007 and 2012 valuations.

Table C1: Comparison of future life expectancies (years)

	2007 valuation	2012 valuation	UK Population[42]
Current pensioners (normal and ill-health)			
Member aged 50	36.3	37.2	35.7
Member aged 55	31.6	31.9	30.6
Member aged 60	27.0	27.0	25.8
Member aged 65	22.6	22.1	21.2
Future pensioners (normal health) – current age 45			
Member life expectancy from age 50	39.6	38.1	36.5
Member life expectancy from age 55	34.8	33.4	32.0
Member life expectancy from age 60	30.2	28.9	27.7
Member life expectancy from age 65	25.7	24.5	23.6

C.12 The comparison of future life expectancies given in table C1 is complex. It reflects changes to both the assumed baseline mortality and mortality improvements, as well as a change to using different mortality assumptions for people born in different years (rather than an average mortality assumption for the relevant population).

C.13 A comparison can also be shown of future life expectancies which do not allow for future improvements in mortality after the period 2007-2012. This comparison reflects only the change to the assumed baseline mortality.

[41] Cohort future life expectancies based on the ages shown as at the valuation date, ie allowing for future mortality improvements.

[42] Cohort life expectancies from the 2012-based projections for males in the United Kingdom, produced by the Office for National Statistics.

C.14 Table C2 compares future life expectancies for current pensioners assumed and recommended for the 2007 and 2012 valuations respectively[43]. The equivalent figures for the UK population are also shown.

Table C2: Comparison of future life expectancies without allowance for future improvements in mortality (years)

	2007 valuation	2012 valuation	UK population[44]
Current pensioners (normal and ill-health)			
Member aged 50	33.4	32.2	30.4
Member aged 55	28.8	27.6	26.0
Member aged 60	24.2	23.2	21.8
Member aged 65	19.9	18.9	17.8

[43] Period future life expectancies based on the ages shown as at calendar year 2009, ie approximately mid-way between the 2007 and 2012 valuation dates.
[44] Period life expectancies from the 2012-based projections for males in the United Kingdom at calendar year 2009, produced by the Office for National Statistics.

Appendix D: Analysis of age retirement from service

Process for setting assumptions

D.1 A reasonable process is:

- Set assumptions for the group 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 a simple task because the available experience is overwhelmingly from the 1992 scheme which has very different retirement rules to the new scheme.
- Set assumptions for members with service in the Schemes 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 retirement behaviour of this group of members.

Members with full protection

Data analysed

D.2 We have analysed the pattern of age retirements from active membership over the five-year period to 31 March 2012 for the Schemes. The analysis compares the actual rate of age retirements (grouped by age of retirement) to the expected rate.

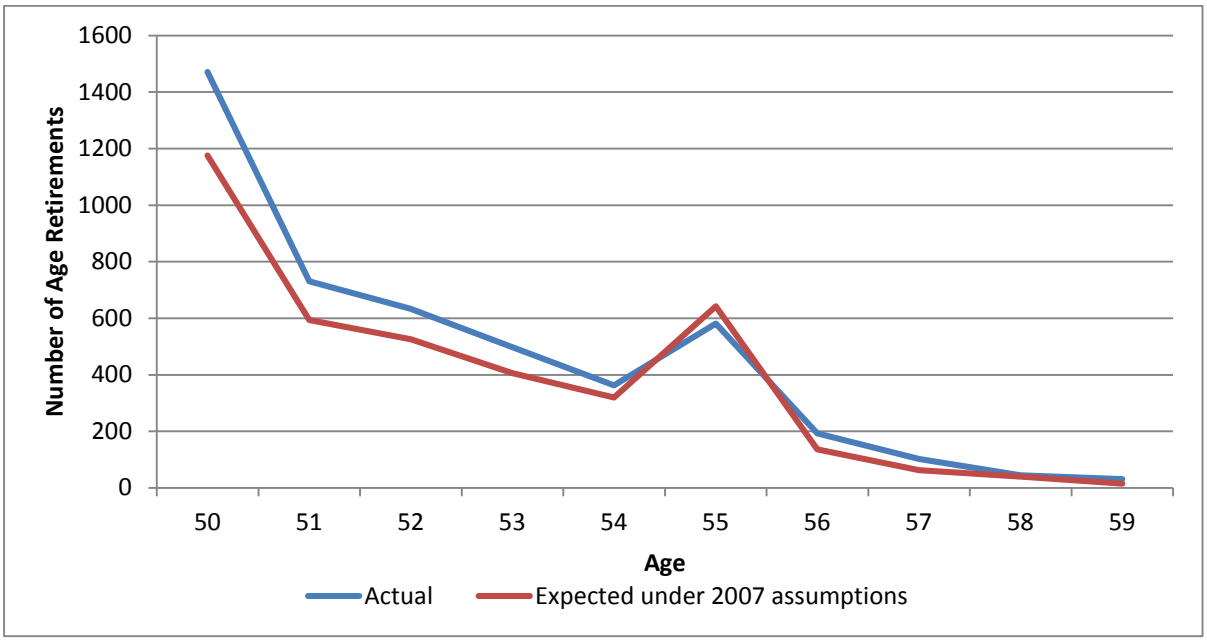
D.3 Insufficient data exists to perform a credible analysis of the 2006 scheme Regular or Retained firefighters.

D.4 The data used in this analysis excludes members from five FRAs (about 15% of the total) because:

- In the case of three FRAs (about 7% of the total experience data), the movement coding in their data was not credible.
- In the case of the other two FRAs (about 7% of the total experience data), data did not contain the "Service at leaving" field.

D.5 Graph D1 below shows a comparison of actual age retirements and expected retirements under the 2007 assumptions.

Graph D1: Actual age retirements against expected



D.6 Table D1 below shows the actual and expected age retirements split into three age bands.

Table D1: Age retirement experience 2007-12 by age

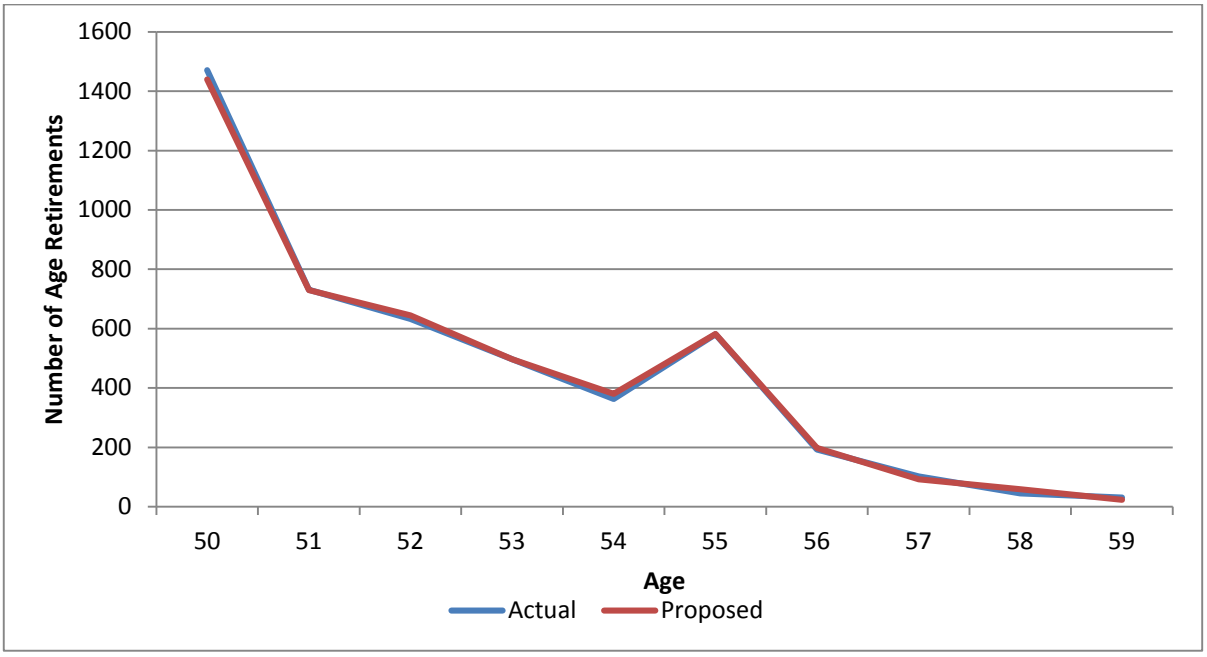
		2007 assumptions	
Age	**Actual retirements**	**Expected retirements**	**Actual / Expected**
50-54	3,695	3,021	122%
55	581	642	90%
56-59	371	255	145%
Totals	4,647	3,919	119%

Recommended rates - 1992 scheme

D.7 For the 2012 valuation we recommend members are assumed to retire in line assumptions used in the 2007 valuation with adjustments made to each age band shown in Table D1 to bring the expected number of retirements in line with the actual experience.

D.8 Graph D2 below shows the actual rates of age retirement compared to the proposed assumptions described above.

Graph D2: Actual age retirement rates against proposed rates



Recommended rates – 2006 scheme

D.9 In the absence of sufficient relevant experience, a pragmatic approach to setting the assumptions is required. Given that members retiring before age 60 will receive an actuarially reduced pension where the reduction is with reference to their deferred pension age of 65, our recommended approach is to retain the 2007 valuation assumption of assuming all members retire at age 60.

New entrants to the 2015 scheme

D.10 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 approach is to assumed 25% of members retire at age 55[45] with the remainder retiring at age 60. This is consistent with the assumption adopted for the scheme reform work.

[45] The age at which 25% of members are assumed to retire reflects the offer in Brandon Lewis's letter of 19 June 2013 which provided enhanced terms for retirements at ages 55 and 56 under the proposed 2015 scheme design.

Members with service in the existing schemes and the 2015 scheme

D.11 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 behavior is therefore required. The approach outlined below is intended to be unbiased.

D.12 As is currently the case, both age and service are likely to influence members' retirement decisions. The relative level of service in the two schemes is also likely to influence the age of retirement.

D.13 In general one might expect that retirement patterns will generally change smoothly and gradually over time. However, less smooth changes may be expected when active and deferred pension ages differ, as is the case for the Fire Schemes. This particularly affects the consideration of retirements before age 55. 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.14 It is appropriate to consider separately the 1992 scheme and 2006 scheme 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 2006 scheme members have relatively little service compared to 1992 scheme members.

D.15 For members with 1992 scheme service, the attainment of 30 years' service (and the associated attainment of the maximum accrual rate) is currently a significant trigger for members to retire between ages 50 and 54. Reaching age 55 is also a significant trigger. 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 1992 scheme 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 1992 scheme 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.16 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. For those who retire before age 55, their 2015 scheme benefit will become a deferred pension payable from SPA.

D.17 The 2006 scheme retirement assumption for the 2007 valuation assumed that all members retired at age 60. Retirement before age 60 would lead to 2006 scheme benefits being deferred and payable from 65.

D.18 We recommend the following assumptions for members who transfer to the 2015 scheme

Ex-1992 scheme members:

D.19 Members with tapered protection and members with no tapered protection and 16 or more years' accrued service as at 31 March 2012 retire in line with 1992 scheme assumptions.

D.20 Members with no tapered protection and less than 16 years accrued service as at 31 March 2012 do not retire earlier than age 55, with a bulk of retirements happening at age 55 and some people assumed to retire later than age 55 if they would have been assumed to retire later than age 55 under the 1992 scheme assumptions

D.21 As set out above, some ex-1992 scheme members may choose to delay retirement to age 55, but it is difficult to predict how many.

D.22 Allowance for members delaying retirement would significantly increase the value of 2015 scheme accrual and would place a slightly lower value on accrued 1992 scheme benefits.

D.23 Tapered members will generally accrue a greater proportion of their benefits in the 1992 scheme than the unprotected members, so it is reasonable to assume that retirement decisions will be more focused on the availability of 1992 scheme benefits for tapered members than for unprotected members. The same is true of members with more accrued service in the 1992 scheme.

D.24 The impact of not allowing for some members with tapered protection or with less than 16 years' service retiring later is the opposite of not allowing for some of the unprotected members with less than 16 years' service retiring before age 55. Therefore, there will be an offsetting effect between these two simplifications.

Ex-2006 scheme members:

D.25 All members are assumed to retire at age 60.

D.26 Members choosing to retire before age 60 will suffer a significant reduction in the value of their 2007 scheme benefits as these will be converted to a deferred pension payable from age 65. We expect this will act as a disincentive to retiring before age 60 for members with service in the 2006 scheme.

Appendix E: Analysis of ill-health retirement from service

Rates of ill-health retirement

E.1 We have analysed the pattern of ill-health retirements over the five-year period to 31 March 2012. The analysis compares the actual rate of ill-health retirements to the expected rate of ill-health retirements based on the assumptions for the previous valuation in 2007.

E.2 The data used in this analysis excludes members from three FRAs (about 7% of the total experience data), because their data did not contain credible movement coding.

E.3 The table below shows the actual number of ill-health retirements compared with the expected number of ill-health retirements based on the 2007 assumptions.

Table E1: Ill-health retirement experience 2007-12

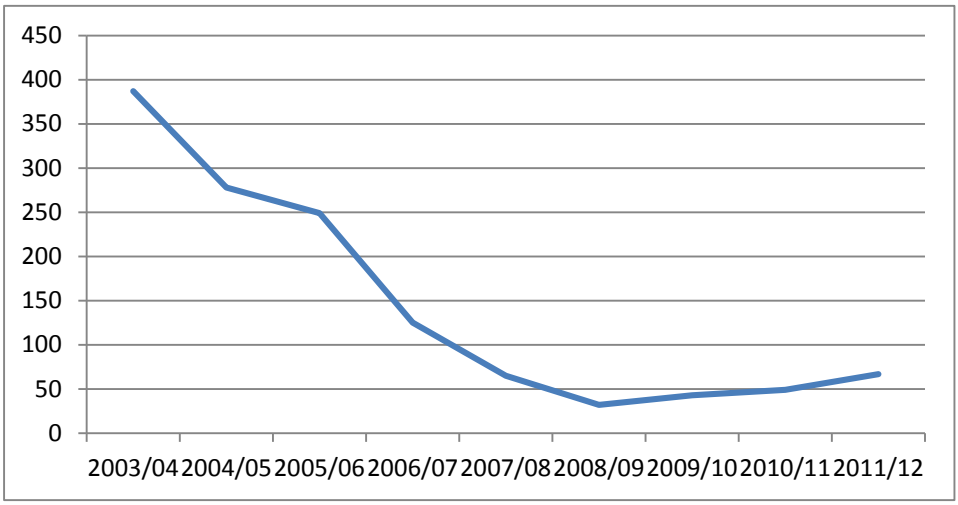
	2007 assumptions	
Actual retirements	**Expected retirements**	**Actual / Expected**
255	1,692	15%

E.4 We have analysed all members as a single group, covering both Regular and Retained firefighters. We do not have a credible split between Regular and Retained firefighters in order to analyse them separately. Neither is there any evidence in the information we have that Retained firefighters suffer significantly different rates of ill-health. In particular the Fire Service NPA Review 2012[46] (p. 124-5) concluded that there was no evidence of a significantly different rate of ill-health retirement for Retained firefighters.

E.5 We have also compared the number of ill-health retirements in each year. As graph E1 shows ill-health fell steeply in the years up to 2008/09. They have remained low since then, however there is now a slight upward trend.

[46] Normal Pension Age for Firefighters: A review for the Firefighters Pensions Committee (12 January 2013)

Graph E1: Ill-health retirements by year[47]



E.6 Table E2 below shows the number of ill-health retirements observed in each year of the analysis. The number of retirements is highest in the first and last years.

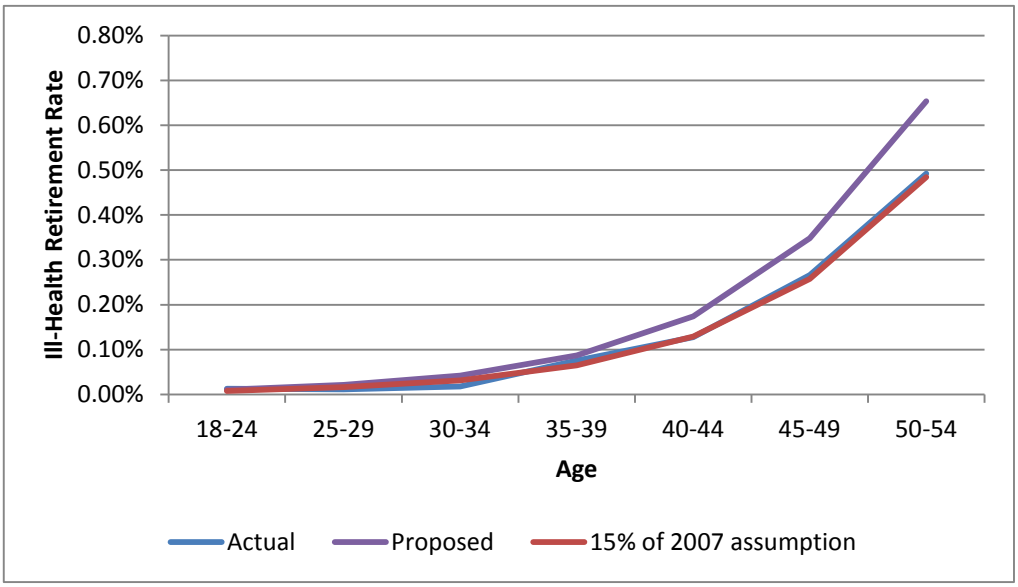
Table E2: Numbers of ill-health retirements

2007/08	2008/09	2009/10	2010/11	2011/12	Total
62	30	41	53	69	255

E.7 Graph E2 shows the actual rates of ill-health retirements for firefighters by age against the rates based on the 2007 assumptions multiplied by 15% to reflect experience in 2007-12. The graph shows that the general pattern of ill-health retirement rates by age is similar to the proposed assumptions.

[47] This graph includes data from the 3 excluded FRAs but not Retained firefighter data. This is in order to be consistent with the data for 2003/04 to 2007/08.

Graph E2: Ill-health retirement experience 2007-12



E.8 The number of ill-health retirements has increased over the last three years of the analysis and the number of retirements in the 2011/12 is about 35% above the average number for 2007-12. Therefore we recommend adjusting the level of the assumption up from the best fit to the 2007-12 experience by 35%. This is illustrated by the "proposed" line in graph E2. This does not include any allowance for that trend continuing in the future and we do not have any evidence that it will.

E.9 Furthermore, recent data concerning ill-health retirement experience since the valuation date supports making the above upward adjustment to the best fit to the 2007-12 inter-valuation experience.

E.10 Our recommended assumption is that rates of ill-health retirement are in line with the previous assumptions but rated down at all ages to around 20% to be in line with the experience in 2011-12.

Proportion of higher-tier ill-health benefit awards

E.11 The data we have does not have a credible split of ill-health retirements between higher and lower tier grants. In particular it is inconsistent with published DCLG statistics for the years 2010-11 and 2011-12.

E.12 We have used these published DCLG statistics for the years 2010-11 and 2011-12 to determine a value for the proportion of higher tier benefit awards made to 1992 scheme members. We have not considered 2006 scheme data as very few 2006 scheme members will have the five years' service required to be eligible for a higher tier award.

E.13 During this two-year period 43 higher-tier ill-health retirements were recorded out of a total of 104 ill-health retirements in the 1992 scheme. Therefore we recommend assuming that 40% of (eligible) members retiring on ill-health grounds will receive the higher-tier benefit and the remainder will receive the lower-tier benefit.

Appendix F: Analysis of voluntary withdrawal from service

Data used in setting the assumptions

F.1 The data used in this analysis excludes members from three FRAs (about 7% of the total experience data), because their data did not contain credible movement coding.

Excluding short servers

F.2 Most of our analysis was carried out only on members with more than two years' service.

F.3 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. We expect that this simplification would not affect the assessment of the employer cost cap or employer contribution rate by as much as 0.1% of salaries. On the other hand including short serving members in the analysis may give them undue weight when setting the assumption given their relatively low financial impact.

Rates of withdrawal - 1992 scheme

F.4 The table below shows the actual number of withdrawals compared with the expected number of withdrawals based on the 2007 assumptions.

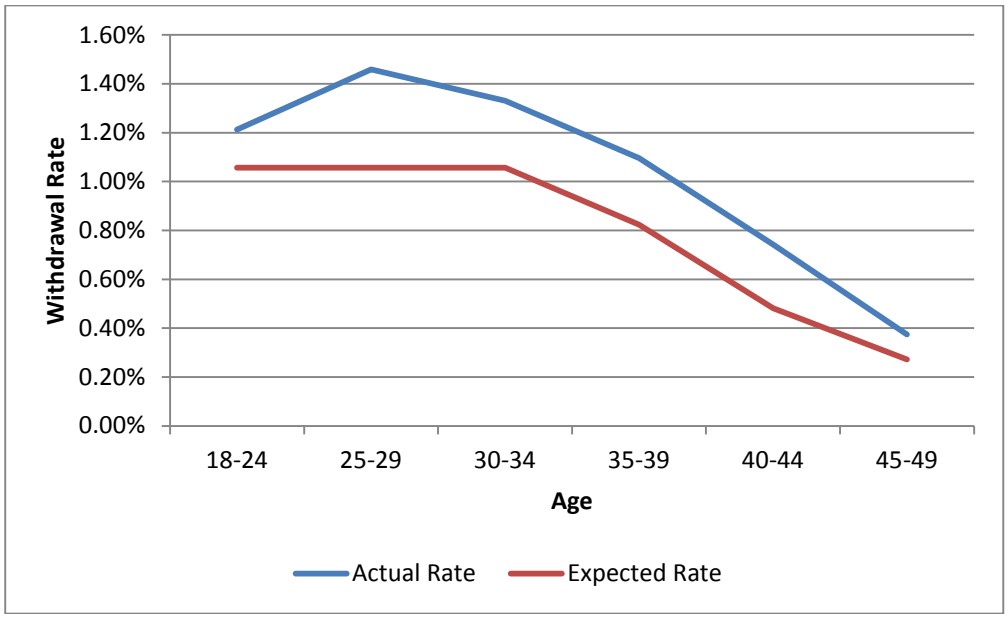
Table F1: Actual number of withdrawals vs expected based on 2007 assumptions

		2007 assumptions	
	Actual retirements	Expected retirements	Actual/ Expected
Regular firefighters in the 1992 scheme	913	668	137%

F.5 As we can see from the table above, actual withdrawal rates are 137% of the 2007 assumptions. Our analysis of the movement data indicates that roughly ¼ of the members who have been coded as withdrawals were recorded as active members of the 1992 scheme as at 31 March 2012. (It is possible that some member who took inter-authority transfers were coded as withdrawals). Allowing for these members who are present in the 2012 data, the number of actual withdrawals would be around 685, ie very close to the number expected of 668 on the 2007 assumptions.

F.6 The graph below shows the actual withdrawal rates derived from the data analysis, together with the expected rates based on the assumptions agreed for the 2007 valuation. The graph shows that the general pattern of withdrawals by age is similar to the proposed assumptions, although the actual rate from the 2007-12 is higher at all ages. As discussed above, roughly a quarter of these withdrawals in the 2007-12 data were recorded as active members of the 1992 scheme as at 31 March 2012.

Graph F1: Net Withdrawal rates – 1992 scheme members with at least two years' service



Rates of withdrawal – 2006 scheme Regular firefighters

Credibility of 2006 scheme coding of Regular vs Retained movements

F.7 We have compared the valuation movement data to Fire and Rescue Service Operational Statistics Bulletin for England from 2010-11 and 2011-12 and the Schemes Membership Data England 2010-11 and 2011-12, split by Regular and Retained firefighters:

Table F2: Comparison of Regular and Retained firefighter valuation data against workforce data published by DCLG

	2010-11		2011-12	
	Regular	**Retained**	**Regular**	**Retained**
DCLG Stats - Withdrawals	201	1,166	232	1,300
DCLG Stats - Optants out	89	81	195	131
DCLG Stats - Withdrawals Total	290	1,247	427	1,431
Valuation data Withdrawals Total	753	119	791	188

F.8 The valuation movement data, and in particular the split between Regular and Retained withdrawals, does not appear credible. Note that the valuation data totals are likely to be around 7% understated as we have excluded 3 FRAs data, but this fact does not alter the conclusion above.

F.9 The workforce data can give us an approximate rate of withdrawal. However it should be noted that members leaving the workforce may also be less (or more) likely to be in the pension scheme, therefore the rate of withdrawal from the pension scheme may be lower (or higher).

Table F3: Comparison of leavers against workforce data, based on DCLG statistics

	2010-11			2011-12		
	Regular	**Retained**	**Total**	**Regular**	**Retained**	**Total**
DCLG Stats – Withdrawals Total	290	1,247	1,537	427	1,431	1,858
DCLG Stats – Headcount Total	29,178	14,224	43,402	28,245	13,817	42,062
Rate of leavers	1.0%	8.8%	3.5%	1.5%	10.4%	4.4%

F.10 It appears that Retained firefighters leave service at a much higher rate than Regular firefighters. Therefore we cannot carry out a credible analysis of 2006 scheme withdrawals jointly. Note that the proportion of members that join the Schemes may vary between Regular and Retained firefighters so it is impossible to draw precise conclusions as to relative rates of withdrawal from the Schemes based on the above data.

F.11 There is some weak evidence that members of the 2006 scheme are more likely to withdraw than members of the 1992 scheme. If the withdrawal assumption adopted for 1992 scheme members applied to 2006 scheme regular firefighters as well, we would expect about 173 Regular firefighters to have withdrawn each year in the period 2007-12. This compares with the DCLG statistics for 2010/11 and 2011/12 above, which had 217 Regular firefighters withdrawing and 142 opting out per year – a total of 359 per year. However this comparison should be treated with caution because:

- The expected number of withdrawals of 173 per year ignores the fact that members with less than two years' service are more likely to withdraw (see paragraph F3 above), and so may be understated.
- The DCLG statistics come from two different sources, one of which is based on workforce statistics, including firefighters who are not members of the Schemes, so this may not be comparing like with like.

Rates of withdrawal – 2006 scheme Retained firefighters

F.12 It is impossible to analyse the Retained experience separately as discussed above. However it is possible to get the approximate order of magnitude of an appropriate assumption.

Table F4: Rates of withdrawal in 2006 scheme

	First alternative	Second alternative
Total actual withdrawal rate of 2006 scheme members	5.1%	5.1%
Expected withdrawal rate of 2006 scheme members on scheme reform assumptions	1.6%	0.7%
Approximate proportion of 2006 scheme experience over 2007-12 which is in respect of Retained firefighters	¾	¾
Rate of withdrawal of Retained members which would be consistent with Regular firefighters withdrawing in line with scheme reform assumptions	6.3%	6.6%
Ratio of rate of withdrawal of Retained firefighters to Regular firefighters	Four times	Nine times

F.13 This rate of withdrawal overall (5.1%) is also consistent with the number of deferred members in the 2006 scheme as at 31 March 2012.

F.14 DCLG have confirmed that they propose to adopt the second alternative above: that is, to use withdrawal rates for Regular firefighters in the 2006 scheme that are the same as those for Regular firefighters in the 1992 scheme, with retained firefighters withdrawing at nine times these rates.

Appendix G: Analysis of death in service

G1 The results of the experience analysis over the five-year period to 31 March 2012 show that the actual number of deaths was lower than expected compared to the 2007 assumptions.

G2 The data used in this analysis excludes members from three FRAs (about 7% of the total experience data), because their data did not contain credible movement coding. We have analysed male and female members jointly.

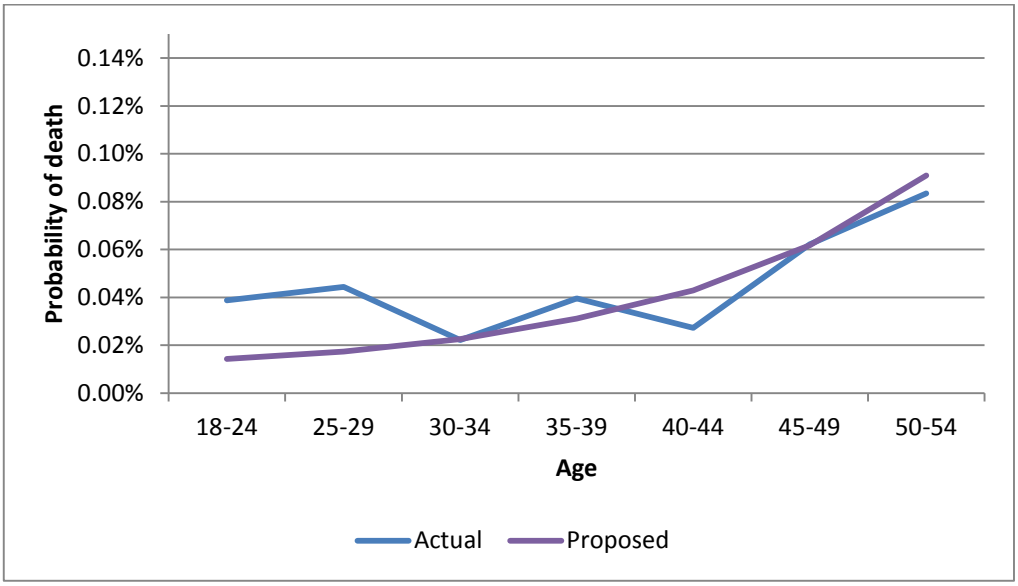
G3 The table below shows the number of actual and expected deaths.

Table G1: Death in service experience 2007-12

	ONS 2008-10 interim life table		2007 assumptions	
Actual deaths	Expected deaths	Actual/ Expected	Expected deaths	Actual/ Expected
72	320	23%	91	80%

G4 The graph below shows the actual and proposed rates of deaths by age band.

Graph G1: Death in service experience 2007-12



G5 The analysis of deaths in service is used to inform the recommendation for death before retirement, i.e. both deaths in service and deaths in deferment.

Appendix H: Analysis of promotional pay increases

Approach to the analysis

Regular firefighter members

H.1 The experience over the five-year period to 31 March 2012 was analysed by looking at the profile of the active membership as at 31 March 2012 in terms of average pensionable pay at each duration of service (up to 30 years) and how this compares with the next duration of service. These increases were then compared to the assumed increases adopted for 1992 scheme in the 2007 valuation.

H.2 The 2007 valuation assumption was then adjusted for use in the 2012 valuation to reflect the differences in membership profile observed at 31 March 2012.

H.3 We also considered the impact that certain pay allowances (which were previously considered non-pensionable in the Schemes) becoming pensionable following the High Court Judgement Norman v Cheshire Fire & Rescue Service [2011] (the Norman Judgement) may have on future pay progression.

H.4 We asked FRAs to provide information about the number of firefighters in receipt of such pay allowances, at what age, and for how long they are paid, and the size of the pay allowances relative to their pay.

H.5 We received responses from seven FRAs. The Firefighters in receipt of the relevant pay allowances were spread over a range of ages, and were paid the allowances for a range of durations. Given there is no clear pattern of these payments with age (and hence service), we propose that the salary scale is not adjusted to allow for the pay allowances becoming pensionable.

Retained firefighter members

H.6 Retained firefighters were only eligible to join the scheme from April 2006, and as such the date of joining the scheme does not correspond to the date they joined the Fire and Rescue Service. Therefore, the experience for Retained firefighters was analysed by looking at the profile of the Retained firefighter membership as at 31 March 2012 in terms of the average pensionable pay at each age.

H.7 We have fitted a promotional pay scale to the membership data observed as at 31 March 2012. The analysis and proposed assumption are shown in Graph H2.

Results of 2007-12 experience analysis

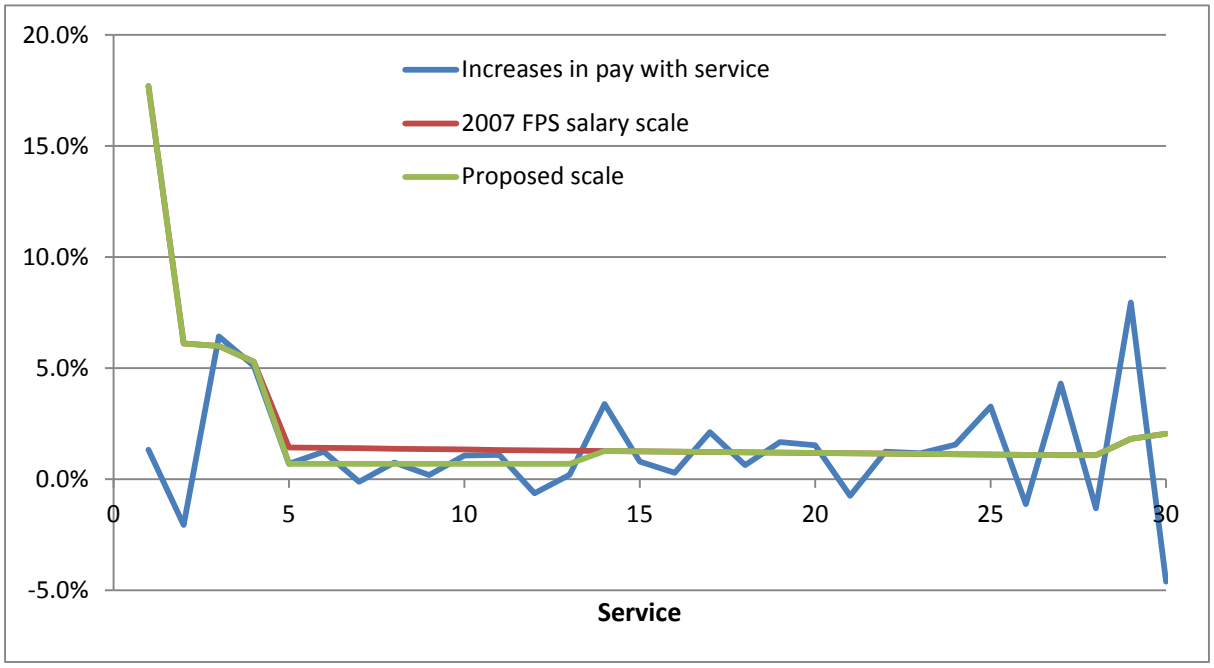
Regular firefighter members

H.8 Graph H1 shows the implied and expected annual increases in promotional pay for Regular firefighter members for durations up to 30 years' service. The implied promotional pay increases are derived using the analysis set out above. The expected annual increases are based on the assumption used for 1992 scheme in the 2007 valuation.

H.9 The graph shows that the implied salary increases derived from the membership profile as at 31 March 2012 are broadly consistent with those assumed for the 2007 valuation at most durations of service.

H.10 The adjusted 2007 assumption shown allows for the lower annual increases in pensionable pay for members with between 5 and 13 years of service. This is the promotional pay scale proposed for use in the 2012 valuation.

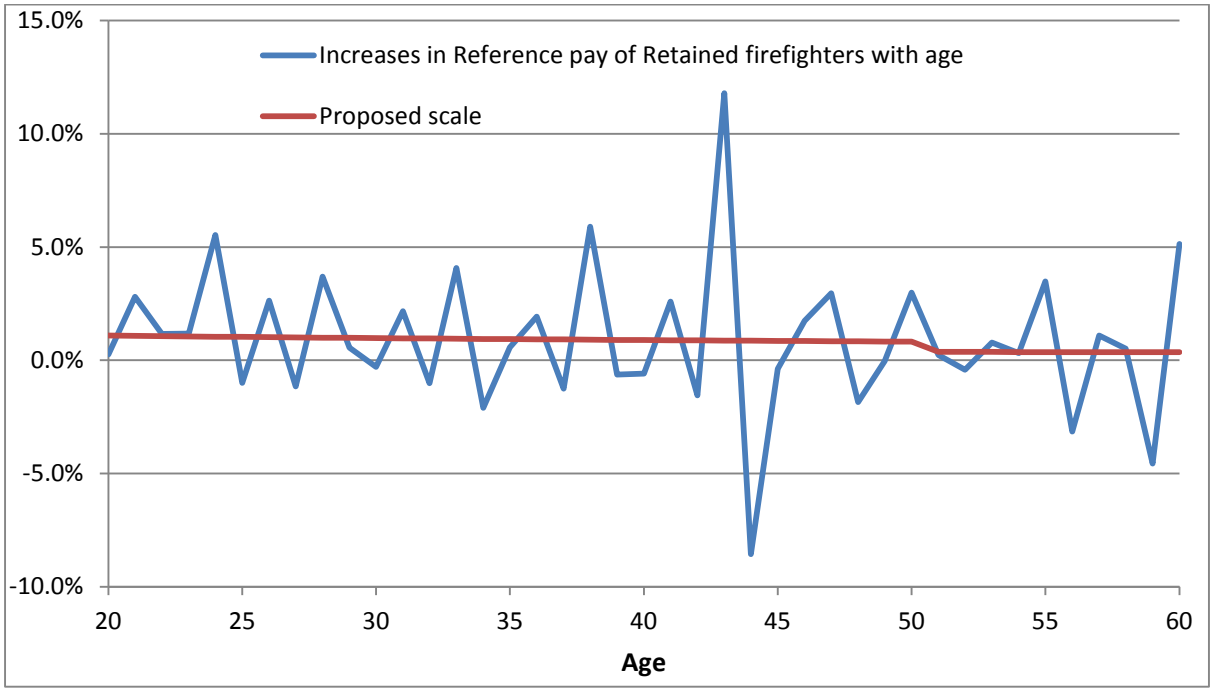
Graph H1: Regular firefighter members' promotional pay increases



Retained firefighter members

H.11 Graph H2 shows the implied annual increases in Retained firefighter member's Reference pay due to promotion and the proposed scale for promotional increases. This graph illustrates that Reference pay for Retained firefighter members tends to increase with age; by around 1% pa on average up to age 50, and by around ½% above age 50.

Graph H2: Retained firefighters' promotional pay increases



Appendix I: Analysis of commutation

I.1 The following table summarises the proportion of pension commuted by members of the 2006 scheme during the five-year inter-valuation period.

Table I1: Commuted pensions on retirement (2006 scheme)

Number of retirements (normal health)	Pension at retirement (before commutation)	Pension commuted	Commutation proportion
78	£98,000	£16,000	16%

Appendix J: Record of changes since 8 October 2013 draft

J.1 This advice was issued in draft on 8 October 2013, and circulated by the Department for Communities and Local Government to the Firefighters' Pension Committee. The table below records the changes made since that draft.

Reference	Comment
Section 4 and Appendix C	No change to the proposed baseline mortality assumption. Life expectancies updated to reflect ONS 2012 population projections, released in November 2013.
Section 5, Appendix B and Appendix D	Amendment to the age retirement assumption for the 1992 scheme to allow for a more accurate approximation of when, on average members are expected to retire, based on experience. Amendments to the assumption for the 2015 scheme to reflects the regulations which provide for enhanced terms for retirements at ages 55 and above Assumptions for unprotected and taper members with service in both an existing scheme and the 2015 scheme recommended
Section 7, Appendix B and Appendix F	States the withdrawal assumption that DCLG proposes to adopt.
Section 10 and Appendix B	The commutation assumptions have been updated to reflect what is now required by HMT directions.
Various	The "approximate impact of proposed change in assumption" tables in the last paragraph of sections 4 to 11 have been updated and expanded to show separately the impact on past service and the impact on the cost of accrual in the 1992, 2006 and 2015 schemes. No changes have been made to the proposed assumptions themselves other than as described in this Appendix.
Various	Minor drafting changes to correct spelling, grammatical and other minor issues, or to clarify previous wording.