Government Actuary's Department

Teachers' Pension Scheme

Actuarial valuation as at 31 March 2012
Advice on assumptions

Date: 9 June 2014

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1 Executive summary

This report contains our recommendations for the best estimate assumptions to be set by the Secretary of State for Education for the 2012 valuation of the Teachers' Pension Scheme.

1.1 HM Treasury's *Public Service Pensions (Valuations and Employer Cost Cap) Directions 2014* require that a valuation of the Teachers' Pension Scheme 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 Education, 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 formal advice to the Secretary of State for Education 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.

1.4 The previous completed actuarial valuation of the Teachers' Pension Scheme was carried out as at 31 March 2004. A valuation as at 31 March 2008 was started, including an analysis of experience and a proposed set of assumptions, but was not completed. Most of the assumptions put forward in this report differ from those used for the 2004 valuation. The most significant changes are:

- Increased expected pensioner longevity[1]
- A large reduction in assumed ill-health retirements
- New and later age retirement assumptions for members joining or moving to the 2015 scheme
- A new commutation assumption in the 2015 scheme[2]

1.5 The following chapters and appendices provide more detail on the advice, supporting analysis and the financial impact of the assumptions on the results. They also contain important background information about the context of this advice and its limitations.

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

[1] The allowance for future improvements in mortality is specified in the Directions.
[2] The commutation assumption for the 2015 scheme is specified in the Directions.

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

Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 valuation assumptions	
			Past service[3]	SCR (2015-19)
Pensioner baseline mortality[4]	Aligned to standard SAPS table[5, 6]			
Normal health	Males: 107% of S1NMA_L Females: 74% of S1NFA_L up to age 79, 84% at ages 80-84, 98% at 85-89, 106% from age 90	In line with 2008-2012 experience[7] *see graphs C1 and C2, page 48*	-0.1%[8]	Immaterial[8, 9]
Ill health (current)	Males: 65% of S1IMA up to age 71, 114% of S1NMA above age 71 Females: 89% of S1IFA up to age 71, 109% of S1NFA above age 71	In line with 2008-2012 experience *see graphs C3 to C6, pages 51 to 53*		
Ill health (future)	100% of S1IXA	In line with experience of UK self-administered pension schemes due to lack of Scheme experience on which to base this assumption.		
Dependants	Males: 108% of S1NMA Females: 88% of S1DFA	In line with 2008-2012 experience *see graphs C7 and C8, pages 55 and 56*		

[3] Deficit contribution required over 15 years from 2015.
[4] As directed by HMT, improvements in mortality from 2012 are assumed to be in line with those underlying the ONS 2012-based population projections.
[5] SAPS tables are published by the Actuarial Profession and based on the experience of self-administered pension schemes over the period 2000 to 2006. The 'S1' series has separate standard tables based on experience of members retiring in normal health (S1NXA) and in ill health (S1IXA) and for dependants (S1DFA). The assumptions for members retiring in normal health relate to low mortality variants of the main tables (S1NXA_L).
[6] Adjusted to 2012 to take account of improvements in population mortality derived using rates from the UK Interim Life Tables (and ONS population projections from 2012).
[7] Scheme experience was compared to relevant SAPS tables adjusted to take account of improvements in population mortality between 2002 (the base year for the tables) and 2009/2010 (the central years of our period of analysis) derived using mortality rates from the UK Interim Life Tables.
[8] Includes the baseline changes for all pensioner groups and the change to future improvements.
[9] Changes are considered immaterial if their expected impact on the contribution rate is less than 0.05%.

Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 valuation assumptions	
			Past service[3]	SCR (2015-19)
Age retirement				
NPA 60 protected (ie pre-07 entrants, aged 50 and above[10])	About 40% retire before age 60, 20% at age 60, remainder spread to age 70	In line with 2008-2012 experience *see graphs D1 and D2, pages 58 and 59*	Immaterial	Immaterial
NPA 65 protected (ie post-07 entrants, aged 55 and above[10])	About 40% retire before age 65, remainder at age 65	Levels of early retirement as for NPA 60[11], cost neutral late retirement	Immaterial	Immaterial
New entrants from 2015	About 40% retire before age 65, remainder evenly spread to SPA	Reasonable allowance for enhanced early retirement terms and earlier retirement	No past service	New assumption
Members with service in both schemes (ie unprotected pre-2015 entrants)	Gradual change between protected and new entrant patterns above	Reasonable approach given uncertainty	Immaterial	New assumption
Ill-health retirement				
Incidence	Increasing by age: <0.01% at age 25, <0.1% at age 45, about 0.6% at age 65	In line with 2008-2012 experience, not adjusted for further improvements in health *see graphs E1 to E4, pages 62 to 65*	Immaterial	Immaterial
Upper/lower tier[12] split	55% (M), 63% (F) on upper tier		Immaterial	Immaterial

[10] Age at 31 March 2012
[11] Retirement probabilities for ages 55-59 in the NPA 60 section are assumed to apply for ages 60-64 in the NPA 65 section.
[12] Ill-health benefits operate on a two-tier basis. Upper-tier benefits contain a top-up pension and are awarded to members unable to engage in any regular employment.

Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 valuation assumptions	
			Past service[3]	SCR (2015-19)
Withdrawal	Withdrawals, net of re-entry within 5 years, of about 3% a year	Based on 2008-2012 withdrawal experience with allowance for re-entry within 5 years based on 1997-2007 experience *see graphs F1 and F2, page 67*	0.1%	Immaterial
Death before retirement	Increasing by age: 0.01% at age 25, about 0.05% at age 45, 0.35%(M)/0.17%(F) at age 65	In line with 2008-2012 experience, not adjusted for future improvements in mortality *see graphs G1 and G2, pages 68 and 69*	Immaterial	Immaterial
Promotional salary scale	Steeper at younger ages: about 4% a year at age 25, 1% at age 45 and 0.01% at age 65	As adopted for 2004 and 2008 valuations and no clear evidence that it is no longer appropriate *see graphs H1 to H4, pages 71 to 73*	No change in assumption	
Commutation				
NPA 60 service	5% (M), 4% (F) of pension commuted	In line with 2007-12 experience *see graphs I1 and I2, pages 76*	Immaterial	Immaterial[13]
NPA 65 service	15% of pension commuted	As set out in Directions	Immaterial	Immaterial[133]
2015 scheme	15% of pension commuted	As set out in Directions	No past service	0.7%[133]

[13] Weighted impact on total contribution rate. The overall impact on the total contribution rate is approximately 0.7%. 2015 scheme assumption is compared against the 2008 assumption for the NPA 65 section.

Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 valuation assumptions	
			Past service[3]	SCR (2015-19)
Family statistics				
Proportion married/partnered	75% (M), 60% (F) at retirement (consistent assumptions for existing pensioners)	Comparative level of scheme experience against ONS statistics *see graphs J1 and J2, pages 80 and 81*	Immaterial	-0.1%
Age difference	Male member 3 years older than partner Female 2 years younger than partner	Based on scheme experience *see graph J3, page 84*	-0.1%	-0.1%
Remarriage	No allowance	Simplification on grounds of materiality	Immaterial	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 HM Treasury's *Public Service Pensions (Valuations and Employer Cost Cap) Directions 2014* require that a valuation of the Teachers' Pension Scheme (TPS or 'the Scheme) 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 Education, 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.

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

2.3 The advice is provided in accordance with the HM Treasury (HMT) Directions.

2.4 The advice also has regard to HMT's suggested approach[14] for setting assumptions in the absence of direct evidence.

2.5 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

2.6 Assumptions may also be required in other areas, eg relating to the projection of the membership to 2015. We will provide separate advice on additional assumptions as required.

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

2.7 The Secretary of State for Education is now asked to set the actuarial assumptions (listed in paragraph 2.5) to be adopted for the valuation as required by the Directions, consulting with HMT as appropriate, and to confirm those assumptions to GAD[15]. We would be happy to provide further analysis to the Secretary of State for Education, if required.

2.8 Teachers' Pensions, the Scheme's administrator, supplied data on the experience of the Scheme membership over the four-year period to 31 March 2012, together with some additional information on experience falling outside of this period. We have used this data to analyse the Scheme's experience in order to develop our advice on the assumptions. Our report, *Teachers' Pension Scheme: Actuarial valuation as at 31 March 2012: Report on data used for experience analysis* dated 9 June 2014, provides information about this data and should be read in conjunction with this advice. The report includes details of the checks carried out on the data, the amendments made to the data and our residual concerns about the quality of the data. There is some uncertainty over the true levels of withdrawals between 2008 and 2012, and this is our main concern regarding the quality of the data. Chapter 7 on voluntary withdrawal from service contains more details on this. In preparing our advice, we have relied upon the general completeness and accuracy of the data provided.

2.9 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 the expected future experience of the Scheme membership.

2.10 The report is also being made available to:

- the TPS Discussion Forum as part of the engagement process relating to the valuation of the TPS; and
- HMT as part of the process for granting their approval to the assumptions proposed by the Secretary of State.

2.11 We are content for the Secretary of State for Education to release this report to third parties, provided that:

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

[15] This advice was previously provided in draft on 15 November 2013. The changes since that draft are summarised in Appendix K. The Secretary of State has since confirmed that the assumptions recommended in this advice should be used for the purposes of the 2012 valuation.

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

3 General considerations

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

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

HMT Directions

3.2 The advice in this report reflects the requirements of the HMT Directions that assumptions should be set as the 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 four-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 advice setting out the approach that schemes should take when setting these assumptions[16].

Different populations

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

[16] 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 the 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.

Relative importance of assumptions

3.6 The HMT Directions require the employer contribution rate and employer cost cap to be determined to the nearest 0.1% of pensionable payroll. This is a required level of accuracy for a particular calculation and based on a particular set of assumptions. In each of the remaining chapters in this report we conclude by providing an indication of the impact on results of the change being recommended to the assumptions[17] and, in some cases, possible alternative assumptions. These figures also indicate the potential magnitude of future changes in calculated employer contribution rates and the employer cost cap which may emerge if experience indicates the assumptions should be amended. The figures are approximate[18] and are not independent so the impact of multiple changes will not necessarily be the sum of the individual impacts. Changes are considered immaterial if their expected impact on the contribution rate is less than 0.05%.

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

[17] In many cases we show the impact of the recommended assumptions relative to those proposed for the 2008 valuation of the Scheme. The valuation as at 31 March 2008 was started, including an analysis of experience and a proposed set of assumptions, but was not completed. Further details of the assumptions recommended for the 2008 valuation of the scheme are contained in our draft report *Teachers' Pension Scheme: Actuarial Review as at 31 March 2008: Advice in relation to the Actuarial Assumptions and Methodology to be adopted.*

[18] In some cases, more accurate calculations have been carried out later in the valuation process, after the Secretary of State decided on the valuation assumptions to be used. The figures shown in this report are those included in our draft advice of 15 November 2013 and so available at the time of the Secretary of State's decision. The differences between these figures and the more accurate figures subsequently available are quite small.

4 Pensioner mortality

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

Proposed assumptions for 2012 valuation

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

Table 4.1: Recommended mortality assumptions (expressed as adjustments to standard tables[19])

Group	Males	Females
Normal-health pensioners	107% of S1NMA_L	Age-dependent adjustments to S1NFA_L: ≤79: 74% 80-84: 84% 85-89: 98% ≥90: 106%
Existing ill-health pensioners	Age-dependent assumption: ≤71: 65% of S1IMA >71: 114% of S1NMA	Age-dependent assumption: ≤71: 89% of S1IFA >71: 109% of S1NFA
Future ill-health pensioners	100% of S1IMA	100% of S1IFA
Dependants	108% of S1NMA	88% of S1DFA

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

[19] From the 'S1' series of standard tables published by the CMI and based on the experience of self-administered pension schemes over the period 2000 to 2006. Separate tables are available based on experience of members retiring in normal health (S1NXA) and in ill health (S1IXA) and for dependants (S1DFA). The assumptions for members retiring in normal health relate to low mortality variants of the main tables (S1NXA_L).

Previous valuation assumptions

4.3 At the 2008 valuation, the proposal for baseline mortality was similarly based on adjusted standard tables with future improvements based on the then most recent ONS population projections.

Comparison of expected pensioner longevity

4.4 The tables below give a comparison of the resulting life expectancies[20] proposed and recommended for the 2004, 2008 and 2012 valuations respectively.

Table 4.2: Comparison of life expectancies (years)

	2004 valuation	2008 valuation	2012 valuation
Current pensioners			
Male aged 60	25.3	28.9	29.2
Male aged 65	20.4	23.9	24.2
Female aged 60	28.4	32.4	31.9
Female aged 65	23.4	27.3	26.8
Future pensioners – current age 45			
Male life expectancy from age 60	27.4	30.3	30.8
Male life expectancy from age 65	22.6	25.9	26.2
Female life expectancy from age 60	30.4	33.9	33.4
Female life expectancy from age 65	25.6	29.4	28.8

Use of the assumption

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

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

Results of analysis

4.6 The proposed assumptions are based on analysis of past mortality experience for the Scheme. We have analysed the pensioner mortality experience over the four-year period to 31 March 2012 on an 'amounts' basis. An amounts basis weights the experience by the size of the members' pensions. Further information on the data analysed and the results of that analysis are shown in Appendix C.

4.7 In order to make a recommendation of the most appropriate base table for pensioner mortality we have compared the actual mortality experience over the four-year period with that expected based on the most appropriate S1 standard tables[21]. The results are as shown in paragraph 4.1.

4.8 For male normal-health pensioners there was a good fit to the S1NMA_L standard table with a single adjustment factor applying at all ages. For female normal-health pensioners we could not find a standard table which had the same shape as the Scheme's mortality experience. We have recommended an assumption based on the S1NFA_L standard table with adjustments depending on the age of the member. An investigation of the mortality experience in earlier periods suggests that this effect has been apparent for some time and does not appear to be the result of cohorts of members moving through the population. We therefore recommend that the age bands are fixed so that a particular member's mortality relative to the standard table changes as they get older.

Financial impact

4.9 The approximate financial impact of the proposed change to the mortality basis (both baseline and update of the improvement basis) compared to that proposed in 2008 is set out in Table 4.3.

Table 4.3: Approximate financial impact of change in mortality assumptions

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Changes in mortality assumptions (baseline and improvements) from 2008 to 2012 proposed assumptions[22]	-0.1%	Immaterial	Immaterial

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

4.10 The overall impact of the changes in mortality assumptions lead to a slight reduction in cost. This is primarily driven by the shorter life expectancies for female normal-health pensioners.

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

[22] Impacts calculated assuming future improvements in mortality in line with ONS 2010-based population projections rather than 2012-based as specified in the Directions because the 2012-based projections were not available at the time. Impacts calculated using the 2012-based projections would be similar.

5 Age retirement from service

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

Proposed assumptions for 2012 valuation

5.1 We recommend that rates of age retirement are set separately for members who will continue in the existing 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.

Members remaining in the existing scheme

5.2 We recommend that NPA 60 members are assumed to retire in line with recent retirement patterns, which cover both early and late retirement. About 40% of members retire before age 60, about 20% at age 60 and the rest spread to age 70. The average assumed retirement age in the NPA 60 section is about 60 for both men and women. NPA 65 members are assumed to have the same early retirement pattern (but relative to age 65 rather than 60) but no allowance is made for late retirement. This is appropriate because, unlike the NPA 60 section, adjustments apply to late retirement pensions in the NPA 65 section to make them actuarially neutral to a retirement at NPA. The average assumed retirement age in the NPA 65 section is about 64 for both men and women.

New entrants after April 2015

5.3 We recommend that members who reach age 65 are assumed to retire evenly spread between age 65 and SPA. This makes allowance for the impact of the enhanced early retirement terms available and is consistent with the assumption used in costing the new scheme. The same early retirement pattern will apply before age 65 as for members remaining in the existing scheme (but relative to age 65 rather than 60). No allowance is made for late retirement, as actuarial adjustments apply to late retirement pensions in the 2015 scheme. The average assumed retirement ages depend on SPA: about 64 for SPA 65 increasing to about 65 for SPA 68.

Members with service in the existing and 2015 schemes

5.4 We recommend assuming a gradual change between the patterns of retirement for members remaining in the existing scheme and those applying to new entrants to the 2015 scheme. To allow for reasonable implementation, we propose to make this change in steps so that a single retirement pattern (separate for men and women) applies to members with a particular SPA. Members will be assumed to have a single retirement date applying to all their service, reflecting the requirement to leave teaching service before accessing their benefits (subject to the approach taken on phased retirement).

Phased retirements

5.5 Phased retirements are not currently a significant feature of the Scheme. In the absence of any evidence of increased uptake of phased retirement we are not recommending an allowance for any change in behaviour. The Department for Education and other stakeholders may have a view on the likelihood of such an increase and the Secretary of State may wish to make an allowance on the basis of their evidence. GAD would be happy to analyse any evidence provided. The impact of all unprotected NPA 60 members gaining access to their NPA 60 benefits by age 60 by phased retirement is shown in Table 5.1. The impact of other proportions of the unprotected membership taking phased retirement would be broadly pro rata to this impact.

Previous valuation assumptions

5.6 Broadly similar assumptions about retirements in the NPA 60 and NPA 65 section were adopted for previous valuations, though with slightly lower levels of retirement before NPA and slightly higher level of retirement around age 65 in the NPA 60 section.

Use of the assumption

5.7 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.

5.8 In both sections of the existing scheme and in the 2015 scheme an actuarial reduction is applied to the pension payable on retirement before NPA. The actuarial reduction is set to give the early retirement pension the same value as the deferred benefits payable following withdrawal at the same age (with special terms applying for the period between 65 and SPA in the 2015 scheme). As the deferred benefits are expected to be less valuable than the benefits payable had the member stayed in service and retired at NPA, early retirement represents a saving to the Scheme. Early retirement is common in the TPS and so the early retirement assumptions have a significant impact on overall costs.

5.9 An actuarial uplift is applied for retirement after NPA in the NPA 65 section and the 2015 scheme. However, in the NPA 60 section the pension payable on retirement after NPA is not subject to actuarial adjustment. This means pensions paid from the NPA 60 section on retirement after NPA are typically less costly to the Scheme (ie the value of the benefit payable to a member is typically lower) than a pension paid at NPA. The rates of retirement of members of the NPA 60 section at or after NPA are therefore financially significant components of the assumption.

Results of analysis

5.10 We analysed the pattern of age retirements from active membership over the four-year period to 31 March 2012 for the NPA 60 section of the Scheme. There was insufficient data to perform a credible analysis of the NPA 65 section experience. In total there were around 77,000 age retirements from the NPA 60 section 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.

5.11 The analysis showed that experience over the period has been broadly in line with the assumptions proposed for the 2008 valuation. There was a slight increase in early retirement. Other deviations from the 2008 assumptions were consistent with the experience between 2004 and 2008 and so our recommended assumptions are in line with the experience analysed.

Financial impact

5.12 The approximate financial impact of alternative retirement assumptions is set out in Table 5.1.

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

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Impact of average age of retirement being assumed to be 1 year earlier than under rates as proposed	-0.1%	-0.1%	-0.2%
Impact of assuming unprotected NPA 60 members retire in line with assumption for fully protected members	Immaterial	only past service effects considered	
Impact of all unprotected members accessing their NPA 60 benefits by age 60	0.1%[23]	only past service effects considered	

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

[23] For protected NPA 60 members, it may become more attractive for members to take their NPA 60 benefits before age 60 (so are not subject to abatement) and then return to work and accrue further 2015 scheme benefits. If all members currently aged below 60 access their NPA 60 benefits by age 60, the estimated past service effect is an increase of approximately 0.3% to the contribution rate.

5.13 Changing the assumed timing of retirement has different effects on members retiring before and after NPA. For members retiring before NPA, bringing forward retirement will result in a saving to the Scheme (see paragraph 5.8). For NPA 60 members retiring after NPA, bringing forward retirement will result in additional costs to the Scheme as some of the savings from late retirement are lost (see paragraph 5.9).

5.14 The recommended assumptions for unprotected NPA 60 members result in later retirements than for protected members. If instead we assume they retire in line with the assumption for protected members the savings and costs from earlier retirements before and after NPA broadly balance out.

5.15 In contrast, if all unprotected NPA 60 members take their NPA 60 benefits by age 60, eg by phased retirement, and there is no change to early retirement then there would be no offsetting savings to the cost of the late retirements being brought forward. In this scenario there is a small past service cost to the Scheme.

6 Ill-health retirement from service

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

Proposed assumptions for 2012 valuation

6.1 We recommend that a single set of assumptions (separate for men and women) is used to allow for the incidence of ill-health retirement, ie applying both to those members who remain in the existing scheme and to those who join the new scheme. Assumed rates of ill-health retirement increase with age but fewer than 1% 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 55% of men and 63% of women retiring on ill-health grounds will receive the upper-tier benefit and the remainder will receive the lower-tier benefit.

Previous valuation assumptions

6.3 Higher rates of ill-health retirement were assumed for the 2004 and 2008 valuations. The 2012 assumptions are approximately 20% and 80% respectively of the 2004 and 2008 assumptions.

6.4 For the 2004 and 2008 valuations it was assumed that 67% and 60% respectively of those retiring on ill-health grounds would receive upper-tier benefits.

Use of the assumptions

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

Results of analysis

6.6 We analysed around 2,400 ill-health retirements over the four-year period to 31 March 2012. The analysis compared the numbers of actual retirements to the expected number of retirements under previous valuation assumptions. Details of the analysis are shown in Appendix E.

Ill-health retirement rates

6.7 The analysis showed there were substantially fewer ill-health retirements than assumed under the 2004 and 2008 valuation assumptions (around 20% and 80% of the expected number respectively), though the distribution of retirements was broadly in line with the rates assumed for the 2004 and 2008 valuations in terms of the profile of the assumption.

6.8 The numbers retiring on ill-health grounds from the NPA 65 section were particularly low. This is expected due to the effect of the introduction of the new section and the interaction with the two years' minimum service criterion, and the time lag before health issues result in retirement. For this reason we analysed only the NPA 60 section when determining a recommended assumption.

6.9 The recommended ill-health rates have been based on the assumption for the previous valuations but rated down to be in line with recent experience. The rates have also been extended to older ages.

Split between tiers

6.10 The proportion of awards qualifying for the upper tier differs for men and women but is not particularly dependent on age.

Financial impact

6.11 The approximate financial impact of the proposed change to ill-health retirement assumptions is set out in Table 6.1.

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

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Change from 2008 assumptions to those proposed for 2012	Immaterial	Immaterial	Immaterial
Change from 2004 assumptions to those proposed for 2012	-0.3%	-0.6%	-0.6%

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

7 Voluntary withdrawal from service

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

Proposed assumptions for 2012 valuation

7.1 We recommend that a single set of rates of withdrawal (separate for men and women) is used for the purposes of the valuation, ie applying equally to those members who remain in the existing scheme and those who join the new scheme. The recommended rates are net of re-entry within five years. They are related to age but are typically about 3% a year. The same rates apply regardless of the length of the member's service. Sample rates are provided in Appendix B.

Previous valuation assumptions

7.2 At previous valuations, separate withdrawal and re-entry assumptions have been used rather than a single net assumption. The rates are not, therefore, directly comparable to the recommended 2012 assumptions. The change to the net withdrawal approach ties in with the provisions for re-linking service to salary after re-entry in the existing scheme[24].

7.3 Separate assumptions were adopted for members who had recently entered the Scheme. Although there is quite clear evidence that members with shorter service are more likely to withdraw, the impact of allowing for this on the valuation results is small.

Use of the assumption

7.4 Withdrawal rates specify the rate at which members are assumed to leave voluntarily before retirement becoming entitled to either deferred benefits or, for those with less than two years' service, a refund of contributions. 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 five years, and therefore the member's benefits not being linked to their final salary at retirement (or the in-service revaluation rate in the CARE scheme).

[24] From 2015, only members who leave the Scheme and return within five years will have their accrued service in the current NPA 60 or NPA 65 section linked to their final salary at retirement. Currently, the link is re-established irrespective of the period out of service.

Results of analysis

7.5 The calculation of the net withdrawal rates is split into two elements:

- what is the chance that a member leaves service; and
- if a member does leave service, what is the chance they do not return within five years.

7.6 For the first element, we have analysed the pattern of withdrawals from active membership over the four-year period to 31 March 2012 for the NPA 60 and NPA 65 sections combined. In practice NPA 60 section members form the majority of the long-serving leavers (over two years' service) and the majority of the short-serving leavers are from the NPA 65 section. In total there were about 200,000 withdrawals over the period.

7.7 For the second element, we have analysed the proportion of withdrawals in earlier periods where the members do not return within five years.

7.8 The recommended net withdrawal rates have been derived by combining the two separate analyses and smoothing the results.

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

Financial impact

7.10 The approximate financial impact of the change to the withdrawal rates compared to those proposed for the 2008 valuation and the impact of higher withdrawal rates are set out in Table 7.1.

Table 7.1: Approximate financial impact of proposed change in withdrawal and re-entry assumptions and alternative assumptions

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Combined impact of changes in withdrawal assumptions from the 2008 proposed assumptions	0.1%	0.1%	Immaterial
Withdrawals a third higher than proposed at all ages	-0.5%	-0.9%	-0.5%

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

7.11 As detailed in our report, *Teachers' Pension Scheme: Actuarial valuation as at 31 March 2012: Report on data used for experience analysis* dated 9 June 2014, there are some unexplained discrepancies between the active membership numbers at 1 April 2008 and 31 March 2012 and there is some uncertainty over the true levels of withdrawals over this period. If the unexplained discrepancies were entirely caused by the under-recording of withdrawals, then withdrawals would be about a third higher than recorded. Increasing the withdrawal rate in line with this would have a significant impact on valuation results, as illustrated in Table 7.1 above.

8 Death before retirement

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

Proposed assumptions for 2012 valuation

8.1 We recommend a single set of assumptions (separate for men and women) is used to allow for the possibility of death before retirement, ie applying equally to those members who remain in the existing scheme and those who join the new scheme. Assumed rates of death 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 Single sets of rates (separate for men and women) were used for the 2004 and 2008 valuations to allow for the possibility of death before retirement. The rates were based on experience prior to the valuation dates and were higher than those recommended for the 2012 valuation. The 2012 rates are approximately 60% of the 2004 rates and 80% of the 2008 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. 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 four-year period to 31 March 2012. The recommended assumptions for both deaths in service and in deferment are based on this analysis. In total there were around 1,400 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. Further information on the data analysed and the results of that analysis are shown in Appendix G.

8.5 The analysis showed there were significantly fewer deaths than expected although the distribution of rates of death in service was broadly in line with the rates assumed for the 2004 and 2008 valuations in terms of the profile of the assumption. To formulate a recommended assumption we considered what adjustment to the previous rates would provide the closest comparison with actual experience. The 'best fit' was achieved by taking around 80% of the 2008 rates.

Financial impact

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

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

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

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

9 Promotional pay increases

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

Proposed assumption

9.1 We recommend assuming separate scales of promotional increases for men and women. The increases are dependent on age and are steeper at younger ages. Sample values of the scales are provided in Appendix B.

9.2 The Department for Education is currently reforming teachers' pay, including incremental pay progression. We do not know what impact this reform will have on future pay progression and therefore the recommended assumptions make no allowance for this change. The Department for Education and other stakeholders may have a view on what impact this reform will have and the Secretary of State may wish to make an allowance on the basis of this evidence.

Previous assumption

9.3 The assumptions used for the 2004 and 2008 valuations are the same as those recommended for the 2012 valuation.

Use of the assumption

9.4 For the existing sections of the Scheme, benefits are linked to salary at, or near, retirement. Members with either full or tapered protection will remain in the existing sections of the Scheme beyond 31 March 2015 and will therefore continue to have benefits linked to final pensionable pay for service beyond this date. Unprotected members will start to accrue service in the 2015 scheme from 1 April 2015. However, their pre-2015 benefits will still be linked to their final pensionable pay whilst they are an active member of the Scheme.

9.5 Members' salaries can increase through a combination of annual general pay awards and promotional pay increases[25]. To calculate an estimate of the level of benefit payable in the future requires assumptions for both these components. The assumption for general pay awards is directed by HMT. The assumption for promotional pay increases is set by the responsible authority.

9.6 Future pay progression will be more significant (in terms of expected pension) for those members with either full or tapered protection because they will continue to have benefits linked to final pensionable pay for service beyond 31 March 2015. A significant proportion of the past service liability for active members (about two-thirds) 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.

[25] Different arrangements apply in different sections of the education sector covered by the TPS.

Results of analysis

9.7 We analysed the promotional increases implied by the current pay structure of the membership and the annual increases received by individual members over the four-year period to 31 March 2012. Details of the analysis are contained in Appendix H.

9.8 The analysis of the pay structure of the membership as at 31 March 2012 suggested that the pay structure is broadly consistent with the 2004 valuation assumption for promotional pay increases.

9.9 The analysis of the annual pay increases for individual members between 2008 and 2012 suggested that promotional pay increases had been higher at almost all ages than assumed under the 2004 valuation (by an average of about ¾% a year between ages 30 and 60).

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

9.11 Based on the full analysis, we consider there is no compelling evidence to suggest that the promotional pay increase assumptions used previously are no longer appropriate. We do not propose to make any changes to the assumptions used for the 2004 valuation.

Financial impact

9.12 Table 9.1 shows the approximate financial impact of assuming promotional increases that are ¾% a year higher than those proposed.

Table 9.1: Approximate impact of alternative promotional salary increase assumption

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Promotional increases are ¾% a year higher than proposed for 2012	2%	3%	Not a feature of the scheme

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

10 Commutation of pension for cash at retirement

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

Proposed assumptions for 2012 valuation

10.1 We recommend that members are assumed to commute the following proportions of their pensions:

Table 10.1: Recommended commutation assumptions for the 2012 valuation

	NPA 60 service	NPA 65 service[26]	2015 scheme service[26]
Males	5%	15%	15%
Females	4%	15%	15%

10.2 The assumption for the NPA 65 and 2015 scheme sections represents around 40% of the maximum commutation under HMRC limits.

Previous valuation assumptions

10.3 The table below summarises the assumptions adopted for the 2004 valuation and proposed for the 2008 valuation. The assumptions were the same for men and women.

Table 10.2: Commutation assumptions for the previous valuations

	NPA 60 service	NPA 65 service
2004 valuation	6.4%	24.4%
2008 valuation	3.9%	24.4%

[26] Specified by HMT Directions

Use of the assumption

10.4 Members may commute part of their pension for a lump sum at a rate of £12 for each £1 of annual pension given up. The assumption 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 NPA 60 and NPA 65 sections will not.

Results of analysis

10.5 We analysed the commutation experience of the Scheme over the calendar years 2007 to 2012. Details of the analysis are contained in Appendix I.

10.6 The recommended assumptions for NPA 60 reflect the recent experience of the Scheme. For women, the experience has been broadly constant over the period. For men, there was some evidence of a trend but this appeared to be levelling out.

Financial impact

10.7 The approximate financial impact of the proposed change to the commutation assumption compared to that proposed in 2008 is set out in Table 10.3.

Table 10.3: Approximate financial impact of proposed change in commutation assumption

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Change from 2008 assumptions to those proposed for 2012	Immaterial	0.3%	0.8%

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

10.8 The impact on the cost of accrual in the existing scheme is dominated by the change to the assumption for NPA 65 members, which is specified by HMT Directions.

11 Family statistics

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

Proposed assumptions for 2012 valuation

11.1 We recommend the following assumptions.

- 75% of men and 60% of women are assumed to be married or have a qualifying partner at retirement with consistent assumptions for current pensioners.
- Men are assumed to be three years older than their partners and women are assumed to be two years younger than their partners.
- On the grounds of materiality, no allowance is made for remarriage.

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. The recommended approach for the 2012 valuation is simpler, which is justified given the relatively minor importance of these assumptions[27].

11.3 The assumed proportions married/partnered are generally lower than adopted for the 2004 valuation or proposed for the 2008 valuation, particularly for older members and partners.

11.4 Allowance was made for remarriage in the 2004 valuation and proposed for the 2008 valuation but at rates typically well below 1% a year for deaths in retirement.

Use of the assumption

11.5 Dependants' pensions[28] are provided to qualifying dependants on the death of a member. The Scheme's benefit provisions for dependants differ according to when the service is accrued. For pension in relation to service accrued on or after 1 January 2007, a pension is payable to qualifying partners as well as to legal spouses and civil partners. For pension in relation to pre-1 January 2007[29] service, only legal spouses and civil partners are eligible for a survivor's pension. 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 will be paid for.

[27] Only about 4% of the liabilities of the Scheme as at 2012 relates to payments to future dependants.
[28] Pensions are also payable to dependent children on a member's death but the costs are not material overall.
[29] Only service after certain dates counts for dependants' pensions.

11.6 Where the member has no service on or after 1 January 2007, the spouse's pension will cease if the spouse remarries. As this only applies to current pensioners and some current deferreds, this assumption does not impact the cost cap in any way.

Results of analysis

11.7 Approximately 40,000 pensioners died during the four-year period to 31 March 2012. We analysed the proportion of deaths giving rise to the payment of a surviving spouse's or partner's pension and the age of the dependants relative to the members. Details of the analysis are contained in Appendix J.

11.8 The majority of deaths observed relate to members with service before 1 January 2007 only and so would qualify for a pension to a legal spouse (or civil partner). The analysis showed significantly fewer members left a surviving spouse than expected under either the 2004 valuation proportion married assumptions or those proposed for the 2008 valuation. To formulate a recommended assumption we considered what adjustment to the population proportions married[30] would provide the closest comparison with actual experience. One particular advantage of this approach is that it leads to a straightforward way of setting the assumption for the proportion married or partnered by making use of the ONS statistics on cohabitation. However, for simplicity and because the resulting assumptions were very close, we have recommended a single assumption applying for both proportions married and partnered.

11.9 The recommendations for age differences between members and their partners is broadly consistent with the results of the analysis.

11.10 No analysis has been carried out on the remarriage experience because we do not expect this to have a material effect on the value of existing spouses' pensions or on the pensions prospectively payable to spouses on the deaths of existing pensioner and deferred members.

Financial impact

11.11 The approximate financial impact of the proposed change to the family statistics assumptions compared to those proposed in 2008 is set out in Table 11.1.

[30] published by the Office for National Statistics (ONS)

Table 11.1: Approximate financial impact of proposed changes in family statistics assumptions

	Past service effect*	Cost of accrual in existing scheme	Cost of accrual in 2015 scheme
Change in proportion married/partnered	Immaterial	Immaterial	-0.1%
Change in age differences	-0.1%	-0.1%	-0.1%
No allowance for remarriage	Immaterial	Not a feature of the scheme	Not a feature of the scheme

Appendix A: Summary of assumptions

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

Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 valuation assumptions	
			Past service	SCR (2015-19)
Pensioner baseline mortality[31]	Aligned to standard SAPS table[32,33]			
Normal health	Males: 107% of S1NMA_L Females: 74% of S1NFA_L up to age 79, 84% at ages 80-84, 98% at 85-89, 106% from age 90	In line with 2008-2012 experience[34] *see graphs C1 and C2, page 48*	-0.1%[35]	Immaterial[35, 36]
Ill health (current)	Males: 65% of S1IMA up to age 71, 114% of S1NMA above age 71 Females: 89% of S1IFA up to age 71, 109% of S1NFA above age 71	In line with 2008-2012 experience *see graphs C3 to C6, pages 51 to 53*		
Ill health (future)	100% of S1IXA	In line with experience of UK self-administered pension schemes due to lack of Scheme experience on which to base this assumption.		
Dependants	Males: 108% of S1NMA Females: 88% of S1DFA	In line with 2008-2012 experience *see graphs C7 and C8, pages 55 and 56*		

[31] As directed by HMT, improvements in mortality from 2012 are assumed to be in line with those underlying the ONS 2012 population projections.
[32] SAPS tables are published by the Actuarial Profession and based on the experience of self-administered pension schemes over the period 2000 to 2006. The 'S1' series has separate standard tables based on experience of members retiring in normal health (S1NXA) and in ill health (S1IXA) and for dependants (S1DFA). The assumptions for members retiring in normal health relate to low mortality variants of the main tables (S1NXA_L).
[33] Adjusted to 2012 to take account of improvements in population mortality derived using rates from the UK Interim Life Tables (and ONS population projections from 2012).
[34] Scheme experience was compared to relevant SAPS tables adjusted to take account of improvements in population mortality between 2002 (the base year for the tables) and 2009/2010 (the central years of our period of analysis) derived using mortality rates from the UK Interim Life Tables.
[35] Includes the baseline changes for all pensioner groups and the change to future improvements.
[36] Changes are considered immaterial if their expected impact on the contribution rate is less than 0.05%.

Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 valuation assumptions	
			Past service	SCR (2015-19)
Age retirement				
NPA 60 protected (ie pre-07 entrants, aged 50 and above[37])	About 40% retire before age 60, 20% at age 60, remainder spread to age 70	In line with 2008-2012 experience *see graphs D1 and D2, pages 58 and 59*	Immaterial	Immaterial
NPA 65 protected (ie post-07 entrants, aged 55 and above[37])	About 40% retire before age 65, remainder at age 65	Levels of early retirement as for NPA 60[38], cost neutral late retirement	Immaterial	Immaterial
New entrants from 2015	About 40% retire before age 65, remainder evenly spread to SPA	Reasonable allowance for enhanced early retirement terms and earlier retirement	No past service	New assumption
Members with service in both schemes (ie unprotected pre-2015 entrants)	Gradual change between protected and new entrant patterns above	Reasonable approach given uncertainty	Immaterial	New assumption
Ill-health retirement				
Incidence	Increasing by age: <0.01% at age 25, <0.1% at age 45, about 0.6% at age 65	In line with 2008-2012 experience, not adjusted for further improvements in health *see graphs E1 to E4, pages 62 to 65*	Immaterial	Immaterial
Upper/lower tier[39] split	55% (M), 63% (F) on upper tier		Immaterial	Immaterial

[37] Age at 31 March 2012
[38] Retirement probabilities for ages 55-59 in the NPA 60 section are assumed to apply for ages 60-64 in the NPA 65 section.
[39] Ill-health benefits operate on a two-tier basis. Upper-tier benefits contain a top-up pension and are awarded to members unable to engage in any regular employment.

Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 valuation assumptions	
			Past service	SCR (2015-19)
Withdrawal	Withdrawals, net of re-entry within 5 years, of about 3% a year	Based on 2008-2012 withdrawal experience with allowance for re-entry within 5 years based on 1997-2007 experience *see graphs F1 and F2, page 67*	0.1%	Immaterial
Death before retirement	Increasing by age: 0.01% at age 25, about 0.05% at age 45, 0.35%(M)/0.17%(F) at age 65	In line with 2008-2012 experience, not adjusted for future improvements in mortality *see graphs G1 and G2, pages 68 and 69*	Immaterial	Immaterial
Promotional salary scale	Steeper at younger ages: about 4% a year at age 25, 1% at age 45 and 0.01% at age 65	As adopted for 2004 and 2008 valuations and no clear evidence that it is no longer appropriate *see graphs H1 to H4, pages 71 to 73*	No change in assumption	
Commutation				
NPA 60 service	5% (M), 4% (F) of pension commuted	In line with 2007-12 experience *see graphs I1 and I2, page 76*	Immaterial	Immaterial[40]
NPA 65 service	15% of pension commuted	As set out in Directions	Immaterial	Immaterial[40]
2015 scheme	15% of pension commuted	As set out in Directions	No past service	0.7%[40]

[40] Weighted impact on total contribution rate. The overall impact on the total contribution rate is approximately 0.7%. 2015 scheme assumption is compared against the 2008 assumption for the NPA 65 section.

Assumption	Summary of recommended assumptions	Rationale for recommendation	Approximate impact on total contribution rate of change from 2008 valuation assumptions	
			Past service	SCR (2015-19)
Family statistics				
Proportion married/partnered	75% (M), 60% (F) at retirement (consistent assumptions for existing pensioners)	Comparative level of scheme experience against ONS statistics *see graphs J1 and J2, pages 80 and 81*	Immaterial	-0.1%
Age difference	Male member 3 years older than partner Female 2 years younger than partner	Based on scheme experience *see graph J3, page 84*	-0.1%	-0.1%
Remarriage	No allowance	Simplification on grounds of materiality	Immaterial	Not a feature of the scheme

Appendix B: Details of assumptions

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

Pensioner mortality

Table B1: Baseline mortality assumptions

Group	Males	Females
Normal-health pensioners	107% of S1NMA_L	Age-dependent adjustments to S1NFA_L: ≤79: 74% 80-84: 84% 85-89: 98% ≥90: 106%
Existing ill-health pensioners	Age-dependent assumption: ≤71: 65% of S1IMA >71: 114% of S1NMA	Age-dependent assumption: ≤71: 89% of S1IFA >71: 109% of S1NFA
Future ill-health pensioners	100% of S1IMA	100% of S1IFA
Dependants	108% of S1NMA	88% of S1DFA

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

Age retirement from service

Table B2: Age retirement rates for members with full protection

Age	NPA 60		NPA 65	
	Males	Females	Males	Females
55	0.06	0.05	-	-
56	0.07	0.06	-	-
57	0.09	0.08	-	-
58	0.13	0.10	-	-
59	0.15	0.13	-	-
60	0.34	0.40	0.06	0.05
61	0.28	0.33	0.07	0.06
62	0.24	0.28	0.09	0.08
63	0.24	0.28	0.13	0.10
64	0.38	0.36	0.15	0.13
65	0.51	0.44	1.00	1.00
66	0.44	0.38	1.00	1.00
67	0.38	0.33	1.00	1.00
68	0.39	0.27	1.00	1.00
69	0.38	0.28	1.00	1.00
70	1.00	1.00	1.00	1.00

Table B3: Age retirement rates for new entrants to the 2015 scheme

Age	SPA 65		SPA 66		SPA 67		SPA 68	
	Males	Females	Males	Females	Males	Females	Males	Females
55	-	-	-	-	-	-	-	-
56	-	-	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-
58	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-
60	0.06	0.05	0.06	0.05	0.06	0.05	0.06	0.05
61	0.07	0.06	0.07	0.06	0.07	0.06	0.07	0.06
62	0.09	0.08	0.09	0.08	0.09	0.08	0.09	0.08
63	0.13	0.10	0.13	0.10	0.13	0.10	0.13	0.10
64	0.15	0.13	0.15	0.13	0.15	0.13	0.15	0.13
65	1.00	1.00	0.50	0.50	0.33	0.33	0.25	0.25
66	1.00	1.00	1.00	1.00	0.50	0.50	0.33	0.33
67	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50
68	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table B4: Age retirement rates for members with service in NPA 60 and 2015 schemes

Age	SPA 67		SPA 68	
	Males	Females	Males	Females
55	0.04	0.04	0.01	0.01
56	0.05	0.05	0.02	0.02
57	0.07	0.06	0.02	0.02
58	0.10	0.08	0.03	0.03
59	0.12	0.10	0.04	0.03
60	0.31	0.33	0.14	0.14
61	0.26	0.31	0.13	0.14
62	0.20	0.24	0.12	0.13
63	0.21	0.24	0.15	0.15
64	0.22	0.24	0.17	0.17
65	0.46	0.40	0.32	0.30
66	0.46	0.41	0.38	0.36
67	0.46	0.42	0.47	0.46
68	0.52	0.43	0.85	0.82
69	0.52	0.44	0.85	0.82
70	1.00	1.00	1.00	1.00

Table B5: Age retirement rates for members with service in NPA 65 and 2015 schemes

Age	SPA 65		SPA 66		SPA 67		SPA 68	
	Males	Females	Males	Females	Males	Females	Males	Females
55	-	-	-	-	-	-	-	-
56	-	-	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-
58	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-
60	0.06	0.05	0.06	0.05	0.06	0.05	0.06	0.05
61	0.07	0.06	0.07	0.06	0.07	0.06	0.07	0.06
62	0.09	0.08	0.09	0.08	0.09	0.08	0.09	0.08
63	0.13	0.10	0.13	0.10	0.13	0.10	0.13	0.10
64	0.15	0.13	0.15	0.13	0.15	0.13	0.15	0.13
65	1.00	1.00	1.00	1.00	0.76	0.76	0.41	0.41
66	1.00	1.00	1.00	1.00	0.78	0.78	0.48	0.48
67	1.00	1.00	1.00	1.00	1.00	1.00	0.61	0.61
68	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Ill-health retirement from service

Table B6: Ill-health retirement rates for all members

Age	Males	Females
20	-	-
25	0.0000	0.0000
30	0.0000	0.0001
35	0.0001	0.0002
40	0.0003	0.0003
45	0.0008	0.0007
50	0.0022	0.0016
55	0.0039	0.0031
60	0.0056	0.0047
65*	0.0069	0.0063

*rates are zero if above the NPA of the relevant section

B.3 55% of males and 63% of females who retire on ill-health grounds are assumed to qualify for upper-tier benefits.

Voluntary withdrawal from service

Table B7: Withdrawal rates (net of re-entry within 5 years) for all members

Age	Males	Females
20	0.056	0.038
25	0.045	0.034
30	0.034	0.030
35	0.030	0.026
40	0.030	0.024
45	0.030	0.024
50	0.032	0.028
55	0.032	0.031
60	0.032	0.033
65*	0.032	0.034

*rates are zero if above the NPA of the relevant section

Death in service

Table B8: Death in service rates for all members

Age	Males	Females
20	0.0001	0.0000
25	0.0001	0.0001
30	0.0002	0.0001
35	0.0003	0.0002
40	0.0004	0.0003
45	0.0005	0.0004
50	0.0008	0.0006
55	0.0013	0.0009
60	0.0023	0.0012
65	0.0035	0.0017

Promotional pay increases

Table B9: Promotional salary scales for all members

Age	Males	Females
20	89	89
25	100	100
30	125	124
35	151	143
40	168	152
45	179	158
50	186	164
55	190	168
60	192	170
65	194	172

Commutation of pension for cash at retirement

Table B10: Recommended commutation assumptions for the 2012 valuation

	NPA 60 service	NPA 65 service[41]	2015 scheme service[41]
Males	5%	15%	15%
Females	4%	15%	15%

[41] Specified by HMT Directions

Family statistics

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

	Accrual before 1/1/2007	Accrual on or after 1/1/2007
	Proportion married	Proportion married or partnered
Males	75%	75%
Females	60%	60%

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

Age	Accrual before 1/1/2007		Accrual on or after 1/1/2007	
	Males	Females	Males	Females
50	72%	60%	76%	62%
60	72%	60%	76%	62%
70	72%	48%	74%	49%
80	60%	24%	61%	24%
90	34%	7%	34%	7%

B.4 Men are assumed to be three years older than their partners and women are assumed to be two years younger than their partners.

Appendix C: Analysis of pensioner mortality

Type of analysis

C.1 Mortality can be analysed on either a 'lives' basis or an 'amounts' basis:

- A 'lives' basis gives an equal weighting to every member of the population being analysed.
- An 'amounts' basis weights the experience by the size of each member's pension (with the longevity of those with larger pensions given more of a weighting).

C.2 There is much evidence[42] to demonstrate that the size of pension is positively correlated with longevity, ie on average those with bigger pensions live longer. For a population with significant variation in the characteristics of the membership and in the amounts of pension being paid, an amounts mortality analysis is generally expected to show lower rates of mortality than a corresponding lives analysis. However, for a scheme such as the TPS, which has a largely homogeneous membership, the difference between the two approaches is likely to be smaller.

C.3 Actuarial valuations are concerned with overall financial impacts and so it is appropriate to set mortality assumptions on an amounts basis where sufficient data is available. Our advice on mortality assumptions for this valuation is based on an amounts analysis.

C.4 For previous valuations only data on a lives basis has been available. We have carried out a parallel analysis on a lives basis for this valuation. The results are similar, with the adjustment to the standard table required for normal-health pensioners to fit the lives experience typically being within 2% of the adjustment required for the amounts experience. The change in approach to this analysis should not, therefore, have a major impact on the valuation results.

Method of analysis and setting of assumptions

C.5 We have compared the mortality experience of the Scheme in the four-year period to 31 March 2012 with that of the most appropriate S1 table and with the assumptions proposed for the 2008 valuation, which were also based on the S1 tables. Since these tables do not include allowance for improvements in mortality, in comparing with the TPS experience we have adjusted the standard tables to those applicable to the period the deaths occurred. The adjustments applied are broadly in line with the improvements applying to the UK population over the relevant period derived using mortality rates from the UK Interim Life Tables. In comparing experience to the standard tables we have sought the 'best fit', ie the adjustments, if any, required to the standard tables' rates to provide a match of experience to assumptions.

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

C.6 The results of this analysis are shown in tables and graphs. The figures shown in the tables are the total pension amounts ceasing in respect of deaths and the ratios of actual total pension ceasing to the expected amount of pension ceasing under certain sets of assumptions. The number of deaths provides some context to the experience. Where there are more deaths, the experience will be more credible for setting assumptions.

Results of analysis

Normal-health pensioners

C.7 The mortality experience in 2008-12 has been compared with the S1 tables most appropriate to normal-health pensioners, namely the S1NMA and S1NMA_L tables for men and the S1NFA and S1NFA_L tables for women. The S1NMA_L table is a low mortality variant of the S1NMA table (and similarly for S1NFA_L).

C.8 When comparing against the S1NMA and S1NFA tables, the relationship between observed TPS mortality and the standard tables differs by age for both men and women. Mortality for younger pensioners is quite light compared to the standard tables but becomes much closer to the standard table for older pensioners.

C.9 When comparing against the S1NMA_L table, the relationship between observed mortality of male pensioners and the standard tables is fairly constant at all ages. When comparing against the S1NFA_L table, there is still significant age dependency between the female experience and the standard table.

C.10 It is not clear what causes this age dependency. However, this feature has been apparent for some time (see Table C4, which considers the Scheme's experience between 2001 and 2012). The evidence suggests that female TPS normal-health mortality differs significantly from any of the standard tables available. We have worked closely with the Scheme's administrators to ensure that the data underlying our analysis is reliable and we have no material concerns about the data. Therefore, we believe it is appropriate to reflect the observed mortality.

C.11 We recommend the following age-dependent adjustments to the standard table for female pensioners.

Table C1: Recommended assumption for female normal-health pensioners

Age	Adjustment to S1NFA_L
50 – 79	74%
80 – 84	84%
85 – 89	98%
90 +	106%

C.12 The tables below show the actual pension amounts ceasing due to deaths compared with the expected amounts under the proposed 2008 valuation assumption, the unadjusted standard table and the recommended assumptions.

Table C2: Male normal-health pensioner mortality experience 2008-12

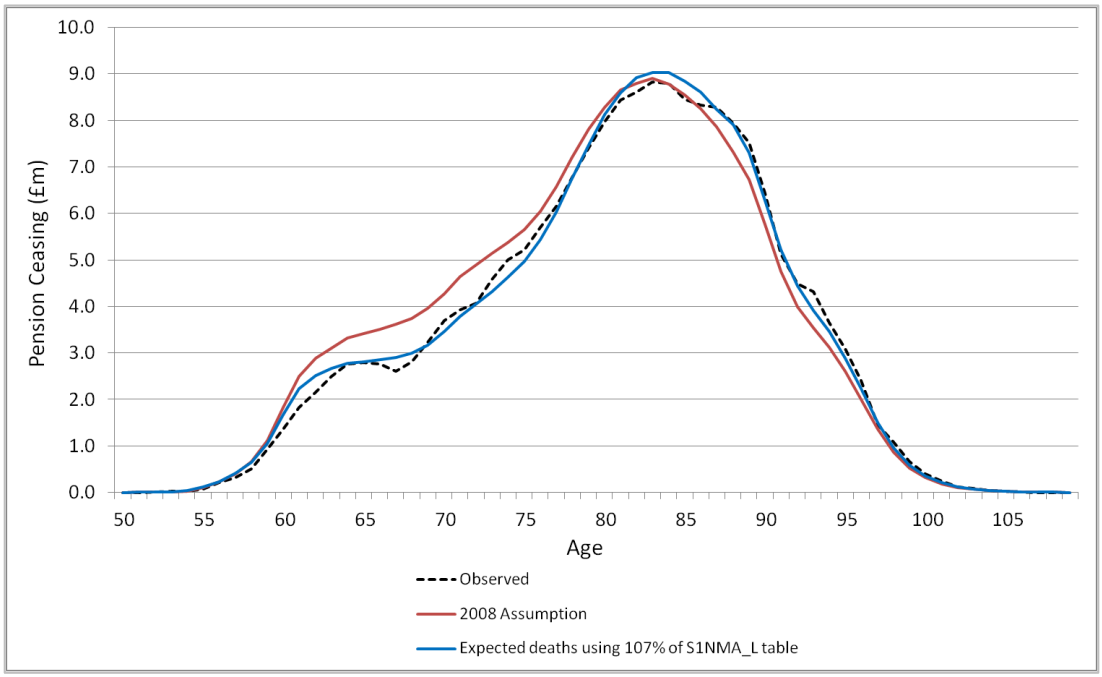
Age	Number of deaths	Pension amount ceasing (£m)	Experience relative to the proposed 2008 valuation assumption	Experience relative to the S1NMA_L table	Experience relative to the proposed 2012 valuation assumption
50 – 54	6	0.1	130%	125%	117%
55 – 59	158	2.0	81%	89%	83%
60 – 64	778	10.6	78%	96%	90%
65 – 69	1,079	14.2	78%	103%	96%
70 – 74	1,694	21.3	87%	112%	105%
75 – 79	2,627	31.3	94%	109%	102%
80 – 84	3,591	42.7	98%	104%	98%
85 – 89	3,392	40.5	105%	106%	99%
90 – 94	1,942	24.0	113%	110%	103%
95 – 99	668	8.7	118%	114%	106%
100 – 104	74	0.9	126%	122%	114%
105 – 109	3	0.0	76%	74%	69%
Overall	16,010	196.2	96%	107%	100%

Table C3: Female normal-health pensioner mortality experience 2008-12

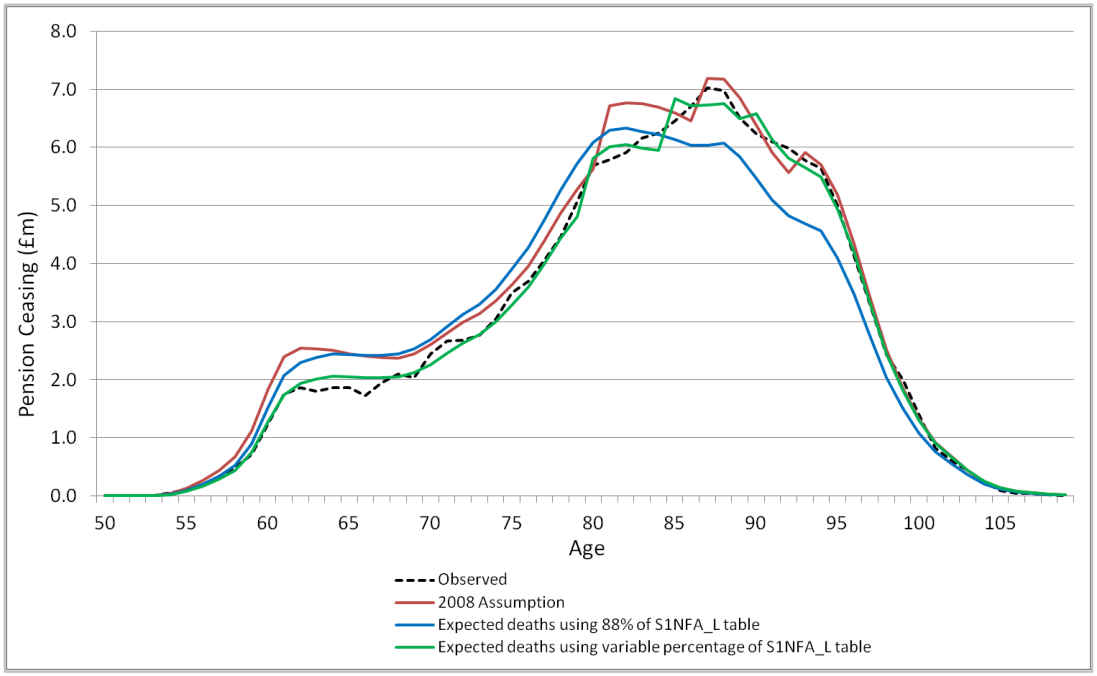
Age	Number of deaths	Pension amount ceasing (£m)	Experience relative to the proposed 2008 valuation assumption	Experience relative to the S1NFA_L table	Experience relative to the proposed 2012 valuation assumption
50 – 54	8	0.1	126%	148%	200%
55 – 59	175	1.8	70%	78%	105%
60 – 64	880	8.5	72%	70%	95%
65 – 69	1,084	9.7	80%	69%	94%
70 – 74	1,517	13.6	91%	77%	104%
75 – 79	2,415	20.8	94%	76%	103%
80 – 84	3,657	29.8	92%	84%	100%
85 – 89	3,923	33.7	98%	98%	100%
90 – 94	3,160	29.7	101%	106%	100%
95 – 99	1,725	16.9	97%	107%	101%
100 – 104	371	3.5	97%	105%	99%
105 – 109	22	0.2	67%	70%	66%
Overall	18,935	168.2	93%	88%	100%

C.13 The graphs compare the actual amount of pension ceasing on death with the 2008 assumption, the standard table with a single percentage adjustment applying at all ages chosen to provide the best fit to the experience, and for female normal health pensioners the standard table with the recommended age-dependent assumptions. The graph for females shows that the single adjustment to the standard tables does not provide a good fit at all ages but that the age-dependent assumptions do.

Graph C1: Male normal-health pensioner mortality experience 2008-12



Graph C2: Female normal-health pensioner mortality experience 2008-12



C.14 Age-dependent adjustments can be implemented in two distinct ways. The adjustments to the standard tables can be determined using the members' current ages (eg under the proposal for females, a 70 year old will be assumed to experience mortality at 74% of the standard table throughout her life) or the differentials in mortality can be assumed to persist over time with no change to the age bands (eg under the proposal for females, a 70 year old will be assumed to experience mortality at 74% of the standard table until she is 79, 84% of the standard table between ages 80 and 84 and so on).

C.15 The first approach ('cohort approach') has been used for the female normal-health mortality assumption in recent work. It would result from cohorts of ex-teachers passing through the scheme with different mortality characteristics from previous generations, eg teachers retiring now are generally healthier than the teachers who were retiring 20 years ago, even after allowing for improvements in the health of the wider population over that time. This might happen if teachers have come from a changing group of the population over time or a change in workforce behaviour or management has impacted the make up of pensioner groups.

C.16 The second approach would result from female teachers having significantly different mortality characteristics from the population underlying the standard table such that they are relatively healthy at younger ages but become less healthy relative to the standard table population as they age. The TPS population is more homogeneous than that underlying the standard table, which is drawn from many different workforces. It is possible that such a homogeneous group would have distinct characteristics.

C.17 We have analysed the experience of female normal-health pensioners against the S1NFA_L table over the period 2001 to 2012. Table C4 shows the number of pensions ceasing due to death compared to the expected number under the standard table. Note that this analysis has been carried out on a lives basis because amounts data was not available for the earlier periods. As a result the 2008-12 results are not directly comparable to Table C3.

Table C4: Female normal-health pensioner mortality experience 2008-12

	Experience relative to the S1NFA_L table		
Age	**2001-4**	**2004-8**	**2008-12**
55-59	161%	161%	79%
60-64	91%	98%	71%
65-69	78%	81%	74%
70-74	79%	79%	77%
75-79	84%	84%	77%
80-84	91%	93%	86%
85-89	106%	104%	98%
90-94	113%	111%	107%
95-99	117%	114%	108%
100-104	126%	127%	104%
105-109	115%	117%	72%
Overall	**98%**	**97%**	**89%**

C.18 Allowing for the general improvement in mortality between 2004-8 and 2008-12, the experience suggests that the age dependency does not result from cohorts. If there were cohorts in the data with different mortality characteristics then we would expect the age at which the experience changes relative to the standard table to increase over time but this is not the case. Therefore, we recommend use of the non-cohort approach.

C.19 This is a change in approach from the way that we recommended the age-dependent adjustments should be applied for the 2008 valuation and the way they have been applied for recent years' accounts. Past service liabilities, the employer contribution rate (for 2015-19) and the cost cap would all be higher under the cohort approach previously used. If the cohort approach were to be retained for this valuation then the contribution rates over 2015-19 would be about 1¾% higher. However, our opinion is that available evidence is inconsistent with the presence of cohorts in the data.

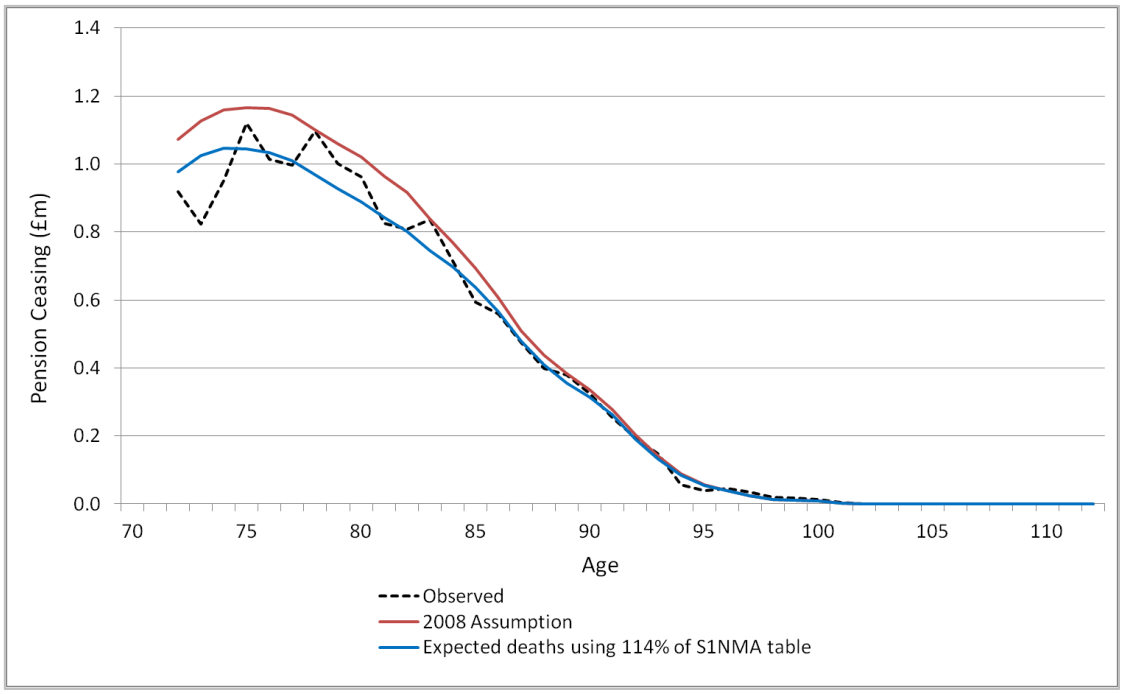
Current ill-health pensioners

C.20 The mortality experience in 2008-12 has been compared with both the S1 tables for ill-health pensioners (S1IMA and S1IFA for men and women respectively) and also the S1 tables for normal-health pensioners (S1NMA and S1NFA for men and women respectively).

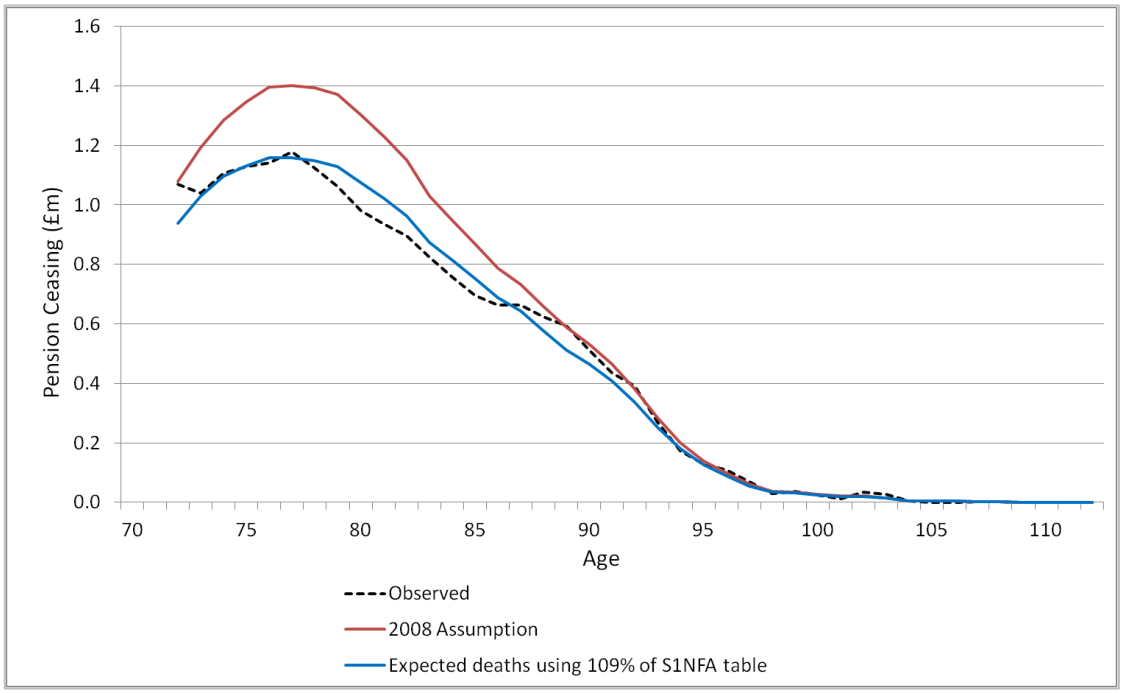
C.21 Analysis of ill-health mortality is complicated by the fact that a significant change to the conditions for qualifying for ill-health benefits was made in 1997. This has led to a noticeable difference when analysing mortality experience for older ill-health pensioners (most of whom retired before 1997 and tend to experience relatively lighter mortality) and younger ill-health pensioners (most of whom retired after 1997 and tend to experience relatively heavier mortality). As a result, we have analysed the ill-health mortality experience separately, broadly for members who retired before and after 1 April 1997. We achieve this by assuming that pensioners aged 71 and below at 31 March 2012 are subject to the mortality of post-April 1997 retirees and that pensioners aged 72 and above are subject to the mortality of pre-April 1997 retirees.

C.22 The standard tables for normal-health pensioners provide a better fit for the relatively lighter mortality of the pensioners aged 72 and above. We recommend that for these members, male pensioners are assumed to have mortality in line with 114% of the S1NMA table and female pensioners in line with 109% of the S1NFA table. The graphs below show that these assumptions provide a reasonable fit for the experience.

Graph C3: Male ill-health pensioner mortality experience for older pensioners



Graph C4: Female ill-health pensioner mortality experience for older pensioners

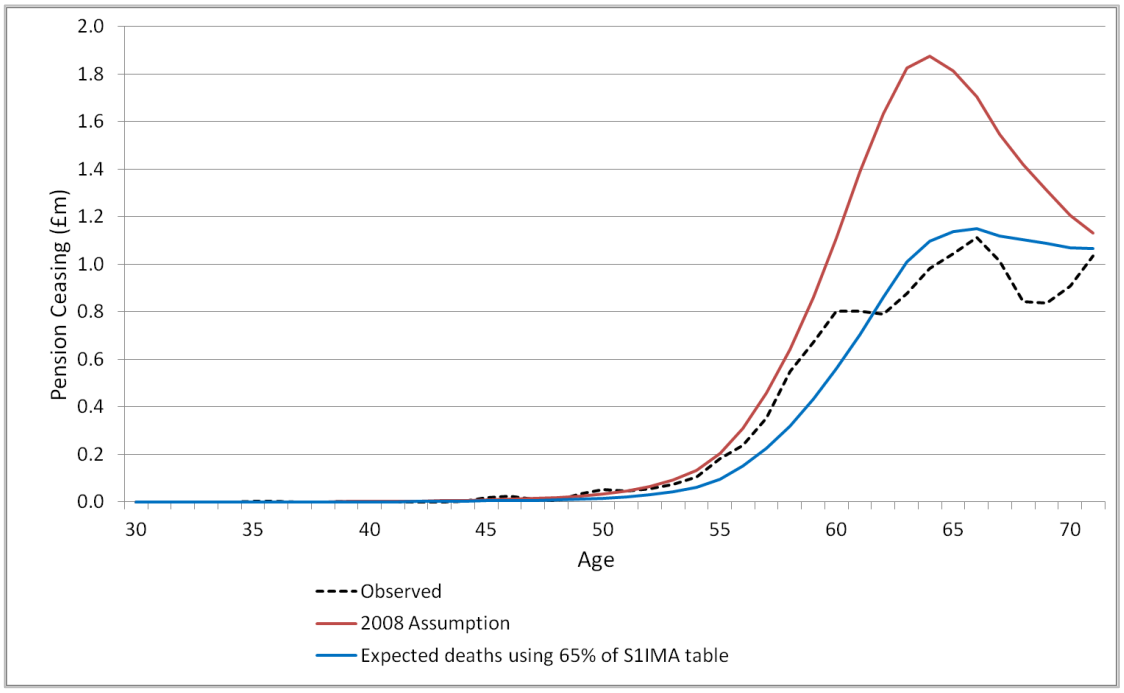


C.23 The standard tables for ill-health pensioners provide a better fit for the relatively heavier mortality of the pensioners aged 71 and below. We recommend that for these members, male pensioners are assumed to have mortality in line with 65% of the S1IMA table and female pensioners in line with 89% of the S1IFA table.

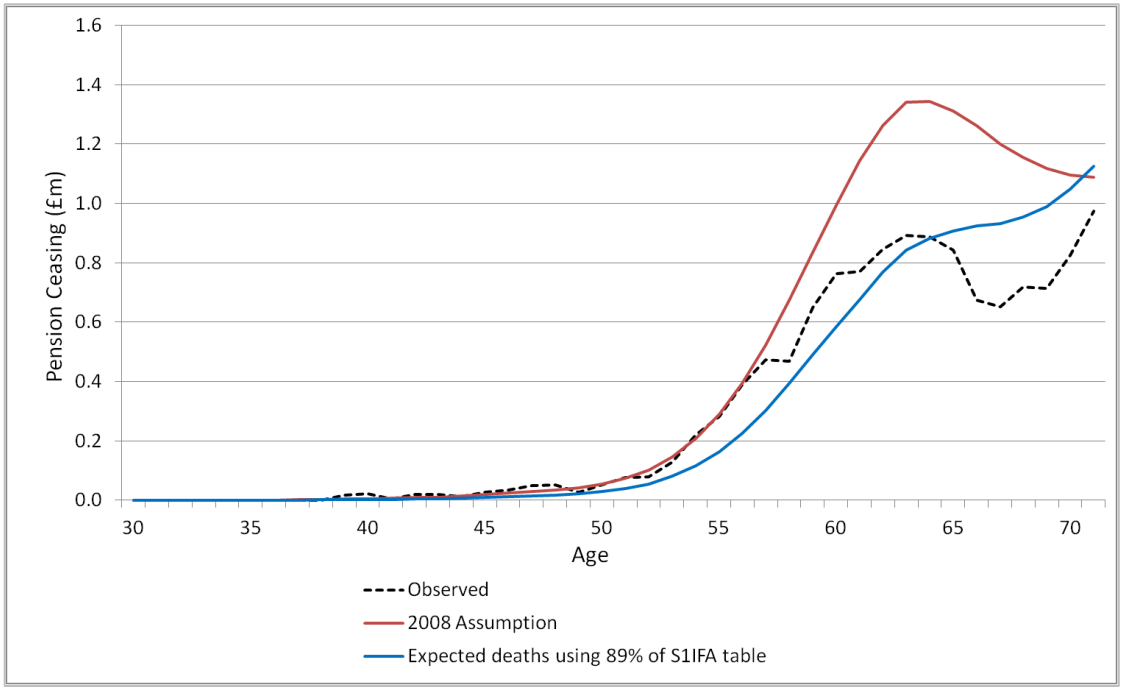
C.24 The adjusted tables are not an ideal fit for all ages, as shown in the graphs below. However, this group of members contains a mixture of members retiring under different ill-health retirement regimes. We are proposing a pragmatic approach to valuing this group given the difficulty of setting an assumption that is appropriate for such a mixture.

C.25 Ill-health pensioners under 72 make up about 10% of the total TPS pensions. Adopting a pragmatic approach for this group should not, therefore, have a particularly large impact on the overall results. Any surplus or deficit that subsequently emerges in respect of these pensioners will impact past service liabilities and therefore employers' contributions. The cost cap does not capture the risks associated with current ill-health pensioners, and therefore any surplus or deficit in respect of this group will not impact the cost cap mechanism.

Graph C5: Male ill-health pensioner mortality experience for younger pensioners



Graph C6: Female ill-health pensioner mortality experience for younger pensioners



Future ill-health pensioners

C.26 The number of ill-health pension awards has fallen significantly in recent years. Since the introduction of the two-tier ill-health arrangements in 2007, there have been around 700 ill-health retirements a year, compared with around 4,000 a year in the late 1990s. It is likely that the mortality experience of future ill-health pensioners will be significantly different from existing ill-health pensioners. We do not hold sufficient data on those retiring under the current ill-health arrangements to carry out a credible mortality analysis. Therefore, we need to take a pragmatic approach to setting the assumption for the mortality of future ill-health pensioners.

C.27 Two possible approaches are:

- Assume mortality is in line with the S1IA tables (which are based on the ill-health experience of certain private sector pension schemes).
- Adjust the S1IA tables by the same proportion as S1NA tables would be adjusted for normal-health pensioners.

C.28 A justification for the first approach is that the ill-health criteria in the public and private sector pension schemes are now likely to be similar. Ill-health mortality is likely to be driven primarily by the illness rather than the type of work the people were doing. If we have a similar set of illnesses in the TPS and the private sector then the mortality should be broadly similar.

C.29 A justification for the second approach is that we know mortality differs between workforces. We might reasonably expect to see differences between groups of ill-health pensioners. In the absence of other evidence, the difference between groups of normal-health pensioners might provide a guide to the difference between corresponding groups of ill-health pensioners.

C.30 On balance, our view is that the argument for the first approach is slightly more convincing. However, neither argument is definitive and we consider both approaches to be reasonable.

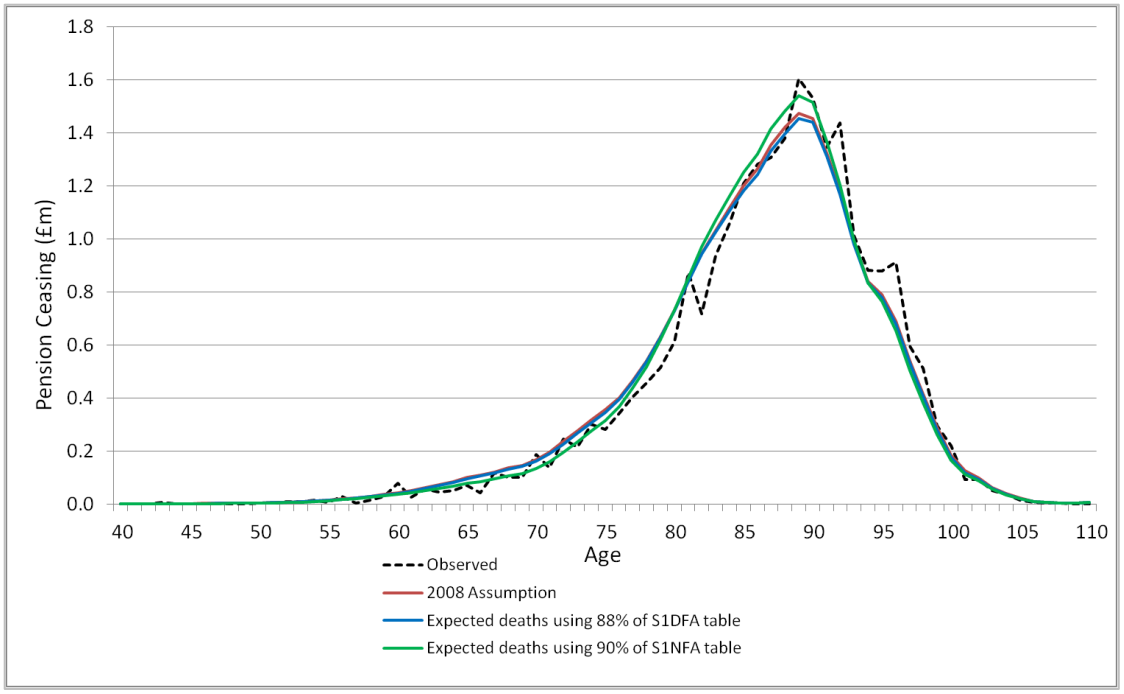
C.31 The relatively low level of ill-health retirement means that the choice of assumption is not particularly material. As a guide, the cost of ill-health members' pensions in the cost ceiling was just 1% of salaries. The second approach above would increase the assessed cost of future accrual but seems unlikely to increase the contribution rate by more than 0.1% of salaries.

Dependants

C.32 The mortality experience in 2008-12 for widows has been compared with the S1 tables relating to widows (the S1DFA table) and normal-health female pensioners (S1NFA). No S1 table exists for widowers so experience has been compared only with the S1 table for normal-health pensioners (S1NMA).

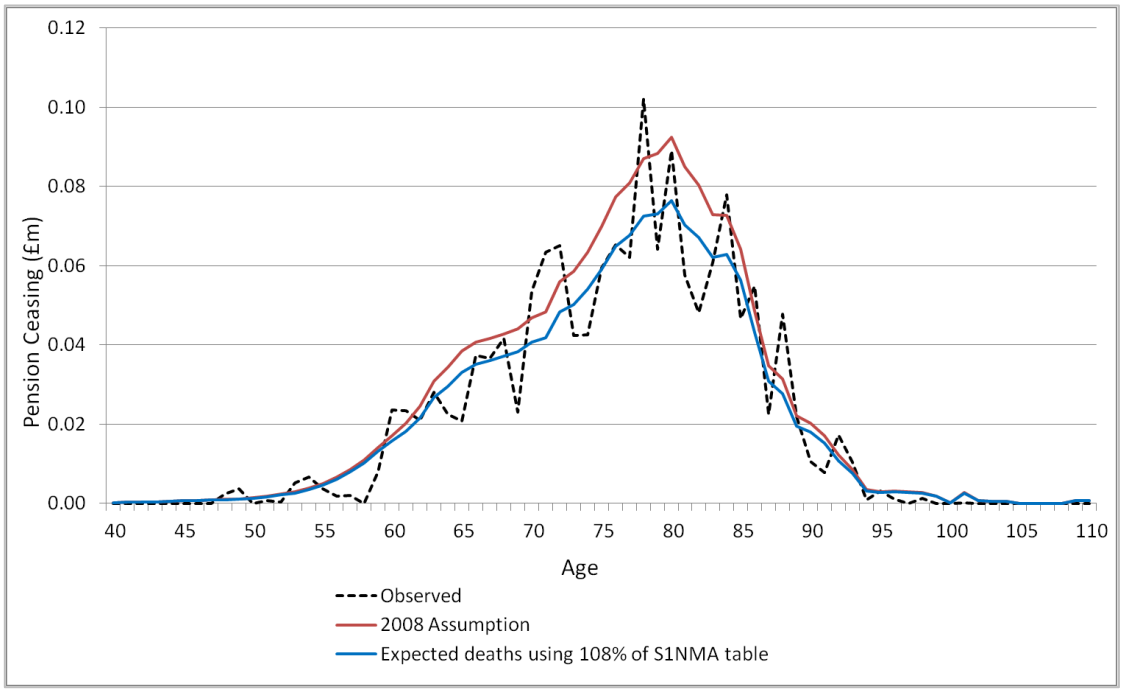
C.33 For widows, the best fits relative to the two tables considered are 88% of the S1DFA table and 90% of the S1NFA table. The graph below shows that both of these assumptions provide a reasonable fit to the data. Our view is that either could be used as the baseline assumption for the mortality of female dependants but we have proposed using S1DFA for consistency with the proposed 2008 valuation assumption.

Graph C7: Widow mortality experience



C.34 For widowers we recommend that mortality is assumed to be in line with 108% of the S1NMA table. The graph below shows that this is a reasonable fit to the experience at all ages.

Graph C8: Widower mortality experience



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 Scheme.
- Set assumptions for new entrants to the 2015 scheme by considering any relevant evidence. This is not a simple task because the available TPS experience relates to NPA 60 rather than SPA.
- Set assumptions for members with service in both 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 relative behaviours of the groups.

D.2 It may also be appropriate to allow for increased phased retirements.

Members with full protection

D.3 We have analysed the pattern of age retirements from active membership over the four-year period to 31 March 2012 for the NPA 60 section of the Scheme. The analysis compares the actual rate of age retirements (grouped by age of retirement) to the expected rate.

D.4 Insufficient data exists to perform a credible analysis of the NPA 65 section experience.

D.5 The graphs below show the actual rate of age retirements compared with the 2004 valuation assumption and the proposed 2008 assumption.

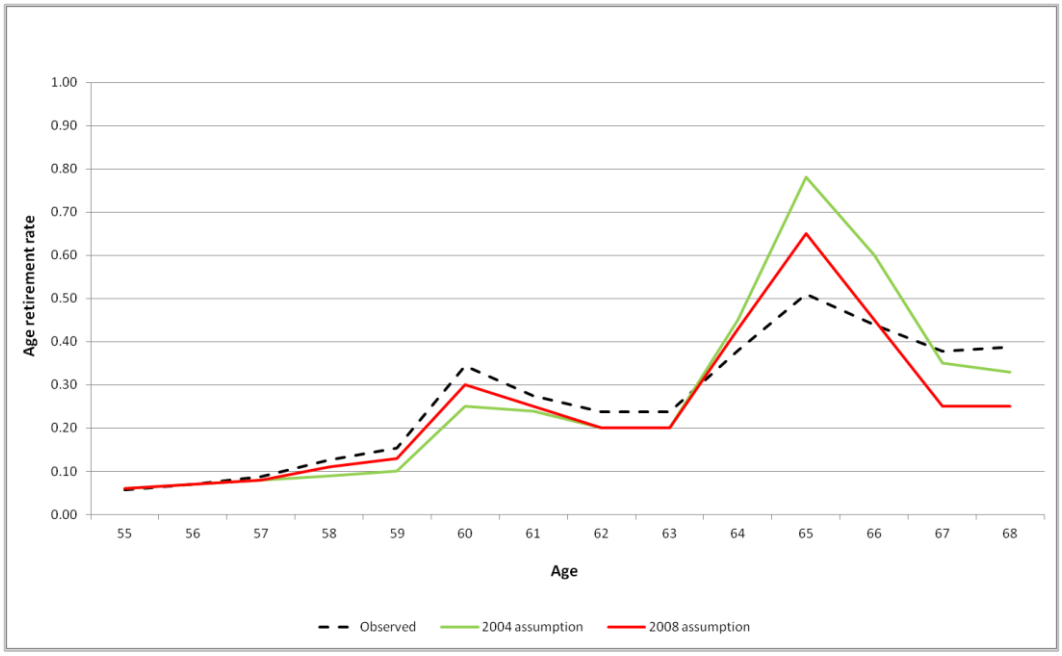
D.6 The experience over the period is broadly similar in pattern to the proposed 2008 assumption. However, observed age retirement rates have generally been higher than expected under the 2008 assumption up to age 63 and after age 66, but lower than expected at ages 64 and 65.

D.7 For men, the increase in retirement up to age 63 is consistent with the experience between 2004 and 2008 and so our view is that it is appropriate to take full account of this. The reduction in the retirement peak around 65 is part of a continuing trend and so we consider it appropriate to reflect the observed rate.

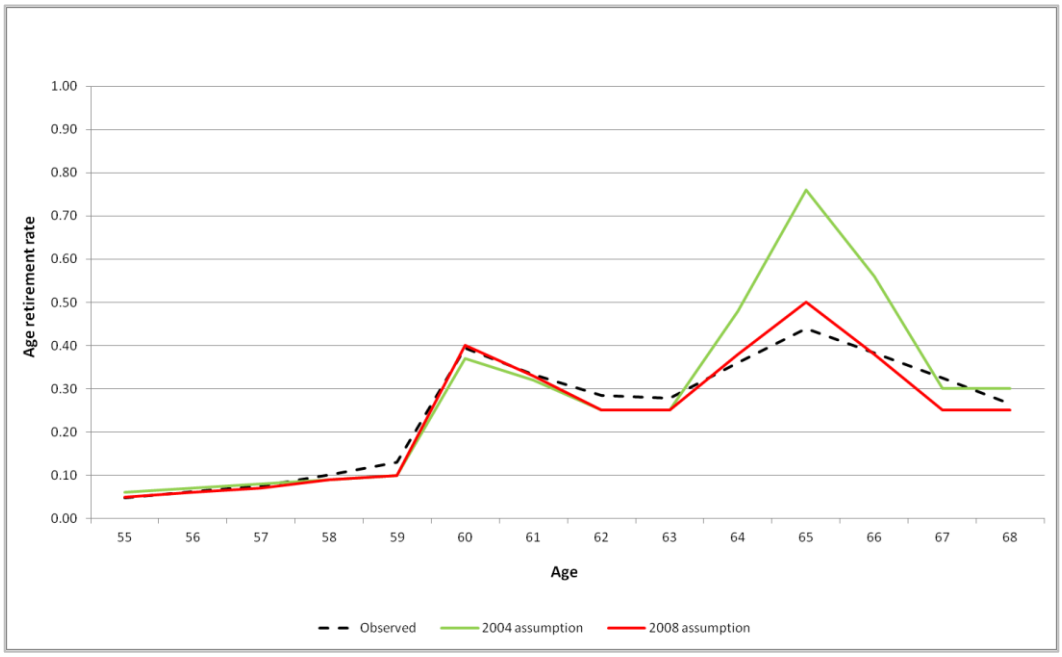
D.8 For women, there has been a slight increase in early retirement rates at some ages. As actuarially reduced early retirement is a relatively new feature of the Scheme, the most recent experience is likely to be the most relevant and so we recommend adopting the observed rates. The experience around age 65 is consistent with the period 2004 to 2008. There is an argument that retirement rates around that age will increase as the SPA for women increases. However, the retirement peak for men at age 65 (their current SPA) has reduced significantly over recent years, suggesting that SPA is not a particularly significant driver of teachers' retirement patterns. Therefore, we recommend that full allowance is made for the observed rate.

D.9 For the 2012 valuation we recommend members are assumed to retire in line with the observed rates between 2008 and 2012.

Graph D1: Male age retirement rates



Graph D2: Female age retirement rates



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:

- members reaching age 65 are assumed to retire evenly spread over the period between age 65 and SPA; and
- members will retire before age 65 in line with recent experience in the NPA 60 section (translated to be relative to age 65 rather than age 60).

D.11 This first step of this approach is intended to make a reasonable allowance for the enhanced early retirement terms by using an assumption consistent with that adopted for costing the new scheme.

D.12 The second step reflects that the enhanced early retirement terms may mean that age 65 is a natural retirement age in the scheme that members will plan their retirements against and that the terms make retirement well before SPA relatively affordable.

Members with service in both schemes

D.13 HMT advice is to assume that retirement patterns will change smoothly and gradually over time. It is not clear that this will be the case but we consider it to be a reasonable approach. Applying this directly would result in very complicated assumptions. To allow for reasonable implementation, we propose to make this change in steps so that a single retirement pattern (separate for men and women) applies to members with a particular SPA.

Impact of phased retirements and actuarially reduced benefits

D.14 Phased retirement is not currently a common feature of members' behaviour. However, for former NPA 60 members with service in both schemes, it may become more attractive to draw some of their NPA 60 benefits while continuing to work (either part-time or at a lower level) and accrue further 2015 scheme benefits. If this brings forward significantly the average payment age for NPA 60 benefits there will be an additional cost to the Scheme. If this is not anticipated when setting the assumptions it would lead to a future cost pressure on the Scheme. However, anticipating these costs will increase employer contributions in the short term. There is a similar situation if members take their NPA 60 benefits before age 60 (so are not subject to abatement) and then return to work and accrue further 2015 scheme benefits.

D.15 In the absence of any evidence of increased uptake of phased retirement we are not recommending an allowance for a change in behaviour. The Department for Education may have a view on the likelihood of such an increase and the Secretary of State may wish to make an allowance on the basis of their evidence.

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 four-year period to 31 March 2012 for the NPA 60 and NPA 65 sections separately. The analysis compares the actual rate of ill-health retirements to the expected rate of ill-health retirements based on the assumptions for previous valuations.

E.2 The table below shows the actual number of ill-health retirements in the NPA 60 section compared with the expected number of ill-health retirements based on the 2004 assumption and the proposed 2008 assumption.

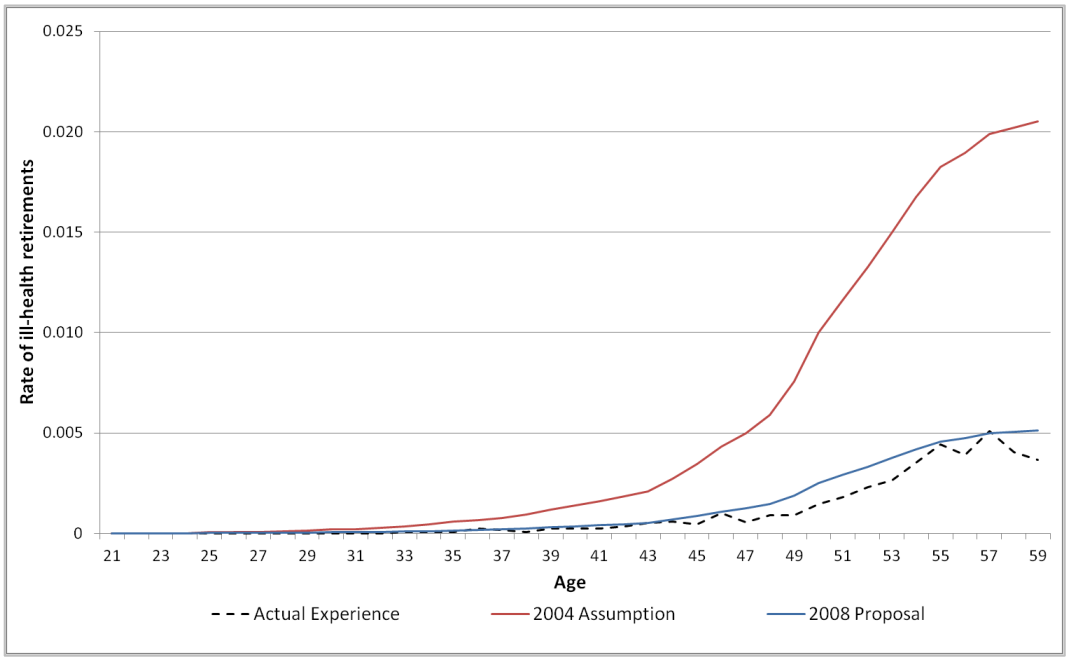
Table E1: Ill-health retirement experience 2008-12 (NPA 60 members)

		2004 assumptions		2008 assumptions	
	Actual retirements	Expected retirements	Actual/ Expected	Expected retirements	Actual/ Expected
Males	836	4,198	20%	1,050	80%
Females	1,550	7,868	20%	1,967	79%

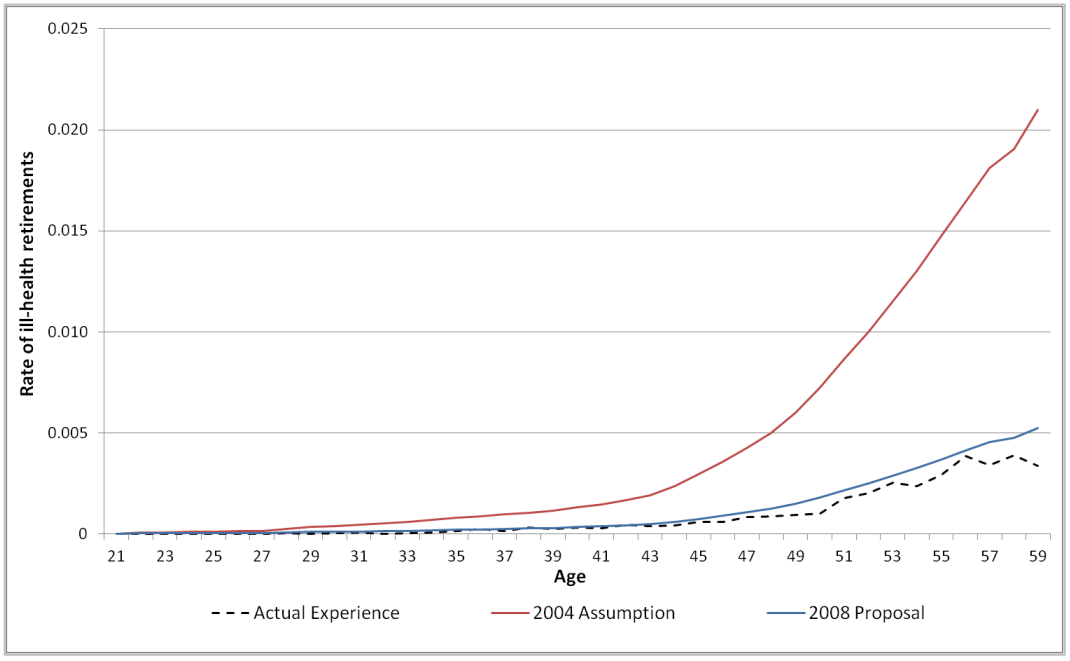
E.3 Only 5 members retired on ill-health grounds from the NPA 65 section, which was considerably lower than anticipated under the 2004 and 2008 assumptions and in comparison to the numbers retiring in ill health from the NPA 60 section. This is expected to be due to the effect of the introduction of the NPA 65 section from 2007. There is an explicit service requirement of two years before a member becomes eligible for ill-health benefits and additionally there is likely to be a lag before health issues result in retirement and award of ill-health benefits. These factors will mean the experience over the period 2008-12, for the NPA 65 section in isolation, is not representative of longer-term expectations. For this reason we have only analysed the NPA 60 experience when determining a recommendation.

E.4 The graphs below show the actual rates of ill-health retirements of NPA 60 members by age for men and women respectively compared with the 2004 valuation assumption and the proposed 2008 assumption. The graphs show that the general pattern of ill-health retirement rates by age is similar to the previous assumptions but the actual rates of ill-health retirements have been lower.

Graph E1: Male ill-health retirement experience 2008-12 (NPA 60)



Graph E2: Female ill-health retirement experience 2008-12 (NPA 60)



E.5 Table E2 below shows the number of ill-health retirements observed in each year of the analysis. Although the number of retirements is highest in the first year and lowest in the last year, there is not a clear trend in the pattern of retirement.

Table E2: Numbers of ill-health retirements

	2008/09	2009/10	2010/11	2011/12	Total
Males	281	198	189	168	836
Females	460	363	403	324	1,550
Total	741	561	592	492	2,386

E.6 Our recommended assumption is that rates of ill-health retirement for NPA 60 members are in line with the previous assumptions but rated down at all ages to be in line with the experience over 2008-12. We have made no allowance for continued falls in ill-health retirement rates because any continuing trend is unclear and rates are at a historically low level overall so that small changes would not have very significant effects on the valuation results.

E.7 The proposed NPA 60 rates need to be extended to all ages, which will accommodate the anticipated longer working lives of members in the NPA 65 section and members of the 2015 scheme. We recommend that the rates be extended by extrapolating the trends in the NPA 60 rates. The proposed NPA 60 assumption for women is broadly linear in the years running up to age 60 and so we propose to extend these rates linearly to SPA.

E.8 For men, the proposed NPA 60 assumption is broadly linear in the early 50s but becomes flatter in the years before age 60. For later retirement ages, the linear pattern in the early 50s can be extended with the flattening now assumed to occur in the years before later NPA. This is the approach adopted for the cost ceiling work. For simplicity, we propose to set a single assumption relative to SPA 68 and apply this to all retirement ages, except that assumed rates will be zero after a member's normal pension age. This simplification is not expected to have a material impact on the valuation results because (i) ill-health rates are very low in the TPS, (ii) the additional cost of providing an earlier benefit on ill health is broadly offset by the heavier mortality compared to a retirement in normal health, and (iii) it only applies to men who do not make up the majority of the Scheme membership.

Proportion of upper tier ill-health benefit awards

E.9 We have analysed the pattern of ill-health retirements awarded with upper tier benefits over the four-year period to 31 March 2012 for the members of the NPA 60 section. We have not analysed experience for members of the NPA 65 section due to the limited experience available.

E.10 Table E3 below summarises the number of ill-health retirements split by the level of benefit awarded.

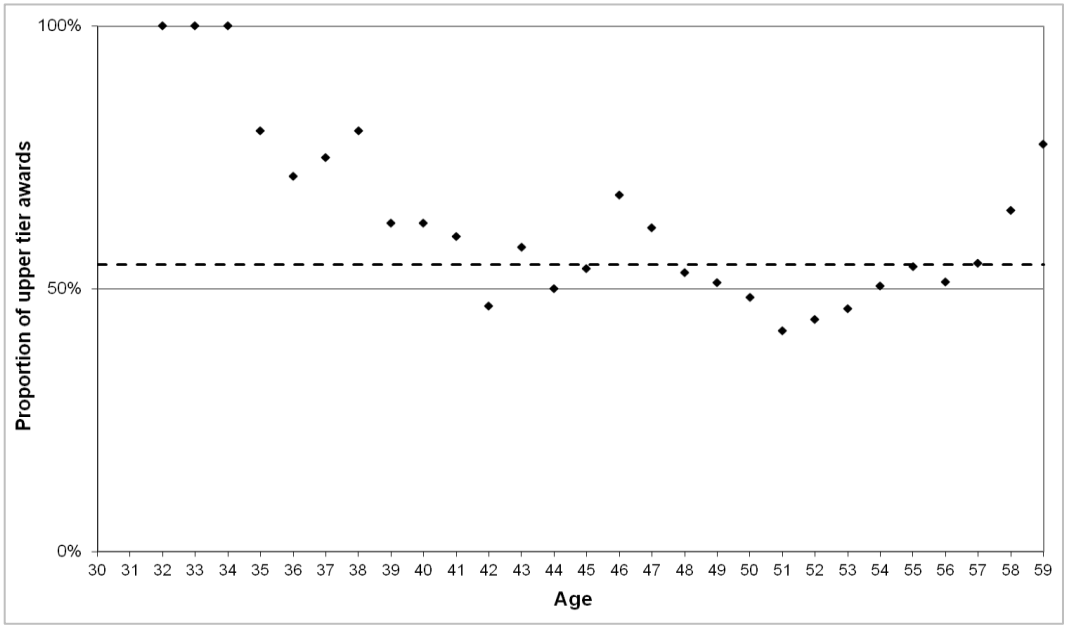
Table E3: Proportion of ill-health benefit awards on upper tier (NPA 60)

	2008/09	2009/10	2010/11	2011/12	Total
Males	54%	61%	50%	54%	55%
Females	62%	61%	66%	63%	63%

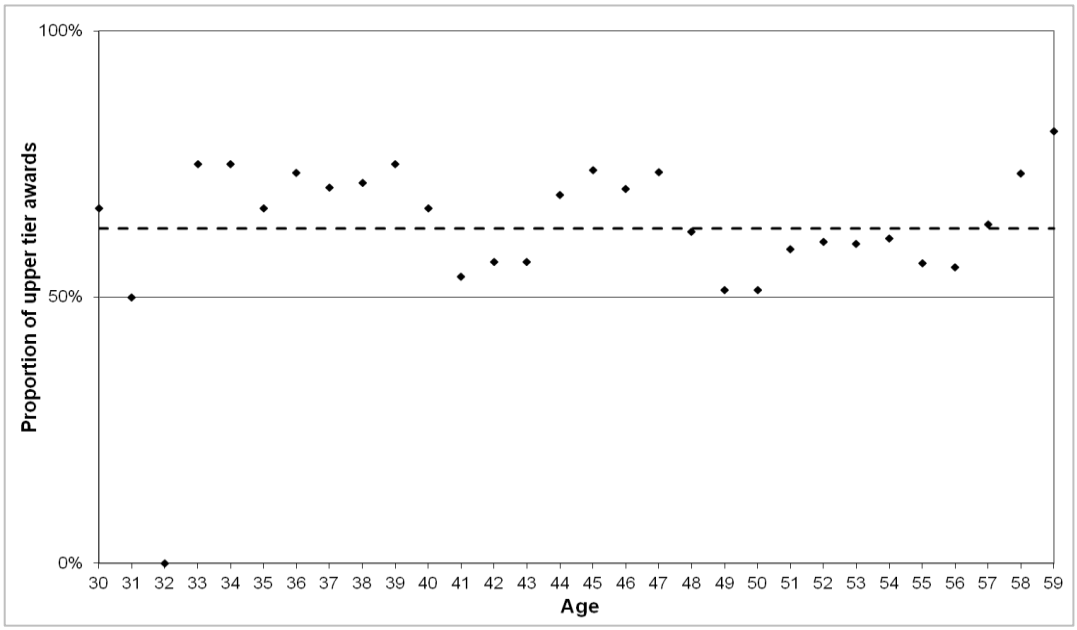
E.11 The proportion of ill-health retirements qualifying for upper-tier benefits is higher for women than for men. The proportions in the upper tier are reasonably stable year on year.

E.12 The following graphs show the proportion of upper tier benefit awards split by gender and age.

Graph E3: Male ill-health upper tier award experience 2008-12 (NPA 60)



Graph E4: Female ill-health upper tier award experience 2008-12 (NPA 60)



E.13 The analysis shows the proportion of awards qualifying for the upper tier differs for men and women but is not particularly dependent on age. There have now been sufficient retirements on the two-tier system for the result of the analysis to be credible and so we recommend adopting the observed proportion over the period 2008-12. This proportion would apply at all ages.

Appendix F: Analysis of voluntary withdrawal from service

F.1 Separate data was provided covering:

- withdrawals in the four-year period to 31 March 2012
- withdrawals in the ten-year period to 31 March 2007, split between those who do and do not return within 5 years.

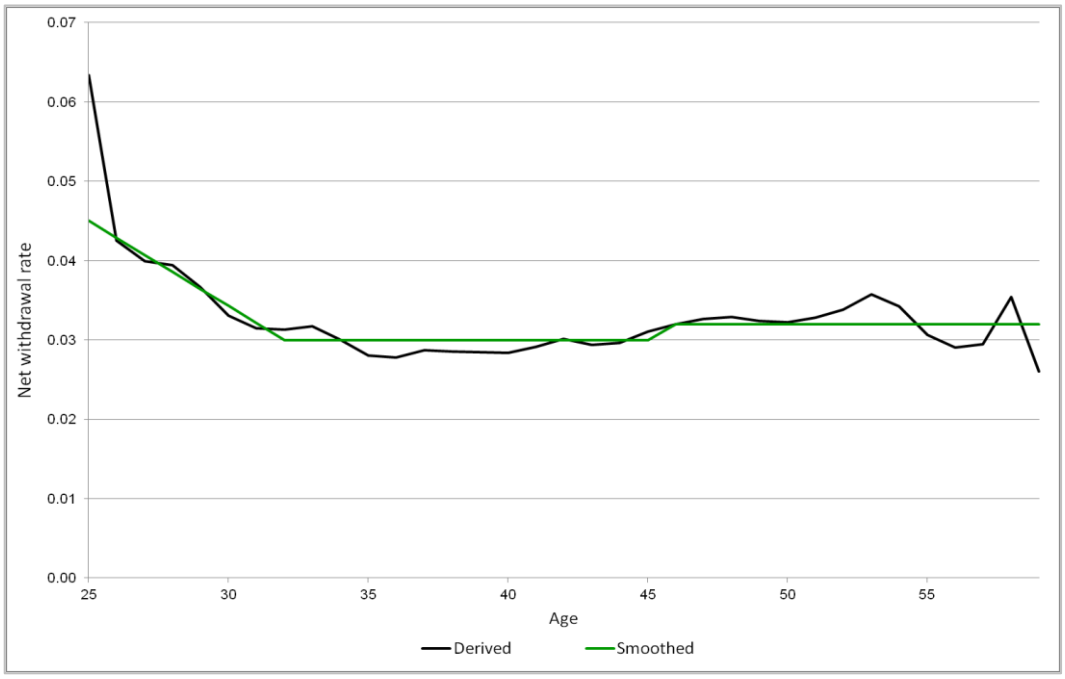
F.2 We have analysed the pattern of gross withdrawals in the first data set for the NPA 60 and NPA 65 sections combined. In practice NPA 60 section members form the majority of the long-serving leavers (over two years' service) and the majority of the short-serving leavers are from the NPA 65 section. In the second data set we have analysed the proportion of members who leave active service and do not rejoin the Scheme within five years.

F.3 We have derived net withdrawal rates by combining the two separate analyses. The withdrawal and re-entry experience relate to two different periods. The withdrawal experience relates to 2008-12 but we cannot know which of the members withdrawing in this period will return to service within five years (since sufficient time has not yet elapsed). The re-entry experience relates to 1997-2007. Ideally the two elements of experience would relate to the same period but this cannot be done without discarding the most recent withdrawal experience. The re-entry experience is broadly stable over the period analysed and so we would not expect the inconsistency with the periods of analysis to invalidate the assumptions derived.

F.4 Analysis was carried out separately for members with less and more than two years' service. 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. It is clear that members with less than two years' service have relatively little past service liability and so there will be little impact here. We also expect that the simplification would not affect the assessment of the employer cost cap or employer contribution rate by as much as 0.1% of salaries. Further, if the same approach is used at future valuations the impact would be similar so the simplification is not expected to impact on consideration of whether the cap has been breached.

F.5 The graphs below show the net withdrawal rates derived from the analysis, together with the smoothed rates that are being recommended for the 2012 valuation. The proposed rates need to be extended to older ages, which will accommodate the anticipated longer working lives of members in the NPA 65 section and members of the 2015 scheme. We recommend that the rates are extended by continuing the broadly linear trends seen at the older ages in the analysis.

Graph F1: Net withdrawal rates – males with at least two years' service



Graph F2: Net withdrawal rates – females with at least two years' service

Appendix G: Analysis of death in service

G.1 The results of the experience analysis over the four-year period to 31 March 2012 show that the actual number of deaths were lower than expected based on both the 2004 and 2008 assumptions.

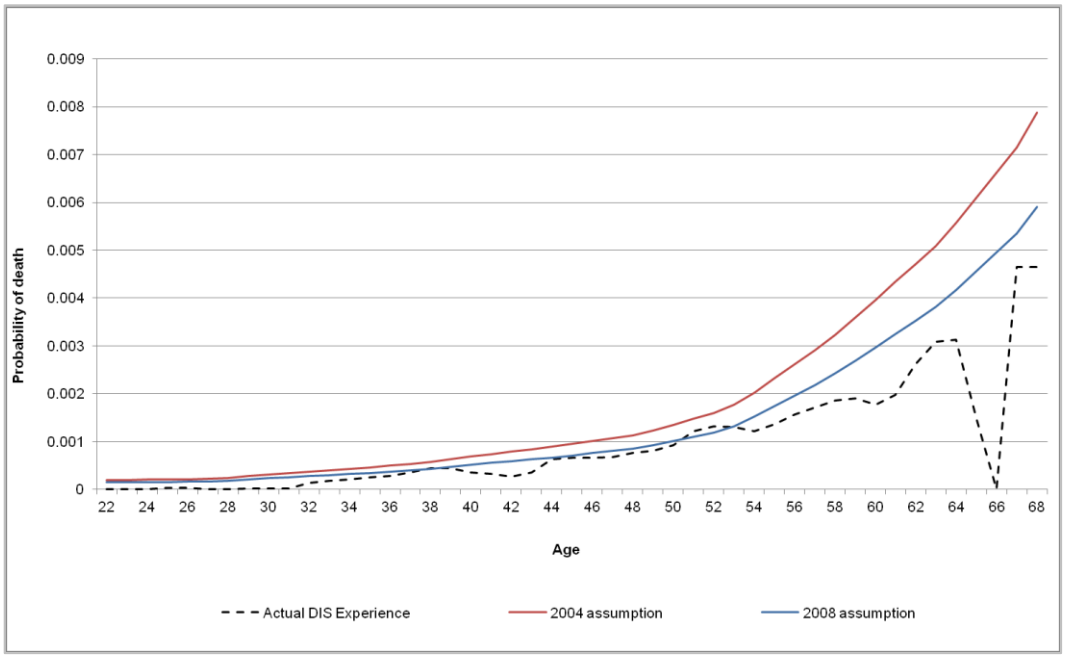
G.2 The table below shows the number of actual and expected deaths split by gender.

Table G1: Death in service experience 2008-12

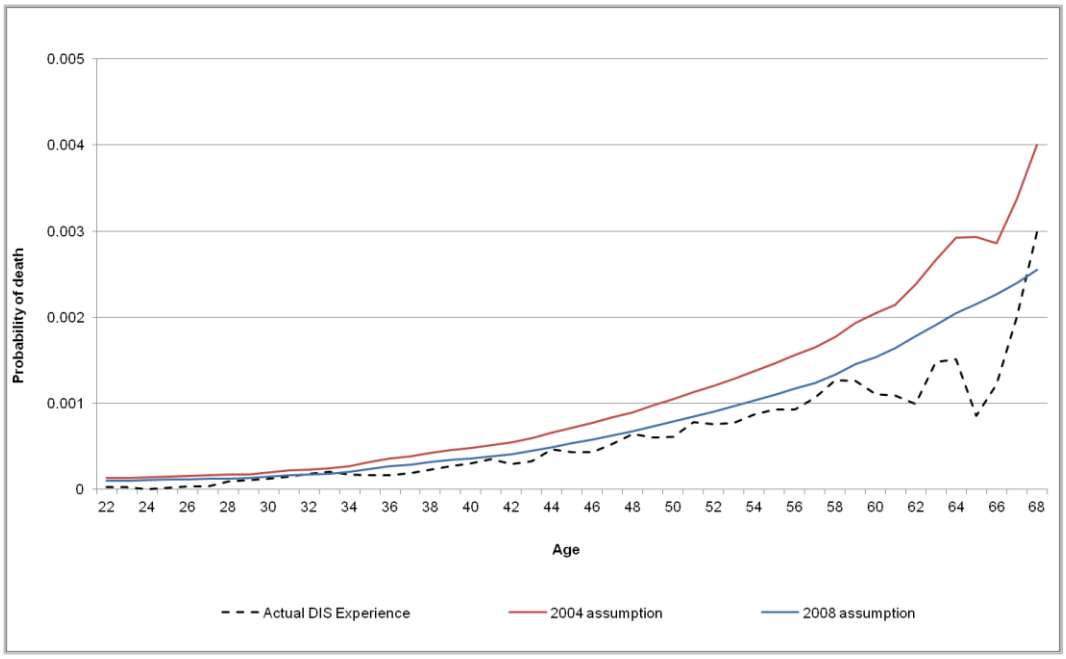
		2004 assumptions		2008 assumptions	
	Actual deaths	Expected deaths	Actual/ Expected	Expected deaths	Actual/ Expected
Males	579	1,006	58%	755	77%
Females	816	1,342	61%	1,006	81%

G.3 The graphs below show the rates of the actual and expected deaths by age for men and women respectively.

Graph G1: Male death in service experience 2008-12



Graph G2: Female death in service experience 2008-12



G.4 The actual distribution of rates of death in service continues to be broadly in line with the rates assumed for the 2008 valuation in terms of the profile of the assumption, although at lower rates than seen previously. In light of this we recommend assuming rates of 77% and 81% of the 2008 rates for men and women respectively for the purposes of the 2012 valuation.

Appendix H: Analysis of promotional pay increases

Approach to the analysis

H.1 The experience over the four-year period to 31 March 2012 was analysed in two different ways:

- Tracking the pensionable pay progression of individual members who were in active service over this period (the 'annual increase analysis'); and
- Looking at the profile of the active membership as at 31 March 2012 in terms of average pensionable pay at each year of age and how this compares with the next year of age (the 'profile analysis').

H.2 These are explained below.

(i) Annual increase analysis

H.3 To ensure that the analysis only includes promotional pay increases, members' pensionable pay has been adjusted to allow for the general pay increases awarded between 31 March 2008 and 31 March 2012. These general pay increases are set out in Table H1 below.

Table H1: General pay awards[43] in 2008-12

Effective date of pay award	Pay award
September 2008	2.45%
September 2009	2.30%
September 2010	2.30%
September 2011	0.00%

H.4 For the purposes of the annual increase analysis, the adjusted total full-time equivalent (FTE) pensionable pay figures at the start of each year are aggregated at each age and compared against the corresponding salaries at the end of the year to derive the observed increases. Only members who were in service at the start and end of the year are included. The observed increases are then compared to the assumed increases adopted for the 2004 valuation.

[43] These are the awards applying in the maintained sector. Different arrangements apply in other sectors.

(ii) Profile analysis

H.5 For the purposes of the profile analysis, we calculate the implied pay increases by comparing the average FTE pensionable pay for each age as at 31 March 2012 to the corresponding average at the next age. These differences are then compared to the assumed increases adopted for the 2004 valuation.

Experience analysis for the uncompleted 2008 valuation

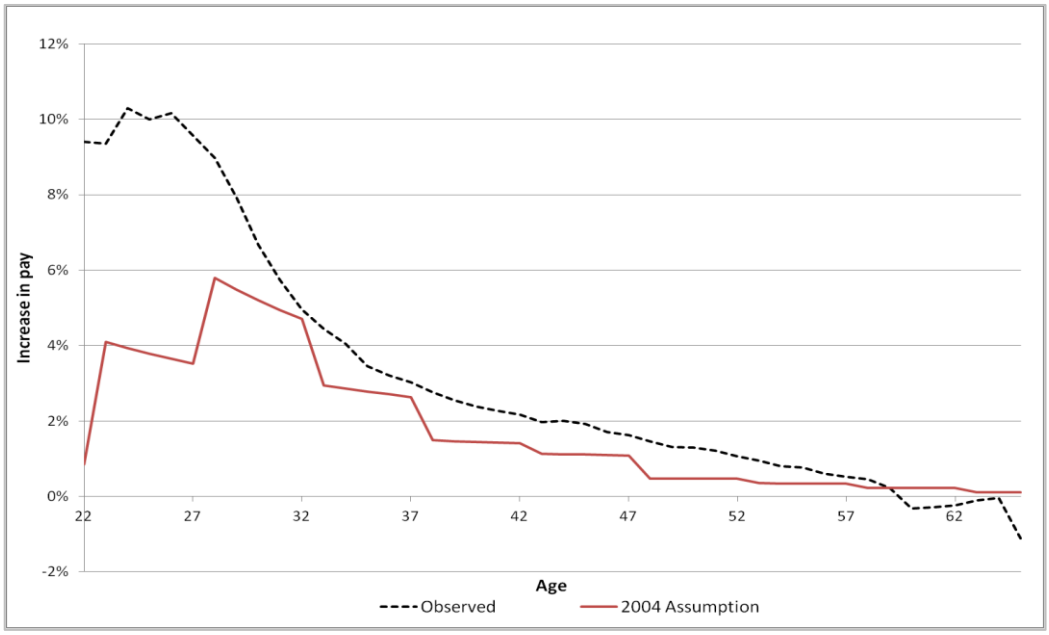
H.6 The data available for the uncompleted 2008 valuation only facilitated a profile analysis. The profile analysis did not provide strong evidence to support a change to the promotional salary scales used for the 2004 valuation.

Results of 2008-12 experience analysis

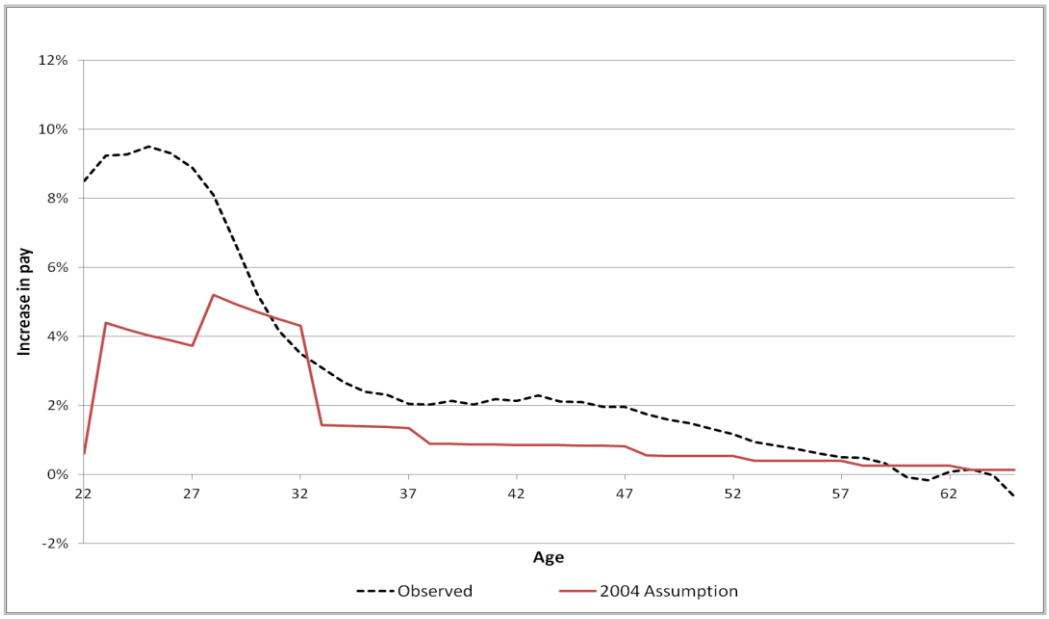
(i) Annual increase analysis

H.7 The graphs below show the observed and expected annual increases in promotional pay for men and women respectively. The observed promotional pay increases are derived using the annual increase analysis set out above.

Graph H1: Male promotional pay increases (annual increase analysis)



Graph H2: Female promotional pay increases (annual increase analysis)



H.8 The result of the analysis indicates that at most ages the observed increases granted over the four-year period were higher than expected. In particular, the observed increases for members below age 30 are significantly larger than allowed for in the 2004 valuation assumption.

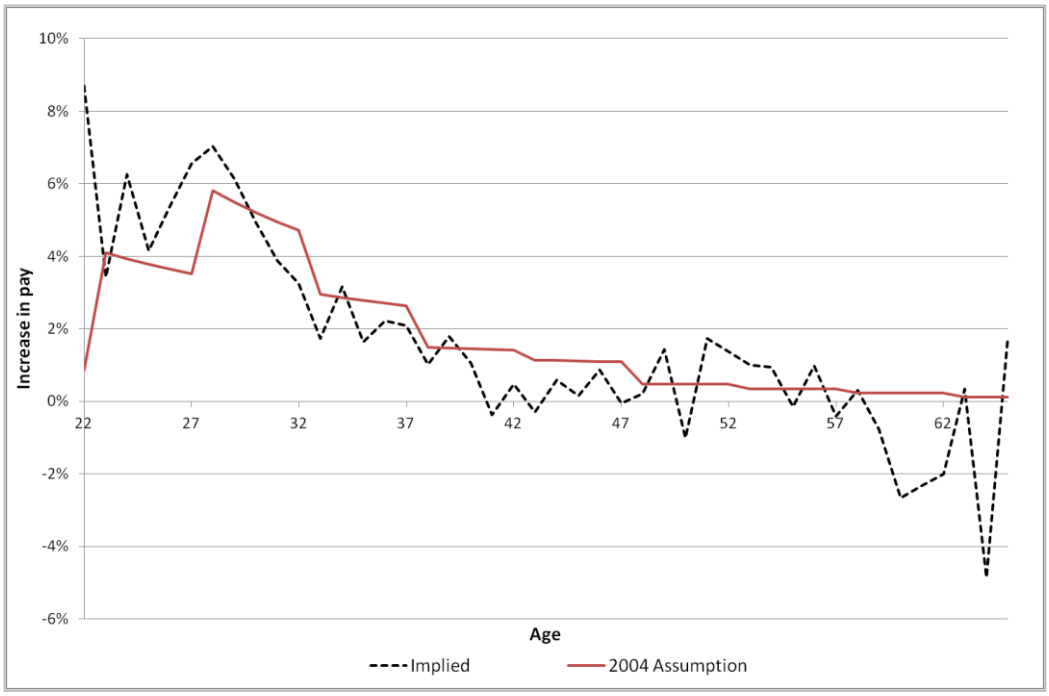
H.9 The results of this analysis should be treated with some caution for a number of reasons:

- It is often the case that average pay increases by more than the headline general pay award (usually referred to as 'pay drift'). We have only allowed for the headline general pay awards and so any drift will be included in this analysis. HMT have included an allowance for drift in their directed general earnings increase assumption. If the promotional salary assumption also includes drift then this will be double counted.
- Much of the increase is driven by members with shorter service where pay scales are relatively steep. Applying the average increase to all members is likely to understate the liability for members with less service and overstate for those with more service. As the overall liability is dominated by those with more service this is likely to be overstated if the average increase is applied to all members.
- The allowance for general pay awards is appropriate for the maintained sector only and so the analysis will be distorted by differences between the maintained and other sectors. Data is not available to carry out this analysis by sector.

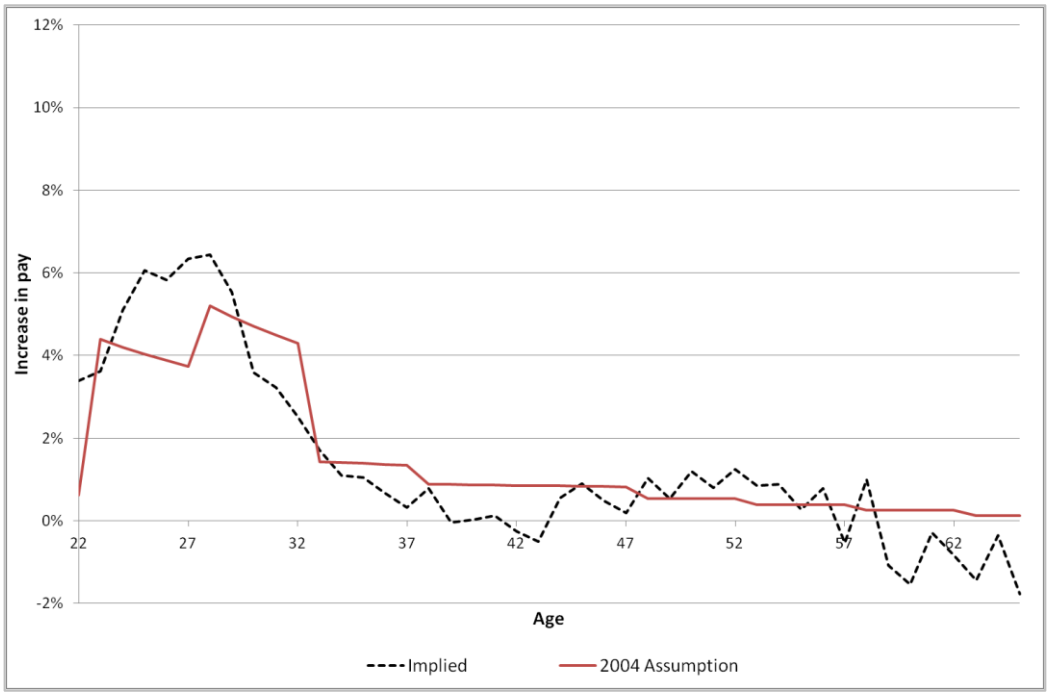
(ii) Profile analysis

H.10 The graphs below show the implied and expected annual increases in promotional pay for men and women respectively. The implied promotional pay increases are derived using the profile analysis set out above.

Graph H3: Male promotional pay increases (profile analysis)



Graph H4: Female promotional pay increases (profile analysis)



H.11 These graphs show that the implied salary increases derived from the membership profile as at 31 March 2012 are broadly consistent with those assumed for the 2004 valuation, particularly after age 30.

H.12 The results of this analysis should be treated with some caution for a number of reasons:

- The analysis is affected by the mixture of members at each age. For example, the group of members at, say, age 30 might better correspond to the members at age 31 with at least a year's service (ie those who were in service at age 30) than the full group at age 31
- There will be effects from members leaving and re-joining. For example, early retirement may lead the average salary of active members aged 55 and above to be lower than the average salary of younger members, as members with higher salaries are thought more likely to take early retirement.

Appendix I: Analysis of commutation

I.1 We have separately analysed the proportion of pension commuted for retirements between 1 January 2007 and 31 December 2012 for the NPA 60 and NPA 65 sections of the Scheme. The proportion commuted for retirements from both the NPA 65 section and the 2015 scheme is directed by HMT. The analysis of commutation experience in the NPA 65 section is therefore not used in setting the valuation assumptions and is shown for information purposes only.

a) NPA 60 section

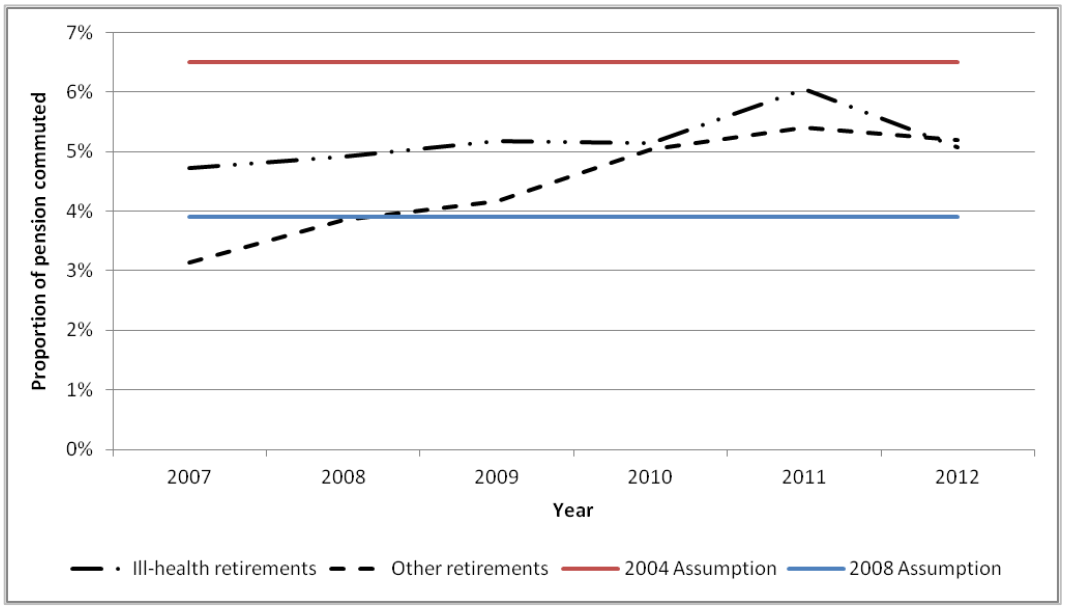
I.2 The following table summarises the proportion of pension commuted by members of the NPA 60 section using the data provided by Teachers' Pensions.

Table I1: Commuted pensions on retirement (NPA 60)

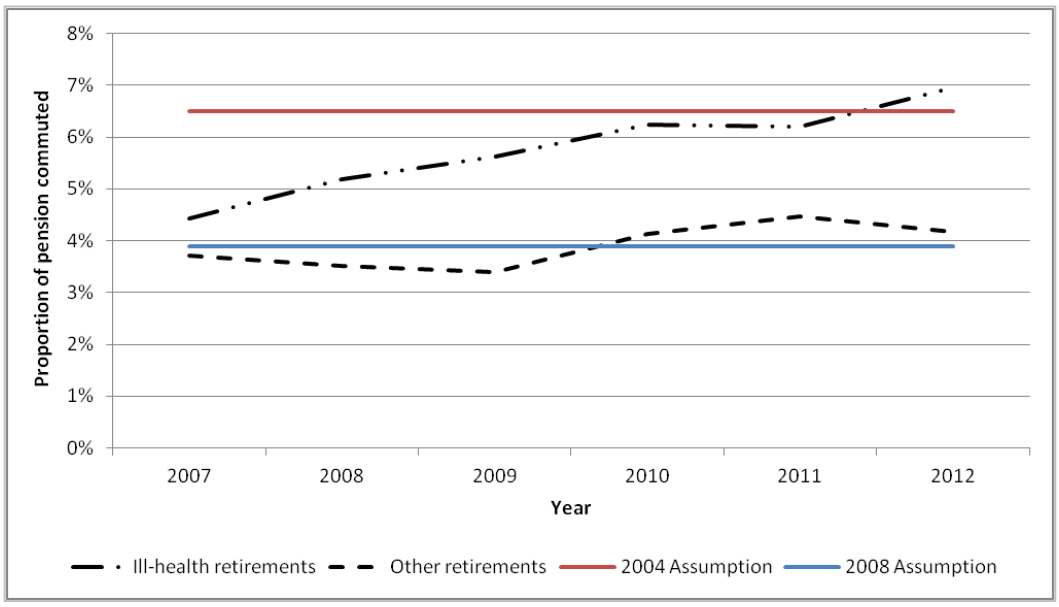
	Number of retirements	Pension at retirement (before commutation)	Pension commuted	Commutation proportion
Males	39,487	£673,752,000	£31,478,000	4.7%
Females	73,169	£899,286,000	£36,180,000	4.0%
Total	112,656	£1,573,038,000	£67,658,000	4.3%

I.3 The graphs below show the proportion of pension commuted by NPA 60 members retiring in each calendar year between 2007 and 2012, split by whether the member retired on grounds of ill health or not.

Graph I1: Male commutation proportions (NPA 60)



Graph I2: Female commutation proportions (NPA 60)



I.4 Table 1 shows that, on average, male NPA 60 section members commuted 4.7% of their pension and female NPA 60 section members commuted 4.0% of their pension over the analysis period. Overall, NPA 60 members commuted 4.3% of their pension.

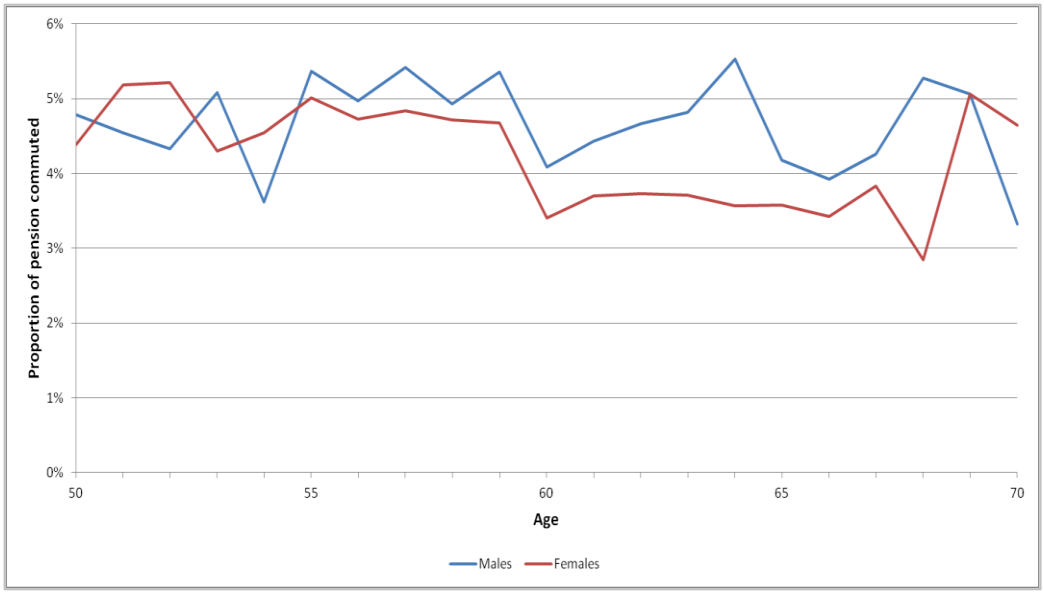
I.5 Graphs I1 and I2 show that:

- The actual proportions of pension commuted seem broadly in line with the assumption proposed for the uncompleted 2008 valuation

- There is a trend that male members have commuted more pension in the later years. The experience appears to have levelled somewhat over 2010 to 2012 though it is difficult to draw firm conclusions
- Members retiring on grounds of ill health typically commute more pension than those who retire on grounds other than ill health

I.6 We have also analysed the commutation proportion at each retirement age for NPA 60 members. Graph I3 shows the results of this analysis:

Graph I3: Commutation proportion at each age (NPA 60)



I.7 Although the commutation experience is not constant for all ages, there is no clear trend between retirement age and the proportion of pension commuted.

Setting assumptions for the NPA 60 section

I.8 The data provided for the 2012 valuation is much more detailed and covers many more retirements than for the 2008 analysis. It is therefore appropriate to base the assumptions on the 2012 analysis.

I.9 We recommend that women are assumed to commute 4% of their pension in line with experience over the period 2007 to 2012. We recommend that men are assumed to commute 5%.This is higher than the overall experience between 2007 and 2012 but there appears to be a trend in the experience for members to commute more in the later years and so we have given more weight to that experience. There is not strong evidence of the trend continuing and the experience has levelled out somewhat over 2010 to 2012.

I.10 More detailed analysis indicates that members who retire on grounds of ill health commute slightly more pension than members who retire on grounds other than ill health. However, as this difference is generally quite small and there are now relatively few ill-health retirements we propose to use a single assumption for all retirees.

I.11 The analysis of proportions commuted by age shows no clear trend so our recommendations above also apply to the NPA 60 service of members with service in both schemes who might be expected to retire slightly later than typical current NPA 60 retirement ages.

b) NPA 65 section

I.12 The NPA 65 section has only been open to membership since 1 January 2007, so there are relatively few retirements recorded in the data, especially in the earlier years, and very few on the grounds of ill health. As a consequence, we have not separately analysed the proportion of pension commuted by members who retire on grounds of ill health or otherwise.

I.13 The following table summarises the proportion of pension commuted by members of the NPA 65 section using the data provided by Teachers' Pensions.

Table I2: Commuted pensions on retirement (NPA 65)

	Number of retirements	Pension at retirement (before commutation)	Pension Commuted	Commutation Proportion
Males	297	£600,000	£82,000	13.7%
Females	244	£562,000	£79,000	14.1%
Total	541	£1,162,000	£161,000	13.9%

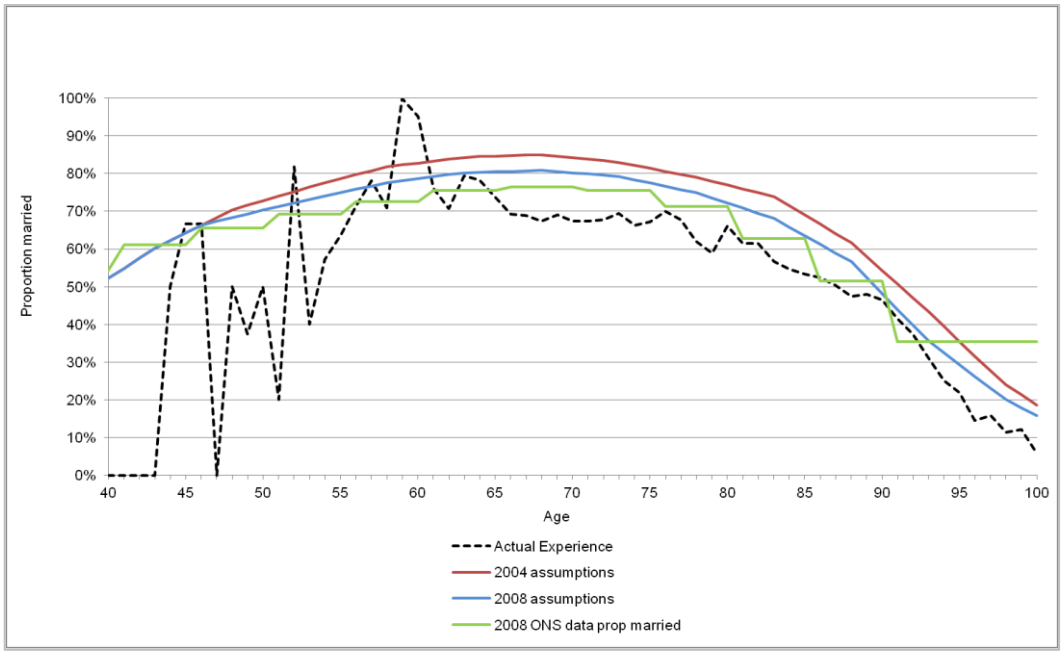
Appendix J: Analysis of family statistics

a) Proportions married/partnered

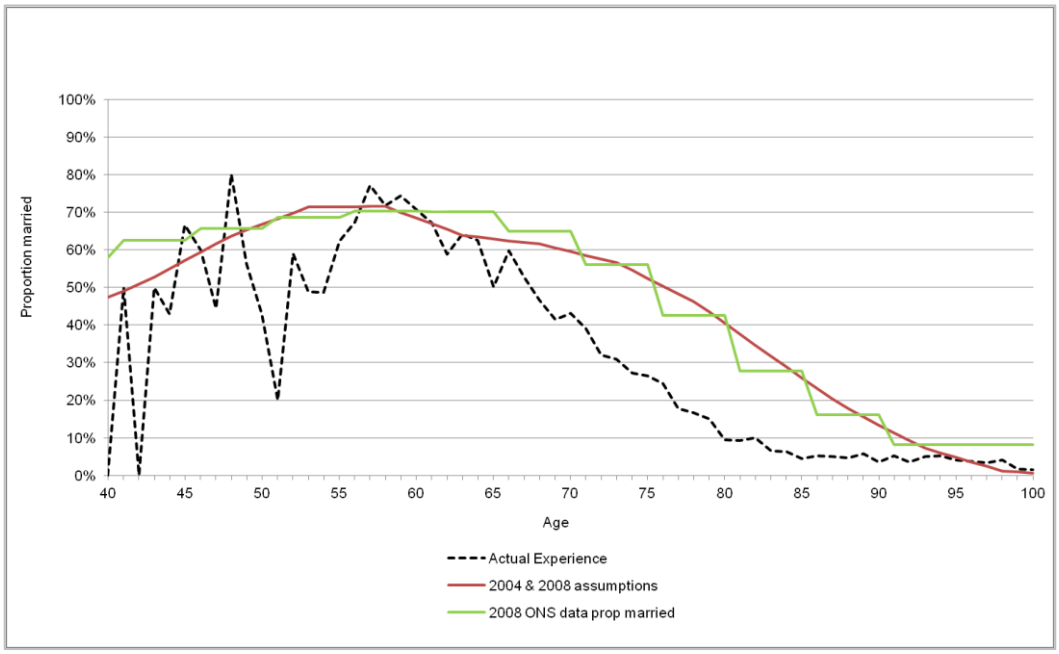
J.1 Our experience analysis looked at the pensioners who died over the four-year period from 1 April 2008 to 31 March 2012. Approximately 40,000 pensioners died during this period. We compared the proportion giving rise to the payment of a surviving spouse's or partner's pension with the 2004 and 2008 valuation proportion married assumptions. Note that this analysis is dominated by members who left active service prior to 1 January 2007 and so for most a survivor's pension would only have been payable to a legal spouse.

J.2 The Office for National Statistics (ONS) publishes England & Wales population data on the proportions of people at various ages that are married, cohabiting or 'other' (ie living alone and not married). We have also compared the proportion of deaths that gave rise to a spouse's or partner's pension with the proportion who are married according to the ONS's 2008 tables. (This assumes the experience data relates entirely to members who left service prior to 1 January 2007. As noted above, the data will include some members who were active at this date, but we do not consider this will significantly affect this analysis.) The graphs below show the results of this analysis. Note that only about 2% of the deaths occur before age 60.

Graph J1: Proportions married for male pensioners



Graph J2: Proportions married for female pensioners



J.3 The proportions giving rise to a dependant's pension drop away rapidly for older female pensioners. This reflects the historical situation whereby unequal eligibility criteria applied to widows and widowers for service prior to 1988 and so the 'actual' experience does not provide reliable information about the proportion of older female pensioners who are married.

J.4 Our analysis shows that the number of survivors' pensions that became payable following pensioners' deaths over the four years to 31 March 2012 (principally to legal spouses or civil partners) was lower than both the number expected according to the proportions married assumed for the 2004 valuation and 2008 valuation, and the number expected according to the ONS 'married' tables.

Setting assumptions

J.5 The graphs above suggest that the shape of the 2008 ONS rates provides at least as good a fit to the actual experience as the 2004 or 2008 assumptions. We have prepared our provisional recommendation for the assumptions based on adjustments to the 2008 ONS rates. One particular advantage of this approach is that it leads to a straightforward way of setting the assumption for the proportion married or partnered.

J.6 Based on the results of our analysis for male pensioners, looking in particular at ages below 85, which is where most of the deaths occur that give rise to dependants' pensions that will be paid for a relatively lengthy period, it would be reasonable to assume proportions married for Scheme members are equivalent to about 95% of those implied by the ONS's 'married' tables. Therefore, we provisionally recommend that for male members the assumed proportions married should be based on 95% of the ONS's 'married' tables.

J.7 Similarly for females, the number of deaths that gave rise to a dependant's pension at ages below 70 equates to roughly 85% of those implied by the ONS's 'married' tables. Above those ages the observed rates are likely to be distorted by the historical (pre-1988) eligibility conditions. With this in mind, we provisionally recommend that for current female members the assumed proportions married should be based on 85% of the ONS's 'married' tables.

J.8 For members who began accruing service on or after 1 January 2007 (as well as current active members) dependants' pensions are subject to wider eligibility conditions. For these members it is more appropriate to base the assumption about surviving partners on the ONS's population data in respect of those who are co-habiting as well as those who are married.

J.9 We provisionally propose that the proportions at various ages leaving an eligible surviving partner on their death will be assumed equivalent to 95% and 85% for males and females, respectively, of the rates implied by the ONS's population data on those who are either married or cohabiting. This implicitly assumes that the lower proportions of TPS pensioners who are married than suggested by the ONS data are not compensated by higher proportions of pensioners who were cohabiting without being married. As the eligibility change has only applied since 2007 there is not yet sufficient credible data upon which to test this assumption, or to base an alternative assumption.

J.10 For simplicity we propose to extend the assumption appropriate to current pensioners at age 60 down to all younger ages. This makes a reasonable allowance for post-retirement marriages but will not have a material effect on the results of the valuation.

J.11 For future pensioners, the proportion married at retirement will be used in our calculations, rather than the proportion married at the valuation date. The table below shows, for ages 60 to 64 and 65 to 69, the proportion of members leaving an eligible surviving partner based on 95% and 85% for males and females, respectively, of the rates implied by the ONS's population data on those who are either married or cohabiting.

Table J1: Proportion married or partnered based on adjustments to the ONS data

Age	Accrual before 1/1/2007	Accrual on or after 1/1/2007
	Proportion married	Proportion married or partnered
Males		
60 – 64	72%	76%
65 – 69	73%	75%
Females		
60 – 64	60%	62%
65 – 69	55%	57%

J.12 For simplicity we propose assuming a single proportion at retirement for future male and female pensioners. Based on the rates above, we recommend assuming 75% of male members and 60% of female members are married or have a partner at retirement.

J.13 Based on the above, the recommended proportion married/partnered assumptions are summarised below:

Table J2: Recommended proportion married or partnered at retirement for future pensioners

	Accrual before 1/1/2007	Accrual on or after 1/1/2007
	Proportion married	Proportion married or partnered
Males	75%	75%
Females	60%	60%

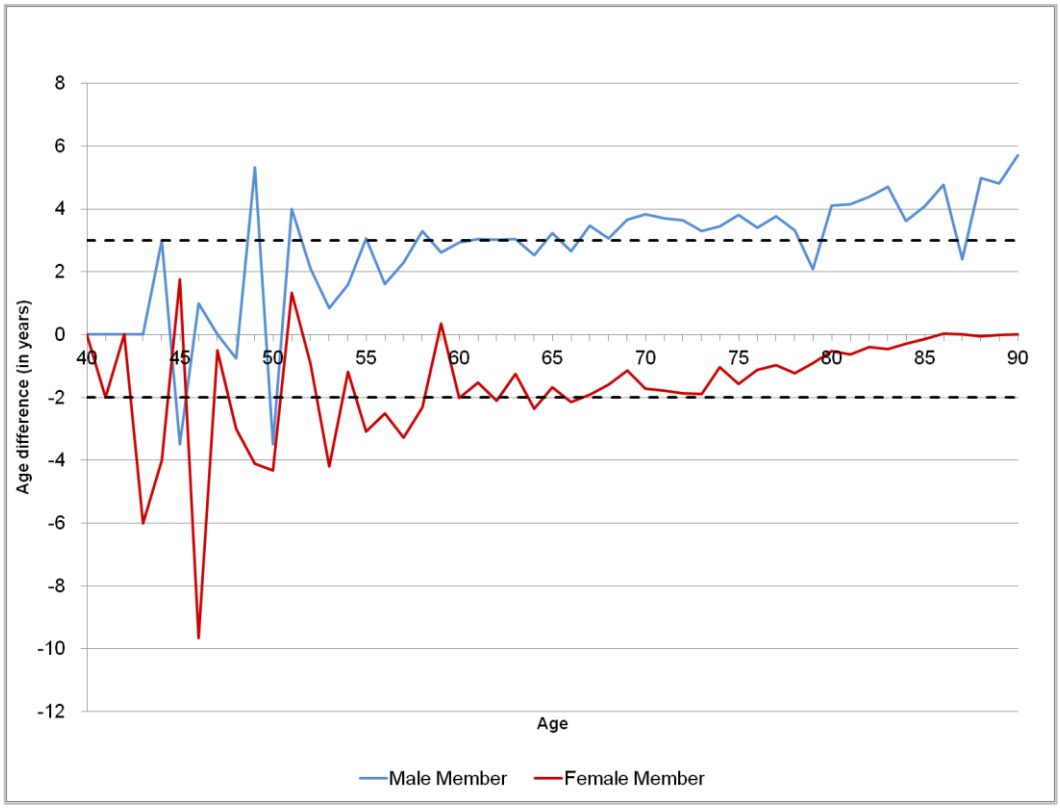
Table J3: Proposed proportion married or partnered for current pensioners (at the valuation date)

Age	Accrual before 1/1/2007		Accrual on or after 1/1/2007	
	Males	Females	Males	Females
50	72%	60%	76%	62%
60	72%	60%	76%	62%
70	72%	48%	74%	49%
80	60%	24%	61%	24%
90	34%	7%	34%	7%

b) Age difference between member and spouse/partner

J.14 We analysed the average age difference between members and their dependants (spouse, civil partner or other partner) at the date of the member's death over the four-year period from 1 April 2008 to 31 March 2012. The graph below shows the results of this analysis.

Graph J3: Age difference between member and spouse



J.15 We propose that the partner is an older male if the member is female and a younger female if the member is male. This is consistent with the proposed assumptions as at the 2004 and 2008 valuations. For simplicity, we propose that the age difference is constant at all ages. The analysis shows that male members are broadly 3 years older than their female partners and that female members are broadly 2 years younger than their male partners.

Setting assumptions

J.16 The analysis suggests that where a member dies at older ages and leaves a surviving partner then that partner is relatively younger than when the member dies earlier. This is not unexpected as older partners are likely to have died before the member. When considering an appropriate assumption we have focussed more on deaths of younger pensioners since these will result in partners' pensions paid for longer periods.

Appendix K: Record of changes since 15 November 2013 draft

K.1 This advice was issued in draft on 15 November 2013. The table below records the changes made since that draft.

Reference	Change
Paragraph 1.1, 2.1	Changed reference from draft to final version of the Directions.
Table 1 & Table A1	Additional footnotes and references to clarify the summary of advice.
Table 1, Section 10, Table B.10, Appendix I	Amended to clarify the directed assumptions for commutation in the NPA 65 section and the 2015 scheme.
Paragraph 2.3	Removed caveat about advice changing if new evidence emerges.
Paragraphs 2.4 and 3.3	Reference to the issued version of the advice.
Table 4.2	Presentational change, no change to the proposed assumption. Life expectancies updated to use the mortality improvements applying for the valuations in question (at the request of HMT) and to use ONS 2012-based projection assumptions for the 2012 valuation which were not available at the time of the November draft. This ensures consistent approach to the presentation of life expectancies with other schemes' reports.
Paragraph 4.10	Adjustment to the explanation provided following changes to presentation of Table 4.2.
Table 5.1, Paragraph 5.15	Presentational change, no change to the proposed assumption. Amended the presentation of the financial impact of members accessing their benefits at age 60 for greater consistency with paragraph 5.5.
Paragraph B.3	Added the upper/lower tier assumption for completeness.
Table B9	Presentational change, no change to the proposed assumption. Rebased salary scales to 100 at age 25 for consistency with presentation of the salary scale assumption in other schemes' reports.
Various	Minor drafting changes to correct spelling, grammatical and other errors or to clarify previous wording.