Continuous Mortality Investigation

Self-administered Pension Schemes Mortality Committee

Working Paper 53

An initial investigation into rates of mortality improvement for pensioners of self-administered pension schemes

July 2011

Contents

1. Introduction

1.1 An earlier version of this paper was released to SAPS members in April 2011. There have been minor amendments to some of the text in this paper to improve the clarity in places but there have been no changes to the analysis that is presented.

1.2 The SAPS mortality investigation started in 2001 and since then various analyses have been carried out on the mortality experience of occupational pension scheme members and their dependants. Regular high level updates on the mortality experience are produced using data submitted by 30 June each year and are presented in a number of Working Papers, a summary of these is included in Appendix A.

1.3 Over the years the SAPS Mortality Committee ("the Committee") has received enquiries about the improvements experience seen within the data collected. Trends in the mortality experience have been presented in the regular updates but these were heavily caveated; a summary of these is presented in the Section 2 of this paper.

1.4 However, to date, the Committee has not published an analysis of the improvements in the SAPS mortality experience. This is primarily due to the time it takes to collect sufficient historic data to warrant such an analysis being undertaken.

1.5 The release of the CMI Mortality Projections Model, which is based on mortality improvements derived from England & Wales (E&W) population data (collected by the Office for National Statistics (ONS)), also highlighted the need for an analysis of the SAPS mortality improvements experience. In particular, an analysis of the extent to which parallels can be drawn between the mortality improvements experience for the E&W population and within the SAPS dataset would be valuable.

1.6 In 2009 the Committee decided to undertake an analysis of the improvements experience within the SAPS dataset. Initial investigations attempted to demonstrate statistical significance of the results but the approaches used were challenged internally and it was agreed that the conclusions were not sufficiently robust to be published.

1.7 The Committee thought that it would however be helpful to share the results of a high level analysis of the SAPS mortality improvements experience despite it not being possible to comment on the statistical significance of the results.

1.8 This analysis covers the period from 2001 to 2009. The SAPS dataset underlying the majority of the analysis, for the years 2002 to 2009, is that submitted by 30 June 2010. This was also the data underlying Working Paper 51 issued in May 2011. Working Paper 51 did not cover 2001 so data for this year is that submitted by 30 June 2009, analysed in Working Paper 44. A summary of the data is included in Appendix B.

1.9   This analysis uses standardised mortality ratios (SMRs) as simple means of conveying the experience. Section 3 provides background to the methodology underlying the analysis.

1.10   This Working Paper shows the results of the high level analysis of the SAPS mortality improvements experience against several different comparators. Section 4 presents a comparison of the experience observed in the SAPS data against that for the E&W population data, which to some extent provides further insight into the issue highlighted in paragraph 1.5. In addition, comparisons of the experience underlying different subsets of the SAPS data have been carried out. Section 5 analyses the improvements experience for male and female pensioners with different pension amounts and Section 6 compares the improvements experience for male pensioners against that for female pensioners. Please note that the comparisons presented do not allow the statistical significance of differences in the experience of the datasets to be commented on.

1.11   The Committee was considering whether to investigate further the feasibility of undertaking a more detailed and rigorous statistical analysis of mortality improvements experienced within the SAPS dataset, for a possible future Working Paper. However, subsequent feedback in respect of the draft version of this paper, released to members in April 2011, indicated that the high level analysis presented here is valuable and that further research is not considered to be high priority.

1.12   Insofar as the principles are applicable, this paper complies with the material requirements of the principles in the Board for Actuarial Standard's TAS D and TAS M, in respect of CMI SAPS data; this paper also uses ONS population data and validation of this by the CMI has not been possible so in this respect TAS D has not been considered.

2. Background

2.1 The Committee has shown trends in mortality experience in the annual mortality experience Working Papers; see Appendix A for details of these Working Papers. The following graphs summarise the trends observed for data received by 30 June in each of the years 2006-2010.

2.2 As noted in previous Working Papers, care should be taken when interpreting these results due to low volumes of data in the years shortly before the deadline for the cut-off of data and due to heterogeneity in different years.

2.3 Comparisons against the PNML00 and PNFL00 tables are illustrated below since earlier years' comparisons were not made against the "S1" Series tables.

Figure 1: 100A/E Male Pensioner Lives compared to PNML00
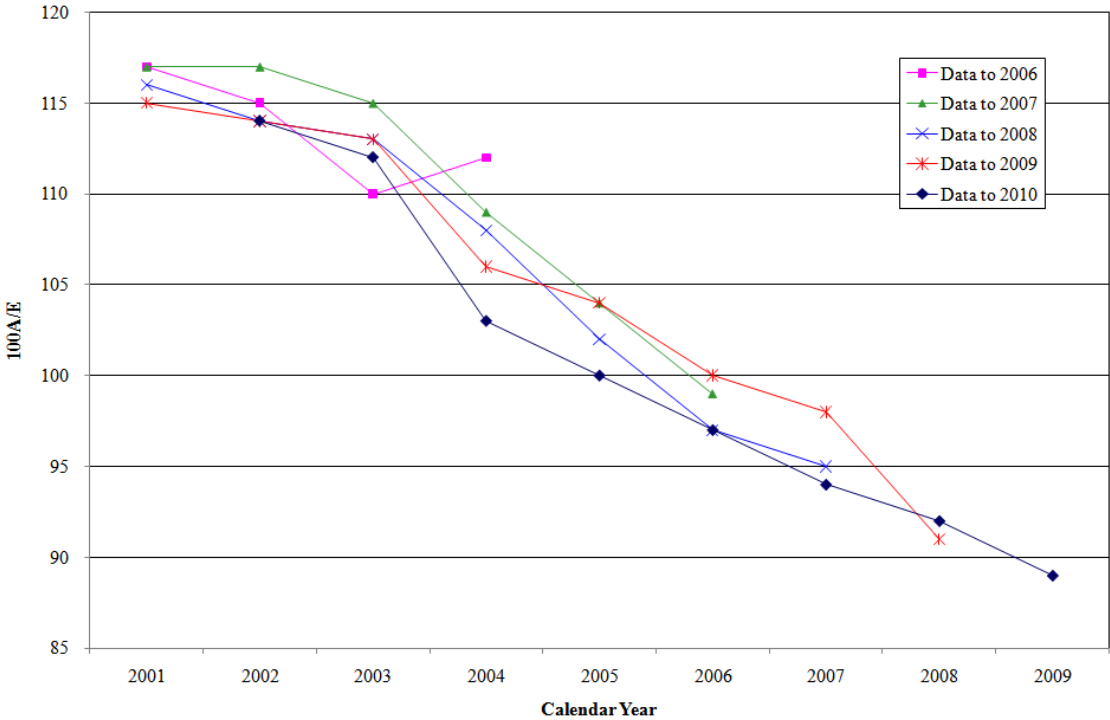
Figure 2: 100A/E values for Female Pensioner Lives compared to PNFL00
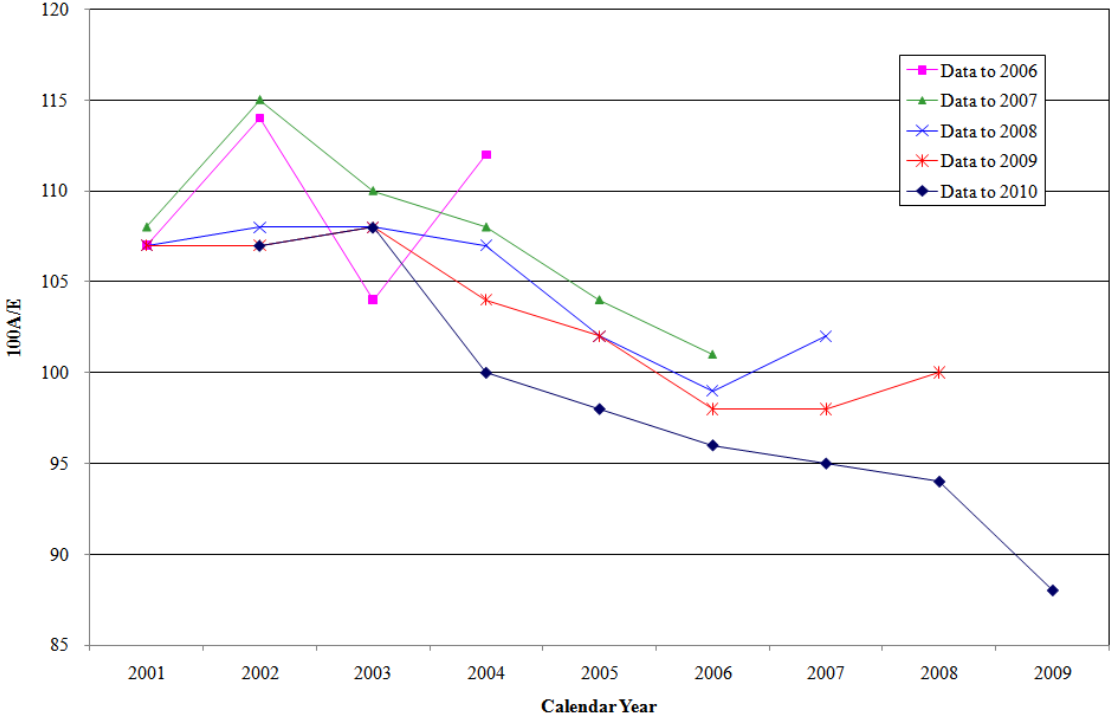
2.4 Note that in Figures 1 and 2 above the results plotted are based on Male and Female Pensioner data. For the earlier datasets (i.e. to 2006 and 2007) previously published Working Papers have not presented these results separately for Pensioners and Dependants so, if compared with the results here, there will be small differences.

2.5 While there is considerable variation in the overall level of mortality as the dataset develops, there is clearly a pattern of improving mortality year on year, with the possible exceptions of 2002 and 2003 for females. However, it is very difficult to draw firm conclusions on the mortality improvements within the SAPS dataset from these graphs and the analyses carried out to date. Nevertheless, the question of importance is whether mortality improvements can reliably be measured within the SAPS dataset.

2.6 There are a number of key issues associated with analysing mortality improvements that the Committee has considered. These include the volume of available data, the heterogeneity in the SAPS data for different years and the difficulties of finding a sufficiently robust approach for measuring the statistical significance of differences between datasets.

2.7 The first of these issues, the volume of data, was highlighted in the development of the CMI Mortality Projections Model, see Working Paper 39. This work showed that smoothing smaller datasets, such as the male CMI Permanent Assurances and CMI Life Office Pensioner datasets, using techniques such as P-Spline, results in a less detailed picture than the one emerging from population data as the degree of smoothing naturally increases as data volumes reduce. The effect of this is that the identification of features in the data becomes increasingly uncertain (in a statistical sense) for such datasets.

2.8   Working Papers 38 and 39 demonstrate that, even with the large back history of data in the male CMI Permanent Assurances and CMI Life Office Pensioner datasets, estimates of mortality improvement rates do change with the addition of further years' data – the changes are largest where the new data is added, but taper back for several years into the dataset.   The scale of these revisions to previous estimates is quantified in Working Paper 39 for the ONS population dataset, and it is likely the effect would be greater for the CMI datasets given their much smaller size. Given the relative unreliability of estimates of mortality improvement rates at the edge of the dataset, the CMI Mortality Projections working party took the view that it is necessary to step 2 years inside the edge of the data to obtain a sufficiently robust estimate.

2.9   There are probably three separate features within the male CMI Permanent Assurances database that cause it to be less stable over time than the ONS database. The first is the smaller number of lives, the second is the changing population over time as the life offices submitting data have varied, not least because of the consolidation of life offices that has been taking place over the last decade or two, and, finally, there is a change in the mix of business around age 60-65 as endowment policies mature and whole of life covers remain.

2.10   SAPS data is submitted on an ongoing basis and the annual 'cuts' of data, at 30 June, comprise of changing populations which leads to variation in the overall level of mortality for each year shown. For example, it was noted in Working Paper 51 that the all-years result for Male Pensioners had fallen from 97% of S1PML, in Working Paper 44, to 90% of S1PML but that users should not infer that this necessarily represents an improvement in mortality rates for the latest years. The primary cause of this movement was the addition of new data for previous years that exhibits lighter mortality experience.

2.11   The Committee is conscious of this changing aggregation of occupational pension schemes that are in the SAPS data from year to year. Despite so few years of data to look at, and bearing in mind this changing dataset population, the Committee has nevertheless felt that it is now in a position to offer further insights into the mortality improvements that exist within the SAPS dataset.

3. Methodology

3.1 This analysis of mortality improvements covers the period from 2001 to 2009. The SAPS dataset underlying the majority of the analysis, for the years 2002 to 2009, is that submitted by 30 June 2010. This dataset was also the basis for the annual experience analysis presented in Working Paper 51. This Working Paper did not cover 2001 so data for this year is that submitted by 30 June 2009. A summary of the data is included in Appendix B.

3.2 It should be noted that the data volumes drop in the most recent years, particularly 2009, and particular care should be taken when interpreting the results for these years.

3.3 The Committee decided to use standardised mortality ratios (SMRs) in this analysis as they are commonly used in many academic studies and allow a comparison of mortality rates to be drawn across populations of data with different age structures, including between males and females, and over time. Please note, however, that such comparisons do not allow the statistical significance of differences in the experience of the datasets to be commented on.

3.4 SMRs were also referenced by the CMI in Working Paper 38, where age-standardised mortality rates (split by cause for males aged 60 to 89) were compared between 1968 and 2005. This age-standardisation was performed using the age distribution of the E&W population in 2005. In other words, weighted average mortality rates were derived using weights based on the number of males in the population of E&W in 2005 at each age from 60 to 89.

3.5 In formulaic terms, standardised mortality ratios using a reference population's age distribution in a certain year, y, can be expressed by the following:

$$SMR_y = \frac{\sum(Reference\ Exposure_x \times Dataset\ m_x)}{\sum(Reference\ Exposure_x \times Reference\ m_x)} \times 100$$

where;

Reference Exposure$_x$ is the proportion of individuals at age x in the reference population, for a fixed year.

m_x is the number of deaths at age x divided by the exposed to risk at age x.

Dataset m_x is the m_x for the dataset being standardised, for the year under investigation, y.

Reference m_x is the m_x for the reference population, for a fixed year.

3.6 Please note that where the E&W population data is used as the reference population, the exposed to risk used to calculate m_x is based on mid-year population estimates. However, for the SAPS dataset, when it is being standardised or is being used as the reference population, the exposed to risk used to calculate m_x is the central exposed to risk.

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3.7   Using this approach, an SMR of 100 implies that the mortality experience for the population under investigation is, on average, the same as that of the reference population and SMRs of less/greater than 100 imply that the investigation population experiences, on average, lighter/heavier mortality.

3.8   The SMRs presented in Section 4 have been weighted using the Male or Female, as appropriate, E&W population data in 2001 as the reference population. These age-standardised SMRs have been used to compare the SAPS mortality improvements experience with the E&W population experience.

3.9   The SMRs presented in Section 5 have been weighted using the Male or Female, as appropriate, SAPS Pensioner data in 2001 as the reference population. These age-standardised SMRs have been used to compare the SAPS mortality improvements experience for pensioners with different pension amounts.

3.10   The SMRs presented in Section 6 have been weighted using the Male SAPS Pensioner data in 2001 as the reference population. These age-standardised SMRs have been used to compare the SAPS mortality improvements experience for Male and Female Pensioners.

3.11   In all cases an age range of 60 to 89 has been used.

4.   Comparison of SAPS and E&W population experience

4.1   This section analyses the trends and improvements in SMRs, for males and females in the SAPS dataset, and compares these to results for the E&W population. The reference dataset for age-standardisation of both the SAPS and E&W datasets is the Male or Female, as appropriate, E&W population in 2001. An age-range of 60 to 89 has been used.

4.2   As the Male Dependants dataset is so small we have not used this in our analysis, so all male results shown below are based on the Male Pensioner dataset.

4.3   The Female Pensioner and Female Dependants datasets are both considered to be of sufficient size to warrant analysis (see Appendix B for details), consistent with previous Working Papers. These datasets may well show different characteristics as the Dependants dataset has a much higher average age and also a higher average pension amount.

4.4   The SMRs in the E&W population and the SAPS datasets are shown below. A comparison of the annual rate of improvement in the SMRs follows each of the SMR charts.

4.5   The Committee hopes that these analyses and the commentary that has been included will provide readers with an insight into the comparability of SAPS mortality improvements experience relative to that of the E&W population. In particular, although the absence of sufficiently robust statistical tests means the Committee cannot draw any definitive conclusions from the analyses carried out, it is hoped that they may give some comfort to those who are using mortality improvements seen in the E&W population as a proxy for improvements in a dataset of pensioners and dependants of occupational pension schemes.

Figure 3: SMRs for SAPS Pensioners and E&W Population – Males
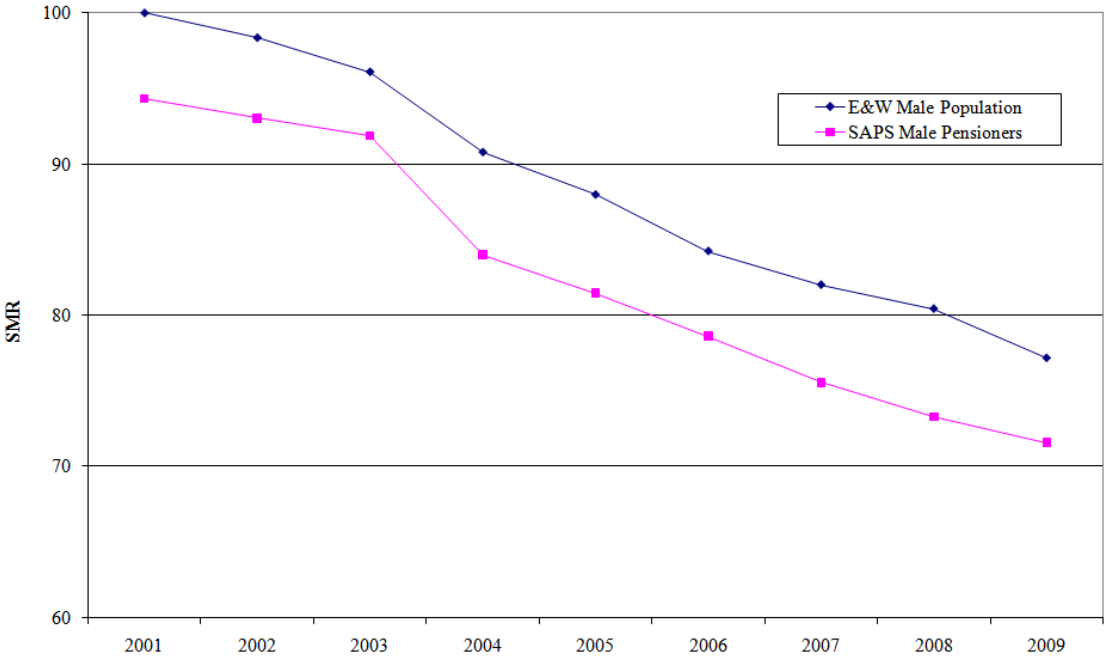
4.6 Table 1 summarises the results in the graph above, in the form of ratios of the SAPS Male Pensioner SMRs compared to the Male E&W population SMRs.

Table 1: Ratio of SAPS Pensioner SMRs to E&W Population SMRs – Males

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Ratio	94.3%	94.6%	95.6%	92.5%	92.6%	93.3%	92.1%	91.1%	92.7%

4.7 Figure 1 and Table 1, show that the Male Pensioner SMRs remain below the Male E&W population SMRs in all years (i.e. the male SAPS dataset has experienced lighter mortality rates). However, the Male Pensioner SMRs do appear to move broadly in line with the Male E&W population SMRs, with the exception of in 2003 (where they converge slightly) and in 2008 (where they diverge slightly).

Figure 4: Improvement in SMRs for SAPS Pensioners and E&W population – Males

4.8 Table 2 summarises the annual improvements, over the pairs of years 2001-2002 to 2008-2009, plotted in the graph above and shows an unweighted arithmetic mean of improvements for the whole period. The mean does not account for the volumes of data in each year and, specifically, the low volume of data in the later years, particularly 2009.

Table 2: Improvements in SMRs – SAPS Pensioners and E&W population – Males

Year	2002	2003	2004	2005	2006	2007	2008	2009	Average
E&W	1.6%	2.3%	5.5%	3.1%	4.2%	2.6%	1.9%	4.1%	3.2%
SAPS	1.4%	1.2%	8.6%	3.0%	3.5%	3.9%	3.0%	2.4%	3.4%

4.9 Figure 2 shows that there is considerable volatility in the improvements from year to year. The volatility is generally greater for the SAPS Male Pensioner dataset, which is to be expected given its smaller size relative to the E&W population. Despite the volatility exhibited, the overall averages for the datasets appear to be relatively close.

4.10 There is a notable improvement in 2004 for the SAPS Male Pensioners and, to a lesser extent, for the E&W Male population. This feature is visible in all the datasets analysed in this paper.

4.11 It is worth reminding users that the SMR approach age-standardises the datasets being compared. Figure 5 below compares the age distribution of the Male Pensioner dataset and that of the E&W Male population.

Figure 5: Age distribution of the two male datasets
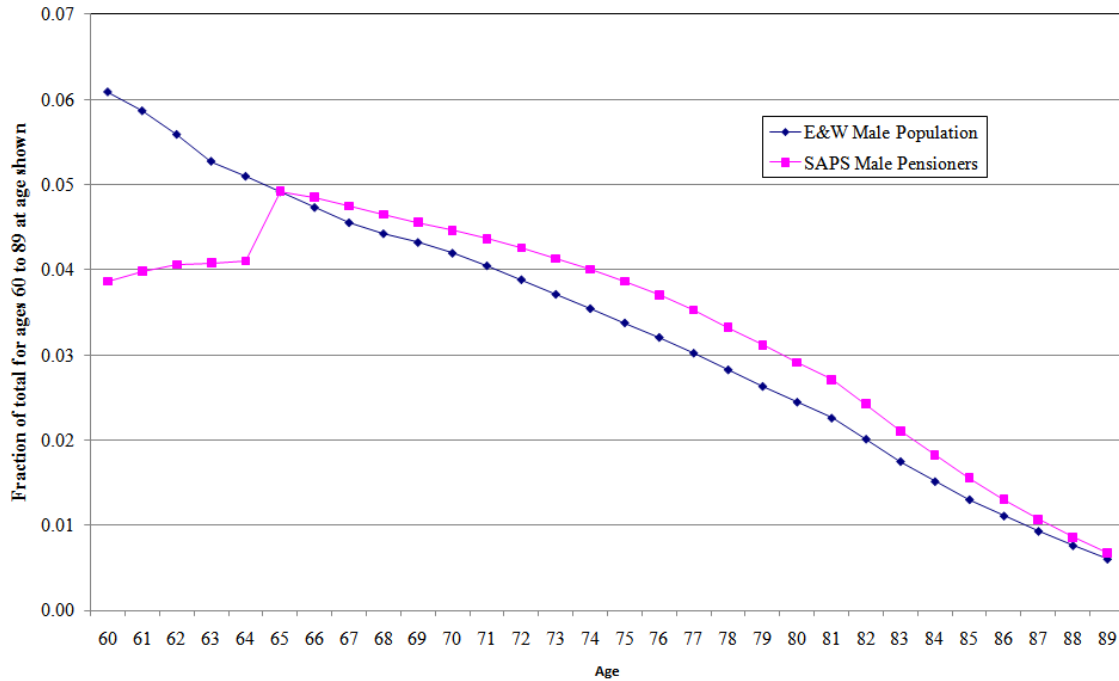
4.12   As illustrated in Figure 5 above, the volume of data for the SAPS Male Pensioner dataset is relatively constant up to age 64 and then, as could be expected, there is a step change at age 65 followed by a gradual decrease in the volume of data. From age 65 the age-structure of the two male datasets is not that dissimilar.

Figure 6: SMRs for SAPS Pensioners and E&W Population – Females
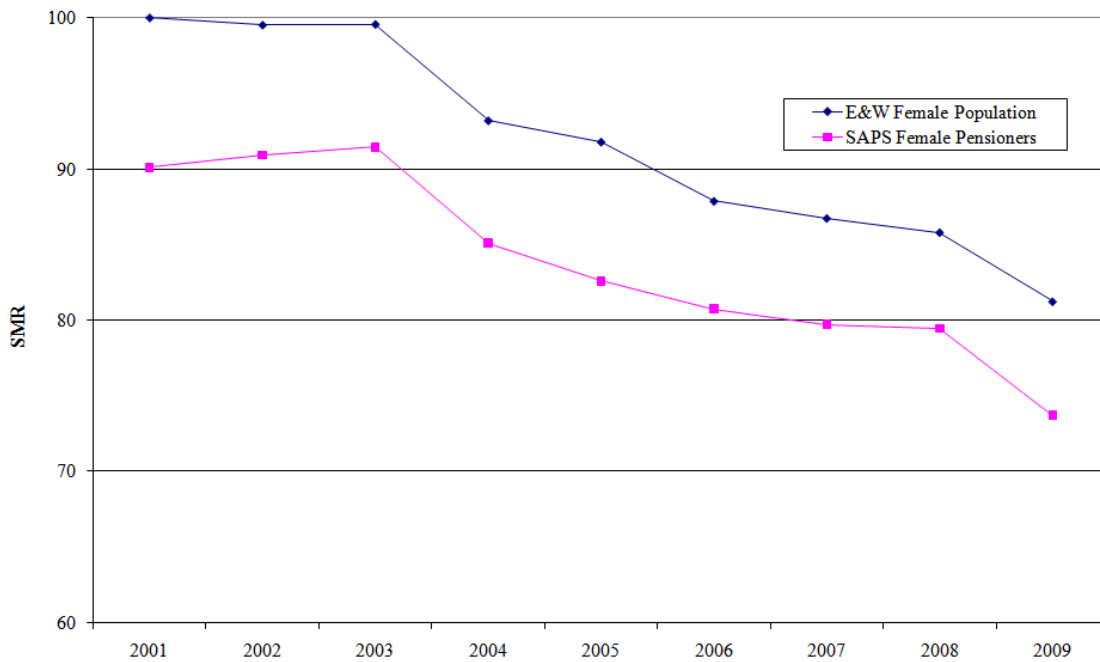
Table 3: Ratio of SAPS Pensioner SMRs to E&W Population SMRs – Females

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Ratio	90.1%	91.4%	91.9%	91.3%	90.0%	91.9%	91.9%	92.6%	90.7%

4.13 For females, the Pensioner SMRs remain below those of the corresponding population SMRs in all years, as was the case for males. These results also appear to show that the SAPS Female Pensioner SMRs move broadly in line with the Female E&W population SMRs, with the exception being in year 2003 (where they converge slightly) and in 2005 (where they diverge slightly).

Figure 7: Improvement in SMRs for SAPS Pensioners and E&W population – Females

Table 4: Improvements in SMRs – SAPS Pensioners and E&W population – Females

Year	2002	2003	2004	2005	2006	2007	2008	2009	Average
E&W	0.5%	0.0%	6.4%	1.5%	4.3%	1.3%	1.1%	5.3%	2.5%
SAPS	-0.9%	-0.6%	7.0%	2.9%	2.3%	1.3%	0.3%	7.2%	2.4%

4.14 The results in Figure 7 and Table 4 above suggest that the improvements in each year for SAPS Female Pensioners are of a similar magnitude to those for the corresponding E&W population and the overall averages for each of the datasets are quite close. Please note that the results for the most recent years, particularly 2009, may be affected by the lower data volumes. Overall they possibly adhere more closely than for the SAPS Male Pensioners, however this is a subjective view.

Figure 8: SMRs for SAPS Dependants and E&W Population – Females

Table 5: Ratio of SAPS Dependants SMRs to E&W Population SMRs – Females

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Ratio	98.7%	101.6%	101.5%	95.1%	97.2%	99.5%	97.3%	100.9%	98.5%

4.15 As has been the case for the Male and Female Pensioners, the SMRs for Female Dependants move broadly in line with the Female E&W population SMRs.

Figure 9: Improvement in SMRs for SAPS Dependants and E&W population – Females

Table 6: Improvements in SMRs – SAPS Dependants and E&W population – Females

| Year	2002	2003	2004	2005	2006	2007	2008	2009	Average
E&W	0.5%	0.0%	6.4%	1.5%	4.3%	1.3%	1.1%	5.3%	2.5%
SAPS	-2.4%	0.1%	12.3%	-0.7%	1.9%	3.6%	-2.6%	7.6%	2.5%

4.16 Figure 9 above suggests that the variability in improvement rates for SAPS Female Dependants, compared to those for the Female E&W population, is greater than for SAPS Female Pensioners. However, this could be expected given the smaller size of the Dependants dataset.

4.17 The results in Figure 8 appear to show that the SMRs for Female Dependants are much closer to those of the Female E&W population compared to the Female Pensioners or, in other words, Female Dependants appear to be experiencing heavier mortality than Female Pensioners. However, care should be taken when interpreting these results.

4.18 The age-structure of the E&W population dataset is considerably different to that of the Female Dependants dataset, but is not that dissimilar to the age-structure of the Female Pensioner dataset, see Figure 10 below. The greatest volume of Female Dependants data is at the higher ages whereas the volume of E&W population data decreases with age. Using the E&W population data as the reference dataset results in a greater weight being given to the mortality experience at the younger ages, whereas the Dependants experience relates more to the older ages.

Figure 10: Age distributions of the three female datasets
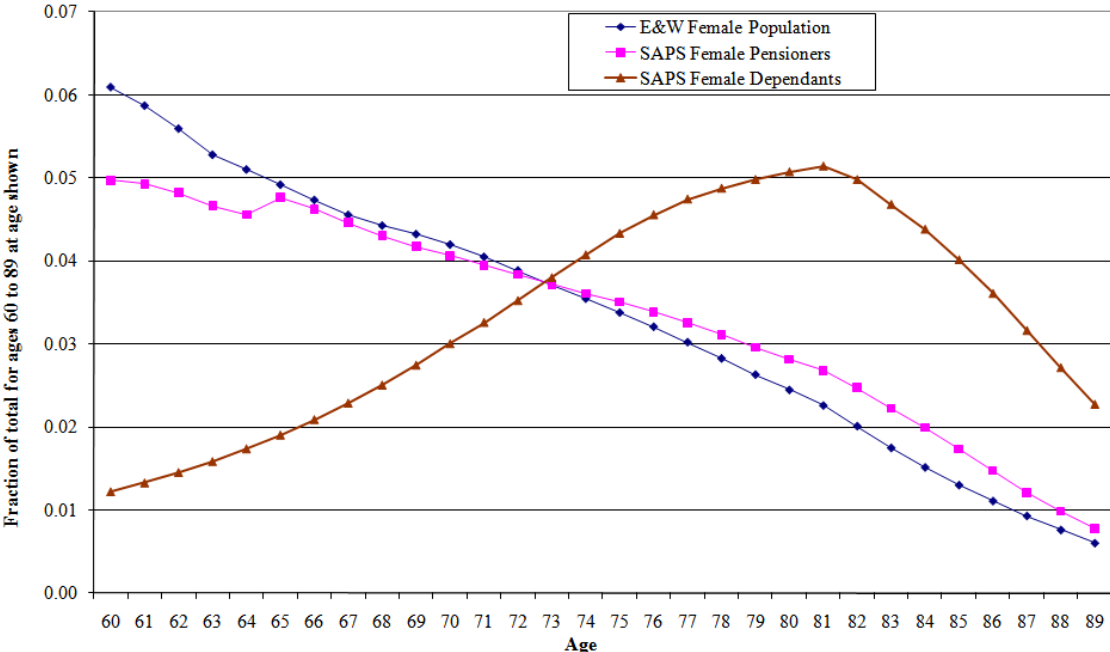
4.19 The "S1" Female Pensioner and Dependants tables show that the mortality experience for these two groups is actually of a similar magnitude from around age 80 and above but tends to be heavier for Dependants for ages below this, down to age 60 which is in the age range being analysed, see Figure 11 below. Hence, giving greater weight to the younger ages will take greater account of the heavier mortality, for Dependants, and relatively less weight will be given to those ages where mortality is more closely aligned to the Pensioner experience. Overall this gives the appearance that SMRs for Female Dependants are closer to those of the Female E&W population compared to the Female Pensioners, which may be misleading.

Figure 11: Ratio of S1PFL to S1DFL
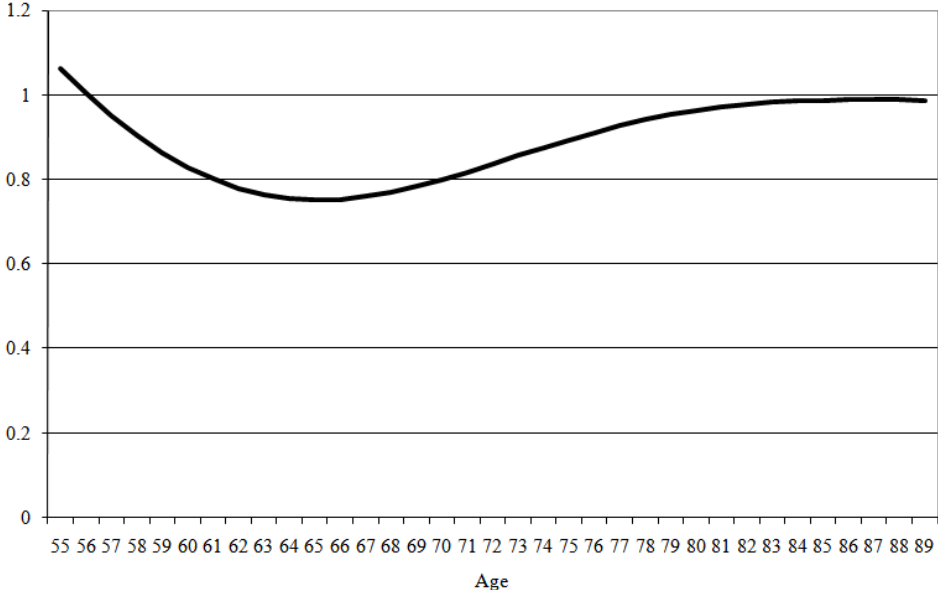
5. Comparison of experience by pension amount in the SAPS dataset

5.1 This section analyses the trends and improvements in SMRs, for Male and Female Pensioners in the SAPS dataset with pensions of different sizes. The reference dataset for age-standardisation purposes is the Male or Female, as appropriate, SAPS Pensioner data (not split by pension amount) in 2001. An age-range of 60 to 89 has been used.

5.2 For Male Pensioners the data has been split between those pensioners with pensions of less than £4,500 p.a. and those with pensions of £4,500 p.a. or more. For Female Pensioners the data has been split between those pensioners with pensions of less than £1,500 p.a. and those with pensions of £1,500 p.a. or more. These datasets have been created by combining the data produced for the pension amounts analysis in the Working Paper 51, such that approximately 50% of the data falls in each of the datasets. A comparison by pension amount has not been carried out for Female Dependants.

5.3 The SMRs are presented in the graphs below. A comparison of the annual rate of improvement in the SMRs follows each of the SMR charts.

Figure 12: SMRs for SAPS Pensioners split by amount – Males
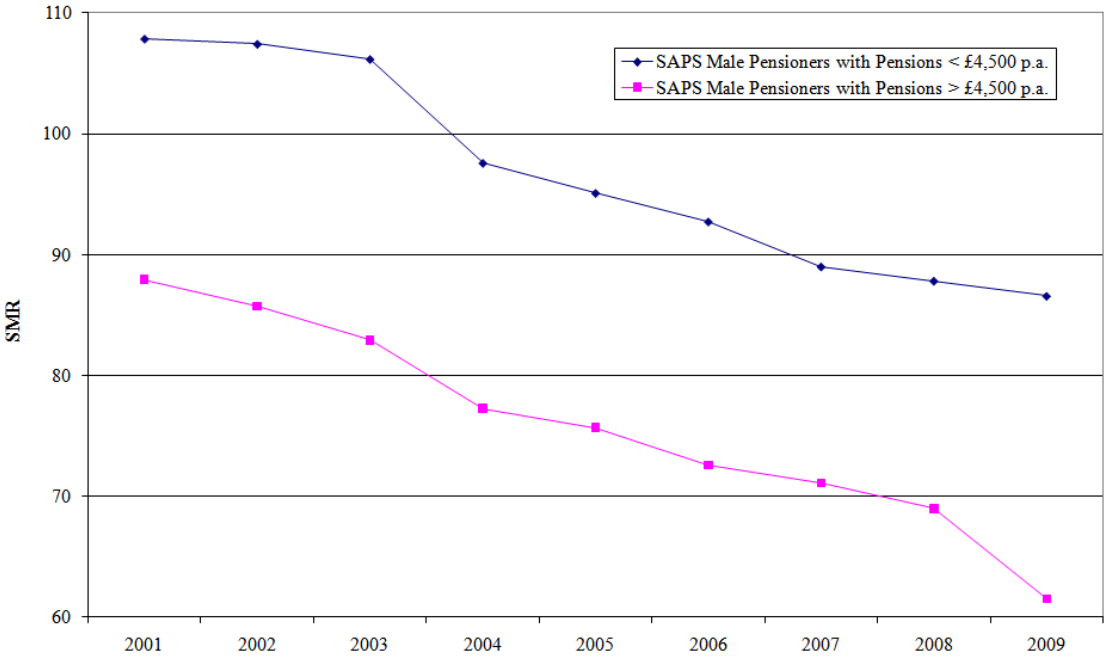

5.4 Table 7 summarises the results in the graph above, in the form of ratios of the SAPS Male Pensioner SMRs for those with pensions less than £4,500 p.a. compared to the SMRs for those with pensions of £4,500 p.a. or more.

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Table 7: Ratio of SMRs for Pensions ≥£4,500 p.a. to SMRs for Pensions <£4,500 p.a. – Males

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Ratio	81.5%	79.8%	78.1%	79.2%	79.6%	78.2%	79.9%	78.5%	71.0%

5.5   The results in Figure 12 show that SMRs for SAPS Male Pensioners with pensions less than £4,500 p.a. have been greater in every year (i.e. they have experienced heavier mortality) than the SMRs for those with pensions of £4,500 p.a. or more. Please note that the split at £4,500 p.a. has been applied across all years, it has not been adjusted for the effect of inflation.

Figure 13: Improvement in SMRs for SAPS Pensioners split by pension amount – Males
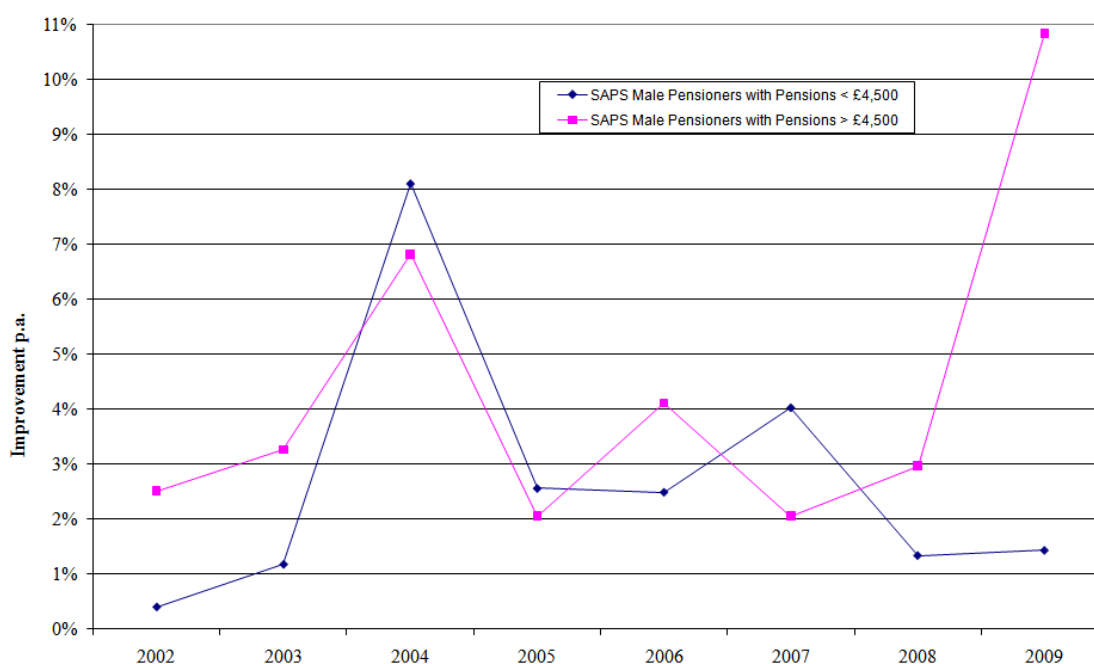
5.6   Table 8 summarises the annual improvements plotted in the graph above, over the pairs of years 2001-2002 to 2008-2009, and shows an unweighted arithmetic mean of improvements for the whole period. The mean does not account for the volumes of data in each year and, specifically, the low volume of data in the later years, particularly 2009.

Table 8: Improvements in SMRs – Pensions ≥£4,500 p.a. and Pension <£4,500 p.a. – Males

Year	2002	2003	2004	2005	2006	2007	2008	2009	Average
< £4,500	0.4%	1.2%	8.1%	2.6%	2.5%	4.0%	1.3%	1.4%	2.7%
> £4,500	2.5%	3.3%	6.8%	2.0%	4.1%	2.1%	3.0%	10.9%	4.3%

5.7   The improvement in 2004, noted in paragraph 4.10, can be seen in both subsets of the Male Pensioner data. However, the improvements for Male Pensioners receiving pensions of different sizes do not appear to be that similar and the overall averages are not that close, although it is not possible to comment on the statistical significance of the differences.

5.8   The large difference in the improvements in 2009 may be due to the small size of the datasets, which is likely to have resulted in high variance in the SMRs for that year. In fact, if the 2009 improvements are excluded from the overall averages then the difference between the two datasets reduces considerably.

Figure 14: SMRs for SAPS Pensioners split by amount – Females
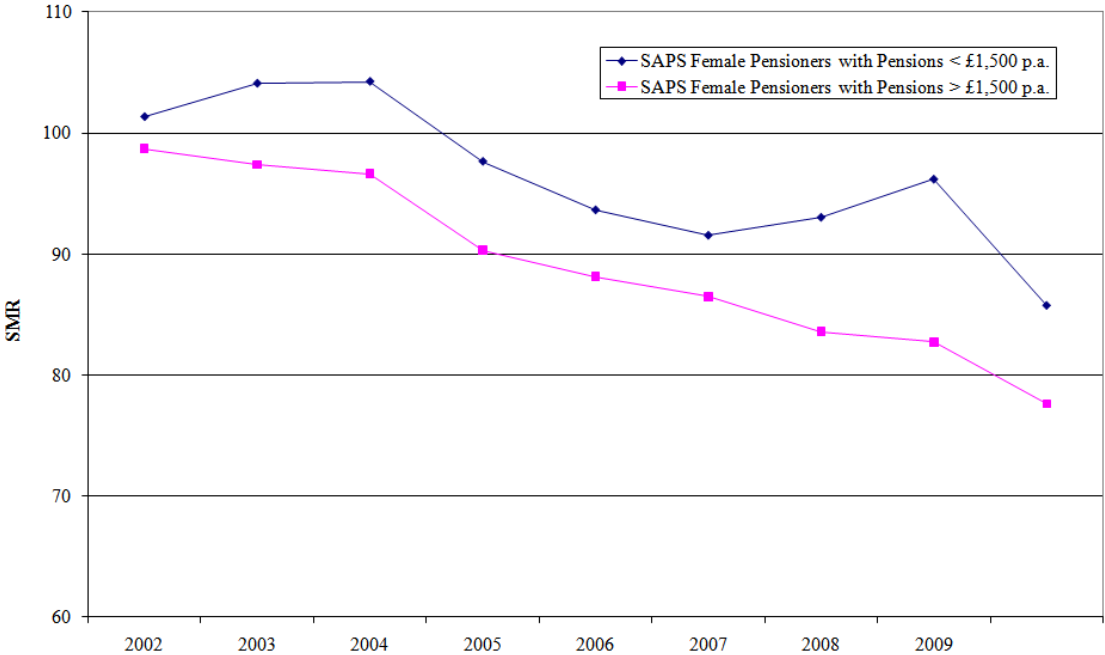
Table 9: Ratio of SMRs for Pensions ≥£1,500 p.a. to SMRs for Pensions <£1,500 p.a. – Females

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Ratio	97.4%	93.6%	92.7%	92.5%	94.1%	94.5%	89.9%	86.0%	90.5%

5.9   Figure 14 suggests that there is less differentiation for SAPS Female Pensioners receiving pensions of different sizes compared to Male Pensioners. This is not unexpected given the much lower levels of pensions for females compared to males. For females a split at £1,500 p.a. is required rather than at £4,500 p.a. for males in order to form two groups with sufficient data for a meaningful comparison to be made. As for males, the split has not been adjusted for the effect of inflation and is fixed at £1,500 p.a. across all years.

5.10   The results above also show that the SMRs move broadly in line with each other between the years 2002 and 2006, but diverge in 2007 and 2008, before converging

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again in 2009. As noted previously, care should be taken when considering the results for later years due to the lower data volumes, particularly in 2009.

Figure 15: Improvement in SMRs for SAPS Pensioners split by pension amount – Females

Table 10: Improvements in SMRs – Pensions ≥£1,500 p.a. and Pension <£1,500 p.a. – Females

Year	2002	2003	2004	2005	2006	2007	2008	2009	Average
< £1,500	-2.7%	-0.1%	6.3%	4.1%	2.2%	-1.6%	-3.4%	10.8%	2.0%
> £1,500	1.3%	0.8%	6.6%	2.4%	1.9%	3.3%	1.0%	6.2%	2.9%

5.11 For Female Pensioners with pensions of different sizes, the improvements appear to be more in line with each other than is the case for Male Pensioners and the overall averages for the two datasets are closer.

5.12 The Committee notes that it cannot draw any conclusions on trends by social class or indeed comment on whether pension size is a good proxy to social class from the analyses of SAPS data presented above.

6. Comparison of experience in the SAPS dataset for males and females

6.1 This section analyses the trends and improvements in SMRs, for SAPS Male and Female Pensioner datasets. The reference dataset for age-standardisation purposes is the Male SAPS Pensioner data in 2001. An age-range of 60 to 89 has been used. No analysis has been carried out on the SAPS Dependants.

6.2 The SMRs are presented in the graphs below. A comparison of the annual rate of improvement in the SMRs follows each of the SMR charts.

Figure 16: SMRs for Male and Female SAPS Pensioners
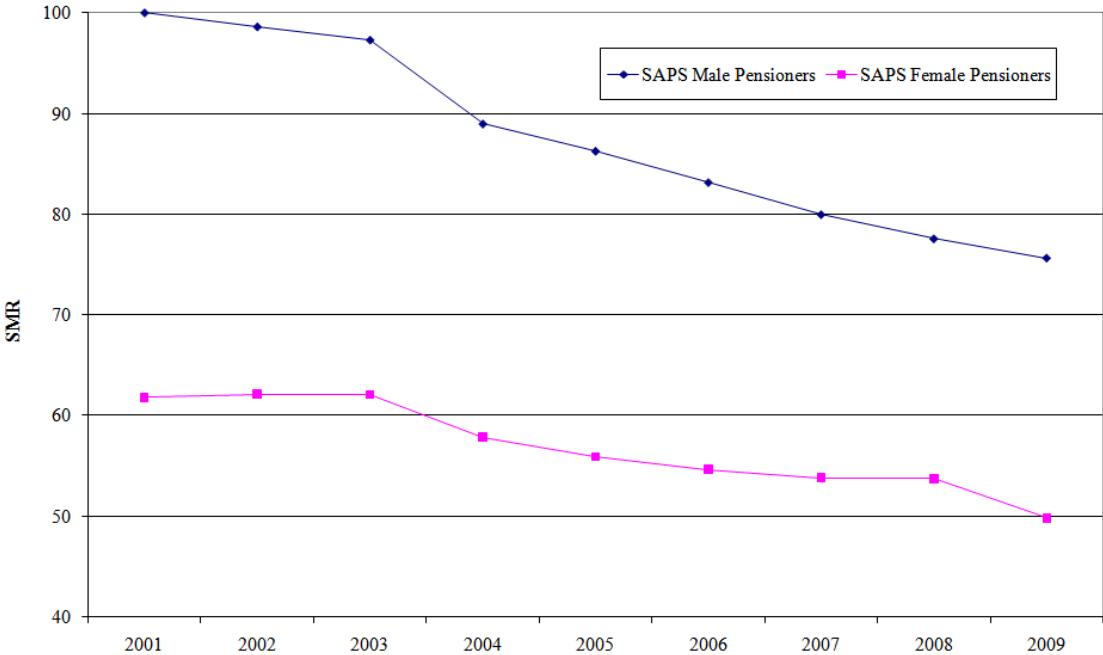
6.3 Table 11 summarises the results in the graph above, in the form of ratios of the SMRs for SAPS Male Pensioners compared to the SMRs for SAPS Female Pensioners.

Table 11: Ratio of SMRs for Male SAPS Pensioners to Female SAPS Pensioners

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Ratio	61.8%	63.0%	63.8%	65.0%	64.8%	65.7%	67.3%	69.3%	65.8%

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Figure 17: Improvement in SMRs for SAPS Male and Female Pensioners
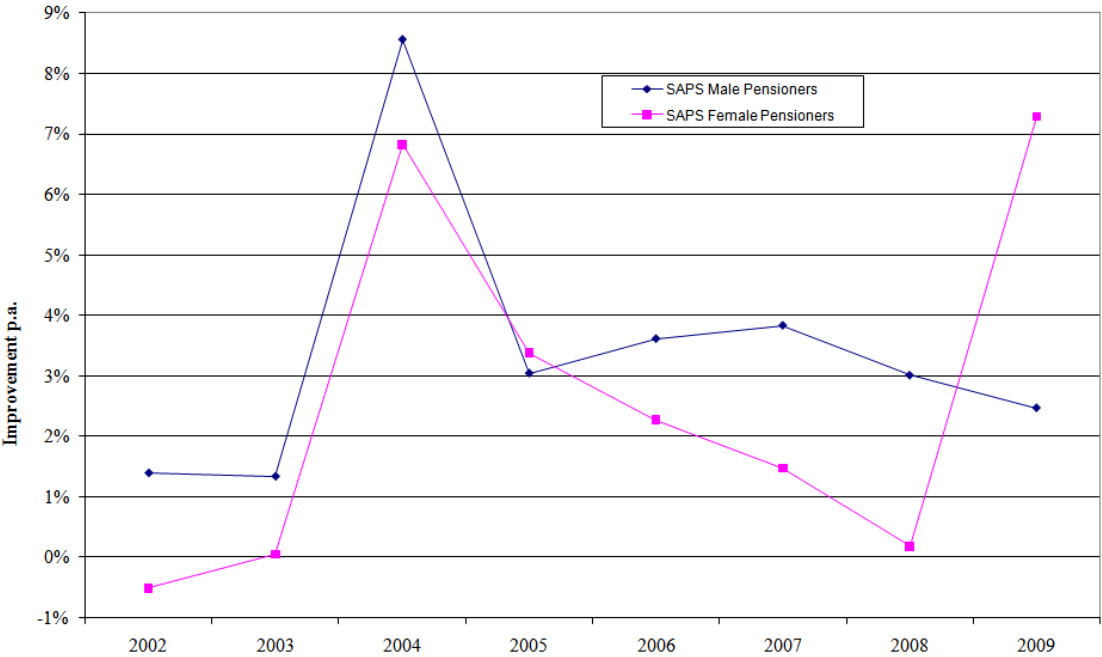
Table 12: Improvements in SMRs – SAPS Male Pensioners and Female Pensioners

Year	2002	2003	2004	2005	2006	2007	2008	2009	Average
Males	1.4%	1.3%	8.6%	3.0%	3.6%	3.8%	3.0%	2.5%	3.4%
Females	-0.5%	0.0%	6.8%	3.4%	2.3%	1.5%	0.2%	7.3%	2.6%

6.4   Overall the results in Figure 17 imply that males have been experiencing a greater level of improvement compared to females over the last 8 years. Indeed, Table 12 shows that the annual rates of mortality improvement, as measured by improvements in the SMRs, have been greater for males than females each year with the exception of 2005 where females had a marginally higher improvement rate and 2009. Again, it should be noted that the volume of data was much less for 2009 and so this may have had an impact on the observed rates of improvement.

7.   Conclusion and Next Steps

7.1   Whilst it is not possible to draw conclusions regarding the statistical significance of the results that have been presented in this paper, the Committee hopes that readers will find the analyses of interest and of use.

7.2   The comparisons that have been presented seek to demonstrate the relative improvements in mortality for the SAPS dataset and the E&W population and for various subsets of the SAPS dataset. There tends to be considerable variation in improvements for individual years, particularly for the most recent years where the data volumes are lower. The averages of the improvements over the period have also been presented for each of the datasets being compared.

7.3   In particular, the average improvements for the SAPS dataset and the E&W population, over the period analysed, are relatively close. Although it is not possible to comment on the statistical significance of the difference, it is hoped that the analysis may be valuable, and give some comfort, to those using mortality improvements seen in the E&W population as a proxy for improvements in a dataset of pensioners and dependants of occupational pension schemes.

7.4   The comparisons of the subsets of the SAPS Pensioner datasets by amount and gender appear to show larger differences in the overall improvements. In particular, the comparison of improvements experience for Male and Female Pensioners indicates that overall males have experienced a greater level of improvement compared to females.

7.5   A number of limitations of the approach used to analyse improvements have been highlighted throughout this paper, including the impact of the age-structure of the reference population and the inability to comment on the statistical significance of the results.

7.6   The Committee was considering whether to undertake further research into alternative approaches that will enable a more statistically rigorous analysis feasible. However, subsequent feedback from SAPS members has indicated that the high level analysis presented in this paper is valuable and that further research is not considered to be high priority.

Appendix A: History of SAPS Working Papers

Working Paper 29	Data received by 30 June 2006, covering the period 2000 - 2004
Working Paper 35	Data received by 30 June 2007, covering the period 2000 – 2006. This dataset underlies the "S1" series.
Draft Working Paper (March 2009)[1]	Data received by 30 June 2008, covering the period 2000 - 2007
Working Paper 44	Data received by 30 June 2009, covering the period 2001 - 2008
Working Paper 51	Data received by 30 June 2010, covering the period 2002 - 2009

[1] This paper was issued in draft form to members in March 2009 and was intended to be finalised and published in Autumn 2009. However, for a minority of schemes data was found to be unreliable and so was resubmitted. As a result this paper was not finalised.

Appendix B: Summary of the data for the period 2001 to 2009

Males – Data for each year

	Pensioners Lives	Pensioners Amounts (£'000)	Average Amounts (Pensioners) (£ pa)	Dependants Lives	Dependants Amounts (£'000)	Average Amounts (Dependants) (£ pa)
Exposure						
2001	918,990	5,787,652	6,298	19,274	30,963	1,606
2002	1,304,602	8,530,790	6,539	29,291	47,531	1,623
2003	1,157,972	7,525,967	6,499	27,975	49,849	1,782
2004	1,348,943	9,421,966	6,985	31,723	48,902	1,542
2005	1,424,648	10,451,587	7,336	36,645	56,458	1,541
2006	1,379,603	10,644,865	7,716	37,418	58,800	1,571
2007	1,190,798	9,876,676	8,294	30,103	52,317	1,738
2008	915,671	8,234,636	8,993	23,041	43,534	1,889
2009	554,538	4,756,112	8,577	14,694	26,368	1,795
Deaths						
2001	34,169	155,696	4,557	841	1,059	1,259
2002	49,923	233,134	4,670	1,347	1,813	1,346
2003	45,479	206,468	4,540	1,227	1,873	1,526
2004	50,653	255,729	5,049	1,366	2,137	1,565
2005	52,516	287,505	5,475	1,544	2,338	1,514
2006	50,039	287,015	5,736	1,562	1,961	1,256
2007	43,251	265,732	6,144	1,401	1,901	1,357
2008	33,364	222,261	6,662	1,096	1,483	1,353
2009	20,791	139,369	6,703	655	828	1,264

N.B. The figures presented for 2001 are consistent with those presented in Working Paper 44, based on data collected by 30 June 2009, and the figures for the remaining years are consistent with those presented in the Working Paper 51, based on data collected by 30 June 2010.

Females – Data for each year

	Pensioners Lives	Pensioners Amounts (£'000)	Average Amounts (Pensioners) (£ pa)	Dependants Lives	Dependants Amounts (£'000)	Average Amounts (Dependants) (£ pa)
Exposure						
2001	429,394	1,165,394	2,714	326,403	821,618	2,517
2002	603,740	1,665,835	2,759	459,344	1,253,601	2,729
2003	582,466	1,572,073	2,699	401,404	1,180,323	2,940
2004	725,742	2,129,153	2,934	490,322	1,487,952	3,035
2005	838,260	2,586,949	3,086	523,294	1,670,144	3,192
2006	829,764	2,712,016	3,268	505,452	1,701,447	3,366
2007	643,413	2,300,170	3,575	447,724	1,658,414	3,704
2008	464,696	1,866,562	4,017	362,098	1,408,405	3,890
2009	304,385	1,301,026	4,274	234,271	868,838	3,709
Deaths						
2001	10,534	26,235	2,491	15,464	33,630	2,175
2002	15,401	38,146	2,477	23,180	55,862	2,410
2003	14,818	34,567	2,333	20,873	55,513	2,660
2004	18,577	48,857	2,630	23,843	64,872	2,721
2005	21,457	58,487	2,726	27,002	76,775	2,843
2006	21,206	61,785	2,914	26,489	78,650	2,969
2007	17,722	53,385	3,012	24,188	78,904	3,262
2008	13,748	45,606	3,317	20,824	70,599	3,390
2009	8,892	32,345	3,638	13,420	44,122	3,288

N.B. The figures presented for 2001 are consistent with those presented in Working Paper 44, based on data collected by 30 June 2009, and the figures for the remaining years are consistent with those presented in the Working Paper 51, based on data collected by 30 June 2010.