Pay-As-You-Go Public Service Pension Schemes
December 2009 Cashflow Projections
Methodology, data and assumptions

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1 Executive Summary

1.1 HM Treasury has commissioned the Government Actuary's Department to produce long-term cash flow projections of expenditure from the Pay-As-You-Go public service pension schemes, sometimes known as unfunded schemes. The results of the long-term cash flow projections were published in the December 2009 Long-term public finance report.

1.2 The purpose of this report is to describe, to users of the December 2009 Long-term public finance report, the methodology, data and assumptions used in the projections of long-term cash flow projections of expenditure from the Pay-As-You-Go public service pension schemes shown in the December 2009 Long-term public finance report.

1.3 The long-term cash flow projections cover all Pay-As-You-Go public service occupational pension schemes. The projections estimate the benefit expenditure on pensions and lump sums over the next 50 years. The projected expenditure relates to the benefits of current pensioners, deferred pensioners, active members and future new entrants.

1.4 The projections allow for the recent reforms to the public service pension schemes and include allowance for the potential savings from cap and share due to increases in life expectancy.

1.5 The results presented are projections – not forecasts – which should be reviewed in light of updated information available. The projections are based on currently announced policy, but are not intended as statements of future policy.

1.6 The benefit expenditure from the five largest schemes are modelled explicitly, using detailed membership data at a recent date. These schemes cover the NHS, teachers, civil service, armed forces and police. These projections are then grossed up to cover the smaller schemes.

1.7 The projections have been aligned with the data from the 2007/08 Resource accounts of public service pension schemes, so that the projections for 2008/09 onwards are consistent with the estimated outturn for 2007/08.

1.8 The methodology and assumptions adopted for the Long-term public finance report are set by HM Treasury, having obtained advice from the Government Actuary's Department. GAD then takes instructions to produce these projections on those assumptions. The Long-term public finance report presents 5 scenarios which illustrate the sensitivity of the results to assumed productivity growth and life expectancy. The key assumptions are as follows:

- Long-term real earnings growth is assumed to be either 1.75%, 2% or 2.25% pa
- Future improvements in mortality are assumed to be in line with the life expectancy scenarios in the 2008-based UK population projections
- The number of active members is assumed to remain constant at 31 March 2008 levels (the constant workforce assumption)
- Other assumptions about demographics and working patterns are based on recent experience in public service pension schemes

1.9 The methodology and assumptions used in the December 2009 projections are largely the same as those used for the previous projections and differences are detailed in this report.

1.10 These cash flow projections relate to the benefits payable in future years and relate to both past and future service. They should not be confused with the total liability of the Pay-As-You-Go public service schemes as reported in resource accounts, which express the future cash flows as a single figure in today's terms and relate only to past service.

2 Introduction

2.1 HM Treasury has commissioned the Government Actuary's Department (GAD) to produce long-term cash flow projections of expenditure from the Pay-As-You-Go (PAYG) public service pension schemes (sometimes known as unfunded schemes), and to prepare a report to describe the methodology, data and assumptions used in the projections. The results of the long-term cash flow projections were published in the December 2009 Long-term public finance report[1].

2.2 The purpose of this report is to describe, to users of the December 2009 Long-term public finance report, the methodology, data and assumptions used in the projections of long-term cash flow projections of expenditure from the PAYG public service pension schemes shown in the December 2009 Long-term public finance report.

2.3 The Long-term public finance report (LTPFR) shows the projected benefit expenditure in respect of pension and lump sum payments from the PAYG schemes as a percentage of projected GDP at ten yearly intervals for 50 years. GAD provided HM Treasury with the projected benefit payments in constant price terms and Treasury have used this in conjunction with its own projections of GDP to calculate projected expenditure as a percentage of GDP.

2.4 HM Treasury have requested these projections as inputs into the LTPFR. The projections are based on currently announced policy, but are not intended as statements of future policy.

Coverage of the cashflow projections

2.5 The long-term cash flow projections cover all PAYG public service occupational pension schemes. These are defined as pension schemes established by statute or by Ministers exercising statutory powers. The list of schemes covered by these projections is given in Annex A. The main schemes covered are those for the NHS, teachers, civil service, armed forces, police and firefighters.

2.6 These projections do not cover the cashflows arising from statutory public service schemes which are funded, such as the Local Government Pension Scheme.

2.7 The projections estimate the benefit expenditure on pensions and lump sums over the next 50 years. The projected expenditure relates to all of the following:

- Current pensioners and Deferred pensioners
- Active members, in respect of benefits built up in the past
- Active members, in respect of benefits that are projected to be built up in the future
- Future entrants to the schemes

Assumptions

2.8 The methodology and assumptions adopted for the Long-term public finance report are set by HM Treasury, having obtained advice from the Government Actuary's Department. GAD then takes instructions to produce projections as requested.

2.9 Assumptions about future life expectancies and long-term productivity growth have a significant impact on the projections of expenditure for the PAYG public service pension schemes and so the LTPFR presents projections on five different scenarios to

[1] http://www.hm-treasury.gov.uk/d/pbr09_publicfinances.pdf

illustrate this impact. One scenario assumes life expectancy in line with the principal projection in the Office for National Statistics (ONS) 2008-based population projections and long-term productivity of 2% pa. These assumptions are then varied separately to give the following five scenarios:

Scenario	Life expectancy	Long-term productivity
Principal life expectancy	Principal life expectancy	2% pa
Low life expectancy	Low life expectancy	2% pa
High life expectancy	High life expectancy	2% pa
1.75 productivity	Principal life expectancy	1.75% pa
2.25 productivity	Principal life expectancy	2.25% pa

2.10 All the life expectancy assumptions in these scenarios are based on the Office for National Statistics (ONS) 2008-based population projections. These projections are produced by the ONS with the primary purpose of providing an estimate of the future population which is used as a common framework for national planning in a number of different fields. The projections are updated once every two years. The latest projections are 2008-based and were published on 21 October 2009.

2.11 The other key assumptions are as follows:

> Long-term earnings grow in line with productivity growth

> The number of active members is assumed to remain constant at 31 March 2008 levels (the constant workforce assumption)

> Other assumptions about demographics and working patterns are based on recent experience in public service pension schemes

2.12 After obtaining advice from GAD, HM Treasury takes responsibility for the setting of the assumptions and ensuring that they are appropriate and coherent for the purpose because of the need for consistency with the wider uses of the LTPFR and other HM Treasury projections. GAD's subsequent role in supporting the Long-term public finance report is limited to the provision of public service pension projections on the basis of the assumptions set by the Treasury.

Cap and share

2.13 Cap and share mechanisms have been introduced in some of the public service pension schemes. Under these arrangements, any increased costs resulting from demographic developments will be shared between the employee and employer up to the level of the cap, with any increases above the cap falling to employees. Any increased costs which fall to employees would result either in increased employee contributions, reduced benefits for future service or some combination of both. The December 2009 projections include allowance for the potential savings from cap and share due to increases in life expectancy.

Projections, not forecasts

2.14 The projected expenditure depends on the assumptions adopted, especially in the long-term. The key assumptions are those relating to levels of future employment, levels of future salaries and future pensioners' life expectancy. The first two of these assumptions shape the level of future benefits whilst changes to life expectancy affect how long the benefits are paid. While the projections provide useful information about the shape of each scheme's cashflows distribution, the absolute values of scheme-specific cashflows need to be interpreted carefully. Although the overall results are reasonable for the purpose of the exercise, the scheme specific results might not be appropriate for other purposes.

Resource accounts and the total PAYG liability

2.15 The cashflow projections relate to the cash outgoings which appear in the schemes' resource accounts as benefits payable. They include the pensions and lump sums paid to the members of the public service schemes and the benefits paid to dependants of former members. During the financial year 2007/08 the level of expenditure was approximately £23 billion.

2.16 These projections should not be confused with the total liability of the PAYG public service occupational pension schemes, as published in the December 2009 Long-term public finance report. The total liability as at 31 March 2008 was estimated by the GAD to be £770 billion, based on the liabilities reported in accounts prepared under the Accounting Standards Board's Financial Reporting Standard 17: Retirement Benefits.

2.17 The estimate of the total liability represents the value of all future benefit payments accrued up to 31 March 2008, and are due over the next 60 to 70 years or so to around 7½ million individuals who work, have worked, or are the dependants of individuals who worked in the public service. The measured value of the total liability is therefore dependent on assumptions of a number of factors, such as the mortality of current and future pensioners and, crucially, a discount rate in order to express future cash flows as a single figure in today's terms. Although the discount rate has a large impact on the measured value of the total liability, it does not affect the size or timing of benefit expenditure from the schemes.

2.18 The long-term cash flow projections, by contrast, do not depend on a discount rate, because the expected future cash flows are presented for each future year, rather than expressing these cash flows as a single figure in today's terms.

2.19 Note that the long-term cash flow projections allow for benefits built up in the past and benefits which will be built up in future by current active members and future new entrants. The total liability of the PAYG public service occupational pension schemes relates only to benefits built up in the past.

3 Methodology

3.1 The long-term cash flow projections cover all PAYG public service occupational pension schemes. The list of schemes covered by these projections is given in Annex A.

3.2 The benefit expenditure from the largest schemes are modelled explicitly, and these projections are grossed up to cover the smaller schemes. The following schemes are modelled explicitly:

> NHS Pension Scheme
> Teachers' Pension Scheme
> Principal Civil Service Pension Scheme
> Armed Forces Pension Scheme
> Police Pension Scheme (England & Wales)

In 2007/08 these five schemes represented around 95% of the benefit expenditure from all the PAYG schemes. The grossing up factors used to extend the explicit projections for these five schemes to cover the other smaller schemes are discussed at paragraph 3.8.

Explicit modelling of the five largest schemes

3.3 The projection model aggregates members into groups based on their age, sex and the pension scheme to which they belong. Members in each group are assumed to have the same characteristics in terms of their salary progression and service or pension. The probability that they will change their status in a particular year (e.g. moving from active service to deferred member or deaths of pensioners) is also assumed to be the same for all individuals in each group. The model projects movements of membership and cashflow over each financial year, commencing with date on which the detailed membership data was extracted (see paragraph 3.6 and section 4).

3.4 Allowance has been made for the new schemes introduced across the public service schemes. The dates on which these new sections were introduced are as follows:

> NHS Pension Scheme (England and Wales): 1 April 2008
> Teachers' Pension Scheme (England and Wales): 1 January 2007
> Principal Civil Service Pension Scheme: 30 July 2007
> Armed Forces Pension Scheme: 6 April 2005
> Police Pension Scheme (England & Wales): 6 April 2006

The new schemes have, in general, increased the Normal Pension Age (NPA) of new joiners from 60 to 65 and pensions accrue at a different rate. For simplicity, the projection model assumes that the new schemes came into force on the nearest 1 April.

3.5 The Firefighters' Pension Scheme also introduced a new section for new entrants joining service after 6 April 2006. Cashflows arising from the Firefighters' scheme are not modelled directly but are estimated from the cashflows from the Police scheme. Since the two schemes introduced new sections for new entrants on the same date, there is an implicit allowance for the date on which the new section was introduced in the Firefighters' scheme.

3.6 As mentioned in paragraph 2.11, the number of active members is assumed to remain constant at 31 March 2008 levels (the constant workforce assumption). The number of members leaving active status is projected using the assumptions about in service mortality, withdrawals from service, age retirements and ill health retirements detailed below. It is assumed that the number of new entrants will be exactly sufficient to replace those who leave. The projected benefit expenditure in respect of new entrants joining after the introduction of the new schemes is based on the benefit structures of those new schemes.

Grossing up for the smaller schemes

3.7 Police Pension Scheme cash flows were modelled for England and Wales only. PPS cash flows in respect of the rest of the UK are assumed to be 13% of England and Wales PPS cashflows. Cash flows in respect of the Firefighters' Pension Scheme across the UK were assumed to be 21% of those in respect of the Police Pension Scheme across the UK. These factors were based on statistics published by the Chartered Institute of Public Finance and Accountancy (CIPFA).

3.8 Cashflows in respect of the remaining PAYG schemes are assumed to be 1.9% of the cashflows in respect of NHSPS, TPS and PCSPS combined. This is to cover the smaller schemes which were not modelled such as the pension schemes for the UK Atomic Energy Authority, Judges, Research Council and Department for International Development. This grossing-up percentage is based on the ratios of the schemes' liabilities reported in accounts.

Cap and share

3.9 As part of the Government policy to deliver sustainable public service pensions, cap and share mechanisms have been incorporated in the rules of the Principal Civil Service Pension Scheme, the Teachers' Pension Scheme, and the NHS Pension Scheme[2]. Under these mechanisms any increased costs resulting from demographic developments are shared between the employee and employer up to the level of the cap, with any increases above the cap falling to employees.

3.10 Any increased costs which fall to employees would result either in increased employee contributions, reduced benefits for future service or some combination of both. The weighting between increased contributions and reduced benefits would be decided at the time, and evidence for the likely outcome has not yet emerged. The allowance for cost sharing and cost capping in these projections assumes that two-thirds of cost pressures which fall to employees are met by reducing benefits. It is assumed that the remaining third of cost pressures are met by changes to member contributions. This is purely illustrative for the purpose of these projections of gross benefit expenditure and does not prejudge the decisions that will be taken at the time. The projections show gross benefit expenditure and so only the reductions to benefits have any effect on these projections.

3.11 A change in the cost of the scheme can result from a number of circumstances such as; future improvements in life expectancy; savings that arise from the recent reforms made to the schemes; changes in the membership profiles of the schemes and changes in the assumptions and actuarial methodologies used at future valuations.

3.12 Although changes in costs are generally unanticipated, the December 2009 projections include allowance for the potential savings as a result of cap and share due to increasing life expectancies. This includes potential savings which may arise when the

[2] Cap and Share mechanisms have also been incorporated in the rules of The Local Government Pension Scheme and the Parliamentary Contributory Pension Fund, but these schemes are not included in these projections because they are funded.

schemes' next actuarial valuations are carried out (assuming life expectancy assumptions are increased in these valuations to bring them into line with 2008-based population projections). It also includes potential savings in respect of continuing improvements in life expectancy in schemes' subsequent actuarial valuations, in line with the continuing future improvements assumed in the latest ONS population projections.

3.13 In the long-term costs will be driven by the recently introduced schemes for new entrants. As yet there is little demographic experience from these schemes to inform the setting of the demographic assumptions to project the costs of these schemes. As a result, the demographic assumptions are generally set to be the same as for the existing schemes.

3.14 Further details regarding the methodology and assumptions adopted to allow for cap and share can be found in Annex B.

Implicit assumptions

3.15 Most of the schemes have a number of deferred members aged over normal pension age (NPA) within their data. Some of these members may have died and the scheme not notified, or they may have simply not claimed their benefits. Some of this second group may subsequently claim their pension. After uprating the data, we have removed deferred members aged over normal pension age. This makes approximate allowance for future deferred members not claiming on time and avoids a short-term peak in projected cashflows which is not expected to occur.

3.16 No allowance has been made for the PCSPS Partnership plan, which involves employer contributions to third-party personal pension products. The employer contributions score as public expenditure as they are made but the purchase of annuities from these plans and the payment of pensions under those annuity contracts do not score as public expenditure. The Cabinet Office estimates that approximately 7,000 civil servants are members of PCSPS Partnership. Ignoring these members does not have a material impact on the cashflow projections. In consequence we have therefore assumed that the Partnership proportion of the active membership joining the PCSPS will not increase.

3.17 Employees who are eligible to join a pension scheme may opt out of it. No allowance has been made for any change in opt out rates. The constant workforce assumption therefore produces a constant active scheme membership.

3.18 No allowance has been made for deferred pensioners to take cash equivalent transfer values (CETVs) to extinguish their liabilities with the scheme (bringing forward the timing of cashflows). Nor has any allowance been made for members to retire early with an actuarially reduced pension (bringing forward and spreading the timing of cashflows).

3.19 No allowance has been made for members bringing a transfer value into the pension schemes.

3.20 No explicit allowance has been made for the aggregation of service of those members who leave a scheme and rejoin in future (or who take advantage of the Public Sector Transfer Club arrangements). No allowance has been made for the effect of Guaranteed Minimum Pensions. The pattern of AFPS payments to those who retire below age 55 has been simplified.

4 Data

4.1 The projections are based on detailed membership data for the five largest schemes. The detailed membership data is as follows:

> NHS Pension Scheme (England & Wales): valuation data as at 31 Mar 2004
> Teachers' Pension Scheme (England & Wales): valuation data as at 31 Mar 2004
> Principal Civil Service Pension Scheme: valuation data as at 31 Mar 2007
> Armed Forces Pension Scheme: valuation data as at 31 Mar 2005
> Police Pension Scheme (England & Wales): data as at 31 Mar 2003

For the four largest schemes the detailed membership data is taken from the most recent scheme valuation. The first formal triennial valuation of the Police Pension Scheme will take place as at 31 March 2008, but data from that exercise was not yet available to inform these projections. The Police Pension Scheme data used in this exercise is as at 31 March 2003, the latest available.

A summary of this detailed membership data is shown in Annex C.

4.2 The NHS Pension Scheme, the Teachers' Pension Scheme and the Principal Civil Service Pension Scheme have equivalents in Scotland or Northern Ireland. These schemes have been allowed for by grossing the detailed membership data. The factors are based on the relative size of the Scotland and Northern Ireland schemes, based on data available in the pension scheme resource accounts. The resource accounts which are used to make allowance for the Scottish and Northern Ireland equivalents are:

> NHS Pension Scheme: 2003/04 Resource Accounts
> Teachers' Pension Scheme: 2003/04 Resource Accounts
> Principal Civil Service Pension Scheme: 2006/07 Resource Accounts

4.3 This membership data (from 2003, 2004, 2005 or 2007) has then been projected forward to April 2008 using the cash flow model, and any necessary adjustment made to bring these projections in to line with the aggregate membership data in the 2007/08 Resource Accounts. Projecting the membership data forward in this way makes allowance for expected changes in the age profile of the schemes between the date on which the detailed membership data was extracted and April 2008.

4.4 The adjustments required to bring these projections in to line with 2007/08 aggregate membership data were based on the following aggregate membership data from schemes' Resource accounts:

> Active members: projected salary roll in 2007/08 adjusted so that it was consistent with the employer's contributions reported in Resource Accounts
> Deferred pensioners: projected number of deferred members adjusted so that it was consistent with that reported in Resource Accounts as at 31 March 2008
> Current pensioners: projected pensions payable in 2007/08 adjusted so that it was consistent with that reported in Resource Accounts

4.5 A summary of the Resource account data used to make these adjustments is shown in Annex D.

5 Assumptions

5.1 The methodology and assumptions adopted for the Long-term public finance report are set by HM Treasury, having obtained advice from GAD, and these projections are produced using those assumptions.

Financial Assumptions

5.2 The salaries of active members and new entrant starting salaries are assumed to increase in line with the National Average Earnings index over the year 2008/09. From 2009 these salaries are assumed to increase by 2.25% pa over the medium term forecast period (i.e. up to 2013/14). The assumption adopted up to the medium term in the LTPFR was 2% pa. Using the LTPFR assumption of 2% pa rather than 2.25% pa over the medium term would have a small impact on the projections and would lower them to no less than 98% of their values. From 2014 these salaries are assumed to increase each year in line with the productivity growth assumption for the corresponding LTPFR scenario (i.e. either 1.75%, 2% or 2.25% pa).

5.3 In all years the salaries of active members are also assumed to increase in line with promotional salary increases.

5.4 The increase in total salary each year is not always the same as the productivity growth assumption because promotional salary increases for active members do not exactly offset the difference between the salaries of those leaving and joining active service. In other words this method makes allowance for the effect on total salary of features in the age and salary profile of active members.

5.5 The results are presented in 2008/09 prices and so they are not sensitive to the assumed level of RPI increases. The December 2009 projections allow for nil pension increases in April 2010, although the Retail Prices Index fell by 1.4% in the year to September 2009.

Demographic Assumptions

5.6 The demographic assumptions that have been adopted for NHSPS, PCSPS, TPS and AFPS are not scheme-specific except that the assumptions for age-retirement differ where differences in the benefit structure would justify this.

5.7 In general the assumptions adopted for the AFPS reflect the experience of the three biggest schemes. Data split by gender is not readily available for the AFPS so, for simplicity and in view of the relatively small number of female members of this scheme, the AFPS projections were based entirely on assumptions appropriate for males.

5.8 The Police Pension Scheme has been modelled independently of the other schemes. The pensioner mortality assumptions adopted for the PPS are the same as those adopted for the other schemes; other demographic assumptions adopted for PPS may be different from other schemes but are consistent with the PPS projections for the previous LTPFR.

5.9 The assumptions adopted for NHSPS, TPS, PCSPS, AFPS and PPS are considered in more detail below, and detailed rates are outlined in Annex E.

Pensioner Mortality

5.10 Pensioner mortality in the December 2009 projections is based on that underlying the ONS 2008-based population projections, which is consistent with other projections within the LTPFR. However, members of public service occupational pension schemes experience lower mortality than the general population and so the mortality rates have been adjusted to reflect this. This adjustment is to use 85% of the mortality of the general population. The figure of 85% is based on an analysis of the life expectancy assumptions adopted for, and disclosed in, the resource accounts of the NHSPS, TPS, PCSPS and AFPS. The effect of this adjustment on life expectancies is illustrated in Table 1 and Table 2 below: it is assumed that pension scheme members will live about 1½ years more than the general population.

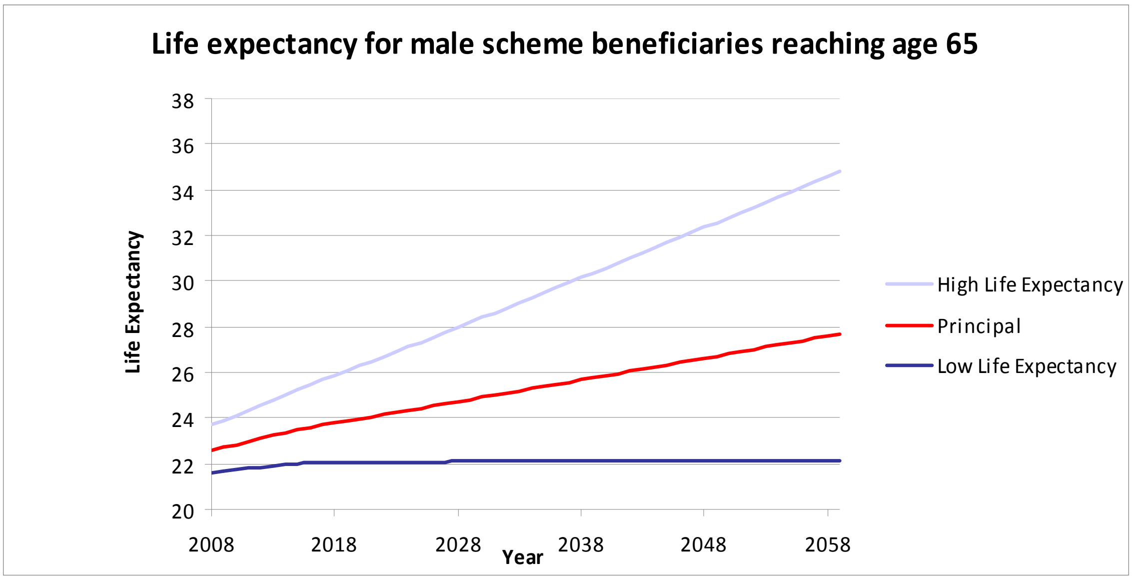
Table 1 Life expectancies of male scheme beneficiaries reaching age 65

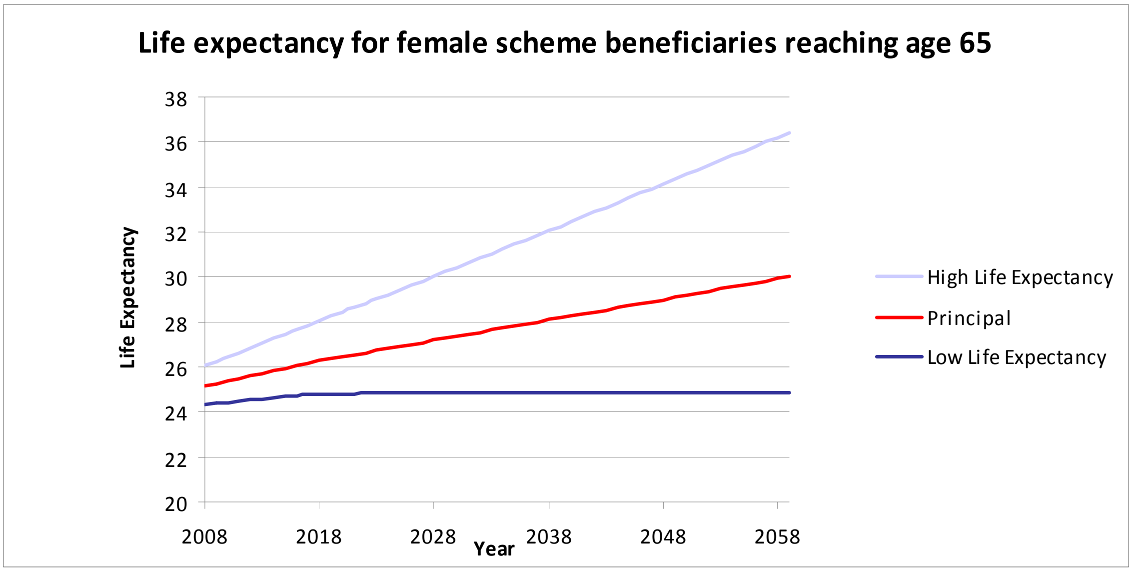
ONS 2008 Principal projection	*2008*	*2015*	*2025*	*2035*	*2045*	*2055*
Adjusted for LTPFR	22.6	23.5	24.4	25.4	26.3	27.3
Unadjusted	21.0	22.0	22.9	23.8	24.8	25.7

Table 2 Life expectancies of female scheme beneficiaries reaching age 65

ONS 2008 Principal projection	*2008*	*2015*	*2025*	*2035*	*2045*	*2055*
Adjusted for LTPFR	25.1	26.0	26.9	27.8	28.7	29.6
Unadjusted	23.7	24.5	25.4	26.3	27.2	28.1

5.11 The following graphs show the assumed future life expectancy of beneficiaries reaching 65 in the public service pension schemes in the Principal, low life expectancy and high life expectancy projections:





5.12 Death in deferment mortality for NHSPS, TPS, PCSPS, AFPS and PPS is based on the same tables as that for pensioner mortality.

In-service mortality

5.13 The assumption for in-service mortality for NHSPS, TPS, PCSPS and AFPS is based on actual experience in the most significant work groups within the larger schemes. Different assumptions were adopted for the PPS projections. The assumed in-service mortality rates are detailed in Annex E Table 5 and Table 6.

Withdrawals from service

5.14 The assumed rate of withdrawals from service for NHSPS, TPS, PCSPS and AFPS were based on experience from the larger schemes. Scheme specific assumptions were adopted for the PPS. The assumed withdrawal rates are details in Annex E Table 7 and Table 8.

Age Retirements

5.15 The assumed rates of retirement were dependent on the Normal Pension Age (NPA) of the individual scheme. Members in NPA 60 schemes are assumed to retire over a range of ages from 60 to 65, bases on experience in NHSPS, TPS and PCSPS. New entrant members with NPA 65 are assumed to retire at age 65.

5.16 Special Class members in the NHS who have NPA 55 have slightly different retirement assumptions to reflect their right to retire before 60 with unreduced benefits.

5.17 Members of the AFPS are often able to retire before 60 with an unreduced pension providing they have sufficient service. The rules vary between officers and other ranks in the AFPS 1975 scheme and are different again in the 2005 schemes. The assumptions adopted for AFPS members have been chosen to reflect their right to retire early.

5.18 For the PPS different assumptions have been assumed for members of the PPS (mainly applicable to pre 2006 entrants) and members of the New PPS (mainly applicable to post 2006 entrants). In addition, different retirement assumptions have been assumed based on the member's age at joining PPS to reflect the rules of this scheme.

5.19 The assumptions adopted for all the schemes are outlined in Annex E Table 9 through to Table 12.

5.20 No allowance has been made for possible future changes to working patterns. In particular, there is no allowance for flexible retirement or for the possibility that members delay retirement beyond age 65.

Ill Health Retirements

5.21 The assumed rates of exit from active status for ill health retirement are based on experience within the NHSPS, TPS and PCSPS. Where members are assumed to have NPA 65, modified rates are used at the later ages to allow for ill health retirements after age 60.

5.22 As with other assumptions, scheme specific assumptions have been adopted for the PPS. In particular, different rates have been assumed for the old and new sections of the PPS.

5.23 The assumptions for all schemes are outlined in Annex E Table 13 and Table 14.

5.24 Ill-health pensioners are assumed to have the same mortality as normal pensioners. This is for simplicity and also because we do not hold data on the split between age and ill health pensioners for all the schemes.

Progression of pensionable pay

5.25 It is assumed that active members receive promotional pay increases in excess of the general salary increases which were described in paragraph 5.2. The assumed salary scale for NHSPS, TPS, PCSPS and AFPS is based on experience from the NHSPS and PCSPS. The TPS and AFPS experience is not inconsistent with these assumptions. Separate promotional salary increases are assumed for males and females. Different assumptions were adopted for the PPS projections. The assumed salary scales are detailed in Annex E Table 15 and Table 16.

Commutation

5.26 In most new public service pension schemes it is possible for a member to choose to give up part of their pension in exchange for a lump sum. This procedure is known as commutation of pension.

5.27 In the past a lump sum was generally paid along with the pension and there was no option to commute pension. In the NHS Pension Scheme, the Teachers Pension Scheme and the Principal Civil Service Pension Scheme this lump sum was calculated as 3/80 of final salary for each year of service. Existing members of these schemes will continue to receive this lump sum, but they now have the option to commute their pension to increase their lump sum.

5.28 HMRC rules limit the amount of pension that can be commuted. It has been assumed that in final salary schemes, half of the members will commute pension in order to provide the maximum lump sum permitted by HMRC and that the other half will commute pension (if necessary) to provide a lump sum of 3/80 of final salary for each year of service. This is equivalent to commuting 27.2% of pension in a scheme providing a pension where a lump sum is only available through commutation. In PCSPS Nuvos, which is a career average scheme, members are assumed to commute 27.2% of their pension to provide a lump sum.

5.29 In practice, there will be a range of levels of commutation. Experience of commutation patterns is limited and so far expenditure on lump sums has fluctuated from year to year. This assumption is intended to reflect the average mix of pension and lump sum taken at retirement. The aggregate effect of allowing commutation of pension is to increase expenditure in the short-term due to the larger lump sums being paid, but to reduce it in the long-term due to the smaller pensions being paid.

New Entrants

5.30 As described in paragraph 3.6, the number of active members is assumed to remain constant at 31 March 2008 levels. It is assumed that the number of new entrants will be exactly sufficient to replace the projected number of leavers.

5.31 The new entrant profiles for all schemes are based on the schemes' data and experience from previous valuations. The new entrant profiles for the financial year 2008/09 are shown in Annex E Table 17.

5.32 The salaries paid to new entrants in years after 2008/09 are assumed to grow in line with the earnings growth assumptions set out in paragraph 5.2.

Other assumptions

5.33 Other demographic assumptions are based on the experience of the most significant work groups within the larger schemes.

6 Previous Projections

6.1 The results of previous projections of cash flow from PAYG public service pension informed the LTPFR that was published alongside the March 2008 budget.

6.2 There have been no changes to the benefit structures of the five largest schemes modelled explicitly in the March 2008 projections that would have a material effect on the projections. In October 2009 the NHSPS regulations were amended so that over the next few years members with a Normal Pension Age (NPA) of 60 will be given a choice to increase their pension by moving to the NPA65 section of the scheme. The projections in the 2009 LTPFR do not make any allowance for this.

6.3 The methodology and assumptions used in the December 2009 projections are largely the same as those used for the March 2008 projections, except for the changes noted below. Details of the methodology and assumptions for the March 2008 projections are described in the GAD note PAYG Public Service Pension Schemes 2007/08 Cashflow Projections: Methodology, assumptions and data[3].

Resource accounts 2007/08

6.4 The December 2009 projections have been based on aggregate membership data from the 2007/08 Resource accounts. Previous projections were based on aggregate membership data from the 2006/07 Resource accounts.

Financial Assumptions

6.5 Real earnings growth is assumed to be 2.25% pa up to the medium term (i.e. 2013/14). Thereafter it is assumed to be in line with the productivity growth assumptions used in the LTPFR. More details are set out in paragraph 5.2. Previous projections adopted real earnings growth of 2% pa throughout the projections.

6.6 The December 2009 projections assume that the public service pension increase in April 2010 is nil, although the retail price index fell by 1.4% in the year to September 2009. This treatment is in line with other projections in the LTPFR. The previous projections assumed that pension increases were exactly in line with changes in the Retail Prices Index.

Cap and share

6.7 The December 2009 projections include allowance for the potential savings from cap and share. This is a refinement to the previous projections (which made no allowance for cap and share) now that cap and share regulations are in force. More details are set out in Annex B.

Pensioner Mortality

6.8 In the December 2009 projections the probability of a pensioner dying in a given year is assumed to be 85% of the probability used in the 2008-based population projections. More details are set out in paragraph 5.10. In the previous projections pensioner mortality was based on the 2006-based population projections and with a slightly different adjustment to take account of the fact that members of occupational pension schemes experience lower mortality than the general population.

[3] http://www.gad.gov.uk/Documents/Occupational%20Pensions/2007-08%20PSP%20Cashflow%20projections%20methodology%209%20Dec%202009.pdf

6.9 Table 3 and Table 4 compare the life expectancies between these and the previous projections (based on the Principal projections).

Table 3 Life expectancies of male scheme beneficiaries reaching age 65:

	2008	***2015***	***2025***	***2035***	***2045***	***2055***
December 2009 projections	22.6	23.5	24.4	25.4	26.3	27.3
March 2008 Projections	21.8	22.8	23.8	24.7	25.6	26.6

Table 4 Life expectancies of female scheme beneficiaries reaching age 65:

	2008	***2015***	***2025***	***2035***	***2045***	***2055***
December 2009 projections	25.1	26.0	26.9	27.8	28.7	29.6
March 2008 Projections	24.2	25.1	26.0	26.9	27.8	28.7

Dates on which the schemes introduced new sections for new entrants

6.10 The public service pension schemes have introduced new sections, which generally have a Normal Pension Age of 65. New entrants to the schemes from a certain date join these new sections. The dates on which these new sections for new entrants were outlined in paragraph 3.4.

6.11 The December 2009 projections take account of the different dates on which the schemes introduced these new sections for new entrants, by assuming the new sections were introduced on the nearest 1 April. In the previous projections, for simplicity it was assumed that the new public service pension schemes for new entrants all came into effect from April 2007.

Projected development of the pension schemes between the detailed membership data and April 2008

6.12 The December 2009 projections project the detailed membership data (from 2003, 2004, 2005 or 2007) forward to April 2008 using the cash flow model, and make adjustments to bring these projections in to line with the 2007/08 estimated outturn. This makes allowance for expected changes in the age profile of the schemes between the date on which the detailed membership data was extracted and April 2008.

6.13 The methodology used in the previous projections made a simplifying assumption that the age profiles of schemes did not change between the date on which the detailed membership data was extracted and the starting year of the projections.

Annex A: Schemes covered by these projections

The cash flow projections cover the following schemes:

- For civil servants:
    - Principal Civil Service Pension Scheme
    - Principal Civil Service Pension Scheme (Northern Ireland)
- Armed Forces Pension Scheme
- For NHS employees:
    - NHS Pension Scheme
    - NHS Superannuation Scheme (Scotland)
    - Health and Personal Social Services Northern Ireland Superannuation Scheme
- For teachers:
    - Teachers' Pension Scheme (England and Wales)
    - Scottish Teachers' Superannuation Scheme
    - Northern Ireland Teachers' Superannuation Scheme
- Police Pension Scheme (administered locally)
- Firefighters' Pension Scheme (administered locally)
- United Kingdom Atomic Energy Authority Pension Schemes
- Judicial Pensions Scheme
- Department for international Development – Overseas Superannuation Scheme
- Research Councils' Pension Schemes

In addition to the schemes mentioned above, the cash flow projections cover dozens of smaller schemes and many established to cover only one senior appointment.

Annex B: Cap and share methodology and assumptions

This annex sets out further details of the methodology and assumptions used to allow for the potential savings from cap and share due to increases in life expectancy.

Schemes with cap and share regulations in place

The December 2009 projections make allowance for cap and share for the schemes which have incorporated it into their rules:

> Principal Civil Service Pension Scheme

> Teachers' Pension Scheme (England and Wales)

> NHS Pension Scheme (England and Wales)

Proportionate savings are assumed for the corresponding schemes in Scotland and Northern Ireland[4].

Cap and share framework

The schemes' cap and share rules work within the framework of the schemes' actuarial valuations which are carried out using the "SCAPE" approach. SCAPE stands for Superannuation Charge Adjusted for Past Experience and is the approach usually adopted for setting employer contribution rates for the Pay-As-You-Go public service pension schemes.

Although the schemes are Pay-As-You-Go and they have no assets, when SCAPE was introduced schemes were assigned a notional fund based on their liabilities at the time. At each actuarial valuation the notional fund of a scheme is rolled up with notional investment returns in line with the SCAPE discount rate and compared with the scheme liabilities. The difference between the scheme's notional fund and liabilities is the scheme's notional surplus (or deficit).

Cost pressures

Under cap and share mechanisms any increased costs resulting from demographic developments are shared between the employee and employer up to the level of the cap, with any increases above the cap falling to employees. The change in the cost of the scheme can result from a number of circumstances such as:

> Future improvements in life expectancy

> Savings that arise from the recent reforms made to the schemes

> Changes in the membership profiles of the schemes

> Changes in the assumptions and actuarial methodologies used at future valuations

> Notional deficits or surpluses arising from scheme experience differing from assumptions, such as pay increases being higher or lower than assumed

[4] Cap and Share mechanisms have also been incorporated in the rules of The Local Government Pension Scheme and the Parliamentary Contributory Pension Fund, but these schemes are not included in these projections because they are funded.

The cap and share mechanisms will produce savings if the underlying costs of pension provision increases. Changes in costs are generally unanticipated and we cannot anticipate all the causes of increases and decreases in the underlying costs of pension provision that will emerge at the schemes' next actuarial valuations. However the following factors are expected to result in changes to scheme cost:

> Future improvements in life expectancy
> Repayment of existing notional surpluses and deficits within the schemes
> Increasing number of members in the pension schemes for new entrants

The potential savings as a result of sharing these cost pressures with employees have been modelled in the December 2009 projections. These factors are discussed in turn below.

Future improvements in life expectancy

The actuarial valuations that assess the costs of public service pension schemes incorporate an assumption about future increases in life expectancy. This is generally informed by the assumptions underlying the national population projections and the last round of pension scheme valuations was informed by the 2004-based national population projections. The latest ONS population projections assumed much faster increases in life expectancy and updating the assumptions in the next round of pension schemes valuations to reflect this will result in increased costs. The latest ONS population projections assume that life expectancies will continue to gradually increase over time. This will result in a continuing gradual upward pressure on pension scheme costs. These projections are informed by the latest 2008-based population projections.

Existing notional surpluses and deficits

Under cap and share, the pension scheme costs include adjustment to take account of notional surplus and deficits reported in the actuarial valuations. The last round of valuations revealed a notional surplus in the PCSPS and a notional deficit in the TPS (E&W) and the NHSPS (E&W). These adjustments to contribution rates for existing notional surpluses and deficits will reduce towards zero as they are repaid.

The pension schemes for new entrants

The schemes for new entrants to the PCSPS, TPS and NHSPS have an increased Normal Pension Age of 65. As an increasing number of members enter these schemes costs will change. We have taken account of this effect in the TPS where details of the reduced cost of the Normal Pension Age 65 schemes were disclosed in the valuation report.

Other cost pressures

Any cost pressures arising from sources other than the above have not been modelled in these projections to date. It should be noted that other sources may have a significant impact on costs (for example rates of pay increase or the number of ill health retirements). However the existence of cap and share makes the projections of future cash flows more stable, because the impact of factors which would change benefit expenditure (such as higher or lower improvements in life expectancy) is reduced because of the changes to benefits which would emerge from cap and share.

Allocation of costs

Under the cap and share mechanisms cost pressures may be shared between employees and employers, or fall to employees only, or to employers only. In the December 2009 projections the above changes in cost have generally been shared between the employee and employer up to the level of the cap, with any increases above the cap falling to employees.

The cost caps in the schemes are 14% in TPS and NHSPS and 20% in PCSPS. Where costs increase above these caps the cost pressures fall entirely to employees.

Increases to member contributions or reductions to future benefits

Any increased costs which are borne by employees would result either in increased employee contributions or reduced benefits for future service (which could include an increase in Normal Pension Age). The weighting between increased contributions and reduced benefits would be decided at the time, and evidence for the typical outcome has not yet emerged. The allowance for cap and share in these projections assumes that two-thirds of cost pressures which fall to employees are met by reducing benefits. It is assumed that the remaining third of cost pressures are met by changes to member contributions. In practice, the weighting between increased contributions and reduced benefits may be different.

Assumptions about the rate of increases in earnings

The assumptions about the long-term rate of increases in earnings in excess of price inflation are as follows:

- Actuarial valuations for cost sharing and cost capping: 1.5% pa
- Cash flow projections for Long-term public finance report: 1.75%, 2% or 2.25% pa

In general these cash flow projections assume earnings increase by 1.75%, 2% or 2.25% pa in excess of price inflation, but the actuarial valuations assume lower earnings increases. If the outturn for earnings increases actually was 1.75%, 2% or 2.25% pa then, everything else being equal, this would lead to increased costs and would trigger the cap and share mechanisms. The complexity arising from this effect has not been modelled in these projections.

Other assumptions

Changes will be made to the schemes following the actuarial valuations of the scheme. However, for presentational purposes, theses projections ignore the actual timings of actuarial valuations and assume that scheme changes are made continuously, starting from April 2011. In practice savings would start to emerge when each scheme implemented the first changes as a result of cap and share.

For simplicity these long-term projections do not make allowance for any short term effects caused by scheme specific differences in the cap and share rules. We do not expect these features to have a material impact on the results.

Annex C: Detailed membership data

Detailed Membership Data

	NHS	***PCSPS***	***TPS***	***AFPS***	***PPS***
Data as at	31/3/2004	31/3/2007	31/3/2004	31/3/2005	31/3/2003
No of Contributing Members (million)	1.3	0.6	0.6	0.2	0.1
Total Salary (£ billion)	26.6	15.1	20.1	5.6	3.7
Average salary (£)	20,900	23,700	32,000	28,000	27,500
Total No of Pensioners (million)	0.5	0.6	0.5	0.3	0.1
Total Pension In Payment (£ billion)	2.5	3.2	3.8	2.3	1.2
Average pension in payment (£)	5,200	5.700	8,300	6,700	11,600
Total No of Deferreds (million)	0.4	0.3	0.3	0.3	0.0
Total Preserved Pension (£ billion)	0.7	1.0	0.6	0.6	0.1
Average deferred pension (£)	1,600	2,900	2,000	2,000	4,300

Notes:

i) The TPS, PPS and AFPS include the pension increase payable at the following April

Annex D: Data as at 31 March 2008

Data as at 31 March 2008

	NHS	***PCSPS***	***TPS***	***AFPS***
No of Contributing Members (million)	1.6	0.6	0.7	0.2
Employer Contributions during 2007/08 (£ billion)	5.3	2.9	3.5	1.5
Total No of Pensioners (million)	0.7	0.6	0.6	0.4
Pensions paid during 2007/08 (£ billion)	4.5	3.4	5.4	2.7
Total No of Deferreds (million)	0.5	0.3	0.4	0.3

Notes:

i) Figures cover the whole of the United Kingdom
ii) Figures are available from the schemes' resource accounts
iii) The PPS is administered locally by police authorities and does not produce Resource accounts centrally

Annex E: Demographic Assumptions

In service mortality

Table 5 Assumed number of deaths per 10,000 members of staff in the year following the age stated (NHSPS, TPS, PCSPS and AFPS)

Age	*Male*	*Female*
20	4	2
25	5	2
30	6	3
35	7	5
40	9	7
45	15	11
50	23	15
55	40	22
60	60	30

Table 6 Assumed number of deaths per 10,000 members of staff in the year following the age stated (PPS)

Age	*Male*	*Female*
20	5	3
25	5	3
30	5	3
35	5	3
40	5	3
45	5	4
50	7	5
55	10	7
60	16	12

Withdrawals from service

Table 7 Assumed number of withdrawals per 10,000 members of staff in the year following the age stated (NHSPS, TPS, PCSPS and AFPS)

Age	*Male*	*Female*
25	891	945
30	756	806
35	621	668
40	486	529
45	351	391
50	216	252
55	45	54
60	0	0

Table 8 Assumed number of withdrawals per 10,000 members of staff in the year following the age stated (PPS)

For the PPS, members in their first two years of membership are assumed to leave at the rate of 500 per 10,000 members. After that the rates assumed are as follows.

Age	*Male*	*Female*
25	295	405
30	167	249
35	94	136
40	50	63
45	21	33
50	9	20
55	0	0
60	0	0

Age retirements

Table 9 Assumed age retirement pattern – Normal Pension Age 60 Members (NHSPS, TPS and PCSPS)

Age	*Male*	*Female*
Range of Retirement Ages	60-65	60-65
Average retirement age	62.1	61.5

Table 10 Assumed age retirement pattern - AFPS active members

Age	*Officers in AFPS75*	*All other members*
Range of Retirement Ages	38-56	41-56
Average retirement age	47.8	43.7

Table 11 Assumed age retirement pattern - Old PPS active members

Age at entry	*20*	*25*	*30+*
Range of Retirement Ages	50-60	50-60	55-60
Average retirement age	50.8	54.9	56.3

Table 12 Assumed age retirements - New PPS active members

Age at entry	*20 and Under*	*23*	*25+*
Range of Retirement Ages	55-60	55-60	55-60
Average retirement age	55.2	56.3	56.7

Notes:

i) Members in NPA65 schemes are assumed to retire at age 65.

Ill health retirements

Table 13 Assumed number of ill-health retirement per 10,000 members of staff in the year following the age stated (NHSPS, TPS, PCSPS and AFPS)

Age	*Male*	*Female*
25	4	6
30	8	13
35	15	20
40	23	28
45	36	40
50	59	59
55	119	119
60*	180	180

Table 14 Assumed number of ill-health retirement per 10,000 members of staff in the year following the age stated (PPS)

Age	*PPS*	*New PPS*
25	11	8
30	19	15
35	29	23
40	40	31
45	63	50
50	112	89
55	0	0

Progression of pensionable pay

Table 15 Salary scale based on an index of 100 at age 20 (NHSPS, TPS, PCSPS and AFPS)

Age	*Male*	*Female*
20	100	100
25	131	130
30	168	157
35	201	176
40	224	187
45	237	192
50	249	196
55	253	200
60	256	202

Table 16 Salary scale based on an index of 100 at 0 years' service (PPS)

Completed Years of Service	*Males and Female*
0	100
5	134
10	158
15	166
20	170
25	175
30	179
35	181
40	181

Table 17 Assumed new entrant profiles for NHSPS, PCSPS, TPS, PPS & AFPS

	NHSPS			**PCSPS**		**TPS**			**PPS**			**AFPS**		
	Age	Proportion at each age	Salary at joining £	Proportion at each age	Salary at joining £	Age	Proportion at each age	Salary at joining £	Age	Proportion at each age	Salary at joining £	Age	Proportion at each age	Salary at joining £
Males	16-20	1%	13,600	4%	15,900	21-24	4%	23,600	<19	1%	22,000	16-20	70%	23,100
	21-25	4%	19,500	9%	18,100	25-29	7%	25,200	19-23	27%	22,000	21-25	23%	28,700
	26-30	5%	26,000	7%	20,700	30-34	5%	28,100	24-28	30%	22,000	26-30	5%	27,400
	31-35	4%	27,200	5%	23,200	35-39	4%	29,700	29-33	12%	22,000	31-35	1%	39,700
	36-40	3%	28,100	5%	25,400	40-44	3%	31,300	34-38	4%	22,000	36-40	2%	44,400
	41-45	2%	27,100	5%	26,200	45-49	2%	32,400	39-43	1%	22,000	41-45	0%	47,400
	46-50	1%	25,100	4%	27,700	50-54	2%	35,700	44+	0%	22,000	46-50	0%	57,700
	51-55	1%	21,500	5%	27,200	55-59	2%	36,600						
	56-60	1%	18,500	3%	24,300	60-64	1%	36,900						
Females	16-20	4%	12,600	5%	14,300	21-24	19%	23,500	<19	0%	22,000			
	21-25	16%	19,000	12%	17,500	25-29	20%	25,100	19-23	9%	22,000			
	26-30	12%	21,400	9%	21,100	30-34	8%	28,500	24-28	10%	22,000			
	31-35	11%	18,100	7%	22,600	35-39	7%	30,600	29-33	4%	22,000			
	36-40	11%	15,800	6%	22,500	40-44	6%	31,800	34-38	1%	22,000			
	41-45	10%	15,400	6%	22,400	45-49	4%	34,300	39-43	0%	22,000			
	46-50	7%	15,300	5%	22,700	50-54	2%	38,000	44+	0%	22,000			
	51-55	5%	14,600	3%	21,600	55-59	2%	38,500						
	56-60	2%	13,800	1%	20,000	60-64	1%	38,500						

i) Salaries are actual rate of salary paid as opposed to full-time equivalent (full time equivalent rate of salary for PPS) for a member joining the scheme in April 2008.

Glossary

AFPS	Armed Forces Pension Scheme
GAD	Government Actuary's Department
LTPFR	Long-term public finance report
NHSPS	NHS Pension Scheme
NPA	Normal Pension Age
PAYG	Pay-As-You-Go
PCSPS	Principal Civil Service Pension Scheme
PPS	Police Pension Scheme
TPS	Teachers' Pension Scheme