Continuous Mortality Investigation
Technical Support and Research Committee
of the Pensions Board
Working Paper 9
An analysis of the preliminary results of the mortality of male pensioners of self-administered pension schemes for the period 2000 to 2002 as reported in Working Paper 4

November 2004

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1 Introduction

1.1 This Working Paper follows on from Working Paper 4 published in March 2004. In that paper we aimed to make available to scheme actuaries and others as soon as possible the results of the data collected over the period from early 2003 (the start of the project) to February 2004.

1.2 Working Paper 4 contains 18 tables of summarised data with comparisons of actual to expected deaths (or pension amounts ceasing) as measured against the a(90) and PA(90) tables each rated down 2 years and against the appropriate "92" Series table with original improvement projections, but without cohort improvement projections. The paper contained no detailed comment or detailed analysis of the data. That was left to follow and this is the first paper aiming to add commentary to the Working Paper 4 data.

1.3 This Working Paper, due to pressure of time, concentrates on the male data, although some commentary on female data is included. We hope to produce a further paper concentrating on the female data in 2005.

1.4 There is a danger of reading too much into data collected during a 12 month period, albeit that it relates to three calendar years (2000 to 2002), and it will be seen in section 9 below that standard tables are some years away. Nevertheless, the amount of data collected to date is large (compared to that in the life office studies) and it demonstrates features that may be of importance to scheme actuaries (and others), not least in the analysis of results by amounts.

1.5 It is anticipated that updated tables of summarised data will be produced annually (with minimal commentary) so that the progress of the investigation can be followed. It is currently intended that Working Papers with commentary on results will be published as and when it is considered that there is particular added value in so doing.

2 Executive summary

2.1 Data

The data cover a period from calendar year 2000 to 2002. There are over 2.35 million years of exposed to risk, with amounts exposed exceeding £11.88 billion. The data is derived from 99 schemes and covers 50,951 male deaths and 34,565 female deaths.

2.2 Overall levels of mortality compared with "92" Series

The retirements under consideration in the current Working Paper include all retirements. However, there is evidence that the levels of mortality are higher than would be expected on the basis of the "92" Series projected to the years under review. They are significantly higher than the "92" Series allowing for the cohort effect. It could be that the high mortality levels are a result of the particular schemes (i.e. those with at least 500 pensioner lives) that participate in

the study being more heavily weighted towards 'blue collar' workers than the whole of the self-administered schemes population.

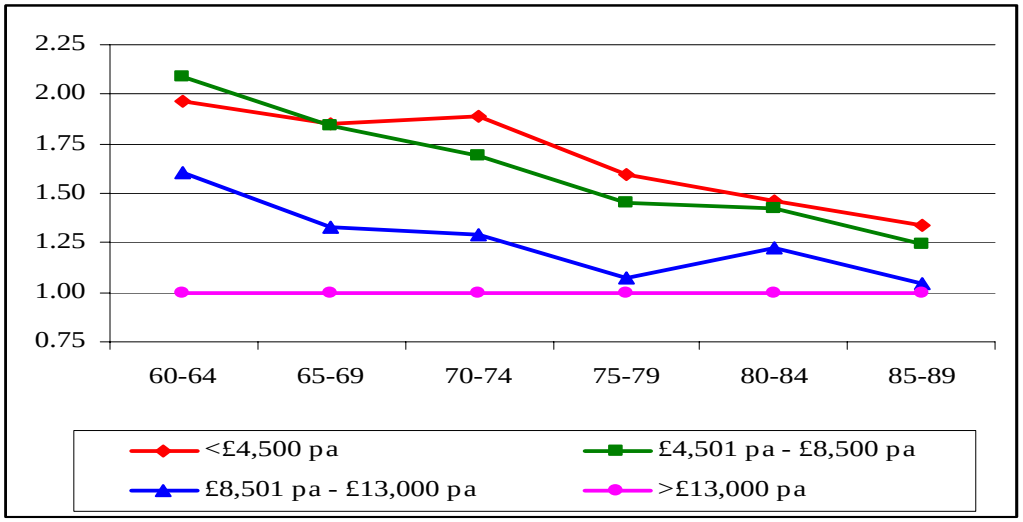
It should be noted that approximately 50% of the data comes from only six schemes. We have analysed the data separately for these six schemes and this has shown that their experience is similar, but not identical, to the overall experience. (For the six schemes in aggregate, measured against PMA92 and PFA92, actual/expected was 121% for males and 123% for females, compared to overall percentages of 110% and 116% for males and females respectively. Average pensions for the six largest schemes were £6,289 pa males and £2,561 pa females, compared to overall averages of £6,629 pa and £2,744 pa for males and females respectively.) We have, therefore, assumed that their inclusion has not produced any undue bias on the overall results, although they may well have caused some bias in the analyses by amounts and by industry classification.

This Working Paper concentrates on comparisons with PML92 and PFL92 tables rather than with amounts tables.

2.3 **Amounts effect**

Our most significant findings relate to the extent to which mortality varies with the amount of the pension in payment. The volume of data permits us to divide the "male - all retirements - lives" group into four subsections by annual amount of pension. The following chart shows the level of mortality experienced by those with smaller pensions relative to a base line of the experience of those with the largest pensions.

Figure 1



An analysis of life office pensioner data used in the most recent study (*C.M.I.R.* **21**) shows that average pensions for insured pensioners are £2,373 pa for male normal retirements and £2,572 pa for male early retirees. These compare with the average pension for males of £6,629 pa in this study. The populations of pensioners of insured schemes and those of self-administered schemes are therefore so heterogeneous that standard tables based on life office data need to be treated with great care when being used for self-administered schemes.

2.4 **Cohort effect**

A lack of historical data makes an assessment of the extent of the cohort effect impossible (see *CMI Working Paper 1* and *Willets (2004)* for background on the cohort effect). However, the shape of the mortality curve for those on higher pensions mirrors more closely the shape of the curve for PML92 with the cohort projection whilst the shape of the mortality curve for those on smaller pensions mirrors more closely the shape of the PML92 curve without the cohort effect.

2.5 **Industry effect**

Our findings suggest that, although the amounts effect can make a significant contribution towards explaining the variations in mortality that are observed between industries, it does not provide a complete explanation.

3 Analysis of results by amount – preliminary

3.1 On a first look at the results broken down by industrial grouping in Figure 2 below, it was evident that the mortality rates differed greatly by industry group. We were concerned, however, that there may be some underlying factors, other than industry grouping, that may be affecting the results. In particular, an examination of average amount of pension for each industry grouping showed that those with lower than average pension amounts generally suffered higher mortality. However, two of the six groups considered are exceptions and so too much should not be read into this tentative conclusion. It is not clear why General Industries should be an exception. The other exception is Local Authority, where mortality is higher than might be expected given the average pension – but this could be explained if the average period of pensionable service were longer, a not unreasonable assumption. Also, the Local Authority scheme data is based on relatively few schemes (primarily those with a valuation date of 31 March 2002) and these, comprising a particular geographic grouping, may well not be representative of all such schemes. A factor potentially affecting all groups is geographic location within the UK, but our data does not permit such an analysis.

Figure 2

Industry Grouping	Average Pension	100A/E on PML92
Basic Industries	£4,390 pa	115
General Industries	£4,410 pa	95
Local Authorities	£4,420 pa	132
Cyclical Services	£6,670 pa	105
Information Technology	£8,220 pa	101
Financials	£13,330 pa	92

3.2 We therefore decided to analyse the data by grouping according to amount of pension. Deciding on the groupings was not straightforward. We initially looked at ignoring individuals with pensions of less than £1,000 pa, as they showed a slight anomaly in that their mortality was marginally better than the next highest group that we considered. This could be a result of small pensions from short periods of service which could be a false reflection of the total pension a pensioner was receiving. On reflection, however, we decided that we would be jettisoning too much data by omitting these pensions and we reassessed the groupings to be considered.

3.3 In order to analyse better the top end of the spectrum, where the variation of mortality is more important because of the higher risks associated with large pensions, we decided to split the data into four bands so that, on a lives exposed to risk basis, around 50% were in the lowest band, 25% in the second band and 12.5% in each of the top two bands. With rounding of band boundaries, the data analysed is shown below in Figure 3.

Figure 3

Distribution of amounts of pension (Lives basis)

All schemes to 03/03/2004
All industries
All pension types
Exposure years 2000 to 2002

Males exposure

age band	£0 - £4,500	£4,501 -£8,500	£8,501 - £13,000	over £13,000	% by age
20-24	88%	8%	5%	0%	0.01%
25-29	78%	8%	4%	10%	0.01%
30-34	71%	18%	6%	6%	0.06%
35-39	63%	22%	7%	8%	0.19%
40-44	52%	29%	9%	11%	0.46%
45-49	18%	11%	4%	67%	2.26%
50-54	25%	20%	18%	36%	7.34%
55-59	29%	25%	22%	25%	11.00%
60-64	38%	29%	19%	15%	15.13%
65-69	54%	25%	13%	8%	18.72%
70-74	63%	21%	10%	6%	17.37%
75-79	69%	18%	9%	4%	14.27%
80-84	70%	19%	8%	3%	8.21%
85-89	71%	19%	8%	2%	3.79%
90-94	71%	19%	8%	1%	1.04%
95-99	72%	21%	7%	0%	0.14%
100-104	79%	17%	5%	0%	0.01%
	52%	22%	13%	13%	100%
Total exposure	721,005	312,613	185,154	177,185	1,395,957

3.4 Figure 4 shows the same breakdown by deaths. The lighter mortality in the higher bands results in the 50/25/12.5/12.5 split, as may be expected, does not survive on this breakdown.

Figure 4

Males deaths

age band	£0 - £4,500	£4,501 -£8,500	£8,501 - £13,000	over £13,000	% by age
20-24	94%	6%	0%	0%	0.03%
25-29	100%	0%	0%	0%	0.00%
30-34	100%	0%	0%	0%	0.01%
35-39	64%	27%	9%	0%	0.04%
40-44	43%	45%	12%	0%	0.12%
45-49	49%	34%	16%	2%	0.26%
50-54	42%	30%	19%	9%	0.96%
55-59	34%	36%	17%	12%	2.19%
60-64	41%	33%	16%	10%	4.96%
65-69	58%	26%	10%	7%	9.57%
70-74	68%	20%	7%	5%	15.75%
75-79	72%	17%	6%	5%	22.27%
80-84	70%	18%	7%	5%	20.36%
85-89	71%	18%	6%	4%	15.61%
90-94	69%	18%	7%	5%	6.44%
95-99	74%	16%	5%	5%	1.32%
100-104	69%	21%	5%	5%	0.11%
	67%	20%	8%	5%	100%
Total deaths	33,895	10,343	3,966	2,747	50,951

4 Analysis of results by amounts – tentative conclusions based on data received to date

4.1 The four bands chosen for more in-depth analysis are compared graphically in Figures 5 and 6, measured by the ratio of actual to expected deaths on the tables PML92(Calendar year) and PML92(Calendar year) short cohort.

Figure 5

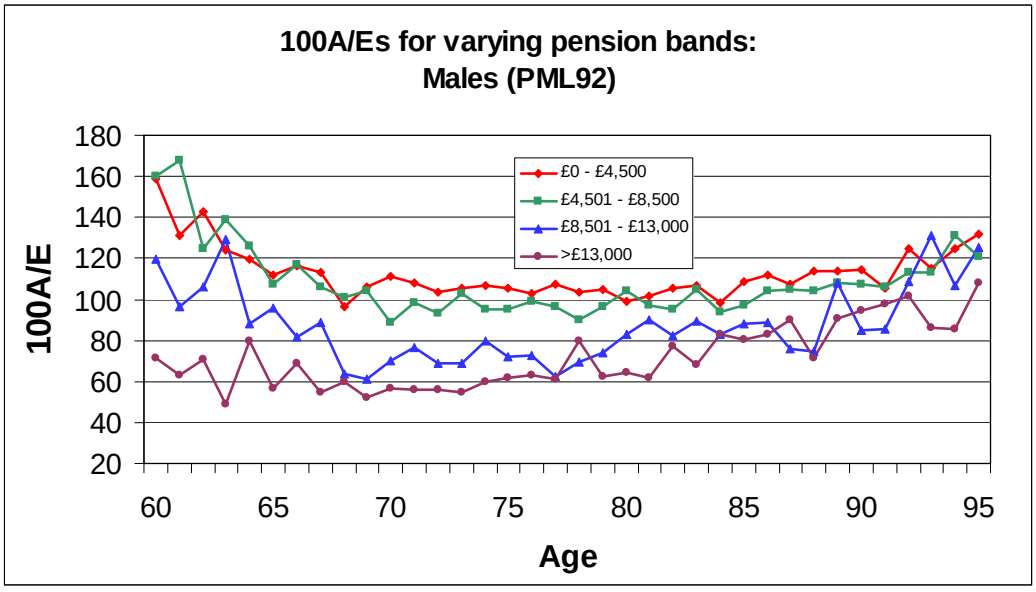
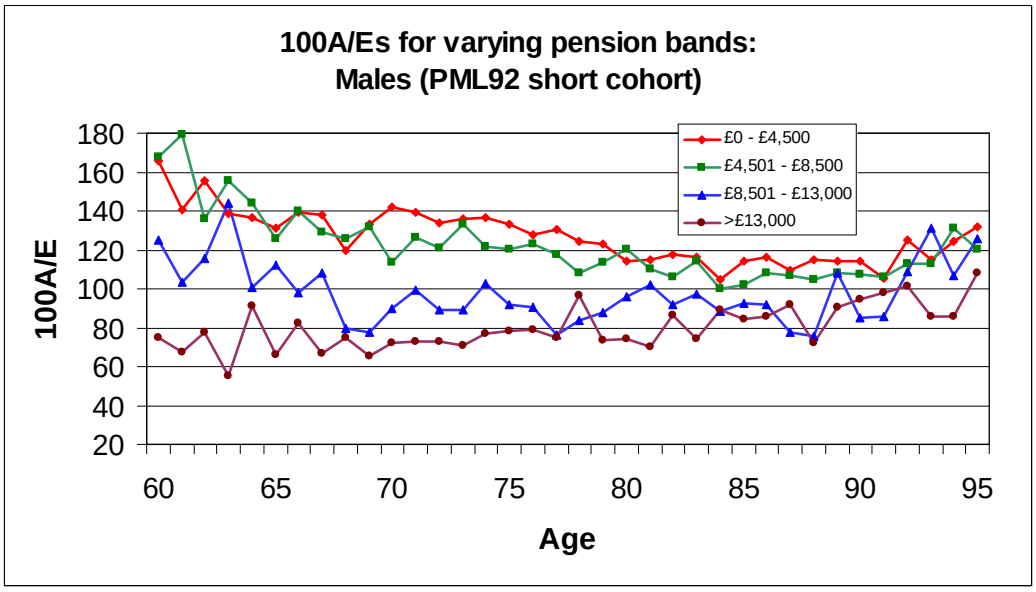


Figure 6



4.2 Lack of data at some ages and for some bands results in trends not being obvious from these graphs. Figures 7 and 8 have been constructed by aggregating data into five year groups and then plotting trendlines (using third order polynomials). From these the discrepancy in mortality between the bands is more obvious. Clearly, as the investigation continues more data will become available and more definitive pronouncements on the effect of pension amounts on mortality will be able to be made.

Figure 7

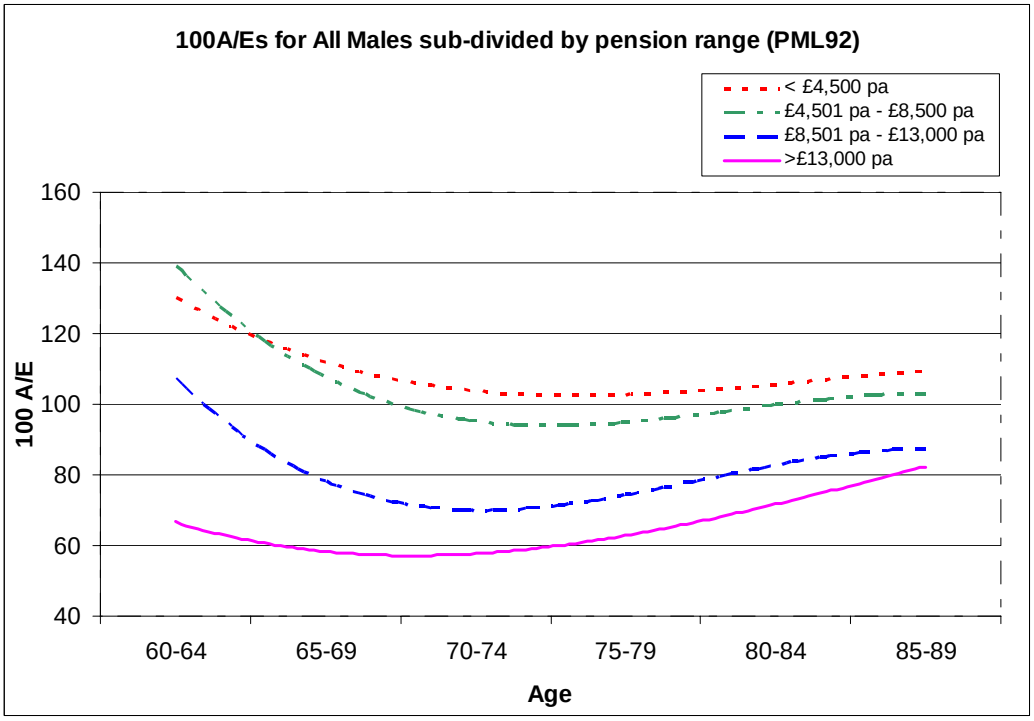
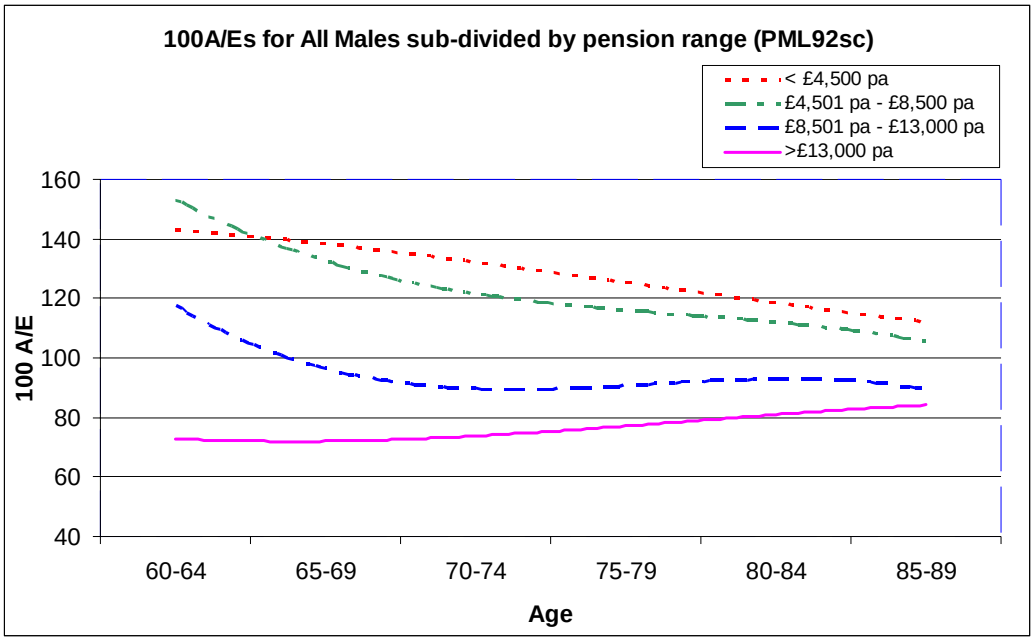


Figure 8



4.3 The data in five year groups underlying Figures 7 and 8 are given in Figure 9.

Figure 9

All males						
Age group	Exposed to risk	Actual deaths	Expected deaths PML92	Expected deaths PML92sc	100A/E PML92	100A/E PML92sc
60-64	218,252	2,525	2,133	1,937	118	130
65-69	269,941	4,874	4,960	4,059	98	120
70-74	249,257	8,028	8,277	6,429	97	125
75-79	206,717	11,348	11,659	9,569	97	119
80-84	119,171	10,373	10,575	9,478	98	109
85-89	55,167	7,953	7,502	7,314	106	109

Under £4,500 pa						
Age group	Exposed to risk	Actual deaths	Expected deaths PML92	Expected deaths PML92sc	100A/E PML92	100A/E PML92sc
60-64	79,805	1,037	788	715	132	145
65-69	140,457	2,818	2,614	2,137	108	132
70-74	152,047	5,432	5,080	3,951	107	137
75-79	137,698	8,158	7,785	6,400	105	127
80-84	80,202	7,264	7,120	6,387	102	114
85-89	37,554	5,662	5,108	4,981	111	114

£4,501 pa - £8,500 pa						
Age group	Exposed to risk	Actual deaths	Expected deaths PML92	Expected deaths PML92sc	100A/E PML92	100A/E PML92sc
60-64	60,340	829	594	539	140	154
65-69	65,147	1,262	1,181	967	107	130
70-74	50,815	1,603	1,674	1,298	96	123
75-79	36,177	1,938	2,034	1,666	95	116
80-84	21,650	1,911	1,927	1,726	99	111
85-89	10,316	1,446	1,400	1,364	103	106

£8,501 pa - £13,000 pa						
Age group	Exposed to risk	Actual deaths	Expected deaths PML92	Expected deaths PML92sc	100A/E PML92	100A/E PML92sc
60-64	40,339	417	389	354	107	118
65-69	33,553	469	607	497	77	94
70-74	24,323	584	801	620	73	94
75-79	17,613	695	990	810	70	86
80-84	9,627	727	851	761	85	96
85-89	4,170	491	567	552	87	89

Over £13,000 pa						
Age group	Exposed to risk	Actual deaths	Expected deaths PML92	Expected deaths PML92sc	100A/E PML92	100A/E PML92sc
60-64	37,768	242	362	330	67	73
65-69	30,785	325	559	457	58	71
70-74	22,072	409	723	559	57	73
75-79	15,230	557	849	692	66	80
80-84	7,691	471	677	604	70	78
85-89	3,127	354	427	416	83	85

4.4 Figures 10 and 11 show another representation of the data in the form of crude *mu*s (i.e. the observed rates of mortality at each age) for the top two bands against those for the bottom two bands and for the top band against the bottom band. Note than the vertical scale is logarithmic.

Figure 10

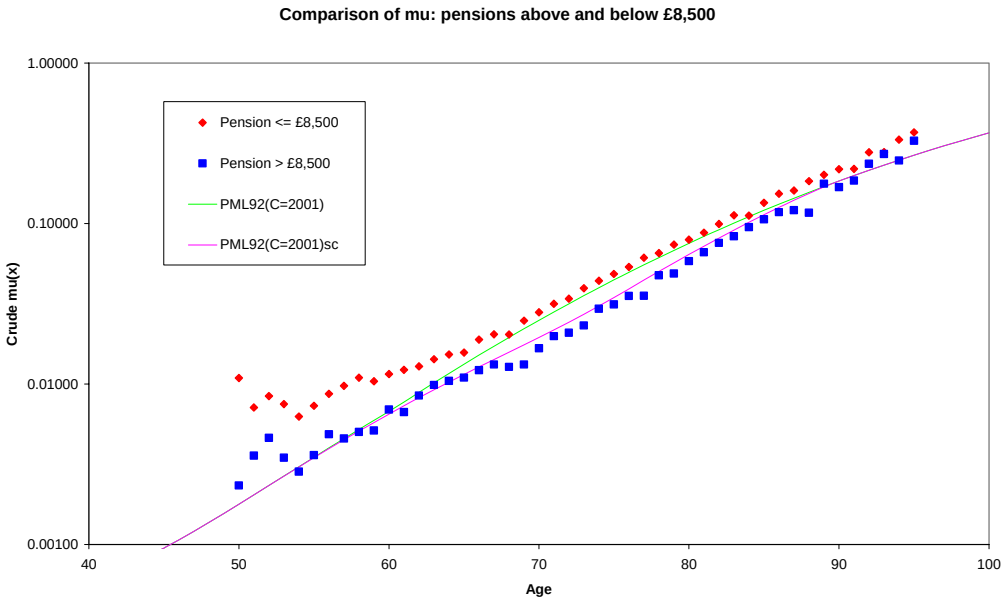
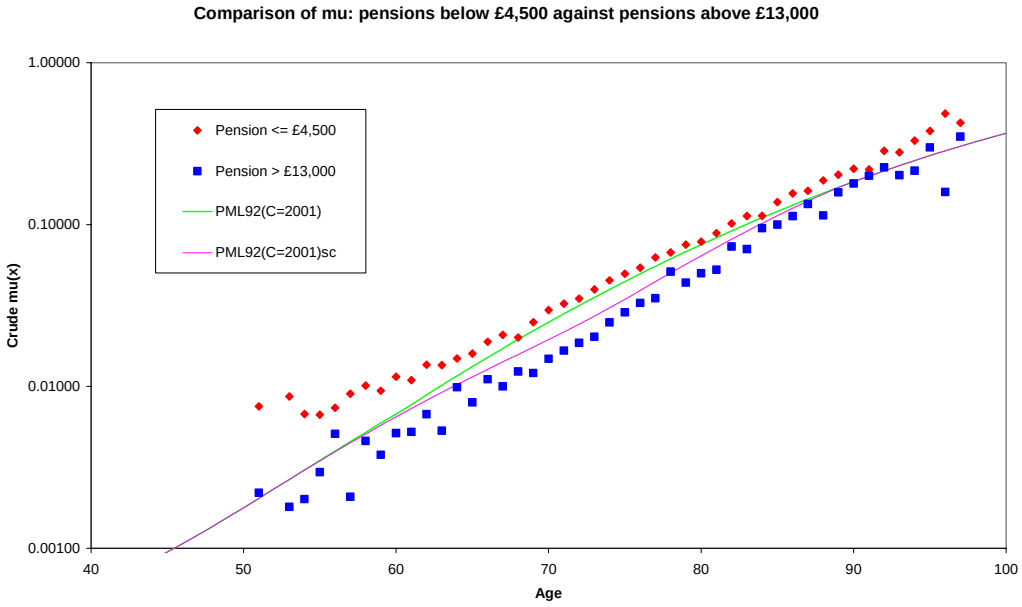


Figure 11



4.6 The conclusions to be drawn from the data in this section may be summarised as:

- On the basis of data received to date, there is significantly reduced mortality for those with higher pensions.
- At some ages rates of mortality for those on higher pension may be half, or less, that of those on smaller pensions.

4.7 The Working Party has not investigated the causes of the differences observed. There are a number of possible reasons, not all mutually exclusive. These are discussed in Willets et al (2004) section 2.22.

5 The shape of the mortality curve

5.1 Another way of looking at this data is to look at the crude *mu*s at each age and statistical measures of significance, with a 'high gate' and a 'low gate' at each age showing 97.5% and 2.5% upper and lower confidence limits. Figures 12 to 15 show the results for four different bands of pension amounts. The vertical scale is again logarithmic.

Figure 12

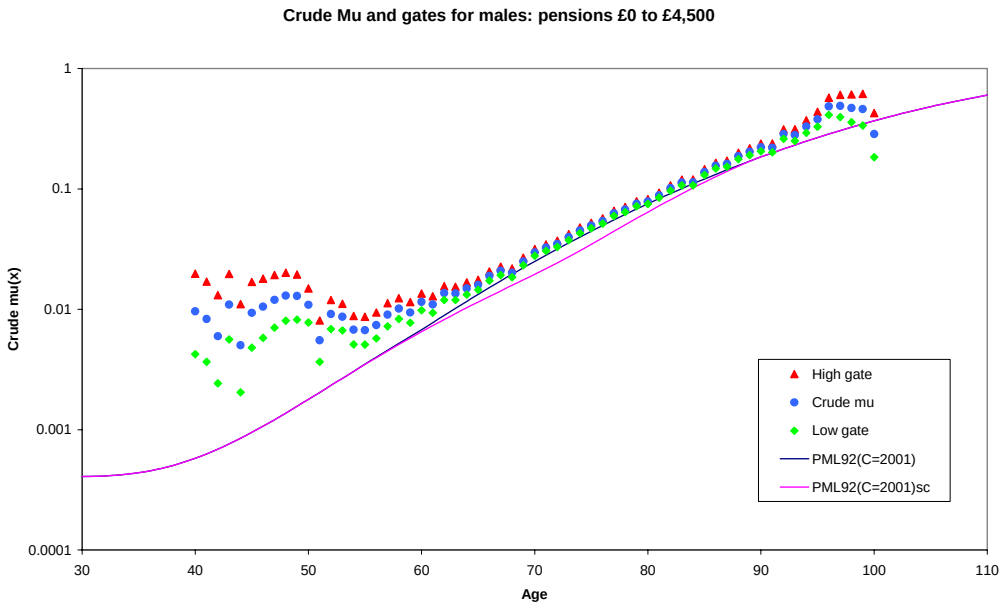


Figure 13

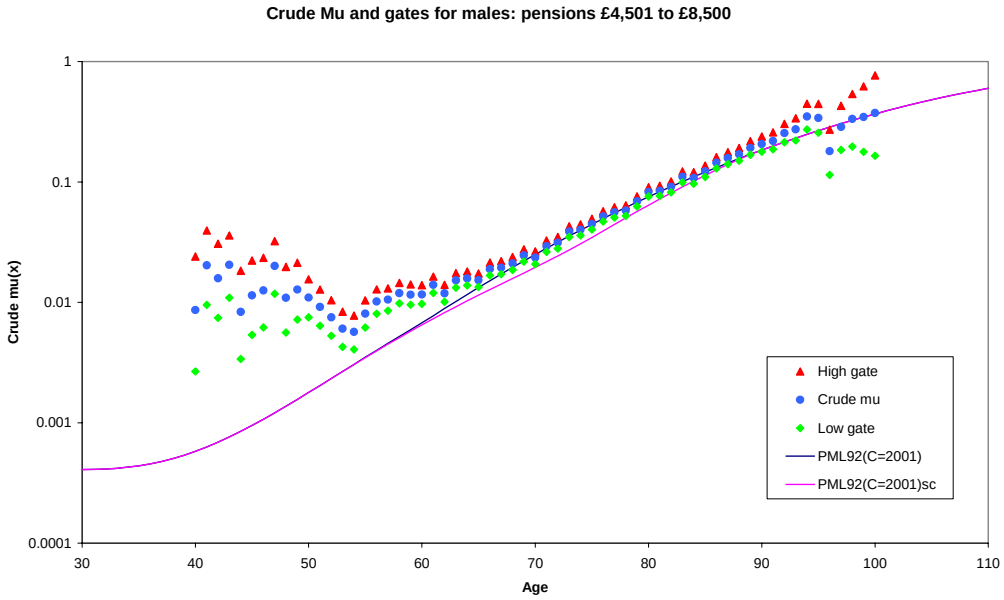


Figure 14

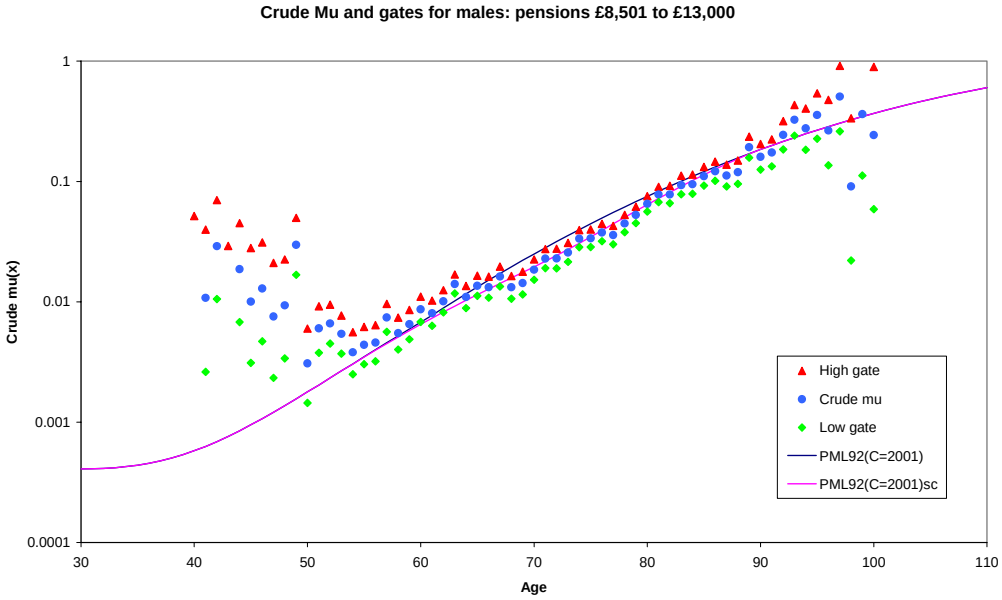
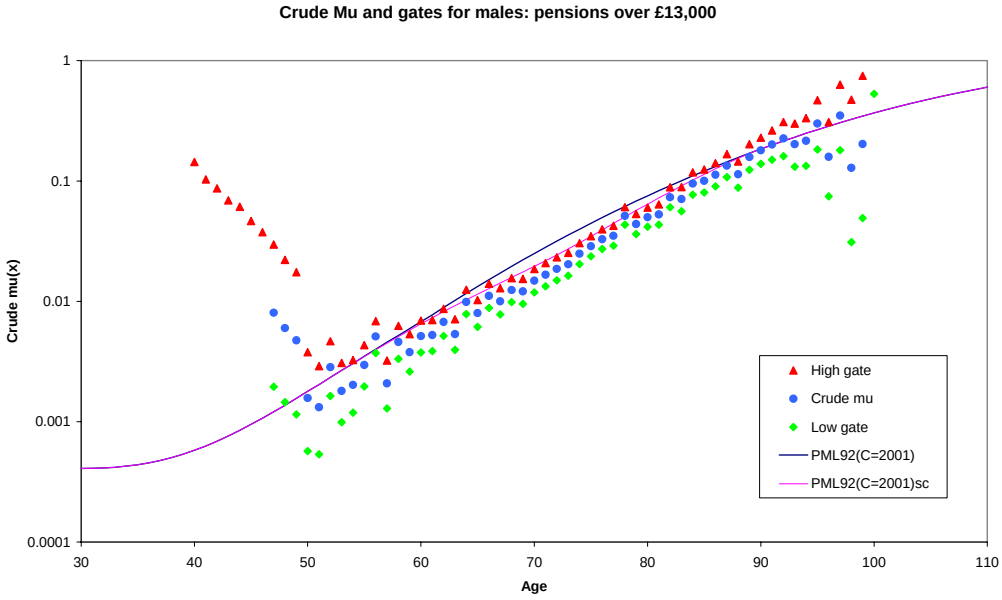


Figure 15



5.2 It appears from these graphs (and also Figures 10 and 11) that those individuals in receipt of higher pensions (above £8,500 pa) exhibit a mortality curve that better fits the cohort mortality than the non-cohort mortality, whilst those with smaller pensions do not.

5.3 We will keep this under review in the coming years. Meanwhile, subsequent analyses that compare actual with expected will use both the "92" Series without and with the cohort effect (measuring against the short cohort). Measures against a(90) and PA(90) tables will be dropped. For completeness, Tables 1, 2, 3, 4, 17 and 18 from Working Paper 4 are reproduced in the Annex with the new cohort comparison,

as Tables 1 to 6, and tables of all female pensioners (excluding dependants), lives and amounts, are given for the first time as Tables 7 and 8 – this is in anticipation of our next paper in which we will examine in more detail the female results.

6 Insured pensioner mortality comparison

6.1 The latest published data from the life office insured pensioner mortality investigation (see *C.M.I.R.* **21** pages 75, 76, 80 and 82) over the comparable period to that covered by this Working Paper (2000 to 2002) may be summarised as:

Figure 16

Male data	**Average pension ETR** Ages 51 - 100	**100A/E on PML92(Calendar year)** Ages 61 - 100
Normal retirements	£2,373 pa	89
Early retirements	£2,572 pa	104 (approx)

For normal retirements the 100A/E Figure has been inferred by averaging those for the three relevant calendar years shown on page 80 and for early retirees by multiplying the normal retiree figure by 132/113, the figures shown as 100A/E on PML92(C2020) on pages 75 and 76.

6.2 The obvious observations are that the average pension exposed to risk in the insured pensioner investigation is significantly lower than that for the current self-administered scheme investigation of £6,629 (see Tables 1 and 2 in the Annex) and the mortality of insured pensioners is significantly lighter than for pensioners in the current investigation (100A/E = 103 overall on PML92(Calendar year)).

6.3 There are clearly significant differences in the insured and self-administered populations. In particular the observation that pensioners with higher pensions have lighter mortality does not hold true if the two populations are treated as homogeneous. This in turn implies that the two populations are sufficiently heterogeneous that standard tables based on life office data need to be treated with great care when being used for self-administered schemes – hence the importance of the current work on self-administered schemes.

7 Analysis of results by industry classification

7.1 Not all industry classifications have sufficient data for significant conclusions to be drawn. The industry classifications listed in the summary table are those ones containing five or more schemes in the dataset. No sector has sufficient data to enable worthwhile analysis to be made by separate bands of amount of pension. Tables 9 to 20 in the Annex show male mortality analyses (for all male retirees) on both a lives and an amounts basis, where there is sufficient data.

7.2 As mentioned in paragraph 3.1, the Local Authority scheme data is based on relatively few schemes (primarily those with a valuation date of 31 March 2002) and these, comprising a particular geographic grouping, may well not be representative of all such schemes.

7.3 A summary of the results is given below.

Figure 17

Table Number	Sector	Lives or Amounts	100A/E "92" Series Ages 60+	100A/E "92" Series short cohort Ages 60+
9	Basic Industries	Lives	114	130
10	Basic Industries	Amounts	124	142
11	General Industries	Lives	93	108
12	General Industries	Amounts	96	111
13	Cyclical Services	Lives	103	119
14	Cyclical Services	Amounts	109	126
15	Information Technology	Lives	99	113
16	Information Technology	Amounts	110	127
17	Financials	Lives	90	102
18	Financials	Amounts	96	109
19	Local Authority	Lives	127	146
20	Local Authority	Amounts	134	153

8 Analysis of ill-health retirees

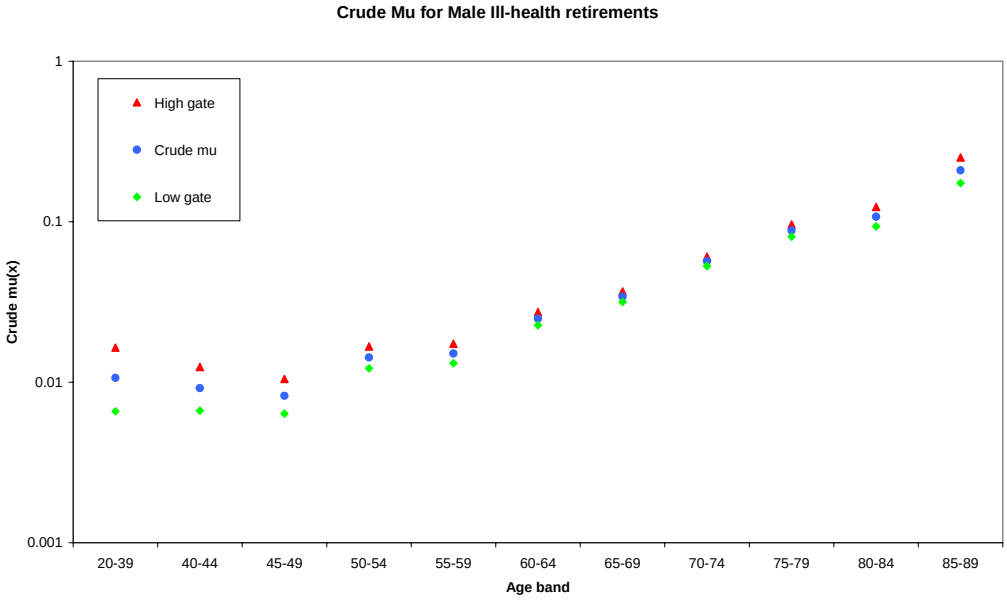
8.1 Some data been has submitted with ill-health pensioners differentiated from normal retirement pensioners (including early non-ill-health) and some data has been submitted where this distinction was not made due to limitations on data records. For males there are 98,631 ill-health retiree lives exposed to risk, 614,988 normal retirement lives exposed to risk, and 648,558 combined[1] retirement lives exposed to risk. It is anomalous that there is heavier mortality from the normal retirement lives (100A/E on PML92 is 106) than from the combined retirement lives (100A/E on PML92 is 94). The Working Party has no insight to offer as to why this should be.

8.2 For the purpose of the ill-health investigation we have used the normal retirement population as comparator. Clearly, if combined retirement or all retirement populations had been used the results would be significantly different. Figure 18 shows the crude *mu*s for male ill-health retirees with high and low gates as described in paragraph 3.4 above. Figure 19 shows the same data, but grouped.

[1] The types of pensioner groupings are normal retirements, ill-health retirements, a combined group (where the health of the pensioner at retirement was not known), dependants of deceased pensioners, and unknown (where the data could not be split between retired scheme member and dependants).

Figure 18

Figure 19



8.3 Figure 20 shows a comparison of *mus* for ill-health retirees with those of normal retirees. Figure 21 shows the same data but with the former as a ratio of the latter.

Figure 20

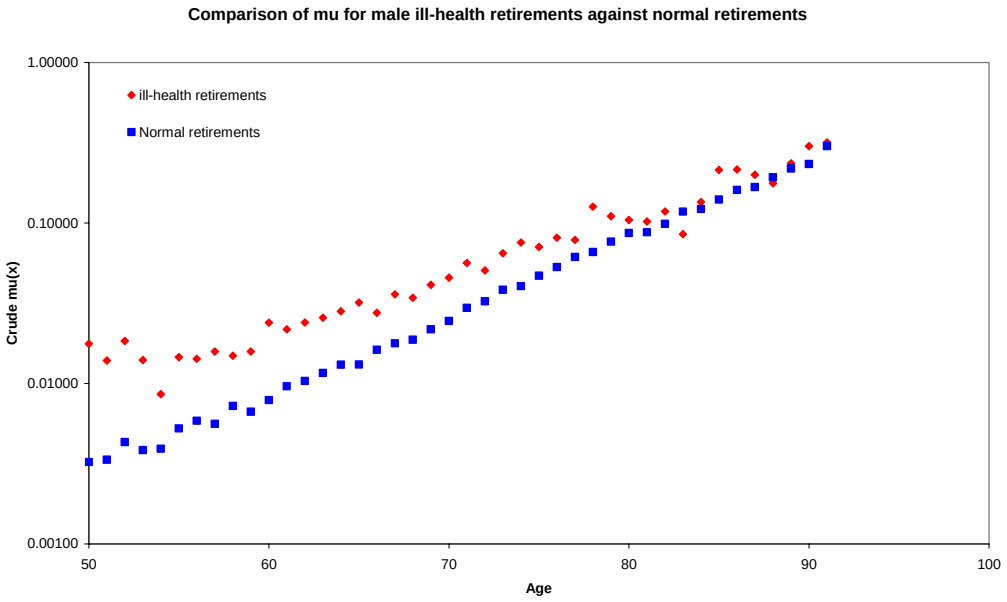
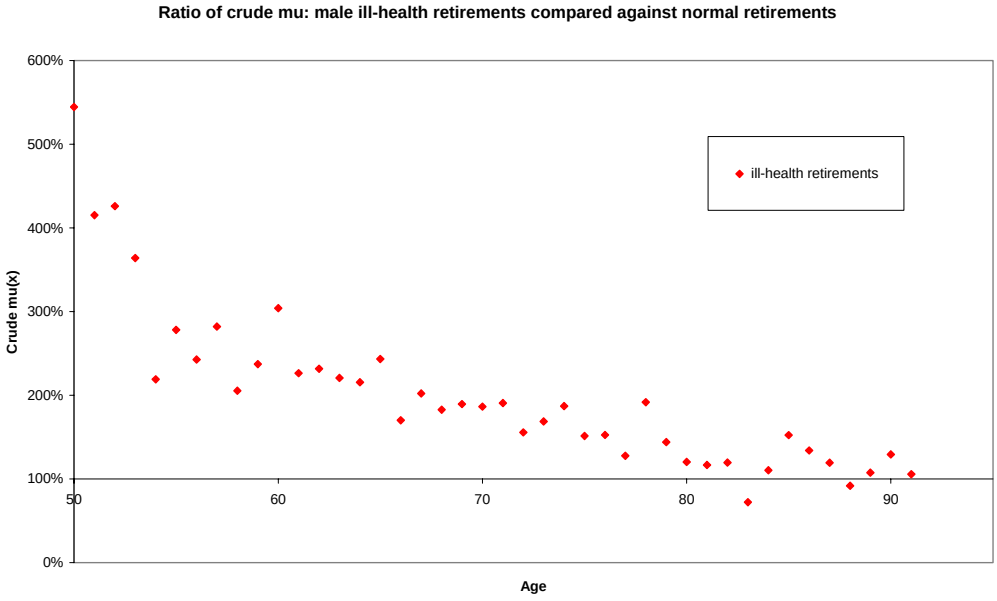


Figure 21



8.4 The graphs show some marked fluctuations at individual ages due to lack of data. This topic will be revisited in a future year when the amount of data will have increased to permit more valid conclusions to be drawn.

9 Females

9.1 As noted in paragraph 1.3, the Working Party has not yet been able to carry out as much analysis on the female data as has been the case for males. The purpose of this

section of the Working Paper is to describe the results of the "all retirements - female" category.

9.2 In total, the exposed to risk amounts to more than 830 thousand years, and £2.13 billion by amount. The data has been sub-divided into two categories, namely "dependants" and "all females excluding dependants". The reason for this lies in the format of some of the data submitted for this investigation. In some cases, it has been possible to identify female dependants; in others, it has not been possible to distinguish between female pensioners and females with pensions deriving from the occupational pension scheme membership of a partner or spouse. These latter categories have therefore been aggregated into the "all females excluding dependants" group.

9.3 It is significant that the average pension among both categories is less than half that of the male counterparts. Whilst the Working Party will seek to carry out an amounts analysis consistent with that described in the earlier sections of this Working Paper, it is less likely that the results will be as significant and reliable. In particular, the "tail" of female pensioners with pensions in excess of £8,500 is very small.

9.4 The results of our overall analyses are set out in Tables 3 to 6 in the Annex; a summary of the values is set out below:

Figure 22

Ages 60-110	Lives		Amounts	
	PFL92	PFL92sc	PFA92	PFA92sc
All females excluding dependants	106	120	117	131
Dependants	108	118	111	123

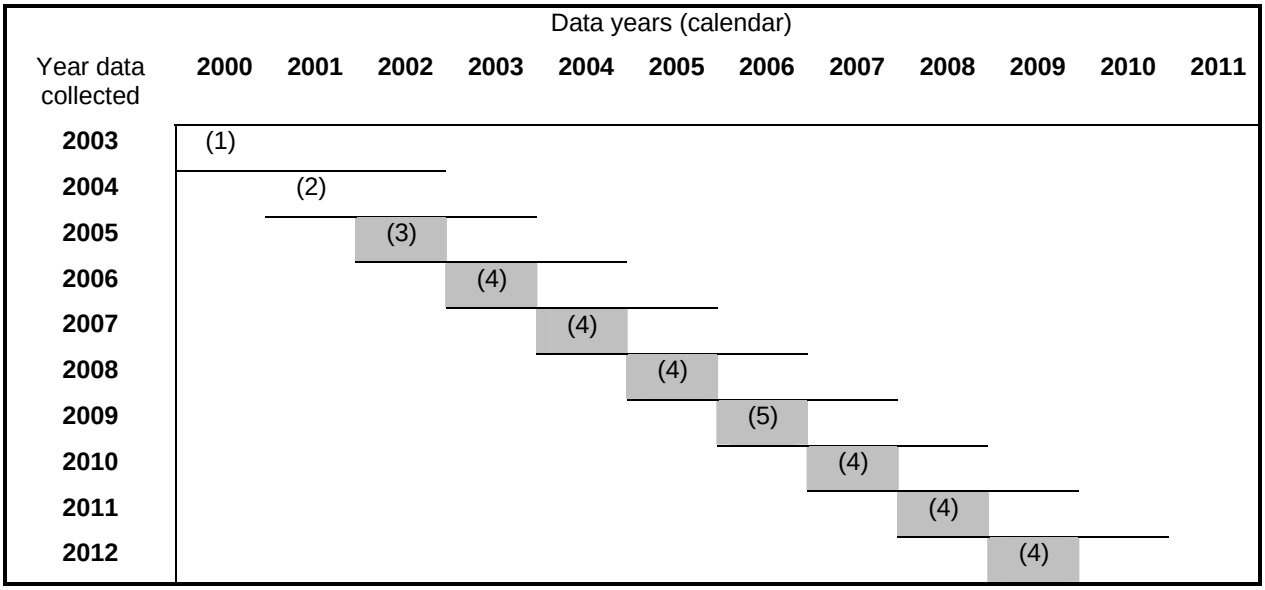
A feature of this table is the high result by amounts for "all females excluding dependants" group, relative to the outcome for lives. This is much further out of line with the results for both female dependants and males, and will require further investigation.

9.5 Both by reference to the overall results and by inspection of the age by age progressions, it would appear that the PFL92 table (without cohort improvements) provides the superior fit to the experience. This could be regarded as consistent with the findings for males in section 5 of this Working Paper, where those with lower pensions provided a better fit to the PML92 table with original improvement factors rather than the cohort improvement factors.

10 Work on standard tables

10.1 Figure 23 shows how data for successive calendar years will be collected, taking into account the fact that, for schemes with triennial valuations, data for the first year of the triennium will only be collected during the year following the valuation year.

Figure 23



Notes

(1)	33% of 'full' data for 2000 - 2002 collected by end 2003
(2)	2001-02 (66%) and 2003 (33%) of 'full' data collected by end 2004
(3)	2002 (100%) & 2003 (66%) & 2004 (33%) of 'full' data collected by end 2005
(4)	Data Year (100%) & Data Year + 1 (66%) & Data Year + 2 (33%) of 'full' data collected by end of year
(5)	As (4) plus full quadrennium data for years 2002 - 2005 available by start of 2009
Shaded	100% of data for calendar year available by end of Year Data Collected

10.2 It can be seen that full data for a full quadrennium (the period normally chosen to eliminate bias due to climatic conditions and virus epidemics etc) will not be available until full data for 2005 will have been collected. This will occur when data for valuations covering the triennium 2005–07 will have been collected, which should occur sometime in late 2008. It is therefore the case that, if standard tables are to be based on a full quadrennium's data, the tables will not see the light of day until sometime in 2009.

10.3 It is, however, hoped that the annual publication of data analyses based on data received to date will give a good indication to scheme actuaries and others of the emerging experience and will enable educated decisions to be made based on the published data.

10.4 It is also possible that standard tables could be produced earlier by considering data over a longer period than 4 years, but with incomplete data for earlier and later years.

Annex

Table 1

Mortality Analysis Split by Age - All Retirements, Males, Lives 2000-2002				
			100A/E by reference to:	
Age group	Exposed to risk	Deaths	PML92 (C=Year of ETR)	PML92sc (C=Year of ETR)
20-24	164	16	21,685	21,685
25-29	134	1	1,797	1,797
30-34	785	3	903	903
35-39	2,409	22	1,786	1,786
40-44	5,948	60	1,326	1,326
45-49	10,983	134	894	894
50-54	86,241	490	210	211
55-59	153,212	1,114	145	148
60-64	218,244	2,525	118	130
65-69	269,937	4,874	98	120
70-74	249,250	8,027	97	125
75-79	206,712	11,347	97	119
80-84	119,170	10,373	98	109
85-89	55,166	7,953	106	109
90-94	15,310	3,280	112	112
95-99	2,087	674	125	125
100-104	203	58	87	87
105-110	0	0	0	0
60-110	1,136,082	49,111	101	116
All Ages	1,395,957	50,951	103	118

Table 2

Mortality Analysis Split by Age - All Retirements, Males, Amounts 2000-2002				
			100A/E by reference to:	
Age group	Exposed to risk (£'000)	Deaths (£'000)	PMA92 (C=Year of ETR)	PMA92sc (C=Year of ETR)
20-24	346	27	31,275	31,275
25-29	314	3	3,792	3,792
30-34	2,664	2	364	364
35-39	9,464	82	2,998	2,998
40-44	28,633	312	2,742	2,742
45-49	61,204	702	1,663	1,663
50-54	819,142	3,217	274	275
55-59	1,560,105	8,383	189	193
60-64	1,795,990	16,678	151	166
65-69	1,745,917	26,409	118	144
70-74	1,365,118	36,113	104	134
75-79	992,177	46,803	100	123
80-84	549,396	43,230	100	112
85-89	244,682	32,856	106	108
90-94	69,157	14,099	110	110
95-99	9,249	2,785	119	119
100-104	625	233	115	115
105-110	0	0	0	0
60-110	6,772,311	219,205	107	123
All Ages	9,254,181	231,935	110	126

Table 3

Mortality Analysis Split by Age - All Retirements, Females, Lives 2000-2002				
			100A/E by reference to:	
Age group	Exposed to risk	Deaths	PFL92 (C=Year of ETR)	PFL92sc (C=Year of ETR)
20-24	183	20	58,422	58,422
25-29	157	1	3,303	3,303
30-34	955	7	3,345	3,345
35-39	3,081	20	2,239	2,239
40-44	6,231	32	1,135	1,135
45-49	10,040	66	800	800
50-54	38,110	192	312	312
55-59	69,110	396	189	194
60-64	120,373	1,018	144	158
65-69	147,127	1,820	109	133
70-74	166,220	3,746	107	138
75-79	170,518	6,577	104	126
80-84	126,892	7,983	104	115
85-89	70,873	7,297	105	108
90-94	24,471	4,053	113	113
95-99	4,769	1,164	116	116
100-104	659	166	90	90
105-110	20	7	96	96
60-110	831,921	33,831	107	119
All Ages	959,788	34,565	108	120

Table 4

Mortality Analysis Split by Age - All Retirements, Females, Amounts 2000-2002				
			100A/E by reference to:	
Age group	Exposed to risk (£'000)	Deaths (£'000)	PFA92 (C=Year of ETR)	PFA92sc (C=Year of ETR)
20-24	344	31	60,857	60,857
25-29	504	5	5,910	5,910
30-34	3,026	29	5,558	5,558
35-39	10,640	71	2,892	2,892
40-44	22,846	112	1,358	1,358
45-49	37,616	230	930	930
50-54	161,498	608	284	285
55-59	263,399	1,372	207	211
60-64	358,913	2,912	162	178
65-69	402,111	4,353	110	135
70-74	416,095	8,090	106	137
75-79	407,938	14,232	107	130
80-84	299,340	17,508	110	122
85-89	170,661	16,760	114	117
90-94	63,528	10,060	124	124
95-99	13,111	3,254	137	137
100-104	1,660	455	115	115
105-110	81	16	63	63
60-110	2,133,440	77,641	114	127
All Ages	2,633,313	80,099	116	129

Table 5

Mortality Analysis Split by Age - Dependants, Females, Lives 2000-2002				
			100A/E by reference to:	
Age group	**Exposed to risk**	**Deaths**	**PFL92 (C=Year of ETR)**	**PFL92sc (C=Year of ETR)**
20-24	143	18	67,262	67,262
25-29	89	0	0	0
30-34	417	4	4,404	4,404
35-39	1,196	5	1,438	1,438
40-44	2,892	9	686	686
45-49	5,196	19	444	444
50-54	10,130	39	242	242
55-59	17,360	94	178	182
60-64	28,940	287	166	183
65-69	47,933	666	120	147
70-74	72,999	1,776	115	147
75-79	88,175	3,464	105	128
80-84	73,743	4,557	102	113
85-89	43,913	4,552	106	108
90-94	14,893	2,474	113	113
95-99	2,870	696	115	115
100-104	485	116	85	85
105-110	11	3	73	73
60-110	373,963	18,591	108	118
All Ages	411,386	18,779	108	119

Table 6

Mortality Analysis Split by Age - Dependants, Females, Amounts 2000-2002				
			100A/E by reference to:	
Age group	Exposed to risk (£'000)	Deaths (£'000)	PFA92 (C=Year of ETR)	PFA92sc (C=Year of ETR)
20-24	262	28	71,996	71,996
25-29	295	0	0	0
30-34	1,231	7	3,215	3,215
35-39	3,546	2	232	232
40-44	9,293	21	632	632
45-49	17,529	46	397	397
50-54	35,125	74	162	162
55-59	56,111	280	196	201
60-64	86,248	726	165	182
65-69	131,389	1,465	112	137
70-74	181,474	3,511	105	135
75-79	206,671	7,114	105	128
80-84	166,319	9,248	104	116
85-89	98,930	9,610	113	116
90-94	36,557	5,768	124	124
95-99	7,628	1,866	135	135
100-104	1,152	318	116	116
105-110	57	5	25	25
60-110	916,425	39,631	111	123
All Ages	1,039,815	40,088	112	124

Table 7

Mortality Analysis Split by Age - All females excluding dependants, Lives 2000-2002				
			100A/E by reference to:	
Age group	**Exposed to risk**	**Deaths**	**PFL92 (C=Year of ETR)**	**PFL92sc (C=Year of ETR)**
20-24	40	2	26,765	26,765
25-29	67	1	7,673	7,673
30-34	538	3	2,533	2,533
35-39	1,885	15	2,750	2,750
40-44	3,338	23	1,526	1,526
45-49	4,844	47	1,186	1,186
50-54	27,981	153	337	337
55-59	51,751	302	193	198
60-64	91,433	731	136	150
65-69	99,194	1,154	103	126
70-74	93,221	1,970	102	131
75-79	82,342	3,113	102	125
80-84	53,149	3,426	107	119
85-89	26,960	2,745	104	107
90-94	9,578	1,579	112	112
95-99	1,899	468	117	117
100-104	174	50	102	102
105-110	9	4	126	126
60-110	457,959	15,240	106	120
All Ages	548,403	15,786	109	122

Table 8

Mortality Analysis Split by Age - All females excluding dependants, Amounts 2000-2002				
			100A/E by reference to:	
Age group	Exposed to risk (£'000)	Deaths (£'000)	PFA92 (C=Year of ETR)	PFA92sc (C=Year of ETR)
20-24	82	3	25,774	25,774
25-29	209	5	14,196	14,196
30-34	1,795	23	7,149	7,149
35-39	7,094	69	4,218	4,218
40-44	13,553	90	1,859	1,859
45-49	20,087	184	1,395	1,395
50-54	126,373	534	318	319
55-59	207,289	1,092	210	214
60-64	272,665	2,186	161	177
65-69	270,722	2,888	110	134
70-74	234,621	4,579	107	138
75-79	201,266	7,119	109	132
80-84	133,021	8,260	117	130
85-89	71,731	7,150	116	119
90-94	26,971	4,292	125	125
95-99	5,484	1,388	140	140
100-104	508	137	113	113
105-110	24	11	153	153
60-110	1,217,015	38,010	117	131
All Ages	1,593,498	40,010	120	135

Table 9

Mortality Analysis split by Age - All Retirements, Males, Lives 2000-2002				
Industry category - Basic Industries			**100A/E by reference to:**	
Age group	**Exposed to risk**	**Deaths**	**PML92 (C=Year of ETR)**	**PML92sc (C=Year of ETR)**
20-24	39	4	22,926	22,926
25-29	15	1	15,579	15,579
30-34	89	0	0	0
35-39	186	2	2,087	2,087
40-44	533	6	1,485	1,485
45-49	861	17	1,441	1,441
50-54	5,918	51	315	316
55-59	14,112	104	143	146
60-64	22,407	333	150	165
65-69	35,755	720	108	132
70-74	38,963	1,437	110	140
75-79	36,704	2,272	109	132
80-84	20,702	2,034	110	122
85-89	8,891	1,443	119	122
90-94	2,127	552	135	135
95-99	316	108	132	132
100-104	36	9	77	77
105-110	0	0	0	0
60-110	165,901	8,908	114	130
All Ages	187,655	9,093	115	131

Table 10

Mortality Analysis split by Age - All Retirements, Males, Amounts 2000-2002				
Industry category - Basic Industries			**100A/E by reference to:**	
Age group	**Exposed to risk (£'000)**	**Deaths (£'000)**	**PMA92 (C=Year of ETR)**	**PMA92sc (C=Year of ETR)**
20-24	39	10	105,740	105,740
25-29	31	3	38,578	38,578
30-34	150	0	0	0
35-39	490	4	2,675	2,675
40-44	1,752	16	2,284	2,284
45-49	2,998	49	2,338	2,338
50-54	40,563	281	478	479
55-59	112,330	587	176	180
60-64	158,729	1,875	191	210
65-69	156,233	2,675	132	161
70-74	140,837	4,285	118	151
75-79	112,481	5,978	112	136
80-84	63,974	5,998	118	131
85-89	27,070	4,313	126	129
90-94	5,644	1,438	138	138
95-99	844	325	151	151
100-104	97	41	132	132
105-110	0	0	0	0
60-110	665,909	26,927	124	142
All Ages	824,261	27,877	126	144

Table 11

Mortality Analysis split by Age - All Retirements, Males, Lives 2000-2002				
Industry category - General Industries			**100A/E by reference to:**	
Age group	**Exposed to risk**	**Deaths**	**PML92 (C=Year of ETR)**	**PML92sc (C=Year of ETR)**
20-24	15	0	0	0
25-29	7	0	0	0
30-34	41	2	11,581	11,581
35-39	136	0	0	0
40-44	330	4	1,596	1,596
45-49	861	25	2,053	2,053
50-54	9,029	65	266	267
55-59	22,157	183	162	166
60-64	40,750	421	105	116
65-69	58,461	960	90	110
70-74	58,105	1,711	89	115
75-79	47,434	2,395	90	111
80-84	25,651	2,133	94	105
85-89	12,177	1,620	98	100
90-94	3,323	657	104	104
95-99	448	127	110	110
100-104	76	17	69	69
105-110	0	0	0	0
60-104	246,425	10,041	93	108
All Ages	279,001	10,320	95	109

Table 12

Mortality Analysis split by Age - All Retirements, Males, Amounts 2000-2002				
Industry category - General Industries			**100A/E by reference to:**	
Age group	**Exposed to risk (£'000)**	**Deaths (£'000)**	**PMA92 (C=Year of ETR)**	**PMA92sc (C=Year of ETR)**
20-24	45	0	0	0
25-29	12	0	0	0
30-34	208	2	4,088	4,088
35-39	954	0	0	0
40-44	2,198	15	1,717	1,717
45-49	5,197	161	4,386	4,386
50-54	50,239	319	439	440
55-59	145,674	952	223	229
60-64	253,264	2,030	128	142
65-69	282,093	3,699	102	125
70-74	230,526	5,386	92	120
75-79	144,459	5,992	89	110
80-84	71,765	5,343	95	107
85-89	33,025	3,833	91	93
90-94	9,972	1,853	101	101
95-99	1,350	375	111	111
100-104	103	32	96	96
105-110	0	0	0	0
60-104	1,026,557	28,543	96	111
All Ages	1,231,085	29,992	99	115

Table 13

Mortality Analysis split by Age - All Retirements, Males, Lives 2000-2002				
Industry category - Cyclical Services			**100A/E by reference to:**	
Age group	**Exposed to risk**	**Deaths**	**PML92 (C=Year of ETR)**	**PML92sc (C=Year of ETR)**
20-24	22	0	0	0
25-29	20	0	0	0
30-34	172	0	0	0
35-39	394	4	2,012	2,012
40-44	857	9	1,395	1,395
45-49	1,689	20	871	871
50-54	8,888	52	218	218
55-59	19,414	145	149	153
60-64	28,486	360	129	142
65-69	34,614	641	101	124
70-74	29,331	964	100	129
75-79	25,271	1,434	100	121
80-84	16,385	1,407	97	109
85-89	7,146	1,070	111	114
90-94	1,974	423	111	111
95-99	330	107	127	127
100-104	13	7	166	166
105-110	0	0	0	0
60-104	143,552	6,413	103	119
All Ages	175,009	6,643	105	120

Table 14

Mortality Analysis split by Age - All Retirements, Males, Amounts 2000-2002				
Industry category - Cyclical Services			**100A/E by reference to:**	
Age group	**Exposed to risk (£'000)**	**Deaths (£'000)**	**PMA92 (C=Year of ETR)**	**PMA92sc (C=Year of ETR)**
20-24	28	0	0	0
25-29	69	0	0	0
30-34	652	0	0	0
35-39	1,695	12	2,367	2,367
40-44	4,472	40	2,290	2,290
45-49	9,703	106	1,595	1,595
50-54	57,316	265	316	316
55-59	242,058	1,212	181	184
60-64	208,876	2,251	175	193
65-69	224,168	3,441	120	147
70-74	153,092	4,153	108	140
75-79	132,144	7,060	110	134
80-84	89,892	6,695	96	108
85-89	33,522	4,517	107	110
90-94	8,403	1,590	102	102
95-99	1,071	321	120	120
100-104	51	15	90	90
105-110	0	0	0	0
60-104	851,220	30,042	109	126
All Ages	1,167,214	31,676	112	128

Table 15

Mortality Analysis split by Age - All Retirements, Males, Lives 2000-2002				
Industry category - Information Technology			**100A/E by reference to:**	
Age group	**Exposed to risk**	**Deaths**	**PML92 (C=Year of ETR)**	**PML92sc (C=Year of ETR)**
20-24	22	0	0	0
25-29	5	0	0	0
30-34	63	0	0	0
35-39	414	2	932	932
40-44	1,434	15	1,360	1,360
45-49	3,362	38	828	828
50-54	40,674	173	158	158
55-59	59,742	394	134	137
60-64	72,872	768	109	120
65-69	74,239	1,269	93	114
70-74	65,982	2,050	93	120
75-79	55,530	2,969	95	115
80-84	32,977	2,816	96	107
85-89	16,241	2,333	106	108
90-94	4,574	1,011	116	116
95-99	465	185	154	154
100-104	39	8	62	62
105-110	0	0	0	0
60-104	322,919	13,409	99	113
All Ages	428,636	14,031	101	115

Table 16

Mortality Analysis split by Age - All Retirements, Males, Amounts 2000-2002				
Industry category - Information Technology			**100A/E by reference to:**	
Age group	**Exposed to risk (£'000)**	**Deaths (£'000)**	**PMA92 (C=Year of ETR)**	**PMA92sc (C=Year of ETR)**
20-24	120	0	0	0
25-29	17	0	0	0
30-34	335	0	0	0
35-39	1,954	10	1,757	1,757
40-44	8,287	99	2,963	2,963
45-49	21,788	232	1,538	1,538
50-54	463,714	1,468	222	223
55-59	661,044	3,510	189	193
60-64	694,906	6,427	151	166
65-69	594,198	9,111	120	146
70-74	450,922	12,692	110	142
75-79	333,257	16,121	103	126
80-84	186,075	14,781	101	112
85-89	83,223	11,288	107	110
90-94	20,284	4,243	114	114
95-99	2,043	750	144	144
100-104	127	23	55	55
105-110	0	0	0	0
60-104	2,365,036	75,435	110	127
All Ages	3,522,296	80,754	114	130

Table 17

Mortality Analysis split by Age - All Retirements, Males, Lives 2000-2002				
Industry category - Financials			**100A/E by reference to:**	
Age group	**Exposed to risk**	**Deaths**	**PML92 (C=Year of ETR)**	**PML92sc (C=Year of ETR)**
20-24	15	11	164,291	164,291
25-29	3	0	0	0
30-34	49	0	0	0
35-39	127	2	3,109	3,109
40-44	325	4	1,623	1,623
45-49	551	3	402	402
50-54	6,121	21	127	127
55-59	10,245	48	94	96
60-64	12,314	90	76	83
65-69	11,549	169	80	98
70-74	9,338	256	83	106
75-79	7,373	341	82	100
80-84	4,143	346	93	104
85-89	2,442	345	102	104
90-94	1,151	239	107	107
95-99	178	49	106	106
100-104	16	6	113	113
105-110	0	0	0	0
60-104	48,503	1,841	90	102
All Ages	65,938	1,930	92	103

Table 18

Mortality Analysis split by Age - All Retirements, Males, Amounts 2000-2002				
Industry category - Financials			100A/E by reference to:	
Age group	Exposed to risk (000's)	Deaths (000's)	PMA92 (C=Year of ETR)	PMA92sc (C=Year of ETR)
20-24	25	14	218,929	218,929
25-29	15	0-	0	0
30-34	217	0-	0	0
35-39	806	17	7,220	7,220
40-44	2,580	25	2,498	2,498
45-49	5,092	22	630	630
50-54	83,807	187	155	155
55-59	157,139	574	127	130
60-64	170,676	1,069	102	112
65-69	155,596	1,923	95	116
70-74	123,852	2,630	84	107
75-79	89,975	3,787	90	110
80-84	46,052	3,467	95	105
85-89	28,157	3,975	108	110
90-94	13,006	2,586	106	106
95-99	2,064	504	96	96
100-104	119	55	144	144
105-110	0	0	0	0
60-104	629,498	19,997	96	109
All Ages	879,179	20,836	98	110

Table 19

Mortality Analysis split by Age - All Retirements, Males, Lives 2000-2002				
Industry category - Local Authority			**100A/E by reference to:**	
Age group	**Exposed to risk**	**Deaths**	**PML92 (C=Year of ETR)**	**PML92sc (C=Year of ETR)**
20-24	39	0	0	0
25-29	62	0	0	0
30-34	306	1	767	767
35-39	964	7	1,414	1,414
40-44	2,050	18	1,152	1,152
45-49	2,944	23	577	577
50-54	7,010	82	433	434
55-59	10,775	127	233	238
60-64	16,551	344	211	232
65-69	21,995	561	138	168
70-74	17,956	775	130	166
75-79	12,434	865	123	148
80-84	6,826	653	107	119
85-89	2,782	437	117	120
90-94	602	125	107	107
95-99	90	26	111	111
100-104	8	3	115	115
105-110	0	0	0	0
60-104	79,245	3,789	127	146
All Ages	103,396	4,047	132	152

Table 20

Mortality Analysis split by Age - All Retirements, Males, Amounts 2000-2002				
Industry category - Local Authority			**100A/E by reference to:**	
Age group	**Exposed to risk (000's)**	**Deaths (000's)**	**PMA92 (C=Year of ETR)**	**PMA92sc (C=Year of ETR)**
20-24	47	0	0	0
25-29	77	0	0	0
30-34	572	0	220	220
35-39	2,345	23	3,403	3,403
40-44	6,306	78	3,100	3,100
45-49	10,651	59	806	806
50-54	38,421	377	680	681
55-59	63,835	712	386	394
60-64	82,823	1,344	258	284
65-69	95,172	2,077	168	205
70-74	73,047	2,623	141	180
75-79	45,720	2,550	118	142
80-84	23,853	2,080	110	122
85-89	11,123	1,600	113	116
90-94	2,846	598	112	112
95-99	376	92	95	95
100-104	43	21	147	147
105-110	0	0	0	0
60-104	335,002	12,984	134	153
All Ages	457,256	14,234	143	163

Sources quoted:

CMI Working Paper 1: An interim basis for adjusting the "92" Series mortality projections for cohort effects (Continuous Mortality Investigation December 2002)

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Willets (2004): The Cohort Effect: Insights and Explanations. Paper presented to the Faculty of Actuaries March 2004 and to the Institute of Actuaries April 2004

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