



Government Actuary's Department

Scottish Teachers' Superannuation Scheme

Actuarial valuation as at 31 March 2012

Report on data used for experience analysis

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1 Introduction

- 1.1 This report is addressed to SPPA, acting on behalf of Scottish Ministers. This report 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 purposes of this report are:
- > to discuss and summarise the member experience data provided and to be used for the purposes of analysing the experience of the Scottish Teachers' Superannuation Scheme (STSS or 'the Scheme') over the period 1 April 2009 to 31 March 2012;¹ and
 - > to ensure that users of the valuation report understand the issues relating to the data used and in particular those issues that may have a material impact on the valuation result.
- 1.3 Membership data used for the actuarial valuation calculations are the subject of a separate report, *Scottish Teachers' Superannuation Scheme: Actuarial Valuation as at 31 March 2012: Report on membership data* dated 27 February 2015.
- 1.4 All data provided and discussed in this report were supplied by the Scottish Public Pensions Agency (SPPA), the Scheme's administrators. Annual Accounts for the relevant period are publicly available.
- 1.5 In preparing this report, GAD has relied on data and other information supplied by the administrators described in the report. Any checks that GAD has made on this information are limited to those described in the report, including any checks on the overall reasonableness and consistency of the data. These checks do not represent a full independent audit of the data supplied. In particular, GAD has relied on the general completeness and accuracy of the information supplied without independent verification.
- 1.6 The contents of this report have been discussed and agreed with SPPA, which has confirmed that it is content that the resulting data is appropriate for use in the 2012 actuarial review of the STSS.
- 1.7 Throughout this report the totals given in tables may not add due to rounding.

¹ the 'analysis period'.



2 Description of data provided

- 2.1 SPPA provided membership data by way of individual data records for those active members, deferred pensioners and current pensioners who changed status over the analysis period. This was initially provided to GAD in June 2013, although a number of issues with the data were highlighted at this stage. SPPA and GAD worked to resolve the issues together and a final version of the data was sent to GAD in December 2013, with some supplementary data received in January 2014.

Movement data – actives

- 2.2 The data items provided for active members are set out in Appendix A – Actives data.
- 2.3 The movements data which GAD received did not include the number of members in each category at 31 March 2010 or 31 March 2011, and so it was not possible to perform a reconciliation of membership for each group (actives, deferreds and pensioners) for each individual year of the period. Instead a reconciliation covering the entire three-year period was performed, and these are inherently more difficult to reconcile than a single year analysis.
- 2.4 It was also not possible to separate out NPA 60 members from NPA 65 members, so the analysis carried out was on the aggregate of both of these groups where it was appropriate to do so. In general this is not a problem in analysing the movements of active members. However, we were unable to analyse the proportion of pension commuted for a lump sum, because due to the different benefit structures of the NPA 60 and NPA 65 sections, separate analyses would be required.

Movement data – deferreds

- 2.5 The data items provided for deferred members are set out in Appendix B – Deferreds movement data. This was not used directly in the experience analysis, but was used to check parts of the active and pensioner movement data for consistency, for example the numbers of new deferreds in the deferreds movement data against the number of withdrawals in the active movement data.

Movement data – pensioners

- 2.6 Data for pensioner members and their dependants was provided in the same spreadsheets, with indicators to flag which members are pensioners and which are dependants. Further data was provided in January 2014 for new dependants. The movements data for pensioners who retired on age and ill-health grounds was analysed in order to inform the mortality assumptions. However the results for the analysis of female age pensioners provided a result which we felt was not credible, and this cast doubt on the rest of the mortality analysis, and so the movements data was not used to set the mortality assumptions.



- 2.7 In addition to the numbers of entrants and exits over the year, the data specifies whether the pensioner member died with or without a dependant to whom a dependant's pension would be paid. This data was analysed in order to inform the proportion married assumption. However there were inconsistencies between the numbers of pensioner deaths recorded as resulting in a spouse or partner's pension coming into payment and the number of new dependants' pensions that came into payment during the period.
- 2.8 The data also provides information on the age of the dependant on the member's death and this information is analysed to inform the assumptions around the age difference between current members and their spouse or partner. However the age of the spouse or partner was only shown for 420 members and so the data was not used directly to set the assumption for age difference between member and their spouse or partner.
- 2.9 The data items provided for pensioner members and dependants are set out in Appendix C – Pensioners movement data.

Year-end data

- 2.10 The Administrators also provided a full valuation extract for each group as at 31 March 2009 and 31 March 2012, with data in respect of each individual member at these dates. The full valuation extract for individual active members included salary details at the beginning and at the end of the analysis period which enabled pay information to be tracked on a member-by-member basis, thus enabling an analysis of pay progression to be undertaken.
- 2.11 The key items of the year-end data as used for the pay progression analysis for actives at the beginning and end of the period are shown in Appendix A.

Accounting information

- 2.12 Published Annual Accounts were available for periods which covered the analysis period. These include summaries (of varying completeness) of the Scheme's membership and membership movements for each accounting period. The amount of information on membership movements varied between the three years. For the year ending 31 March 2010, the accounts showed membership figures plus some information on movements, the year ending 31 March 2011 showed membership figures only, with no information on movements, and the year ending 31 March 2012 showed a full reconciliation of movements over the year.



3 Checks carried out on the data

Reconciliation of membership movements within categories

- 3.1 The main check carried out on the data is a reconciliation of movements with the numbers of members in each of the membership categories at the start and end of the analysis period. The data reconciles reasonably well for pensioner members. The discrepancies are discussed further in Section 4.

Comparison of membership movements across categories

- 3.2 A comparison of the membership movements across categories (actives, deferreds and pensioners) is set out in Section 4. This highlights some discrepancies between the movements information for different groups.
- 3.3 Also, the reconciliation of actives and deferred members did not tie together well, as there were 3,750 more new deferred members than members leaving from active service. Similarly there were 3,850 more members leaving deferred status to rejoin the scheme than there were new active rejoiners. One possibility is that members who left service and re-entered in the same year may have been recorded as both entering and exiting deferred status, but may not have been recorded as entering or exiting active status. This would make the deferred and active membership numbers internally consistent, but not consistent with each other.

Comparison against Annual Accounts data

- 3.4 A comparison of the membership movements as recorded in the valuation data with the total membership numbers as at 31 March 2009 and 31 March 2012 shown in the Annual Accounts is set out in Section 4. It was not possible to compare the member movements over the period as the accounts for the year ending 31 March 2011 did not include member movement numbers.

Consistency of movements over time

- 3.5 A comparison of the number of movements between years was carried out, for example comparing the number of new pensioners in 2009-2010 with the number of new pensioners in 2010-2011 and 2011-2012. We would expect the number of movements to be fairly consistent over time and the data was in line with our expectations in this respect.

Checks on correctness and completeness of data

- 3.6 We checked that each data field was populated and in line with the data specification, and that any recorded dates of entry or exit were within the analysis period. We had no concerns regarding the data in this respect.



4 Membership movements

- 4.1 The tables below summarise the membership movements recorded over the analysis period and the corresponding figures based on information published in the Annual Accounts. The numbers at 1 April 2009 under 'Valuation data' are those recorded on the year end data forms provided for this valuation rather than from data provided for the 2009 valuation.
- 4.2 The 'number expected as at 31 March 2012' is based on the total number of records as at 1 April 2009 in the movements data forms plus any additions and deductions taken from the movements data forms.
- 4.3 The 'number recorded at 31 March 2012' is based on the final total of member records in the year end data forms.

Table 1: Active member movements

	Valuation data (rounded to nearest 10)
Number at 1 April 2009	72,970
Additions	
New entrants	17,980
Re-entrants	3,760
Deductions	
Deaths	(150)
Retirements	(10,040)
Withdrawals	(11,040)*
Number expected at 31 March 2012	73,480
Number recorded at 31 March 2012	76,320
Difference	2,840

*The 11,040 withdrawals include 2,900 records which were excluded from the experience analysis as their ages were under 18 or over 70. See paragraphs 4.8 and 4.17 to 4.21 for further details.



Table 2: Deferred member movements

	Valuation data (rounded to nearest 10)
Number at 1 April 2009	
Total start of year adjustments	24,400
Additions	
New deferreds	13,820
Deductions	
Deaths	140
Retirements	2,120
Re-entrants to active	7,610
Transfers out	280
No exit code	160*
Number expected at 31 March 2012	27,910
Number recorded at 31 March 2012	30,780
Difference	2,870

*160 records included a date of exit from deferred status but no exit code. We assumed that these records were genuine exits but their code had been omitted in error. If the records were not exits, and the date of exit from deferred status was included in error then the number expected at 31 March 2012 would increase to 28,070, and the difference would reduce slightly, to 2,710.

Table 3: Pensioner member movements

	Valuation data (rounded to nearest 10)
Number at 1 April 2009	50,480
Additions	
New pensioners	11,910*
Deductions	
Pensioner deaths and other cessations	(3,910)
Number expected at 31 March 2012	58,480
Number recorded at 31 March 2012	57,930
Difference	(550)

*This figure excludes around 40 duplicate records from the data provided but this exclusion should not have a material impact on the analysis.



Table 4: Dependant member movements

	Valuation data (rounded to nearest 10)
Number at 1 April 2009	6,380
Additions	
New dependants	1,370
Deductions	
Dependant deaths and other cessations	(540)
Number expected at 31 March 2012	7,210
Number recorded at 31 March 2012	7,030
Difference	(180)

Comments on reconciliation of valuation movements data

Actives

- 4.4 Table 1 earlier shows discrepancies between the number of active members recorded as at 31 March 2012 and the number expected based on the movement data.
- 4.5 The actives year end form records around 76,320 members as at 31 March 2012, compared with an expected number of around 73,480 members based on the starting position and movements over the period, a difference of around 2,840 members.
- 4.6 Other causes of the discrepancies in Table 1 may be one or more of the following:
- > over-recording of withdrawals or retirements from active service;
 - > under-recording of entrants/re-entrants to active status; and
 - > incorrect recording of numbers of members at 1 April 2009 and/or 31 March 2012.
- 4.7 There may be other issues we are unaware of which result in the number of new entrants and re-entrants being understated in the active movement forms, which would explain the discrepancy between the actual and expected number of active members as at 31 March 2012.
- 4.8 The movement data included 2,900 members classified as withdrawals whose ages were under 18 or over 70. We excluded these members from our withdrawal analysis as their ages are outside the expected range. If any of these members are not withdrawals (or any other movement) then this could explain the discrepancy between the actual and expected number of active members as at 31 March 2012.



- 4.9 As we have not been able to fully resolve the discrepancy between the recorded and expected number of actives as at 31 March 2012, and against the figures in the year end accounts there is uncertainty around the true level of movements, particularly for withdrawals and re-entry. If the number of withdrawals used in our analysis (which excluded the 2,900 members described in paragraph 4.8) is understated then the withdrawal rate assumed for the valuation will be too low and the costs and liabilities of the Scheme will be overstated.
- 4.10 Our valuation assumptions report will go into more detail on the sensitivity of the valuation liabilities to the assumptions chosen, and the potential impact if actual experience varies from the assumptions which we have chosen on the basis of the data which we have. The report covers all assumptions, including withdrawals, retirements, mortality rates, salary scales and all other significant demographic assumptions.

Deferred pensioners

- 4.11 The deferred data does not reconcile with the recorded movements (27,910 expected records versus 30,780 members recorded at 31 March 2012 in the movements data forms). The deferred movements data was not used directly in the experience analysis, though some figures correspond directly with parts of the analysis (eg number of new deferreds should be the same as the number of withdrawals from active service).

Pensioners

- 4.12 The pensioner data reconciles within 1% of the recorded movements (58,480 expected records versus 57,930 members recorded at 31 March 2012 in the movements data forms). However, the results of the pensioner mortality analysis lead to concerns about the pensioner movement data.

Dependants

- 4.13 The dependants' data reconciles within around 2.5% of the recorded movements (7,210 expected records versus 7,030 members recorded at 31 March 2012). However there are inconsistencies between the numbers of pensioner deaths which are recorded as resulting in a spouse's or partner's pension coming into payment, and the number of new dependants' pensions that came into payment during the period.

Comparison of valuation movement figures against other categories

Retirements

- 4.14 The number of retirements from the active movement forms is used to set the age retirement assumptions.



4.15 Hence, as a further check the total number of retirements from the active and deferred movements data forms was compared with the number of new pension awards on the pensioner movement forms. The pensioner movement forms recorded around 11,900 retirements over the analysis period. The active and deferred movements forms recorded around 12,200 retirements in total over the analysis period.

4.16 For members who retired on ill-health grounds, the movement data also showed whether they retired with an upper-tier or lower-tier pension. In 2009/10, the proportion of members retiring on ill-health grounds who were recorded as receiving an upper-tier pension was extremely low, so that year's data was excluded from the analysis of the proportion of members who take upper and lower-tier ill-health retirement.

Withdrawals

4.17 The number of withdrawals recorded on the active forms is used to set the withdrawal assumption.

4.18 Hence, as a further check the number of withdrawals to deferred status recorded on the active forms was compared with the number of new deferred members in the deferred forms. In the initial data with which we were provided, there were around 10,070 members leaving active service and becoming deferred but close to 13,820 new deferred members. This is discussed further in the Re-entrants section below. (Please note that the figure of 10,070 is different to the figure of 11,040 withdrawals in Table 1, as the 11,040 includes refunds of contributions and transfers-out, whereas the 10,070 is only members who became deferred.)

4.19 There were a relatively high number of members recorded as withdrawing between ages 60 and 70. It was assumed that such members retired immediately on withdrawal since the lack of late retirement factors means that there would be no benefit to the member of postponing retirement after leaving employment. These members were included in the age retirement analysis.

4.20 There were also a higher than expected number of members withdrawing from service between ages 55 and 59, and it is likely that these were a mixture of withdrawals and early retirements. In light of this issue, only members under age 55 were analysed in our withdrawal experience analysis. These members were not included in the age retirement analysis, as the number of excess withdrawals, who might be assumed to be early retirements, was less than 10% of the number of movements classed as retirements over this age group and it is unclear whether they are in fact retirements.

4.21 There were also a large number of members (2,900) recorded as withdrawals where the members were aged over 70 or under 18. These records were excluded from our analysis but are included in the reconciliation in Table 1. If any of these members are genuine movements then this could impact on the withdrawal and retirement analysis and assumptions. If any of these members are not genuine movements then the reconciliation in Table 1 shows too many exits.



Re-entrants

- 4.22 The number of re-entrants to active status recorded on the active and deferred forms was checked for consistency. This data is not used in our assumptions analysis but the movements recorded on both forms were used to check the consistency between the forms.
- 4.23 In the data there were 3,760 rejoiners to active service, and 7,610 members recorded as leaving deferred status to rejoin active status. This discrepancy of 3,850 members broadly matches to the excess of new deferred members over active members leaving service (3,750).
- 4.24 One possibility is that members who leave the scheme and rejoin in the same year are being recorded as both entering and leaving deferred status, but are not recorded as neither leaving nor re-entering active status.

Comparison of movements data against Annual Accounts

- 4.25 Table 5 below shows the numbers of members recorded in the Scheme's Annual Accounts as at 31 March 2009 and 31 March 2012. This shows a discrepancy between the figures in the Annual Accounts compared to the valuation data for active members (76,320 as at 31 March 2012 in Table 1, compared to 80,324 in Table 5 below). However, the membership figure quoted in the accounts reflects the number of teaching contracts on 31 March 2012 rather than the number of members. The number quoted in the accounts should therefore be higher than the number of members in the valuation data, which is the case.
- 4.26 The pensioners and dependants reconcile more closely (64,960 as at 31 March 2012 in Tables 3 and 4, compared to 66,358 in Table 5 below).
- 4.27 The number of deferred members recorded in the Annual Accounts (13,854 in Table 5 below) is less than half the number recorded in the valuation data (30,780 as at 31 March 2012 in Table 2). There is a footnote in the accounts saying that in addition, there are a further 9,735 members who no longer contribute to the Scheme who have less than two years' service (and so are not entitled to a deferred pension but would be entitled to a refund of contributions or a Cash Equivalent Transfer Value). However, even allowing for this, the numbers are still substantially different.

Table 5: Summary of accounts data

	Actives	Deferreds	Pensioners and dependants
Number recorded at 31 March 2009	78,242	14,975	56,173
Number recorded at 31 March 2012	80,324 ⁽ⁱ⁾	13,854 ⁽ⁱⁱ⁾	66,358 ⁽ⁱ⁾

(i) Figures taken from *Scottish Teachers' Superannuation Scheme: Annual Report and Accounts 2012-13*. The active and pensioner figures as at 31 March 2012 have been amended from those disclosed in the previous year's accounts to allow for adjustments in the year, and are more comparable with the valuation data provided by SPPA. No change was made to the deferred figure.

(ii) There were a further 9,735 members who no longer contribute to the Scheme with under two years' service.



5 Limitations of analysis based on data

- 5.1 The data described in this report is to be used to inform the process of setting assumptions for the valuation to be undertaken as at 31 March 2012. Past experience over a particular period does not necessarily correlate to an exact expectation for a particular future period. It is also necessary to consider the effect of random variation on the results of any analysis of a scheme of this size. Therefore the weight that is attached to the precise outcome of the inter-valuation experience analysis depends on the analysis itself and an assessment of the extent to which recent experience is a guide to the future.
- 5.2 Where other information is considered as part of the process of agreeing assumptions for the valuation such information will be discussed within the report providing our advice on those assumptions.



Appendix A: Actives data

Movement data forms were provided for each Scheme year of the analysis period. The forms showed the following data items for each individual member.

- a. identifier
- b. gender
- c. date of birth
- d. date of first entry to scheme
- e. date of rejoining (where applicable)
- f. method of rejoining
- g. date of exit (where applicable)
- h. reason for exit
- i. service at exit (not reduced for previous phased retirement)
- j. final pensionable salary at exit
- k. date of birth of spouse or partner where a dependant's pension comes into payment (ie for deaths in service)
- l. service drawn as pension (for phased retirement only)

Year end data forms were provided for the membership as at 31 March 2009 and 31 March 2012. The forms showed the following data items for each individual member.

- a. identifier
- b. gender
- c. date of birth
- d. date joined scheme
- e. pensionable remuneration at extract date
- f. actual salary at extract date
- g. *total* full time equivalent reckonable NPA 60 service for member's benefits
- h. *total* full time equivalent reckonable NPA 60 service counting for spouse's pension
- i. NPA 60 service drawn as pension
- j. additional NPA 60 pension
- k. additional partner's NPA 60 pension
- l. additional NPA 60 pension indexation
- m. *total* full-time equivalent reckonable NPA 65 service
- n. NPA 65 service drawn as pension
- o. additional NPA 65 pension
- p. additional partner's NPA 65 pension



- q. additional NPA 65 pension indexation
- r. total calendar length of service (including any previous periods of service)
- s. part-time proportion
- t. GMP per annum accrued from service before 5 April 1988, with revaluation to the extract date (if available)
- u. GMP per annum accrued from service after 6 April 1988, with revaluation to the extract date (if available)
- v. pension debit including revaluation up to the extract date



Appendix B: Deferreds movement data

Movement data forms were provided for each Scheme year of the analysis period. The forms showed the following data items for each individual member.

- a. identifier
- b. gender
- c. date of birth
- d. date of leaving active service
- e. date of exit from deferred status
- f. reason for exit from deferred status

Year end data forms were provided for the membership as at 31 March 2009 and 31 March 2012. The forms showed the following data items for each individual member.

- a. identifier
- b. gender
- c. date of birth
- d. date of most recent exit
- e. total reckonable NPA 60 service deferred
- f. total reckonable NPA 65 service deferred
- g. total pensionable remuneration at exit
- h. total deferred NPA 60 pension including pension increases awarded to deferred pensions as at the extract date
- i. total prospective NPA 60 spouse's pension including pension increases as at the extract date
- j. additional NPA 60 pension
- k. additional NPA 60 partner's pension
- l. additional NPA 60 pension indexation
- m. total deferred NPA 65 pension including pension increases awarded to deferred pensions as at the extract date
- n. additional NPA 65 pension
- o. additional NPA 65 partner's pension
- p. additional NPA 65 pension indexation
- q. GMP accrued for service up to 5 April 1988, revalued to the extract date
- r. GMP accrued for service after 6 April 1988, revalued to the extract date
- s. pension debit including revaluation up to the extract date
- t. pension credit member (yes/no indicator)



Appendix C: Pensioners movement data

Movement data forms were provided for each Scheme year of the analysis period. The forms showed the following data items for each individual member.

- a. identifier
- b. for dependants, the identifier of the member
- c. gender
- d. date of birth
- e. pensioner group
- f. date of pension commencing
- g. pension coming into payment before commutation
- h. pension coming into payment after commutation
- i. lump sum paid as a result of commutation
- j. date of cessation
- k. reason for cessation
- l. date of birth of spouse or partner where a dependant's pension comes into payment

Year end data forms were provided for the membership as at 31 March 2009 and 31 March 2012. The forms showed the following data items for each individual member.

- a. identifier
- b. for dependants, the identifier of the member
- c. gender
- d. date of birth
- e. pensioner group
- f. date pension payment commenced
- g. total pension in payment *including* pension increases awarded to the extract date before deduction of NI modifications for pensions in abatement, the total unabated pension including pension increases
- h. total prospective spouse's pension, *including* pension increases awarded to the extract date amount of NI modification
- i. short-term pension (for those receiving short-term pensions at the extract date)
- j. GMP accrued up to 5 April 1988, including revaluation to the extract date GMP accrued after 6 April 1988, including revaluation to the extract date
- k. GMP accrued up to 5 April 1988 at date pension payment commenced
- l. GMP accrued after 6 April 1988 at date pension payment commenced



Appendix D: Dependants data

Movement data forms were provided for each Scheme year of the analysis period. The forms showed the following data items for each individual new member joining the dependants' population.

- a. identifier
- b. gender
- c. date of birth
- d. dependant group
- e. date of entry to dependant status

Year-end data for dependants was provided alongside the year end data for pensioners. More detail on the year end data provided for pensioners is included in Appendix C.



Appendix E: Record of changes since 25 April 2014 draft

E.1 This advice was issued in draft on 25 April 2014. The table below records the changes made since that draft.

Reference	Change
Table 1	'Number recorded at 31 March 2012' amended to reflect unadjusted data received, rather than adjusted data that will be used in the valuation calculations.
Table 4	'Number at 1 April 2009' and 'Number recorded at 31 March 2012' updated to include Children's pensions. Any references to these figures or dependencies elsewhere in the report updated also.
Table 5	Number of actives and pensioners at 31 March 2012 updated to show the latest figures stated in the accounts, which allow for more up-to-date information and are more consistent with the valuation data received.
Various	Minor drafting changes to correct spelling, grammatical and other errors or to clarify previous wording