



# Government Actuary's Department

## **Teachers' Pension Scheme**

Actuarial valuation as at 31 March 2012  
Report on methodology

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## Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Active membership projections</b>	<b>2</b>
<b>3</b>	<b>Accrual cost methodology</b>	<b>9</b>
<b>4</b>	<b>Approximations and miscellaneous items</b>	<b>10</b>



## 1 Introduction

- 1.1 This report is addressed to the Department for Education (DfE). It should not be reproduced or disseminated to other parties without prior consent. The Government Actuary's Department (GAD) does not accept any liability to third parties, whether or not it has agreed to the disclosure.
- 1.2 The purpose of this report is to summarise the methodologies adopted for certain aspects of the valuation calculations. It also explains why the approaches taken are necessary and the impact of the approaches taken on the valuation results.
- 1.3 The data and assumptions to be used for the valuation are the subject of separate reports.
- 1.4 The contents of this note have been discussed with DfE who has confirmed that it is content that the methodology is appropriate for use in the 2012 valuation.
- 1.5 Throughout this report the totals given for summed data may not be exactly the same as the sum of the components shown due to rounding effects.



## 2 Active membership projections

- 2.1 The Directions<sup>1</sup> require the actuary to calculate the cost of benefits accruing over the periods 1 April 2012 to 31 March 2015 and 1 April 2015 to 31 March 2019.
- 2.2 In addition to the assumptions used, the main factors affecting the expected cost of the benefits are:
- (i) the scheme benefits being accrued by members; and
  - (ii) the profile of the active membership over these periods.
- 2.3 The former is particularly important due to the changes being introduced on 1 April 2015 as a result of the reform of the Teachers' Pension Scheme ('TPS' or 'the Scheme'). The expected cost of the benefits provided to members remaining in the existing final salary schemes differs from the expected cost of providing those members with benefits in the 2015 career average scheme. Further, the expected cost of providing benefits also varies for members in the NPA 60 and NPA 65 sections of the existing final salary scheme.
- 2.4 The Directions therefore implicitly require the actuary to determine the expected active membership up to 31 March 2019 in order to determine the valuation results. However, for a practical application of the methodology we have focussed on the membership of the Scheme as at 31 March 2015, 1 April 2015<sup>2</sup> and 31 March 2019.

### **Approach to determining the active membership of the Scheme as at 31 March 2015 and 31 March 2019**

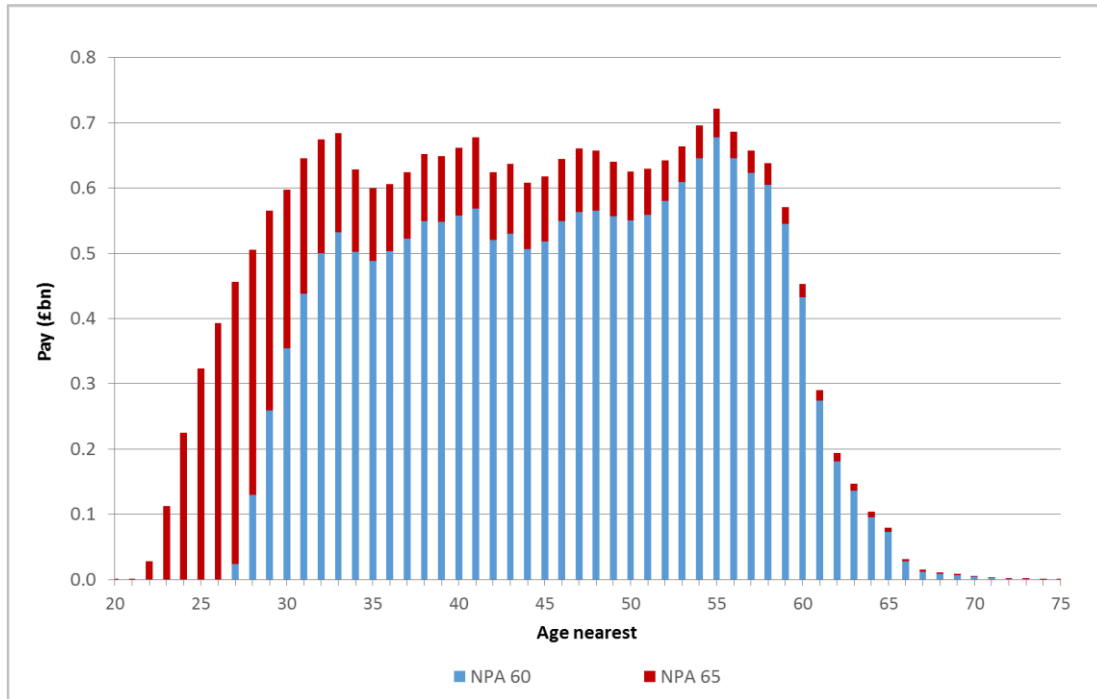
- 2.5 Detailed data on the active membership is held as at 31 March 2012. There are two main alternative approaches which could be used to determine the active membership at future dates:
- (i) Assume the active population remains relatively stable by total salary roll at each age. Appropriate adjustments would be made to allow for the transfer of members to the 2015 scheme.
  - (ii) Project forward the 31 March 2012 data and allow for expected changes in the workforce at future dates.
- 2.6 An analysis of recent changes in the active membership has shown that the population has not remained relatively stable by total salary roll at each age. Chart 2.1 below shows the profile of the active membership as at 31 March 2012 by age and salary roll.

<sup>1</sup> *The Public Service Pensions (Valuations and Employer Cost Cap) Directions 2014* issued by HM Treasury

<sup>2</sup> The active membership will essentially be the same on both 31 March 2015 and 1 April 2015. The difference is that unprotected members will transfer across to the 2015 scheme on 1 April 2015. For the purposes of this report, any reference to data as at 31 March 2015 also applies to the data as at 1 April 2015.



**Chart 2.1: 2012 active membership profile by age and salary roll**



2.7 The chart shows there are peaks at various ages which are expected to move over time as these members move closer to retirement. As such, it is not appropriate to assume that the active membership will remain stable by age and salary roll over the period 1 April 2012 to 31 March 2019.

2.8 The active membership therefore needs to be projected to 31 March 2015 and 2019 in order to determine the active membership at these dates. This requires three components:

- Determine the expected total payroll of the active membership as at 31 March 2015 and 31 March 2019
- Project the 2012 active membership to 31 March 2015 and 31 March 2019
- Add in expected new joiners over the periods 2012-2015 and 2015-2019.

#### **Total salary roll as at 31 March 2015 and 31 March 2019**

2.9 DfE submitted income and expenditure information for the December 2013 OBR forecasts, which was used for the Autumn Statement 2013. The total payroll of the active membership of the TPS was projected forward to the year 2019/20 to determine the expected employer contributions to this time. This information has been used to calculate the expected total payroll as at 31 March 2015 and 31 March 2019. These figures are shown below, along with the 31 March 2012 total payroll from the valuation data for comparison.



**Table 2.1: Expected total payroll of the TPS**

	Total payroll (nominal)	Total payroll (real) <sup>3</sup>
31 March 2012	£23.3bn	£23.3bn
31 March 2015	£24.4bn	£23.5bn
31 March 2019	£27.1bn	£23.5bn

### Projecting the active membership data to 31 March 2015 and 31 March 2019

- 2.10 Not all of the active membership at 31 March 2012 will still be in active service as at 31 March 2015 or 31 March 2019. We have projected the current membership forward assuming members leave in line with the valuation assumptions adopted for normal health retirements, ill-health retirements, withdrawals, deaths in service and promotional salary increases<sup>4</sup>. These assumptions were set based on recent experience in the Scheme and therefore represent the best estimate of future movements within the Scheme.

### New joiners to the Scheme

- 2.11 In order to achieve the required total payroll at 31 March 2015 and 31 March 2019 which is consistent with the amounts in table 2.1 above, we need an assumption about the profile of new entrants to the scheme.
- 2.12 We have assumed that the profile of new entrants (in terms of age, gender and pay) is consistent with the profile of recent entrants to the TPS (based on the data provided for the 2012 valuation for members with short service). Specifically, we have assumed that the members as at 31 March 2015 who have entered the scheme since 31 March 2012 have the same profile as members in 2012 with less than three years' service. Similarly, the profile of entrants between 2015 and 2019 is based on the membership in 2012 with less than four years' service. The average age of both of these groups is about 32 at entry.
- 2.13 The total salaries of new joiners has been set so that the total combined salaries of new joiners over 2012 to 2015 and of the projection of the existing membership matches the total payroll of £24.4bn as at 31 March 2015. New entrants are assumed to join the NPA 65 section over this period.
- 2.14 The projected membership in 2019 is determined in a similar way, with the 2015 membership projected in line with valuation assumptions and new entrants added in to match the overall payroll.

<sup>3</sup> Effects of general salary increases (in line with Direction 17) removed to give the salary roll in 2012 terms.

<sup>4</sup> Allowance for general salary increases is in line with Direction 17.



### Summary of the scheme membership as at 31 March 2015 and 31 March 2019

- 2.15 We have determined the expected membership of the scheme as at 31 March 2015 and 31 March 2019 in line with the method set out above.
- 2.16 The tables below summarise the active membership data at these dates, showing the proportions of payroll and the average age in each section of the Scheme at the relevant dates.

**Table 2.2: Projected proportion of payroll**

Section	31 March 2012	31 March 2015	1 April 2015	31 March 2019
NPA 60	78%	64%	27%	11%
NPA 65	22%	36%	1%	0%
2015 scheme	0%	0%	72%	89%

**Table 2.3: Average age\* of projected membership**

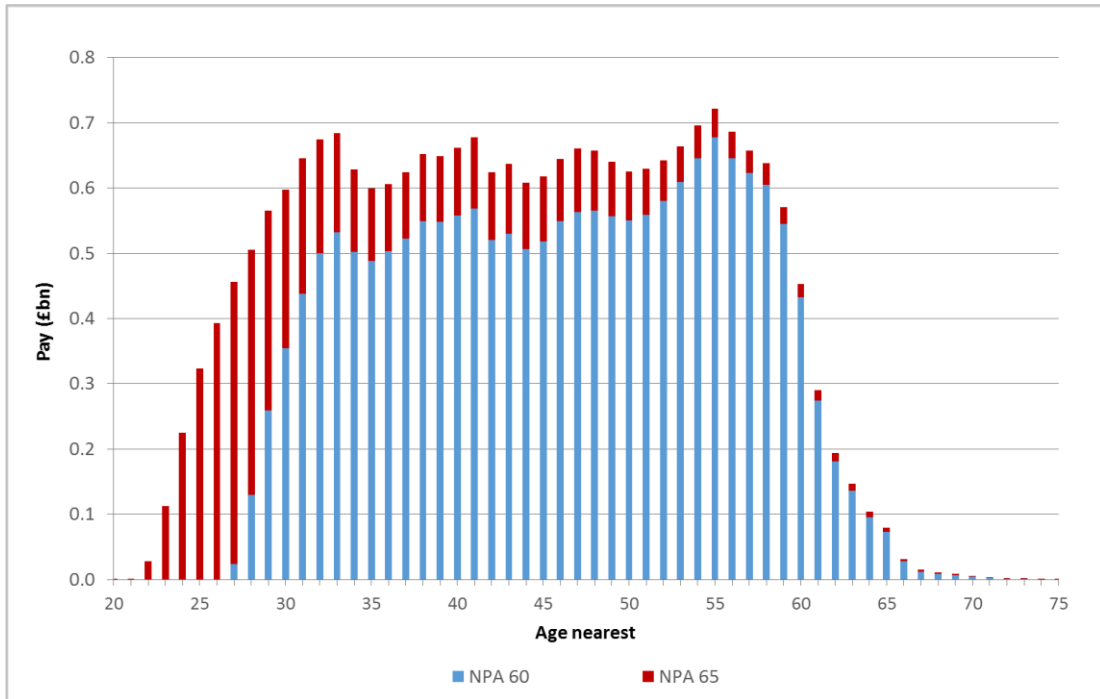
Section	31 March 2012	31 March 2015	1 April 2015	31 March 2019
NPA 60	46.0	47.1	55.9	59.3
NPA 65	35.0	35.6	58.4	62.6
2015 scheme	-	-	37.8	40.6

\* weighted by salary

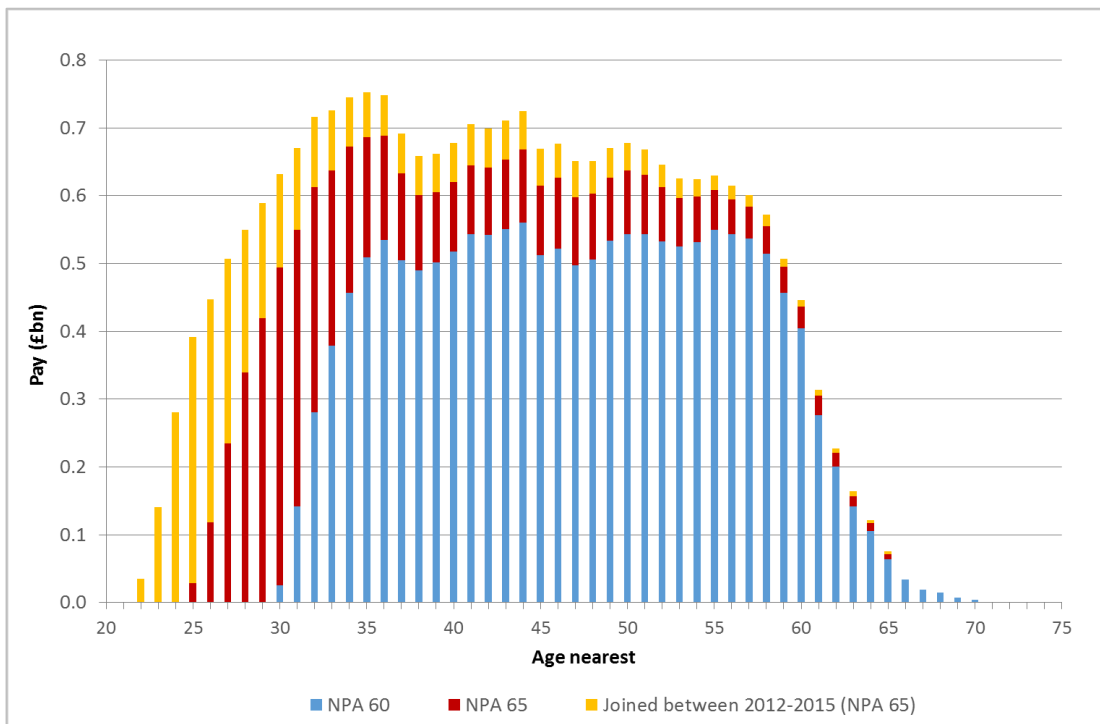
- 2.17 The distribution of the membership by age and salary roll at each relevant date is shown in the charts below. The projection does not directly model membership numbers.



**Chart 2.2: 31 March 2012 membership profile by age and salary roll**



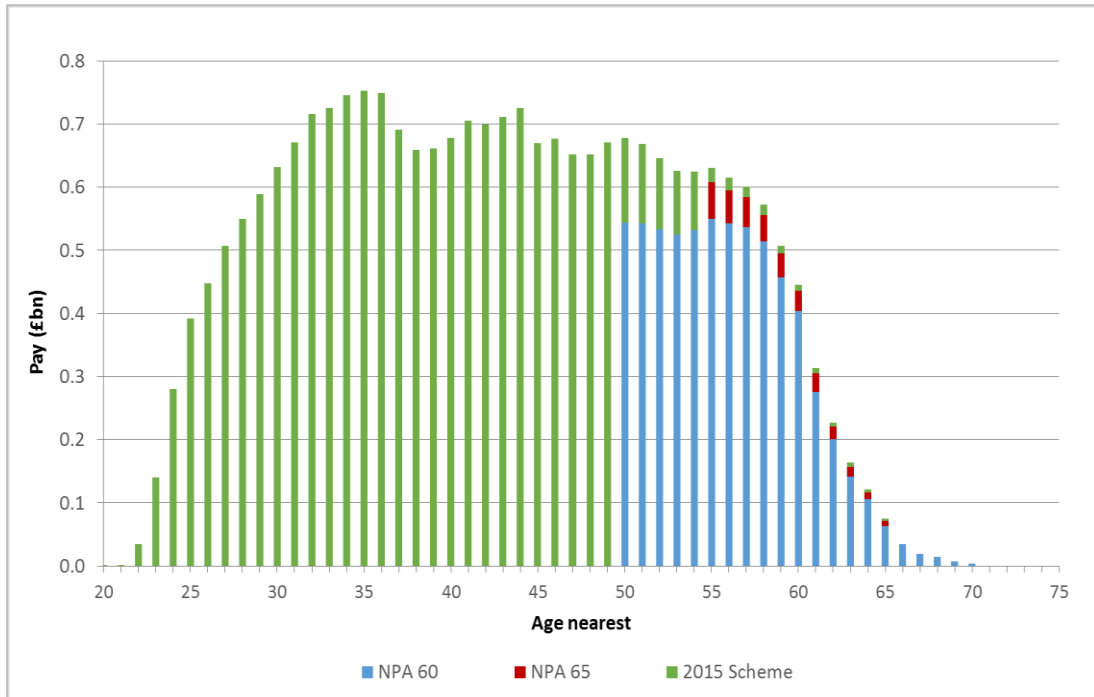
**Chart 2.3: 31 March 2015 membership profile by age and salary roll**



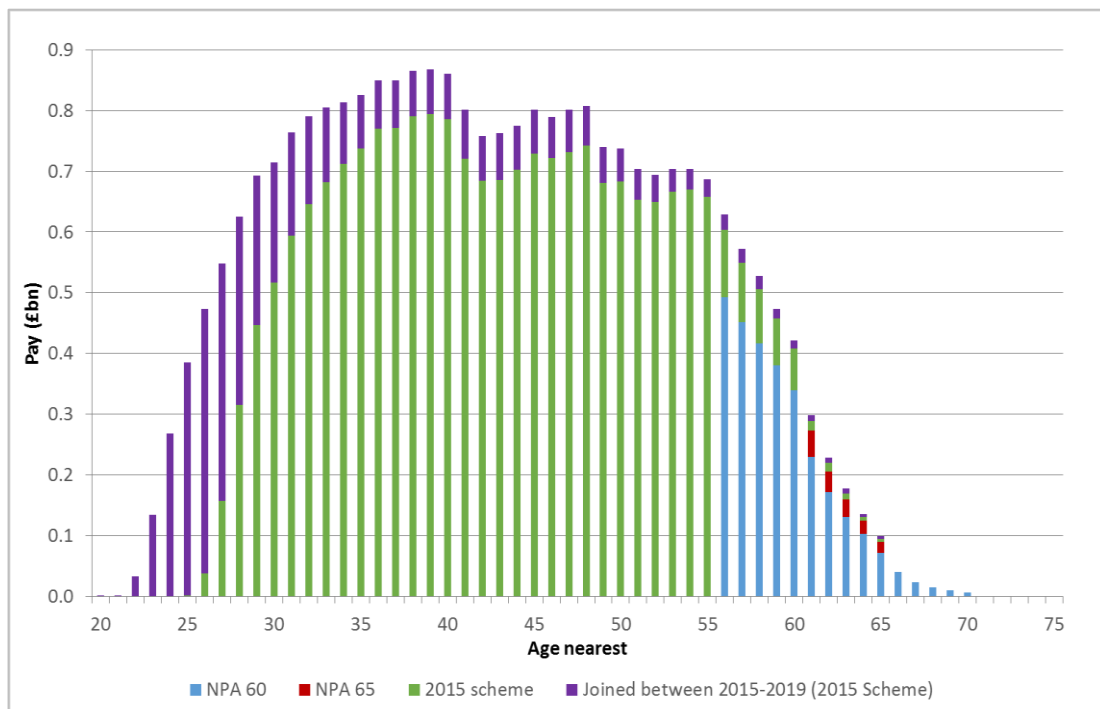




**Chart 2.4: 1 April 2015 membership profile by age and salary roll**



**Chart 2.5: 31 March 2019 membership profile by age and salary roll**





### **Projecting the membership beyond 31 March 2019**

- 2.18 The total salary roll for 2019/20 is assumed to be in line with the OBR forecasts (see paragraph 2.9). After 2019/20, the total salary roll is assumed to increase in line with the general salary increases set out in Direction 17. The salary roll up to 31 March 2030 is required to determine deficit contributions payable under Directions 27(1)(a) and (c).

### **Membership projections for the employer cost cap**

- 2.19 The same membership projections are used for the cost of accrual over 2015-19 (Direction 27(1)(d)) and the proposed employer cost cap (Direction 53).



### 3 Accrual cost methodology

- 3.1 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 membership is grouped by gender, age (to nearest birthday), service (to nearest whole year) and section (NPA 60, NPA 65, mixed or 2015 scheme).
- 3.2 Direction 11 requires use of the projected unit methodology to determine the valuation results.
- 3.3 When determining the costs of accrual as required by Directions 27(1)(b), 27(1)(d) and 53(1), the cost has first been determined at the start and end of the relevant period based on the (projected) membership of the sections of the scheme and the applicable assumptions at those times. The overall cost of accrual for the period is then determined as the average of the costs at the start and end, weighted by the expected present value of the payroll at these times. This approach should be reasonable provided that changes to the membership are spread out across the period. This is likely to be the case for the TPS, where annual retirement experience tends to be quite steady year on year and the tapered group will reduce steadily over 2015-19.
- 3.4 Directions 14, 16 and 17 specify some modifications to the financial assumptions in the short term. An implication of the short term modifications is that the projected unit methodology is expected to result in an increasing standard contribution rate over successive periods. For example, the cost of accrual under the existing scheme is lower in 2012 than in 2015 (for a similar group of members). This effect is not immaterial for final salary benefits but has no effect on the cost cap calculation since short term assumptions are explicitly disregarded for this purpose in Direction 53.
- 3.5 Non-accruing benefits such as lump sums payable on death in service or enhancements payable on ill-health retirement or death in service are recognised only at the time of retirement or death.



## 4 Approximations and miscellaneous items

### Guaranteed Minimum Pensions (GMPs)

- 4.1 The scheme is not liable for the full indexation of GMPs and so makes savings on GMPs compared to the cost of providing a fully indexed pension. Individual GMP data could not be supplied for members where the GMP was not in payment and so the savings have been estimated in an approximate manner.
- 4.2 The approximation is based on the ratio of GMP to other pension for pensioners who are old enough for GMP to be in payment. This provides an indication of the total GMP that will have been accrued in the Scheme. The approximation is intended to be unbiased but its accuracy will be affected by changes in scheme size and earnings profile over the period of GMP accrual (1978-1997).
- 4.3 The total estimated savings are just over 1½% of total liabilities and allowance for this serves to reduce the deficit contributions (assessed as being required for 15 years from 2015) by just over 1% of pay, compared with valuing all benefits as fully indexed pensions. Three quarters of the savings have been attributed to pensioner members with the rest split between actives and deferreds in line with the liabilities of those groups.
- 4.4 Much more complete data is expected to be available at the next valuation. Any difference between the estimated savings and a more accurate assessment using more complete data will feed into the surplus or deficit at that valuation and impact upon the employer contribution rate then determined in relation to addressing the surplus or deficit.
- 4.5 The estimation of GMP savings has no impact on the calculation of the cost cap. Provided accurate GMP data is available as at 31 March 2015, the approximation will not apply to the starting value of the cost cap fund and so will not impact on the operation of the cost cap mechanism.

### Earnings cap

- 4.6 The earnings cap only applies in very limited circumstances in the TPS. No allowance has been made for its impact as this would not be material to the valuation results.

### Public Service Transfer Club (PSTC)

- 4.7 Costs arise on final salary PSTC transfers because the transfer value is usually less than the cost of providing the service credit granted. Most PSTC transfers over 2015-19 will be transfers of final salary benefits. Allowance has been made for the potential costs of these transfers by assuming that the level of transfers continues at recent levels and the cost of providing the service credit is about twice the transfer value received. Overall, the additional costs are equivalent to about 0.2% of pay. HMT has confirmed that these costs also apply to the calculation of the cost cap.



- 4.8 In the longer term, PSTC transfers will increasingly be transfers of career average benefits. The exact form of these transfers and distribution of the costs involved has yet to be determined. However, it is likely that PSTC costs to the Scheme will fall over time.

#### **Expenses**

- 4.9 No allowance has been made for expenses. Expenses are met from outside the Scheme's valuation framework.

#### **General pay increases**

- 4.10 Pay increases are assumed to occur on 1 September each year in accordance with Direction 17, eg an increase of 1.8% on 1 September 2012.

#### **Final pensionable pay**

- 4.11 We have assumed that members' average pensionable pay is their pay in the final year of service. Some members will benefit from a higher average salary from alternative parts of the definition of average salary. An analysis of data provided for the 2007 reforms suggests that this might increase the liabilities of active members by about 0.2%. However, our view is that such an allowance would be spurious given the significant uncertainty around levels of general and promotional pay increases.

#### **Dependants' pensions**

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

#### **State Pension Age**

- 4.13 A member's Normal Pension Age in the 2015 scheme is set equal to their State Pension Age (SPA). Direction 18 sets out the SPA to use for a member in the valuation calculations. Increases in SPA are not instantaneous. For example, someone born on 5 April 1960 has an SPA of 66 years, someone born on 5 October 1960 has an SPA of 66 years and 6 months, and someone born on 5 April 1961 has an SPA of 67.
- 4.14 For the purposes of the valuation calculations we have taken a pragmatic approach to calculate each member's SPA. Using the example above, anyone born between 5 April 1960 and 30 September 1960 is assumed to have an SPA of 66, and anyone born between 1 October 1960 and 5 April 1961 is assumed to have an SPA of 67. The same approach has been adopted for the transition between other SPAs. This approach will not have a material impact on the valuation results.



### **Early retirement factors**

- 4.15 When modelling retirement before Normal Pension Age where an actuarial reduction would be applied, early retirement factors have been set equal to current factors (applied for the appropriate period before the normal pension age). For the 2015 scheme, a combination of the standard reduction of 3% a year applying between 65 and SPA and the current NPA 65 factors has been used. A different approach would be to use early retirement factors that are expected to apply in future. However, this would not have a material impact on valuation results.

### **Re-entry of members**

- 4.16 Re-entry of members to pensionable service has been modelled by the use of a 'net' withdrawal assumption for active members. This explicitly allows for a proportion of those leaving active service to return.
- 4.17 No explicit allowance has been made in the valuation for a proportion of those deferred at the valuation date subsequently to rejoin. It is clear some members will rejoin and so this will understate the deferred liabilities. It is difficult to assess the impact of this but the contribution rate over 2015-19 might be about 0.1-0.2% lower than if we allowed for re-entry. The impact of this will come through as future deficit and therefore slightly higher employer contributions will be required in future to make up for this. The cost cap mechanism is not impacted by the calculation of liabilities for current deferreds.

### **Deferred members above NPA**

- 4.18 Members above age 70 are assumed not to claim their benefits. Only half of members between NPA and age 70 are assumed to claim their benefits. Overall, if these members were included, we estimate this would increase the past service liabilities by around £1.5bn and the contribution rate by around 0.5%. There would be no impact on the employer cost cap.

### **Phased retirements**

- 4.19 The pensioner data provided includes phased retirement pensions that were in payment on 31 March 2012. The reckonable service data provided for active members also includes any service a member may have already taken due to phased retirement. A separate extract was provided detailing the phased retirement pensions of current active members in payment on 31 March 2012.
- 4.20 The liability for active members has first been calculated using the full service recorded and then reduced by the liability in respect of the phased retirement pensions in the separate extract. No adjustment was needed to the pensioner liability.



### **Past added years (PAY)**

- 4.21 The reckonable service information provided in the individual active data includes the full PAY service the member had elected to purchase, not what PAY service they had paid for at the valuation date.
- 4.22 Additional data was provided detailing the future PAY contribution payments required to purchase the outstanding PAY service not yet paid for at the valuation date. The present value of the future contributions has been deducted from the active past service liability, which is initially calculated using the full PAY amounts.

### **Additional Pension (AP)**

- 4.23 The valuation data forms provide the full AP entitlement the member has elected to purchase, not what AP they had paid for at the valuation date. The data forms also provided the future contribution payments required to purchase the outstanding AP not yet paid for at the valuation date.
- 4.24 The liability in respect of the full AP entitlement has been calculated. The present value of the future contributions has been deducted from this to estimate the liability in respect of AP paid for at the valuation date.

### **Money purchase additional voluntary contributions (AVCs)**

- 4.25 Teachers can pay AVCs under the *The Teachers' Superannuation (Additional Voluntary Contributions) Regulations 1994*. This is not a connected scheme for the purpose of Section 11 of the *Public Service Pensions Act 2013* and so is not within the scope of this valuation.