Government Actuary's Department

Firefighters' Pension Schemes (Scotland) (FPS (Scotland))

Advice on assumptions

Actuarial valuation as at 31 March 2020

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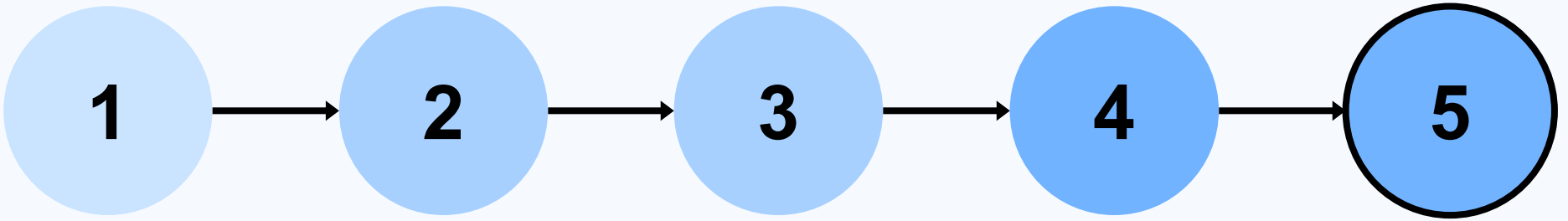
26 January 2024

Assumptions setting process



GAD analyse experience data and prepare an initial set of recommended 'scheme-set' assumptions.

GAD discuss recommended assumptions with the Scottish Public Pensions Agency (SPPA).

GAD discuss recommended assumptions with the Scottish Firefighters' Pension Scheme Advisory Board.

GAD present final recommended assumptions to Scottish Ministers.

Scottish Ministers decide on the assumptions to be used in our calculations and inform GAD.

Details of our recommended assumptions can be found in Part B of this report.

The purpose of these discussions is to:

- Go through our recommended assumptions to make sure they are reasonable and appropriately reflect scheme experience.
- Provide an opportunity for stakeholders to highlight any relevant additional information they hold which could impact our recommendations.

Scottish Ministers have ultimate responsibility for setting the 'scheme-set' assumptions covered in this report, after considering GAD's advice.

Scottish Ministers have decided to adopt all of the recommended 'scheme-set' assumptions set out in this report.

Highlights

	Scheme-set assumptions		Our recommendations	
	Importance relative to scheme-set assumptions		Size of recommended changes	Impact of recommended changes on scheme costs
Mortality after retirement	Most		Small	Higher costs
Proportion commuted	Average		Medium	Lower costs
Retirement ages	Average		Small	Lower costs
Rates of leaving service	Average		Large	Lower costs
Promotional pay increases	Average		None	No impact
Rates of ill-health retirement	Least		None	No impact
Mortality before retirement	Least		None	No impact
Family statistics	Least		None	No impact

This table provides a summary of the 'scheme-set' assumptions and their likely bearing on the valuation results. It is intended to highlight areas of potential focus to aid with the process of deciding on the 'scheme-set' assumptions to be adopted.

These assessments are indicative, rather than precise. More information on the approach used can be found in Section B1.

Be aware that several of the most important valuation assumptions do not appear in this table as they will be directed by HM Treasury. The impact of these 'directed' assumptions could be much greater than that of the impact of 'scheme-set' assumptions.

Advice on assumptions

Contents

Part A: Background

Any terms that appear in this report in underlined text are defined in the Glossary.

At the Government Actuary's Department (GAD), we seek to achieve a high standard in all our work. We are accredited under the Institute and Faculty of Actuaries' Quality Assurance Scheme. Our website describes **the standards** we apply.

Part B: Recommendations

Part C: Appendices

Part A: Background

Introduction

Who is this report for?

This report is addressed to Scottish Ministers.

The Directions require the scheme actuary to carry out a robust analysis of the demographic experience of the scheme. The purpose of this report is to provide our analysis, advice and recommendations on the 'scheme-set' assumptions to be adopted for the actuarial valuation of the FPS (Scotland) as at 31 March 2020, as required.

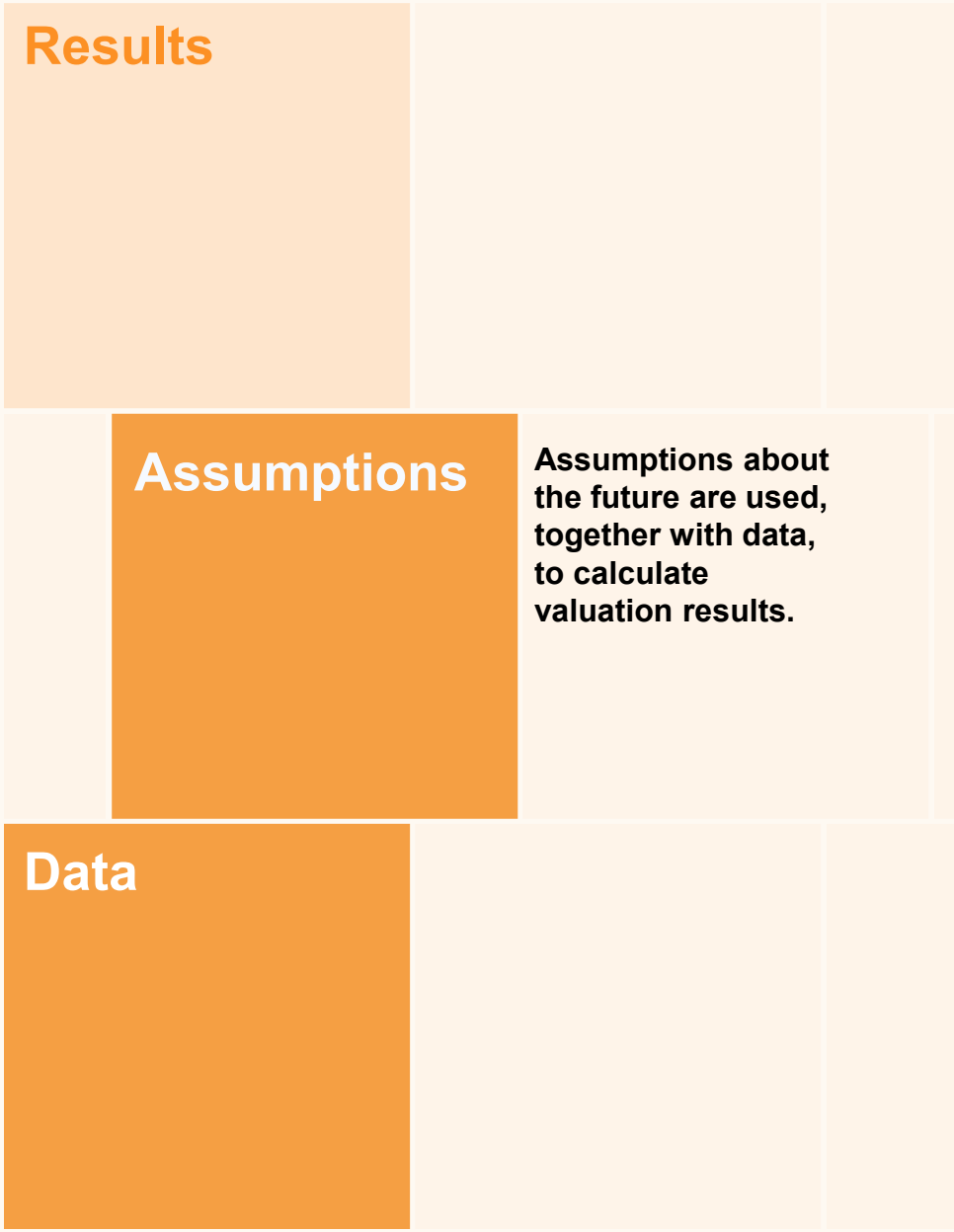
This report is intended to help Scottish Ministers:

- understand the key assumptions about the future that need to be made in order to carry out the valuation
- understand the impact those assumptions can have on the valuation results
- decide on the 'scheme-set' assumptions to be adopted.

Why are assumptions important?

Assumptions are estimates of uncertain variables needed to carry out the actuarial valuation of the FPS (Scotland) as at 31 March 2020, in accordance with HM Treasury Directions.

The results of the valuation are critically dependent on the assumptions adopted. If what actually happens in the future turns out to be significantly different to these assumptions, employers could end up having over- or under-paid contributions, or benefit changes could be made when they otherwise wouldn't be.



Types of assumptions

What assumptions are needed?

There are 2 main types of assumption:

- **Demographic assumptions.** These focus on member characteristics and help to determine when and for how long benefits are expected to be paid.
- **Financial assumptions.** These focus on financial factors and help to determine how much is expected to be paid to members.

Together, these assumptions determine how much needs to be set aside now, in order to meet future payments.

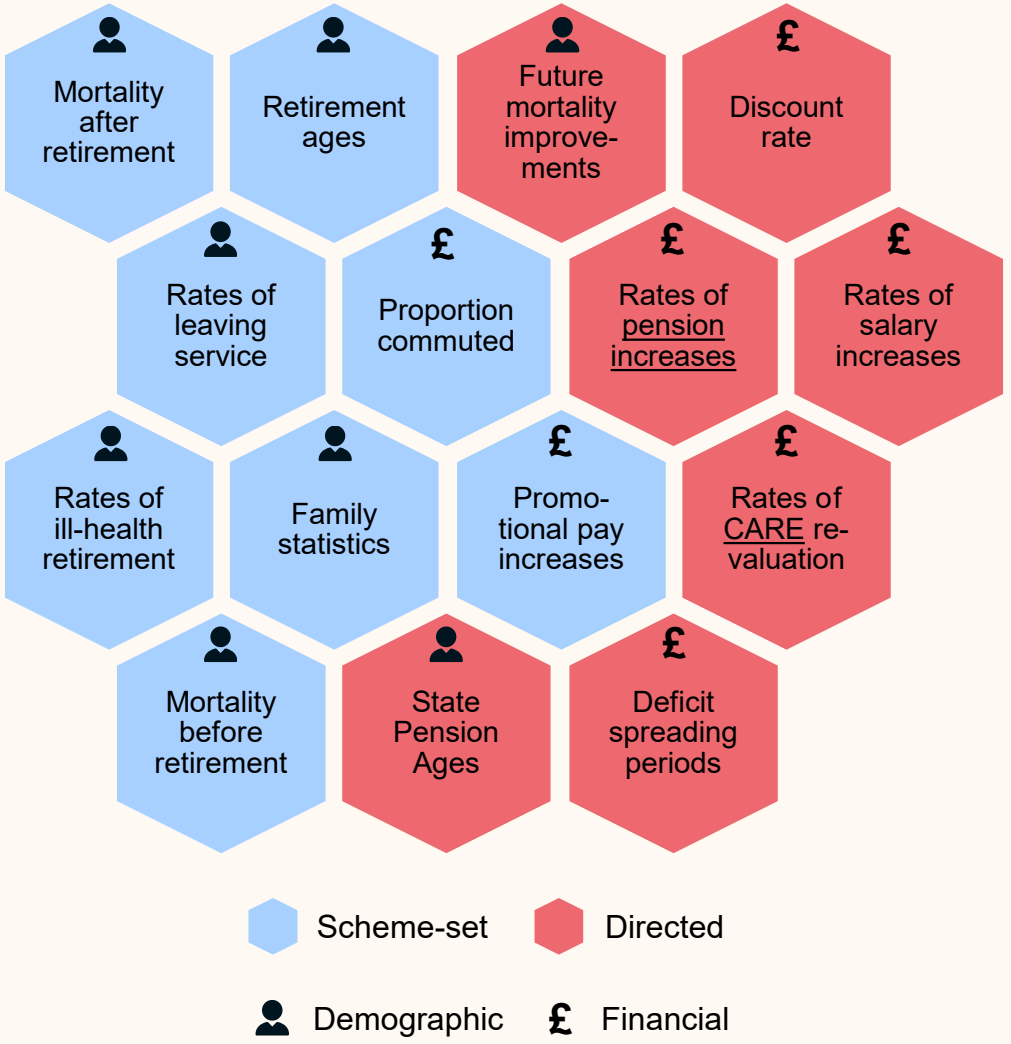
Who is responsible for assumptions?

There are 2 parties responsible for setting assumptions:

- Scottish Ministers, who are responsible for setting 'scheme-set' assumptions (after taking actuarial advice). These are usually demographic assumptions.
- HM Treasury, who are responsible for setting 'directed' assumptions through legislation. These are usually financial assumptions.

In this report, we focus on 'scheme-set' assumptions, but 'directed' assumptions are included for context. Directed assumptions are shown in Appendix C1.

Additional assumptions are also required to estimate the liability arising from the Matthews second options exercise. Details of assumptions can be found in Appendix C3. Scottish Ministers are responsible for setting these assumptions.



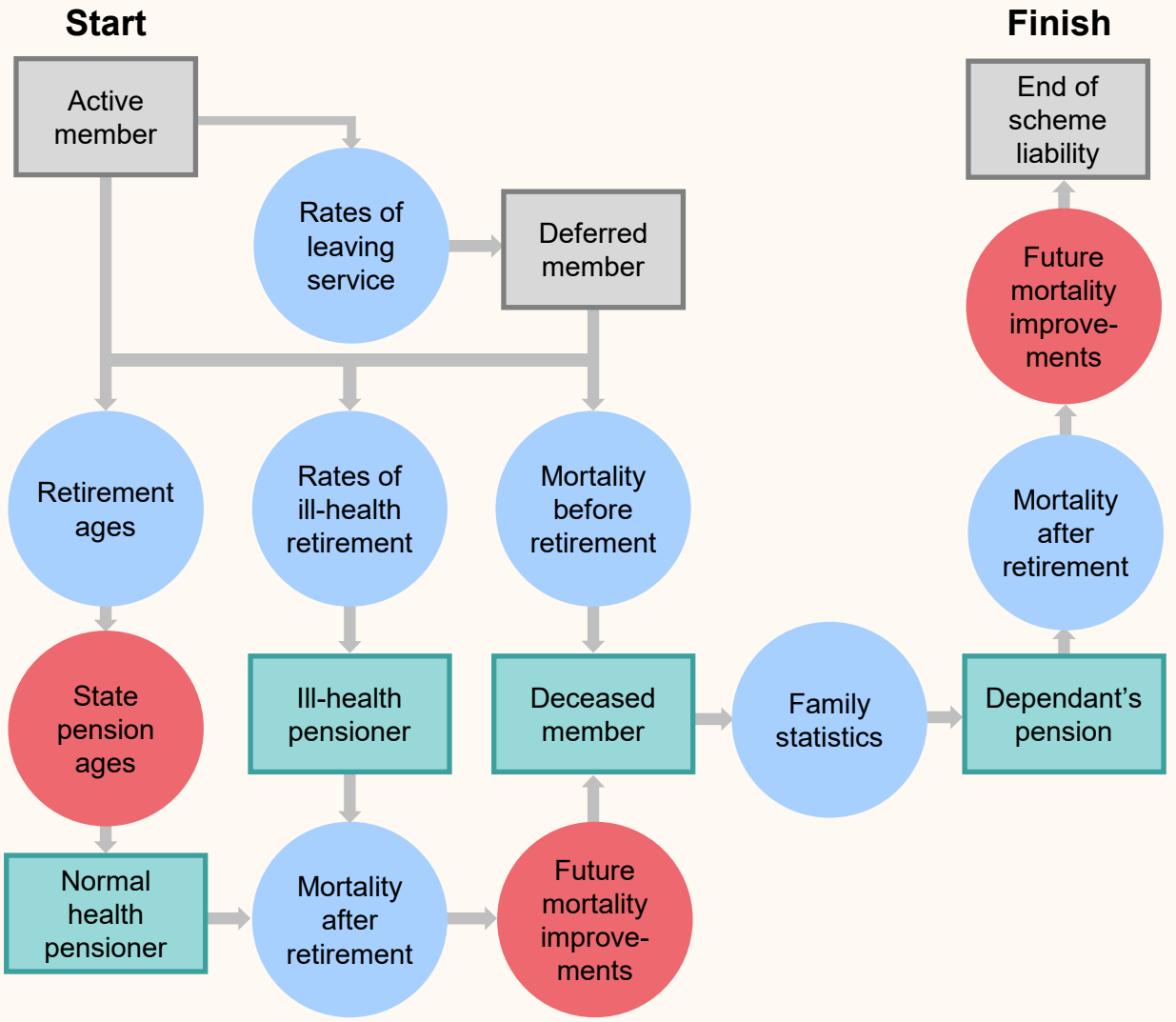
Demographic assumptions

How are the assumptions used?

Demographic assumptions are used to predict what will happen to the status of members in the future, until their liability in the scheme is extinguished.

The chart to the right shows a simplified set of paths that an active member could follow. Demographic assumptions (shown in circles) are used to determine the likelihood that the member follows any given path.

Most demographic assumptions are set by the scheme, rather than directed by HM Treasury.



Member status: **no benefits payable**

Member status: **benefits payable**

Scheme-set

Directed

Financial assumptions

How are the assumptions used?

Financial assumptions are used to predict:

- the size of future benefits due to members
- the current cost of those benefits to the scheme.

The chart to the right shows a simplified summary of how these assumptions are applied.

The only financial assumptions set by the scheme are:

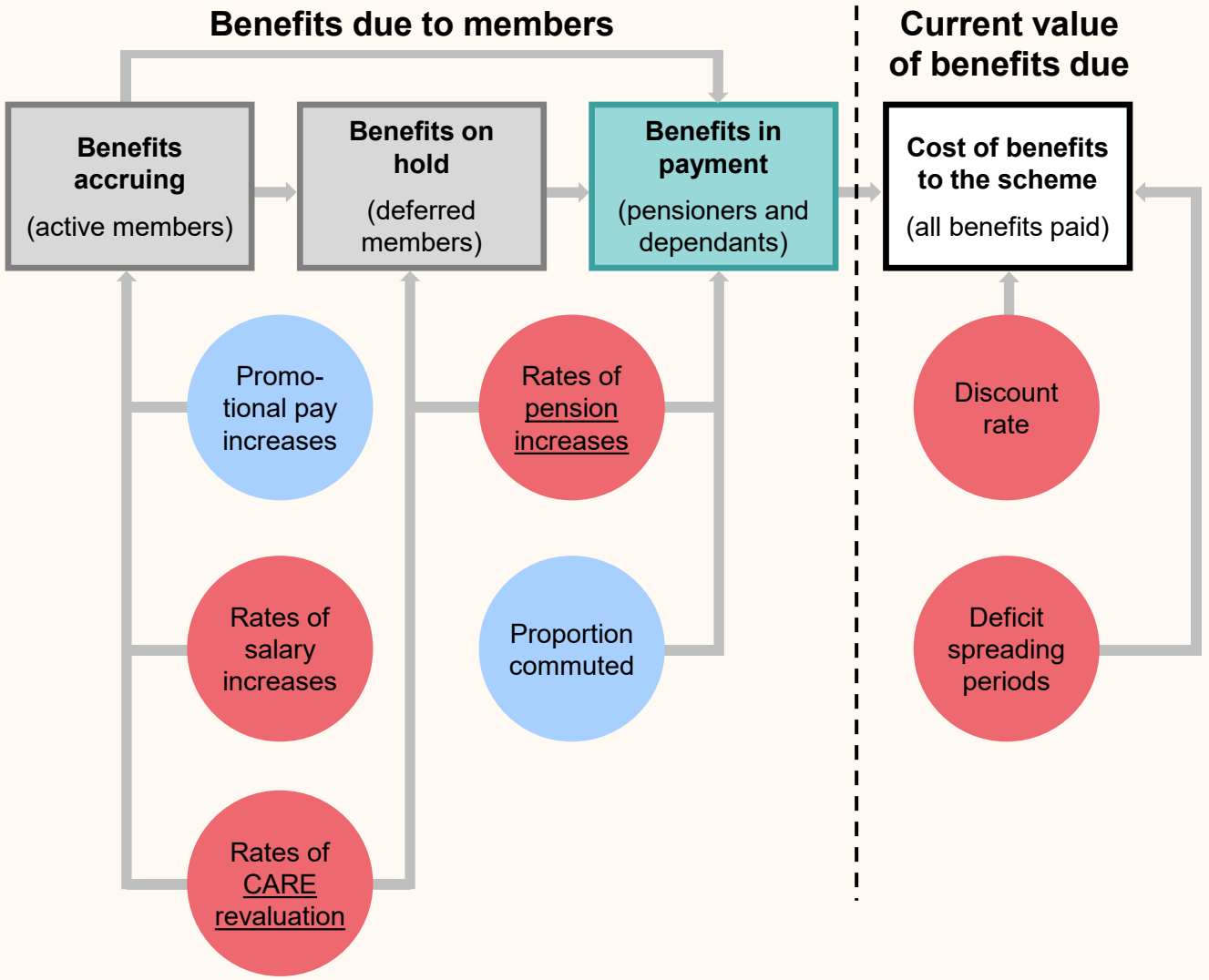
- promotional pay increases
- commutation proportions.

Member status: **no benefits payable**

Member status: **benefits payable**

Scheme-set

Directed



Setting assumptions

How are the assumptions decided?

We recommend 'scheme-set' assumptions after considering all relevant information. The picture to the right summarises the 3 main inputs.

Schemes in Scotland typically have smaller populations and more volatile experience compared to the larger schemes for members in England or Great Britain. In setting assumptions, we have considered the experience in the larger scheme of the same workforce.

Scottish Ministers then decide on the 'scheme-set' assumptions to be adopted, after considering GAD's advice.

What rules need to be followed?

HM Treasury Directions specify that 'scheme-set' assumptions must be Scottish Ministers' best estimates of future experience. This means they cannot include any margins for prudence or optimism.

The Directions also require that assumptions must consider:

- previous valuation assumptions
- an analysis of demographic experience, where there is enough data to perform such an analysis
- any other relevant data, including anything that only became available after the date of the valuation
- any emerging evidence about historic or expected future long-term trends.

The assumptions are required to be best-estimate, including an allowance for expected future GDP growth and life expectancy progression.

In our Results report dated 26 January 2024, we also consider three future climate scenarios, their potential impact on valuation assumptions, and how these, in turn, might impact on the cost of future benefits payable from the scheme.

Impact on employer contribution rates

Which assumptions are most important for setting employer contribution rates?

The chart to the right shows the importance of each assumption on employer contribution rates, relative to that of other assumptions. This shows that:

- there is a large degree of variation in the significance of each assumption
- the more significant assumptions tend to be directed by HM Treasury.

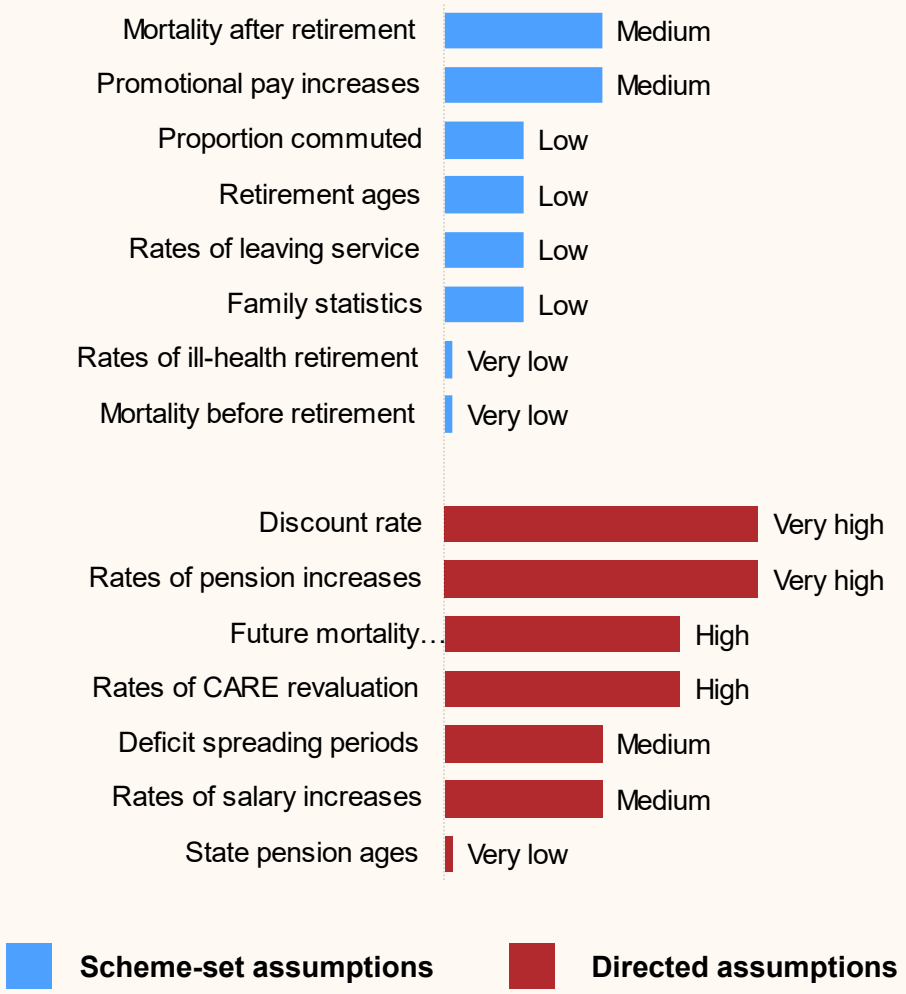
For example, the discount rate is shown as very highly significant compared to mortality before retirement. This means that even if the discount rate changes by a small amount, the impact on employer contribution rates could be very large compared to a fairly large change in mortality before retirement.

For context, the employer contribution rate is currently 28.5% of pensionable pay. In monetary terms, this was equivalent to employer contributions of £40.6 million in 2020-21.

The rankings shown are approximate and are based on the relative significance of each assumption only. They are intended as an illustration and are not a prediction of potential future changes.

This comparison considers all assumptions and therefore differs to the earlier Highlights summary and the later Summary statistics.

Importance relative to all assumptions



Impact on the scheme's cost cap cost

Are the same assumptions important for calculating the cost cap cost?

The significance of each assumption on the cost cap cost can be very different to the significance of the same assumption on employer contribution rates. This is because the cost cap process was designed to exclude certain costs.

The chart to the right shows the significance of each assumption on the cost cap cost of the scheme, which itself tends to be lower than the employer contribution rates. This excludes the effect of the economic check.

It's important to be aware that even a small change in an assumption with low significance could result in cost cap thresholds being breached and member benefits being adjusted.

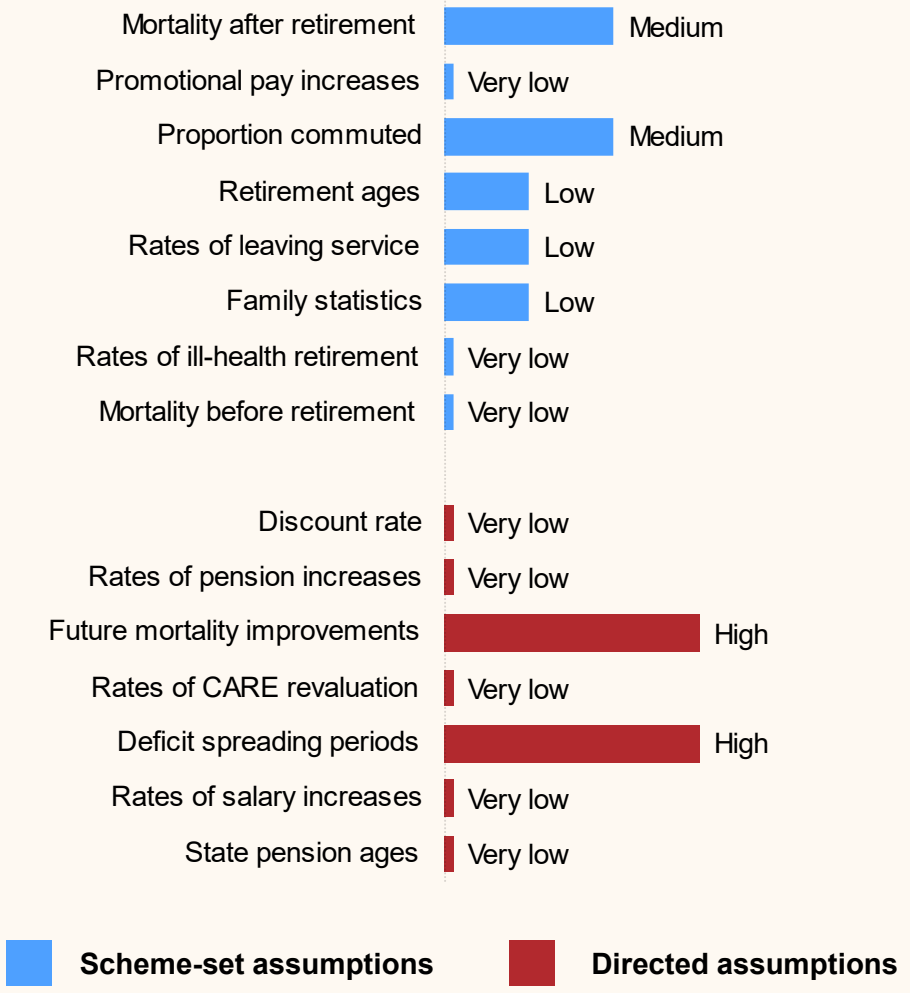
The main differences when compared to the significance of assumptions on the employer contribution rate are:

- most financial assumptions, such as the discount rate, are not very significant to the cost cap cost
- the significance of directed assumptions (relative to 'scheme-set' assumptions) tends to be lower for the cost cap cost than for employer contribution rates.

For context, the current target cost of the scheme is 15.8% of pensionable pay.

As before, the rankings shown are approximate and are intended as an illustration, not a prediction of potential future changes.

Importance relative to all assumptions



Limitations

Data

In preparing this report, GAD has relied on data and other information supplied by SPPA as the administrators of the FPS (Scotland), as described in our report titled 'Membership data', dated 26 January 2024. The limitations set out in that report apply equally to this report.

Unless stated otherwise, all data adjustments mentioned in that report apply equally to the data used for setting assumptions. Any additional data adjustments made solely for the purpose of setting assumptions are detailed in this report.

Assumptions

We have used the data provided to analyse the scheme experience and develop our recommended assumptions.

When considering appropriate assumptions, experience usually provides the most reliable evidence.

However, robust analysis of scheme experience will only be possible where there is both sufficient quality, and quantity, of data. The level of reliance that can be placed on assumptions derived from the analysis will also vary depending on these two factors.

Our recommended assumptions are long term and are not suitable for predicting short term future experience.

Sharing

This report has been prepared for the use of Scottish Ministers and SPPA. This report will be published as part of completing the 2020 valuation of the Scheme, and we are content for Scottish Ministers to release this report to third parties, provided:

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

Other than Scottish Ministers and SPPA, no person or third party is entitled to place any reliance on the contents of this report, except to any extent explicitly stated herein. GAD has no liability to any person or third party for any action taken or for any failure to act, either in whole or in part, on the basis of this report.

Compliance statement:

This report has been prepared 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.

Part B: Recommendations

B1. Summary

Summary statistics

Scheme-set assumptions	Assumption information		Our recommendations	
	Importance relative to scheme-set assumptions	Volatility of experience and unreliability of data	Size of recommended change	Impact of recommended changes on scheme costs
Mortality after retirement	Most	Low	Small	Higher costs
Proportion commuted	Average	Medium	Medium	Lower costs
Retirement ages	Average	Low	Small	Lower cost
Rates of leaving service	Average	Low	Large	Lower costs
Promotional pay increases	Average	High	None	No impact
Rates of ill-health retirement	Least	Low	None	No impact
Mortality before retirement	Least	Low	None	No impact
Family statistics	Least	Medium	None	No impact

This table provides a summary of the 'scheme-set' assumptions and their likely bearing on the valuation results. It is intended to highlight areas of potential focus to aid with the process of deciding on the scheme-set assumptions to be adopted.

These assessments are indicative, rather than precise. More information on the approach used can be found on the next page.

Be aware that several of the most important valuation assumptions do not appear in this table as they will be directed by HM Treasury. The impact of these 'directed' assumptions could be much greater than that of the impact of 'scheme-set' assumptions.

Interpretation of summary statistics

	Importance relative to scheme-set assumptions	Volatility of experience and unreliability of data	Size of recommended changes	Impact of recommended changes on scheme costs
What does it show?	The importance of this assumption on employer contribution rates (ECR) and the cost cap cost (CCC) of the scheme, relative to other scheme-set assumptions	The variability of experience and unreliability of data observed in the past. This can impact the weight we place on current experience.	The size of change we recommend, relative to the assumptions used at the last valuation.	The likelihood of our recommendations leading to higher or lower employer contribution rates (ECR) and cost cap cost (CCC) of the scheme
What is it based on?	Our actuarial judgement and the sensitivity analysis carried out at the last valuation.	Public service pension scheme experience at previous valuations	Assumptions recommended at this valuation and those used at the last valuation.	Our actuarial judgement and the sensitivity analysis carried out at the last valuation.
What are the possible ratings?	**Most** An assumption that could plausibly impact the ECR **or** CCC by more than 1%. **Average** An assumption with an impact in between most and least. **Least** An assumption that could plausibly impact both the ECR **and** the CCC by less than 0.2%.	**High** A current or previous lack of credible data, or large changes in member behaviour. **Medium** Volatility of experience or unreliability of data classified in between high and low. **Low** A large pool of credible data that doesn't tend to change much.	**Large** An average change in assumption of over 25%. **Medium** An average change in assumption of between 10% and 25%. **Small** or **None** An average change in assumption of between 0% and 10%.	**Higher** ECR and CCC likely to be higher. **Lower** ECR and CCC likely to be lower. **Uncertain** Likely impact on the ECR and CCC is still uncertain. For example, if assumptions for different categories move in different directions. **No impact** Likely to be no material impact on the ECR or CCC.

Significance, volatility and size of changes

The diagram to the right shows, for the 'scheme-set' assumptions:

- **Relative importance of assumption.** It's important to pay regard to the more significant assumptions, as any changes can have a big impact. Assumptions placed higher up the page are those that are more significant.
- **Volatility of experience and unreliability of data.** Assumptions placed further to the right of the page are also important to consider, as they are more volatile or have uncertain experience. This means that they are more likely to change substantially.
- **Size of recommended changes.** Larger changes are key as they are more likely to have a large impact on valuation results (although this also depends on how significant the assumption is). The coloured circles signify the size of our recommended change, as specified in the key below.

Key: Size of recommended changes

L Large M Medium S Small N None

B2. Mortality after retirement

Mortality after retirement

What does this assumption represent?

Mortality assumptions are a series of probabilities which represent the likelihood of a member dying at any given age. Different assumptions usually apply to different groups, e.g., for males and females, or normal health or ill-health retirees.

Baseline mortality rates are a scheme-set assumption and are the focus of this section.

Future mortality improvements are a directed assumption, and typically act to reduce baseline mortality rates in future years. They are directed to be in line with the improvements underlying the ONS-2020 population projections, which reflect the latest views on the long-term effect of the COVID-19 pandemic. The rates of improvements can be negative.

Summary statistics

Relative importance of assumption	Volatility of experience and unreliability of data	Size of recommended change	Impact of recommended changes on scheme costs
Most	Low	Small	Higher costs

Our recommendations and rationale

We recommend updating the baseline mortality rates. We recommend continuing to use the updated mortality assumptions for the Firefighters' Pension Schemes in England (FPS (England)), but with a higher adjustment factor being applied, to reflect higher rates of mortality applying in Scotland. We recommend that this adjustment is set using an average of the differential in mortality rates seen in (a) FPS (Scotland) and FPS (England) experience analysis and (b) comparison of national mortality data between Scotland and England. This is consistent with the approach used for the 2016 valuation.

We recommend adopting a single baseline mortality assumption for normal health, current and future ill-health pensioners for both male and female members, assuming all members experience male mortality. We recommend adopting a single baseline mortality assumption for all dependants assuming all dependants experience female mortality.

The ONS-2020 population projections allow for the impact of the COVID-19 pandemic, so it would be inappropriate to adjust the baseline mortality assumptions for this.

Baseline mortality rates are set by adjusting the 'S3' standard mortality tables issued in December 2018 by the Continuous Mortality Investigation (CMI). These tables are derived from a larger amount of public service data, and so are more appropriate for the scheme than previous 'S2' tables adopted at the 2016 valuation. There is a known issue with the unadjusted 'S3' standard tables over-estimating life expectancy. However, our approach of fitting the tables to experience in FPS (England) negates this issue.

Practical implications

Mortality assumptions can be used to estimate the life expectancy of individual members. Higher life expectancies mean a higher cost of providing benefits, as benefits must be paid for longer periods of time.

The table below shows the impact of our recommended assumptions. For each category shown:

- The **first column** is the assumption adopted for the 2016 valuation.
- The **second column** is the 2016 assumption, but updated to use a valuation date of 2020 and ONS-2020 improvements.
- The **third column** is the assumptions we recommend for the 2020 valuation for FPS (Scotland)
- The **fourth column** is the assumptions we recommend for the 2020 valuation for FPS (England).

The changes between the first and second columns show the impact of directed changes to future mortality improvements and the normal passage of time. The changes between the second and third columns show the impact of our recommended changes to baseline mortality assumptions.

All numbers shown are cohort life expectancies that have been calculated allowing for future mortality improvements.

Life expectancies for normal health pensioners

	2016 valuation assumption	2016 assumption updated	2020 valuation recommendation	2020 valuation recommendation FPS (England)
Current pensioners, age 55	85.2	84.2	84.3	85.5
Future pensioners, age 40	86.8	85.6	85.7	86.9

Recommendations in detail

	2016 Assumptions			2020 Recommendations		
Category	**Standard table**	**Adjustment**	**Based on**	**Standard table**	**Adjustment**	**Based on**
Normal health Pensioners	S2NMA	134%	Scheme experience in FPS (England) and wider analysis of mortality differentials experienced by (a) scheme membership in Scotland compared to England and (b) national populations in Scotland compared to England.	S3NMA_M	126%	Scheme experience in FPS (England) and wider analysis of mortality differentials experienced by (a) scheme membership in Scotland compared to England and (b) national populations in Scotland compared to England.
Current ill-health Pensioners						
Future ill-health Pensioners						
Dependants	S2DFA	118%	Scheme experience in FPS (England) and wider analysis of mortality differentials experienced by (a) scheme membership in Scotland compared to England and (b) national populations in Scotland compared to England.	S3DFA	114%	Scheme experience in FPS (England) and wider analysis of mortality differentials experienced by (a) scheme membership in Scotland compared to England and (b) national populations in Scotland compared to England.

Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

Recommendations in detail (FPS (England))

The table shows the corresponding assumptions for the FPS (England).

	2016 Assumptions			2020 Recommendations		
Category	**Standard table**	**Adjustment**	**Based on**	**Standard table**	**Adjustment**	**Based on**
Normal health Pensioners	S2NMA	113%	FPS (England) experience	S3NMA_M	109%	FPS (England) experience
Current ill-health Pensioners						
Future ill-health Pensioners						
Dependants	S2DFA	100%	FPS (England) experience	S3DFA	99%	FPS (England) experience

Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

Our approach

Analysis

We have analysed the scheme's mortality experience over the period 1 April 2016 to 31 March 2020.

Our analysis has been carried out on an 'amounts' basis (as opposed to a 'lives' basis).

An 'amounts' analysis gives more weight to members with larger pensions, better reflecting the impact they have on scheme costs. A 'lives' analysis on the other hand gives an equal weighting to every member being analysed.

As members with higher pensions tend to live longer, an 'amounts' analysis usually results in lighter mortality assumptions than a 'lives' analysis would, based on the same data.

Setting recommended assumptions

We recommend that all baseline mortality assumptions are based on the 'S3' series of standard tables.

Our general approach is:

- Identify groups of members we would expect to have different life expectancies, for example by gender and by health at retirement.
- Identify the most appropriate 'S3' table for each group. Where we have enough scheme experience, we carry out a series of statistical tests to find tables which best fit recent experience. This is approximate, so we apply judgement to select the most appropriate table.
- The last four years of experience may not accurately reflect the longer-term, so we generally 'smooth out' any excess volatility by setting adjustments based on an equal allowance for recent experience and the 2016 valuation assumptions, which were set using pre-2016 experience.
- Where there is not enough scheme experience, we look at assumptions from other groups of members or other schemes which may have similar experience, adjusted to allow for any available information. For the FPS (England), we have analysed male retirement experience to set the assumption for all current pensioners and female dependant experience to set the assumption for all dependants. There is insufficient data to carry out a credible analysis for female retirements and male dependants.

We have considered the corresponding analysis carried out for the FPS (England), being the larger data set of the same workforce, and assessed the likely difference between mortality for members in FPS (Scotland) relative to FPS (England).

Our approach: Limited experience data

Analysis

Assumptions should reflect long term expectations and therefore, should not vary significantly between valuations as a result of random variations in experience.

As set out on page 11, given smaller datasets are subject to considerably more volatility and statistical variation, when forming a view on a recommended assumption, we also look at assumptions from other schemes which we expect have similar experience. We then consider what adjustments might be required to allow for available information on the differences between the groups of members.

For FPS (Scotland), we have considered the experience analysis carried out as part of the 2020 valuation for the FPS (England). We have then assessed the likely difference between mortality for members in FPS (Scotland) relative to those in FPS (England).

In previous actuarial valuations, the mortality assumptions for FPS (Scotland) have been set in line with those recommended for the valuation of FPS (England), but with a further adjustment applied to reflect higher rates of mortality applying in Scotland, compared to those applying in England. The adjustment has been set using an average of the differential in mortality rates seen in (a) FPS (Scotland) and FPS (England) experience analysis and (b) comparison of national mortality data between Scotland and England. We recommend that this approach is retained.

Firefighter Specific Analysis
We have compared the mortality table that provides a best fit for the mortality experience for FPS (Scotland), with the equivalent mortality table which provides a best fit for the mortality experience in FPS (England) over the same period.

Over 2012-2016, mortality rates observed for pensioners in FPS (Scotland) were around 27% higher than for pensioners in FPS (England). Over 2016-2020, mortality rates observed for pensioners in FPS (Scotland) were around 9% higher than for pensioners in FPS (England).

Therefore, allowing for observed experience over the eight years 2012 to 2016, the average differential based on scheme experience only is around 18%. The significant changes in the differential from one valuation to the next are symptomatic of the random fluctuations that might be expected from a relatively small scheme.

Population Differences
As for the 2016 valuation, we have also considered analysis of differences between population mortality rates for Scotland and England (so not just limited to firefighters). We recommend that it is reasonable to retain the existing 12.5% differential. Analysis is set out on page 30.

Overall Adjustment
For the 2020 valuation, we recommend using the average of the 18% differential from the firefighter specific analysis and the 12.5% differential for Scottish population mortality over that for England (that is being used by other public service pension schemes in Scotland).

This results in an overall differential of 15.25%.

Scheme experience: overall

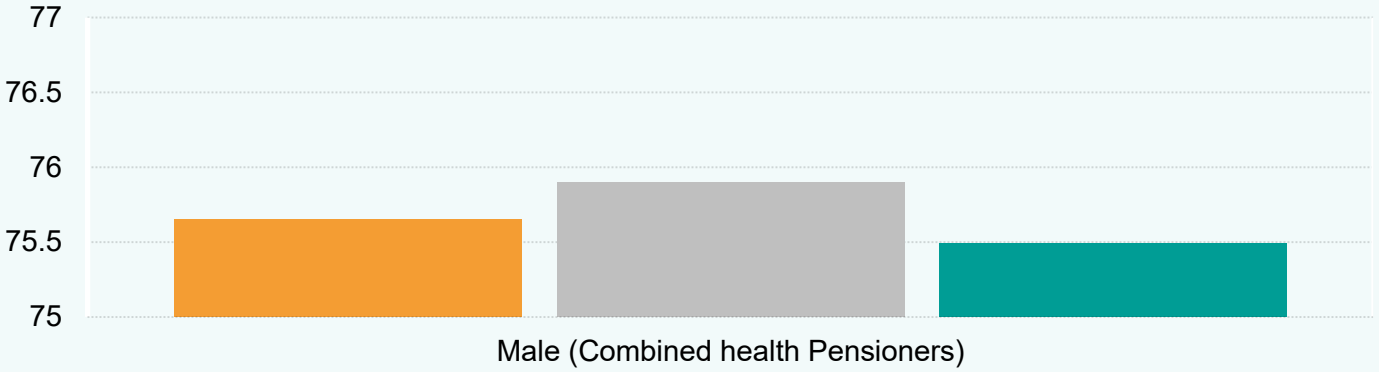
Experience versus expectations show how accurate the assumptions have been in the past and can help inform setting future assumptions.

The chart to the right and those on the following pages compare:

- **actual experience** ( ) on the left – what has happened over the last 4 years.
- **2016 assumptions** ( ) in the middle – what we thought would happen, based on the baseline mortality assumptions adopted for the 2016 valuation. Uses ONS-2020 mortality improvements.
- **2020 recommendations** ( ) on the right – what we would have expected to happen, had our recommended baseline mortality assumptions been adopted for the 2016 valuation. Uses ONS-2020 mortality improvements.

It should be noted that experience can be a very volatile measure for groups with small amounts of data, which then impacts the reliance we place on it.

Experience vs expectations: average age at death



Summary

The 2016 assumptions and the 2020 recommendations are largely in line with the baseline mortality experience. This can be seen through the average age at death on the chart above and the distribution of deaths by age shown on the next page.

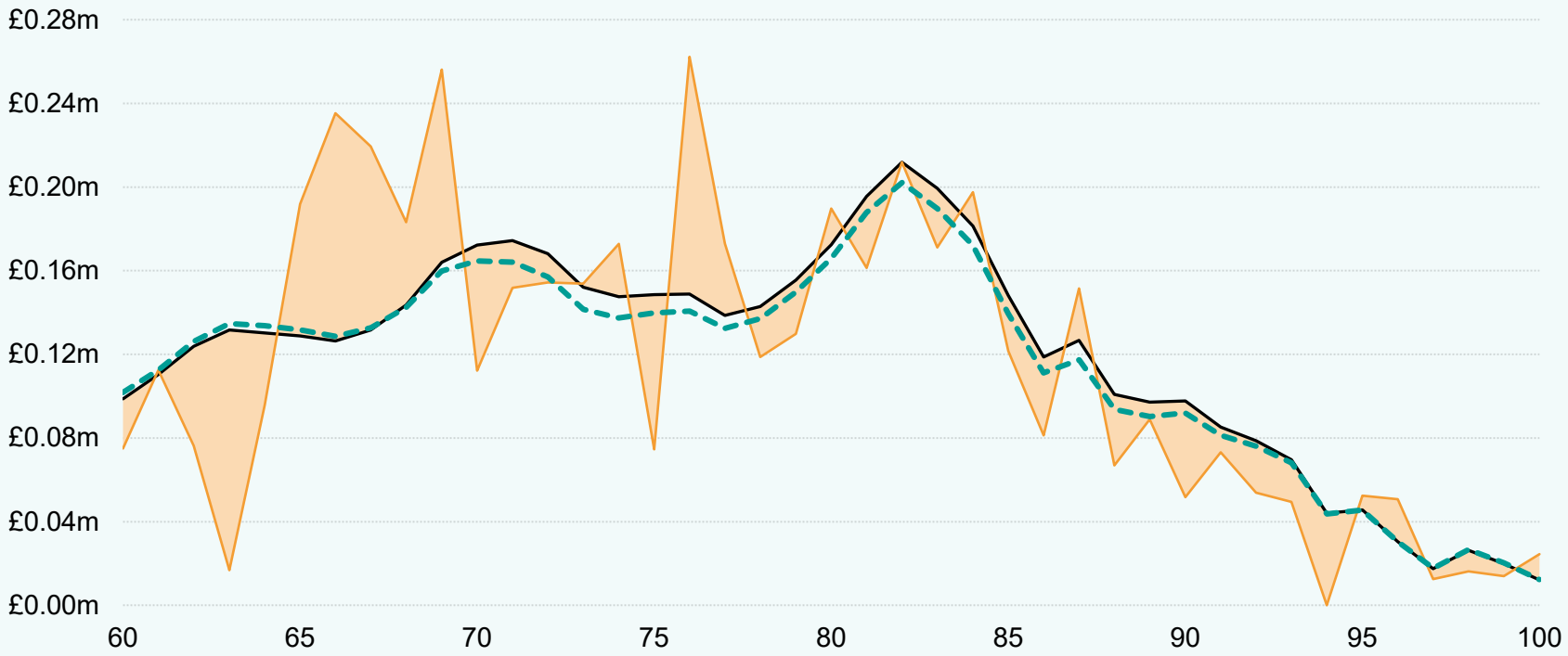
There is relatively little experience data, as shown by the volatility in the chart on the next page. We recommend continuing to set the assumption allowing for the FPS (England) analysis and differences between mortality rates for Scotland and England.

Updating the baseline mortality assumption has a relatively small effect on the life expectancies, shown previously, which have reduced due to directed future mortality improvements.

Scheme experience: in detail

Pension ceasing as a result of death by age, split by category

Male - Combined health Pensioners



Key: **2016 assumptions** **2020 recommendations** **Experience** (line) and difference from 2016 assumptions (shaded area)

Scheme experience: in numbers

Scheme	Category		**Experience** Actual pension ceasing due to death over 2016-2020	**2016 Expectations** Pension expected to cease under the 2016 assumptions	**Experience ÷ 2016 Expectations**	**2020 Expectations** Pension expected to cease under the 2020 recommendations	**Experience ÷ 2020 Expectations**
FPS (Scotland)	**Combined health Pensioners**	**Male**	£5.1 m	£5.3 m	95.8%	£5.2 m	97.1%
	Dependants	**Female**	N/A	N/A	N/A	N/A	N/A
FPS (England)	**Combined health Pensioners**	**Male**	£34.2 m	£33.1 m	103.5%	£33.3 m	102.8%
	Dependants	**Female**	£7.0 m	£6.4 m	108.9%	£6.7 m	103.7%

There was around £1m of pension ceasing due to death over 2016-2020 for female dependants, in respect of 145 deaths in the FPS (Scotland). This is insufficient to produce a robust analysis and therefore we have not included any output in the table above.

For the FPS (England), there was around £40,000 of pension ceasing due to death over 2016-2020 for female pensioners and around £9,000 for male dependants. These were insufficient to produce a robust analysis and therefore we have not included any output in the table above.

Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

Comparison with England mortality

Population mortality data

We have considered the most recent analysis of differences between aggregate population mortality rates in Scotland, compared to England.

The charts on this page show the ratios of Scottish population mortality rates to those for England over different time periods. These are taken from the ONS National Life Tables.

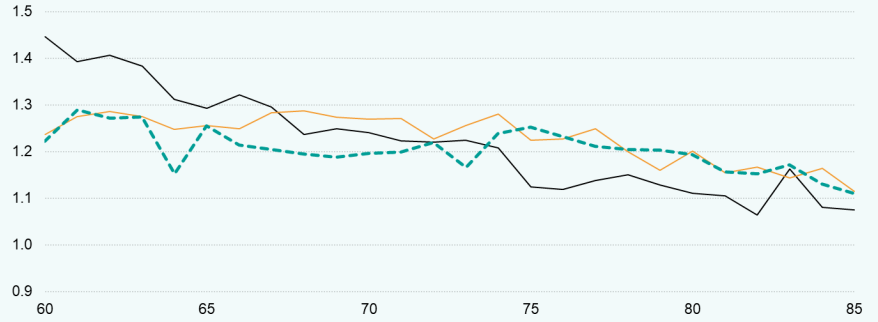
Scottish mortality rates are higher than England rates at almost all ages and the differences have been relatively stable over time. The ratios generally converge as age increases.

Similar differentials were observed for the 2012 and 2016 valuations. The 2016 valuation assumptions for the FPS (Scotland) were set similar to those recommended for the 2016 valuation of the FPS (England), but with a 18.25% higher adjustment factor being applied. The 18.25% incorporated a 12.5% differential for general population differences between mortality rates in Scotland over those in England.

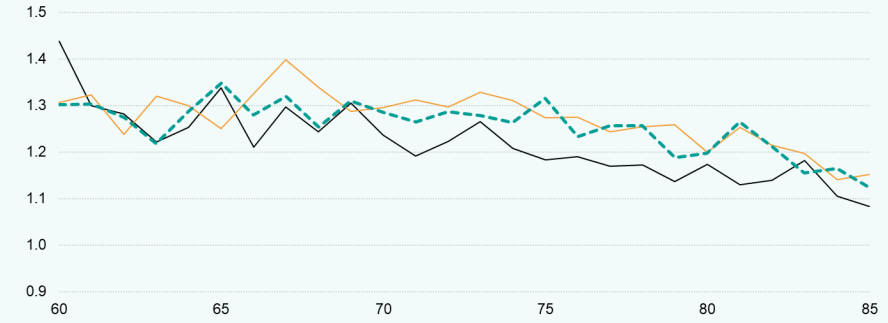
Range of differences

From the updated comparison, a reasonable range for the excess of Scottish mortality over that for England for determining the mortality after retirement assumptions for pension scheme members is in the region of 5% to 20%. This supports the retention of the existing 12.5% differential.

Ratio of Scotland to England population mortality rates, males



Ratio of Scotland to England population mortality rates, females



Key:

- 2018 - 2020
- 2010 - 2012
- 2000 - 2002

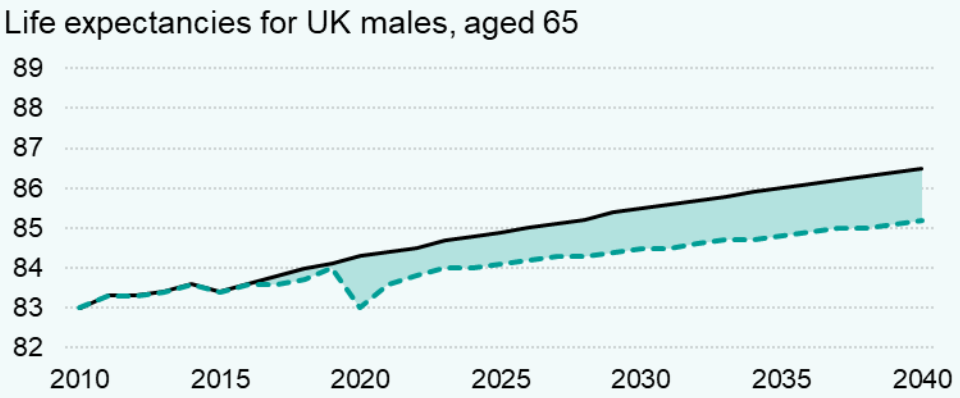
Wider environment: COVID-19

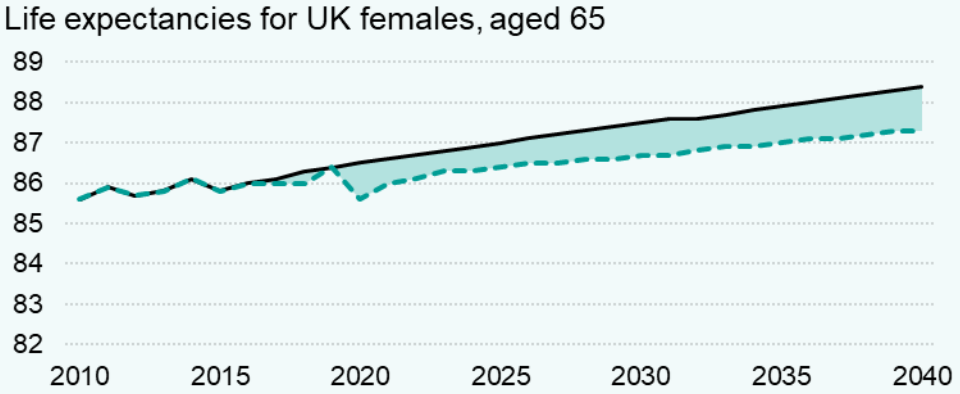
No explicit allowance has been made for the COVID-19 pandemic in our recommended assumptions for **baseline mortality rates**. Our recommendations are based on scheme experience up to 2020 so will only have included deaths from the very start of the pandemic. We do not expect these deaths to have had a material impact on our recommendations.

However, an explicit allowance is included in assumed **future mortality improvements**. These are directed to be in line with the improvements underlying the ONS-2020 population projections.

When deriving the ONS-2020 projections, a panel of mortality experts gave their views on the impact of COVID-19 pandemic on mortality rates in the short term. Based on this, short term adjustments were made to the 2019 to 2024 period to allow for estimated deaths in 2021 and an averaging of the experts' views on estimated improvements by age group over this period. Long term rates of future mortality improvement are not projected to change as a result of COVID-19.

The charts on this page show the impact of the ONS-2020 projections on future life expectancies for a typical UK male and UK female, aged 65. There is a clear drop in life expectancies in 2020 as result of the COVID-19 pandemic. In the longer term, even though mortality is expected to start improving again, the 2020 drop means we start from a lower baseline and the impact of COVID-19 will be with us long into the future.





Key:

Based on **ONS-2016 projections**, which were adopted for the 2016 valuation

Based on **ONS-2020 projections** (dotted line) and difference from the 2016 projections (shaded area)

B3. Proportion commuted

Proportion commuted

What does this assumption represent?

The proportion commuted represents the fraction of pension that members give up at retirement, in return for a single tax-free lump sum payment (subject to HMRC tax limits).

Commutation is a 'scheme-set' assumption for this valuation. In the 2016 valuation, it was 'scheme-set' for some groups of members and directed for other groups.

The proportion commuted is an important assumption because the value of the lump sum received is often less than the value of the pension given up. Higher proportions commuted therefore tend to lead to lower scheme costs.

The lump sum is typically calculated using a commutation rate of £12 lump sum for every £1 of annual pension given up. The commutation rate is not being reviewed in this valuation.

Summary statistics

Relative importance of assumption	Volatility of experience and unreliability of data	Size of recommended change	Impact of recommended changes on scheme costs
Average	Medium	Medium	Lower costs

Our recommendations and rationale

1992 Scheme, 2006 Scheme (Special): We recommend members continue to commute 25% of their 1992 Scheme pension, since experience has been broadly in line with the existing assumptions.

We expect that 2006 Scheme (Special) members may commute similar levels to those in the 1992 Scheme, as the factors that apply for 2006 Scheme (Special) members are similar to those that apply for 1992 Scheme members. Consistent with this, for benefits expected to be purchased through the Matthews second option exercise (see Appendix C3 for further information), we propose assuming members will commute 25% of their pension.

2006 Scheme and 2015 Scheme: There are too few 2006 and 2015 Scheme retirements to set an assumption based on experience. Therefore, we have adopted a similar approach to FPS (England) and considered the average experience from other large public service schemes. We recommend increasing the proportion commuted from 17.5% to 20%.

Mixed 1992/2015 Scheme and mixed 2006 (Special)/2015 Scheme: We recommend assuming members commute 25% of their 1992 Scheme pension or 2006 Scheme (Special) pension, in line with above. In terms of the proportion commuted from the 2015 Scheme, we recommend increasing this from 8.75% to 12%. This is based on 60% of the average experience from other large public service schemes.

Mixed 2006/2015 Scheme: We recommend increasing the proportion commuted from 17.5% to 20% from both schemes, in line with above.

Practical implications

Commutation can drastically alter the timing and amount of benefit payments for individual members.

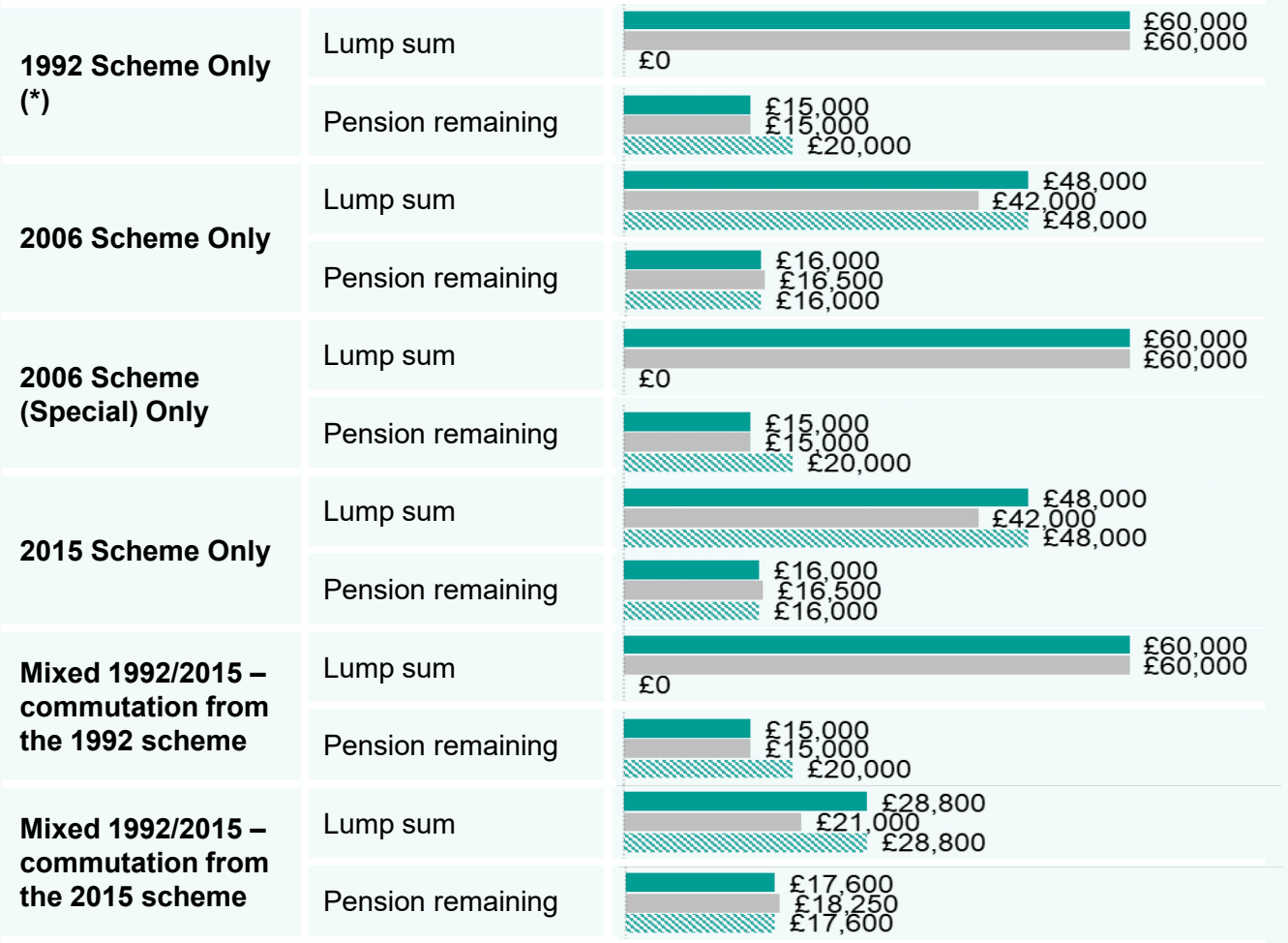
Members choose whether to commute based on their own individual circumstances. For example, their:

- Assessment of their future life expectancy
- Tax circumstances
- Preferences for higher future income vs an immediate lump sum.

The chart to the right shows the impact on assumed benefits of our recommended assumptions. For each category shown:

- The **top line** shows the impact of the assumptions we recommend for the 2020 valuation ( ).
- The **middle line** ( ) shows the impact of the assumptions adopted for the 2016 valuation.
- The **bottom line** ( ) shows the impact of the assumptions we recommend for the FPS (England) valuation.

Lump sum for a member starting with a £20,000 pension



(*) In the FPS (England), 1992 Scheme members are assumed to commute 0% of their pension for cash, given commutation terms are cost neutral compared to the valuation assumptions. In the FPS (Scotland), the commutation terms include an underpin which guarantees factors will not be lower than those used in the FPS (England). The underpin can mean the value of pension given up is lower than the value of the lump sum received. An assumption is therefore required in relation to the pension commuted for cash.

Practical implications

Commutation can drastically alter the timing and amount of benefit payments for individual members.

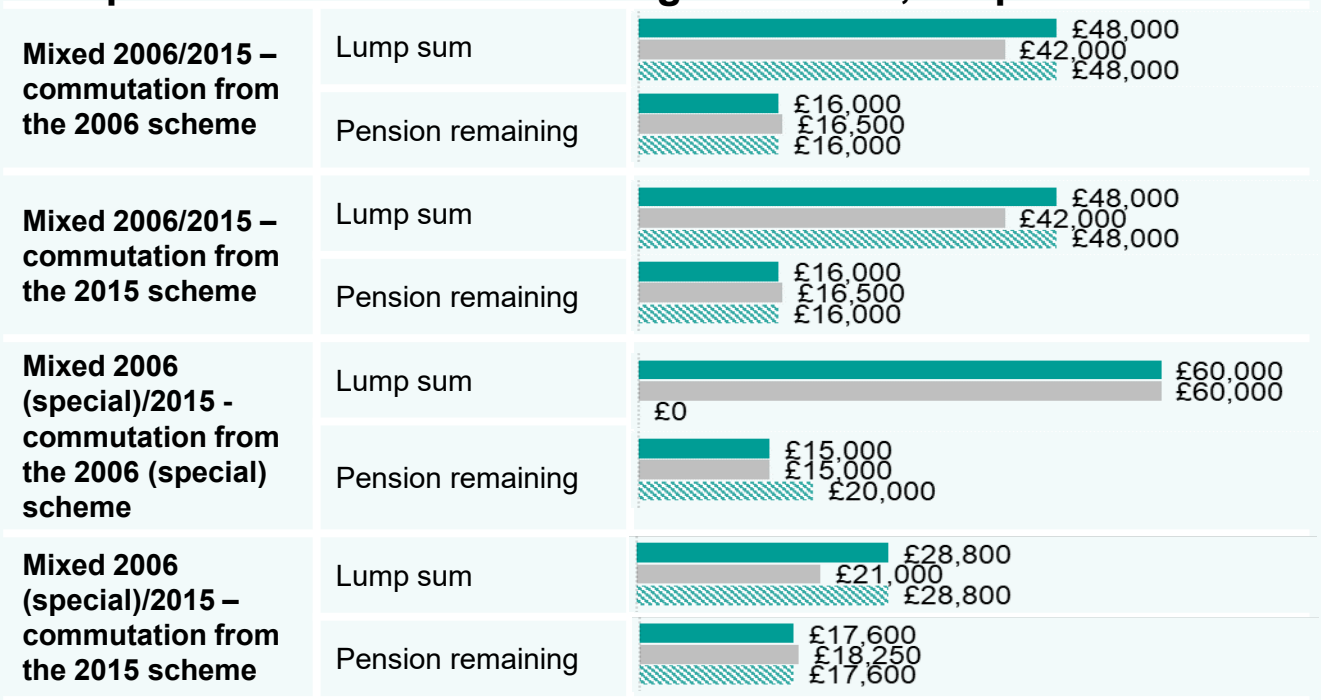
Members choose whether to commute based on their own individual circumstances. For example, their:

- Assessment of their future life expectancy
- Tax circumstances
- Preferences for higher future income vs an immediate lump sum.

The chart to the right shows the impact on assumed benefits of our recommended assumptions. For each category shown:

- The **top line** shows the impact of the assumptions we recommend for the 2020 valuation ( ).
- The **middle line** ( ) shows the impact of the assumptions adopted for the 2016 valuation.
- The **bottom line** ( ) shows the impact of the assumptions we recommend for the FPS (England) valuation.

Lump sum for a member starting with a £20,000 pension



Our approach

Analysis

We have analysed the 1992 Scheme members' commutation experience over the period 1 April 2016 to 31 March 2020.

For the remaining members, we have insufficient data to carry out a credible analysis using the scheme's own data. Therefore, we have used the analysis carried out on the other large public service pension schemes commutation experience over the period 1 April 2016 to 31 March 2020.

Our analysis considered total pension that came into payment and total pension that was commuted and was carried out separately for groups expected to behave differently.

This approach places more weight on members with larger pensions, reflecting the bigger impact they can have on scheme costs.

Setting recommended assumptions

Our general approach is:

- Identify groups of members we would expect to commute in different ways, for example by gender, pension amount and scheme section.
- Compare recent commutation experience against the 2016 valuation assumptions.
- Where there is not enough scheme experience, we look at assumptions from other groups of members or other schemes which may have similar experience, adjusted to allow for any available information.
- Recommend a change to the assumption only if evidence points to a material change to the valuation results. In these cases, our recommendation is to fully align the assumption to recent experience, as there is limited evidence for in-year volatility.
- We make no explicit allowance for HMRC limits, which already influence member behaviours, or for the McCloud judgment as this is unlikely have a significant impact on members' commutation choices.
- For schemes that have commutation factors offered at cost neutral rates compared to the valuation assumptions, we will set the proportion commuted to be 0% for that section of benefits as we expect there to be little impact on the cost of the scheme. Due to cost neutrality, we have not carried out any analysis of commutation experience from these schemes.

Due to the larger dataset, we have also considered the corresponding analysis carried out for the FPS (England) and other larger public sector pension schemes.

For commutation from the 2015 Scheme for the two categories, mixed 1992/2015 Scheme and mixed 2006 (Special)/2015 Scheme, we also need to consider what proportion are likely to commute their pension from the 2015 scheme. This is impacted by the fact the 2015 commutation terms are less generous than the 1992 Scheme or 2006 Scheme (Special). The analysis that was carried out to inform this proportion is set out on the wider environment page.

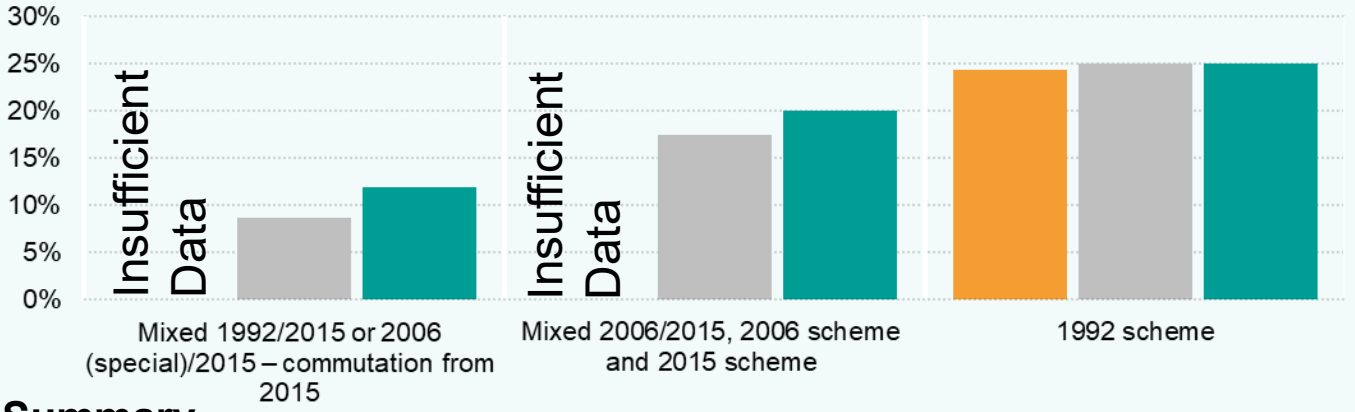
Scheme experience: overall

Experience versus expectations show how accurate the assumptions have been in the past and can help inform setting future assumptions.

- **actual experience** ( ) on the left – what has happened over the last 4 years.
- **2016 assumptions** ( ) in the middle – what we thought would happen, based on the assumptions adopted for the 2016 valuation.
- **2020 recommendations** ( ) on the right – what we would have expected to happen, had our recommended assumptions for the 2020 valuation been adopted for the 2016 valuation.

It should be noted that experience can be a very volatile measure for groups with small amounts of data, which then impacts the reliance we place on it.

Experience vs expectations



Summary

The analysis of the 1992 Scheme members over 2016 to 2020 shows that, on average, 1992 Scheme members commuted 24.4% of their pension for a lump sum (at the 2016 valuation, this was 24.7%). As such, we propose to retain the 2016 assumption where members are assumed to commute 25% of their pension for cash. We also use the 1992 experience to inform the 2006 Scheme (special retained members) only assumption.

There are too few 2006 and 2015 Scheme retirements to carry out any robust analyses for the FPS (Scotland) or for the FPS (England). For the FPS (England), the proposed assumptions are to be based on the average experience from large public service pension schemes. We recommend adopting a consistent approach for the FPS (Scotland).

For members with mixed service in 1992/2015 Scheme and 2006 (Special)/2015 Scheme, we based the 2015 Scheme commutation assumption on 60% of the average experience from the large public service pension schemes. Details on the rationale are on page 39 and 40. For members with mixed 2006/2015 Scheme or only 2015 Scheme, we based the 2015 Scheme commutation assumption on the average experience from the large public service schemes.

Scheme experience: in numbers

Category	Scheme Pension Commuted From	Total pension coming into payment over 2016-2020 (before commutation)	Total pension commuted over 2016-2020	**Experience** Proportion of pension commuted over 2016-2020 (weighted by pension amount)	**2016 Expectations** Pension expected to be commuted under the 2016 assumptions	**2020 Expectations** Pension expected to be commuted under the 2020 assumptions
1992 Scheme Only	**1992**	£16.1 m	£3.9 m	24.4%	25% (0%)	25% (0%)
2006 Scheme Only	**2006**	N/A	N/A	N/A	17.5% (***)	20%
2006 Scheme (Special)	**2006 (Special)**	N/A	N/A	N/A	25% (0%)	25% (0%)
2015 Scheme Only	**2015**	N/A	N/A	N/A	17.5% (***)	20%
Mixed 1992/2015	**1992**	N/A	N/A	N/A	25% (0%)	25% (0%)
	2015	N/A	N/A	N/A	8.75%	12%
Mixed 2006/2015	**2006**	N/A	N/A	N/A	17.5% (***)	20%
	2015	N/A	N/A	N/A	17.5% (***)	20%
Mixed 2006 (Special)/2015	**2006 (Special)**	N/A	N/A	N/A	25% (0%)	25% (0%)
	2015	N/A	N/A	N/A	8.75%	12%
Other large public service schemes (*)	**N/A**	£255m	£50m	19.6%	17.5% (***)	20%

The 2016 expectation and 2020 expectation figures for the FPS (England) are the same as those shown in the table above for the FPS (Scotland), where there are any differences the FPS (England) figures have been provided in brackets (coloured blue) after the FPS (Scotland) figures.

* There were 680 retirements included in the 1992 Scheme commutation analysis.

** Other large public service schemes data includes data from NHS Pension Scheme (England & Wales) – 2008 section, Civil Service Pension Scheme – Non-Classic schemes, Teachers' Pension Scheme (England & Wales) – NPA 65 section and Local Government Pension Scheme (England & Wales) – Post 2008 section.

*** This assumption was previously HMT directed at the 2016 valuation.
Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

1992/2015 and 2006 (Special)/2015 Mixed service: Approach

2016 Valuation Analysis

For the 2016 valuation, it was assumed members with both 1992 and 2015 Scheme benefits:

•commute 25% of their 1992 Scheme pension for cash.

•commute 8.75% of their 2015 Scheme pension for cash.

For the 2016 valuation, it was assumed members with both 2006 (Special) and 2015 Scheme benefits:

•commute 25% of their 2006 Scheme (Special) pension for cash.

•commute 8.75% of their 2015 Scheme pension for cash.

The terms available in the 1992 Scheme and 2006 Scheme (Special) offer a significantly greater lump sum than would be available under the commutation terms of 12:1 offered in the 2015 Scheme. We would expect this to act as a disincentive to commute pension in the 2015 Scheme, especially for those members with significant amounts of service in the legacy schemes. As such, we would not expect that these members will commute significant amounts of their pension from the 2015 Scheme.

However, there was some evidence to suggest that a number of members of the 1992 Scheme commute pension above the HMRC tax limits. This tax charge can happen because members can commute 25% of pension (generally) and the commutation factors are higher than 20 at some ages. This suggests that members will commute additional pension even when the effective terms (after tax) of that additional commutation are much less favourable than for the bulk of the pension they can commute.

It was, therefore, recommended that members with 1992 and 2015 Scheme benefits and members with 2006 (Special) and 2015 Scheme benefits should be assumed to commute 8.75% of their 2015 Scheme pension, which was half of the 2016 valuation assumption for new entrants to the 2015 Scheme (i.e. 17.5%).

1992/2015 and 2006 (Special)/2015 Mixed service: Approach

2020 Valuation Analysis

FPS (England) Analysis

We have analysed retirements over 2016 to 2020 for FPS (England) 1992 Scheme members. This analysis showed that around 70% of members incurred a tax charge when commuting pension for cash.

We recognise that there is some uncertainty over the application of this approach to the commutation assumption. In addition, this proportion may also change over time, particularly as an increasingly significant tranche of benefit will come from the 2015 scheme. However, members do not always make rational financial decisions when it comes to the lump sum. For example, many take the maximum lump sum regardless of the terms.

Therefore, to reflect the data analysis, but also the uncertainty in this approach, we recommend updating the assumption in relation to the amount of 2015 pension members with 1992 and 2015 scheme benefits commute for cash, for the FPS (England). We recommend assuming such members commute 60% (from 50%) of the assumption for new entrants to the 2015 Scheme. This makes broadly equal allowance for recent experience and the 2016 valuation assumptions.

This leads to the recommended assumption that these members will commute 12% of their pension (i.e. 60% of the assumption for new entrants to the 2015 Scheme, which is now 20%).

FPS (Scotland) Recommendation

We also carried out a similar analysis on the FPS (Scotland) 1992 Scheme data, albeit on a much smaller data set, which showed around 90% are expected to incur a tax charge when commuting pension for cash. Allowing for the FPS (Scotland) experience would lead to a higher assumption than 60%.

However, given the much smaller data set and the uncertainty around this approach, we recommend adopting the same proportion as the FPS (England), which is that these members will commute 12% of their pension i.e. 60% of the assumption for new entrants to the 2015 Scheme, which is now 20%.

B4. Retirement ages

Retirement ages

What does this assumption represent?

Retirement age assumptions are a series of probabilities which represent the likelihood of a member retiring and claiming their pension at any given age.

Different assumptions usually apply to groups who are expected to behave differently, e.g., for members with different Normal Pension Ages.

Retirement age affects:

- The benefits members receive e.g. earlier retirement ages for active members means lower benefits, as members will have built up those benefits over a shorter period of time.
- The length of time benefits will be paid for – although in most schemes this impact is offset by early retirement reductions and late retirement uplifts.

Summary statistics

Relative importance of assumption	Volatility of experience and unreliability of data	Size of recommended change	Impact of recommended changes on scheme costs
Average	Low	Small	Lower costs

Our recommendations and rationale

1992 Scheme: For the 2016 valuation, separate expected retirement rates applied to members who were transitionally protected (including taper protected) and those who were unprotected.

- For the Protected / Tapered members, we recommend no changes to the existing retirement rates selected for the 2016 valuation, as these were closely aligned with recent scheme experience.
- For Unprotected members, our expectation is that the McCloud judgment will result in these members exchanging up to 7 years' service from the 2015 scheme to earlier NPA legacy arrangements. Therefore, we recommend assuming **all** unprotected 1992 Scheme members are assumed to retire in line with the protected member assumptions from the 2016 valuation.

2006 Scheme and 2006 Scheme (Special): Due to insufficient experience data, it is not possible to carry out robust scheme experience analysis against these assumptions. We have no reason to believe the existing assumption is no longer appropriate. Therefore, we recommend no change to these assumptions.

2015 Scheme: Due to insufficient experience data, it is not yet possible to test the suitability of the 2015 Scheme assumption. We have no reason to believe the existing assumption is no longer appropriate. Therefore, we recommend no change to the existing assumption.

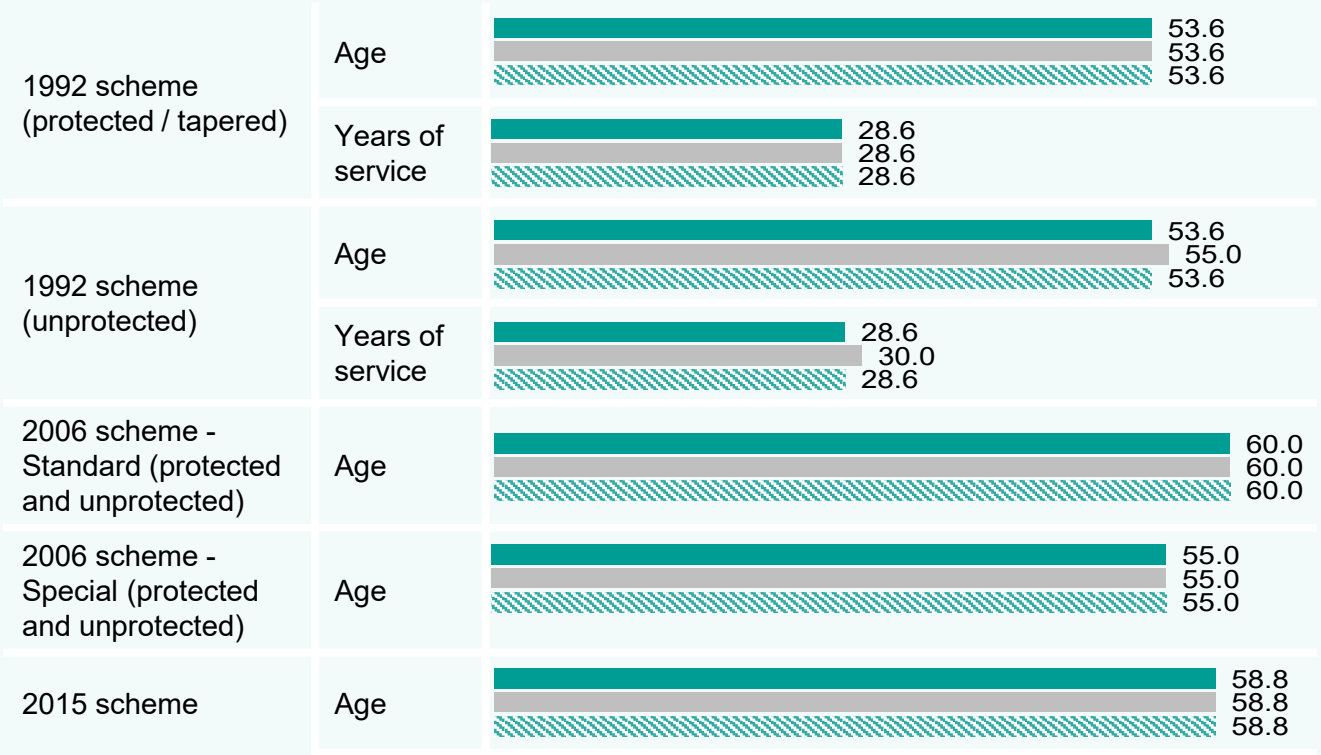
Practical implications

The chart to the right shows the impact of our recommended assumptions. For each category shown:

- The **top line** shows the impact of the assumptions we recommend for the 2020 valuation ( ).
- The **middle line** ( ) shows the impact of the assumptions adopted for the 2016 valuation.
- The **bottom line** ( ) shows the impact of the assumptions we recommend for the FPS (England) valuation.

The numbers shown in this example assume that members retire from active service. No allowance is made for the possibility of ill-health retirement, leaving service before retirement, or death in service. These assumptions are covered in other sections.

Expected retirement age / years of service*



* The Years of service bars represent the numbers of years between joining and retirement (the number of years a member has worked).

Our approach

Analysis

We have analysed the scheme's retirement experience over the period 1 April 2016 to 31 March 2020.

This analysis is based on active members of the scheme. Deferred members are not analysed and assumed to retire at their Normal Pension Age.

Setting recommended assumptions

Our general approach is:

- Identify groups of members we would expect to have different retirement patterns, for example by gender and scheme section.
- Compare recent retirement experience against the 2016 assumptions.
- Where there is not enough scheme experience, we look at assumptions from other groups of members or other schemes which may have similar experience, adjusted to allow for any available information.
- Recommend that the assumption is updated only if evidence points to a material change to the valuation results.
- We typically only recommend a change to the assumed number of retirements, leaving the age profile of the existing assumption unaltered. We only recommend a change to the age profile if we see evidence of a material and non-temporary step change in membership behaviour.
- The last four years of experience may not accurately reflect the longer-term, so if we recommend a change we generally 'smooth out' any excess volatility by basing our recommendation on an equal allowance for recent experience and the 2016 valuations assumptions, which were in turn set using pre-2016 experience.

Due to the larger dataset, we have also considered the corresponding analysis carried out for the FPS (England) and assessed the likely difference between experience for Scotland relative to England.

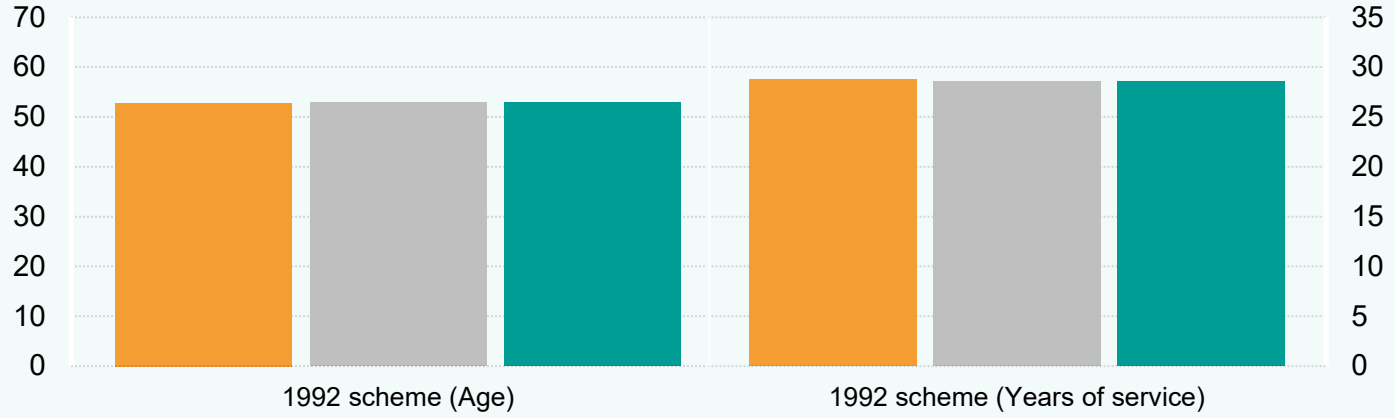
Scheme experience: overall

Experience versus expectations show how accurate the assumptions have been in the past and can help inform setting future assumptions.

- **actual experience** ( ) on the left – what has happened over the last 4 years.
- **2016 assumptions** ( ) in the middle – what we thought would happen, based on the assumptions adopted for the 2016 valuation.
- **2020 recommendations** ( ) on the right – what we would have expected to happen, had our recommended assumptions for the 2020 valuation been adopted for the 2016 valuation.

It should be noted that experience can be a very volatile measure for groups with small amounts of data, which then impacts the reliance we place on it.

Experience vs expectations: average retirement ages



Summary

The average age and service of recent retirements from the 1992 Scheme are close to the 2016 assumptions, as shown above.

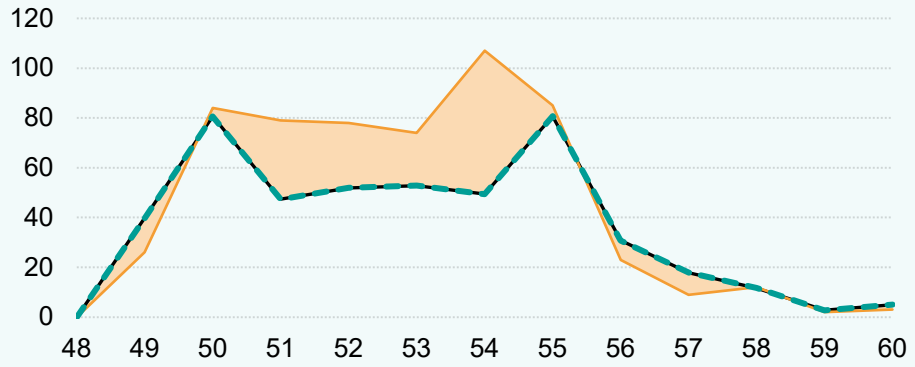
The number of retirements for Protected and Tapered members in the 1992 Scheme at each service period is reasonably close to the 2016 assumptions, as shown on the graph on the right hand side of the next page. Although the number of retirements at ages below age 55 has been greater than expected (as shown on the graph on the left hand side of the next page), experience has shown that the average age at retirement for retirements over 2016 to 2020 has been in line with the previous assumption (52.8 compared to 52.9 – see page 47). Therefore, we propose that the existing assumption is retained.

There is insufficient information to test the impact on the 2006 Scheme, 2006 Scheme (Special) 2015 Scheme and the unprotected 1992 Scheme members, in isolation. However, as we set out in our recommendations, we expect the unprotected members behaviour to more closely mirror the protected members retirement patterns due to the McCloud judgment.

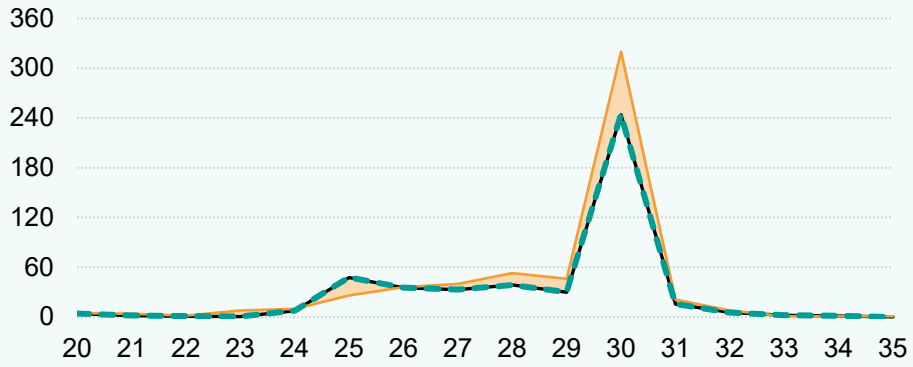
Scheme experience: in detail

Number of retirements by age, for members with accrued pension in the specified scheme, split by category

1992 scheme males (Age)



1992 scheme males (Years of service)



Key: **2016 assumptions** **2020 recommendations** **Experience** (line) and difference from 2016 assumptions (shaded area)

Scheme experience: in numbers

Category		**Data** Number of retirements over 2016-2020	**Experience** Average service / age at retirement for retirements over 2016-2020	**2016 Expectations** Expected average service / age at retirement under the 2016 assumptions	**2020 Expectations** Expected average service / age at retirement under the 2020 assumptions
1992 scheme (protected and tapered protected)	Years of service	579	28.8	28.6	28.6
	Age	579	52.8	52.9	52.9
1992 scheme (unprotected)	Years of service	N/A	N/A	30.0	28.6
	Age	N/A	N/A	55.0	53.6
2006 scheme - Standard (protected and unprotected)	Age	N/A	N/A	60.0	60.0
2006 scheme - Special (protected and unprotected)	Age	N/A	N/A	55.0	55.0
2015 scheme	Age	N/A	N/A	58.8	58.8

Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

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Scheme experience: in numbers (FPS (England))

The table shows the corresponding figures for the FPS (England). This shows the larger dataset available.

Category		**Data** Number of retirements over 2016-2020	**Experience** Average service / age at retirement for retirements over 2016-2020	**2016 Expectations** Expected average serviced / age at retirement under the 2016 assumptions	**2020 Expectations** Expected average service / age at retirement under the 2020 assumptions
1992 scheme (protected / tapered / unprotected with 16 years' service or more at 31 March 2012)	Years of service	3,588	28.6	29.1	29.1
	Age	3,588	52.6	52.7	52.7
1992 scheme (unprotected with less than 16 years' service at 31 March 2012)	Years of service	N/A	N/A	30.0	29.1
	Age	N/A	N/A	55.0	52.7
2006 scheme - Standard (protected and unprotected) *	Age	N/A	N/A	60.0	60.0
2006 scheme - Special (protected and unprotected) *	Age	N/A	N/A	55.0	55.0
2015 scheme *	Age	N/A	N/A	58.8	58.8

* There was insufficient data to produce a robust analysis of retirements from the 2006 Scheme, 2006 Scheme (Special) or the 2015 Scheme

Wider environment:

McCloud judgment

The McCloud judgment could result in many members exchanging up to 7 years' service from the 2015 Scheme to the 1992/2006 schemes.

The additional service in the 1992 Scheme may lead to earlier retirements than previously assumed. However, the magnitude of any change is by no means clear, if it occurs at all. There are many other factors that might be working in the other direction which may influence member behaviour.

To allow for the potential impact of this on member behaviour, we have aligned the retirement decrements of the unprotected 1992 members protected / tapered members.

As the majority of 2006 Scheme members are unprotected, and potential service built up shorter, there was no distinction between protected and unprotected members in the 2016 valuation assumptions. There is insufficient data on 2006 Scheme retirements to analyse the suitability of this assumption and therefore, we propose maintaining the existing retirement rates.

Normal Minimum Pension Age

The Finance Act 2022 sets out that the minimum age at which most pension scheme members can be permitted to draw their pension benefits will rise from 55 to 57 with effect from April 2028, to coincide with the rise of State Pension age to 67.

However, the normal minimum pension age for firefighters is not affected by this change, so we have made no allowance for this.

Commutation Cap

Before April 2022, certain 1992 Scheme members had a limit on the lump sum they could take from the Scheme.

From April 2022, this limit was removed in Scotland.

Although there was a high surge in retirements over the period April to June 2022, and anecdotal evidence suggested this was primarily due to removal of the commutation cap, the volume of retirements has since returned to more 'normal' levels.

We are not aware of any evidence to suggest this change will materially impact members behaviours in the longer term. **Therefore, we do not propose to make any allowance for this.**

B5. Rates of leaving service

Rates of leaving service

What does this assumption represent?

Rates of leaving service (sometimes referred to as withdrawal rates) are a series of probabilities which represent the likelihood of a member voluntarily leaving service (without retiring) at any given age.

Different assumptions are usually adopted for groups who are expected to behave differently, e.g., for males and females, or members with pensions in different sections of the scheme.

Summary statistics

Relative importance of assumption	Volatility of experience and unreliability of data	Size of recommended change	Impact of recommended changes on scheme costs
Average	Low	Large	Lower costs

Our recommendations and rationale

1992 Scheme: For the FPS (Scotland), we were unable to undertake a robust analysis of 1992 Scheme experience. Therefore, we have looked at the experience in the FPS (England), as the larger scheme of the same workforce.

Experience in FPS (England) has shown that withdrawals of regular firefighters over 2016 to 2020 has been significantly higher than previously assumed at all ages. This continued a trend that was identified as part of the previous valuation in 2016, but for the 2016 valuation, the 2012-2016 experience was considered to be unusual and unlikely to continue in the long term. Withdrawals of regular firefighters have actually increased over this valuation period, when comparing 2016-2020 experience versus 2012-2016 experience.

We therefore propose to update and increase the withdrawal assumptions for regular firefighters in FPS (England) to be based upon the combined experience over the 8 year period from 2012 to 2020 from when the higher rates were observed. We recommend that FPS (Scotland) continues to align with the FPS (England) assumption.

2006 Scheme regular, 2006 scheme (Special) and 2015 scheme regular: We recommend continued adoption of the same assumption as the 1992 Scheme (i.e. update as above).

2006 Scheme and 2015 Scheme – standard retained members: We recommend using the assumptions adopted for the 2016 valuation again for the 2020 valuation. For FPS (England), the withdrawal data for the "on-call" firefighters in the entire workforce was considered, and this showed that rates have remained relatively stable in recent years. We have no reason to expect that experience in Scotland would differ, and so, we recommend the assumption is unchanged for FPS (Scotland) too.

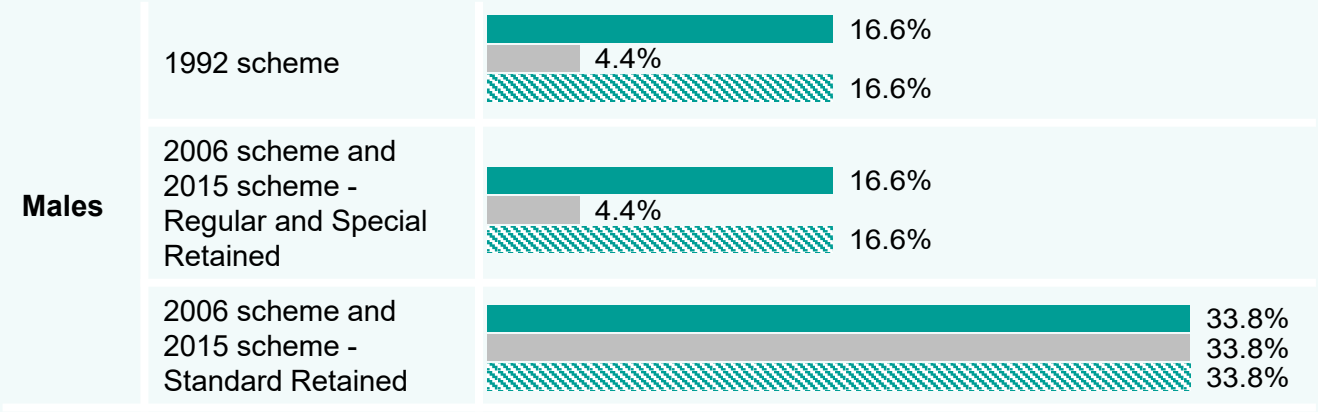
Practical implications

The chart to the right shows the likelihood of a member leaving service before retirement. For each category shown:

- The **top line** shows the impact of the assumptions we recommend for the 2020 valuation ( ).
- The **middle line** ( ) shows the impact of the assumptions adopted for the 2016 valuation.
- The **bottom line** ( ) shows the impact of the assumptions we recommend for the FPS (England) valuation.

The numbers shown assume that members either leave service or remain in service until age 55. No allowance is made for the possibility of early retirement, ill-health retirement, or death in service. These assumptions are covered in other sections.

Likelihood of leaving service before age 55 for member now aged 40



Our approach

Analysis

We have analysed the scheme's experience over the period 1 April 2016 to 31 March 2020.

We have excluded all leavers who rejoined within 5 years from our analysis because after rejoining these members are treated as if they had never left the scheme.

Re-entry of members to pensionable service has been modelled by a 'net' withdrawal assumption for active members. This explicitly allows for a proportion of those leaving active service to return and is based on analysis undertaken on relevant member behaviour. No further explicit allowance has therefore been made in the valuation for a proportion of those deferred at the effective date to subsequently rejoin.

Setting recommended assumptions

Our general approach is:

- Identify groups of members we would expect to have different rates of leaving service, for example by gender and scheme section.
- Compare recent withdrawal experience against the 2016 assumptions.
- Where there is not enough scheme experience, we look at assumptions from other groups of members or other schemes which may have similar experience, adjusted to allow for any available information.
- Recommend that the assumption is updated only if evidence points to a material change to the valuation results.
- We typically only recommend a change to the assumed number of withdrawals, leaving the age profile of the existing assumption unaltered. We only recommend a change to the age profile if we see evidence of a material and non-temporary step change in membership behaviour.
- The last four years of experience may not accurately reflect the longer-term, so if we recommend a change we generally 'smooth out' any excess volatility by basing our recommendation on an equal allowance for recent experience and the 2016 valuations assumptions, which were in turn set using pre-2016 experience.

We have considered the corresponding analysis carried out for the FPS (England) and assessed the likely difference between experience for Scotland relative to England.

Scheme experience: overall

Experience versus expectations show how accurate the assumptions have been in the past and can help inform setting future assumptions.

It should be noted that experience can be a very volatile measure for groups with small amounts of data, which then impacts the reliance we place on it.

Summary

1992 Scheme: The FPS (Scotland) data only identified 4 withdrawals from the 1992 Scheme in the 2016-2020 data provided. This seemed somewhat unusual relative to the 150 withdrawals from the 1992 Scheme that were identified over 2012-2016 for the 2016 valuation.

We have therefore looked at experience in the FPS (England) as the larger scheme of the same workforce. This analysis showed that there has been a significant increase in observed withdrawals compared to the 2016 assumptions for 1992 Scheme members. This follows a similar increase seen at the previous 2016 valuation.

We have therefore recommended increasing the rates of withdrawals for 1992 Scheme members in FPS (England). We have no reason to expect that withdrawal experience would differ materially between the FPS (Scotland) and FPS (England). We therefore recommend continuing to align the assumption for the FPS (Scotland) with that of FPS (England).

All Other Leavers: It was not possible to separate the movement data for 2006 and 2015 Scheme members between regular and retained members. Since there are very different withdrawal patterns between regular and retained members, there are limitations on the conclusions that can be drawn from analysing the total withdrawal rate compared to that expected. However, this analysis does provide some evidence that observed withdrawals in FPS (Scotland) have been higher than the 2016 assumptions (see the next page). This follows a similar increase at the previous 2016 valuation and is in line with observations from other schemes of a general increase in withdrawals, and a wider long-term trend across the public sector.

For FPS (England), the recommendation is to increase the withdrawal assumption for regular members (and special retained members) in line with the recommended 1992 Scheme assumption. We recommend adopting the same assumption for FPS (Scotland).

Standard retained members have a separate (much higher) assumption at the 2016 valuation. For FPS (England), withdrawal data for the “on-call” firefighters in the entire workforce data was analysed, and this highlighted there has been little change in rates of withdrawals in recent years. There was, therefore, no evidence to support changing this assumption for FPS (England), and so, the existing assumption was retained. We also recommend no change to the assumption for retained members of FPS (Scotland).

Scheme experience: in numbers

	Experience Number of leavers over 2016-2020	**2016 Expectations** Expected number of leavers under the 2016 assumptions	**2020 Expectations** Expected number of leavers under the 2020 assumptions
1992 Scheme	N/A	N/A	N/A
All other leavers	452	371	445

There were 4 recorded withdrawals from the 1992 Scheme between 2016-2020. This seemed unusual relative to the 150 withdrawals from the 1992 Scheme that were identified over 2012-2016 for the 2016 valuation. In addition, it would not be possible to carry out a robust analysis of 1992 Scheme experience with such a small number of withdrawals.

It is not possible to separate the movement data for 2006 Scheme members between regular and retained members. It is therefore not possible to show actual number of leavers for 2006 Scheme and 2015 Scheme all male regular and special retained members separately from 2006 Scheme and 2015 Scheme standard retained members. However, we were able to derive approximately the expected total number of withdrawals under the 2016 and 2020 proposed assumptions, for broad comparison purposes only.

Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

Scheme experience: in numbers (FPS (England))

The table shows the corresponding figures for the FPS (England). This shows the larger dataset available.

	Experience Number of leavers over 2012-2020	**2016 Expectations** Expected number of leavers under the 2016 assumptions	**2020 Expectations** Expected number of leavers under the 2020 assumptions
1992 Scheme - all male members	1,876	485	1,941
All other leavers	4,673	n/a	n/a

It is not possible to separate the movement data for 2006 scheme members between regular and retained members. It is, therefore, not possible to show actual number of leavers for 2006 Scheme and 2015 Scheme all male regular and special retained members separately from 2006 scheme and 2015 scheme standard retained members . We show the actual number of leavers in the experience data for all other leavers for reference only.

B6. Promotional pay increases

Promotional pay increases

What does this assumption represent?

Promotional pay assumptions are a series of pay increases that members are assumed to receive **in addition to** normal annual salary increases. The assumptions are usually tied to a member's age or length of service.

Promotional pay increases are a scheme-set assumption. **Salary increases** are a directed assumption and are not covered in this section.

Promotional pay increase assumptions are important as they help determine the value of 'final salary' benefits which make up a high proportion of scheme costs. The final salary proportion will reduce over time as more CARE benefits are built up in the reformed scheme, which are less dependent on promotional pay increases.

Costs of the McCloud remedy are highly sensitive to promotional pay increase assumptions

Summary statistics

Relative importance of assumption	Volatility of experience and unreliability of data	Size of recommended change	Impact of recommended changes on scheme costs
Average	High	None	No impact

Our recommendations and rationale

We recommend that the promotional pay increases assumptions adopted for the 2016 valuation are retained for the 2020 valuation.

There is some volatility in the experience, but the overall shape of the experience is broadly in line with the 2016 assumption. The volatility in experience is in line with expectations as the analysis is affected by the shape of the active membership profile.

Adjusting the assumptions for recent experience for these members would not have a material effect on the valuation results.

Practical implications

The number and size of promotional pay increases can dramatically affect member benefits. This is especially true for final salary benefits (which are based on salary at retirement), but also true for career average benefits (which are based on earnings over a member's working lifetime in the scheme).

The chart to the right shows the potential salary at age 55 of a member currently aged 40 and paid £30,000 a year, where the regular firefighter has 15 years' service.

For each category shown:

- The **top line** shows the impact of the assumptions we recommend for the 2020 valuation ( ).
- The **middle line** ( ) shows the impact of the assumptions adopted for the 2016 valuation.
- The **bottom line** ( ) shows the impact of the assumptions we recommend for the FPS (England) valuation.

General (non-promotional) salary increases are set to be zero in the chart so that the impacts of different promotional pay assumptions can be seen more clearly.

Salary at age 55 for a member now aged 40, with 15 years' service and paid £30,000

Our approach

Analysis

We have analysed the scheme's salary growth experience by comparing the average (whole-time equivalent) pensionable pay of the overall active membership as at 31 March 2020 for each year of age (or service) with that for the next year of age (or service). This is known as "profile analysis".

We have made no allowance for members moving between categories.

Setting recommended assumptions

Our general approach is:

- Identify groups of members where we see different levels of promotional increases. This has included working patterns* in the past, and we continue to examine whether differences exist for workforce patterns.
- Compare recent levels of promotional increases against the 2016 valuation assumptions
- Where there is not enough scheme experience, we look at assumptions from other groups of members or other schemes which may have similar experience, adjusted to allow for any available information.
- Recommend a change to the assumption only if evidence points to a material change to the valuation results.
- We typically only recommend an overall adjustment to the assumed promotional increases, leaving the profile of the existing assumption unaltered. We only recommend a change to the profile if we see evidence of a material and non-temporary change in membership behaviour.
- The last four years of experience may not accurately reflect the longer-term, so if we recommend a change we generally 'smooth out' any excess volatility by basing our recommendation on an equal allowance for recent experience and the 2016 valuations assumptions, which were in turn set using pre-2016 experience.

We have also considered the corresponding analysis carried out for the FPS (England).

* regular / retained members

Scheme experience: overall

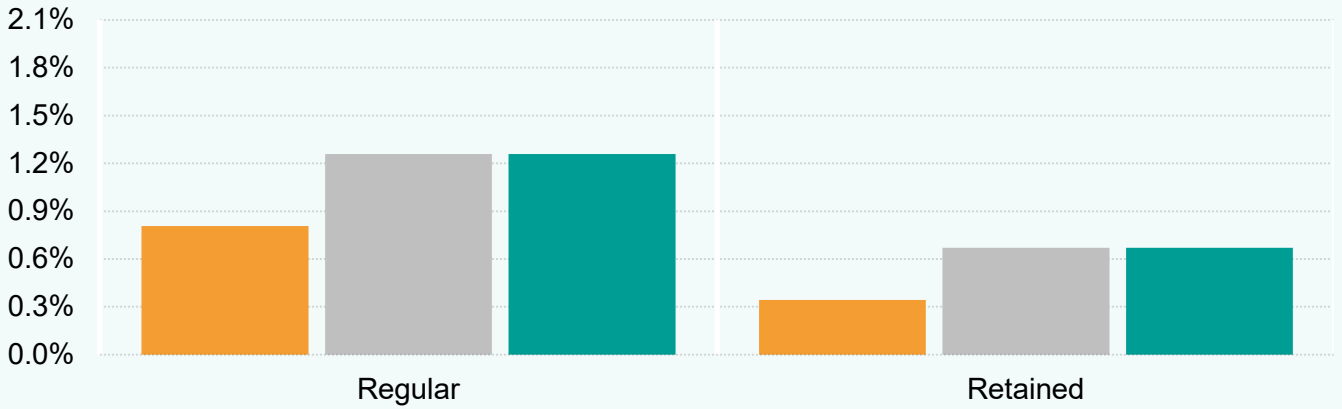
Experience versus expectations show how accurate the assumptions have been in the past and can help inform setting future assumptions.

The chart to the right and those on the following pages compare:

- **actual experience** ( ) on the left – what has happened
- **2016 assumptions** ( ) in the middle – what we thought would happen, based on the assumptions adopted for the 2016 valuation.
- **2020 recommendations** ( ) on the right – what we would have expected to happen, had our recommended assumptions been adopted for the 2016 valuation.

It should be noted that experience can be a very volatile measure for groups with small amounts of data, which then impacts the reliance we place on it.

Experience vs expectations: average annual increases from age 45 to 65



Summary

Overall, both regular firefighters and retained firefighters have experienced lower promotional pay increases than expected, based on the 2016 assumptions, although the absolute differences are small.

There is some volatility in the experience (as highlighted on the charts on the next page). This is not unexpected as the analysis is affected by the shape of the active membership profile.

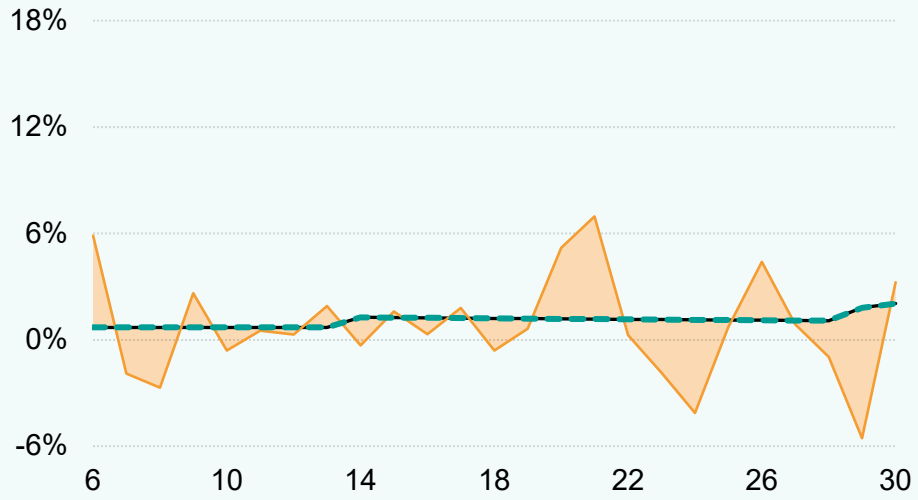
The promotional pay assumption is becoming less important to the calculation of the employer cost with the move from final salary accrual to CARE accrual.

Adjusting the assumptions for recent experience would not have a material effect on the valuation results.

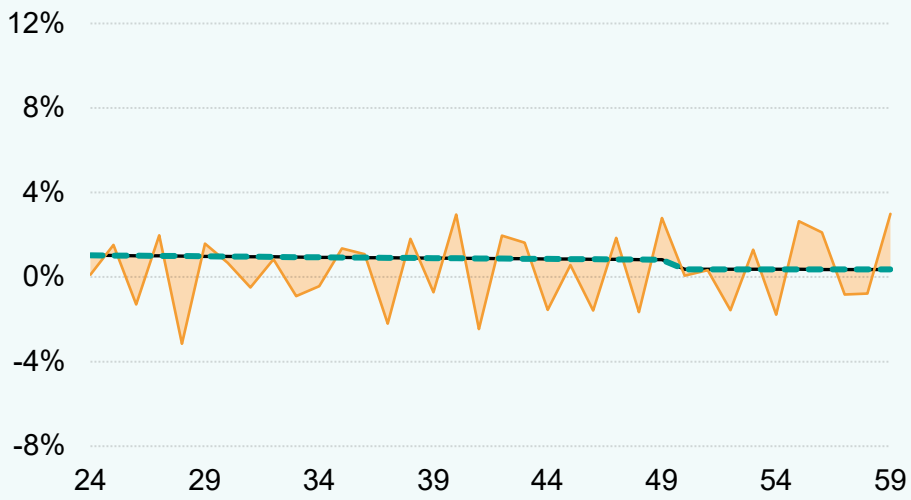
Scheme experience: in detail

Annual promotional pay increases by age, split by category

Regular - Years of service



Retained - Age



Key: **2016 assumptions** **2020 recommendations** **Experience** (line) and difference from 2016 assumptions (shaded area)

Scheme experience: in numbers

Category	2020 payroll of analysed members	**Experience** Implied annual promotional pay increase, after removal of general salary increases	**2016 Expectations** Expected annual promotional pay increase under the 2016 assumptions	**2020 Expectations** Expected annual promotional pay increase under the 2020 assumptions
Regular	£101 million	0.8%	1.3%	1.3%
Retained	£41 million	0.3%	0.7%	0.7%

The Experience and Expectations figures shown in the table above show the annual promotional pay increases to age 55 for a member now aged 40 with 15 years' service. Different rates would apply for different current age, service and retirement age combinations.

Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

Scheme experience: in numbers (FPS (England))

The table shows the corresponding figures for the FPS (England). This shows the larger dataset available.

Category	2020 payroll of analysed members	**Experience** Implied annual promotional pay increase, after removal of general salary increases	**2016 Expectations** Expected annual promotional pay increase under the 2016 assumptions	**2020 Expectations** Expected annual promotional pay increase under the 2020 assumptions
Regular	£600 million	1.8%	1.3%	1.3%
Retained	£200 million	0.1%	0.7%	0.7%

The Experience and Expectations figures shown in the table above show the annual promotional pay increases to age 55 for a member now aged 40 with 15 years' service. Different rates would apply for different current age, service and retirement age combinations.

Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

B7. Rates of ill-health retirement

Rates of ill-health retirement

What does this assumption represent?

Rates of ill-health retirement are a series of probabilities which represent the likelihood of a member retiring in ill-health at any given age.

Members are eligible for either upper-tier or lower-tier ill-health benefits, depending on the severity of their illness.

Summary statistics

Relative importance of assumption	Volatility of experience and unreliability of data	Size of recommended change	Impact of recommended changes on scheme costs
Least	Low	None	No impact

Our recommendations and rationale

Ill-Health Incidence: We were not able to carry out an experience analysis for this assumption for the FPS (Scotland). In the absence of this experience data, we have considered the FPS (England) analysis, where no change was recommended.

For the 2016 valuation, the assumption for the ill-health retirement rates was the same as that used for FPS (England). We have no reason to believe ill-health retirement rates in the FPS (Scotland) would differ to that in the FPS (England) and so, we also recommend no change to the existing assumption for the FPS (Scotland).

Split between ill-health tiers: We were not able to carry out an experience analysis for this assumption for the FPS (Scotland). In the absence of this experience data, we have considered the FPS (England) analysis. Although it was noted there has been a lower proportion of upper tier ill-health retirements than previously assumed, there was some concerns over the credibility of this analysis. As such, no change was recommended for the FPS (England), where the current assumed split for higher / lower tiers is 40:60.

For the 2016 valuation, assumed split for higher / lower tiers for the FPS (Scotland) was the same as that adopted for the FPS (England). As there is insufficient data to analyse and the low materiality to future contribution rates, it is not unreasonable to maintain the existing tier split for the FPS (Scotland).

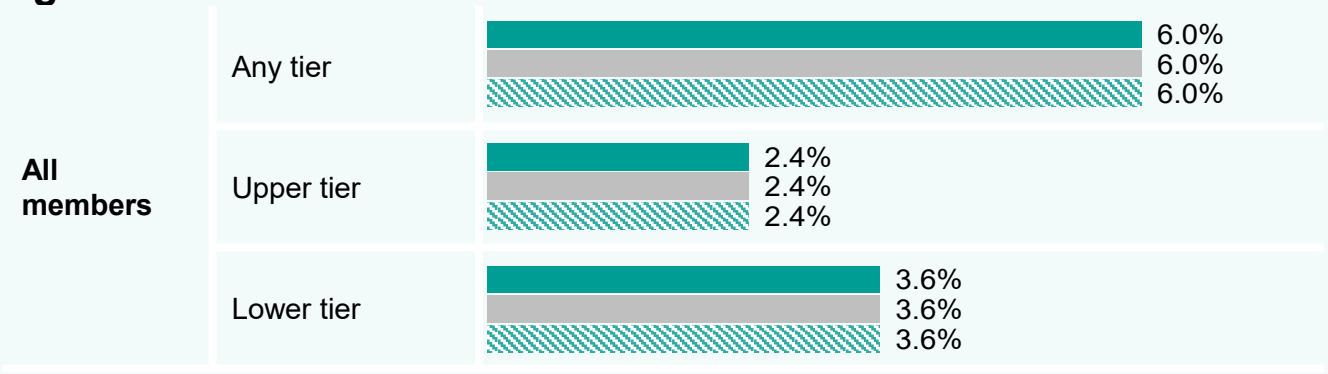
Practical implications

The chart to the right shows the likelihood of members retiring in ill-health before retirement. For each category shown:

- The **top line** shows the impact of the assumptions we recommend for the 2020 valuation ( ).
- The **middle line** ( ) shows the impact of the assumptions adopted for the 2016 valuation.
- The **bottom line** ( ) shows the impact of the assumptions we recommend for the FPS (England) valuation.

The numbers shown assume that members either retire in ill health or remain in service until age 55. No allowance is made for the possibility of early retirement, leaving service, or death in service. These assumptions are covered in other sections.

Likelihood of member now aged 40 retiring in ill-health before age 55



Our approach

Analysis

We have analysed the scheme's experience over the period 1 April 2016 to 31 March 2020.

As ill-health criteria sometimes differ between schemes, there is a chance that experience might have been slightly different if members in scope for the McCloud remedy were in a different scheme to currently. We expect the overall impact of this to be immaterial and have made no allowance for this possibility.

Setting recommended assumptions

Our general approach is:

- Identify groups of members we would expect to have different rates of ill-health retirement, for example by gender.
- Compare recent ill-health retirement experience against the 2016 assumptions.
- Where there is not enough scheme experience, we look at assumptions from other groups of members or other schemes which may have similar experience, adjusted to allow for any available information.
- Recommend that the assumption is updated only if evidence points to a material change to the valuation results.
- We typically only recommend a change to the assumed number of ill-health retirement, leaving the age profile of the existing assumption unaltered. We only recommend a change to the age profile if we see evidence of a material and non-temporary step change in membership outcomes.
- The last four years of experience may not accurately reflect the longer-term, so if we recommend a change we generally 'smooth out' any excess volatility by basing our recommendation on an equal allowance for recent experience and the 2016 valuations assumptions, which were in turn set using pre-2016 experience.
- The same approach applies to the proportions of ill-health retirements across the different severity tiers.

Due to the larger dataset, we have also considered the corresponding analysis carried out for the FPS (England) and assessed the likely difference between experience for Scotland relative to England.

Scheme experience: overall

Experience versus expectations show how accurate the assumptions have been in the past and can help inform setting future assumptions.

It should be noted that experience can be a very volatile measure for groups with small amounts of data, which then impacts the reliance we place on it.

Considerations for setting assumption

For the 2016 valuation, the assumed incidence of ill-health retirements in FPS (Scotland) was the same as those set for FPS (England). No change was recommended to the ill-health incidence rates in FPS (England), on the grounds that adjusting the assumption for recent experience would not make a material change to the valuation results. We have no reason to believe ill-health retirement rates in the FPS (Scotland) would differ to that in the FPS (England), and so we recommend no change for FPS (Scotland).

For FPS (England), it was recommended that the upper-tier proportion was unchanged for the 2020 valuation. We recommend no change for FPS (Scotland), as there is no evidence to suggest the current assumption is inappropriate.

Summary of FPS (England) experience

There have been fewer ill-health retirements over 2016-2020 compared to the expected number of ill-health retirements based on the 2016 assumptions. However, adjusting the assumption for recent experience would not make a material change to the valuation results, so we recommended that the 2016 valuation assumptions were retained.

As the available data ends at 31 March 2020, it misses most of the impact of COVID-19. There is anecdotal evidence that COVID-19 has increased the number of ill-health retirements, which supported retaining the current assumption despite pre-pandemic evidence.

We separately considered the ill-health tiers. For the 2016 valuation, 40% of members were assumed to retire with upper-tier benefits when leaving due to ill-health. Our analysis identified that around 26% of actual retirements were with upper-tier benefits. Updating for this difference would not be expected to have a material effect on the contribution rate, so we propose to maintain the current assumption.

Scheme experience: in numbers (FPS (England))

The table shows the corresponding figures for the FPS (England). This shows the larger dataset available.

Category		**Experience** Number of ill-health retirements over 2016-2020	**2016 Expectations** Expected number of ill-health retirements under the 2016 assumptions	**2020 Expectations** Expected number of ill-health retirements under the 2020 assumptions
All members	**Any tier**	306	341	341
	Upper tier	81 (26%)	137 (40%)	137 (40%)
	Lower tier	225 (74%)	205 (60%)	205 (60%)

Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

Wider environment: McCloud

McCloud judgment

We would not expect the McCloud judgment to impact the number of ill-health retirements directly. However, the tests for the eligibility of members to receive ill-health benefits can differ between the legacy and reformed schemes.

Therefore, there may be an increased rate of ill-health retirement for in scope members, who may be reassessed under different rules. We would not expect this to have a material impact on contribution rates.

In addition, this ceased to apply from 1 April 2022 when all members moved into the reformed scheme.

B8. Mortality before retirement

Mortality before retirement

What does this assumption represent?

Mortality assumptions are a series of probabilities which represent the likelihood of a member dying at any given age. Different assumptions usually apply to males and females.

Mortality after retirement assumptions are used after members are assumed to retire and these and these are covered in Part B2.

Summary statistics

Relative importance of assumption	Volatility of experience and unreliability of data	Size of recommended change	Impact of recommended changes on scheme costs
Least	Low	None	No impact

Our recommendations and rationale

We were not able to carry out a robust experience analysis for this assumption for FPS (Scotland).

In the absence of this experience data, we have therefore considered the FPS (England) analysis, being the larger data set of the same workforce, and assessed the likely difference between experience for FPS (Scotland) relative to FPS (England).

For FPS (England), actual death before retirement experience was slightly lower than that expected at most ages. We recommended no changes to the current assumptions as this difference was not material to the valuation results. In addition, it was noted that the analysed experience runs to 31 March 2020, and as such misses most of the impact of COVID-19. It is accepted that COVID-19 increased the number of deaths before retirement.

We recommend continuing to align the assumption for FPS (Scotland) with that of FPS (England). There is no evidence to suggest the existing assumption is inappropriate.

Practical implications

The chart to the right shows the likelihood of dying before retirement. For each category shown:

- The **top line** shows the impact of the assumptions we recommend for the 2020 valuation ( ).
- The **middle line** ( ) shows the impact of the assumptions adopted for the 2016 valuation.
- The **bottom line** ( ) shows the impact of the assumptions we recommend for the FPS (England) valuation.

The numbers shown assume that members either die or remain in service until age 55. No allowance is made for the possibility of early retirement, leaving service, or ill-health retirement. These assumptions are covered in other sections.

Likelihood of member now aged 40 dying in service before age 55

Our approach

Analysis

We have analysed the scheme's pre-retirement mortality experience over the period 1 April 2016 to 31 March 2020.

Setting recommended assumptions

Our general approach is:

- Identify groups of members we would expect to have different rates of death before retirement, for example by gender.
- Compare recent pre-retirement death experience against the 2016 assumptions.
- Where there is not enough scheme experience, we look at assumptions from other groups of members or other schemes which may have similar experience, adjusted to allow for any available information.
- Recommend that the assumption is updated only if evidence points to a material change to the valuation results.
- We typically only recommend a change to the assumed number of pre-retirement deaths, leaving the age profile of the existing assumption unaltered. We only recommend a change to the age profile if we see evidence of a material and non-temporary step change in membership outcomes.
- The last four years of experience may not accurately reflect the longer-term, so if we recommend a change we generally 'smooth out' any excess volatility by basing our recommendation on an equal allowance for recent experience and the 2016 valuations assumptions, which were in turn set using pre-2016 experience.

Due to the larger dataset, we have also considered the corresponding analysis carried out for the FPS (England) and assessed the likely difference between experience for Scotland relative to England.

Scheme experience: overall

Considerations for setting assumption

Experience versus expectations show how accurate the assumptions have been in the past and can help inform setting future assumptions.

It should be noted that experience can be a very volatile measure for groups with small amounts of data, which then impacts the reliance we place on it.

There were 19 deaths before retirement over the 2016 to 2020 inter-valuation period in the FPS (Scotland). This is insufficient data to provide a robust analysis. We have therefore referred to the experience in FPS (England).

Considerations for setting assumption

For the 2016 valuation, the pre-retirement mortality assumptions were the same as those adopted for the equivalent valuation of FPS (England).

Although we recommend a shorter life expectancy for post-retirement mortality, the rates of mortality before retirement are lower and therefore less material to the employer contribution rate. We have no reason to believe that the mortality before retirement experience between firefighters in Scotland and England would differ to a material extent.

The mortality before retirement experience over 2016-2020 in FPS (England) was slightly lower than assumed for the 2016 valuation. No change was made to the pre-retirement mortality assumption for the 2020 valuation of FPS (England). On the basis of no evidence to support a change, we recommend no change to the FPS (Scotland) assumption for the 2020 valuation.

Summary of FPS (England) experience

There have been fewer pre-retirement deaths compared to the 2016 valuation assumption.

The age profile of the recent deaths broadly match the 2016 assumptions.

We recommended no changes to the current assumptions as adjusting the assumption for recent experience would not make a material change to the valuation results. In addition, it was noted that the analysed experience runs to 31 March 2020, and as such misses most of the impact of COVID-19. It is accepted that COVID-19 increased the number of deaths before retirement.

Scheme experience: in numbers (FPS (England))

The table shows the corresponding figures for the FPS (England). This shows the larger dataset available.

Category	**Experience** Number of deaths in service over 2016-2020	**2016 Expectations** Expected number of deaths in service under the 2016 assumptions	**2020 Expectations** Expected number of deaths in service under the 2020 assumptions
All members	49	60	60

Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

B9. Family statistics

Family statistics

What does this assumption represent?

The term 'family statistics' covers several assumptions, including:

- the probability that an eligible partner exists
- the average age of that partner, compared to the member.

The assumptions are used to estimate the likelihood of a dependant's pension coming into payment when a member dies, and how long that pension will be paid.

For existing pensioners, we consider the likelihood of members having an eligible partner on 31 March 2020. For future pensioners, we consider the likelihood of members having an eligible partner at retirement, or earlier death.

Mortality assumptions apply independently to the member and assumed partner.

Summary statistics

Relative importance of assumption	Volatility of experience and unreliability of data	Size of recommended change	Impact of recommended changes on scheme costs
Least	Medium	None	No impact

Our recommendations and rationale

Proportion Married/Partnered: For the proportion married assumptions (applicable to 1992 Scheme members) and the proportion married/partnered assumptions (applicable to 2006 Scheme and 2015 Scheme members), there was insufficient experience data available in relation to the FPS (Scotland) to produce a robust analysis

We therefore considered the experience analysis of the larger dataset of the FPS (England), which also considered the ONS married and married/partnered assumptions in informing the recommendation. The conclusion reached was that there was no evidence to support updating the existing assumption. We have no reason to believe family circumstances in the FPS (Scotland) would differ to that in the FPS (England), and so, we also recommend no change to the existing proportions married/partnered assumption for the FPS (Scotland).

Age difference assumptions: We recommend retaining the existing assumption that males are assumed to be three years older than females. There was insufficient experience data available in relation to the FPS (Scotland) to test the suitability of this assumption. Therefore, we have considered the FPS (England) analysis which showed experience was broadly in line with the current 2016 valuation assumptions.

Other assumptions: For other minor assumptions such as minor dependants' pensions, dependants' gender and remarriage, we recommend no change to the existing assumptions.

Practical implications

The chart to the right shows the likelihood that an eligible partner exists when a member dies. The likelihoods shown depend on:

- Assumptions about the existence of an eligible partner and that partner's age (discussed in this section)
- Assumptions about the member and partner's mortality (discussed in the mortality after retirement section).

For each category shown:

- The **top line** shows the impact of the assumptions we recommend for the 2020 valuation ( ).
- The **middle line** ( ) shows the impact of the assumptions adopted for the 2016 valuation.
- The **bottom line** ( ) shows the impact of the assumptions we recommend for the FPS (England) valuation.

Likelihood of an eligible partner existing at time of death*, for normal health pensioner who retired at age 55

*Expected age at death for normal health male pensioners in the FPS (Scotland) who are currently aged 55 is 84, using the life expectancy assumptions we recommend for the 2020 valuation.

Our approach

Analysis

We have insufficient data to carry out a credible analysis using the scheme's own data. We have considered the experience analysis carried out on the FPS (England) over the period 1 April 2016 to 31 March 2020.

Our analysis has been carried out on an 'lives' basis reflecting data available.

Setting recommended assumptions

Our general approach is:

- Identify groups of members we would expect to have different family statistics, for example by gender, and by section of the scheme, where there are differences in eligibility.
- Compare recent proportion married for members against the 2016 assumptions.
- Where there is not enough scheme experience, we look at assumptions from national statistics, other groups of members or other schemes which may have similar experience, adjusted to allow for any available information.
- Recommend that the assumption is updated only if evidence points to a material change to the valuation results.
- Recommend that the proportion married/partnered assumption remains aligned to the proportion married assumption in the absence of any experience data or evidence that would justify changing the proportion married/partnered assumption.
- We typically only recommend a change to the overall assumed proportion married or married/partnered, leaving the age profile of the existing assumption unaltered. We only recommend a change to the age difference if we see evidence of a material and non-temporary step change in membership behavior.
- The last four years of experience may not accurately reflect the longer-term, so if we recommend a change we generally 'smooth out' any excess volatility by basing our recommendation on an equal allowance for recent experience and the 2016 valuations assumptions, which were in turn set using pre-2016 experience.

We have also considered the analysis carried out for the FPS (England) and assessed the likely difference between experience for Scotland relative to England.

Scheme experience: overall

Considerations for setting assumption

Experience versus expectations show how accurate the assumptions have been in the past and can help inform setting future assumptions.

It should be noted that experience can be a very volatile measure for groups with small amounts of data, which then impacts the reliance we place on it.

For the 2016 valuation, the assumption was the same as the proportions married and proportions married/partnered table for the FPS (England).

Summary: Proportion Married and proportion married/partnered

There was insufficient data to carry out a robust analysis of the proportion married and proportion married/partnered assumption using the FPS (Scotland)'s own data.

Therefore, in the absence of their own scheme analysis, we have considered the FPS (England) analysis being the larger dataset of the same workforce. For the FPS (England), the proportion married and proportion married/partnered experience analysis was summarised as follows:

- For males in the 1992 Scheme, a similar proportion married has been seen in recent years (62%) compared to the 2016 assumption (62%). However, as this analysis only covers 18 out of 45 forces (around 34% of members), this limits the credibility of the data analysis. There is insufficient information to carry out any analysis for females.

- There is insufficient information to test the impact on the 2006 Scheme and 2015 Scheme proportion married/partnered assumption, due to low rates of deaths. However, ONS married and married/partnered statistics were considered when informing whether the married/partnered assumption remained appropriate. The ONS data supported no change to the gap between the married and married/partnered assumption.

No change was made to the proportion married and married/partnered assumptions for the FPS (England).

On the basis that there is no reason to believe family circumstances in the FPS (Scotland) should be significantly different to that in the FPS (England), we recommend no change to the FPS (Scotland) proportion married and married/partnered assumption.

The following page "Scheme experience: in numbers (FPS (England))" sets out the figures for the analysis carried out for the FPS (England).

Scheme experience: in numbers (FPS (England))

Proportion married or married/partnered at death, by age and category

The table shows the figures for the FPS (England). This shows the larger dataset available.

Category		**Experience** Number of member deaths over 2016-2020	**Experience** Actual number of dependant's pension coming into payment over 2016-2020, as a percentage of how many could have come into payment if every member who died had an eligible dependant	**2016 Expectations** Expected proportion married or partnered at death under the 2016 recommendations	**2020 Expectations** Expected proportion married or partnered at death under the 2020 recommendations
Male	**1992 Scheme (*)**	835	62%	62%	62%
	2006 Scheme, 2006 Scheme (Special) and 2015 Scheme (**)	N/A	N/A	80%	80%

(*) there was 1 female death, which is insufficient data to analyse. This is not included in the table above.

(**) There were 23 male member deaths over 2016-2020 from the 2006 scheme and 2015 scheme which is insufficient data to produce a robust analysis. Therefore, the output included in the table above is for information only.

Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

Scheme experience: overall

Considerations for setting assumption

Experience versus expectations show how accurate the assumptions have been in the past and can help inform setting future assumptions.

It should be noted that experience can be a very volatile measure for groups with small amounts of data, which then impacts the reliance we place on it.

For the 2016 valuation, the assumption was the same as the age difference assumption for the FPS (England).

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Summary: Age difference

There was insufficient data to carry out a robust analysis of the age difference assumption using the schemes' own data.

Therefore, in the absence of their own scheme analysis, we have considered the FPS (England) analysis being the larger dataset of the same workforce. For the FPS (England), the age difference experience analysis was summarised as follows:

- For males the actual average age difference between member and spouse at death has been a slightly larger differential in recent years compared to the 2016 assumption. However, the data set underlying the analysis is relatively small and therefore the experience data is not likely to be credible for justifying any change to the assumption.

No change was made to the age difference assumptions for the FPS (England).

On the basis that there is no reason to believe family circumstances in the FPS (Scotland) should be significantly different to that in the FPS (England), we recommend no change to the FPS (Scotland) age difference assumption.

The page "Scheme experience: in numbers (FPS (England))" sets out the figures for the analysis carried out for the FPS (England).

Scheme experience: in numbers

Age difference between member and spouse or partner, by age and category

Category	**Experience** Number of member deaths over 2016-2020	**Experience** Average age difference between member and eligible spouse or partner at date of death	**2016 Expectations** Expected age difference between member and eligible partner or spouse under the 2016 assumptions	**2020 Expectations** Expected age difference between member and eligible partner or spouse under the 2020 assumptions
Males	N/A	N/A	3	3

N/A - There was no experience data to produce an analysis of the age difference between member and spouse or partner.

Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

Scheme experience: in numbers (FPS (England))

Age difference between member and spouse or partner, by age and category

Category (*)	**Experience** Number of member deaths over 2016-2020	**Experience** Average age difference between member and eligible spouse or partner at date of death (***)	**2016 Expectations** Expected age difference between member and eligible partner or spouse under the 2016 assumptions	**2020 Expectations** Expected age difference between member and eligible partner or spouse under the 2020 assumptions
Males (**)	540	3.6	3	3

(*) there were no female deaths.

(**) There was insufficient data to produce a robust analysis and therefore, the output included in the table above is for information only .

(***) The average age difference is weighted by total deaths resulting in an adult dependant pension.

The table shows the figures for the FPS (England). This shows the larger dataset available.

Details of our 2020 recommendations are set out in a separate document that will be published alongside this report.

Wider environment and other assumptions

Walker & Goodwin

The Goodwin legal challenge was brought against The Department for Education (DfE) in respect of survivor's benefits provided in the Teachers' Pension Scheme. The Goodwin challenge follows on from the Walker case (which ruled in 2017 that to treat same-sex spouses/civil partners less favourably than their opposite-sex equivalents constituted unlawful discrimination). TPS provided survivor's benefits to male widowers of female members based on service from 6 April 1988, whereas same-sex partners of male members were provided benefits based on service from 1 April 1972 (or 6 April 1978 if the marriage was after the last day pensionable service). Some other public service schemes have similar provisions and we previously identified that this could have a material effect for those schemes.

The Government announced in July 2020 that it had concluded that changes are required to the Teachers' Pension Scheme (England & Wales) to address this discrimination. The government believes this difference in treatment will also need to be remedied in other UK public service pension schemes with similar provisions.

However, we understand that Goodwin does not affect the Firefighter schemes, so no adjustment is required to the analysis.

Minor dependants' pensions

No allowance has been taken for short term dependants' pensions or childrens' pensions (other than those already in payment), on grounds of immateriality.

Dependants' gender

All dependants are assumed to be the opposite sex of the member, on the grounds of materiality.

Remarriage

No allowance is made for remarriage on the grounds of materiality.

In each case, the approach is the same as that adopted for the 2016 valuation.

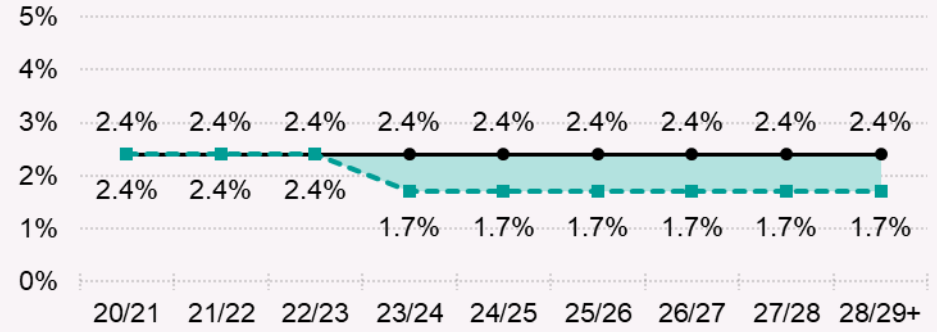
Part C: Appendices

C1. Directed assumptions 1

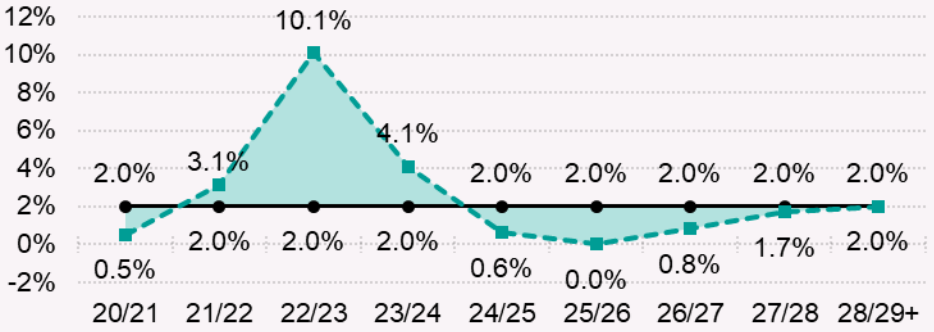
Annual financial assumptions

Taken from Directions dated 30 August 2023.

Discount rate, net of assumed pension increases

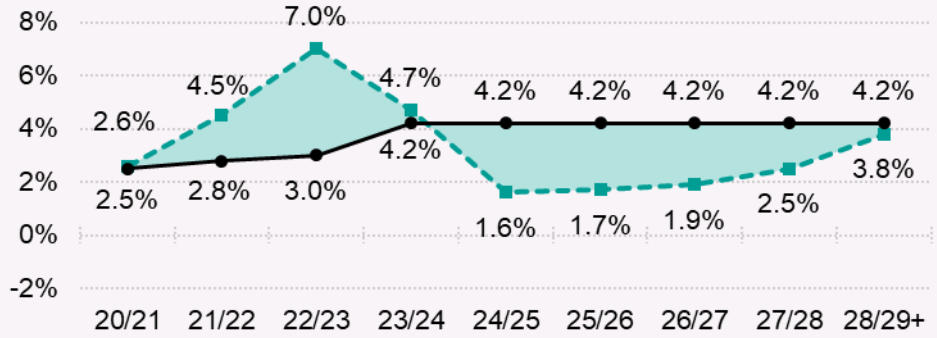


Rates of pension increases



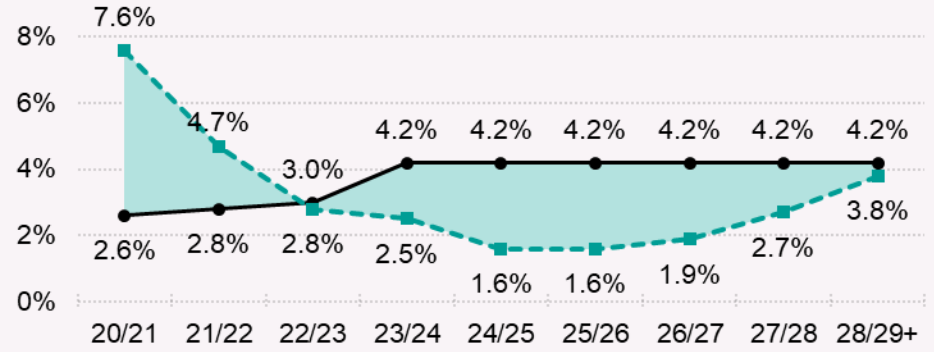
*Note: applicable from April at end of period

Rates of CARE revaluation



*Note: applicable from April at end of period. Allows for corrected CARE revaluations for 2020/21 and 2021/22.

Rates of salary increases



Key: **2016 assumptions** **2020 assumptions** (dotted line) and difference from 2016 assumptions (shaded area)

C1. Directed assumptions 2

Other directed assumptions

Taken from Directions dated 30 August 2023.

Assumption name	2016 assumption	2020 assumption
Deficit spreading periods	15 years	15 years
Future mortality improvements	In line with 2016-based ONS projections	In line with 2020-based ONS projections
State Pension ages	As legislated for in the Pensions Act 1995, Pensions Act 2007, Pensions Act 2011 and Pensions Act 2014	As legislated for in the Pensions Act 1995, Pensions Act 2007, Pensions Act 2011 and Pensions Act 2014

C2. Other minor assumptions 1

Active membership projections

Direction 12 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 2020). This implicitly requires the actuary to estimate the membership to future dates in order to determine the valuation results.

Members of the legacy sections ceased to accrue benefits in these sections at 31 March 2022 and future accrual for all members is in the reformed section from 1 April 2022.

The expected cost of accruing benefits over periods after the effective date has been determined by assuming an overall stable population (age and pay profile) to the end of implementation period.

The approach incorporates the following assumptions:

- Members with past service in the legacy sections are assumed to retire in line with recent experience. This provides for some legacy section members to remain in active service in the reformed scheme beyond 2022 due to late retirement.
- The overall profile of the membership in terms of average age and pay distribution is assumed to remain constant over the period.
- The overall active membership will be in receipt of pensionable pay for each relevant year equal to that assumed for forecasting purposes.
- The State Pension age in the projected populations is assumed to be determined by the implied dates of birth and so the State Pension age mix changes over time despite the assumed stable population. This allows for the membership accruing benefits to change over the implementation period.
- Mortality is assumed to be projected forward to the relevant year of use in all cases.

C2. Other minor assumptions 2

Grouping of individual active member records

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 previous protection status (ie protected, tapered or unprotected), section/scheme (ie 1992 Scheme, 2006 Scheme, 2015 Scheme and Modified 2006 Scheme), age, State Pension age and service.)

Payroll projection

For the purposes of spreading any past service surplus or deficit, the future payroll estimates are assumed to be projected forward (only) in line with known payrolls up to 2022/23 (derived from employer contributions from the scheme accounts), but with 2022/23 payroll adjusted for the backdated 2022 pay award. Subsequent payroll figures assume a stable workforce size and use valuation assumptions.

Member contribution yield over implementation period

The member contribution yield assumed to apply over the implementation period is 13.2% of pensionable pay.

This is the target member contribution yield for the scheme.

C2. Other minor assumptions 3

McCloud calculation approach

The outcome of the remedy required to address the McCloud judgement is twofold:

- When benefits become payable, eligible members can select to receive them from either the reformed or legacy sections for the period 1 April 2015 to 31 March 2022.
- All active members still in the legacy scheme were transferred to the reformed scheme from 1 April 2022.

Members are likely to choose the option that provides them with the highest benefits. This impact was also allowed for in the 2016 cost cap valuation and we have followed the same approach for the 2020 valuation.

To allow for the McCloud remedy in our calculation methodology, we have valued the 'better' benefits for groups of members when comparing benefits in their reformed and legacy sections.

Benefits are valued in each contingency (eg retirement or death), at each future date and for each eligible individual, using the same demographic assumptions (eg retirement ages) for both the reformed and legacy section calculations.

This approach differs from the approach taken for the Cost control valuation as at 31 March 2016, as detailed in the Cost Cap valuation report dated 26 January 2022. The approach for the 2020 valuation is required to be more accurate because it impacts the employer contribution rate payable from 1 April 2024. A simplified approach was taken to the 2016 Cost Cap valuation because the conclusion that there was no floor breach would not have been impacted by any refinements to the calculation approach.

C3. Matthews second options exercise

2020 valuation allowance

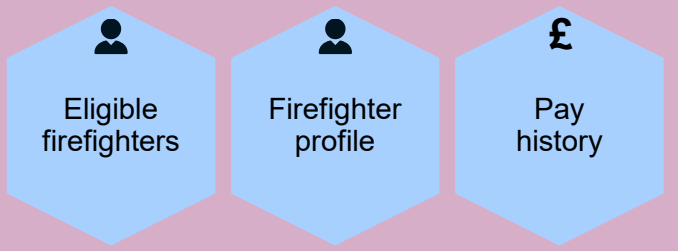
In November 2018, a ruling on the legal case involving part time judges ("O'Brien v MoJ") had a direct impact on the equivalent case for retained firefighters ("Matthews"). SPPA have now consulted on the required changes to the scheme. An options exercise, ("Matthews second options exercise" or "M2") to enable eligible firefighters to elect to buy historic service, will commence in early 2024 and has potential to substantially increase scheme liabilities.

HM Treasury Directions require that all relevant liabilities are included within the valuation. M2 liabilities are considered to be relevant. The outcomes of the options exercise are not yet known so, assumptions are needed to make an allowance in the scheme liabilities for the benefits that will be purchased. These assumptions will be 'scheme-set' assumptions decided upon by Scottish Ministers.

There is considerable uncertainty over the exact eligible population and service available under the exercise, although this has been bolstered by SPPA sharing the individual data used at the first Matthews Options exercise in 2014-2015 ("M1 data"). However, as the exercise is a substantially different offer to individuals from that in the prior exercise, there is very limited evidence to estimate take-up rates ahead of the exercise.

Required additional assumptions

Available evidence



Our advice is structured similarly to the main assumptions.

Limited evidence

Our advice illustrates that there is a range of potential best estimate assumptions. We suggest assumption setting options for Scottish Ministers to discuss with stakeholders.

Scheme-set Directed

Demographic £ Financial

C3. Matthews assumptions: Highlights

Scheme-set assumptions	Assumption information	
	Importance relative to scheme-set assumptions	Volatility of experience and unreliability of data
Eligible firefighters	Most	Medium
Employment periods	Most	Medium
Pay History	Most	Medium
Take-up rate	Most	High

The inclusion of M2 in the 2020 valuation will increase employer contribution rates.

Costs are directly proportional to the number of members assumed to be eligible, the proportion of reference pay assumed and the take-up rate. The longer the assumed employment periods, the higher the cost.

As the options exercise will only affect legacy scheme service, the cost cap mechanism is not impacted by the inclusion of M2.

This table is an addendum to the 'summary statistics' on page 17. It provides an overview of the new M2 'scheme-set' assumptions and their likely bearing on the valuation results. It is intended to highlight areas of potential focus to aid with the process of deciding on the 'scheme-set' assumptions to be adopted for the inclusion of M2.

These assessments are indicative, rather than precise. More information on the approach used can be found on the 'Interpretation of summary statistics' on page 18.

Note that several of the most important valuation assumptions do not appear in this table as they will be directed by HM Treasury. The impact of these 'directed' assumptions could be much greater than that of the impact of 'scheme-set' assumptions.

C3. Matthews assumptions: Eligible firefighters

What does this assumption represent?

The group in scope for M2 will include a mixture of current and former retained firefighters.

An assumed total of those eligible is needed to estimate liabilities. M1 data shared by SPPA provides useful information to help estimate this population.

Summary statistics

Relative importance of assumption	Volatility of experience and unreliability of data
High	Medium

Our recommendation:

Total no. eligible

2,250

Setting the assumption

Our recommendation is based on the available data about the eligible population:

Key to steps below: Data; Recommendation

The **M1 data shared by SPPA** includes details of all individuals who were eligible to make a choice in M1 (this information was compiled in 2014-2015 at the time of the first exercise). — 3,600

Of these individuals, those with **employment before 1 July 2000** are the main group eligible for M2. Firefighters eligible for M1 who were not given an opportunity to participate in M1 are also eligible. (However, we understand there is not a significant number of such individuals). — 2,300

We uprated the data to make an approximate allowance for those firefighters employed in the period 7 April 2000 – 30 June 2000, but not after, who are not included in M1 data. We then make a reduction to allow approximately for **mortality** between 2014 (the date of M1) and 2020 (the valuation date). — 2,250

The final number of eligible members may be higher or lower than our recommendation.

C3. Matthews assumptions: Firefighter profile

What does this assumption represent?

Eligible firefighters will be able to purchase service in the scheme from the date that they commenced employment. An assumed pattern of employment dates, and associated ages, is needed to estimate liabilities.

Summary statistics

Relative importance of assumption	Volatility of experience and unreliability of data
High	Medium

Our recommendation:

Estimate the pattern of employment and birth dates for eligible population from the M1 data

Setting the assumption

Firefighters eligible for M2 in Scotland are predominantly individuals included in the M1 data, with employment start dates before 1 July 2000. Other groups eligible for M2 in Scotland contain relatively few individuals. Those firefighters employed in the period 7 April 2000 to 30 June 2000, but not after, are not included in the M1 data. As retained firefighters leaving service in a 3-month period, we expect this group to be relatively small. The Scottish Fire & Rescue Service ('SFRS') have estimated that there is not a significant number of individuals who did not receive a reasonable opportunity to participate in M1 and are eligible for M2.

Therefore, the subset of the M1 data we have considered represents a large share of the eligible population for M2. By combining with information from the valuation membership data, we were able to analyse patterns of birth dates, employment, and existing scheme membership, for this subset of the M1 data. As such, it represented a robust basis for estimating the periods of service which eligible firefighters will have an option to purchase under M2. Finally, it also provides the associated ages needed to estimate liabilities expected to arise from M2.

C3. Matthews assumptions: Pay History

What does this assumption represent?

Retained firefighters work on an on-call basis. The service that they will be able to purchase depends on their actual earnings in each year of employment as a proportion of the relevant full-time reference pay.

Further, firefighters who purchase service under M2 will need to pay contributions based on associated historic actual pay.

The LGA and Fire Brigade Union have collected and shared national pay agreements setting full-time reference pay from 1962 onwards.

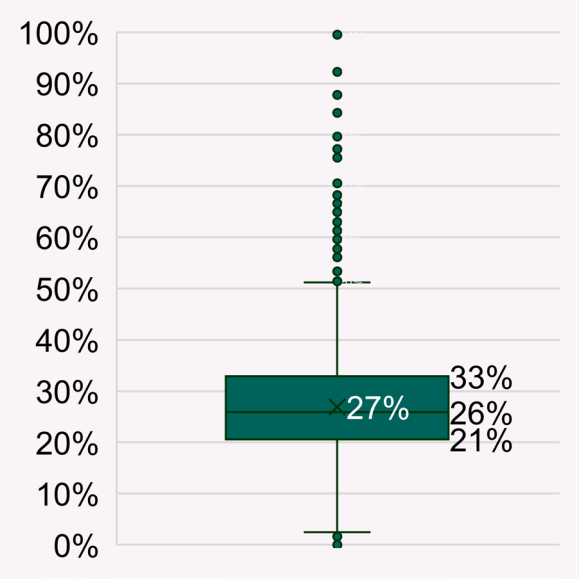
Where pre-2000 actual pay is not known, the draft regulations released alongside Scottish Government's remedy consultation, require that 25% of reference pay is to be assumed under the remedy regulations.

We assume that all eligible members received pay at 25% of reference pay.

Summary statistics

Relative importance of assumption	Volatility of experience and unreliability of data
High	Medium

Post 2000 pay ratios for M1 data firefighters employed pre 1 July 2000



Our recommendation:

Ratio of earnings

25%

Setting the assumption

We only have data on eligible firefighters pay from 2000 onwards. SFRS were not able to provide information on pay for years prior to 2000. Firefighters are expected to be unable to provide evidence of pay over this period, in most cases.

As such, it is expected that the missing pay assumption of 25% of reference pay, as set out in draft regulations, will dictate the majority of service available for purchase under M2.

This percentage is aligned with the approach to be taken for the same exercise in England. It is also informed by GAD analysis of the 2000 – 2014 actual pay for M1 members (who were employed pre 1 July 2000) to pay of a whole-time firefighter (see left). The shaded box shows the range of the middle 50% of those ratios, and 'x' denotes the mean ratio.

While it will be in individuals' interest to provide evidence of higher actual pay, we do not expect this to be significant enough to merit increasing this figure.

C3. Matthews assumptions: Take-up rate

What does this assumption represent?

The take-up rate represents the proportion of eligible firefighters expect to take-up the option to purchase service under the exercise.

Firefighters' decisions will be framed by their personal circumstances and there are good reasons to expect different groups to behave differently:

- Firefighters who took up M1 have already expressed a preference for buying historic service benefits.
- Those who have reached pension age at the point of making their M2 choice can use immediate access to lump sum benefits bought to pay contributions owed.
- Those below pension age must fund contributions from savings or income until reaching retirement.
- Other groups may be relevant: eg whether they are scheme members or are current firefighters

Summary statistics

Relative importance of assumption	Volatility of experience and unreliability of data
High	High

Scottish Ministers' decision:

Broadly 65% take-up rate overall

Scottish Ministers' decision and rationale

Opted for M1: Take-up rate 100%.
This group have previously purchased service and are therefore viewed as very likely to do so again. Scottish Ministers judge that, while not all will be traceable or choose to engage, the open-ended exercise window does not support setting a take-up level assumption for this group lower than 100%. This is aligned with the assumption to be used for the FPS (England) valuation.

Other Age ≥ 55: Take-up rate 70%.
Evidence from analysis of M1 showed 30% take-up. Scottish Ministers considered that improved communication efforts, demand to increase incomes due to inflation, and the open-ended exercise window (as noted above) mean that take-up for this group will be higher for the M2 exercise than in the M1 exercise. Scottish Ministers are therefore setting the M2 assumption higher than M1 experience. The take up rate they have opted for is aligned with the assumption to be used for the FPS (England) valuation.

Other Age < 55: Take-up rate 20%
Evidence from analysis of M1 showed 15% take-up. Scottish Ministers judge that there are factors which partially offset the pressure from improved communications efforts, and the open-ended exercise window for this group (eg current inflationary pressures on incomes may limit ability/desire for non-pensioners to fund contributions). On balance, Scottish Ministers want to make a smaller upward adjustment to the M1 experience take-up for this group for M2. The take-up rate they have opted for is aligned with the assumption to be used for the FPS (England) valuation.

C3. Matthews assumptions: Take-up rate

Available experience

No direct evidence on firefighters' choices under M2 is available yet.

The table below shows available information on the take-up from M1.

Table 1: M1 take-up rates

Description	M1 take-up
1) M1 opt-ins as a percentage of option letters sent	15%
2) Of those eligible for M1 who joined employment before July 2000, the percentage who opted in	20%

Analysis

We have analysed the M1 data for those **with employment before July 2000**, to understand:

A) The pattern of M1 choices by whether firefighters were above or below age 55 at 2014 (NPA for 2006 Scheme (Special)).

This analysis only considers those who were employed at M1, as other M1 data did not include the date of birth data needed.

Table 2: M1 take-up age dependency

Age group	M1 take-up
Age at 2014 >= 55	30%
Age at 2014 < 55	15%

Those above age 55 had immediate access to benefits at M1, with contributions owed less than the lump sum payable. The take-up rate was higher for this group versus those below age 55.

B) The change in the split of firefighters above or below age 55 at M2 compared with at M1.

Table 3: age distribution at each exercise

	Proportion of eligible population at 31/03/2014 (M1 proxy)	Proportion of eligible population at 31/03/2024 (M2 proxy)
Opted for M1	-	20%
Other Age >= 55	30%	55%
Other Age < 55	70%	25%

C3. Matthews assumptions: Take-up rate

Applying M1 experience

Eligible subgroup	Approx. % M2 eligible	Assumed Take-up
Opted for M1	20%	100%
Other Age >= 55	55%	30%
Other Age < 55	25%	15%
Overall	100%	~40%

The M2 take-up assumption above relies solely on information from the first exercise and assumes that:

- All members who took up M1 have expressed a preference to buy benefits and are highly likely to buy M2 benefits.
- The proportions of other firefighters buying M2 benefits will show the same age-based pattern as observed under M1.

Scottish Ministers considered wider circumstances and local knowledge, alongside the M1 experience, as well as the assumptions to be adopted for the FPS (England) Valuation, as explained opposite.

- The M2 exercise is a substantially different offer to eligible firefighters from the prior M1 exercise. This is primarily due to the longer periods of historic service that can be bought.
- Almost a decade has passed since the first exercise, and eligible individuals will be older and for many their personal circumstances may have changed significantly.
- Plans to improve to the coordination of M2 and member communications versus M1 are well developed, but it is hard to judge the level of impact they may have.
- Wider economic circumstances will differ during M2 compared to M1 and may affect the decisions taken by individual groups of members differently.
- The draft regulations permit elections for benefits to be made indefinitely. This open-ended exercise window may enable more eligible firefighters to take-up the M2 option in comparison to the M1 option.
- The corresponding analysis and conclusions in relation to the FPS (England) have also been considered, and the likely difference between experience for members in FPS (Scotland) relative to FPS (England).

C4. Glossary 1

CARE	CARE stands for Career Average Revalued Earnings and refers to a methodology whereby earnings over a member's working lifetime in the scheme are used in the calculation of their benefits in the reformed scheme.
CARE revaluation	The rate at which the CARE pension is revalued each year a member is an active member.
Cost cap cost (CCC)	A measure of the cost of benefits being provided from the reformed scheme, which is then compared to a 'target cost'. The FPS (Scotland) target cost is set at 15.8% of pay. If the results of the valuation show that the cost cap cost is more than 3% of pensionable pay away from the target cost, and the cost of the scheme still results in a breach once the impact of the economic check is taken into account, changes must be made to the reformed scheme (e.g., to the benefits provided) to bring the cost cap cost back to the target cost.
Directions	A document published by HM Treasury and referred to in the Public Service Pensions Act 2013, which sets out the process and requirements for carrying out valuations, including the results which need to be disclosed. Directions were first published in 2014 and have been amended several times since then.
Employer contribution rates (ECR)	The percentage of scheme members' pensionable salaries which employers are required to pay in order to: • meet the costs of benefits currently being built up by active members • make good any shortfall in the notional amounts set aside to cover benefits already built up. The result is heavily dependent on assumptions about future financial conditions and membership changes.
Matthews	The Matthews second option exercise (or "M2") is a programme to enable certain members to elect to buy historic service in the 2006 (Special) Scheme. At time of writing, M2 regulations have been consulted on and the M2 exercise is expected to begin in early 2024. It arises because of a November 2018 ruling in a legal case involving part-time judges ("O'Brien v MoJ") that effectively broadened the scope of an earlier ruling in the equivalent case for retained firefighters ("Matthews") and which had previously led to the first Matthews options exercise.

C4. Glossary 2

McCloud	McCloud refers to a legal judgment made in December 2018. The England and Wales Court of Appeal judgment upheld claims of age discrimination brought by some firefighters and members of the judiciary against 'transitional protection' rules. These rules determined the date on which some members would move between reformed and legacy sections of the scheme.
Normal pension age	The age at which a member in normal health is entitled to unreduced benefits. This age varies between the schemes: • **1992 Scheme**: Retirement age 55 or from age 50 after completion of 25 years' service, with deferred pension age 60. • **2006 Scheme (Standard**): Retirement age 60, with early retirement from age 55 subject to benefits being actuarially reduced. Deferred pension age 65. • **2006 Scheme (Special):** Retirement age 55, with deferred pension age 60. • **2015 Scheme:** Retirement age 60, with early retirement from age 55 subject to benefits being actuarially reduced. Deferred pension age equal to State Pension Age (SPA) with a minimum of age 65.
Pension increase	Public service pensions are increased under the provisions of the Pensions (Increase) Act 1971 and Section 59 of the Social Security Pensions Act 1975.
Professional actuarial requirements	The professional requirements that we have complied with when completing this actuarial valuation include: 1. Technical Actuarial Standards: TAS 100 and TAS 300, issued by the Financial Reporting Council (FRC) 2. The Actuaries' Code, issued by the Institute and Faculty of Actuaries (IFoA) 3. The Civil Service Code. GAD is also accredited under the IFoA's Quality Assurance Scheme. More details can be found in our terms of reference.

C4. Glossary 3

Reformed and legacy sections	The reformed section of the scheme is the section that was set up in line with the Public Service Pensions Act 2013, and which came into force on 1 April 2015. All non-reformed sections are known as legacy sections. This terminology is used in the McCloud judgment.
Scheme Advisory Board	The Board set up in line with section 7 of the Public Service Pensions Act 2013, with responsibility for providing advice on potential changes to the scheme and other matters relating to the efficient administration and management of the scheme. Scheme Advisory Board is commonly shortened to 'SAB'.
Special member	An amendment to the 2006 Scheme regulations made in April 2014 introduced a modified section of the 2006 Scheme for retained firefighters who were employed in Scotland during the period 1 July 2000 to 5 April 2006 to provide them with access to a pension scheme (known as 'Special' members). The modified section of the 2006 Scheme is called the 2006 Scheme (Special) in this report. The Firefighters' Pension Scheme (Scotland) Amendment (No. 2) Order 2014 (legislation.gov.uk)
Standard table	The standard tables used for the mortality after retirement assumption are the SAPS tables. These are published by Continuous Mortality Investigation (CMI) and based on the experience of defined benefit self-administered pension schemes. The 'S2' series are based on experience over the period 2004 to 2011. The S3 series of tables were published by CMI in December 2018 and these updated mortality tables cover experience between 2009 and 2016. The S3 series include tables for pensioners retiring in normal health (S3NXA), in ill health (S3IXA) and all pensioners (S3PXA), as well as for dependants (S3DXA). The tables are also split into "Heavy", "Middle", "Light" and "Very Light" subsets according to pension amount, as well as a table covering all amounts. The "Very Light" tables reflect the highest pension amounts.