Government Actuary's Department

Police Pension Schemes (Scotland) (PPS (Scotland))

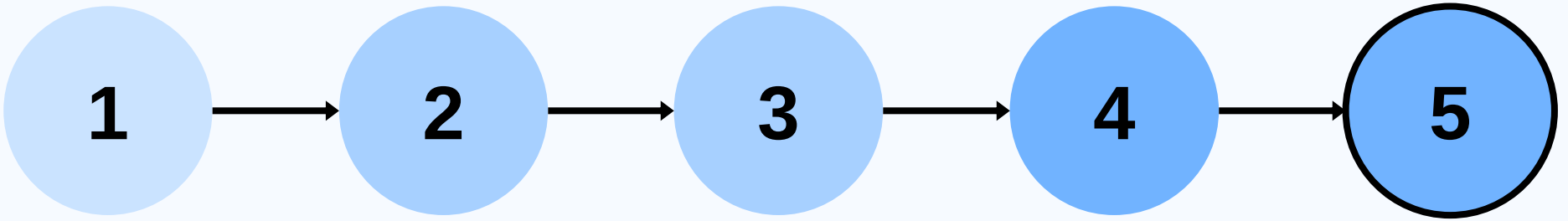
Advice on assumptions

Actuarial valuation as at 31 March 2020

Anne-Marie Pettie and Garry Swann

30 October 2023

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 Police 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 HM Treasury Directions ('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 PPS (Scotland) as at 31 March 2020, as required.

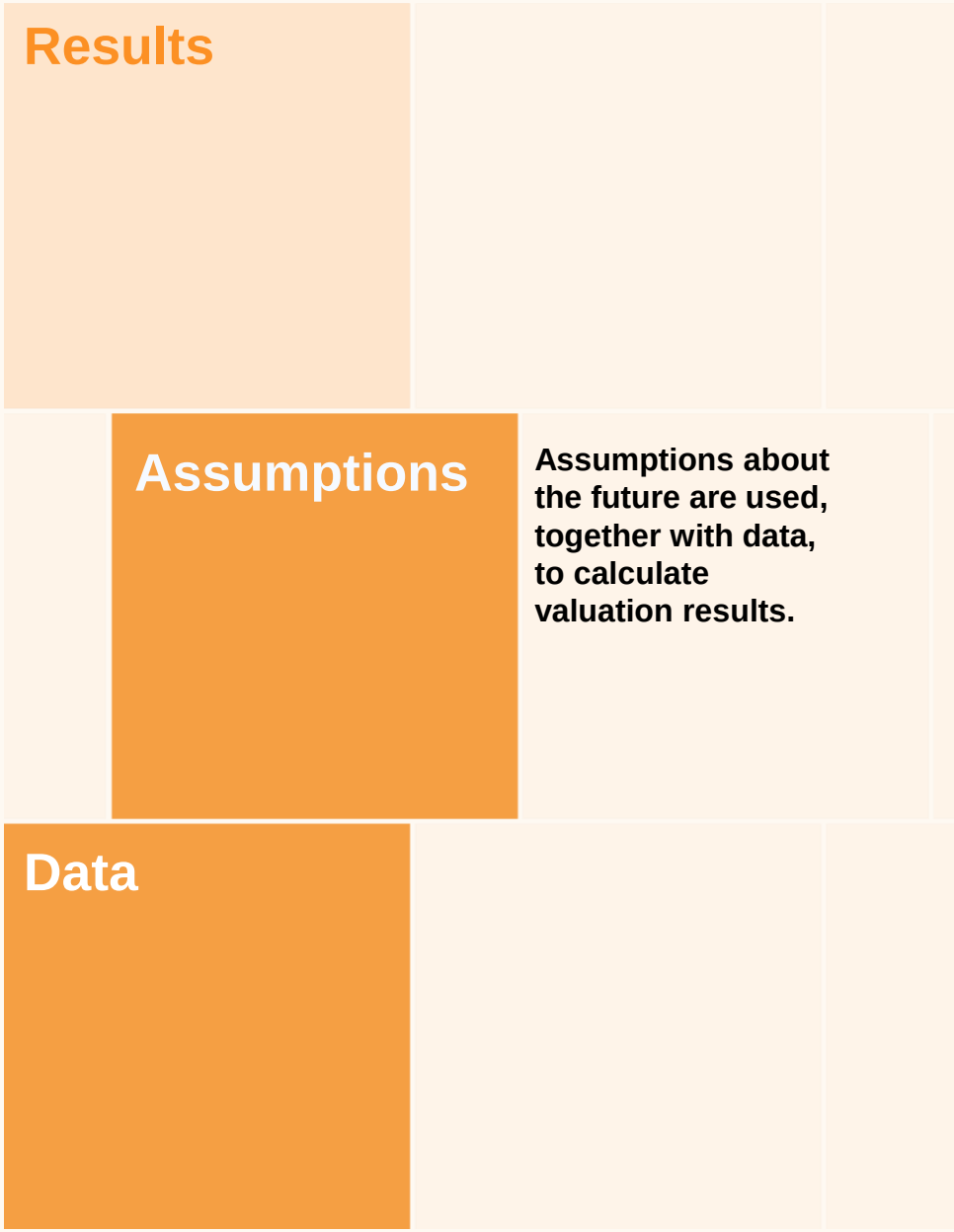
This report is intended to help Scottish Ministers:

- 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 PPS (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.

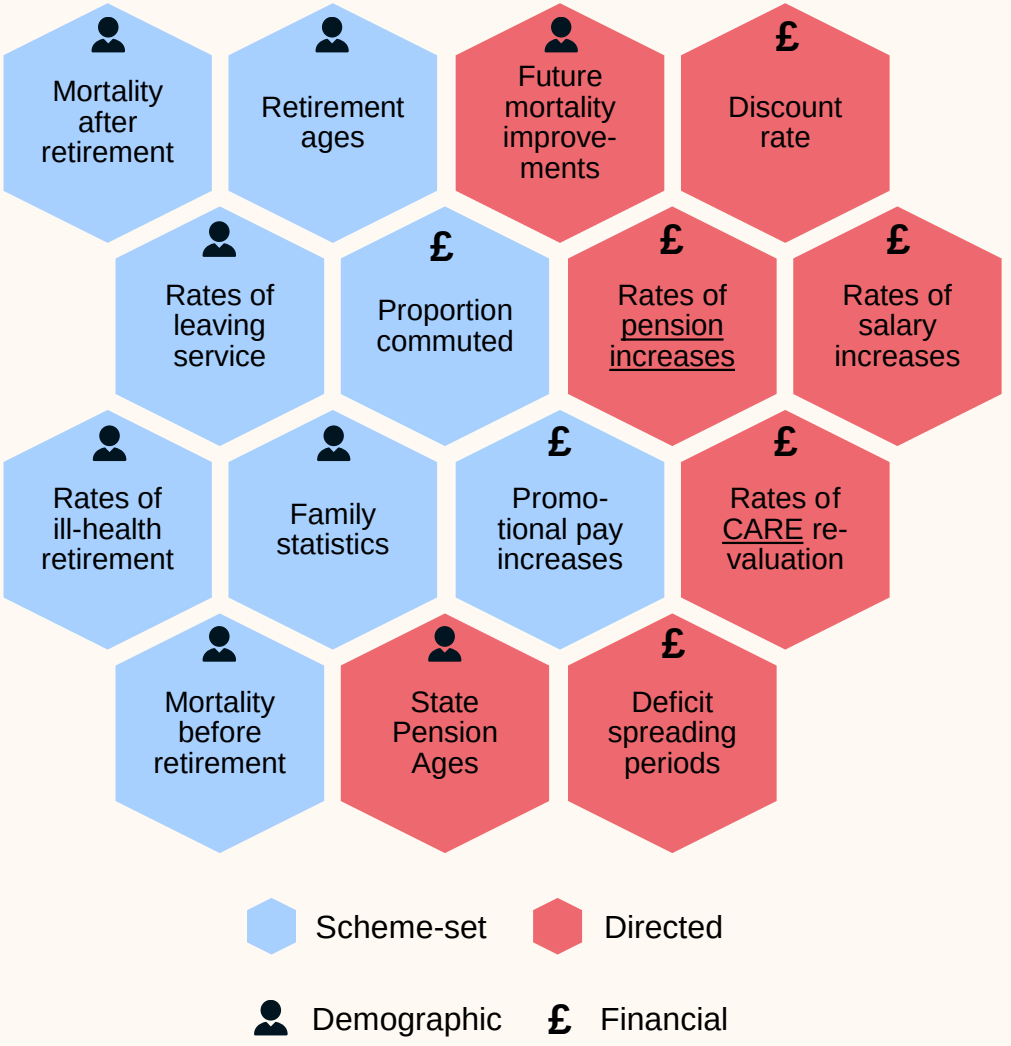
Together, these assumptions determine how much needs to be set aside now, in order to meet future payments.

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 C2.



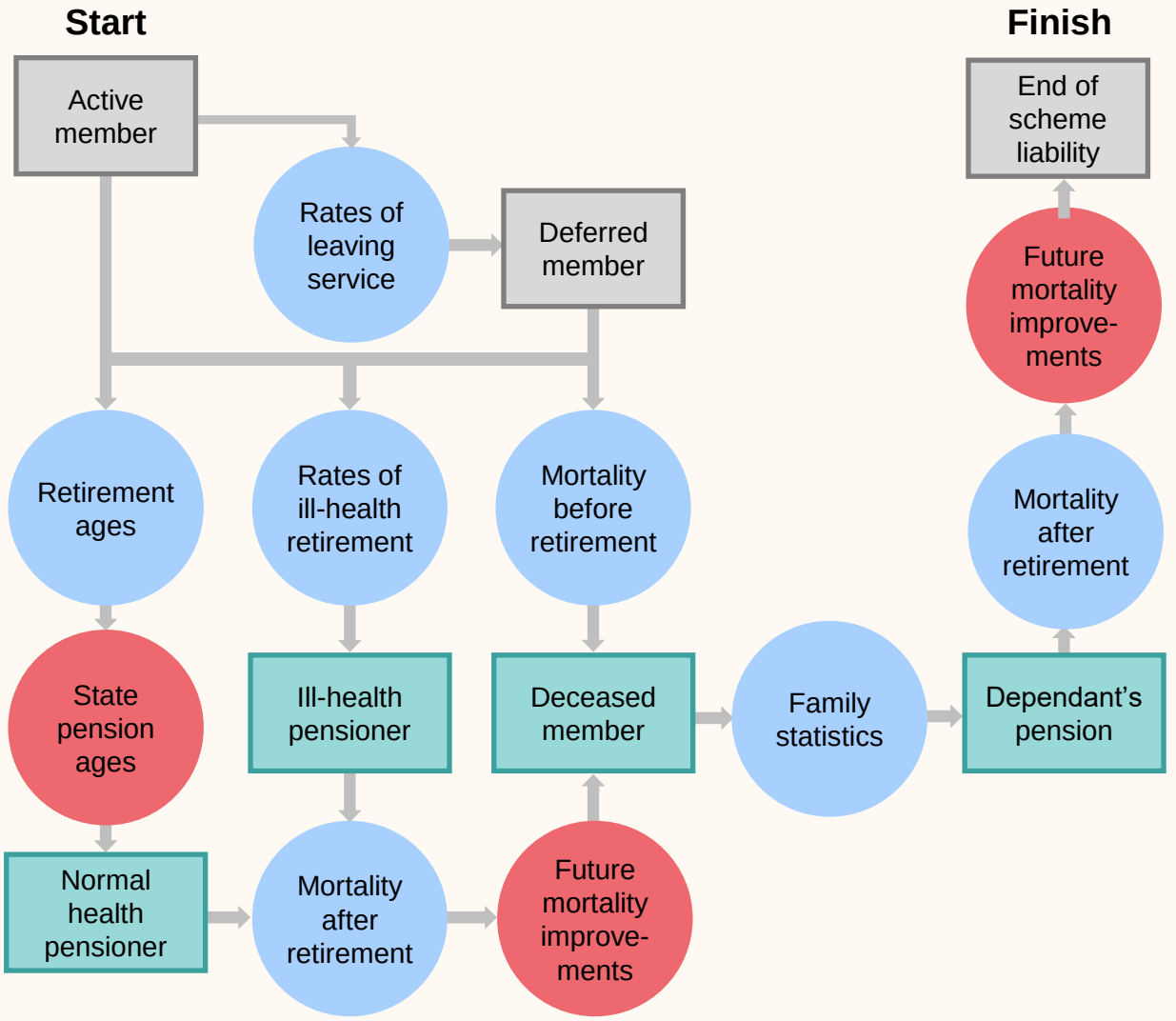
Demographic assumptions

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:

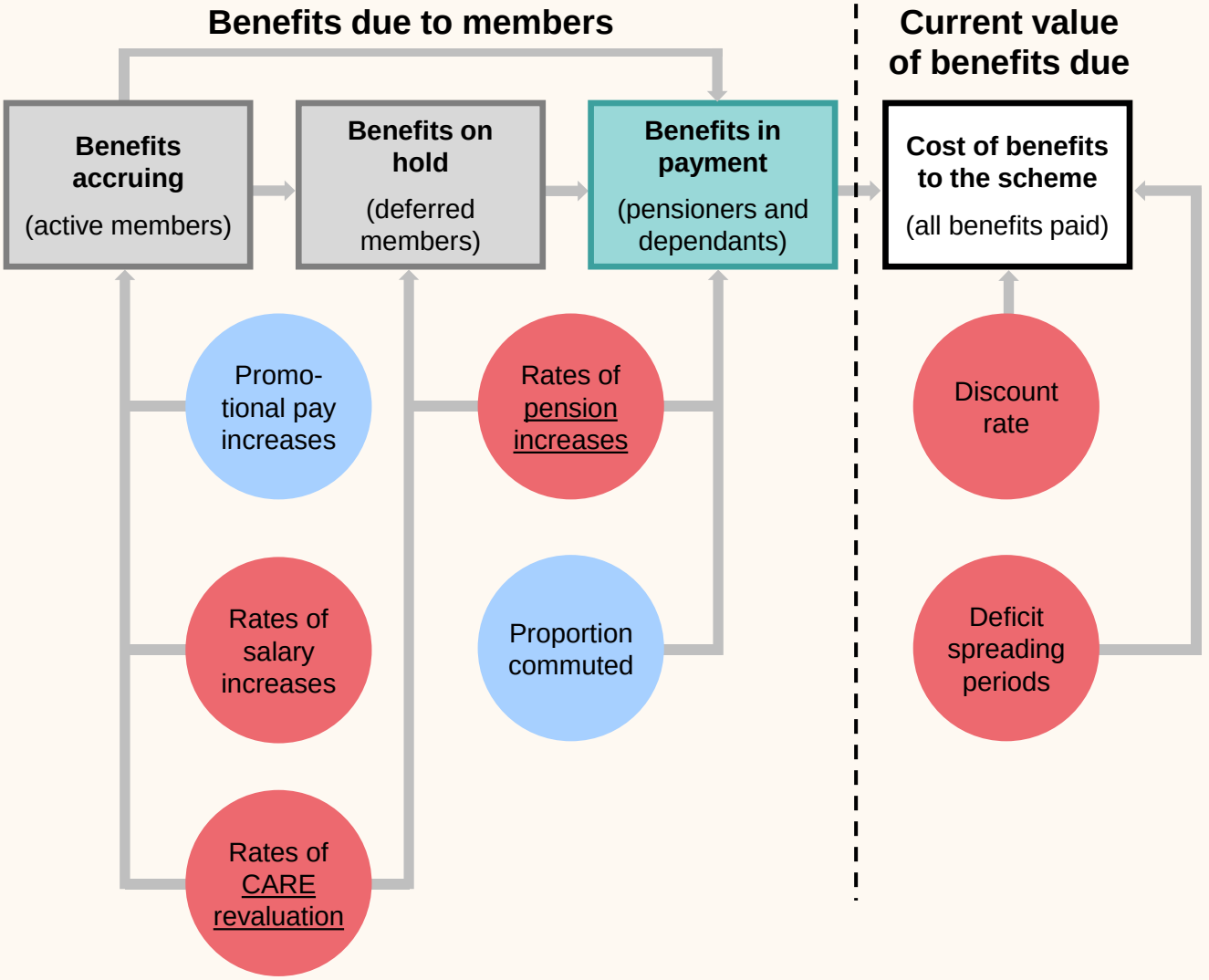
- promotional pay increases
- commutation proportions.

Member status: **no benefits payable**

Member status: **benefits payable**

Scheme-set

Directed



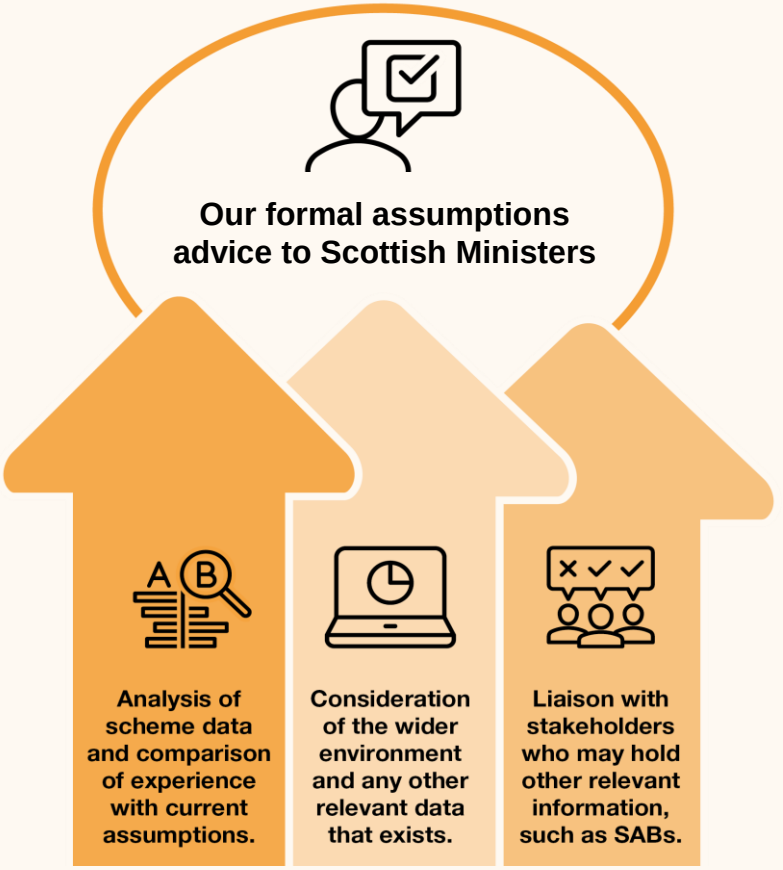
Setting assumptions

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 and Wales 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 Valuation Results report dated 30 October 2023, 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.

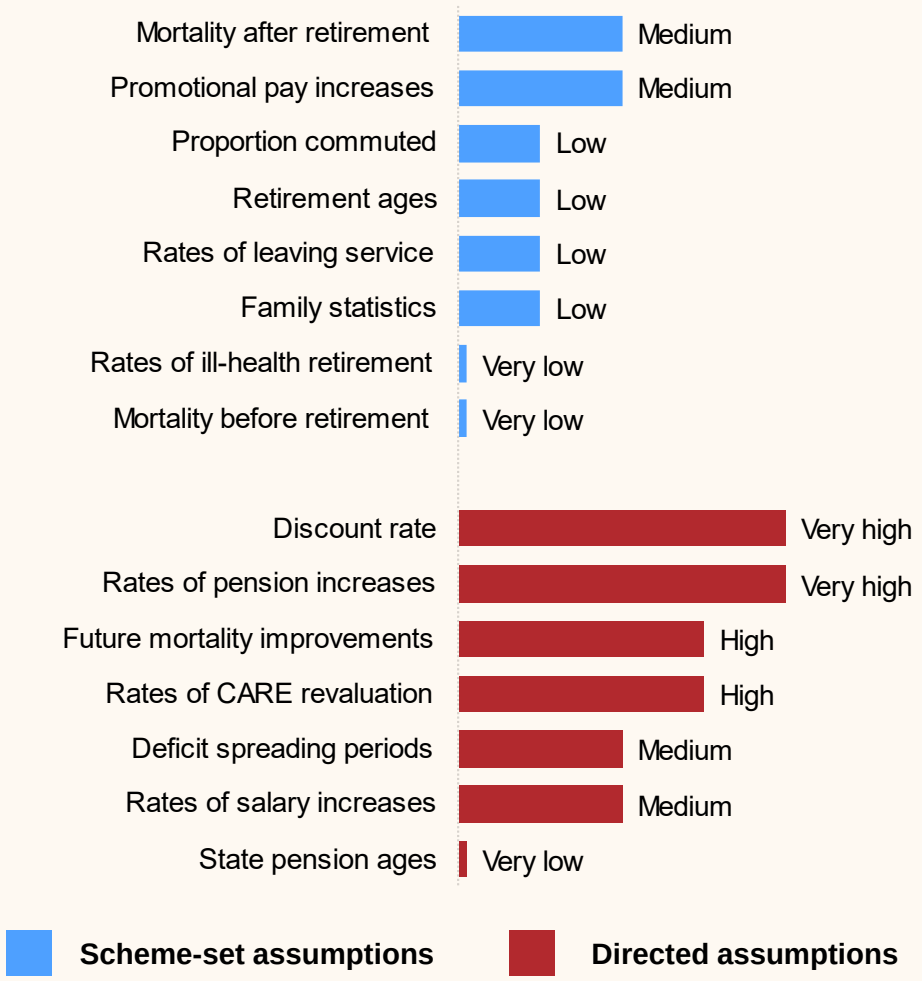
For example, the discount rate is shown as very highly significant compared to mortality before retirement. This means that even if the discount rate changes by a small amount, the impact on employer contribution rates could be very large compared to a fairly large change in mortality before retirement.

For context, the employer contribution rate is currently 29.4% of pensionable pay. In monetary terms, this was equivalent to employer contributions of £194 million in the financial year 2021-2022.

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.

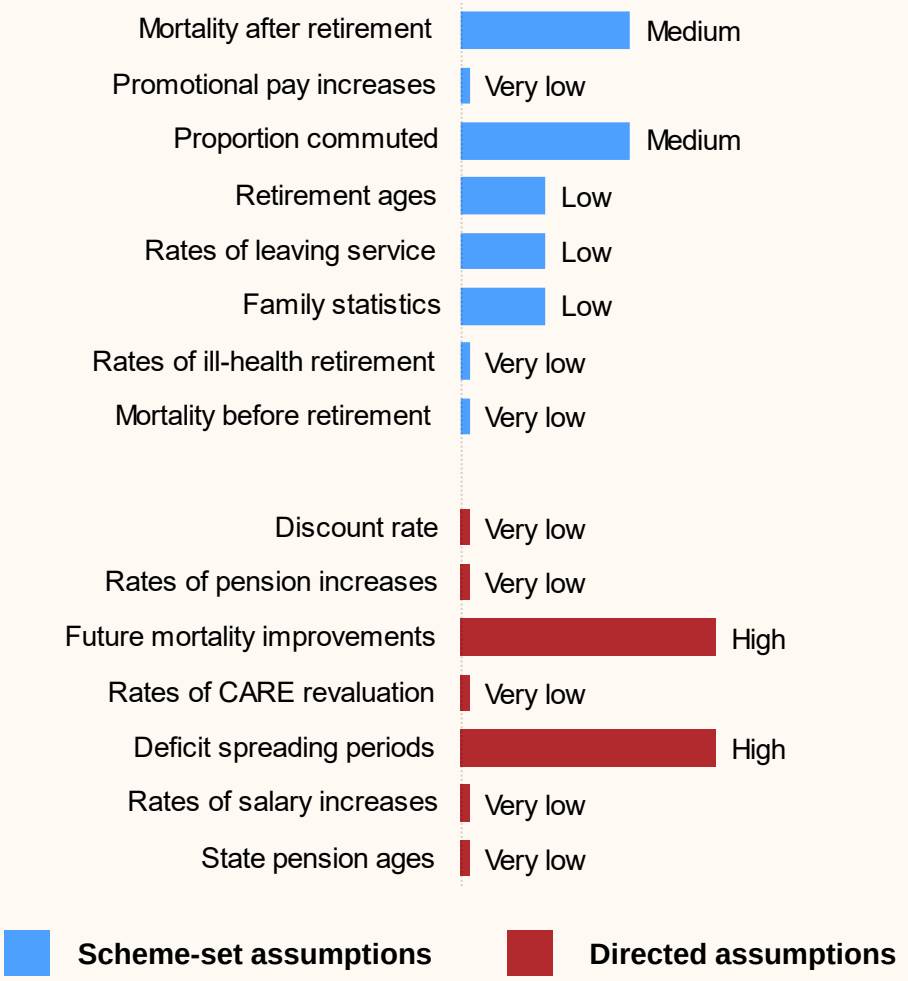
The main differences when compared to the significance of assumptions on the employer contribution rate are:

- 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 12.3% 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 PPS (Scotland), as described in our report titled 'Membership data', dated 30 October 2023. 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. 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 or 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 costs
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.

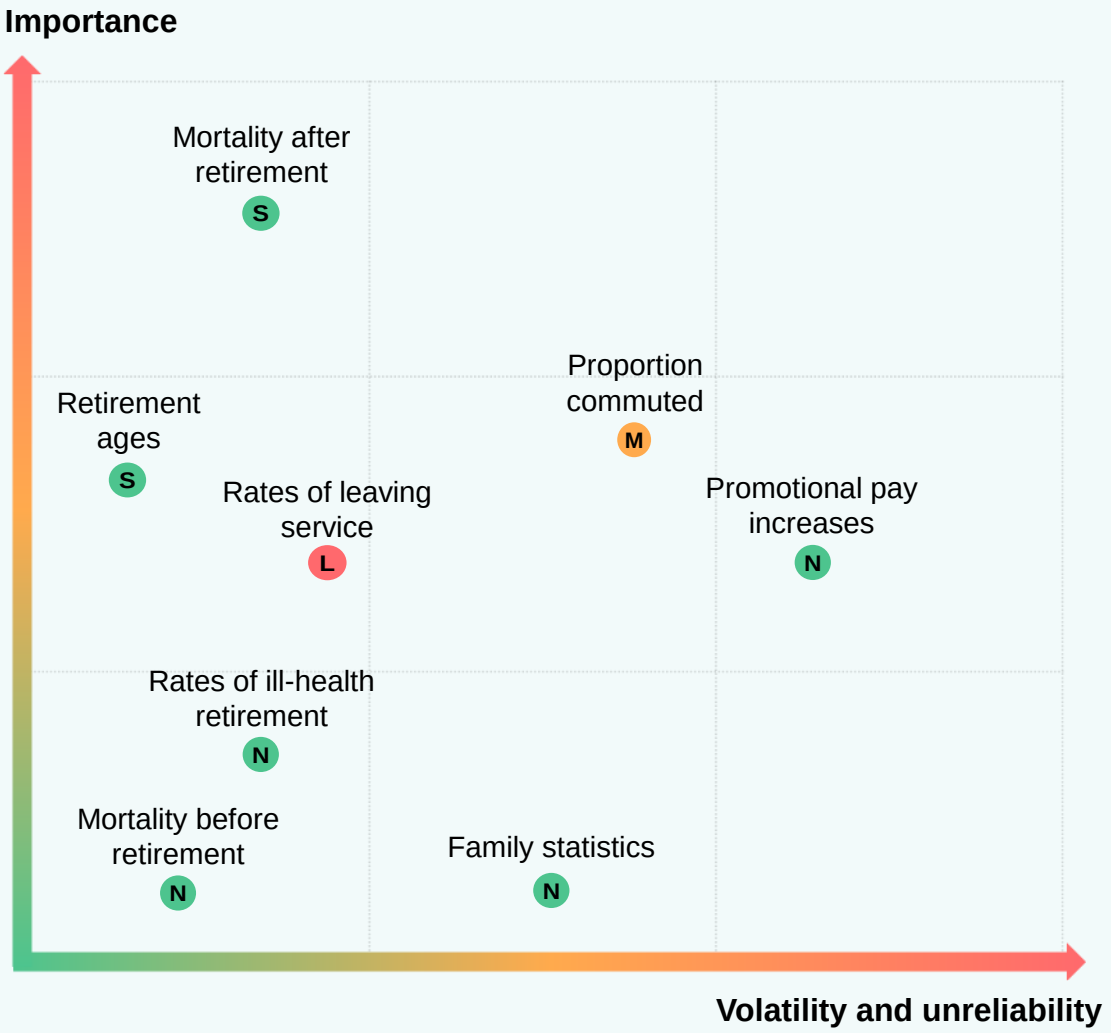
Significance, volatility and size of changes

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 rate 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

Given the smaller volume of experience data available for the PPS (Scotland), we recommend continuing to use the Police Pension Schemes in England & Wales (PPS (E&W)) assumptions, but with a 12.5% higher adjustment factor being applied. The adjustment reflects higher rates of mortality applying in Scotland.

We recommend adopting a single baseline mortality assumption for both current and future ill-health pensioners, in line with the PPS (E&W). This differs from the 2016 valuation when the assumption for future ill-health pensioners was set equal to the standard ill-health table. The change anticipates that the difference in mortality experience of current and future ill-health pensioners will disappear over time.

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 to allow 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 the '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 the PPS (E&W)'s experience 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** for males and females is the assumption adopted for the 2016 valuation.
- The **second column** for males and females is the 2016 assumption, but updated to use a valuation date of 2020 and ONS-2020 improvements.
- The **third column** for males and females is the assumptions we recommend for the 2020 valuation for the PPS (Scotland)
- The **fourth column** for males and females is the assumptions we recommend for the 2020 valuation for the PPS (E&W).

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

	Males				**Females**			
	2016 valuation assumption	2016 assumption updated	2020 valuation recommendation	2020 valuation recommendation (PPS (E&W))	2016 valuation assumption	2016 assumption updated	2020 valuation recommendation	2020 valuation recommendation (PPS (E&W))
Current pensioners, age 55	86.3	85.3	85.4	86.4	88.0	87.2	87.4	88.2
Future pensioners, age 55	87.9	86.7	86.8	87.7	89.5	88.5	88.6	89.5

Recommendations in detail

		2016 Assumptions			2020 Recommendations		
Category		**Standard table**	**Adjustment**	**Based on**	**Standard table**	**Adjustment**	**Based on**
Normal health Pensioners	**Male**	S2NMA	117%	Scheme experience in the PPS (E&W) and wider analysis of mortality differentials experienced by population in Scotland compared to England & Wales	S3NMA	120%	Scheme experience in the PPS (E&W) and wider analysis of mortality differentials experienced by population in Scotland compared to England & Wales
	Female	S2NFA	117%		S3NFA	129%	
Current ill-health Pensioners	**Male**	S2NMA	160%		S3NMA_H	118%	
	Female	S2NFA	160%		S3NFA_H	136%	
Future ill-health Pensioners	**Male**	S2IMA	100%	UK-wide expectations	S3NMA_H	118%	
	Female	S2IFA	100%		S3NFA_H	136%	
Dependants	**Male**	S2NMA	116%	Scheme experience in the PPS (E&W) and wider analysis of mortality differentials experienced by population in Scotland compared to England & Wales	S3DMA	88%	
	Female	S2NFA	116%		S3DFA	111%	

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

Recommendations in detail (PPS (E&W))

The table shows the recommendations for the PPS (E&W).

		2016 Assumptions			2020 Recommendations		
Category		**Standard table**	**Adjustment**	**Based on**	**Standard table**	**Adjustment**	**Based on**
Normal health Pensioners	**Male**	S2NMA	104%	PPS (E&W) experience	S3NMA	107%	PPS (E&W) experience
	Female	S2NFA	104%		S3NFA	115%	
Current ill-health Pensioners	**Male**	S2NMA	142%		S3NMA_H	105%	
	Female	S2NFA	142%		S3NFA_H	121%	
Future ill-health Pensioners	**Male**	S2IMA	100%	UK-wide expectations	S3NMA_H	105%	
	Female	S2IFA	100%		S3NFA_H	121%	
Dependants	**Male**	S2NMA	103%	PPS (E&W) experience	S3DMA	78%	
	Female	S2NFA	103%		S3DFA	99%	

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

Our general 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: General approach

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. Further information on this is provided on the next page.

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 the PPS (Scotland), we have considered the experience analysis carried out as part of the 2020 valuation for the PPS (E&W). We have then assessed the likely difference between mortality for Scotland relative to E&W.

Previous Approach

Given the smaller volume of experience data in the PPS (Scotland), in previous actuarial valuations, the mortality assumptions have been set in line with those adopted for the PPS (E&W) valuation, but with a further adjustment applied to reflect higher rates of mortality applying in Scotland, compared to those applying in E&W.

For the 2016 valuation, the mortality assumptions for the PPS (Scotland) were derived by applying a loading of 12.5% to the 2016 valuation mortality assumptions for the PPS (E&W).

2020 Valuation Approach

For the 2020 Valuation, we recommend that the existing approach of applying an adjustment to the updated PPS (E&W) mortality assumption is retained.

On page 31, we have reviewed recent evidence on the comparison of the overall Scottish population mortality experience with that of E&W. This shows that retaining the 12.5% differential is not unreasonable.

On page 27, we have also considered actual experience in the PPS (Scotland) over 2016 to 2020, relative to experience in the PPS (E&W). This scheme specific analysis also concludes that a differential of 12.5% is not unreasonable.

We therefore recommend the mortality assumption for the PPS (Scotland) is updated to be equivalent to the updated 2020 valuation mortality assumption for the PPS (E&W), but with a 12.5% loading applied.

Scheme experience: overall

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

The charts on the following pages compare:

- **actual experience** – what has happened over the last 4 years.
- **2016 assumptions** – what we thought would happen, based on the baseline mortality assumptions adopted for the 2016 valuation. Uses ONS-2020 mortality improvements.
- **2020 recommendations** – 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.

Further considerations for setting assumption

At the 2012 valuation, the differential between the normal-health mortality rates between the PPS (Scotland) and the PPS (E&W) was around 15%, i.e. mortality rates in the PPS (Scotland) were around 15% higher than those in the E&W Schemes. For the 2016 valuation, the differential was around 9%.

The analysis for the period 2016 to 2020 shows that the differential is around 14%, with the mortality rates in Scotland continuing to be greater than those in E&W.

Collectively, this suggests the use of 12.5% differential is not unreasonable.

Summary

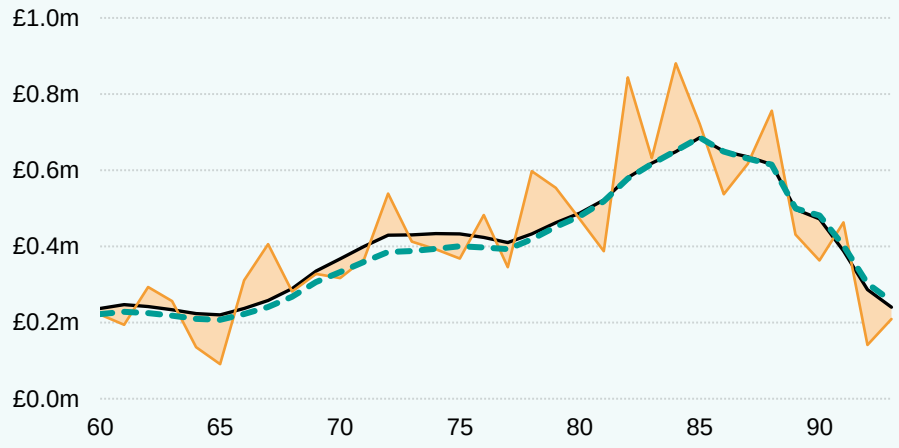
The 2016 assumptions and the 2020 recommendations for the PPS (Scotland) are broadly in line with the baseline mortality experience for normal health male pensioners. However, there is volatility in the experience due to the relatively small datasets. This can be seen through the distribution of deaths by age in the PPS (Scotland) shown on the next page.

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

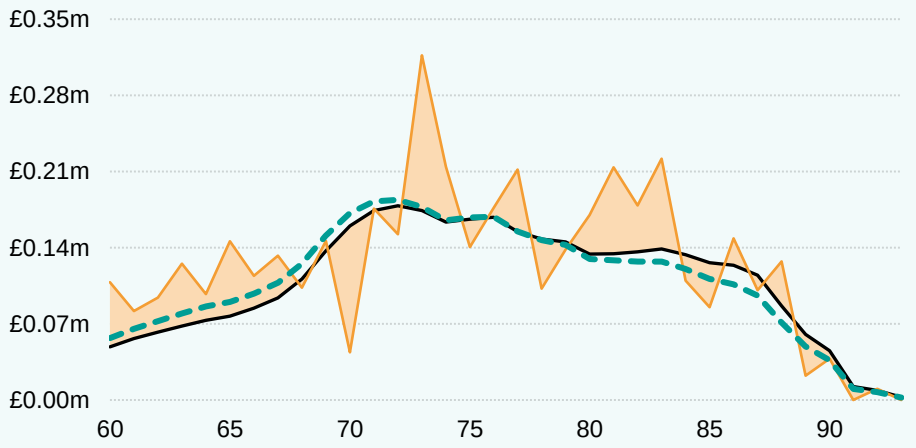
Scheme experience: in detail

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

Male - Normal health Pensioners



Male - Ill-health Pensioners



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

Scheme experience: in numbers

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**
Normal health Pensioners	**Male**	£15.7 m	£15.6 m	**100.4%**	£15.3 m	**102.5%**
Ill-health Pensioners	**Male**	£4.7 m	£3.9m	**118.9%**	£4.0 m	**116.6%**

There were insufficient numbers of deaths to consider analysis for other categories of members.

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

Scheme experience: in numbers (PPS (E&W))

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**
Normal health Pensioners	**Male**	£121.6 m	£122.7 m	**99.1%**	£120.7 m	**100.7%**
Ill-health Pensioners	**Male**	£35.9 m	£35.6 m	**100.8%**	£35.5 m	**101.1%**
Dependants	**Female**	£33.9 m	£32.1 m	**105.5%**	£32.9 m	**102.8%**

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

Comparison with England and Wales mortality

Population mortality data

We have considered the most recent analysis of differences between aggregate population mortality rates.

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

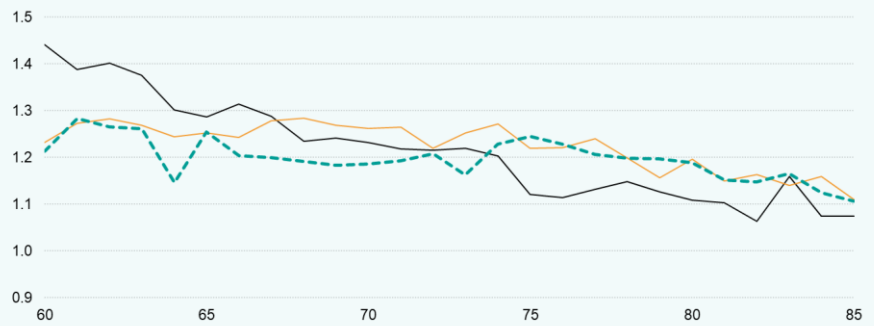
Scottish mortality rates are higher than England & Wales rates at almost all ages and the differences have been relatively stable over time. The ratios generally converge as age increases.

Similar differentials were observed for the 2012 and 2016 valuations. The 2016 valuation assumptions were set similar to those recommended for the 2016 valuation of the PPS (E&W) but with a 12.5% higher adjustment factor being applied.

Range of differences

From the updated comparison, a reasonable range for the excess of Scottish mortality over that for England & Wales 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 & Wales population mortality rates, males



Ratio of Scotland to England & Wales population mortality rates, females

Key:

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

Wider environment: COVID-19

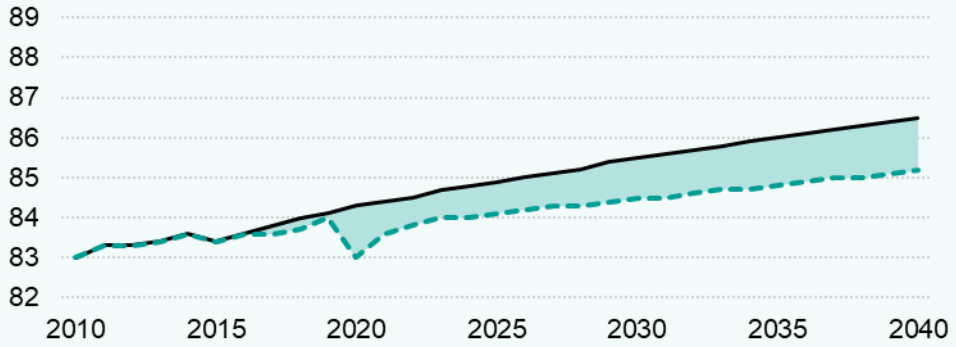
No explicit allowance has been made for the COVID-19 pandemic in our recommended assumptions for **baseline mortality rates**. Our recommendations are based on scheme experience up to 2020 so will only have included deaths from the very start of the pandemic. We do not expect these deaths to have had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

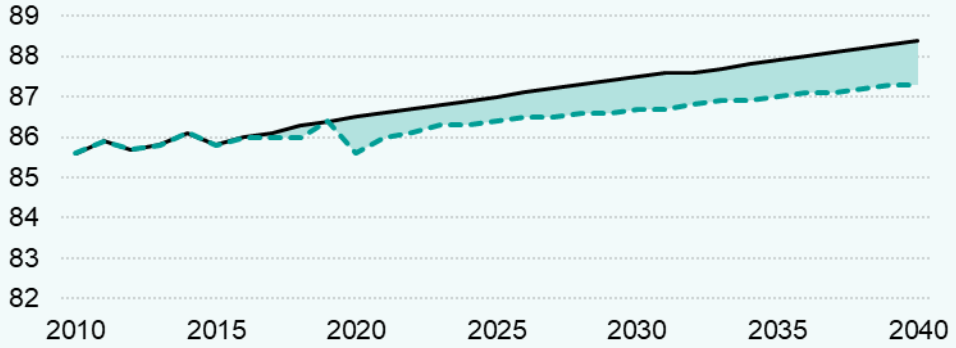
When deriving the ONS-2020 projections, a panel of mortality experts gave their views on the impact of COVID-19 pandemic on mortality rates in the short term. Based on this, short term adjustments were made to the 2019 to 2024 period to allow for estimated deaths in 2021 and an averaging of the experts' 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.

Life expectancies for UK males, aged 65



Life expectancies for UK females, aged 65



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

1987 Scheme: We recommend 1987 Scheme members continue to commute 25% of their pension for cash, since the experience has been broadly in line with the existing assumption.

2006 Scheme: Members receive an automatic lump sum but have the option to exchange some of this for higher annual pension payments on actuarially equivalent terms. Valuation of the benefits would be the same whether or not allowance was made for members exercising them. Therefore, for simplicity, we recommend continuing to make no allowance i.e. assume 0%.

2015 Scheme: There are too few 2015 Scheme retirements to set an assumption based on experience. Therefore, we have adopted a similar approach to the PPS (E&W) and considered the average experience from other large public service schemes.

Mixed 1987/2015 Scheme: We recommend increasing the proportion commuted from 8.75% to 12% of their 2015 Scheme pension. This is based on 60% of the average experience from other large public service schemes.

Mixed 2006/2015 Scheme and 2015 Scheme: We recommend increasing the proportion commuted from 17.5% to 20% of their 2015 Scheme pension. This is based on the average experience from other large public service schemes

Practical implications

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

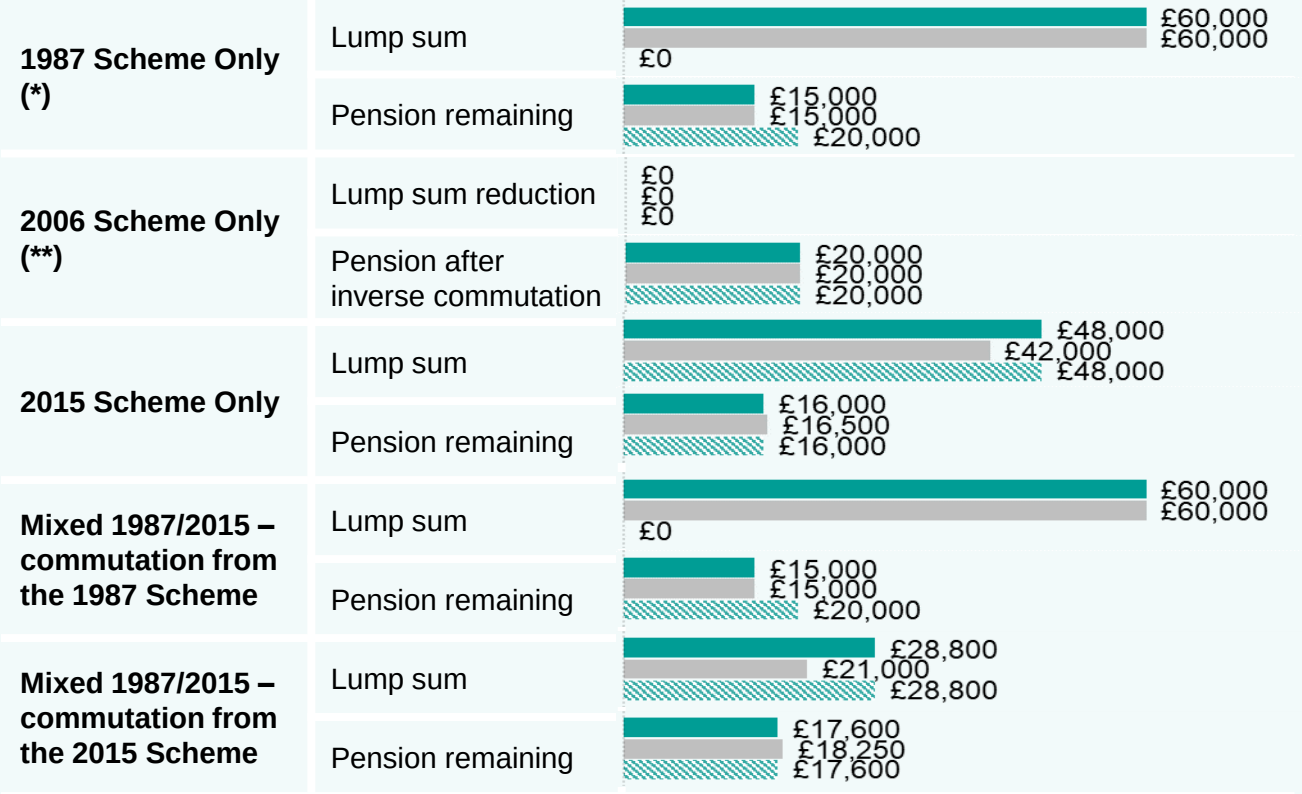
Members choose whether to commute based on their own individual circumstances. For example, their:

- 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 PPS (E&W) valuation.

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



(*) In the PPS (E&W), 1987 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 PPS (Scotland), the commutation terms include an underpin which guarantees factors will not be lower than those used in the PPS (E&W). 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.

(**) In the 2006 Scheme, they have an automatic lump sum and no option to commute additional pension for a higher lump sum. They can only inversely commute their lump sum for higher annual pension payments on cost neutral terms compared to the valuation assumptions.

Practical implications

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

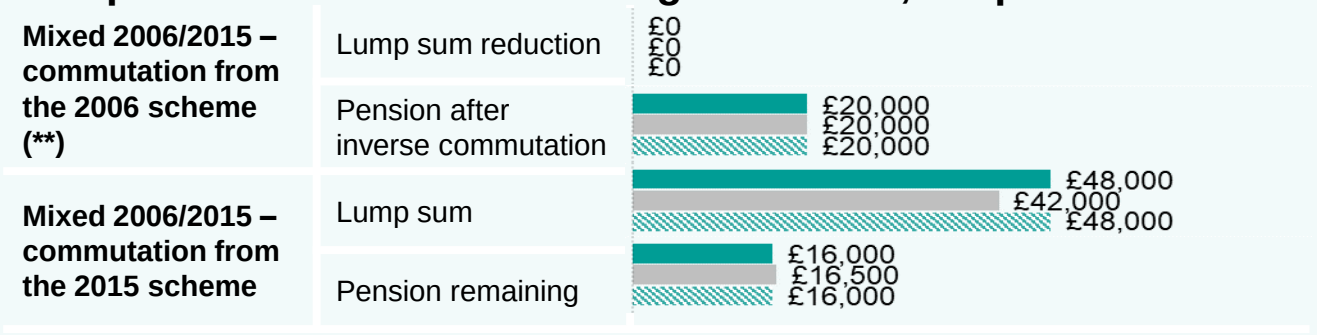
Members choose whether to commute based on their own individual circumstances. For example, their:

- 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 PPS (E&W) valuation.

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



Our approach

Analysis

We have analysed the 1987 Scheme members commutation experience over the period 1 April 2016 to 31 March 2020.

For 2015 Scheme 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 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 PPS (E&W) and other larger public sector pension schemes.

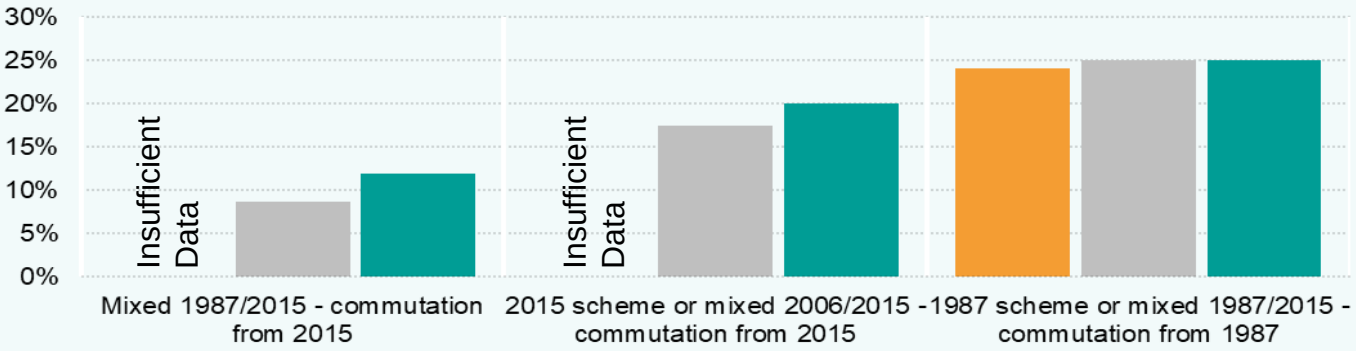
Scheme experience: overall

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 1987 Scheme members over 2016 to 2020 shows that on average, 1987 Scheme members commuted 24.1% of their pension for a lump sum (at the 2016 valuation, this was 24.3%). As such, we propose to retain the 2016 assumption where members are assumed to commute 25% of their pension for cash.

There are too few 2015 Scheme retirements to carry out a robust analysis for the PPS (Scotland) or for the PPS (E&W). For the PPS (E&W), 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 PPS (Scotland).

For members with mixed 1987/2015 Scheme service, we based our proposed 2015 scheme commutation assumption on 60% of the average experience from the large public service schemes over 2016 to 2020. Details on the rationale for this can be found on page 40 and 41.

For members with only 2015 Scheme service or mixed 2006/2015 Scheme service, we based our proposed 2015 Scheme commutation assumption on the average experience from the large public service schemes over 2016 to 2020.

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** Proportion of pension expected to be commuted under the 2016 assumptions	**2020 Expectations** Proportion of pension expected to be commuted under the 2020 assumptions
1987 Scheme Only (*)	**1987**	£57 m	£14 m	24.1%	25% (0%)	25% (0%)
2006 Scheme Only	**2006**	N/A	N/A	N/A	0%	0%
Mixed 1987/2015	**1987**	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	0%	0%
	2015	N/A	N/A	N/A	17.5% (***)	20%
2015 Scheme Only	**2015**	N/A	N/A	N/A	17.5% (***)	20%
Other large public service schemes (**)	**N/A**	£255 m	£50 m	19.6%	17.5% (***)	20%

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

* There were 1,886 retirements included in the 1987 Scheme commutation analysis.

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

1987/2015 Mixed service: Approach

2016 Valuation Analysis

For the 2016 valuation, it was assumed members with both 1987 and 2015 Scheme benefits:

- commute 25% of their 1987 Scheme pension for cash.
- commute 8.75% of their 2015 Scheme pension for cash.

The terms available in the 1987 Scheme 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 scheme. 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 1987 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 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 1987 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%).

1987/2015 Mixed service: Approach

2020 Valuation Analysis

PPS (E&W) Analysis

We have analysed retirements over 2016 to 2020 for PPS (E&W) 1987 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 1987 and 2015 Scheme benefits commute for cash, for the PPS (E&W). 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 recommendation 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%).

PPS (Scotland) Recommendation

We also carried out a similar analysis on the PPS (Scotland) 1987 Scheme data, albeit on a much smaller data set, which showed around 85% are expected to incur a tax charge when commuting pension for cash. Allowing for the PPS (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 PPS (E&W), 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

1987 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 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. We therefore recommend updating this assumption, to assume 1987 unprotected members follow Protected members assumed age retirement pattern.

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

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 and so, we recommend no change to the existing assumption.

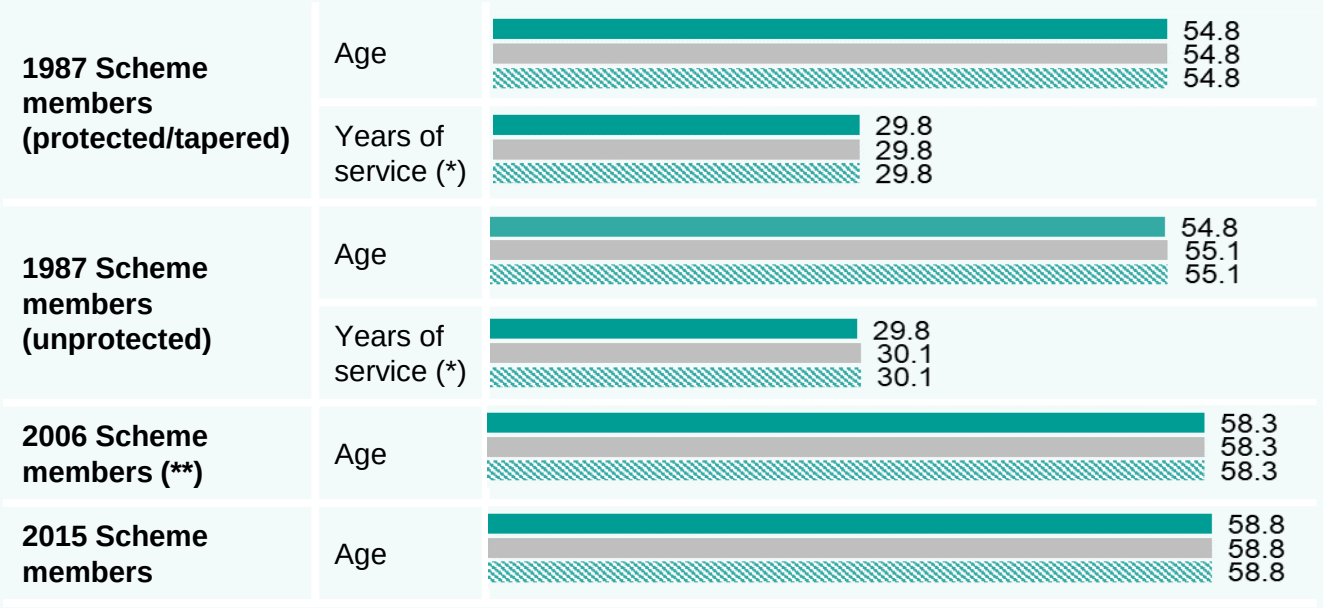
Practical implications

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 PPS (E&W) 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 for a member who joined the scheme at age 25



- The years of service bars represent the numbers of years between joining and retirement (i.e., the number of years a member has worked).

** We do not distinguish between protected and unprotected 2006 Scheme members.

For unprotected 1987 scheme members, the age retirement assumption recommended for the 2020 valuation in the PPS (Scotland), differs to the age retirement assumption recommended for the 2020 valuation in the PPS (E&W). This is because the assumptions recommended for the PPS (E&W) have made allowance for the 'Retire and Rejoin' option that is currently being promoted to Police Officers in E&W.

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.

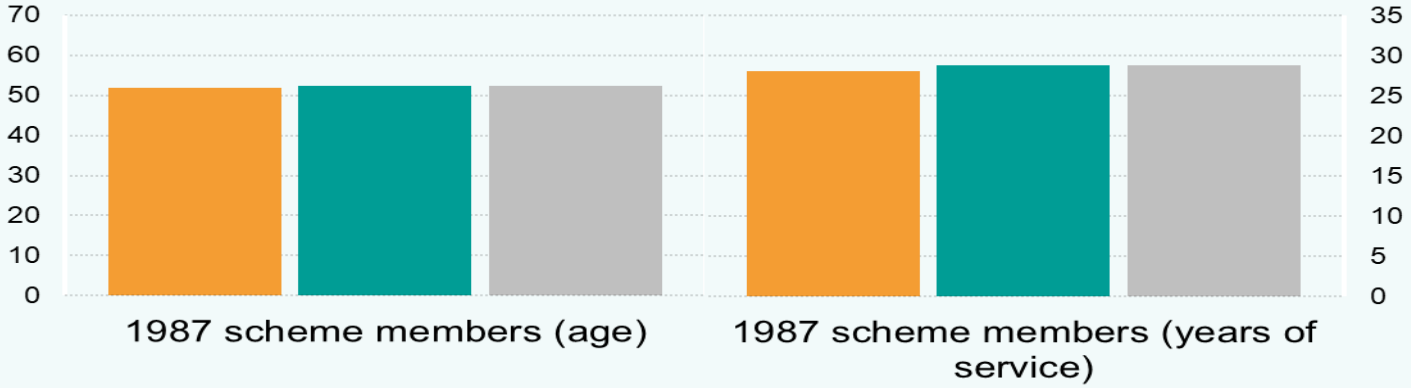
Scheme experience: overall

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

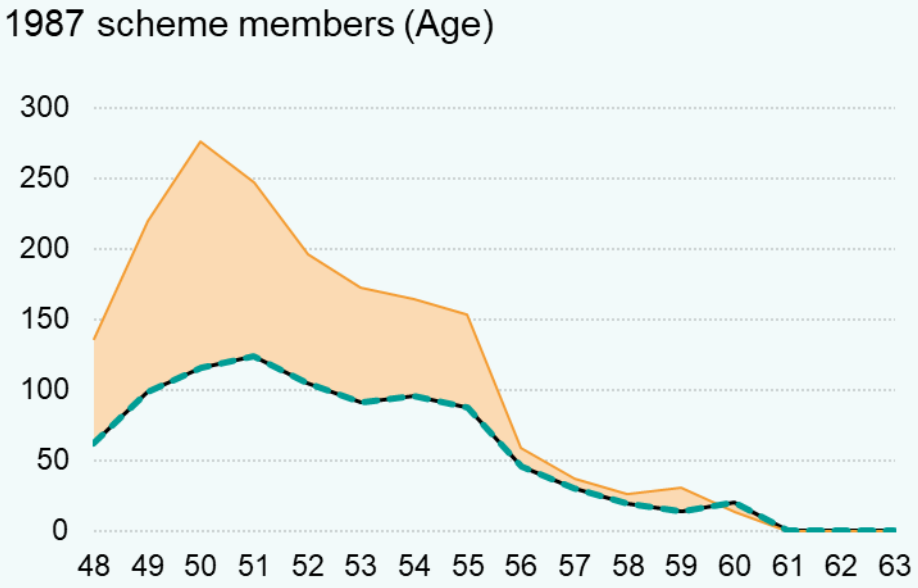
The average age and service of recent retirements are close to the 2016 assumptions, as shown above.

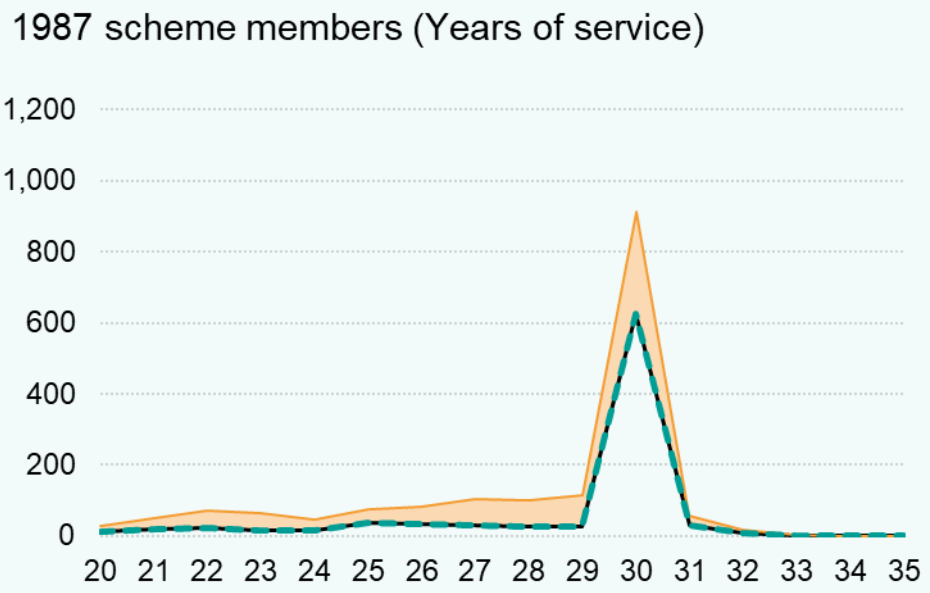
The number of retirements for Protected members in the 1987 Scheme at each service period is reasonably close to the 2016 assumptions, as shown on the graph on the right hand side of the next page. Although the number of retirements at ages below age 55 has been greater than expected (as shown on the 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 (51.9 compared to 52.4 – see page 48) Therefore, we propose that the existing assumption is retained.

There is insufficient information to test the impact on the 2006 Scheme, 2015 Scheme and the unprotected 1987 Scheme members. Though 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





The 1987 Scheme members (protected/tapered) experience reflects retirement ages 48 to 60 and service of 20 to 35 years and includes 11 tapered members.

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
1987 Scheme Members (protected/tapered) (*)	**Age**	1,730	51.9	52.4	52.4
	Years of service	1,730	28.1	28.8	28.8
1987 Scheme Members (unprotected) (**)	**Age**	N/A	N/A	55.1	54.8
	Years of service	N/A	N/A	30.1	29.8
2006 Scheme Members (**)	**Age**	N/A	N/A	58.3	58.3
2015 Scheme Members (**)	**Age**	N/A	N/A	58.8	58.8

* The 1987 Scheme members (protected/tapered) experience reflects retirement ages 48 to 60 and service of 20 to 35 years and includes 11 tapered members.

** There was insufficient data to produce a robust analysis of retirements from the 1987 Scheme (unprotected), 2006 Scheme or the 2015 Scheme.

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

Scheme experience: in numbers (PPS (E&W))

The table shows the corresponding figures for the PPS (E&W). 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 service / age at retirement under the 2016 assumptions	**2020 Expectations** Expected average service / age at retirement under the 2020 assumptions
1987 Scheme Members (protected/tapered)	**Age**	13,690	52.2	52.3	52.3
	Years of service	13,690	28.7	29.3	29.3
1987 Scheme Members (unprotected)	**Age**	N/A	N/A	55.1	55.1***
	Years of service	N/A	N/A	30.1	30.1***
2006 Scheme Members	**Age**	N/A	N/A	58.3	58.3
2015 Scheme Members	**Age**	N/A	N/A	58.8	58.8

* The 1987 Scheme members (protected/tapered) experience reflects retirement ages 48 to 60 and service of 20 to 35 years and includes 197 tapered members and 23 unprotected members.

** There was insufficient data to produce a robust analysis of retirements from the 1987 Scheme (unprotected), 2006 Scheme or the 2015 Scheme.

*** The age/service that the member is expected to retire based on 1987 unprotected assumptions without any allowance for retire and rejoin.

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

Wider environment:

McCloud Judgment

The McCloud judgment could result in many members exchanging up to 7 years' service from the 2015 Scheme to the 1987/2006 Schemes.

To allow for the potential impact of this on member behaviour, we have aligned the retirement decrements of the unprotected 1987 Scheme members with those of protected members.

The additional service in the 1987 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.

Retire and Rejoin

The 'Retire and Rejoin' option is currently being promoted to Police Officers in E&W.

Our understanding is that this option is not available in Scotland and there are no plans to make this available.

We have therefore not made any allowance for this within the age retirement assumption.

Wider environment:

Commutation Cap

Before April 2022, 1987 Scheme members who reached age 50, with at least 25 years' but less than 30 years' service, and who were aged below their relevant voluntary retirement age, had a limit on the lump sum they could take from the Scheme.

From April 2022, this limit has been 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.**

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 Police Officers is not affected by this change, so we have made no 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

Scheme experience has shown that withdrawals over 2016 to 2020 have been higher than previously assumed at all ages.

The higher rates of withdrawal continues a trend that was identified as part of the previous valuation in 2016 which considered experience between 2012 and 2016. For the 2016 valuation, this assumption was not updated as, at that time, it was concluded that the 2012 to 2016 experience was unusual and unlikely to continue in the long term.

Given the trend of withdrawals being higher than assumed has been sustained over an 8-year period, we therefore propose to update and increase the withdrawal assumption for the 2020 valuation. The observed increase in leaving rates is consistent with increased withdrawal rates across the public sector.

The experience in Scotland has been somewhat more volatile than that seen in the PPS (E&W). For the PPS (E&W), the recommendation is to double the existing withdrawals assumption. We recommend a consistent approach to updating the assumption is applied for the PPS (Scotland) i.e. double the existing withdrawal assumption.

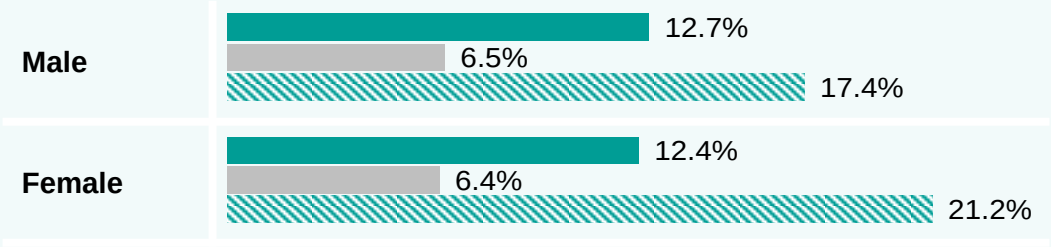
Practical implications

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 PPS (E&W) 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



In the example scenario shown above, the likelihood of leaving service under the 2020 valuation assumptions for the PPS (E&W), is much greater than the likelihood of leaving service from using the assumption recommended for 2020 valuation of the PPS (Scotland).

The rates of leaving service in the PPS (E&W) follow a different pattern to that used in the PPS (Scotland). The PPS (Scotland) rates are greater than the PPS (E&W) rates at younger ages, but lower than the PPS (E&W) rates at older ages.

Our approach

Analysis

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

We have included only those with two or more years service .

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:

- Compare recent withdrawal experience against the 2016 assumptions.
- Where there is enough scheme data, we identify groups of members we would expect to have different rates of leaving service.
- 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 considered pre-2016 experience.
- Due to the larger dataset, we have also considered the corresponding analysis carried out for the PPS (E&W) and assessed the likely difference between experience for Scotland relative to E&W.

Scheme experience: overall

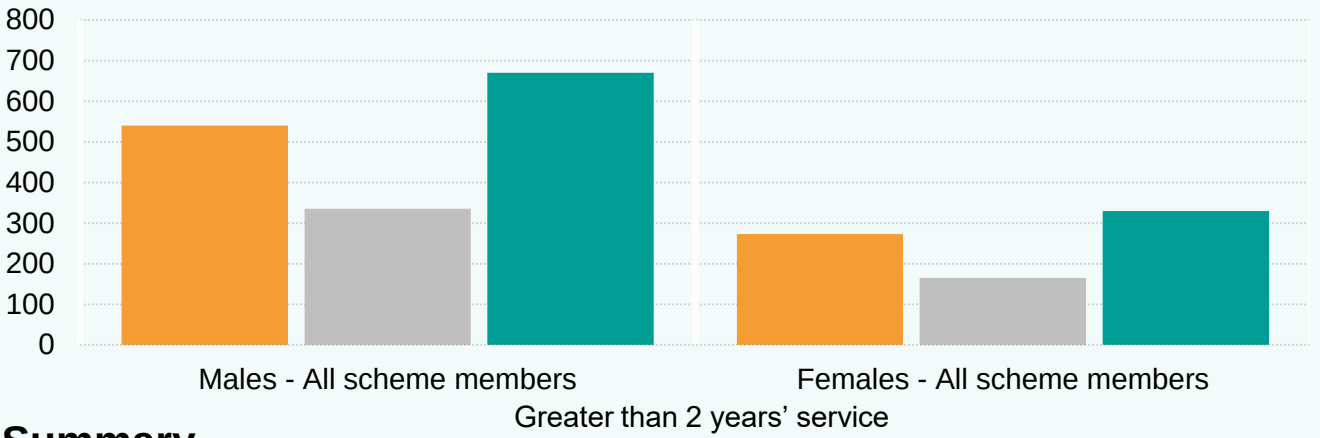
Experience versus expectations show how accurate the assumptions have been in the past and can help inform setting future assumptions.

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 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: number of leavers



Summary

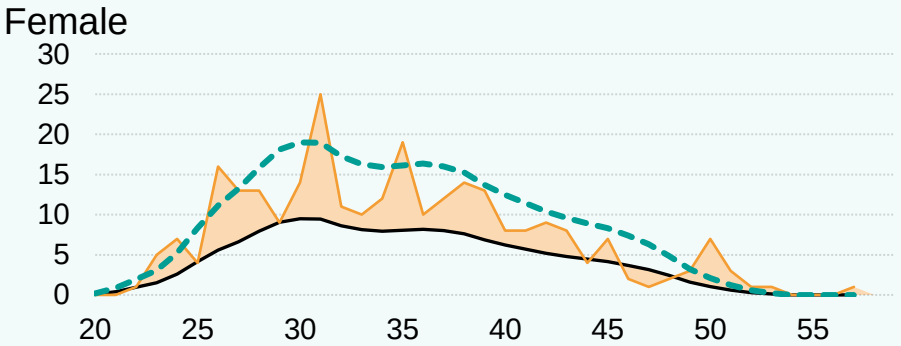
The chart above shows that there has been an increase in observed withdrawals compared to the 2016 assumptions. This follows a similar increase at the previous 2016 valuation. It is also in line with observations from other schemes of a general increase in withdrawals and indicative of a wider long-term trend across the public sector.

The charts on the next page show that, although experience in the PPS (Scotland) has been quite volatile, the 2016 valuation assumed a lower level of withdrawals than that which emerged in experience.

For the PPS (E&W), the recommendation is to double the existing withdrawals assumption. We recommend a consistent approach to updating the assumption is applied for the PPS (Scotland). i.e. double the existing PPS (Scotland) withdrawals assumption.

Scheme experience: in detail

Number of leavers by age, split by gender



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

The charts are based on 4 years experience (2016 to 2020) and only members with two or more years of service are included in the experience line.

Scheme experience: in detail

Category	**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
Male	540	335	670
Female	273	165	330

The analysis is based on 4 years experience (2016 to 2020) and only members with two or more years of service are included in the analysis.

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

Scheme experience: in detail (PPS (E&W))

Number of leavers by age, split by gender

Category	**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
Male	9,867	4,842	9,685
Female	5,044	2,451	4,902

The analysis is based on 8 years experience (2012 to 2020) and only members with two or more years of service are included in the analysis.

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

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.

The differences between actual experience and that assumed are larger for members with shorter service periods. For members with shorter service, experience has been higher than assumed for the 2016 valuation, but this is offset to an extent by lower promotional pay increases for members with longer service periods.

Adjusting the assumption for recent experience will not have a material effect on the valuation results. We therefore recommend that the 2016 valuation assumptions are retained.

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.

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 PPS (E&W) 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

In the example scenario shown above, the salary under the 2020 valuation assumptions for the PPS (E&W), is less than the result from using the assumption recommended for 2020 valuation of the PPS (Scotland).

At service levels up to 20 years, the assumed salary progression is the same for the PPS (Scotland) and the PPS (E&W). However, at service levels beyond 20 years, the salary progression assumption for the PPS (Scotland) is higher than that used for the PPS (E&W).

Our approach

Analysis

We have analysed the scheme's salary growth experience over the period 1 April 2016 to 31 March 2020 by identifying members who appear in the data used for both the 2016 and 2020 valuations and analysing their pay growth over the 2016-2020 period. This is known as an "annual increase" analysis.

We have stripped out an allowance for known general pay increases in order to isolate the promotional elements of pay changes.

Setting recommended assumptions

Our general approach is:

- Identify groups of members where we see different levels of promotional increases.
- 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.

Scheme experience: overall

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

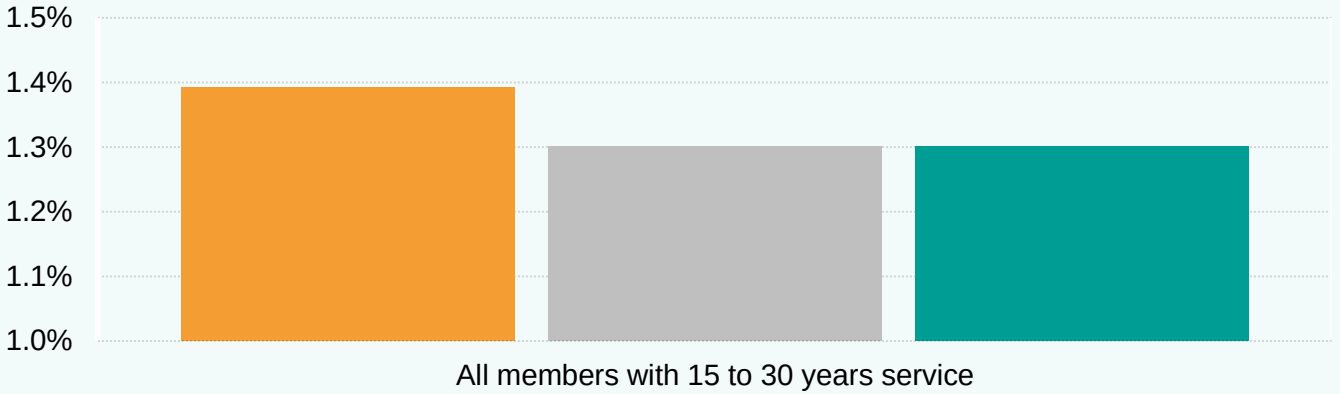
The chart to the right and those on the following pages compare:

- **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 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.

All numbers exclude general (non-promotional) salary increases.

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 40 to 55



All members with 15 to 30 years service

Summary

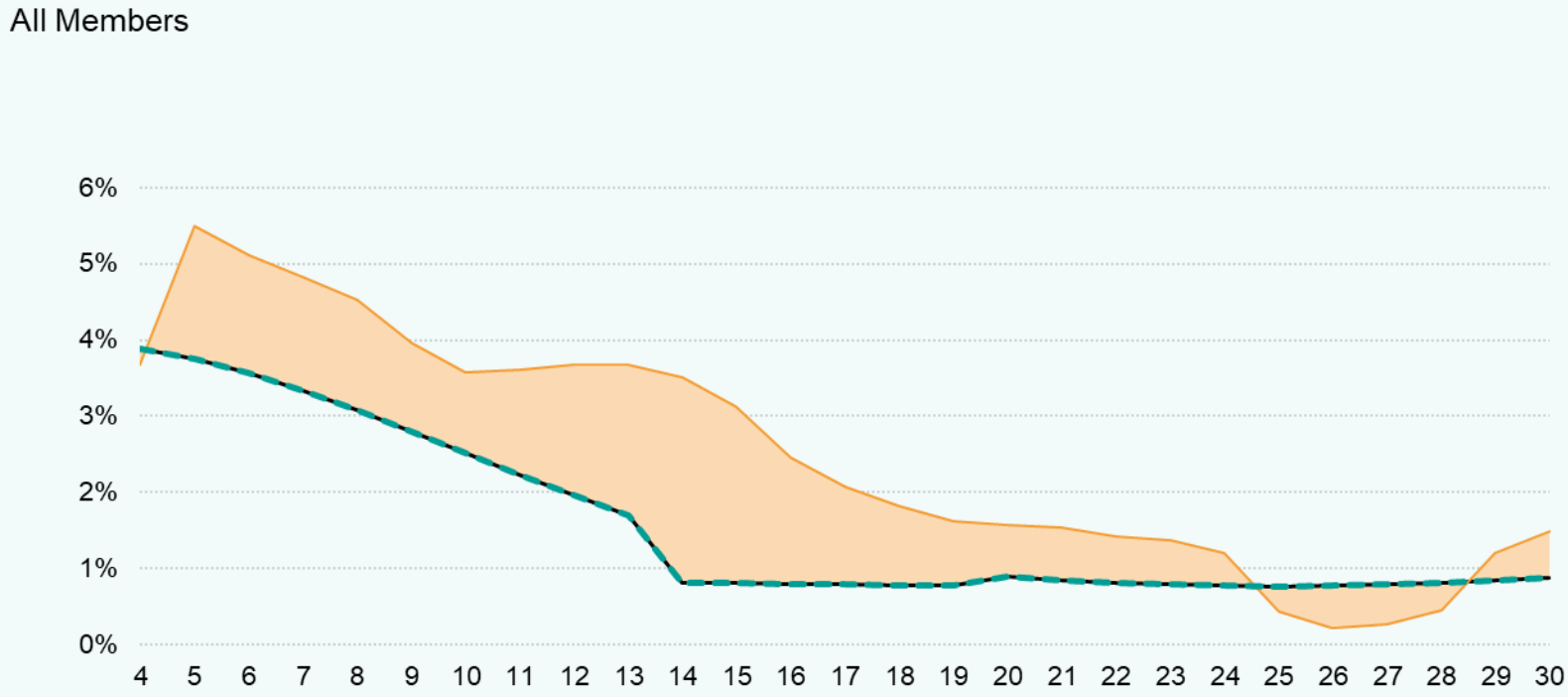
Overall, members have experienced higher promotional pay increases than expected, based on the 2016 assumptions, but the size of the difference is small.

The differences are larger for members with shorter service periods and are offset to an extent by lower promotional pay increases for members with longer service periods.

Adjusting the assumption for recent experience will not have a material effect on the valuation results, so we recommend that the 2016 valuation assumptions are retained.

Scheme experience: in detail

Annual promotional pay increases by service



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

Scheme experience: in numbers

Category	2016 payroll of analysed members	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
All Members	£487 million	£532 million	1.39%	1.30%	1.30%

The 2016 payroll figures above include an allowance for known general pay increases from 2016 to 2020 . 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. Different rates would apply for different current age 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?

There are two elements to the retirement in ill-health assumption

1. The rate of ill-health retirement
2. The tier of ill-health benefits a member will receive

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 PPS (Scotland).

In the absence of this experience data, we have considered the PPS (E&W) analysis. No change was recommended for this scheme.

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

Split between ill-health tiers: We were not able to carry out an experience analysis for this assumption for the PPS (Scotland).

In the absence of this experience data, we have considered the PPS (E&W) analysis. Although it was noted there has been a higher 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 E&W Scheme, where the current assumed split for higher / lower tiers is 50:50.

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 PPS (Scotland), where the assumed split for higher / lower tiers is 75:25.

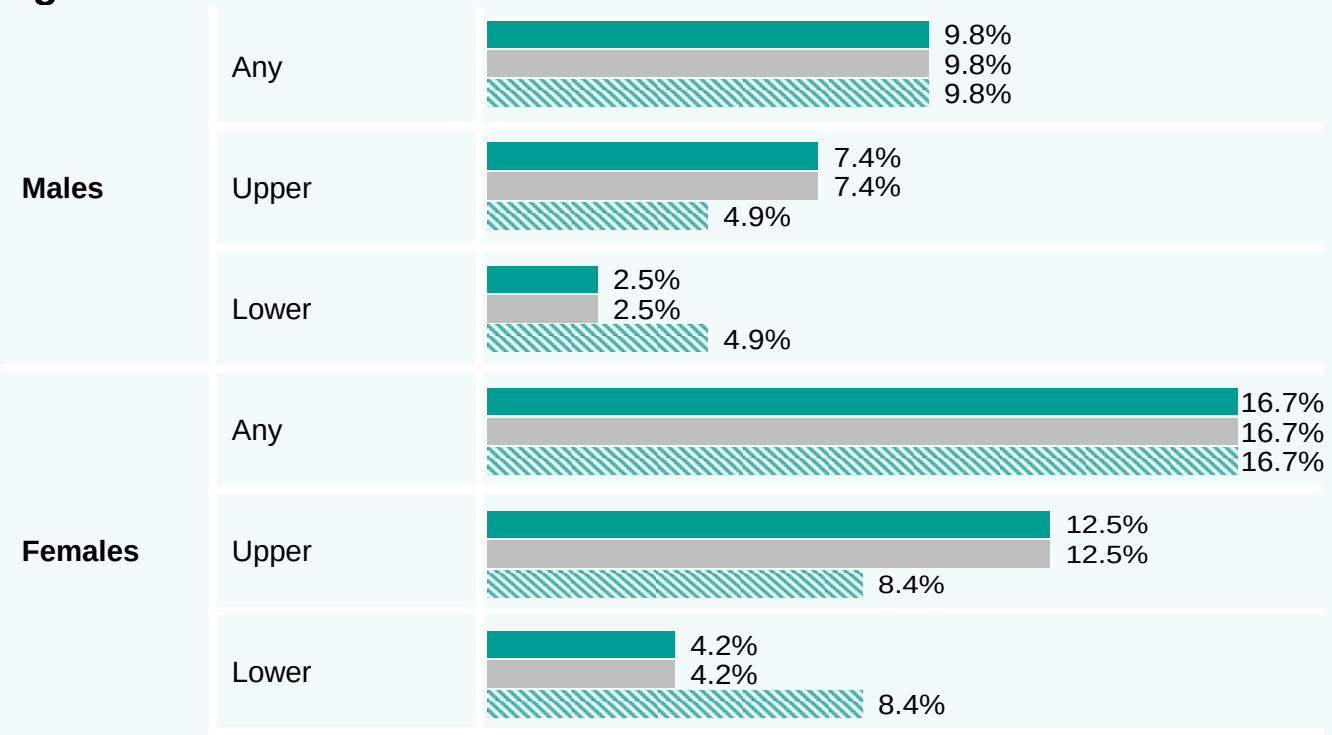
Practical implications

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 PPS (E&W) 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



The assumption in relation to the rate of ill-health retirements in the same for the PPS (Scotland) and the PPS (E&W).

The assumed split for upper / lower tier ill-health retirements is 75:25 in the PPS (Scotland), whereas it is 50:50 in the PPS (E&W). This difference is reflected in the figures shown above.

Our approach

Analysis

The scheme experience provided was not sufficient to carry out a robust analysis. We have considered the PPS (E&W) ill-health 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 considered the corresponding analysis carried out for the PPS (E&W) and assessed the likely difference between experience for Scotland relative to E&W.

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.

Summary

There were 354 ill health retirements over the 2016 to 2020 intervaluation period in the PPS (Scotland). This is insufficient data to provide a robust analysis. We have therefore considered the PPS (E&W) analysis.

Ill-Health Incidence
In the PPS (E&W), ill-health retirements have been slightly below the rates previously assumed. However, adjusting the assumption for recent experience will not make a material change to the valuation results, so we recommend that the 2016 valuation assumptions are retained.

Our experience runs to 31 March 2020, and as such, misses most of the impact of COVID-19. There is anecdotal evidence that COVID-19 has increased the number of ill-health retirements, which supports retaining the current assumption.

Ill-Health Retirement Tiers
There has been a higher proportion of upper tier ill-health retirements than previously assumed in the PPS (E&W). However, we suspect that many authorities in E&W may have only recorded higher tier ill-health retirements, so we have doubts with regards to the quality of the data. Therefore, we propose to maintain assumption for the split for higher / lower tiers at 50:50 despite the experience of a larger proportion of higher tier retirements.

Although, the current split for higher / lower tiers in PPS (Scotland) is 75:25, we do not propose to align to the PPS (E&W) split of 50:50. 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 PPS (Scotland).

Scheme experience: in numbers (PPS (E&W))

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
Males	**Any**	1,180	1,217	1,217
	Upper	968 (82%)	609 (50%)	609 (50%)
	Lower	212 (18%)	609 (50%)	609 (50%)
Females	**Any**	699	833	833
	Upper	583 (83%)	416 (50%)	416 (50%)
	Lower	116 (17%)	416 (50%)	416 (50%)

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

Wider environment:

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.

Changes to Ill-Health Benefit Entitlement

Under the current Scheme regulations, the scheme manager can exclude an officer from being eligible for all ill-health benefits, if the member has underlying health conditions. This would mean the likely cost of providing the officer with ill-health benefits was deemed to be “disproportionately high”. Members who were deemed ineligible for ill-health benefits paid reduced contributions (2.5% less).

This provision is included in the equivalent pension scheme in E&W, where it has been subject of ongoing litigation. As a result of this litigation, Scottish Ministers have confirmed that they intend to consult on amending regulations to ensure future members will no longer be excluded from ill-health benefits. This consultation will also consider the additional implications for police officers who are currently ineligible for ill-health benefits.

Due to the low number of members who are excluded from ill-health benefits, we do not expect this change to have a material impact on the 2020 valuation results.

Over the longer term, we will monitor the potential impact on ill-health retirement experience.

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 on the PPS (Scotland).

In the absence of this experience data, we have considered the PPS (E&W) analysis. No change was recommended for the E&W Scheme.

For the 2016 valuation, the assumption for the PPS (Scotland) was the same as the mortality before retirement rates for the PPS (E&W). We recommend no change to this assumption for the PPS (Scotland).

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 PPS (E&W) 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

The assumptions in relation to death before retirement are the same for the PPS (Scotland) and the PPS (E&W).

Our approach

Analysis

Insufficient scheme experience is available for the PPS (Scotland).

We have considered the PPS (E&W) death before retirement 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 considered the corresponding analysis carried out for the PPS (E&W) and assessed the likely difference between experience for Scotland relative to E&W.

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.

The analysed experience runs to 31 March 2020, and as such misses most of the impact of COVID-19. There is anecdotal evidence that COVID-19 has increased the number of deaths before retirement. However, we have made no allowance for this, as it is unlikely to have any material impact on the valuation results

Summary

There were 26 deaths before retirement over the 2016 to 2020 inter-valuation period in the the PPS (Scotland). This is insufficient data to provide a robust analysis.

We have therefore considered the PPS (E&W) analysis, where deaths before retirement have been reasonably close to the 2016 assumptions. In light of this analysis, GAD recommend no changes to the current assumptions for the PPS (E&W).

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 Police Officers in Scotland and E&W would differ to a material extent.

There is little experience in Scotland to use as a firm base for this assumption, and the limited experience is similar to that observed in E&W. We therefore recommend no change is made to the PPS (Scotland) assumption.

Scheme experience: in numbers (PPS (E&W))

The table shows the corresponding figures for the PPS (E&W). 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
Males	152	190	190
Females	45	75	75

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 1987 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 PPS (Scotland) to produce a robust analysis

We therefore considered the experience analysis of the larger dataset of the PPS (E&W) which also considered the ONS married and married/partnered assumptions in informing the recommendation. Although there were some concerns around the credibility of this data too, 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 Scotland Scheme would differ to that in the E&W Scheme, and so, we also recommend no change to the existing proportions married/partnered assumption for the PPS (Scotland).

Age difference assumptions: We recommend no change to the existing assumptions. The experience (although only a small dataset) was broadly in line with the current 2016 assumptions. We also considered PPS (E&W) which showed a similar experience pattern.

Other assumptions: For other minor assumptions such as minor dependants' pensions, dependants' gender and remarriage, we recommend no change to the 2016 assumptions.

Practical implications

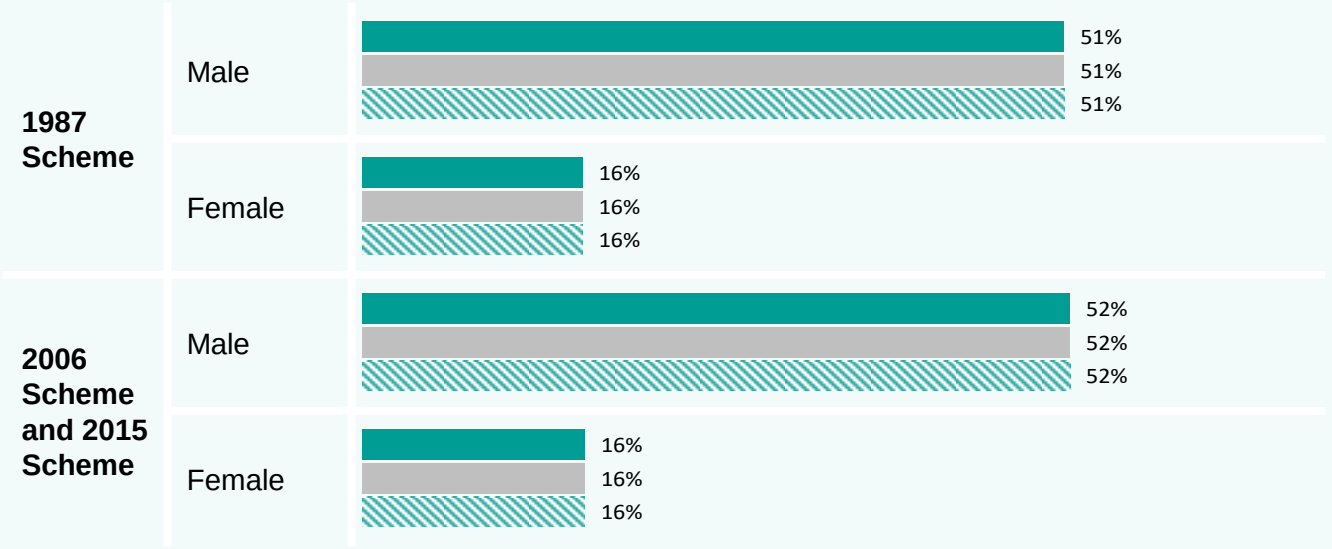
The chart to the right shows the likelihood that an eligible partner exists when a member dies. The likelihoods shown depend on:

- 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 PPS (E&W) valuation.

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



*Assumed age at death for normal health male pensioners is 85 and for females is 87, using the life expectancy assumptions we recommend for the 2020 valuation.

The assumptions in relation to proportion married/partnered are the same for the PPS (Scotland) and the PPS (E&W).

Our approach

Analysis

For the majority of the family statistic assumptions, we have insufficient data to carry out a robust experience analysis. However, we have analysed the scheme's male age difference experience over the period 1 April 2016 to 31 March 2020.

Where 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 PPS (E&W) 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.

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

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 PPS (E&W).

.

Summary: Proportion Married

There was insufficient data to carry out a robust analysis of the proportion married and proportion married/partnered assumption using the schemes' own data.

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

- For males in the 1987 Scheme, a similar proportion married has been seen in recent years (55%) compared to the 2016 assumption (61%). However, as this analysis only covers 8 out of 45 forces (around 40% 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 PPS (E&W).

On the basis that there is no reason to believe family circumstances in the Scotland scheme should be significantly different to that in the E&W Scheme, we recommend no change to the PPS (Scotland) proportion married and married/partnered assumption.

The following page "Scheme experience: in numbers (PPS (E&W))" sets out the figures for the analysis carried out for the PPS (E&W).

Scheme experience: in numbers (PPS (E&W))

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

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	**1987 Scheme (*)**	3,600	55%	61%	61%
	2006 Scheme and 2015 Scheme (**)	N/A	N/A	85%	85%

*There were 132 female deaths, which is insufficient data to analyse. This is not included in the table above.

**There was 1 male member death 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.

The table shows the corresponding figures for the PPS (E&W). 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.

Scheme experience: overall

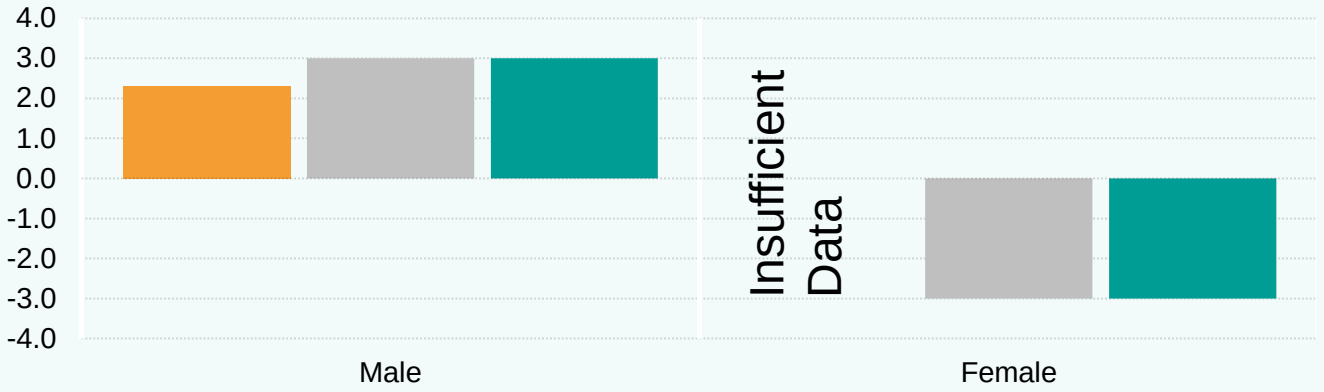
Experience versus expectations show how accurate the assumptions have been in the past and can help inform setting future assumptions.

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 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: age difference at death



Summary

The charts above show that for males, the actual average age difference between member and spouse at death has been a slightly smaller differential in recent years compared to the 2016 assumption in the PPS (Scotland). However, the data set underlying the charts is small and therefore the experience data is not likely to be credible for justifying any change to the assumption.

We have also considered the analysis carried out for the PPS (E&W) being the larger data set, which also showed a similar pattern but again the data set was small and so, no change to this assumption was recommended.

The page “Scheme experience: in numbers” shows the schemes own analysis figures and the following page “Scheme experience: in numbers (PPS (E&W))” sets out the figures for the analysis carried out for the PPS (E&W).

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
Male	696	2.3	3	3
Female (*)	14	-3.7	-3	-3

(*) 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 dependent pension.

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

Scheme experience: in numbers (PPS (E&W))

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
Male	1,997	2.7	3	3
Female (*)	34	-0.9	-3	-3

(*) 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 dependent pension.

The table shows the corresponding figures for the PPS (E&W). 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 (E&W) 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 Police 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.

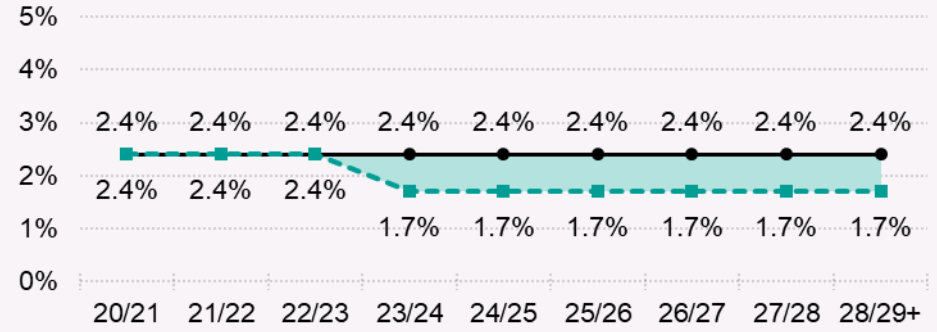
Part C: Appendices

C1. Directed assumptions 1

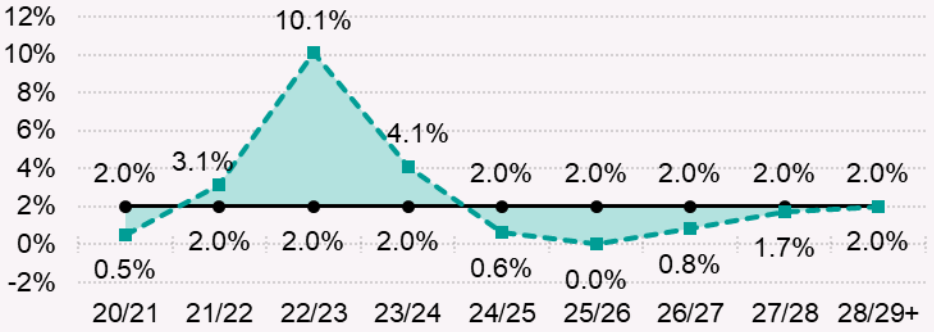
Annual financial assumptions

Taken from Directions dated 30 August 2023.

Discount rate, net of assumed pension increases

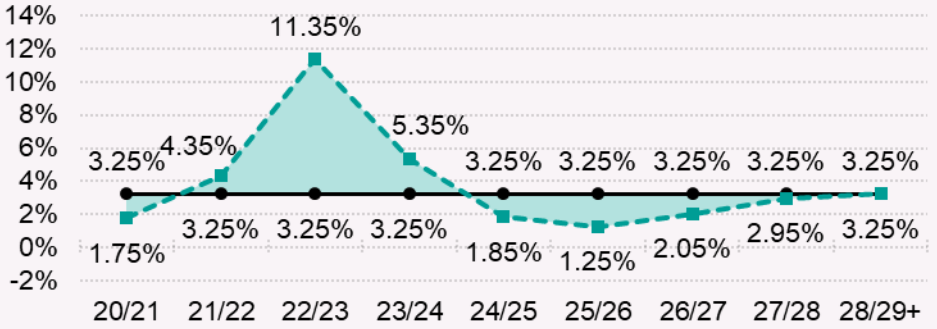


Rates of pension increases



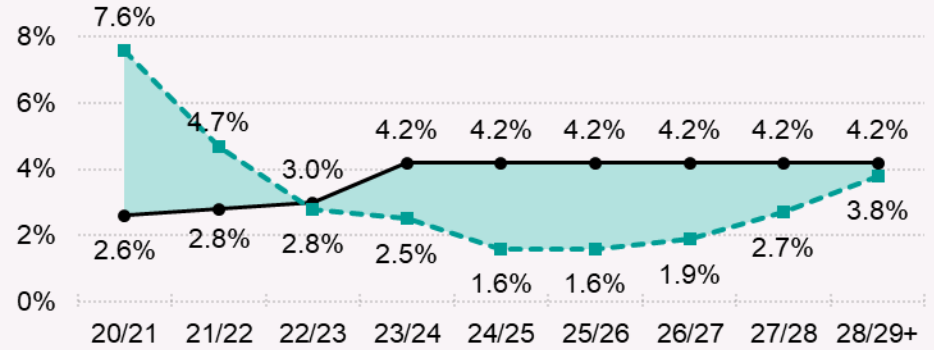
*Note: applicable from April at end of period

Rates of CARE revaluation



*Note: applicable from April at end of period

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 schemes ceased to accrue benefits in these schemes at 31 March 2022 and future accrual for all members is in the reformed scheme from 1 April 2022.

The expected cost of accruing benefits over periods after the effective date have 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 schemes are assumed to retire in line with recent experience. This provides for some legacy scheme 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 each scheme (i.e. 1987, 2006 or 2015), previous protection status (i.e. protected, tapered or unprotected) and based on the following criteria.

- Age: age nearest
- Service: duration (years nearest)

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, and the pay award effective at 1 April 2023. Subsequent payroll figures assume a stable workforce size and use valuation assumptions.

Member contribution yield over implementation period

All members of the 2015 Scheme pay the same member contribution rate of 13.46% (13.5% to 1 decimal place). Assuming no changes to the employee contribution rate, 13.46% (13.5% to 1 decimal place) is the expected average member contribution rate over the implementation period 1 April 2024 to 31 March 2027, as all accrual is in the 2015 Scheme.

This compares to a target member contribution rate of 13.7% of pensionable pay.

For the purposes of the 2020 valuation, we have been instructed by Scottish Ministers to assume that contributions received into the scheme will be 13.5% (to 1 decimal place) over the implementation period 1 April 2024 to 31 March 2027.

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 schemes 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.

For the Police Pension Schemes (Scotland), we have assumed that the legacy scheme benefits are better for all eligible individual members in the 31 March 2020 data.

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 Cost Cap valuation report dated 7 February 2022. The approach for the 2020 valuation is required to be accurate because it impacts on Employer contributions 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. 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 Police Pension Schemes (Scotland) target cost is set at 12.3% 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.

C3. 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: • **1987 Scheme** After 30 years' service at any age, or after 25 years' service at age 50 and above, or otherwise at age 55 (some senior officers have higher retirement ages); Deferred pension age 60 • **2006 Scheme** Age 55; Deferred pension age 65 • **2015 Scheme** Age 60, with flexible retirement from age 55 subject to benefits being actuarially reduced; Deferred pension age equal to State Pension Age (SPA).
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.

C3. 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'.
Standard table	The standard tables used for the mortality after retirement assumption are the SAPS tables. These are published by the 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.