

eNews from GAD

Actuarial analysis from the public sector

Issue 26, December 2016



Welcome to eNews – GAD's regular newsletter. Climate change is a real world risk with increasingly immediate financial implications for UK government. A recent research project undertaken by GAD investigated how actuarial skills might support more robust analysis and decision making in this area. Anna Edwards summarises the main findings.

A more traditional area of work for GAD that is currently underway is the examination of the demographic experience of the memberships of large public sector pension schemes. There are opportunities for GAD to support decision-making by colleagues and partners here as well. We are well placed to contribute insights on the characteristics of the public sector workforce and the possible implications, not only for pension scheme costs, but on wider workforce policy. Mike Scanlon explains in more depth.

Also related to public sector pension schemes, this issue builds on the thoughts I set out in the July edition on measures and controls for managing risks. Barbara Sinkinson examines some of the other measures of public sector pension schemes costs that can supplement the liability figures typically included in government accounts.

I hope that you enjoy this issue and I would like to take this opportunity to wish you a very happy festive holiday season. As always, previous issues of eNews are available on our website www.gov.uk/gad.

MARTIN CLARKE, GOVERNMENT ACTUARY

NEWS FROM GAD

GAD evidence to Work and Pensions Committee

On 8 August 2016, the Work and Pensions Committee launched the [Pension Protection Fund and Pensions Regulator inquiry](#) into defined benefit pensions funds to cover a number of issues. The Government Actuary submitted [written evidence](#) to this inquiry in October, which has now been formally published by the inquiry together with their [final report](#).

Insurance as a tool to fight poverty

GAD actuary Anna Edwards' article that described how insurance could be a cost-effective solution to tackling poverty in developing countries and what can be achieved has been published in [Civil Service Quarterly](#).

State Pension Age review

The [Pensions Act 2014](#) requires the government to carry out periodic reviews of the State Pension Age. The first such review is due to report back by May 2017 and will be supported by two commissioned reports. John Cridland CBE is leading a review team who have [published](#) a wide-ranging [interim report](#). This sets out the evidence considered so far and seeks views, by 31 December, to help shape the recommendations in his final report. GAD has been [commissioned](#) to report on projected life expectancy in future years, considering two scenarios for the proportion of adult life spent in receipt of the State Pension.

DEVELOPMENTS

Autumn Statement 2016

On 23 November, the Chancellor of the Exchequer, Philip Hammond, presented his [Autumn Statement](#) setting out the government's plans for the economy and public finances. GAD's [Technical Bulletin](#) focuses on certain measures announced relating to pensions, savings, insurance and social security.

Secondary market in annuities

The government has [cancelled](#) plans, first announced at [Budget 2015](#), to introduce a [secondary annuity market](#). After engaging with industry, financial regulators and consumer groups, government concluded that the conditions to allow a competitive market to emerge could not be balanced with sufficient consumer protections.

Guaranteed Minimum Pensions

Both HM Treasury and DWP have recently published consultations concerning Guaranteed Minimum Pensions. Under the previous State Pension system, members accrued GMPs between 1978 and 1997 if their pension scheme was contracted-out of Additional State Pension. HMT's [consultation](#) considers how certain public service pension payments should increase in future, following the introduction of the new State Pension. DWP's [consultation](#) includes, among other topics, a possible method by which private sector pension schemes can address the inequalities inherent in private pensions as a result of GMPs.

European Council: IORPs Directive

On 8 December 2016, the European Council [adopted](#) a revised [Directive](#) on institutions for occupational retirement provision (IORPs), intended to facilitate their development and better protect pension scheme members and beneficiaries. Member states will now have two years to transpose the Directive into national laws and regulations.

CLIMATE CHANGE: UK GOVERNMENT AND THE POTENTIAL ROLE OF ACTUARIES

Climate change is now widely accepted as an emerging long-term risk. The UK government has various initiatives and approaches to mitigate and adapt to its effects. GAD recently undertook a research project to gather data on key areas of work across government, in order to consider how actuarial skills might support robust analysis and decision-making in this area. This article explains what we learned and what we plan to do as a result.



Anna Edwards

Climate change and the UK government

The uncertainty surrounding climate change is significant, but the inevitability of a changing climate is now widely accepted. The average temperature in the UK is now 1°C higher than it was 100 years ago (compared to a 0.8°C increase on average across the Earth's surface) and 0.5°C higher than it was in the 1970s^[1].

The long-term trend is toward a warming climate, but natural fluctuations will occur along the way. Temperatures may not always rise in any one year. The trend and fluctuations of the warming at the Earth's surface are leading to:

- warming oceans, leading to melting polar ice and glaciers, and rising sea levels
- more extreme weather events, in both frequency and severity
- significantly varying rainfall levels – some more, some less

The UK government seeks to address climate change in two ways:

- Adaptation: adjusting systems in response to actual or expected climate effects to reduce harm or exploit beneficial opportunities.
- Mitigation: intervening to reduce the sources of greenhouse gases or enhance the sinks which absorb them.

The role of actuaries

Actuaries specialise in financial risk analysis, looking at long term effects under conditions of uncertainty, so their skills are directly applicable to the problem of climate change. As a team of actuaries, GAD aims to support effective decision-making and robust reporting within government, making use of the analytical skills of actuaries to help decision-makers take account of risk and uncertainty.

It was therefore natural that we should consider the work done around climate change in UK government. A brief research project was undertaken to understand how government departments are approaching climate change in their policymaking and other activities, so that we might consider how we might be able to offer the analytical skills and risk expertise of actuaries to contribute.

Outcomes of the research

Departments and responsibilities

The hub of climate change coordination in UK government is the Committee on Climate Change (CCC), a non-departmental public body whose purpose is to advise the government on emissions targets and to report on progress made in reducing emissions and in preparing for climate change.

The CCC coordinates publication of the Climate Change Risk Assessment (CCRA) and the National Adaptation Plan (NAP) and outlines responsibilities for relevant departments undertaking key adaptation actions. An excerpt from the CCRA, the "Top six areas of inter-related climate change risks for the UK" is presented [on the following page](#).

We wanted to understand the analysis undertaken by departments, both for the risks highlighted in the CCRA and any wider climate change initiatives. We held interviews with a sample of 10 key departments. The aim was to understand how departments consider climate change in more detail, especially the analysis currently undertaken and the analysis that they consider may be useful for better policy and decision making. Activity on mitigation, as defined above, is concentrated in BEIS, and was not the focus of our work.

Common themes of analysis undertaken

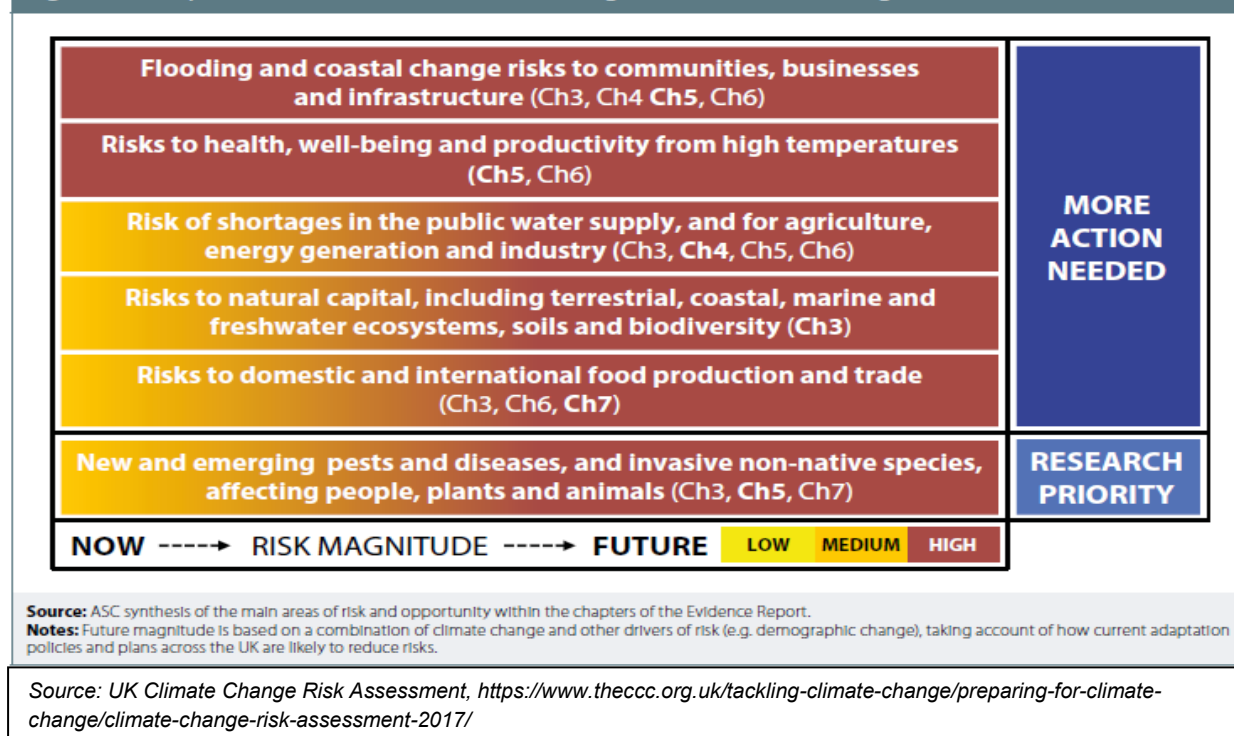
Throughout our interviews, we learned that there was a strong focus on responding to key priorities in the CCRA and actions outlined in the NAP. The extent to which quantitative analysis was undertaken or even possible varied significantly.



[1] <https://www.gov.uk/guidance/climate-change-explained>

CLIMATE CHANGE: UK GOVERNMENT AND THE POTENTIAL ROLE OF ACTUARIES

Figure SR.1: Top six areas of inter-related climate change risks for the United Kingdom



When we discussed modelling and analysis that had been performed, some key themes and issues emerged.

Variability and extremes: There is a tendency to consider the most likely or average scenario, but it is the extreme outcomes that need to be prepared for. The need to consider extremes and variability was recognised, it was not always clear how this should be done.

Dealing with and presenting uncertainty: There is clearly a significant amount of uncertainty around the extent and effect of future changes in climate, as well as what the impact will be on the environment, societies, and economies. It is therefore difficult to define and model any probability or distribution, and trying to quantify or estimate any financial impact seems impossible.

Non-linearity: There is a recognition that the impact of climate change may have “cliff” effects. For example a 1.1 degree change vs. a 1.0 degree change may result in catastrophic differences such as certain species dying out completely vs. only being affected.

Timeframes: Climate change is a long-term issue, but the nature of UK government initiatives is sometimes shorter term – the National Risk Register, for example, only focuses on a 5-year time horizon.

Correlations: The interactions between risks are difficult to understand and may cause significant problems. Much of the current analysis focuses on one risk at a time, assuming that risks are independent as a simplification.

Actuarial support

The modelling issues faced by departments are not unique to climate change, and as actuaries we regularly consider these limitations in analysis we undertake. There are no simple

solutions, and we found through our conversations that there were good approaches being undertaken to address the problems, for example through considering scenarios when presenting uncertainty.

In our view, there are clear areas where actuarial support would be particularly relevant to climate change modelling in the future. We consider our key priorities to be the following:

Applying actuarial techniques to address some of the modelling limitations and improve robustness: Actuaries are experts in areas such as presenting variability and uncertainty, dealing with non-linearity, considering joint distributions to consider key correlations, and long-term analysis with modelling horizons decades into the future.

Cost-benefit analysis & quantification: A key area that could use further support is attempting to quantify the potential benefits of climate change mitigation and adaptation, so that a clearer comparison can be made between costs and benefits. We believe that actuarial techniques can assist with innovative modelling, working with departments based on data and information that is already available.

Supporting departments in preparing the CCRA and addressing the NAP: GAD previously provided input to the framework used in the CCRA. As future iterations of the CCRA and NAP evolve and are published, actuarial input might continue to be used to ensure robust risk assessments and systematic planned actions.

In summary, GAD plans to continue engagement with relevant departments and areas of analysis undertaken in government in relation to climate change. We found the interviews informative and enlightening, and would welcome working further with departments in this area.

UNDERSTANDING THE PUBLIC SERVICE PENSION LIABILITY

The public service pension liability is a significant part of the government's total financial commitments, as can be seen from the data published in the 2014-15 Whole of Government Accounts (WGA). However, looking at the present value of an extremely long term liability is only one part of the picture. In this article we consider other data which also help to explain the development of this liability.



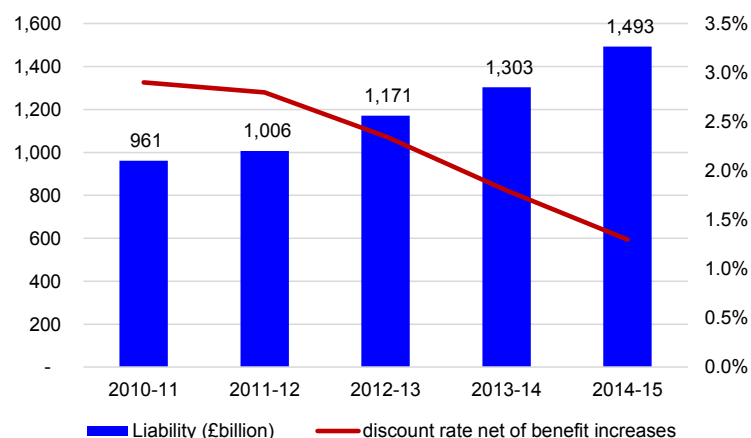
Barbara Sinkinson

Whole of Government Accounts

The WGA consolidate the audited accounts of over 6,000 public sector organisations in order to produce a comprehensive, accounts-based picture of the financial position of the UK public sector. One key piece of information shown in the WGA is the public service pension schemes liability. At £1,493.3 billion, this was the largest provision in the latest (2014-15) set of accounts, a quarter larger than the next largest, that of Government financing and borrowing at £1,174.5 billion.

Figure 1 below shows how the liability has changed from 2010-11 to 2014-15.

Figure 1: Public Service Pension Liability in the WGA



Whilst at first glance this seems to show that the liability is growing rapidly and, with further increases resulting from discount rate reductions in the pipeline, it is important to consider what the figures actually represent.

As a very long-term commitment, the liability is highly sensitive to changes in the assumptions. In particular, the discount rate (the rate at which expected future payments are discounted back to give an equivalent value at the present time) together with the assumed rate of future benefit increases have a significant impact on the results. The liability reported in the WGA for the largest unfunded schemes is calculated using a discount rate and benefit increase assumption prescribed for accounting purposes. Reductions in the discount rate net of benefit increases over 2010-11 to 2014-15 are highly significant in explaining the liability increases, as shown above.

“WGA figures also only consider accrued liabilities”

The assumed rate of future benefit increases is also of importance by itself. The 2011 change in public service pension increases from the Retail Prices Index (RPI) to the Consumer Prices Index (CPI) caused a one-off reduction in the accrued pension liability because CPI increases are generally expected to be lower than RPI increases on average.

Of course, the discount rate and assumed future benefit increases are only part of the picture. A large number of assumptions are made in order to place a value on the public service pension liability, and a number of factors contribute to the change in the liability over time. The notes to the WGA include further information on the change in the liability. For example, they show that changes in assumptions (including the reduction in the discount rate) led the liability to increase by £150.5 billion over the year to March 2015 (out of a total increase of £190.2 billion).

Rather than just looking at the headline WGA liability, it is important to consider the basis on which the amounts are calculated. This is explained in the WGA's underlying notes.

The other important point to note is that the WGA figures only consider accrued liabilities: what the government has an obligation to pay in respect of service to the accounting date.

A projection approach: the Office for Budget Responsibility (OBR) analysis

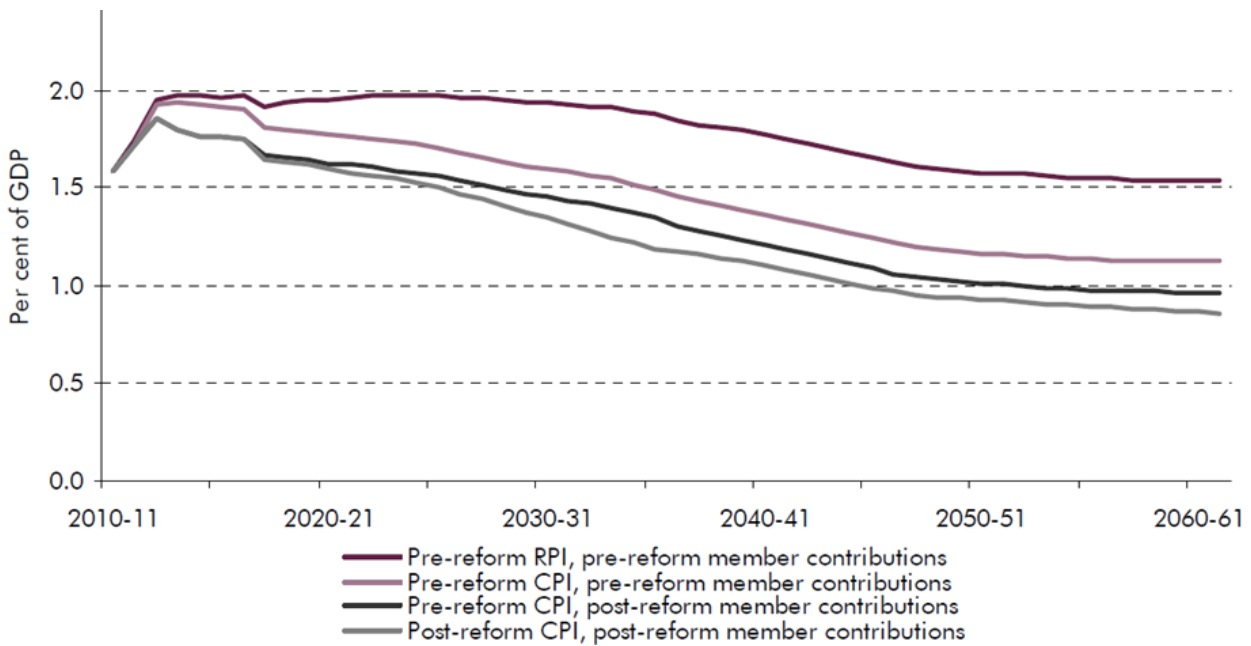
The OBR publishes an annual Fiscal Sustainability Report (FSR) which considers whether the UK's public finances are likely to be sustainable over the longer term. The focus is on projected cashflows rather than a present value, which avoids the sensitivity to the choice of discount rate that is seen in the WGA.

In contrast to the WGA, which only shows benefits accrued to date, the OBR projections consider costs arising from future service as well. They can therefore illustrate the impact of changes to schemes going forward. For example, the 2012 FSR analysed the effects of various reforms to the unfunded public service pension schemes, including

- the move to using the Consumer Prices Index (CPI) rather than the Retail Prices Index (RPI),
- the increases in member contributions, and
- the new schemes that took effect in 2015.

UNDERSTANDING THE PUBLIC SERVICE PENSION LIABILITY

Figure 2: OBR estimated effects of reforms on net expenditure



Source: OBR, GAD

Figure 2 above shows the cumulative effects of these reforms in reducing projected annual expenditure on the schemes as a percentage of GDP. This contrasts with the increasing WGA liability shown in Figure 1.

By the end of the projection period in 2061, around 80% of the projected expenditure is for service that has not yet been undertaken, demonstrating the importance of considering such analysis in addition to the accounting figures which focus on the accrued liability.

In considering the above, it is important to note that, as the projections are very long term, there is significant uncertainty involved including around the GDP growth assumptions. Lower than projected growth would lead to a different picture. The OBR itself emphasises that they should be treated as

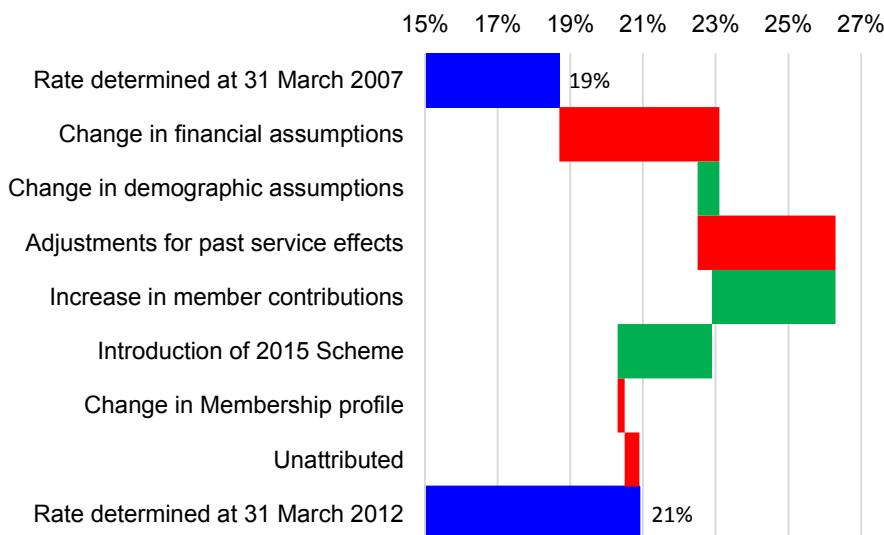
illustrative projections, not detailed forecasts.

Scheme valuations and contribution rates

The rate of employer contributions is another measure of the developing costs of public service pension schemes. Employers pay contributions to meet the assessed costs of the schemes, offset by contributions paid by members.

The published scheme valuation reports set out how scheme costs are assessed for this purpose. Employer contributions will change over time due to changes in each scheme’s membership profile and demographic experience; changes in the forward-looking assumptions; and any changes in the each scheme’s benefit provisions. There is also now an employer cost cap mechanism to help ensure that the costs of the schemes remain within manageable limits going forward.

Figure 3: PCSPS employer contribution rate change from 2007 to 2012 valuations



As an example, Figure 3 summarises some of the results from the published Principal Civil Service Pension Scheme (PCSPS) 2012 valuation report, showing the main reasons for the change in employer contributions following the valuation.

Summary

This article demonstrates the need to consider the costs of public service pension schemes in the round and to understand how they are developing over time. It is important to consider a variety of information and understand the basis on which measures of cost are calculated, rather than focussing solely on one particular measure.

ANALYSING PENSION SCHEME EXPERIENCE: OPPORTUNITIES FOR INSIGHTS

GAD is gearing up to analyse the life expectancy of over 4 million pensioners and the career paths of over 5 million public sector employees, who are members of public sector pension schemes. The results of this analysis will affect the contributions paid by employers and, possibly, the benefits offered to members. However, the analysis also has the potential to offer an insight into the public sector workforce, including salary distributions and progression, and turnover rates. In this article we give a high level overview of the work GAD is undertaking and the opportunities for GAD clients and partners to gain additional insights into their scheme costs and workforces.

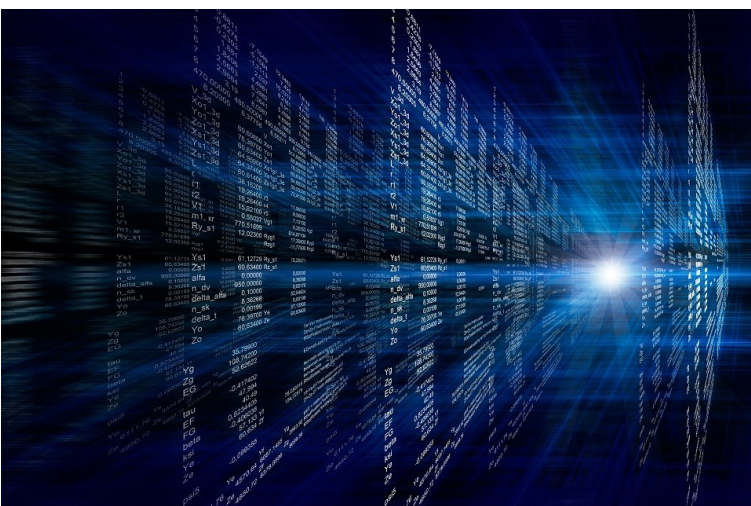


Michael Scanlon

Public service pension schemes 2016 valuations

The public service pension schemes 2016 valuations will assess the financial position and ongoing costs of 20 schemes covering 8 different public sector workforces across all four UK countries. GAD will be analysing what has happened to the members of the pension scheme in the four years since the previous valuations in 2012 (local government three years).

“This mortality analysis of over 4 million pensioners is one of the largest in the UK”



GAD will be updating this analysis to reflect mortality in the four year period from 2012 to 2016. This mortality analysis of over 4 million pensioners is one of the largest in the UK. For comparison, the pensions industry standard tables from the actuarial profession’s Continuous Mortality Investigation are based on an analysis of under 3 million pensioners.

Since 2012, there have been more deaths in the general population than expected, leading to downward revisions to life expectancies in the latest population projections from the Office for National Statistics. However the longer term trend shows significant increases in life expectancy.

Pensioner mortality

The previous valuations have provided a wealth of information on public service pension scheme mortality, unprecedented in the fact that they cover all the schemes at the same valuation date. Figure 1 below shows the life expectancies across the main workforces (excluding local government and based on best estimate valuation assumptions of future mortality, including expected future longevity improvements).

Figure 2: Progression of life expectancy at 65

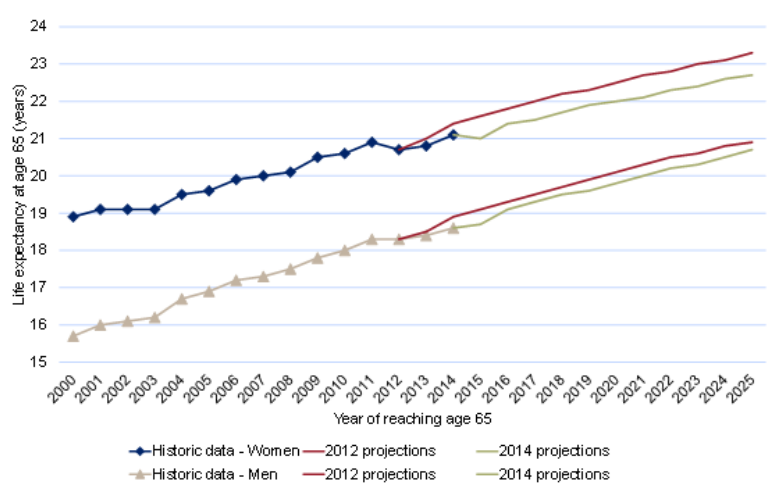


Figure 1: Life expectancy at age 65 for 2012 valuations

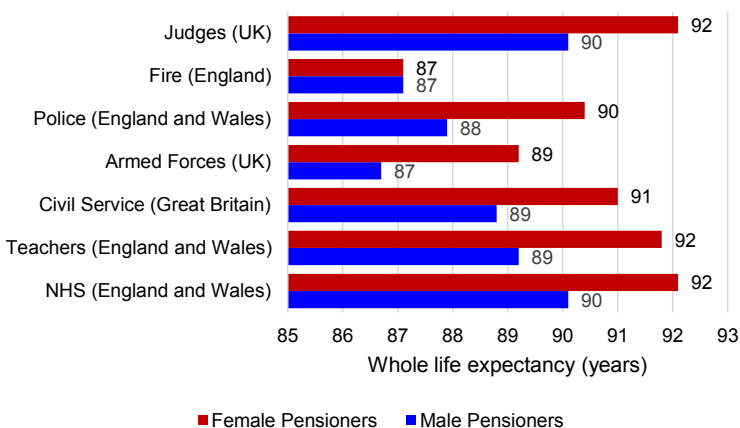


Figure 2 above illustrates this. (The values shown in Figure 2 are on a different basis to those in Figure 1. They show the expected remaining length of life for a person age 65 based on the age-specific mortality rates for the year shown. They don’t allow for expected longevity improvements throughout an individual’s retirement. Nevertheless, the general trend is clear.)

It will be interesting to see if the mortality of public sector pensioners follows the pattern of the wider population.

ANALYSING PENSION SCHEME EXPERIENCE: OPPORTUNITIES FOR INSIGHTS



“It will be interesting to analyse the impact of public sector pay policy on the data, and whether this and the wider economic climate have affected the ages at which people retire or the numbers leaving employment.”

Pensioner Mortality: Opportunities for new insights

While consensus between owners of data and other key stakeholders would be required, where it is possible to pool scheme experience there are opportunities for GAD to provide useful insights such as:

- Create a profile of life expectancy for use in scheme cost projections which may more accurately reflect the public sector workforce than the national population profile
- Monitor improvements to life expectancy at a public sector wide level in the longer term and compare with national population improvements – potentially leading to better assumptions for projecting costs
- Provide credible analysis for different groups of public sector scheme members across schemes where individual scheme data may be too sparse to be statistically significant, for example for specific countries within the UK
- Allow schemes to compare themselves against a public sector average

Workforce analysis

GAD will also analyse the career paths of over 5 million public sector employees over the period 2012 to 2016. This analysis will cover issues such as pay distributions, the progression of individuals’ pay over the period, the ages at which members retire, and the number of people leaving public sector employment before retirement.

Workforce analysis: Opportunities for new insights

The results of this analysis will be vital to the valuations, and also have the potential to offer an insight into public sector workforce issues. For example:

- It will be interesting to analyse the impact of public sector pay policy on the data, and whether this and the wider economic climate have affected the ages at which people retire or the numbers leaving employment.
- The detailed nature of the valuation data means that it may be possible to consider issues at a granular level, for example considering separately the impact on men and women, different age groups, and in some cases geographical location.
- Better understanding the impact of redundancy policies and informing any future changes.
- Analysis could be provided to support developing policy on changing rewards and benefits and introducing flexibility including for issues around pension tax relief limits.

Expected timeframes

The first results from this analysis will be shared with key stakeholders in the coming months, and will be published in due course. In the meantime if you have any questions about the issues raised in this article, please contact Mike Scanlon or your usual GAD advisor.

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For details of our management team and office address please visit:

<https://www.gov.uk/gad#people>

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