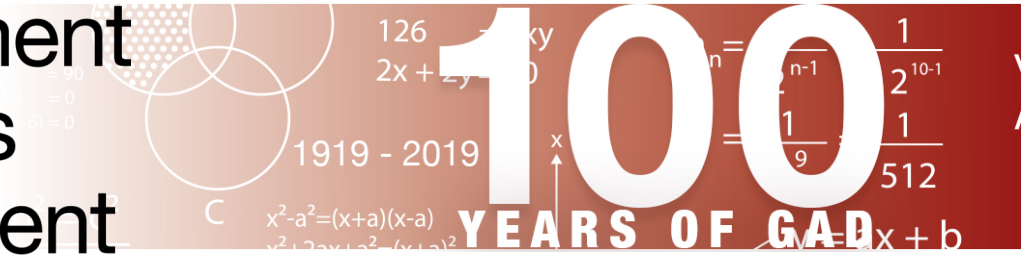
Government Actuary's Department



National Health Service Pension Scheme (NHSPS)

Actuarial valuation as at 31 March 2016
Advice on assumptions

Date: 15 February 2019

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Contents

1	Executive summary	2
2	Introduction	5
3	General considerations	7
4	Pensioner Mortality	9
5	Age retirement from service	17
6	Ill-health retirement from service	28
7	Voluntary withdrawal from service	31
8	Death before retirement	39
9	Promotional pay increases	41
10	Commutation of pension for cash at retirement	47
11	Family statistics	52
Appendix A: Details of assumptions		55
Appendix B: Modelling approach and minor assumptions		61
Appendix C: Assumptions made for data uncertainties		66
Appendix D: Description of valuation groups		69
Appendix E: Sensitivity of valuation results to Secretary of State set assumptions		70

1 Executive summary

This report contains our recommendations for the best estimate assumptions to be set by Secretary of State for Health and Social Care for the 2016 valuation of the NHS Pension Schemes ("the Schemes").

1.1 An actuarial valuation of the NHS Pension Schemes[1] 'the Schemes', is being carried out as at 31 March 2016. The Public Service Pension (Valuation and Employer Cost Cap) Directions 2014 as amended ('the Directions') require that, unless specified otherwise[2], the assumptions to be adopted for this valuation will be set by the Secretary of State for Health and Social Care, having obtained advice from the scheme actuary. Direction 19(c) requires the assumptions to be Secretary of State's best estimates.

1.2 GAD is the appointed scheme actuary to the Schemes. This report sets out GAD's formal advice to the Secretary of State on the actuarial assumptions to be adopted where these are not otherwise specified. The advice covers the assumptions to be set by the Secretary of State. The main advised assumptions are summarised in Table 1 with further detail in Appendix A. This report was provided to the Secretary of State for Health and Social Care in draft form, and was also provided to the Scheme's member and employer representatives, in April 2017. It has been signed alongside the formal valuation report. The only change since the draft report is to conclude a slightly different mortality assumption for male dependants. The Secretary of State has already confirmed to GAD, having consulted with relevant stakeholders, that the actuarial assumptions to be adopted for the valuation should be those set out in this report.

1.3 This report relates to demographic assumptions i.e. assumptions about member behaviours. When considering appropriate assumptions experience, both recent and longer term, generally provides the most reliable evidence when considering best estimates of future experience. Anticipated future events may also influence how assumptions are set. This advice sets out relevant analysis of recent experience and indicates which other factors have been considered in deriving recommendations of best estimate assumptions.

1.4 The previous completed actuarial valuation of the NHS Scheme was carried out as at 31 March 2012. Many of the assumptions put forward in this report are the same as adopted for that valuation. The most significant changes are:

- Rates of pensioner mortality have been updated to reflect recent experience and to reflect changes in population mortality as reflected in the updated ONS population projections[3].
- Age retirement rates for transitionally protected members of the 1995 section have been updated to anticipate earlier retirements.

[1] As provided by The National Health Service Regulations 1995 (SI 1995/300), 2008 (SI 2008/653) and 2015 (SI 2015/94)
[2] Certain assumptions are specified in the Directions.
[3] From the 2012 based projections to the 2016 based projections.

- The amount of pension assumed commuted for additional retirement cash has been changed for 1995 section members from a unisex rate of 8.5% to sex dependent rates of 8% and 11% for men and women respectively.

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

1.6 Where the scheme membership data is not sufficient for the scheme actuary to carry out a robust analysis of that aspect, the Directions require the report to include a statement to that effect. There was insufficient data to undertake an analysis of the age difference between members and their spouse or remarriage rates. The omission is not expected to be material to the valuation results.

1.7 This work has been carried out in accordance with the applicable Technical Actuarial Standards: TAS 100 and TAS 300 issued by the Financial Reporting council (FRC). The FRC sets technical standards for actuarial work in the UK.

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

Assumption	Summary of recommended assumptions	Rationale for recommendation	Magnitude of financial impact of change from 2016 valuation assumptions	
			Past service	SCR (2019-23)
Pensioner baseline mortality[4]	Aligned to standard SAPS table[5,6]	In light of 2012-2016 experience*.	Minimal	Minimal
Normal health	83%(M)/85%(F) x S2NXA			
Ill-health (current)	83%(M)/85%(F) x S2IXA			
Ill-health (future)	100% x S2IXA			
Dependants	100%(M)/100%(F) x S2NXA			
Age retirement				
Members expecting benefits wholly or mainly from the existing scheme (those remaining in the existing scheme after 31 March 2015):				
In 1995 section after 31 March 2015. Rates apply for all service. (NPA 60 or 55).	Age, sex, NPA and occupation dependent rates. On average around 30% retire before NPA, 30% at NPA, with remainder spread over higher ages.	Retirement rates updated to reflect experience 2012 – 2016 which continues to reflect earlier patterns of retirement of protected members.	+0.1%	+0.1%
In 2008 section after 31 March 2015. Rates apply for all service. (NPA 65)	Age, sex, NPA and occupation dependent rates.	No change Not financially significant.		

[4] As directed by HMT, future improvements in mortality assumed to be in line with those underlying the most recent ONS population projections. The financial impact shown relates only to the change in baseline mortality.

[5] SAPS tables are published by the Actuarial Profession and are based on the experience of self-administered pension schemes from 2004 to 2011. The S2 series has separate standard tables based on experience of members retiring in normal health (S2NXA), in ill health (S2IXA) and for widows (S2DFA).

[6] Adjusted to take account of improvements in population mortality between the base year for the tables and the date the future improvements are applied from.

Other transitionally protected members (transferring to the new scheme on 1 April 2015), and new entrants from 2015				
Pre and post 2015 accrual (NPA = SPA in new scheme, existing scheme NPA 55,60,65)	Single set of unisex assumptions for early retirement dependent only on NPA in 2015 scheme. 1	No change In light of 2012-2016 experience	No change in assumption	
Ill-health retirement				
Incidence	Sex dependent. Increasing by age: 0.01% at age 25, around 0.1% at age 45, about 0.7%/0.9% (M/F) at age 65	No change to male rates, Female rates increased to 105% of 2012 rates. In light of 2012-2016 experience*.	Immaterial	Immaterial
Upper/lower tier split	75% on upper tier		No change in assumption	
Withdrawal	No (net) withdrawals assumed for closed groups and practitioners. Single set of net of re-entry within 5 years rates for all other members. Rates are unisex, age and duration dependent (up to 3 years' service).	No change In light of 2012-2016 experience.	No change in assumption	
Death before retirement	Sex dependent rates increasing by age: around 0.025%/0.02% (M/F) at age 25, about 0.095%/0.06% (M/F) at age 45, 0.5%/0.28%(M/F) at age 65	Rates reduced to 95%/90% of 2012 rates for males/females respectively. In light of 2012-2016 experience*, not adjusted for future improvements in mortality	Immaterial	Immaterial
Promotional salary scale	Age, sex and manual/non-manual dependent scales. Steeper at younger ages: for non-manuals about 6%/5% (M/F) a year at age 25, 2%/1% (M/F) at age 45 and nil at age 65. For manuals about 4% a year at age 25, 1% at age 45 and nil at age 65.	No change In light of 2012-2016 experience.	No change in assumption	

Commutation				
1995 section (Automatic lump sum of 3 times pension)	8%/11% for men/women of pension commuted (to provide total cash of 75% of HMRC maximum)	In light of 2012-2016 experience*.	-0.2%	Immaterial
Family statistics				
Proportion married/partnered	Age and sex dependent rates of proportions married or partnered at death. 72%/ 52% (M/F) assumed married at age 60; 76%/54% (M/F) assumed partnered at age 60.	No change In light of 2012-2016 experience.	No change in assumption	
Age difference	Male member 3 years older than partner Female 3 years younger than partner	No change (no evidence)	No change in assumption	
Gender of dependant	Opposite gender to member	No change (no evidence)	No change in assumption	
Remarriage	No allowance	No change (no evidence)	No change in assumption	

* In general 50% of the observed difference in experience since the 2012 assumptions were set has been taken into account when resetting assumptions.

2 Introduction

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

2.1 An actuarial valuation of the NHS Pension Schemes (NHSPS or 'the Schemes') is being undertaken as at 31 March 2016. The Public Service Pensions (Valuations and Employer Cost Cap) Directions 2014 as amended ('the Directions') require that, unless specified otherwise[7], the actuarial assumptions to be adopted for this valuation are the responsibility of the Secretary of State for Health and Social Care, having taken advice from the scheme actuary. Direction 19(c) requires the assumptions to be the Secretary of State's best estimates.

2.2 GAD is the appointed scheme actuary to the Schemes. This report is addressed to the Secretary of State for Health and Social Care and contains our formal advice on the appropriate assumptions to be adopted for the 2016 valuation, as required by the Directions. The purpose of this advice is to enable the Secretary of State to determine the required best estimate assumptions.

2.3 The advice covers the main assumptions to be set by the Secretary of State for Health and Social Care. In particular, we consider the following sets of demographic 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

Appendix B includes other calculation assumptions as required to complete the valuation and Appendix C sets out assumptions made for data uncertainties.

2.4 This report was provided to the Secretary of State for Health and Social Care in draft form in April 2017. The Secretary of State consulted with the NHS Pension Scheme SAB ('SAB') in accordance with direction 19(b) and based on the draft report. The only change since the draft report takes account of the SAB recommendation to conclude a slightly different mortality assumption for male dependants.

2.5 The Secretary of State has already confirmed to GAD, having consulted with relevant stakeholders, that the actuarial assumptions to be adopted for the valuation should be those set out in this report.

[7] Certain assumptions are specified in the Directions.

2.6 NHSBSA, the Scheme's administrator, supplied data on the experience of the scheme membership over the four-year period to 31 March 2016. We have used this data to analyse the Scheme's experience in order to develop our advice on the assumptions. Our report, *NHSPS Actuarial Valuation at 31 March* 2016*: Report on valuation data* also finalised today, provides information about this data and should be read in conjunction with this advice. The report includes details of the checks carried out on the data, the amendments made to the data and our residual concerns about the quality of the data. In preparing our advice, we have relied upon the general completeness and accuracy of the data provided.

2.7 When considering appropriate assumptions experience, both recent and longer term, generally provides the most reliable evidence when considering best estimates of future experience. Anticipated future events may also influence how assumptions are set. This advice sets out relevant analysis of recent experience and indicates which other factors have been considered in deriving recommendations of best estimate assumptions. The Secretary of State should consider whether there is any reason why this approach would be inappropriate.

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

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

2.9 Third parties whose interests may differ from those of the Secretary of State for Health and Social Care should be encouraged to seek their own actuarial advice where appropriate. Other than to the Secretary of State for Health and Social Care 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.

Directions

3.2 The advice in this report reflects the requirements of the Directions issued by HM Treasury 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:

- assumptions set for previous valuations
- analysis of demographic experience in the period up to the valuation date
- historic long term trends and emerging evidence which may illustrate long-term trends in the future
- relevant data from any other sources.

Different populations

3.3 Regulation 7 of the Scheme Regulations[8] requires this actuarial valuation to cover both the scheme established under the Public Service Pensions Act 2013[9] ("2015 Scheme") and the previous pension scheme for Health workers ("pre-2015 scheme"). Assumptions appropriate to both the 2015 scheme and the pre-2015 scheme are required for the valuation. The Directions also require assessment of benefit accrual costs over the ***implementation period***[10]. This requires assumptions about anticipated member behaviour and characteristics during 2019 - 2023 as well as assumptions about member behaviour and characteristics in the longer term.

3.4 There are currently 3 distinct groups of members.

- Those with full protection and remaining in the pre-2015 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' retirement behaviours are expected to be heavily influenced by the provisions of the 2015 scheme
- Members with service in both the 2015 scheme and pre-2015 scheme (including members with tapered protection). Over time, as the proportion of 2015 scheme service increases, the retirement behaviours are expected to become increasingly influenced by the provisions of that scheme.

[8] SI 2015/94 The National Health Service Pension Scheme Regulations 2015
[9] Public Service Pensions Act 2013.
[10] 1 April 2019 to 31 March 2023.

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

Relative importance of assumptions

3.6 The Directions require the valuation results to be estimated 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. Appendix E provides an indication of the sensitivity of the valuation results to the particular assumptions under consideration.

4 Pensioner Mortality

This chapter sets out our recommendation for the baseline pensioner mortality assumptions and summarises the analysis undertaken in order to inform that recommendation.

4.1 The assumptions we recommend for baseline pensioner mortality for the 2016 valuation may be summarised by reference to standard mortality tables as follows. The corresponding assumptions for the 2012 valuation are also shown.

Table 4.1: Recommended mortality assumptions

	2016 valuation		2012 valuation	
Baseline mortality	**Standard table[11]**	**Adjustment**	**Standard table**	**Adjustment**
Males				
Retirements in normal health	S2NMA	83%	S1NMA	80%
Current ill-health pensioners	S2IMA	83%	S1IMA	80%
Future ill-health pensioners	S2IMA	100%	S1IMA	100%
Dependants	S2NMA	100%[12]	S1NMA	80%
Females				
Retirements in normal health	S2NFA	85%	S1NFA	85%
Current ill-health pensioners	S2IFA	85%	S1IFA	85%
Future ill-health pensioners	S2IFA	100%	S1IFA	100%
Dependants	S2NFA	100%	S1NFA	85%

4.2 As specified by HM Treasury, future improvements in mortality will be assumed to be in line with those underlying the most recent ONS principal population projections for the UK, ONS 2016.

[11] SAPS (S2) tables are published by the Actuarial Profession and based on the experience of self-administered pension schemes over the period 2004 to 2011. The 'S2' series includes separate standard tables based on experience of members retiring in normal health (S2NXA) and in ill health (S2IXA) and for female dependants (S2DFA). The S3 series of tables were released by CMI on 5 December 2018, these updated mortality tables cover experience between 2009 and 2016. The final tables are unchanged from the working paper issued during 2018, from which GAD concluded that moving to the S3 tables would likely have no material impact on the valuation results as a whole. It therefore remains appropriate to use the S2 tables for the current valuation.

[12] The final recommendation reflects comments made by NHSSAB.

Comparison of expected pensioner longevity

4.3 The table below gives a comparison of the resulting life expectancies[13] (allowing for future improvements) assumed and recommended for the 2012 and 2016 valuations. The final column shows life expectancies on the proposed 2016 base tables but with future improvements based on the ONS 2012 projections. This column is provided to illustrate the impact of the change in allowance for future improvements on expected life expectancy. The Directions specify that the future improvement basis for the 2016 valuation should be the ONS 2016 projections.

Table 4.2: Comparison of life expectancies (years) at the valuation date

Baseline:	**2012 valuation**	**2016 valuation**	**2016 baseline**
Future mortality improvements:	**ONS 2012**	**ONS 2016**	**ONS 2012**
Current pensioners			
Male aged 60	30.1	29.2	30.6
Male aged 65	25.1	24.2	25.7
Female aged 60	32.1	30.8	32.6
Female aged 65	27.1	25.8	27.6
Future pensioners – current age 45			
Male life expectancy from age 60	31.9	30.8	32.4
Male life expectancy from age 65	27.4	25.7	27.8
Female life expectancy from age 60	33.9	32.1	34.3
Female life expectancy from age 65	29.3	27.1	29.7

Use of the assumption

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

[13] Cohort life expectancies based on the ages shown as at the valuation date, i.e. allowing for future mortality improvement .

Analysis and setting the assumption

4.5 We have analysed the actual pensioner mortality experience over the four-year period to 31 March 2016 on an 'amounts' basis. An amounts basis weights the experience by the size of each member's pension. To derive an assumption we have compared the actual amounts of pension ceasing on deaths with those expected had the members' experience been in line with the mortality rates in the relevant current SAPS tables ("S2 Tables"). The recommended assumption of baseline pensioner mortality is expressed by reference to suitable adjustments to the rates in the relevant S2 table ("the base table"). The analysis is carried out using ONS 2014 projections, being the set of projections available at the time that the analysis was carried out. Previous analysis carried out by GAD suggested that the impact of using ONS 2014 or 2016 projections for mortality analysis would be minimal

4.6 The four year period ending on the valuation date showed significant volatility in mortality experience year on year. This is illustrated in Table 4.3 (for normal health only) below. The figures shown are the ratios of actual to expected death rates with expected rates based on the 2012 valuation assumptions, adjusted as appropriate for each period analysed. This analysis suggests that differing conclusions may have been drawn had the valuation date and inter-valuation period fallen differently. The volatility is believed to be largely a reflection of environmental factors. As assumptions are intended to reflect long term expectations it is reasonable to seek to smooth out the impact of these short term effects. Our recommendation is that the short term effects should be smoothed out by taking only 50% of the difference in experience since the 2012 valuation.

Table 4.3: variation in rates of death by scheme year

Year	Normal health males (A vs E based on 2012 assumption*)	Normal health females (A vs E based on 2012 assumption*)
2012-13	99.0%	101.1%
2013-14	96.1%	91.2%
2014-15	101.8%	98.8%
2015-16	93.3%	91.5%
Overall	97.5%	95.4%

*2012 baseline with ONS-2014 improvements.

Results of analysis

4.7 Table 4.4 sets out the number of pensioner deaths and amount of pension ceasing due to deaths over the inter-valuation period. Figures are shown separately for males and females retiring in normal or ill-health and for dependants. In each case these are compared with the expected figures from the 2012 valuation assumption (with ONS-2014 improvements) and from the unadjusted 2016 base table.

Table 4.4: Pensioner mortality experience 2012-16

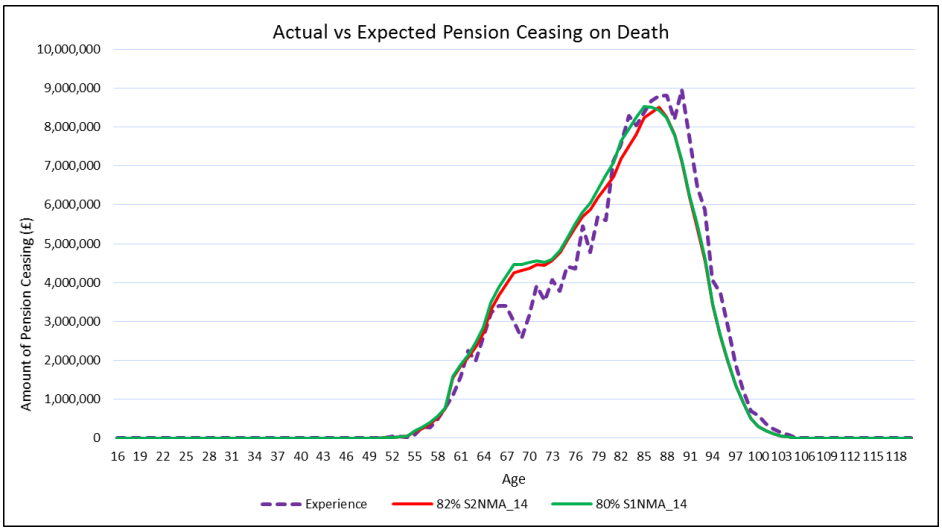
Category	Number of Pensions ceasing due to death	Pension amount ceasing due to deaths £'000s (pa)	A/E* relative to the 2012 valuation assumption†	A/E* relative to the S2 Base Tables†
Normal Health:				
Males	15,300	194,732	97.5%	82.1%
Females	31,181	133,864	95.4%	82.7%
Ill Health:				
Males	4,549	35,726	106.7%	85.5%
Females	8,109	39,050	113.5%	95.4%
Dependants:				
Males	3,634	4,223	169.9%	144.2%
Females	11,828	63,661	119.1%	100.8%

*A/E is actual over expected.
† With ONS-2014 improvements in each case.

Results of Analysis: Normal Health Pensioner Mortality

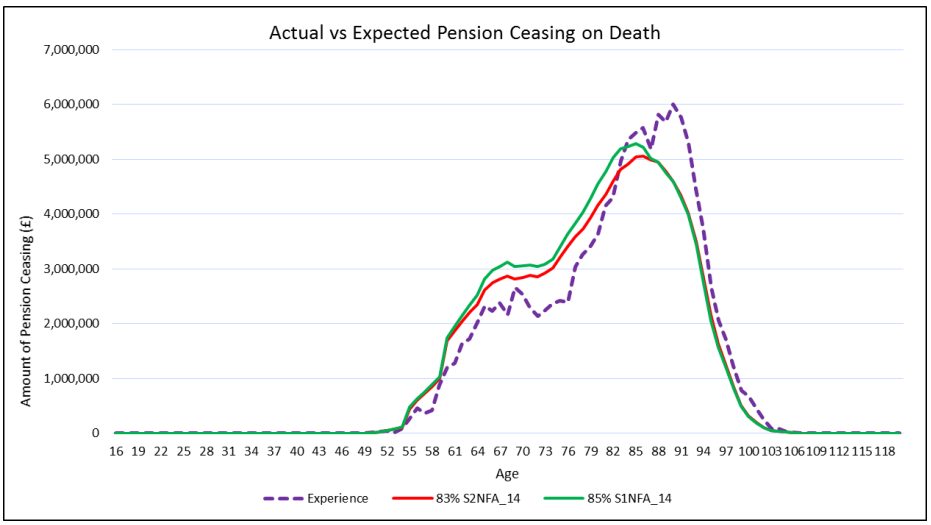
4.8 The charts below show by age, and for males and females separately, a comparison of the actual mortality experience (amount of pension ceasing) over the four year period with that expected based on the 2012 valuation assumption and the 'best fit' of experience to the most appropriate S2 base table[14]. The recommended assumption in each case is midway between the red and green lines.

Graph 4.1: Male normal health pensioner mortality experience 2012-16



[14] In each case with ONS-2014 improvements.

Graph 4.2: Female normal health pensioner mortality experience 2012-16



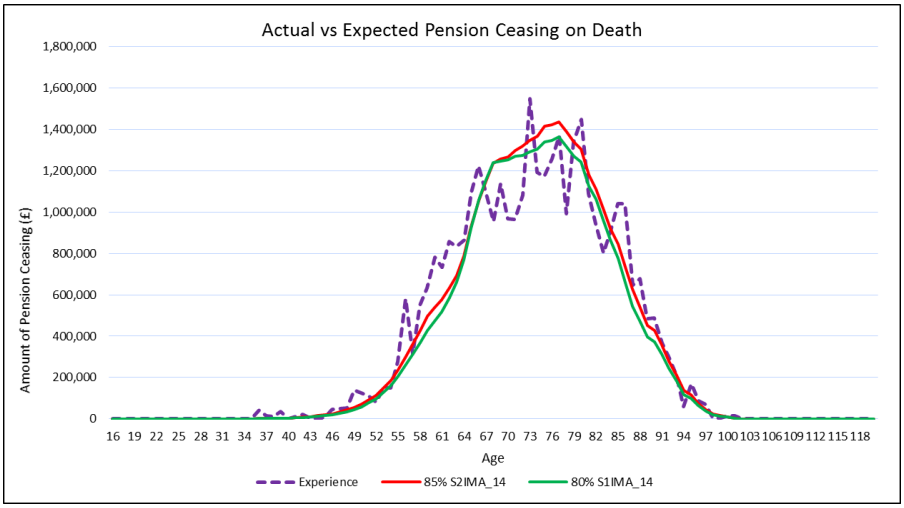
Comments on analysis

4.9 The 'shape' of the base table is slightly different to that of the scheme's experience (particularly for females) with overall the scheme's membership experiencing lighter mortality (fewer deaths) at younger ages and heavier mortality (more deaths) at older ages relative to the population underlying the base table. A better fit could be derived by applying differential adjustments to the rates for different ages. We have tested the materiality of the shape differential and have concluded the simpler approach of applying a single adjustment to all rates has materially the same financial effect as adopting a more complex approach. As this pattern has also been observed in other public service pension schemes the Actuarial Profession are currently exploring whether variant base tables may be produced to inform future valuation assumption setting for the public service schemes.

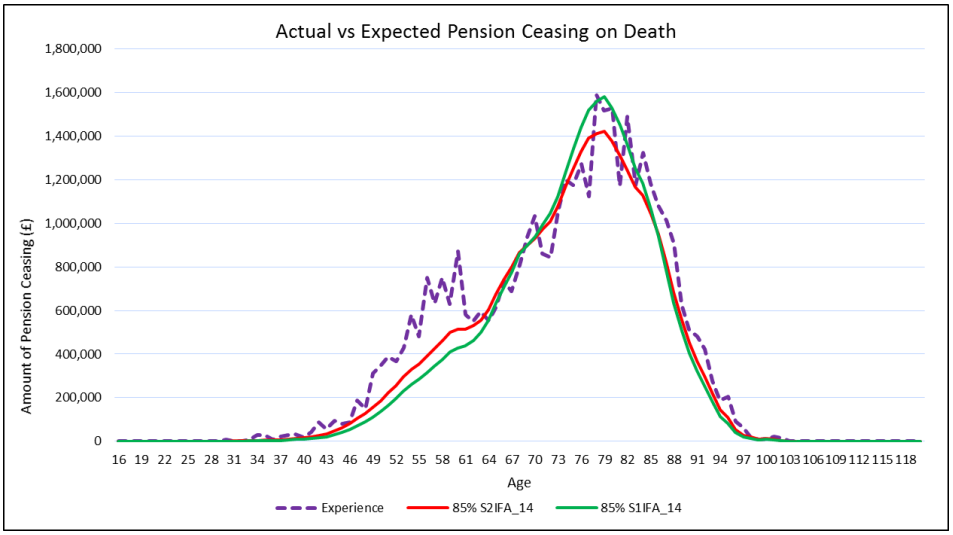
Results of Analysis: Ill-Health Pensioner Mortality

4.10 Charts 4.1 and 4.2 are repeated below for ill-health retirees. As for normal health retirements the recommended rates are mid-way between the red and green lines.

Graph 4.3: Male ill-health pensioner mortality experience 2012-16



Graph 4.4: Female ill-health pensioner mortality experience 2012-16



Comments on ill-health analysis

4.11 For ill-health retirements, at earlier ages there is clear evidence of heavier mortality - presumably as a result of the stringent criteria now applied for medical retirements. The recommended assumption has been derived in the same way as for normal health retirements by taking 50% of the change in experience since the previous valuation.

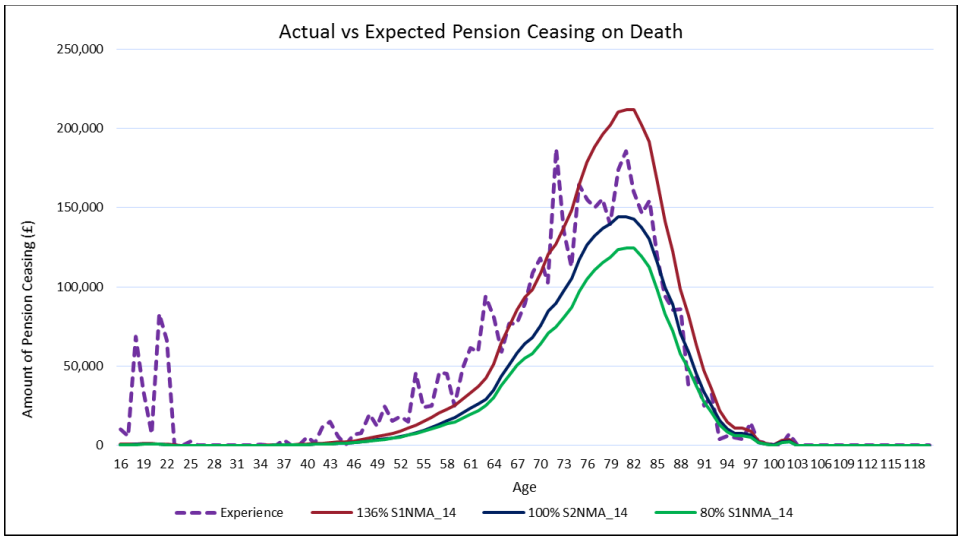
4.12 For future ill-health retirements we recommend a different assumption compared to that for current ill-health pensioners to reflect an expectation that the mortality experience of future ill-health pensioners will be different from that of existing ill-health pensioners due to the significant reduction in ill-health awards in recent years and in light of the introduction of the two-tier ill-health arrangements in 2008. We do not hold sufficient data on those retiring under the current ill-health arrangements to carry out a credible mortality analysis; therefore a pragmatic approach is needed to setting the assumption for the mortality of future ill-health pensioners.

4.13 The approach we recommend is to assume mortality is in line with the S2IA tables (which are based on the ill-health experience of certain private sector pension schemes). This may be justified on the grounds that the ill-health criteria in public and private sector pension schemes are now likely to be broadly similar, with ill-health mortality being driven primarily by the illness rather than the type of work undertaken. The relatively low level of ill-health retirement means that the choice of assumption is not particularly material.

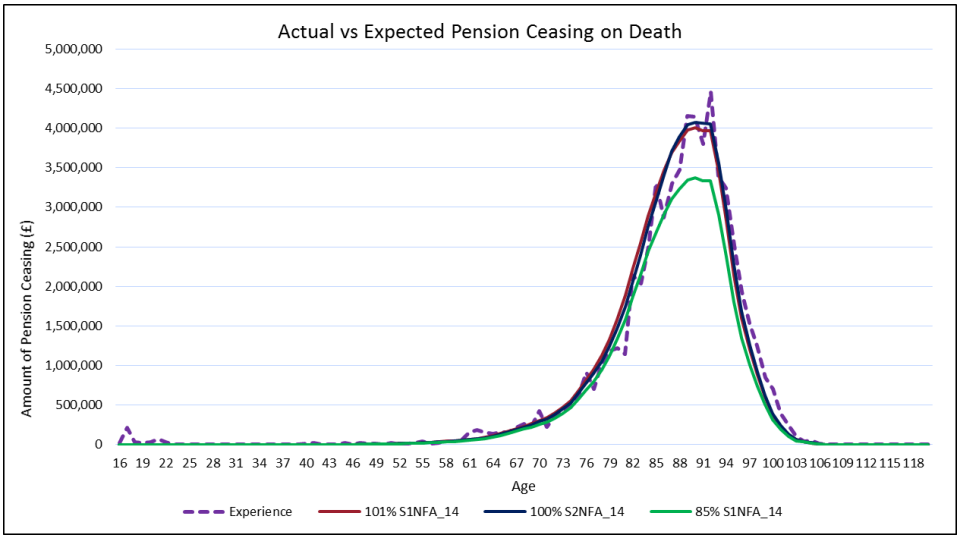
Results of Analysis: Dependant Pensioner Mortality

4.14 Charts 4.5 and 4.6 are repeated below for dependants. In these charts an additional blue line is shown which represents the recommended assumption for the 2016 valuation.

Graph 4.5: Male Dependants mortality experience 2012-16



Graph 4.6: Female Dependants mortality experience 2012-16



Comments on Dependants analysis

4.15 In the case of female dependants the experience suggests slightly heavier mortality of the dependant population compared to that of female members (when compared to the standard tables). At the 2012 valuation the analysis undertaken showed very similar rates of mortality for female members and dependants. However since that analysis was undertaken it has emerged that some of the underlying data was flawed and correcting for the known deficiency would have resulted in a heavier mortality assumption being recommended for that valuation for dependants (compared to members). Given this for the current valuation we recommend that the mortality assumption is based directly on the experience over 2012 to 2016. This is represented by the blue line in Chart 4.6 above.

4.16 In the case of male dependants the analysis is not particularly robust given the limited number of deaths involved as a result of the limited provisions for widower's pensions before 1988 and given that women typically outlive men. As the analysis undertaken is not considered to be sufficiently reliable to form the basis of an assumption, and given that the assumption has relatively little financial impact, we recommend that the standard S2 tables are used for consistency with the assumption recommended for female dependants. The proposed assumption is shown in blue in Chart 4.5 above[15].

[15] The final recommendation reflects comments made by NHSSAB.

5 Age retirement from service

This chapter sets out our recommendation for the assumed patterns of retirement on grounds other than ill-health, and summarises the analysis undertaken in order to inform that recommendation.

Proposed assumptions for 2016 valuation

5.1 We recommend that rates of age retirement are set separately for members who continued in the pre-2015 scheme after April 2015 and for those members who transferred to the new scheme on 1 April 2015, or join as new entrants thereafter. Sample age retirement rates are provided in Appendix A. This approach to setting assumptions was adopted for the previous valuation and in recognition that retirement behaviours are expected to be driven by the provisions of the scheme in which a member has accrued most benefits. When determining in which scheme a member will have accrued most benefits we are effectively saying it is the pre-2015 scheme for those within 13.5 years of normal pension age (NPA) at 1 April 2012 and the post-2015 scheme for all other members[16]. It is recognised this is not a realistic scenario and that a more gradual change in retirement patterns is expected to emerge over time. At the current time retirements are almost entirely from the pre-2015 scheme (with most retirements from the 1995 section). There is not yet any evidence on which to reconsider the approach.

Members who remained in the existing scheme after April 2015 (including those in tapering)

5.2 We recommend that members are assumed to retire in line with recent retirement patterns, which cover both early and late retirement. We recommend different assumptions based on pre-2015 scheme NPA and further split by gender and occupation type (manual officers, non-manual officers and practitioners). For the 1995 section on average, the assumptions assume around 30% of members will retire before normal pension age (NPA), about 30% at NPA, with the remainder retiring after NPA. The average assumed retirement age for NPA 55 members is about 58, for NPA 60 members 62. For the 2008 section the assumptions assume around 20% of members will retire before normal pension age (NPA) and the remainder at NPA. The average assumed retirement age for NPA 65 members is around 64.

New entrants to the 2015 scheme and members who transferred to that scheme on 1 April 2015

5.3 We recommend a common assumption for all members allowing for retirements before or at each member's NPA in the 2015 scheme. The same pattern of retirements is assumed for benefits accrued in both the pre-2015 scheme and the 2015 scheme. On average members are assumed to retire 1.7 years before their NPA in the 2015 scheme. The recommended assumption is unchanged from that adopted for the 2012 valuation.

[16] See also Sections 3.3 – 3.5.

Previous valuation assumptions

5.4 The proposed assumptions are similar in nature and effect to those which were adopted for the 2012 valuation. Some changes to the 2012 assumptions have been recommended for 1995 section members in recognition of a continued trend towards earlier retirement from that section. In effect the changes proposed bring forward the assumed average retirement age for most members of the 1995 section by around 3 months compared to the 2012 valuation assumptions.

Use of the assumption

5.5 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 normal pension age.

5.6 In both schemes an actuarial reduction is applied to a 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. Early retirement has not historically been common in the NHSPS although there have been considerably more such retirements in the recent past.

5.7 An actuarial uplift is applied for retirement after NPA in the 2008 section and in the 2015 scheme. However, in the 1995 section the pension payable on retirement after NPA is not subject to actuarial adjustment. This means pensions paid from the 1995 section on retirement after NPA are less costly to the scheme (i.e. the value of the benefit payable to a member is lower) than a pension paid at or before NPA. The rates of retirement of members of the 1995 section at or after NPA are therefore the most financially significant components of the assumption.

Analysis and setting the assumption

5.8 For the 2012 valuation we concluded a reasonable process for setting age retirement rates was to base:

- assumptions for the group expecting to receive benefits wholly or mainly from the existing scheme (i.e. those with full protection or continuing in the existing scheme after 31 March 2015 under the taper arrangements) by reference to the recent retirement experience in the Scheme
- assumptions for new entrants to the 2015 scheme and those expecting to receive benefits mainly from the 2015 scheme (ie those transferring to the new scheme on 1 April 2015) by considering any relevant evidence. Since the majority of the available NHSPS experience continues to relate to NPA 60 or 55 rather than State Pension Age which determines NPA in the 2015 scheme the actual scheme experience is not directly relevant for this purpose. As for the 2012 valuation we recommend the rates are set by reference to recent patterns of retirement before current scheme NPA, translated to the members' NPAs in the 2015 scheme.

5.9 For the purposes of considering the assumptions appropriate for the first group of members above (ie those continuing in the existing scheme after 31 March 2015) we have compared the actual rates of age retirements over the four-year period to the valuation date to the expected rates based on the corresponding 2012 valuation assumptions. All (non-ill health) retirements have been considered and have been grouped by pre-2015 section membership, NPA, gender and occupational type. The vast majority of retirees retiring from active membership over the intervaluation period have retired from the pre-2015 scheme under the terms of transitional protection.

5.10 There is insufficient data to undertake any analysis of retirements from the 2015 scheme. For the purposes of reconsidering the assumption for the 2015 scheme we have aggregated all recent early retirement experience by reference to the period pre-NPA. This has been compared with the assumed rates of early retirement assumed for those expected to receive benefits predominantly from the 2015 scheme at the 2012 valuation.

Results of analysis: *Members who remained in the existing scheme after April 2015 (including those in tapering)*

Number of age retirements analysed and implied average ages at retirement

5.11 The actual and expected number of age retirements analysed, and implied average ages of retirement, are summarised below in Table 5.1. This shows information split by NPA.

Table 5.1: Age retirement experience by NPA

Pre-2015 section/NPA	Gender	Actual number of retirements	Expected number of retirements	Actual Average age at retirement†	Expected Average age at retirement
1995 - NPA 55	M	4,014	3,537	57.0	57.2
	F	30,473	27,474	57.8	58.1
	Total	**34,487**	**31,011**	**57.7**	**58.0**
1995 - NPA 60	M	20,339	19,870	60.7	61.5
	F	63,393	64,545	60.6	61.2
	Total	**83,732**	**84,415**	**60.6**	**61.3**
2008 - NPA 65	M	3,406	6,781	65.1	64.9
	F	5,426	10,322	64.2	63.8
	Total	**8,832**	**17,104**	**64.5**	**64.2**

† For the purposes of this comparison averages are based on actual age at retirement for all members.

5.12 Table 5.1 shows there have been more retirements from the 1995 section of members with the right to retire at 55 and number of retirements is broadly in line with expected for other 1995 section members. The average age of retirement has been a little earlier on average than expected, driven by higher numbers of members retiring before NPA than historically.

5.13 For 2008 section members the numbers retiring continue to be lower than expected. This comparison was also seen based on experience over the four-year period to 2012 and is thought to be a short term effect given the 2008 section only started in 2008. This means many members in service around retirement age will be unable to complete the 2 years' minimum service criteria and will receive refunds of contributions rather than pension benefits. The average age at retirement is broadly in line with the assumption and retirements from this section are not considered further in this report given the relatively minor financial significance.

5.14 Table 5.2 expands the information in Table 5.1 for 1995 section members only showing the split by occupation type. Note in Table 5.2 the average ages shown are different to those in Table 5.1. The presentation below is relevant when considering the financial impact of the experience and assumptions. Those categories showing significant differences between assumptions and experience are in highlighted in bold.

Table 5.2: Age retirement experience for 1995 section members

Average age at retirement†					
Males	**Non-manual**	**MHO***	**Manual**	**Practitioner**	**Special class nurses***
• 2012 valuation assumption	**62.5**	57.1	**63.5**	61.3	**58.7**
• Experience 2012-16	**62.0**	57.1	**62.7**	61.1	**58.2**
Females					
• 2012 valuation assumption	62.1	57.7	62.4	61.0	**58.5**
• Experience 2012-16	61.8	57.4	62.3	61.0	**58.1**

*NPA 55 (subject to meeting certain service criteria)
†For the purposes of this comparison averages are calculated by assuming all pre NPA retirements occur at NPA

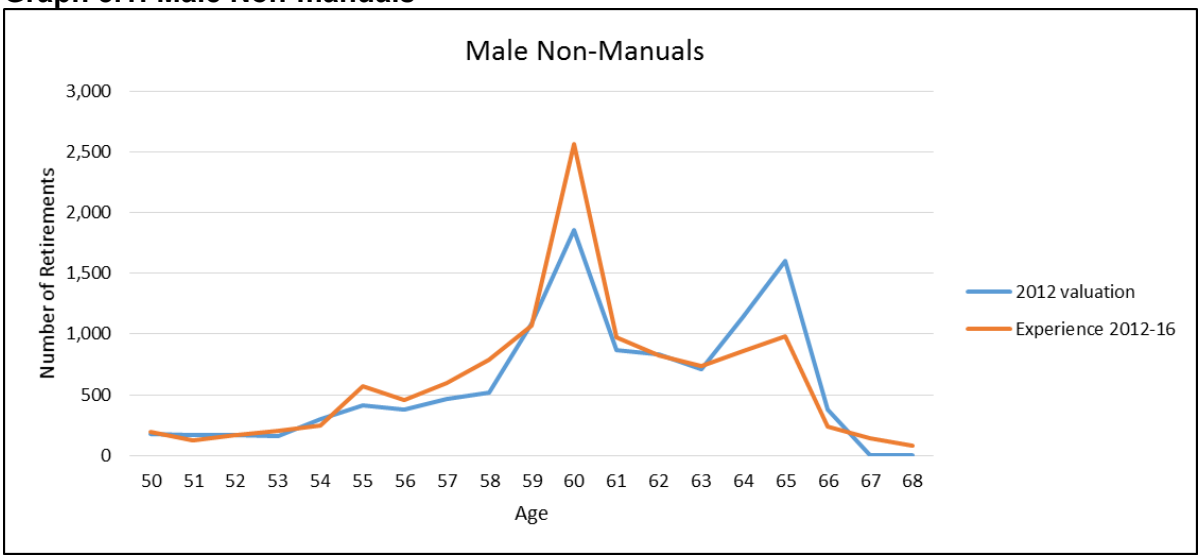
Comments on results of age at retirement analysis

5.15 Table 5.2 shows that over the four-year period ending 2016 retirements from the 1995 section have generally been earlier than expected. A similar trend was observed at the 2012 valuation and believed to be a result of the changes made to the service together with the introduction of tiered member contributions and tax changes. Further tax changes since 2012 appear to have had a further impact over the more recent period. Since these influences may be expected to continue to influence behaviours for the population under consideration ie those expected to retire over the next couple of valuation cycles we recommend that for the 2016 valuation these 1995 section members are assumed to retire in line with the rates observed between 2012 and 2016.

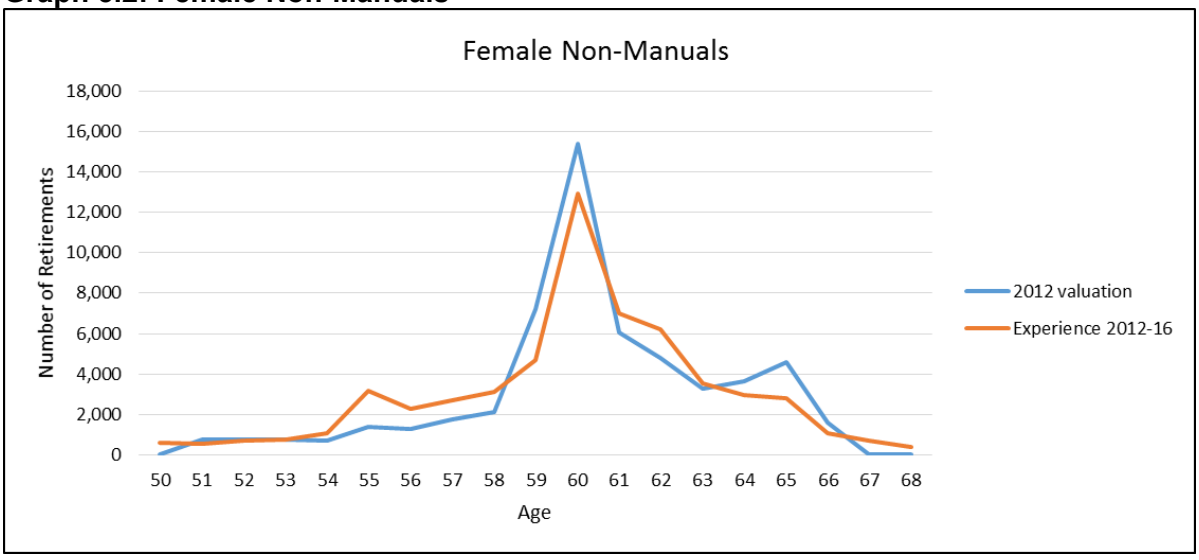
Conclusions

5.16 The charts below illustrate the numbers retiring in each 1995 section category analysed by age. A comparison is shown of the numbers expected to retire at each age and those actually retiring at that age. In each case the recommended 2016 rates are based on the actual numbers (expressed as a rate by reference to the overall numbers in service at these ages). Sample rates recommended for each category are shown in Table 5.3 below the charts and a fuller set is shown in Appendix A.

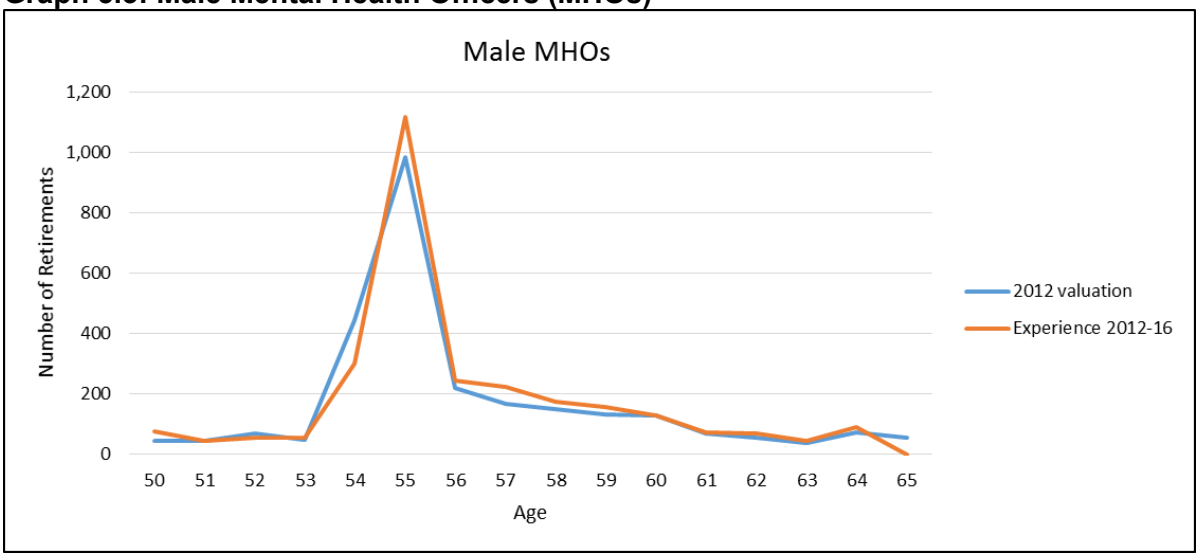
Graph 5.1: Male Non-manuals



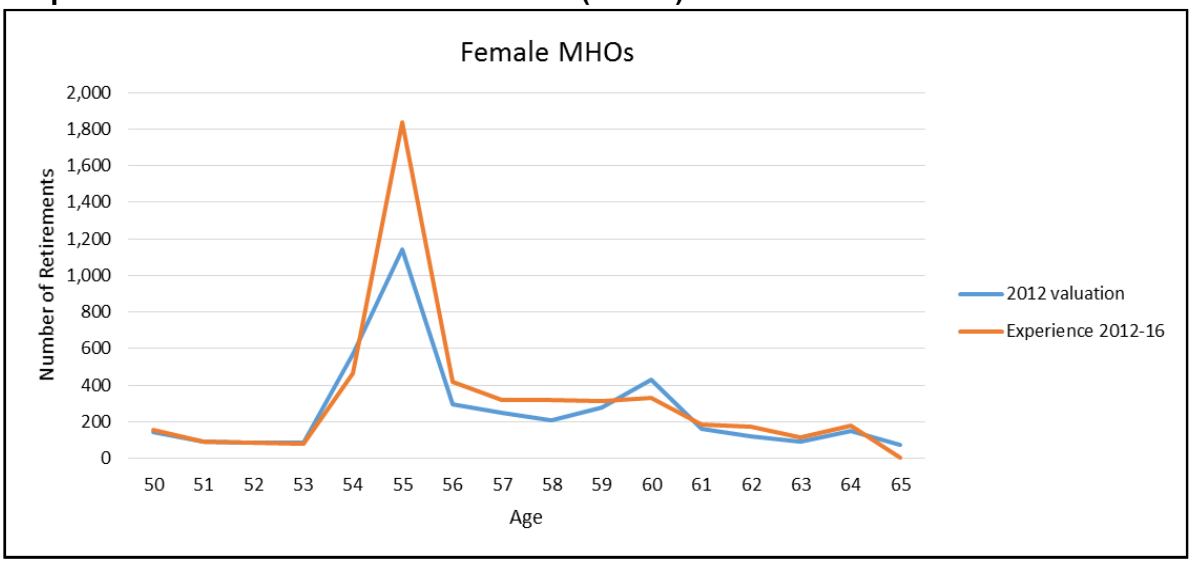
Graph 5.2: Female Non-Manuals



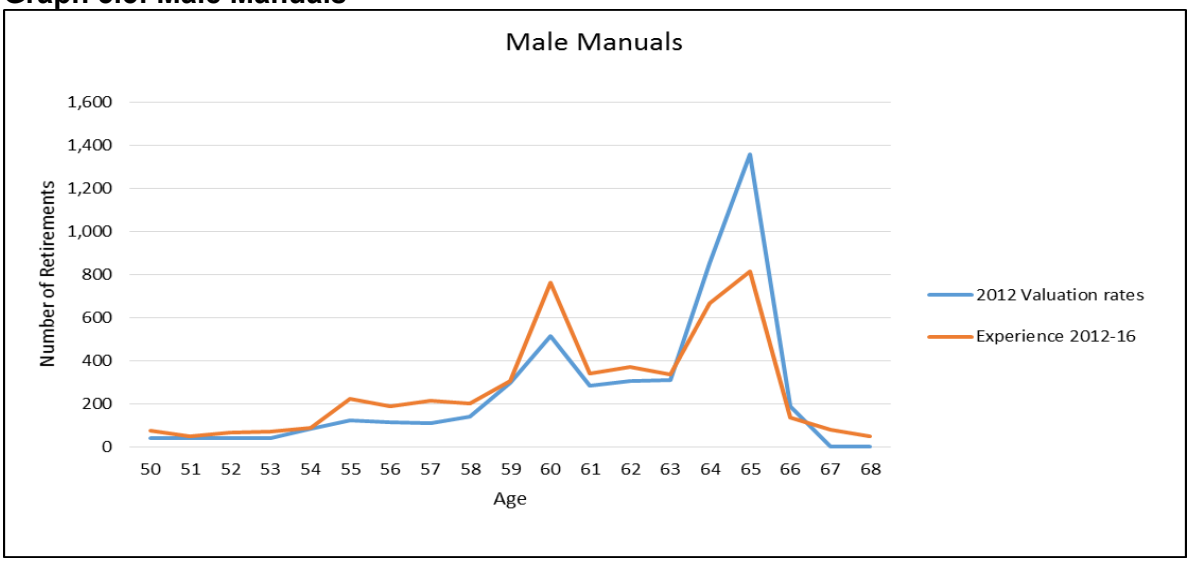
Graph 5.3: Male Mental Health Officers (MHOs)



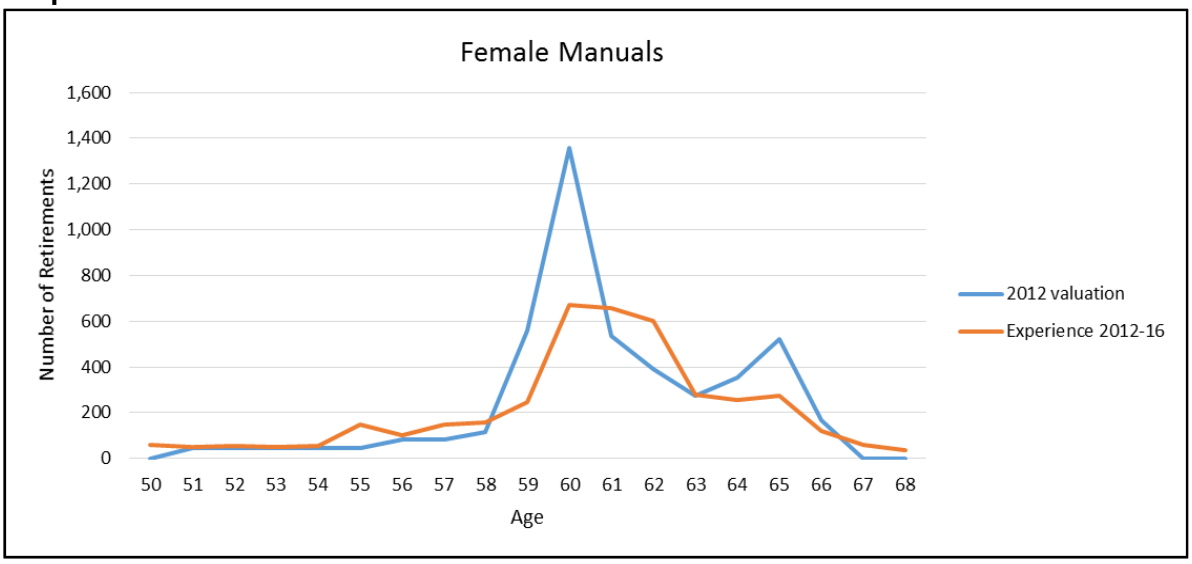
Graph 5.4: Female Mental Health Officers (MHOs)



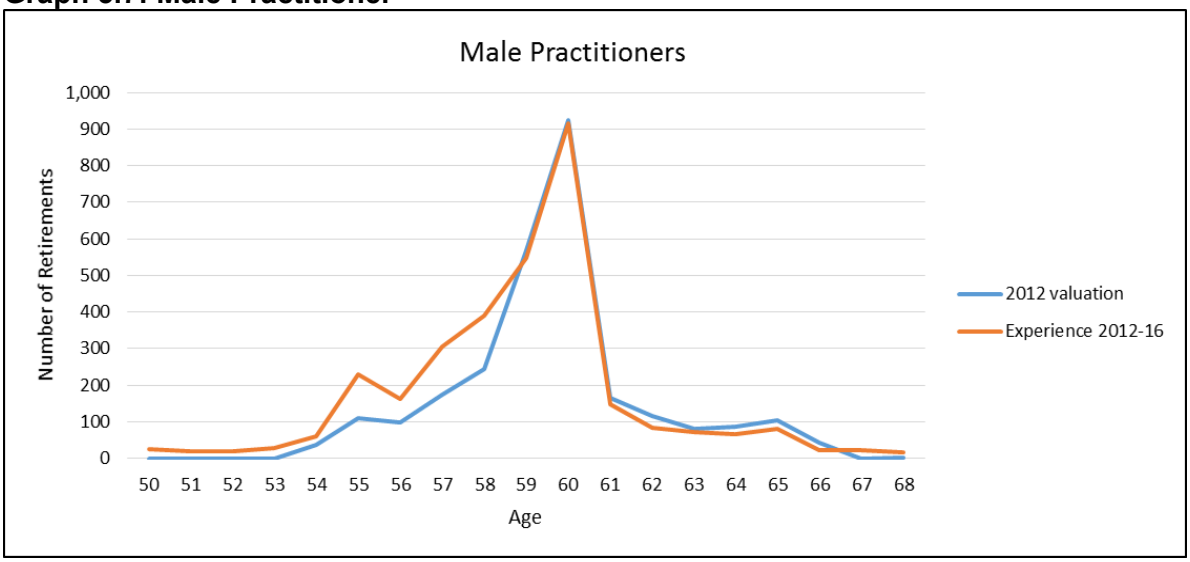
Graph 5.5: Male Manuals



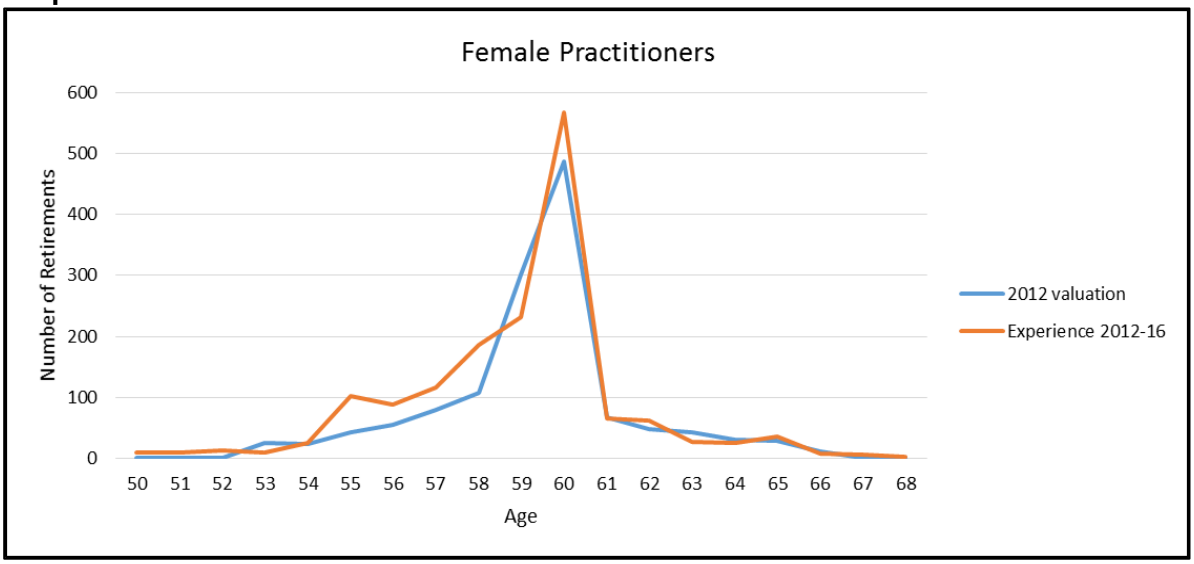
Graph 5.6: Female Manuals



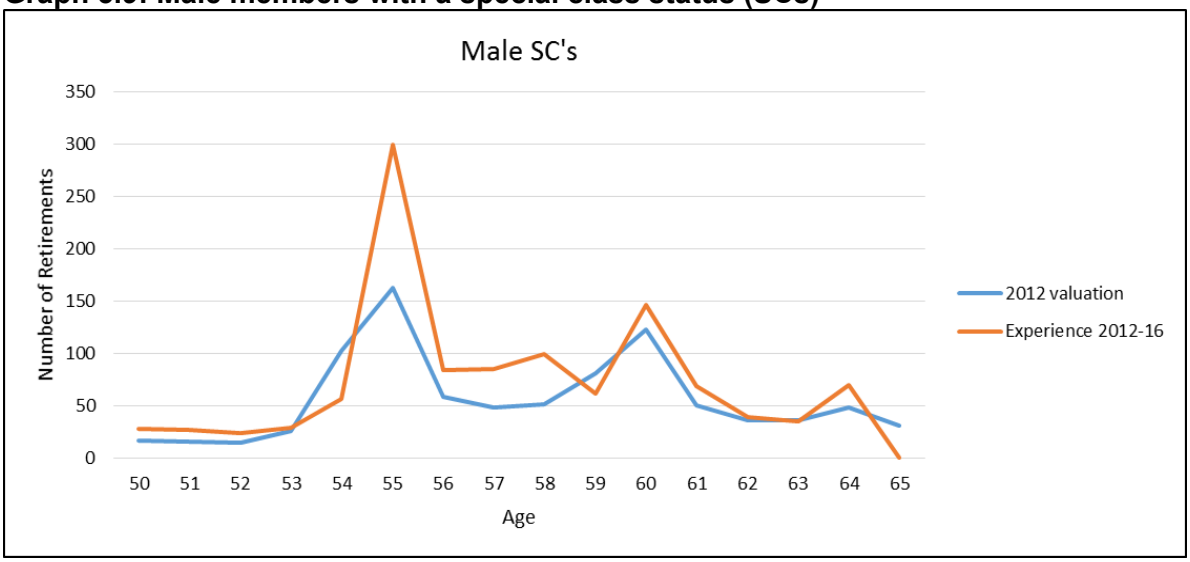
Graph 5.7: Male Practitioner



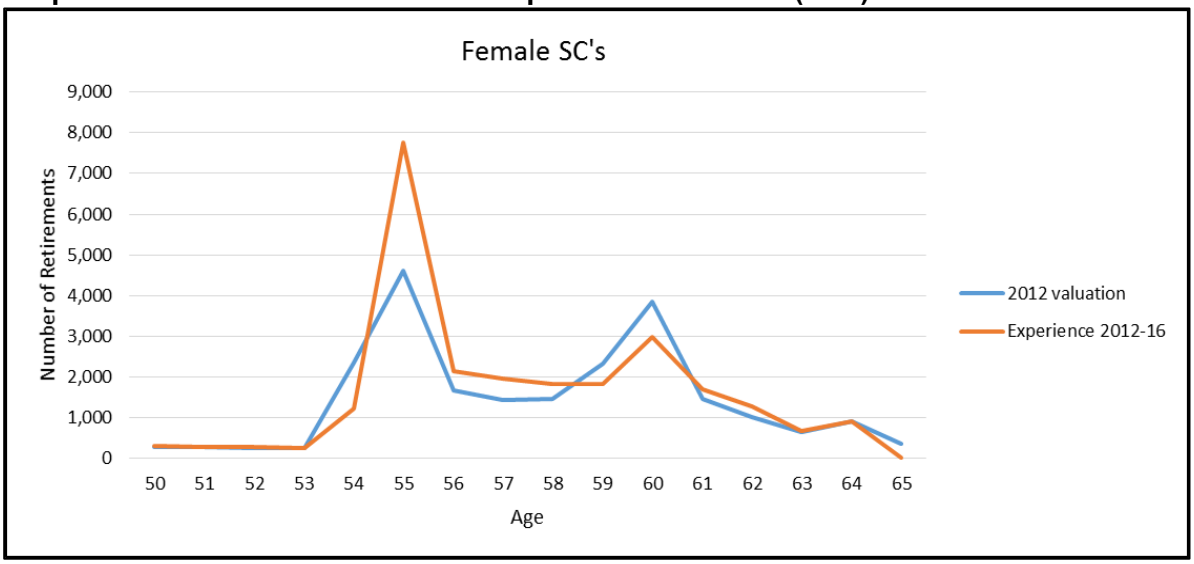
Graph 5.8: Female Practitioners



Graph 5.9: Male members with a special class status (SCs)



Graph 5.10: Female members with a special class status (SCs)



Graph 5.11: Comparison of actual & expected number of retirements (by occupational type)

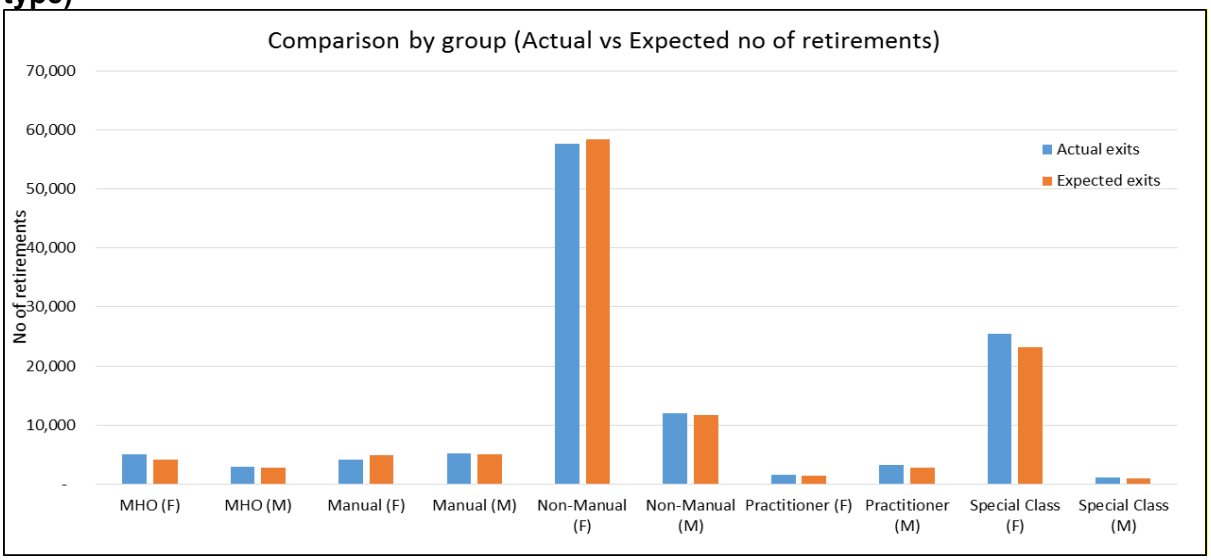


Table 5.3: 1995 section - sample rates of age retirement

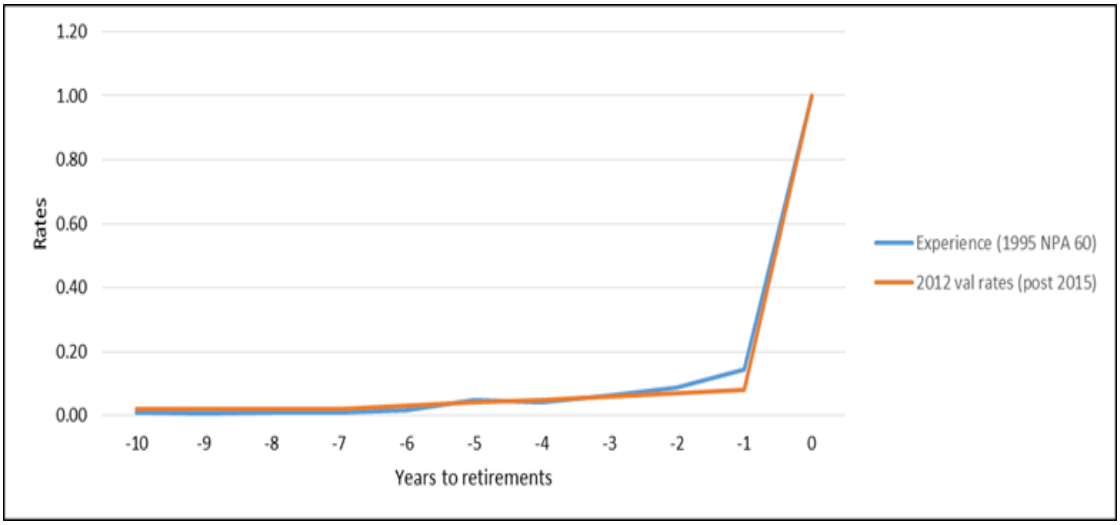
Males					
Age	**Non-manual**	**MHO**	**Manual**	**Practitioner**	**Special class nurses**
50	0.01	0.03	0.02	0.01	0.02
55	0.04	0.50	0.05	0.06	0.30
60	0.33	0.33	0.25	0.63	0.42
65	0.51	1.00	0.59	0.47	1.00
68	1.00		1.00	1.00	
Females					
50	0.01	0.03	0.01	0.00	0.01
55	0.05	0.48	0.03	0.05	0.35
60	0.30	0.35	0.19	0.69	0.39
65	0.39	1.00	0.35	0.57	1.00
68	1.00		1.00	1.00	

Results of analysis: New entrants to the 2015 scheme and members who transferred to that scheme on 1 April 2015

5.17 In the absence of directly relevant experience, the same approach to setting this assumption was adopted as for the 2012 valuation. This approach assumes that members joining the 2015 scheme on or after 1 April 2015 will take all NHS pension benefits in line with recent experience of patterns of early retirements, or otherwise at NPA. Experience relative to the current NPAs is translated to be relative to members' NPA in the 2015 scheme for the purposes of setting the appropriate assumption.

5.18 The chart below show the comparison between actual and expected rates of early retirement. Given the range of factors influencing current retirement trends and the difficulty in translating this into expectations of future retirement behaviours we recommend that the existing age retirement assumptions are retained for this group of members of the 2016 valuation or until such time as more relevant experience becomes available.

Graph 5.12: Comparison of all pre-NPA retirements rates to 2012 valuation rates for those retiring from the 2015 scheme



6 Ill-health retirement from service

This chapter sets out our recommendation for the assumed rates of retirement on grounds of ill-health, and summarises the analysis undertaken in order to inform that recommendation.

Proposed assumptions for 2016 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, i.e. applying both to those members who remain in the pre-2015 scheme and members of the new scheme. Assumed rates of ill-health 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 A.

6.2 We also recommend assuming that 75% of members 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 The proposed 2016 assumptions are 100% and 105% for men and women respectively of the rates adopted for the previous valuation.

6.4 The assumed proportion of members eligible for upper-tier[17] benefits is unchanged from that adopted for the previous valuation.

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.

Analysis and setting the assumption

Ill health incidence

6.6 There were some 8.3k ill-health retirements over the four-year period to 31 March 2016 compared to an expected 7.7k retirements based on the 2012 assumptions.

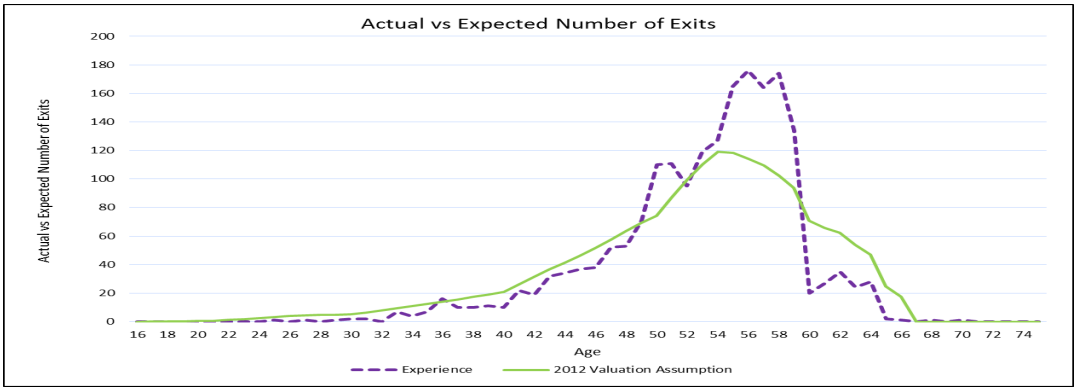
6.7 We have compared the actual rate of ill-health retirements (by gender and age of retirement) to the expected rate from the 2012 actuarial valuation[18] and the recommended assumption has been based on this comparison.

[17] A lower tier award provides for immediate payment of accrued benefits with no actuarial reduction, regardless of age. A higher tier award provides for enhancement of accrued benefits.
[18] See General Considerations in Section 3

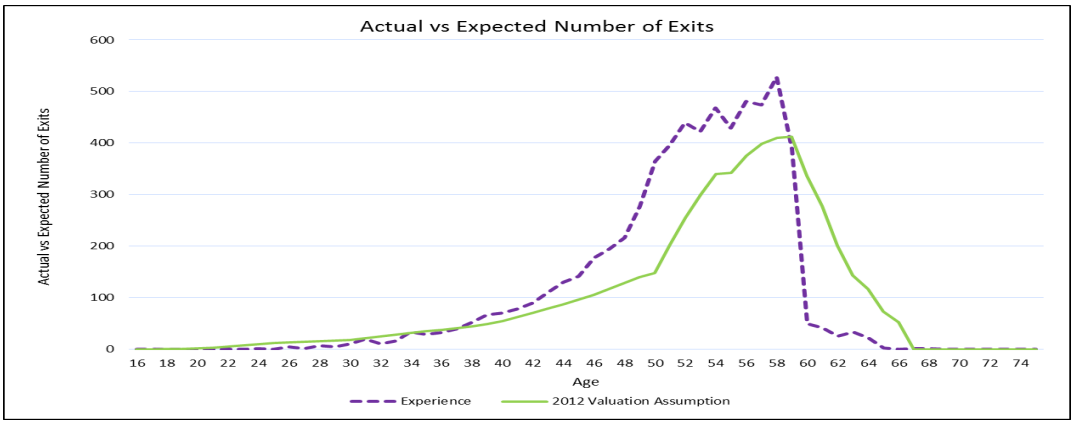
6.8 As for the 2012 valuation rates have been proposed for older ages by linearly extrapolating actual experience to older ages. There is currently limited experience beyond the pre-2015 sections' NPAs.

Results of analysis

Graph 6.1: Male ill-health retirement rates – comparison of experience with 2012 valuation assumption



Graph 6.2: Female ill-health retirement rates – comparison of experience with 2012 valuation assumption



Comments on ill-health retirement analysis

6.9 The graphs above show reasonably good alignment of experience against assumptions for both men and women, and noting that the numbers retiring at each age are relatively small. Overall around 10% more women than expected retired on ill-health grounds over the 4-year period. For this reason we recommend that the assumed rates of ill-health retirement for women are increased slightly for the purposes of the 2016 valuation. Allowing for some expected fluctuation in experience over periods of time we recommend 50% of the difference in experience is reflected in the revised assumption for women i.e. the rates are set equal to 105% of those adopted for the 2016 valuation.

Split between tiers

6.10 The table below shows the percentage of members retiring on ill-health grounds over the four-year period which qualified for upper tier benefits. Over the period 2008-2012 the percentage of upper tier awards was 62% i.e. the current intervaluation experience is very similar to that from the previous period. In both cases these figures exclude members retiring with lower tier benefits and later qualifying for upper tier.

Table 6.1: Ill-health retirements on upper tier

	2012/13	2013/14	2014/15	2015/16	Total
Males	61%	61%	60%	61%	61%
Females	68%	68%	68%	72%	69%

6.11 Additional evidence available for the 2012 valuation supported an assumption that 75% of members would ultimately qualify for upper tier benefits. Similarly additional evidence provided by BSA[19] indicates that for the period 2008 – 2016 if all tier 1 cases subject to review ultimately qualify for upper tier benefits then 75% of cases would qualify for upper tier awards. We therefore recommend retention of the assumption that 75% of ill-health retirements will receive upper tier benefits.

[19] OH Assist Annual Report to NHSBSA.

7 Voluntary withdrawal from service

This chapter sets out our recommendation for the assumed rates of withdrawal from active service, and summarises the analysis undertaken in order to inform that recommendation.

Proposed assumptions for 2016 valuation

7.1 We recommend that a common set of net rates of withdrawal are used for the purposes of the valuation i.e. applying equally to those members who remain in the pre-2015 scheme and members of the 2015 scheme. The recommended rates are net of re-entry within five years, age and service related and unisex and apply for all members with the exception of practitioner and special class members. For these members we recommend no net withdrawals are assumed. Analysis shows the pattern of withdrawals has a strong service relation with considerably higher rates experienced in the first three years of service. The recommended rates reflect this relation. Sample rates are provided in Appendix A.

Previous valuation assumptions

7.2 The proposed 2016 assumptions are the same as the rates adopted for the previous valuation.

Use of the assumption

7.3 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, i.e. 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).

Analysis and setting the assumption

7.4 We have analysed the pattern of (net) withdrawals from active membership over the four-year period to 31 March 2016. In total there were 341k net withdrawals over the period. Of the 341k withdrawals only 11k were of practitioner and special class members. We have considered these groups separately. The analysis undertaken compares the actual rate of voluntary withdrawal (net of re-joiners) grouped by service at date of leaving and age of retirement) to the expected rate from the 2012 actuarial valuation.

7.5 The recommendation of retaining the 2012 valuation assumption for net withdrawal rates is based on this comparison and taking into account the expected atypical nature of the intervaluation experience. Certain aspects of the intervaluation experience are believed to be unusual and resulting from conditions and initiatives specific to the period. For example auto-enrolment commenced during the period. This is likely to have resulted in some peak levels of joiners and leavers with short duration of service. The continuing pay restraint policy and changes to pension taxation may also have resulted in some distortion against longer term trends.

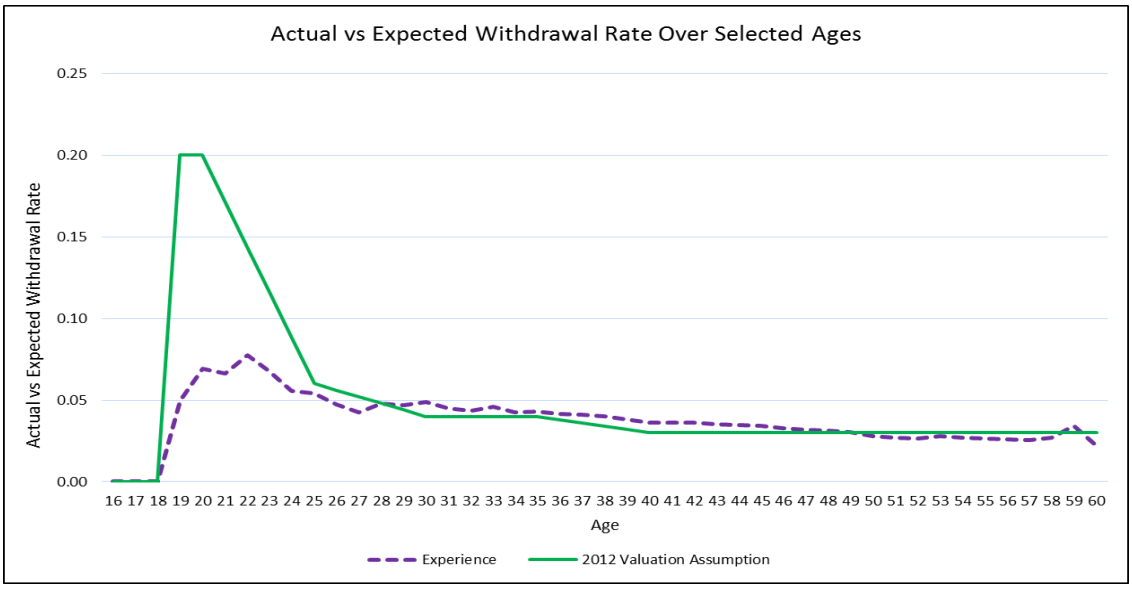
Results of analysis

7.6 The analysis compares the actual rate of voluntary withdrawal for men and women by age compared to the expected rate from the 2012 actuarial valuation.

7.7 The graphs below show the net withdrawal rate comparison derived from the analysis Charts 7.1 and 7.2 show the position for members leaving the scheme after completing at least 3 years' service. The rates of withdrawal for these members are more financially significant than those at shorter durations and the charts illustrate that for most ages the rate of withdrawal has been broadly in line with the assumption made in 2012.

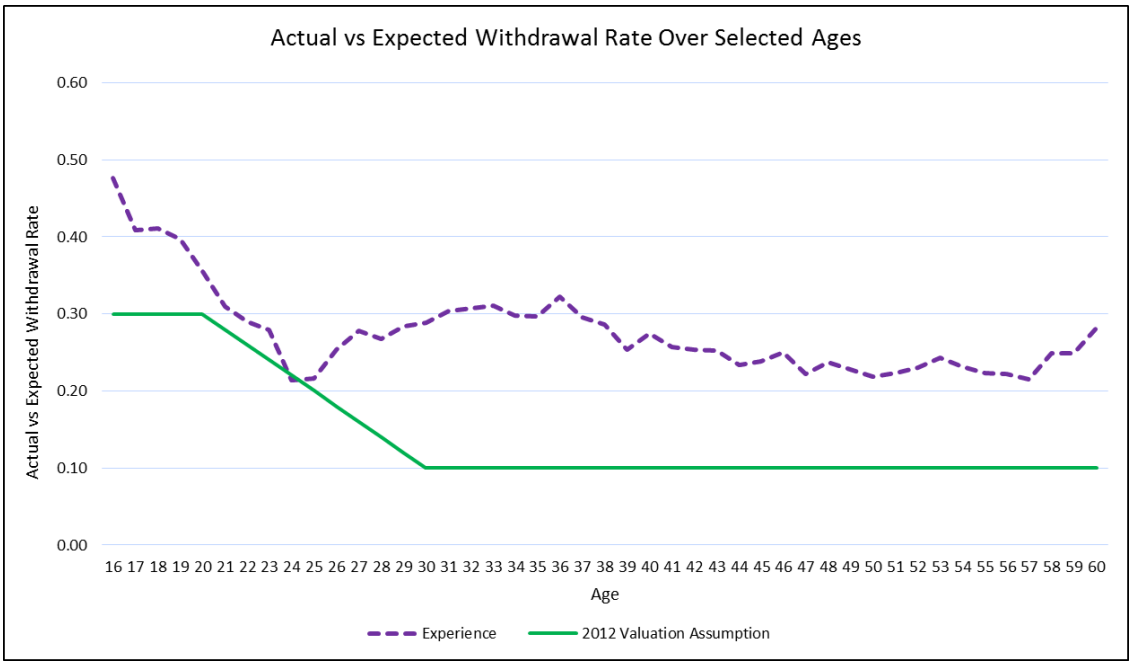
Graph 7.1: All males excluding practitioners and special class members (3+ years' service)

Graph 7.2: All females excluding practitioners and special class members (3+ years' service)

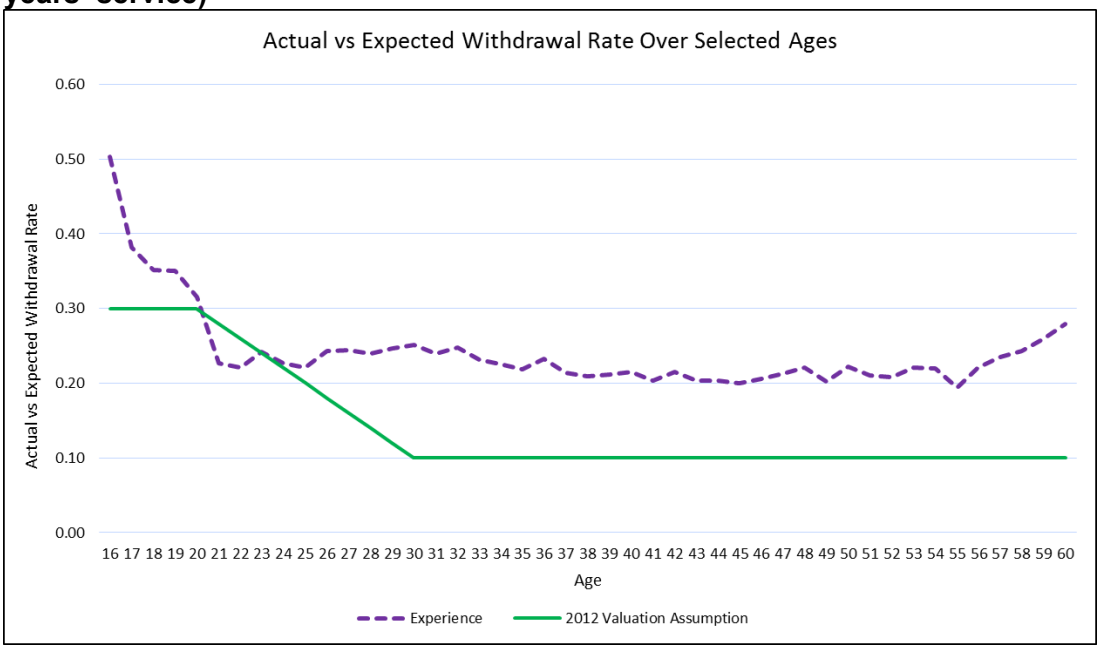


7.8 Charts 7.3 to 7.8 below show the same comparison position of experience and assumptions for members leaving the scheme after completing between 0-1 years, 1-2 years and 2-3 years' service. These show higher than expected levels of withdrawal at most ages.

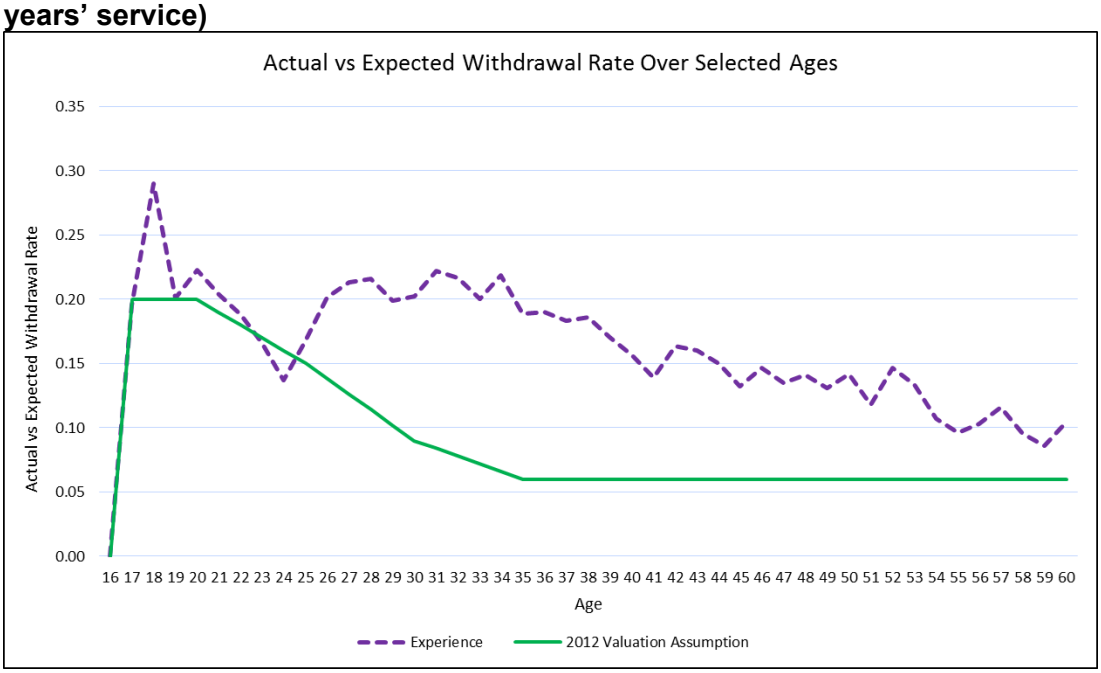
Graph 7.3: All males excluding practitioners and special class members (0-1 years' service)



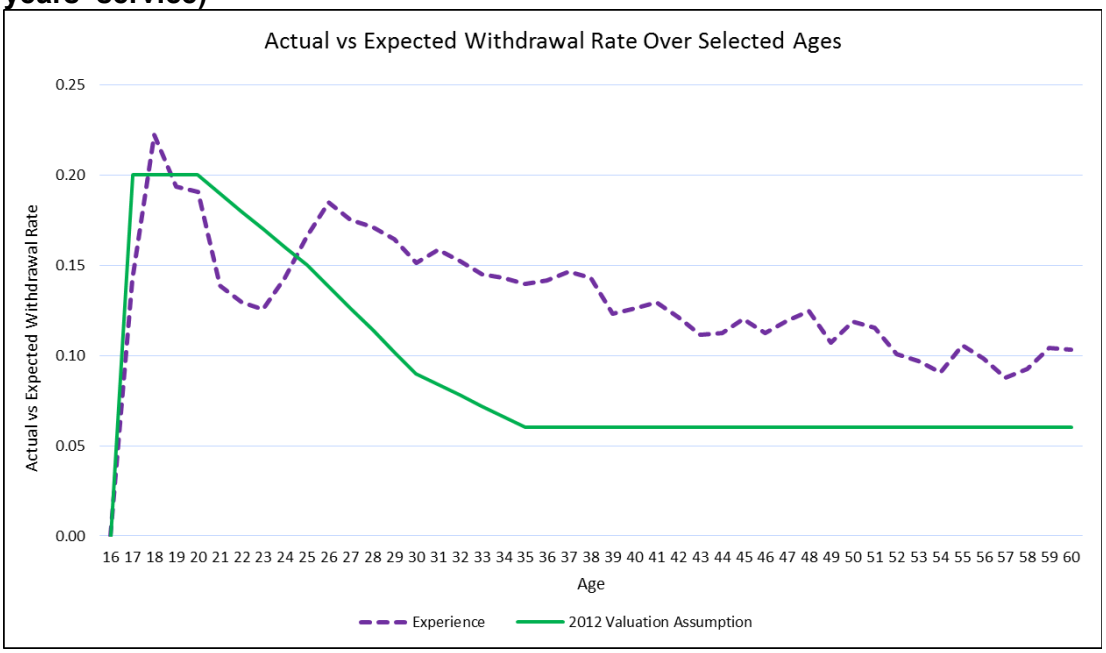
Graph 7.4: All females excluding practitioners and special class members (0-1 years' service)



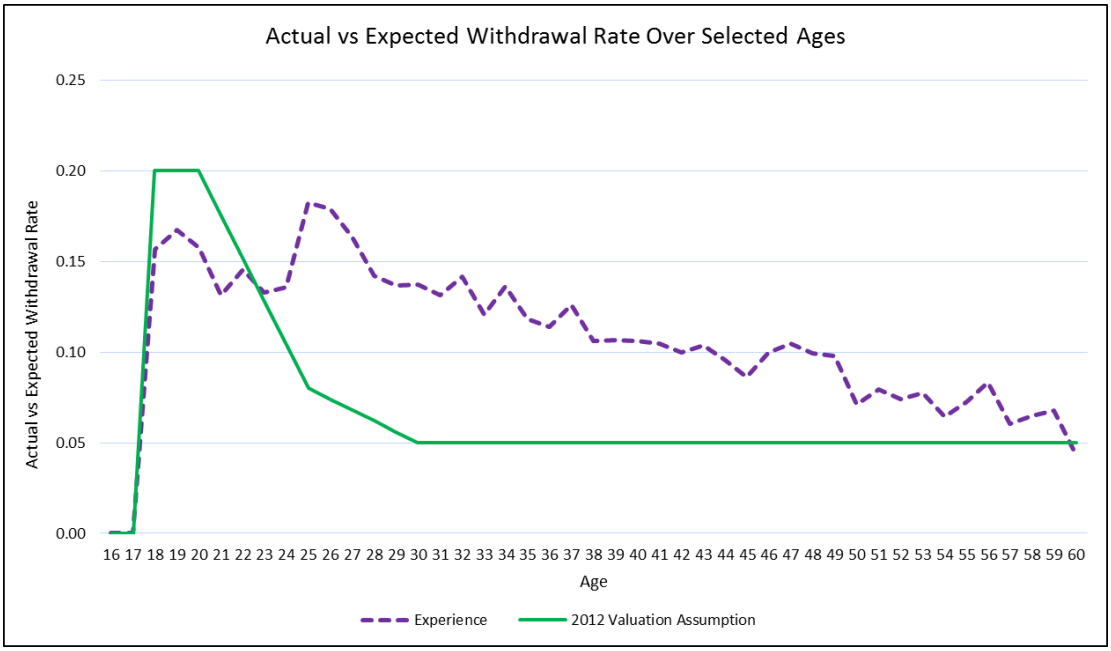
Graph 7.5: All males excluding practitioners and special class members (1-2 years' service)



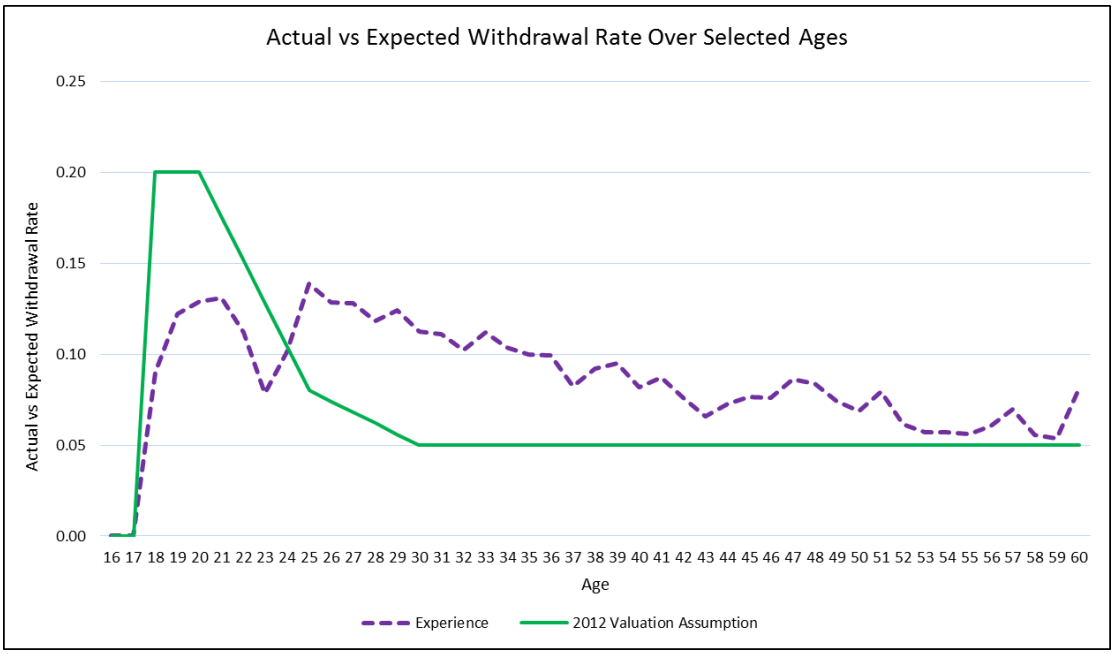
Graph 7.6: All females excluding practitioners and special class members (1-2 years' service)



Graph 7.7: All males excluding practitioners and special class members (2-3 years' service)



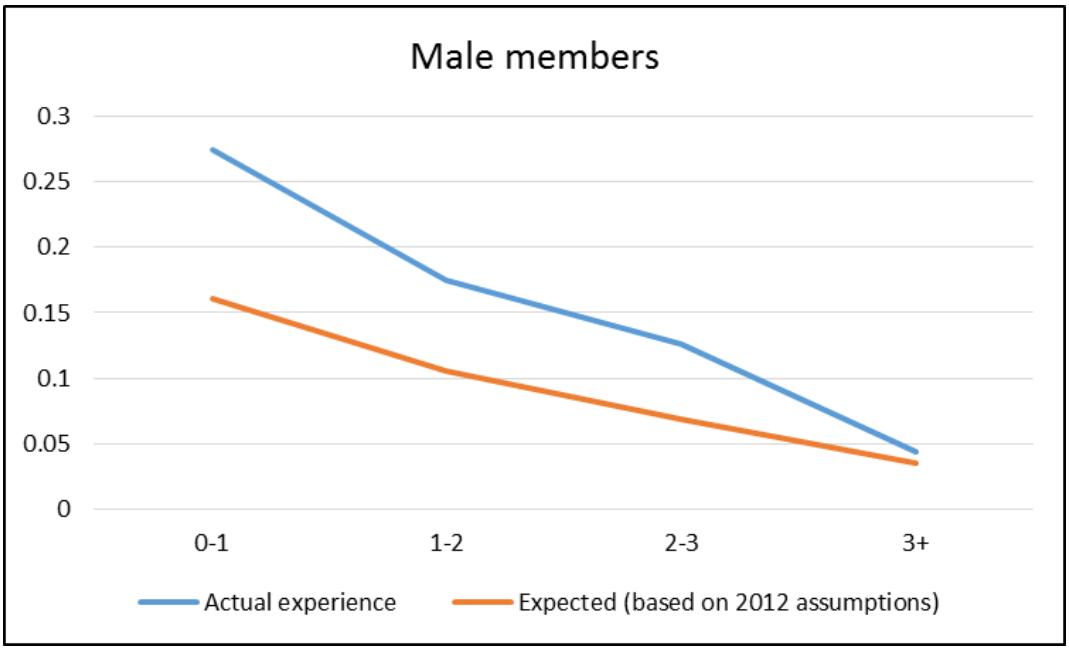
Graph 7.8: All females excluding practitioners and special class members (2-3 years' service)

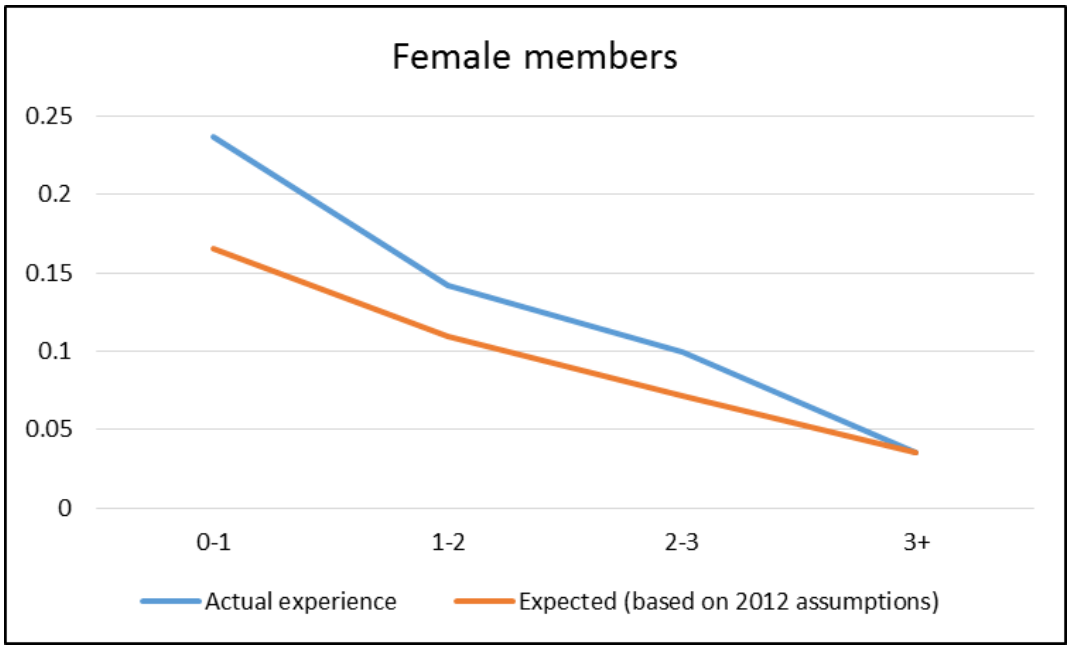


7.9 Charts 7.1 and 7.2 show the net withdrawal patterns for members with service of more than 3 years has been broadly in line with the assumption made in 2012. This equates to around 3% of members being assumed to leave voluntarily (and net of re-joiners) at most ages. Experience at the youngest ages has been for fewer withdrawals than expected. It is likely experience at these ages has been distorted by the introduction of auto-enrolment. The financial significance of withdrawal at these ages is small. The further charts above show withdrawal by age at shorter durations and highlight that experience has been higher than expected at all ages and shorter durations, with the trend at younger ages changing as duration increases. Across all durations the aggregate experience at the younger ages has been reasonably close to expected.

7.10 The further charts below show the aggregate net withdrawal rate comparison by duration (all ages grouped together).

Graphs 7.9: Withdrawals (net of re-entry) by duration (all members except practitioners and special class members)





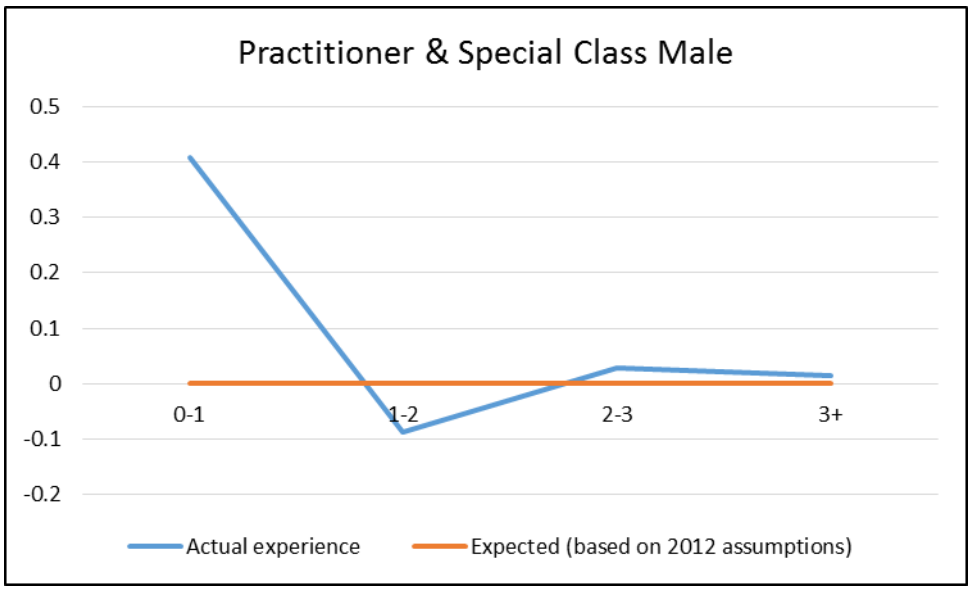
Comments on net withdrawal analysis

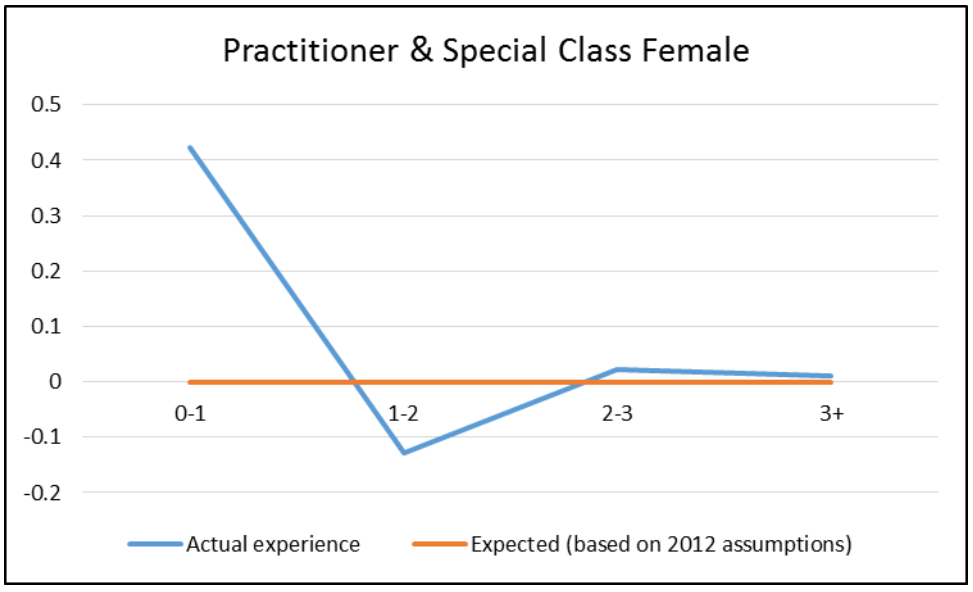
7.11 The analysis shows actual patterns of withdrawals at financially significant age and service durations have been largely in line with those expected based on the 2012 valuation assumptions. There has been some variation at younger ages and shorter durations but given the small financial significance of this variation and the impact of potentially short term effects on these we do not recommend any adjustments to the 2012 assumptions.

Practitioners and special class members

7.12 Charts 7.10 and 7.11 show the aggregate net withdrawal rate comparison for practitioner and special class members.

Graphs 7.10: Withdrawals (net of re-entry) by duration (practitioners and special class members)





Comments on net withdrawal analysis

7.13 The analysis shows for practitioners and special class members that other than at very short durations continuing to assume no net withdrawals is reasonable. Given the limited financial significance of the short duration assumption no change is recommended in that respect.

8 Death before retirement

This chapter sets out our recommendation for the assumed rates of death before retirement, and summarises the analysis undertaken in order to inform that recommendation.

Proposed assumptions for 2016 valuation

8.1 We recommend a single set of assumptions (separate for men and women) to allow for the possibility of death before retirement. Assumed rates of death in service increase with age but fewer than 0.5% of members are assumed to die each year, even at the highest ages. Sample rates are provided in Appendix A.

Previous valuation assumptions

8.2 The proposed 2016 assumptions are 95% and 90% for men and women respectively of the rates adopted for the previous valuation

Use of the assumption

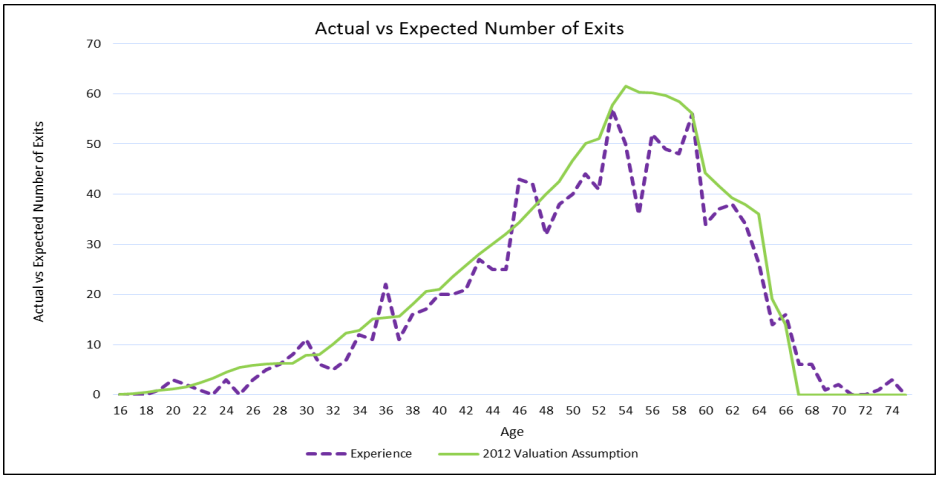
8.3 Death before retirement rates are used to allow for the possibility of deaths whilst in active service or whilst entitled to a deferred pension. The numbers of deaths observed annually, and the recommended rates to be assumed are low, and thus this assumption has relatively little financial significance.

Analysis and setting the assumption

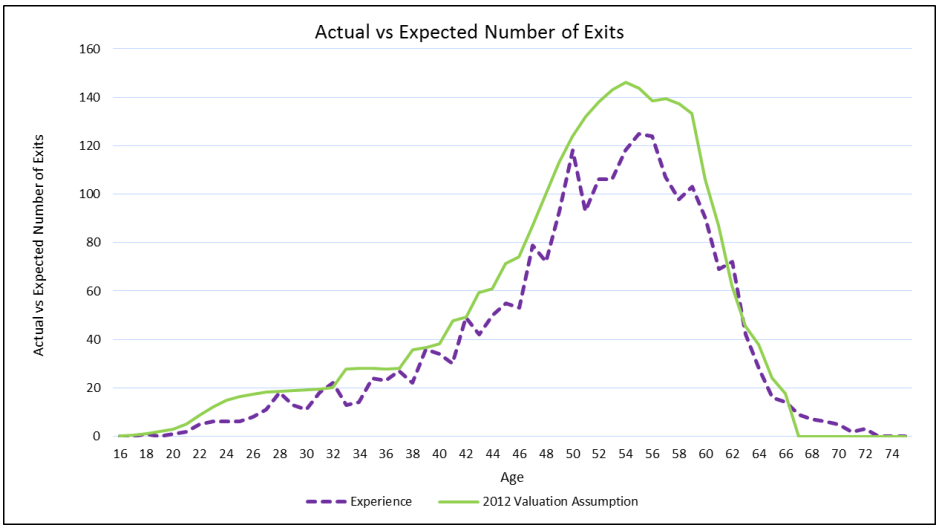
8.4 To formulate a recommended assumption we compared the scheme experience to the expected rates from the 2012 actuarial valuation. In total there were 3,439 deaths of active members, compared to an expected number of 4,153 based on the 2012 valuation assumption. Data was only available on deaths of members in active service though the assumption is used for all non-pensioner members.

8.5 The graphs below compare the rates of actual and expected deaths by age for men and women respectively. In each case expected deaths are shown by reference to the 2012 valuation assumptions.

Graph 8.1: Male death before retirement experience 2012-16



Graph 8.2: Female death before retirement experience 2012-16



Comments on death before retirement analysis

8.6 For men recent experience has been around 10% lighter than the rates assumed for the 2012 valuation, whilst for women experience has been around 20% lighter than rates assumed for the 2012 valuation. Allowing for some fluctuation in experience over periods of time we recommend 50% of the difference in experience is reflected in the assumption to be adopted for the 2016 valuation ie the rates are set equal to 95% and 90% of those adopted for the 2016 valuation for men and women respectively.

9 Promotional pay increases

This chapter sets out our recommendation for the assumed promotional pay increases of active members, and summarises the analysis undertaken in order to inform that recommendation.

Proposed assumption

9.1 We recommend assuming separate scales of promotional increases for manual and other staff (separate 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 A.

Previous assumption

9.2 The assumptions adopted for the 2012 valuation are the same as those recommended for the 2016 valuation.

Use of the assumption

9.3 For most members of the pre-2015 scheme benefits earned in that scheme are linked to pay at or near retirement. Members' pay can increase through a combination of general annual pay awards and promotional, or other increases, to pensionable pay. To calculate an estimate of the level of benefit payable in the future requires assumptions for both these components. The assumption for general pay awards is directed by HMT. The assumption for promotional pay increases is set by the Secretary of State for Health and Social Care.

9.4 It should be noted that the data available only allows analysis of non-general pay growth. The non-general pay growth relates to promotional pay growth and changes in non-basic pay i.e. pensionable allowances. It is possible that in a period of general pay restraint, such as the inter-valuation period, that increases in other elements of pay may not be representative of the level of increases in periods of more normal pay growth. For this reason care should be applied when considering if the evidence from recent periods would be equally applicable to periods with more 'normal' general pay policy.

9.5 Future pay progression will be more significant (in terms of expected pension) for those members with either full or tapered protection because they continue to have benefits linked to final pensionable pay for service beyond 31 March 2015.

Analysis and setting the assumption

9.6 When considering the assumption for non-general pay growth we compared the scheme experience to the assumption adopted for the 2012 valuation. We considered two types of analysis.

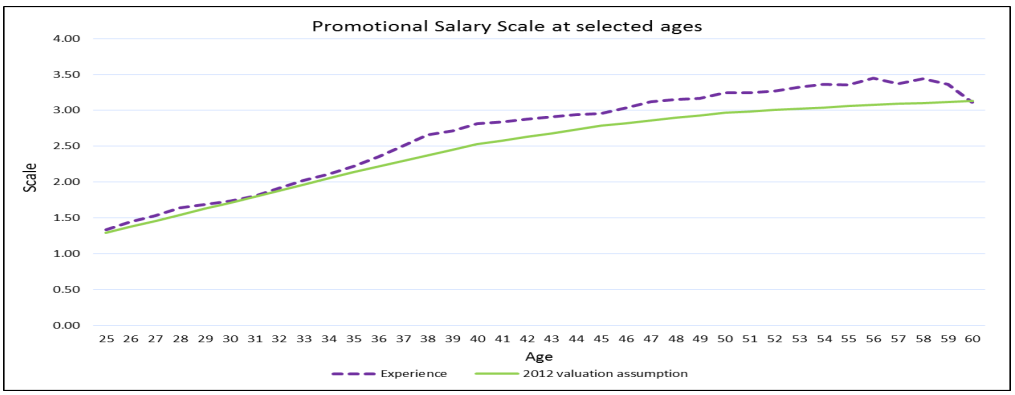
- **Profile analysis:** This considers the overall active membership as at 31 March 2016 and compares average (WTE[20]) pensionable pay at each year of age with that at other ages. This analysis illustrates how (average WTE) pay varies by age and may form a suitable means of setting an age related pay scale. For this analysis only pensionable pay at the valuation date is considered.

- **Starter/ender analysis:** This considers only those members who were in active membership at both the 2012 and 2016 valuation dates. For these members we calculate their increase in pensionable pay (WTE[1]) over the period (net of assumed general pay increases[21]) and compare the average increase for with that assumed. The rates of assumed increase being based on the members' ages over the intervaluation period and the 2012 valuation assumptions. This analysis illustrates how actual promotional pay increases (or rather actual non-general increases) have impacted the rates of earnings of members remaining in service over the intervaluation period. This could also be considered a reasonable means of setting an age related pay scale.

Results of profile analysis

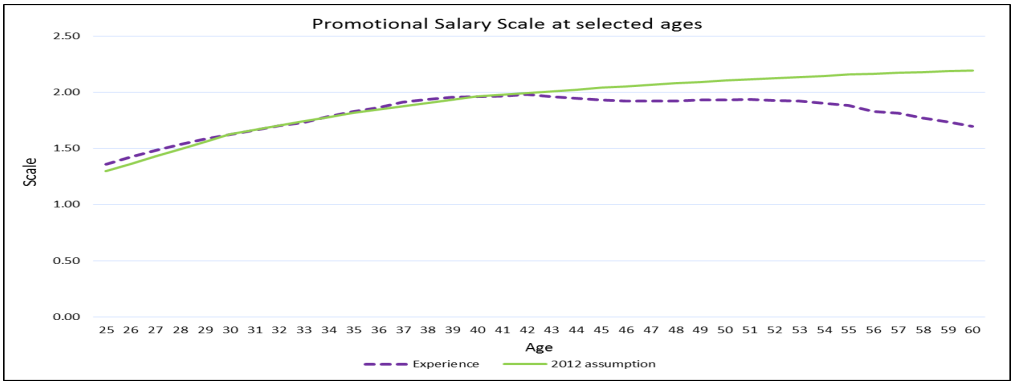
9.7 The graphs below show the implied age related growth in non-general pensionable pay for men and women respectively based on the pay profile of all members at the valuation date. The actual profile is compared with the assumed age related promotional scales adopted for the 2012 valuation.

Graph 9.1: Male Non-manual officers and practitioners

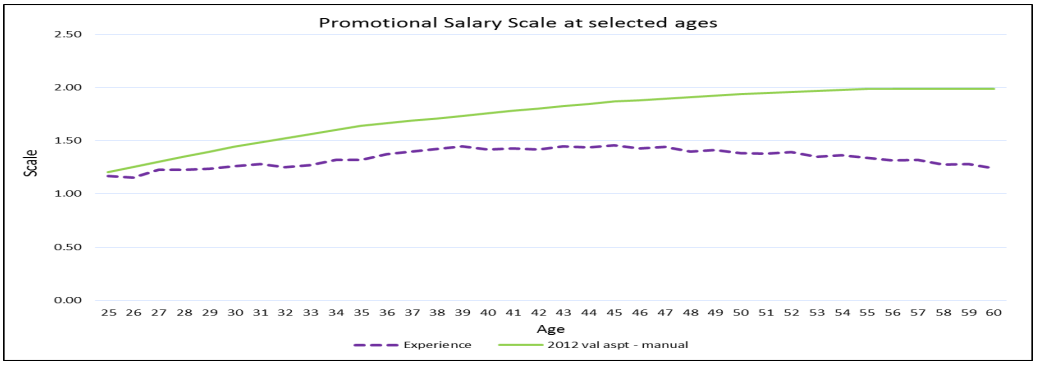


[20] Whole time equivalent pay.
[21] General pay increases have been assumed to be in line with stated government pay policy i.e. 0% for 2012-13 and 1% pa from 2013-16.

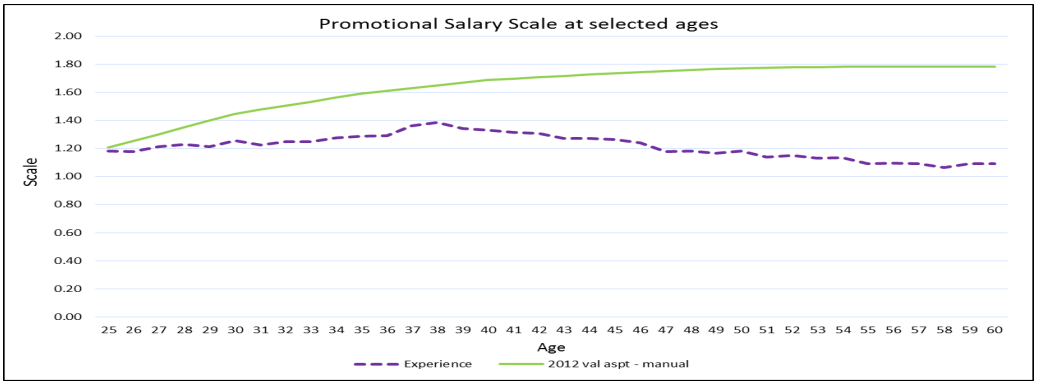
Graph 9.2: Female Non-manual officers and practitioners



Graph 9.3: Male Manual officers



Graph 9.4: Female Manual officers

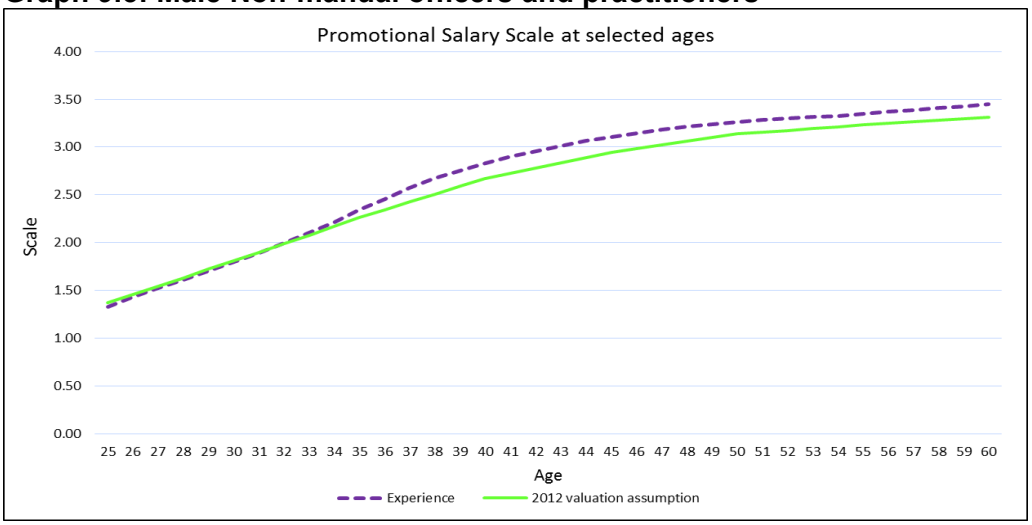


9.8 The graphs above show that other than for male non-manuals the rate of actual non-general pay is lower than assumed at the 2012 valuation. Care should be taken when interpreting this analysis as the membership at each age is not homogeneous. The relative rates of pay at each age is likely to be distorted by the changing mix of members and different behaviours at different ages.

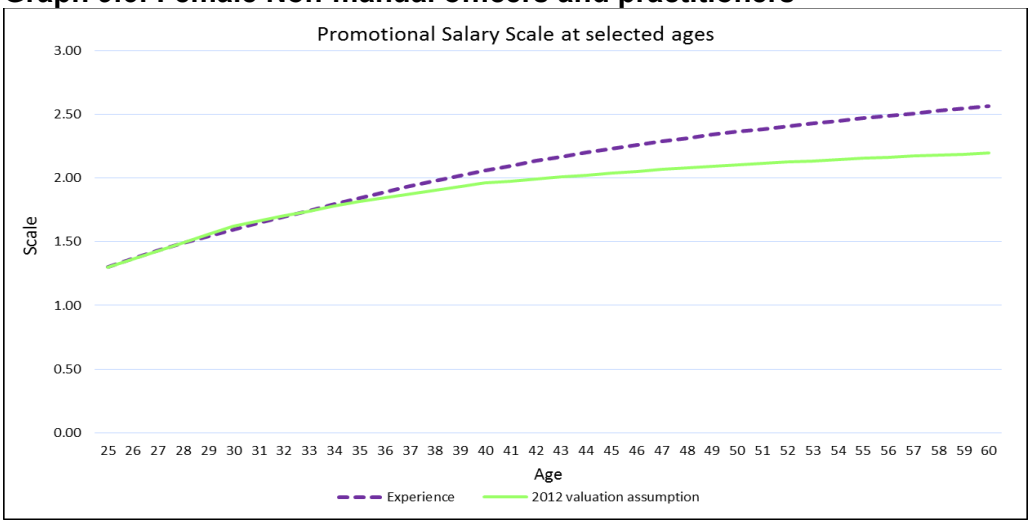
Results of starter/ender analysis

9.9 The further graphs below also show the implied age related non-general pay growth for men and women respectively but in this case based on the starter/ender analysis of those members in service at both the 2012 and 2016 valuation dates. As above these are compared with the assumed age related promotional scales adopted for the 2012 valuation. In each case the charts below suggest that the rate of non-general pay growth have been slightly higher than assumed at the 2012 valuation.

Graph 9.5: Male Non-manual officers and practitioners



Graph 9.6: Female Non-manual officers and practitioners



Graph 9.7: Male Manual officers

Graph 9.8: Female Manual officers

Comments on the analysis

9.10 The results of the two sets of analysis are not consistent. Both should be treated with some caution when considering how to set forward looking assumptions for promotional pay growth.

> The population at each age is not homogeneous thus the profile analysis could be distorted by a changing mix of members and different behaviours at different ages.

- The experience observed in the starter/ender population will be influenced by practices in place during the intervaluation period. Given the ongoing policy of public service pay restraint it is possible that what is being observed is not a true long term reflection of the impact of non-general pay growth. The data available is not sufficient to net out factors such as variable forms of non-basic pay nor any differential promotional policies followed by employers during the exceptional period. When considering the appropriate forward looking assumption for non-general pay growth due account should be taken of how this interrelates to the directed assumption for general pay growth.

9.11 Initial calculations indicate that in aggregate there is little experience gain or strain arising due to aggregate pay growth over the intervaluation period. The analysis suggests that a number of factors have contributed to intervaluation pay growth at an individual level, likely influenced by both the general pay restraint policy and member behaviours. In this light our view is that the analysis available is not sufficient to suggest a change to the 2012 valuation assumptions is appropriate. Whilst those assumptions may not fully model the impact of non-general pay growth at an individual level they have in effect operated as intended at a scheme level in conjunction with the directed general pay assumptions. Thus our recommendation is that no change should be made to the pay scales as assumed for the 2012 valuation.

10 Commutation of pension for cash at retirement

This chapter sets out our recommendation for the assumed level of pension commutation at retirement (where this is not specified in the HM Treasury valuation directions), and summarises the analysis undertaken in order to inform that recommendation.

Proposed assumptions for 2016 valuation

10.1 An assumption is required about the amount of pension commuted by 1995 section members to increase their automatic entitlement to retirement lump sum. The assumption for the 2008 section and 2015 scheme is specified in the HM Treasury directions. Table 10.1 shows the recommended proportion of pension that members are assumed to commute (the assumptions for the 2008 section and 2015 scheme are included for completeness).

Table 10.1: Recommended commutation assumption for the 2016 valuation

1995 section	2008 section (directed)	2015 scheme (directed)
M: 8% F: 11%	17.5%	17.5%

10.2 The recommended assumption for the 1995 section is equivalent to assuming on average members take a total lump sum of 78% of the HMRC maximum permitted lump sum.

Previous valuation assumptions

10.3 A slightly lower unisex assumption of 8.5% of pension commuted for retirement lump sum was adopted for the previous valuation.

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 and contribution rates. Differences between assumed and actual experience in the 2015 scheme will feed through into the cost cap fund but experience in the 1995 and 2008 sections of the existing scheme will not.

Results of analysis

10.5 Almost all members retiring in the four-year period to 2016 retired from the pre-2015 scheme. We analysed the amounts of pension exchanged for cash at retirement for 125k members eligible to commute pension for cash.

Table 10.2: Commutation experience 2012 - 2016

	Number of retirements (rounded to nearest 100)	Pension before commutation £ 000s	Pension post commutation £000s	Implied Commutation proportion	Proportion of lump sum taken as HMRC max
1995 section members					
Males	24,200	523,575	481,152	8.1%	74.1%
Females	96,400	873,574	777,449	11.0%	80.6%
Total	**120,600**	**1,397,149**	**1,258,601**	**9.9%**	**78.2%**
2008 section members*					
Males	1,600	15,561	12,690	18.4%	51.5%
Females	2,800	14,255	11,560	18.9%	52.9%
Total	**4,400**	**29,816**	**24,250**	**18.7%**	**52.4%**

* Including choice optants; these members take a mandatory lump sum.

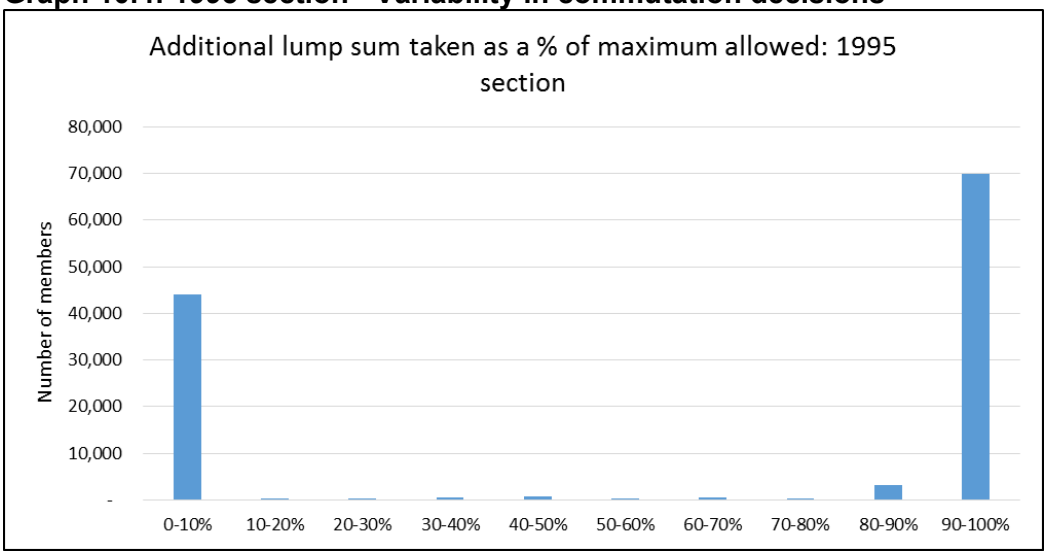
10.6 Table 10.3 shows the variation in commutation experience over the four-year period. For the 1995 section this indicates there has been a steady increase in amount of pension commuted over the four year period.

Table 10.5: Proportion commuted each year over the intervaluation period

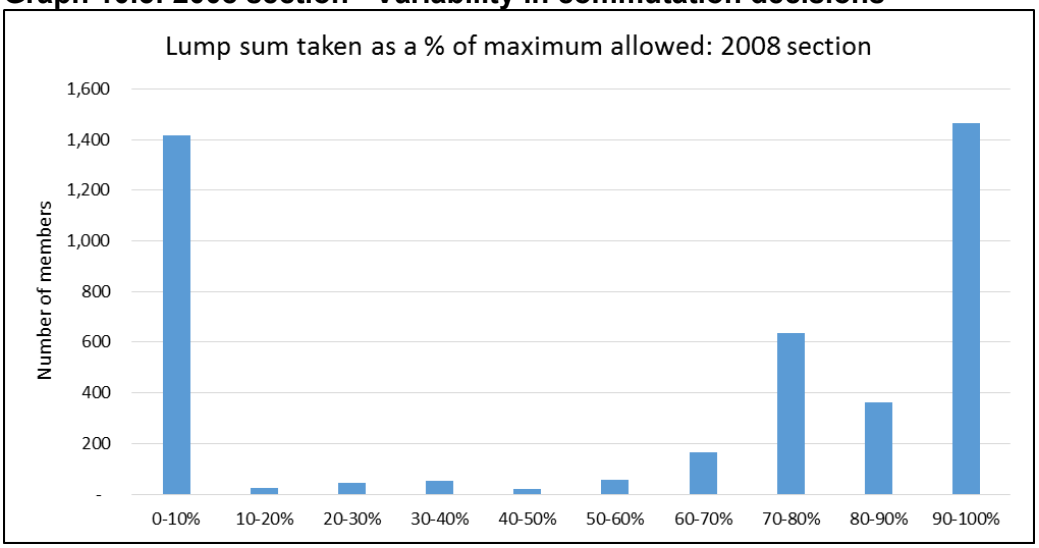
Scheme	Year	Commutation proportion	Proportion of lump sum taken as HMRC max
1995	2012-13	9.6%	77.5%
1995	2013-14	9.6%	77.5%
1995	2014-15	10.3%	79.1%
1995	2015-16	10.1%	78.6%
1995	**2012-16**	**9.9%**	**78.2%**
2008	2012-13	22.4%	62.7%
2008	2013-14	14.0%	39.2%
2008	2014-15	19.2%	53.8%
2008	2015-16	18.1%	50.7%
2008	**2012-16**	**18.7%**	**52.4%**

10.7 Charts 10.4 and 10.5 illustrate the variability in commutation decisions. The first chart, which considers the 1995 section, shows that the vast majority of members took either the maximum additional lump sum or no additional lump sum. The second chart, which considers the 2008 section with no automatic lump sum, shows greater variability in the amounts taken although still with some polarisation. The pattern of variability in commutation decisions is very similar to that observed over the last intervaluation period.

Graph 10.4: 1995 section - Variability in commutation decisions

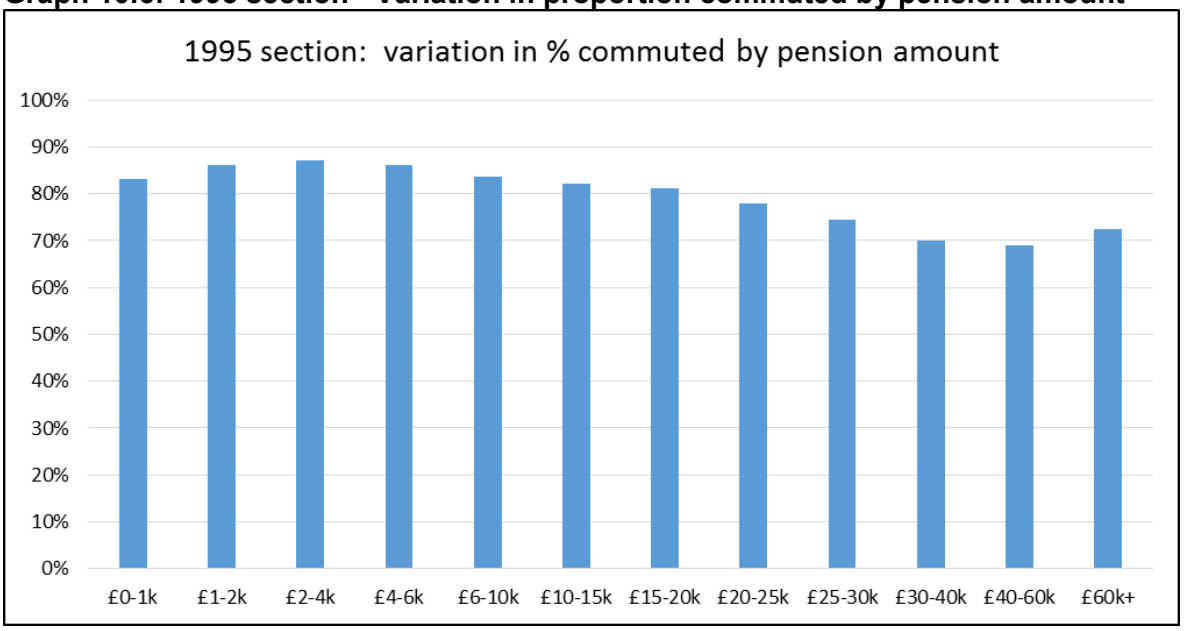


Graph 10.5: 2008 section - Variability in commutation decisions



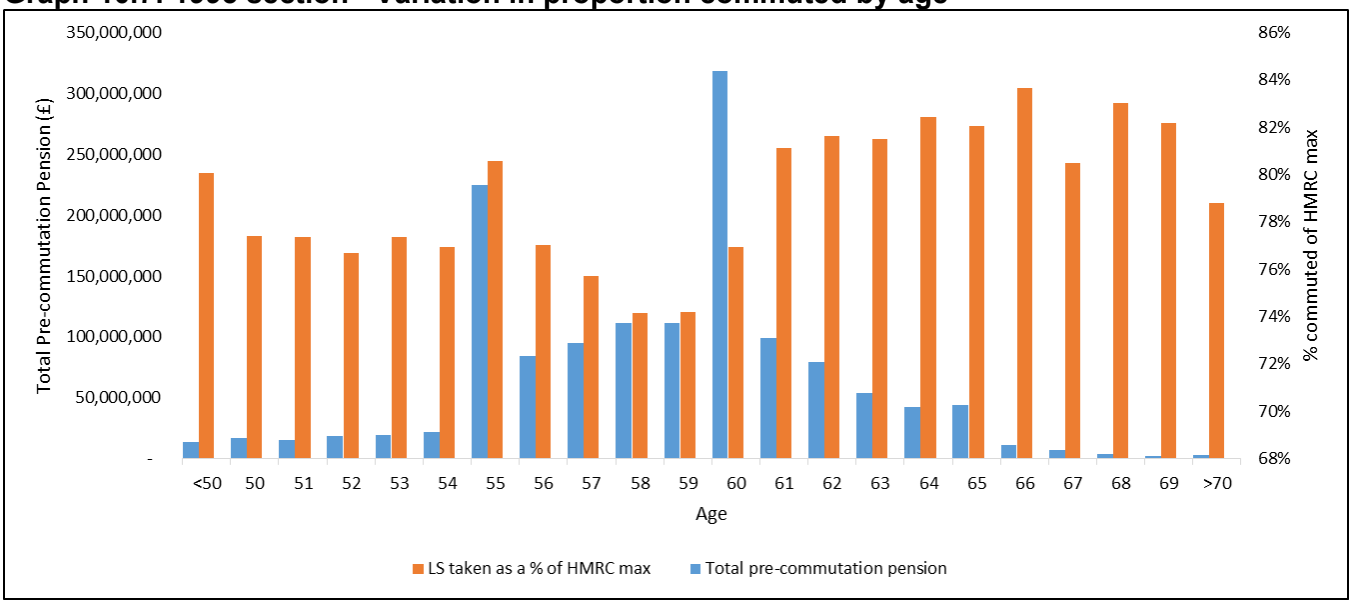
10.8 Chart 10.6 shows the relationship between the percentage of maximum cash taken and pre-commutation pension amount (1995 section). This shows that those with very small pensions are commuting less than the average. This is also the case across most of the range of higher pensioned members, although there is a reverse of the gradual reduction in amount commuted at the very high pension amounts (over £60,000 pa).

Graph 10.6: 1995 section - Variation in proportion commuted by pension amount



10.9 Chart 10.7 (orange bars) shows the variability of commutation behaviour by age at retirement (from the 1995 section). Generally lower proportions are commuted at younger ages and higher proportions at later ages. The blue bars in the chart show the distribution of pre-commutation pension amounts by age for those retiring over the intervaluation period. These show spikes at 55 and 60 (i.e. NPA of special class members and all others), and therefore most of the overall experience is driven by what happens at these ages.

Graph 10.7: 1995 section - Variation in proportion commuted by age



Comments on commutation analysis

10.10 The analysis suggests that members of the 1995 section are commuting more than assumed at the 2012 valuation. Analysis at that valuation indicated a small upwards trend compared to prior analysis and this trend has continued. The differential commutation decisions taken by men and women is also consistent with the pattern seen at the 2012 valuation. Given the clear difference in behaviours for men and women and the continuing general increase in amounts of pension commuted we recommend that the commutation assumption is updated to reflect recent experience. We recommend that the common (unisex) assumption of 8.5% pension commuted for 1995 section members is replaced by a sex dependant assumption of 8% for men and 11% for women.

11 Family statistics

This chapter sets out our recommendation for the assumptions around dependants' pensions for current pensioners, and summarises the analysis undertaken in order to inform that recommendation.

Proposed assumptions for 2016 valuation

11.1 We recommend the following assumptions.

- 72% of men and 52% of women are assumed to be married at death at age 60
- 76% of men and 54% of women are assumed to be partnered at death at age 60
- Male members are assumed to be three years older than their partners and female members are assumed to be three younger than their partners
- No allowance is made for remarriage on the grounds of materiality
- All dependants are assumed to be the opposite sex as the member.

11.2 This section refers to assumptions made for current pensioners. No robust analysis is possible for non-pensioner members and corresponding assumptions for proportions married are based on population statistics.

Previous valuation assumptions

11.3 All family statistic assumptions are the same as those adopted for the 2012 valuation.

Use of the assumptions

11.4 Dependants' pensions[22] are provided on the death of a member. The scheme's benefit provisions for dependants differ according to when the service ended. For members who left service before 1 April 2008 only legal spouses and civil partners are eligible for a survivor's pension. For members in service on or after 1 April 2008, survivors pensions are payable to a qualifying partner[23].

11.5 Where the member has no service on or after 1 April 2008, the spouse's pension will cease if the spouse remarries.

[22] Pensions are also payable to dependent children on a member's death but the costs are not material overall. No allowance is included for children pensions following pensioner deaths and an allowance is incorporated in the population proportions assumed for non-pensioner deaths.

[23] Qualifying partners includes legal spouse, civil partner and 'surviving nominated partner'. To satisfy the latter definition requires a 2-year exclusive relationship between parties able to legally marry or enter a civil partnership, and financial interdependency.

Analysis and approach to setting the assumptions

11.6 To formulate a recommended assumption we compared the scheme experience with the corresponding 2012 assumption.

11.7 We analysed the proportion of deaths giving rise to the payment of a surviving spouse's or partner's pension. The majority of deaths observed relate to members with service before 1 April 2008 only and so would qualify for a pension to a legal spouse (or civil partner) and the analysis compared the aggregate experience with the assumption for proportions married (rather than partnered). Since entitlement to widowers pension only arises for service after 1 April 1988 only members aged 80 or under have been considered in this comparison. This cut off age has been applied based on information derived from other schemes with similar provisions. The NHS data does not allow exclusion of any member deaths where there was no underlying dependant's entitlement rather than there being no eligible spouse.

11.8 As there is no robust scheme specific experience of proportion partnered we recommend the same approach as adopted for the 2012 valuation is retained for this assumption. That approach relies on the differential between proportions married and proportions partnered in population statistics[24].

11.9 We were unable to analyse the age or gender of the dependants relative to the members, or rates of cessation on remarriage, due to lack of data. However, we do not expect these assumptions to have a material effect on the valuation and recommend that the 2012 assumptions are retained. The age difference assumption is based on general population statistics and remarriage is ignored on the basis the impact is expected to be immaterial. Similarly the gender of dependant assumption is not expected to be material.

Results of analysis: Proportions dying with dependant pension payable compared to 2012 assumption of proportion married

11.10 The overall ratio of actual to expected numbers of members dying over the four-year period to 31 March 2016 and leaving a dependant eligible for a contingent pension are shown in the table below. In the below expected numbers are based on the proportions married assumptions adopted for the 2012 valuation for the reasons outlined above.

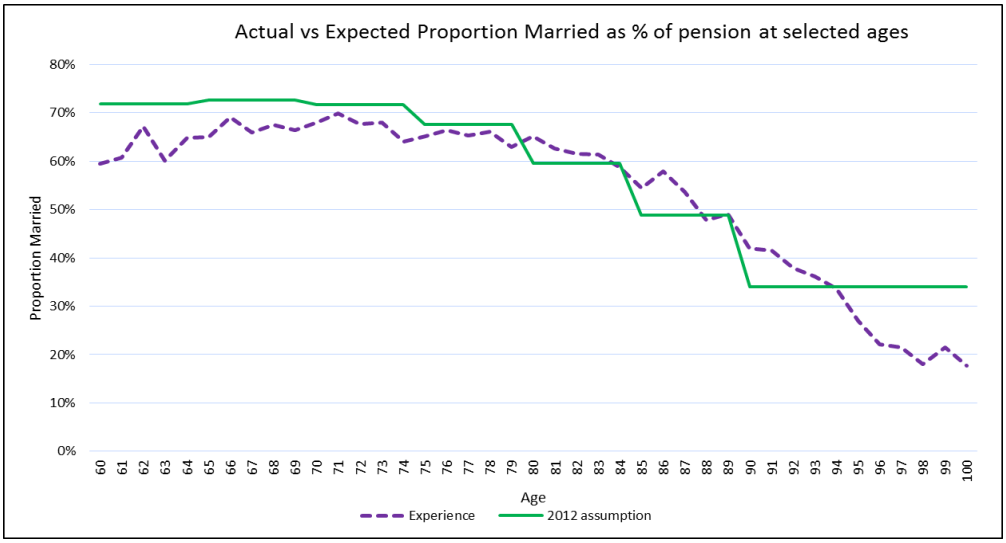
Table 11.1: Comparison of actual to expected proportions married at death

	A/E
Men	99%
Women	100%

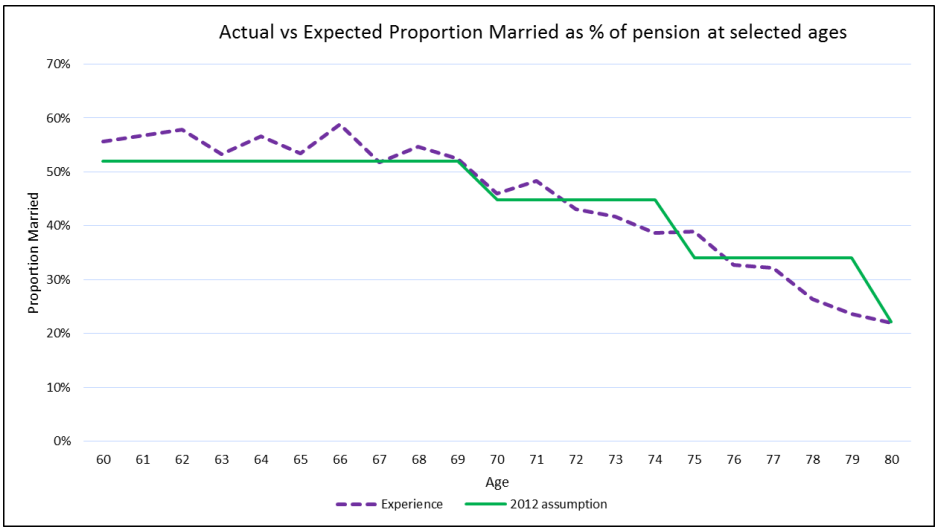
[24] published by the Office for National Statistics (ONS)

11.11 The graphs below show a similar comparison but split by age at death.

Graph 11.1: Male pensioners: Actual proportions married against expected based on 2012 valuation assumptions



Graph 11.2: Female pensioners: Actual proportions married against expected based on 2012 valuation assumptions



Comments on analysis

11.12 The scheme's experience by age over the four-year period to 31 March 2016 is consistent with the assumptions adopted for the 2012 valuation. For this reason we recommend retention of the 2012 assumptions for the 2016 valuation.

Appendix A: Details of assumptions

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

Pensioner mortality

Table A1: Baseline mortality assumptions

Baseline mortality	Standard table[25]	Adjustment
Males		
Retirements in normal health	S2NMA	83%
Current ill-health pensioners	S2IMA	83%
Future ill-health pensioners	S2IMA	100%
Dependants	S2NMA	100%
Females		
Retirements in normal health	S2NFA	85%
Current ill-health pensioners	S2IFA	85%
Future ill-health pensioners	S2IFA	100%
Dependants	S2NFA	100%

As specified by HM Treasury, future improvements in mortality will be assumed to be in line with those underlying the ONS 2016-based principal population projections for the UK.

[25] From the 'S2' series of standard tables published by the CMI and based on the experience of self-administered pension schemes. Separate tables are available based on experience of members retiring in normal and ill-health and for dependants.

Age retirement from service

Table A2: 1995 section: Age retirement rates

	Male rates					Female rates				
Age	**Non-manual**	**MHO**	**Manual**	**Practitioner**	**Special Class Nurses**	**Non-manual**	**MHO**	**Manual**	**Practitioner**	**Special Class Nurses**
50	0.01	0.03	0.02	0.01	0.02	0.01	0.03	0.01	0.00	0.01
51	0.01	0.02	0.01	0.01	0.02	0.01	0.02	0.01	0.00	0.01
52	0.01	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.00	0.01
53	0.01	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.00	0.01
54	0.02	0.13	0.02	0.02	0.05	0.01	0.11	0.01	0.01	0.05
55	0.04	0.50	0.05	0.06	0.30	0.05	0.48	0.03	0.05	0.35
56	0.04	0.24	0.05	0.05	0.13	0.04	0.22	0.02	0.05	0.15
57	0.05	0.27	0.06	0.10	0.16	0.05	0.20	0.04	0.07	0.16
58	0.08	0.25	0.06	0.16	0.21	0.06	0.23	0.04	0.14	0.18
59	0.12	0.29	0.09	0.28	0.16	0.10	0.26	0.07	0.21	0.20
60	0.33	0.33	0.25	0.63	0.42	0.30	0.35	0.19	0.69	0.39
61	0.19	0.27	0.14	0.32	0.31	0.24	0.30	0.23	0.27	0.35
62	0.20	0.34	0.17	0.25	0.24	0.31	0.38	0.31	0.35	0.40
63	0.22	0.28	0.17	0.25	0.29	0.27	0.35	0.23	0.23	0.34
64	0.32	0.72	0.37	0.28	0.76	0.30	0.69	0.25	0.29	0.62
65	0.51	1.00	0.59	0.47	1.00	0.39	1.00	0.35	0.57	1.00
66	0.30		0.32	0.23		0.27		0.25	0.26	
67	0.28		0.29	0.33		0.28		0.19	0.28	
68	1.00		1.00	1.00		1.00		1.00	1.00	

Table A3: 2008 section: Age retirement rates

	Male rates			Female rates		
Age	**Non-Manual**	**Manual**	**Practitioner**	**Non-Manual**	**Manual**	**Practitioner**
55	0.02	0.02	0.02	0.02	0.02	0.02
56	0.02	0.02	0.02	0.02	0.02	0.02
57	0.02	0.02	0.02	0.02	0.02	0.02
58	0.02	0.02	0.02	0.02	0.02	0.02
59	0.03	0.03	0.03	0.03	0.03	0.03
60	0.04	0.04	0.04	0.04	0.04	0.04
61	0.05	0.05	0.05	0.05	0.05	0.05
62	0.06	0.06	0.06	0.06	0.06	0.06
63	0.07	0.07	0.07	0.07	0.07	0.07
64	0.08	0.08	0.08	0.08	0.08	0.08
65	0.94	0.90	0.87	0.92	0.94	0.87
66	0.55	0.70	0.32	0.45	0.50	0.40
67	0.50	0.55	0.32	0.40	0.50	0.40
68	0.50	0.50	0.32	0.35	0.50	0.40
69	0.55	0.40	0.32	0.35	0.50	0.40
70	1	1	1	1	1	1

Table A4: Age retirement rates for members joining the 2015 scheme on or after 1 April 2015

	All members (and applicable to all service)
NPA*	1
NPA-1	0.08
NPA-2	0.07
NPA-3	0.06
NPA-4	0.05
NPA-5	0.04
NPA-6	0.03
NPA-7	0.02
NPA-8	0.02
NPA-9	0.02
NPA-10	0.02
NPA-11}	0.01
NPA-12} to min age 55	0.01
NPA-13}	0.01

* NPA in 2015 scheme in all cases

Retirements are assumed to occur on a member's birthday

Ill-health retirement from service

Table A5: Ill-health retirement rates for all members

Age	Males	Females
20	0.0001	0.0001
25	0.0002	0.0002
30	0.0002	0.0002
35	0.0004	0.0004
40	0.0006	0.0005
45	0.0013	0.0008
50	0.002	0.001
55	0.004	0.003
60	0.005	0.006
62	0.006	0.007
64	0.006	0.008
66	0.007	0.009
68	0	0

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

In all scheme sections, 75% of ill-health retirements are assumed to qualify for upper tier awards.

Voluntary withdrawal from service

No net withdrawals are assumed for practitioner or special class members in the 1995 section.

Table A6: Withdrawal rates (net of re-entry within 5 years) for all other members

Age	Duration of service			
	0-1 year	1-2 years	2-3 years	>3 years
< 20	0.30	0.20	0.20	0.20
25	0.20	0.15	0.08	0.06
30	0.10	0.09	0.05	0.04
35	0.10	0.06	0.05	0.04
40	0.10	0.06	0.05	0.03
45	0.10	0.06	0.05	0.03
50+	0.10	0.06	0.05	0.03

Death before retirement

Table A7: Death before retirement rates for all members

Age	Males	Females
20	0.0002	0.0002
25	0.0002	0.0002
30	0.0003	0.0002
35	0.0005	0.0003
40	0.0006	0.0003
45	0.0009	0.0005
50	0.0012	0.0008
55	0.0019	0.0011
60	0.0030	0.0017
65	0.0048	0.0025

Promotional pay increases

Table A8: Promotional salary scales for all members

Age	Non-manual Officers and Practitioners		Manual Officers	
	Males	Females	Males	Females
	Index value*	Index value*	Index value*	Index value*
20	73	77	83	83
25	100	100	100	100
30	132	125	120	120
35	165	140	136	132
40	195	151	146	140
45	215	157	155	144
50	229	162	161	147
55	236	166	165	148
60	242	169	165	148
65	242	169	165	148

*Relative to an index value of 100 at age 25

Commutation of pension for cash at retirement

Table A9: Recommended commutation assumptions for the 2016 valuation

	1995 section	2008 section	2015 scheme
Males and females	8% (M)/11% (F)	17.5%	17.5%

Family statistics

Table A10: Proportion married or partnered at death

Age	Members leaving service before 31 March 2008		Members in service on or after 31 March 2008	
	Males	Females	Males	Females
50	72%	52%	76%	54%
60	72%	52%	76%	54%
70	72%	45%	74%	46%
80	60%	22%	61%	23%
90	34%	7%	34%	7%

Only a legal spouse of a member leaving before 31 March 2008 is eligible for a dependant's pension. Other dependants may be eligible to dependant's pension for members in service on or after 1 April 2008.

Dependants are assumed to be of the opposite gender as the member.

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

Appendix B: Modelling approach and minor assumptions

Active membership projections

B.1 Direction 11[26] requires the actuary to use the 'projected unit methodology' to calculate the valuation results. The valuation results require the calculation of the cost of benefit accrual over periods after the effective date (31 March 2016). The expected cost of benefits provided to members remaining in the pre-2015 scheme under the provisions of transitional protection differs from the expected cost of providing members with benefits in the 2015 scheme. Further the expected cost of providing benefits varies for members with differing benefit provisions within the pre-2015 scheme (notably for members with differing normal pension ages). This implicitly requires the actuary to estimate the membership to future dates in order to determine the valuation results.

B.2 Since the majority of members (around 80%) were accruing benefits in the 2015 scheme at the effective date, and further given that the remaining members continuing to accrue benefits in the pre-2015 scheme are expected to rapidly decline to close to nil over the future periods being considered in this valuation, a pragmatic approach to estimating the future membership of each section/scheme over the relevant future periods is suitable.

B.3 The expected cost of accruing benefits over periods after effective date have been determined by assuming an overall stable population (age and pay profile) to end of implementation period. In particular:

- Allow for the protected population to reduce over the projection period (ie to 2023) with a corresponding increase in those accruing benefits in the 2015 scheme to maintain the stable population. SPA in the projected populations is determined by implied dates of birth and so the SPA mix changes over time despite the assumed stable population.
- Mortality is projected forward to the relevant year of use in all cases.
- The run off of the protected population is broadly linear from the relevant calculation date to the average age at which members of each identified group (eg NPA 55, 60, 65) are expected to retire.

B.4 The expected cost of accruing benefits over periods after the effective date for cost cap purposes has been determined by assuming:

- The aggregate membership has the same age/pay profile over all projection periods (i.e. to 2023) (and assuming all in the 2015 scheme).

[26] The Public Service Pensions (Valuations and Employer Cost Cap) Directions 2014, as amended.

- Allow for the actual membership (assumed) accruing benefits in the 2015 scheme to change over the projection period (i.e. to 2023). SPA in the projected populations is determined by implied dates of birth and so the SPA mix changes over time despite the assumed stable population.

- Mortality is projected forward to the relevant year of use in all cases.

Grouping of individual active member records

B.5 Individual active members have been grouped together for the purposes of calculating liabilities. This grouping is necessary to accommodate the volume of data within our valuation system. The approach taken to grouping the data has been tested to ensure it does not result in any distortion of the valuation results. The groupings are made for each section/scheme (i.e. 1995, 2008 or 2015), protection status (i.e. protected, tapered or unprotected) and within each valuation group (i.e. based on the categorisation by benefit provision or occupation, a description of each valuation group is given in Appendix D) and based on the following criteria.

Age	*Age nearest*
Service	Duration (years nearest)

Accrual cost methodology

B.6 See B.3 and B.4. The cost over each relevant period has been taken as the average of the cost at the start and end of each period.

B.7 Direction 11 requires use of the projected unit methodology to determine the valuation results. Directions 14, 16 and 17 specify some modifications to the financial assumptions in the short term. An implication of the short term modifications is that the projected unit methodology is expected to result in an increasing standard contribution rate over successive periods. For example the cost of accrual under the existing scheme over the period 2016 - 2019 is lower than that over the period 2019 - 2023 (ignoring any redistribution of members between sections and into the 2015 scheme). This effect is not immaterial for final salary benefits but has no effect on the cost cap future service cost calculation since short term assumptions are explicitly disregarded for this purpose in Direction 40.

B.8 Non-accruing benefits such as lump sums payable on death in service have been recognised only when a benefit payment is expected.

B.9 Members accruing or expecting to accrue benefits at double rate (Mental Health Officers after completion of 20 years' service) are treated as though the overall expected benefit accrues uniformly over all service.

Guaranteed Minimum Pensions (GMPs)

B.10 A global adjustment was applied to reduce the past service liability in respect of estimated GMP entitlements for which provision of post SPA pension increases is not the responsibility of the scheme. The reduction is equivalent to a contribution rate of 0.3% over the 15 year period from the implementation date. This estimation has no impact on the calculation of the employer contribution correction cost.

Earnings cap

B.11 For members joining pensionable service on or after 1 June 1989 pensionable pay is restricted to a monetary cap for any reckonable service between 1 June 1989 and 31 March 2008. The cap was £149,400 for the 2015/16 scheme year and increases each year in line with the Retail Prices Index. A global adjustment was applied to allow for the restriction of benefits for affected members. The difference is equivalent to a contribution reduction of 0.1% over the 15 year period from the implementation date. This estimation only affects the uncorrected employer contribution rate. It has no impact on the employer contribution correction cost.

Public Service Transfer Club (PSTC)

B.12 Allowance has been made for the potential additional liabilities arising from inward transfers on PSTC terms. The volumes of transfers have historically been small and if they continue at these levels the financial impact is expected to be equivalent to a contribution cost of 0.1%.

Final pensionable pay

B.13 All liabilities have been based on pensionable pay at the effective date as provided by NHSBSA. No explicit allowance has been made for the impact of prior years' earnings resulting in higher final pensionable pay for particular members since this effect is not expected to impact a material number of members.

Dependants' pensions

B.14 No allowance has been taken for short term dependant pensions or children's pensions (other than those already in payment), on ground of immateriality.

Expenses

B.15 No allowance has been made for expenses. Expenses are outside the valuation framework.

Early retirement factors

B.16 When modelling retirement before Normal Pension Age where an actuarial reduction would be applied early retirement factors have been set equal to current factors (applied for the appropriate period before the normal pension age).

Re-entry of members

B.17 Re-entry of members to pensionable service has been modelled by the use of a 'net' withdrawal assumption for active members. This explicitly allows for a proportion of those leaving active service to return. No explicit allowance has been made in the valuation for a proportion of those deferred at the effective date to subsequently rejoin. However the analysis undertaken for active members, and the resultant 'net' withdrawal rates include those rejoining from deferred status and hence the valuation of active members implicitly includes some provision for deferred members to return.

Additional voluntary contributions

B.18 Additional voluntary contributions paid to on a money purchase basis are paid in accordance with Regulations which are separate to the pension scheme regulations and have not been considered for the valuation. Additional voluntary contributions paid in accordance with the pension scheme regulations to secure added service or pension are taken into account as liabilities of the scheme.

Scheme pays

B.19 Members can opt to use the scheme pays facility to pay HMRC for an annual allowance or lifetime allowance tax charge (i.e. the scheme pays the tax charge on behalf of the member for a corresponding reduction to the member's pension). Where members have opted to use this facility a lower liability has been valued for these members, to reflect a scheme pays pension debit. The notional fund allows for actual cash flows and reflects any tax charges paid by the scheme, therefore a corresponding lower notional fund has been valued. The impact of these will broadly net off for valuation purposes.

Member contribution yield over implementation period

B.20 The average member contribution yield expected over the implementation period is 9.7% p.a. The target yield is 9.8% and the Department of Health and Social Care has agreed with HM Treasury that for uncorrected employer contribution purposes the valuation results should provide for this yield shortfall of 0.1% to be carried forward to the next valuation, therefore a yield of 9.8% over the implementation period is used in the calculation of the uncorrected employer contribution rate.

Other Direction interpretations

Directions 27 and 28 (contribution rates)

B.21 27(1)(a) and 27(1)(c) : Payroll at effective date projected forward (only) in line with valuation earnings assumptions for purposes of spreading the deficit.

B.22 27(1)(c)(ii) and 28 : Member contributions since the effective date based on actual (or expected) yield for past periods and periods up to 31 March 2019. Set equal to target contribution yield from April 2019. See B.20.

B.23 27(1)(b) and 27(1)(d) : See B.3 and B.4.

Directions 28, 31, 32(1), 33(2)(a) (and related) – member contribution yields

B.24 See paragraph B.20.

Directions 32(1) – expected cost of benefits for past periods (for cost cap purposes)

B.25 Assume that contribution rate required to cover cost of benefits over 2015-16 is the same as the rate required to cover cost of benefits over 2015-19.

Directions 32(1) and 40(1) – expected cost of benefits for future periods (for cost cap purposes)

B.26 See B.4

Direction 33 – cost cap income

B.27 For the CCNLL element this has been based on the liability discount rate used for the cost cap liabilities at 2016 rather than the investment roll up. The impact is immaterial to the results.

Appendix C: Assumptions made for data uncertainties

Summary

C1 Whilst comprehensive data was received from NHSBSA for the 2016 valuation, some aspects of the data were incomplete and/or unreliable for certain elements of our valuation calculations.

C2 It has not been possible to fully resolve these data issues in the timescale required for the valuation. Therefore to calculate results for the 2016 valuation of the Scheme requires assumptions in respect of incomplete and/or unreliable individual member records and movements data, the latter is used for setting assumptions and in the calculation of the Net Leavers Liability.

C3 Scheme specific assumptions are determined by the "responsible authority", which is the Secretary of State for Health and Social Care in the case of the Scheme, and must be set as best estimate assumptions and not include margins for prudence or optimism.

Individual member records

C4 Membership data is provided by NHSBSA for the purpose of the 2016 valuation and we apply checks to these membership records to ensure all key data items are provided and reliable for valuation purposes. Following these checks, it was identified that individual member records at the relevant dates as required for valuation purposes were not fully complete and reliable. We worked with NHSBSA to address a number of these issues, however where critical data items were missing from member records the general approach taken was to exclude that record for calculation purposes with calculations based on the remaining dataset being rated up to incorporate an allowance for the excluded records.

C5 Uprating factors were determined for each membership category equal to the ratio of known valid records and the number of records with adequate data. Implicitly this uprating approach assumes that the records with omissions or errors have the same average profile (age, sex, pay, service) as fully complete records. Some 3% of records were excluded from the 2016 valuation data and around 6% of the data provided for the purposes of setting the initial cost cap fund.

C6 As noted, the approach taken to data omissions is to assume each record with missing data has the same average profile as the complete records and therefore there is a risk that this assumption is not appropriate. The table below indicates the extent to which the valuation results might be incorrect if the approach in fact under/overstates the liability for the omitted members by 10%.

	Impact of error in assumption for missing data (as % of pay)	
	Uncorrected Employer contribution rate	Employer contribution correction cost
Actives (uprating applied: 5%)	0.1%	0.1%
Deferreds (uprating applied: 2%)	<0.05%	nil
Pensioners (uprating applied: 0%)	nil	nil

C7 The table above illustrates the potential impact if known data omissions are subsequently found to have been handled incorrectly. Since it is not possible to undertake independent checks for all categories of members and a full reconciliation has not been achieved against all prior datasets there is the potential for currently unidentified problems with the data to emerge in future. For example a group of deferred members could be identified where no liability has previously been determined. The impact of such unknowns emerging at subsequent valuations could be considerably more than the sensitivity indicated above.

Movements data

Setting assumptions

C8 NHSBSA supplied data on the experience of the scheme membership over the four-year period to 31 March 2016. Fully complete and comprehensive data about members moving status between certain dates (e.g. leaving active status due to death or retirement) was not able to be provided. Analysis of member movements is needed to inform scheme specific demographic assumptions as scheme-specific experience, both recent and longer term, generally provides the most reliable evidence when considering best estimates of future experience.

C9 Assumption setting relies on analysis of movements data in consideration with such other relevant information which is available. The setting of demographic assumptions is to some extent subjective and a matter of interpretation. Changes in assumptions may be expected at successive valuations as circumstances change even with full data. Thus the absence of fully complete movements data does not necessarily introduce uncertainty into the valuation results provided there is other relevant information available to inform those assumptions. It is to be expected that there is some volatility in the experience arising from an analysis of movements data. As assumptions are intended to reflect long term expectations it is reasonable to seek to smooth out the impact of these short term effects. A number of the recommendations we make for scheme-specific valuation assumptions smooth out the short term effects by taking only 50% of the difference in experience since the 2012 valuation, for example in recommending the assumption for baseline pensioner mortality.

Net Leavers Liability (NLL)

C10 The initial cost cap fund is set equal to the liability for actives members at 31 March 2015. The cost cap mechanism is intended to manage the costs of the reformed scheme and recognise any unexpected experience relating to pre-reformed entitlements of members in service at 1 April 2015, but only to the point at which they leave active service. NLL is a quantification of the amount of pre-reformed liabilities which fall out of the cost cap fund at a valuation owing to members which have left service since the previous valuation (or since the initial cost cap fund was set in the case of the 2016 valuation), net of the additional liabilities in respect of members with pre-reformed service who rejoined active membership during 2015-16.

C11 To accurately calculate NLL in accordance with the directions requires full movement data for all members who were active in 2015 and are no longer active at the 2016 valuation. Some approximation has been required to determine NLL for all valuations being undertaken in accordance with the valuation directions, although to a minimal extent for the NHS scheme.

C12 For the purposes of determining the 2016 valuation results, we recommend an approach which implicitly makes an assumption that there is no unidentified experience gain or loss arising over the period 2015 to 2016. A risk of this approach is that any upward or downward cost pressure that has occurred over the period but has not been explicitly identified will not be reflected in the 2016 valuation results.

C13 We expect that the uncertainty introduced by the approach above is not more than 0.1% of pay. Although it should be noted that the deficiencies in the membership data discussed above could compound this scale of uncertainty.

C14 We would not expect significant unidentified experience gains or losses to arise over the one year period 2015 to 2016 in the normal course of events, although such experience can occur. In addition we have reconciled the surplus or deficit arising over the period 2012-16 with only a small unattributed item.

Appendix D: Description of valuation groups

Description		Valuation Group
Administrative and managerial staff not in GP practices	Men	1
	Women	11
Non-manual MHOs (including those not yet doubling service)	Men	2
	Women	12
Manual staff (not MHOs)	Men	3
	Women	13
Clinical staff not in any other group	Men	5
	Women	15
Medical Practitioners	Men	7
	Women	17
Dental Practitioners	Men	8
	Women	18
Nurses, physiotherapists, midwives and health visitors with special class status	Men	9
	Women	19
GP practice staff (except Practitioners and those with special class status who are included in the appropriate groups above)	Men	10
	Women	20

Appendix E: Sensitivity of valuation results to Secretary of State set assumptions

E.1 The table below provides an indication of the sensitivity of the valuation results to the particular assumptions under consideration. The figures shown here are also provided in section 4 of the formal valuation report.

Sensitivity of valuation results to Secretary of State set assumptions

	Addition to uncorrected employer contribution rate[12]	Addition to employer contribution correction cost
Membership profile: 2 years older on average over implementation period	0.6%	0.6%
Mortality rates: 5%* heavier rates of pensioner mortality	(0.9)%	(0.6)%
Age retirement rates: where no actuarial adjustment is applied): 5% more members of the 1995 section assumed to retire at normal pension age than currently assumed, with correspondingly fewer members assumed to retire later	0.1%	0.1%
Commutation (other than as directed): all eligible members of the 1995 section commute 2% of pension more than assumed	(0.2)%	(0.2)%
Ill-health retirement: 5%* increase to assumed rates	0.0%	0.0%
Ill-health retirement: 5%* increase in proportion assumed to receive tier 2 benefits	0.0%	0.0%
Proportions partnered: 5%* more members assumed to have qualifying partners at death	0.2%	0.2%
Resignations and opt outs: 5%* higher numbers assumed to leave voluntarily before retirement (net of rejoiners)	(0.3)%	(0.3)%
Promotional pay increases: 0.5% higher promotional pay increases than assumed	1.7%	1.1%

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

E.2 In each variant of the above table the sensitivity shown is in relation only to the change in assumption described. The impact of a combination of assumption changes will not necessarily equate to the sum of the relevant rows above.