The Actuarial Profession
making financial sense of the future

CMI SAPS Mortality Update

Deborah Cooper

Current Issues in Pensions 2011

6 October 2011

Agenda

- 2002-2009 mortality experience (data to 30 June 2010)

- Analysis of mortality improvements

- Analysis of experience by industry

- Future work

- Updates to the CMI Mortality Projections Model and Library

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2002-2009 mortality experience: overview

- WP51 published in May 2011

- Underlying data files made available

- Substantial volumes of new data – nearly 40% increase in exposure over latest 8-year period

- PPF data was included for the first time

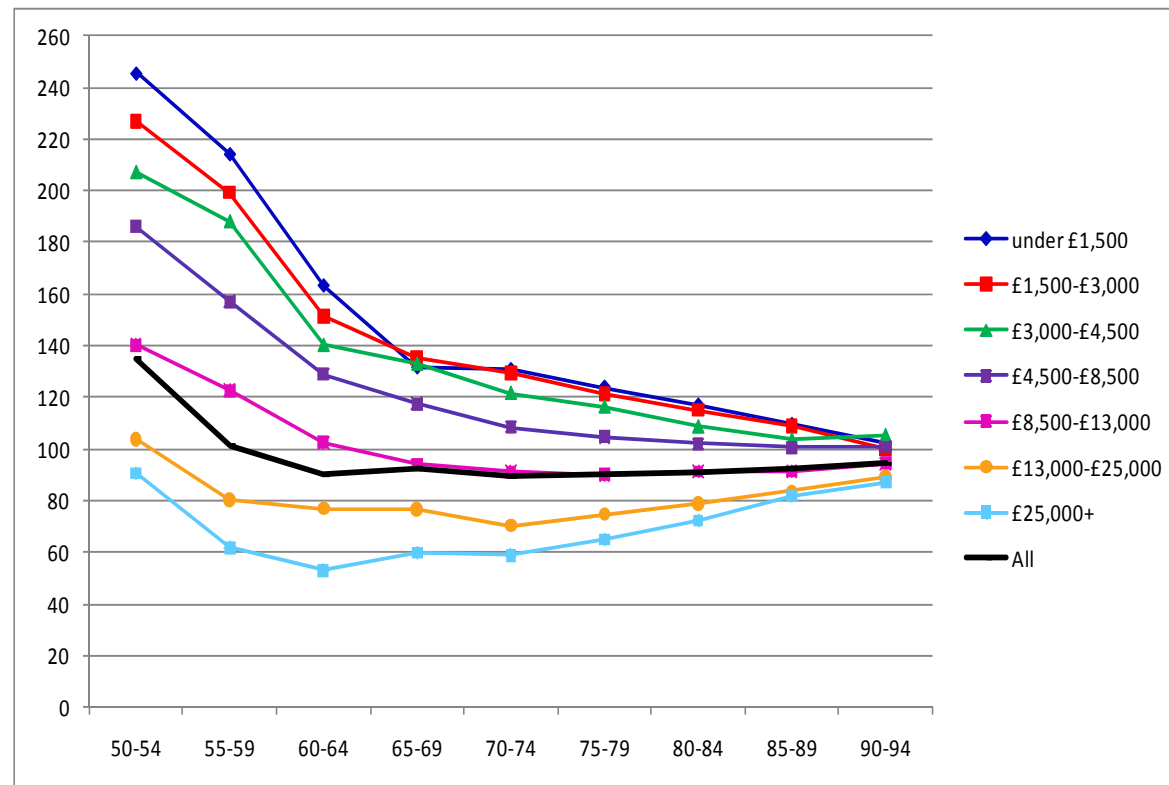# 2002-2009 mortality experience: data by year

Male pensioners
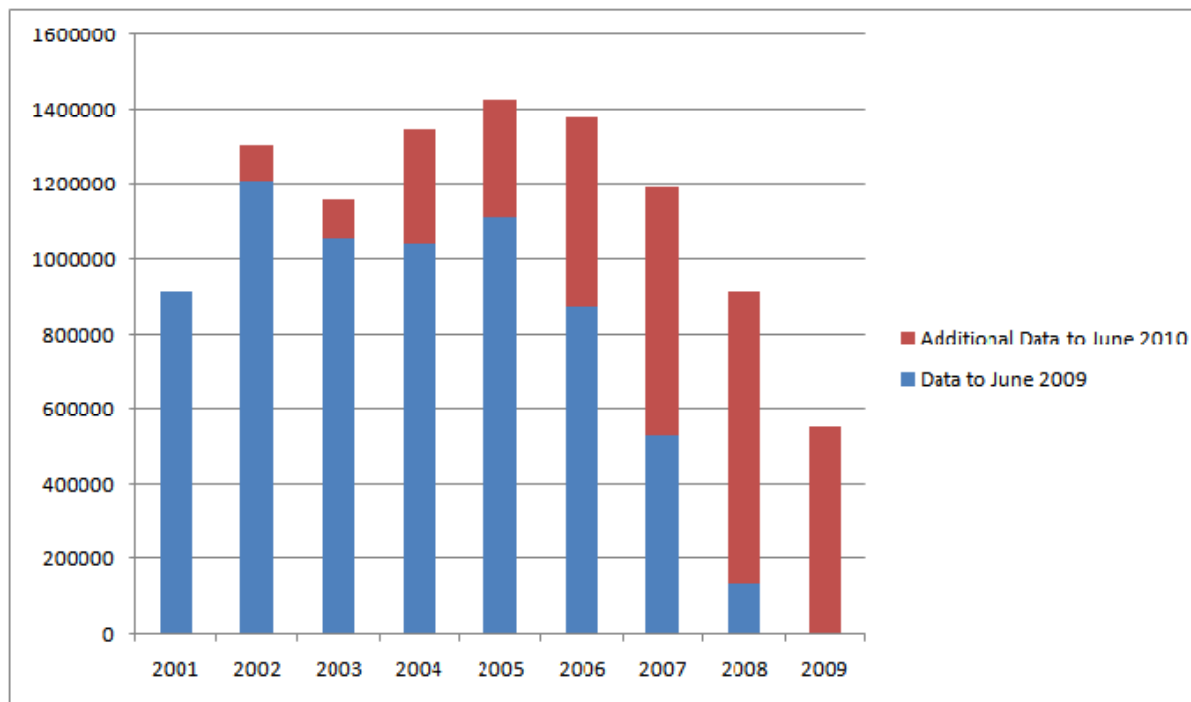
N.B. Additional data for 2001 may have been submitted up to June 2010 but analysis only covered 2002-2009. Similarly some 2009 data may have been submitted up to June 2009 but the analysis only covered 2001-2008.
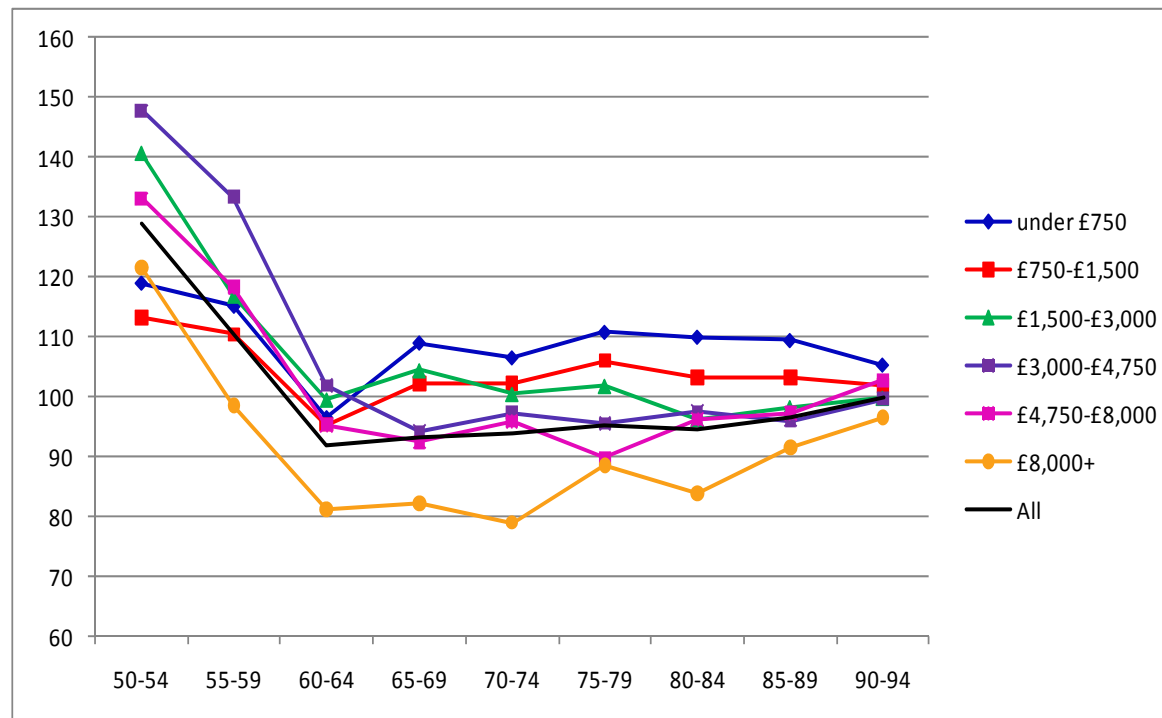
2002-2009 mortality experience: amounts bands

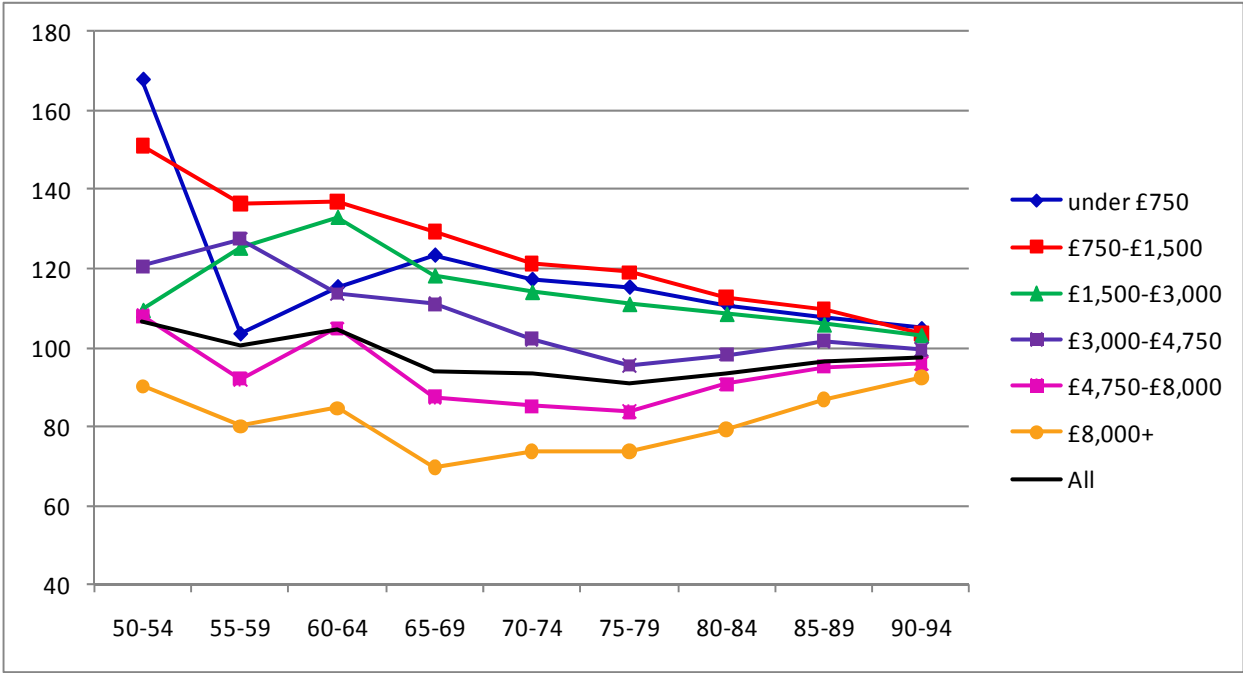Male Pensioners Amounts compared against S1PMA

2002-2009 mortality experience: amounts bands
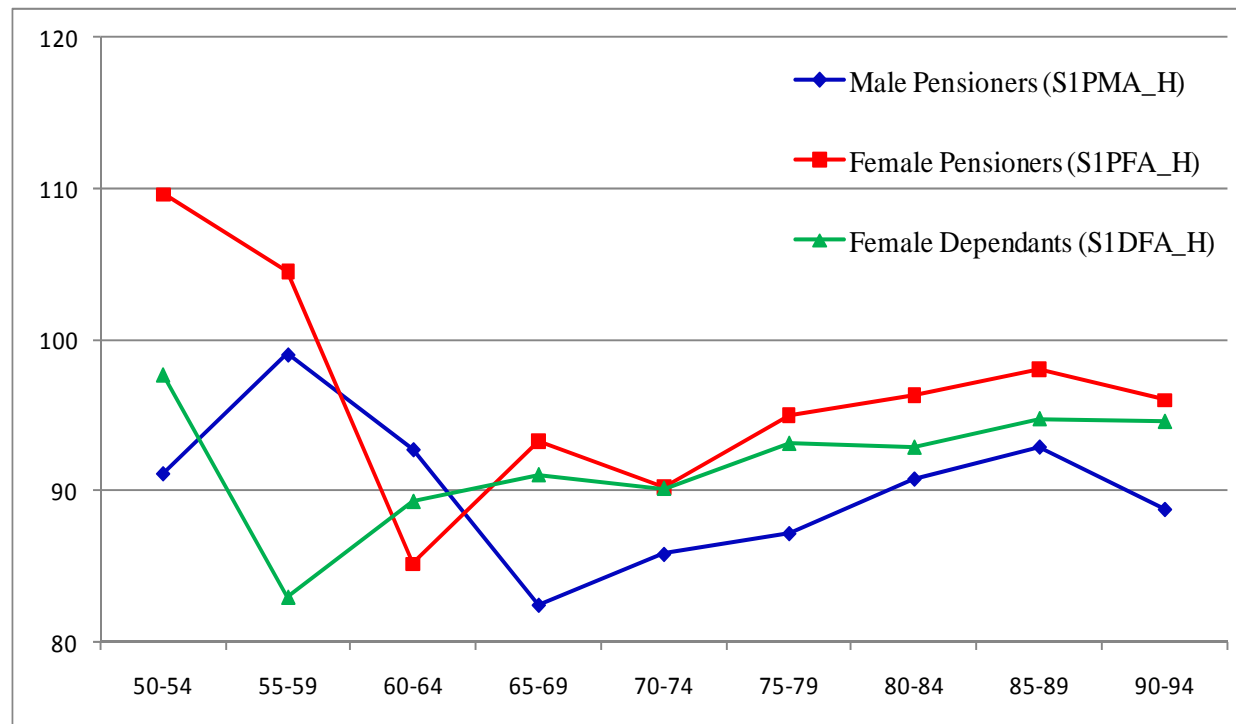
Female Pensioners Amounts compared against S1PFA

2002-2009 mortality experience: amounts bands
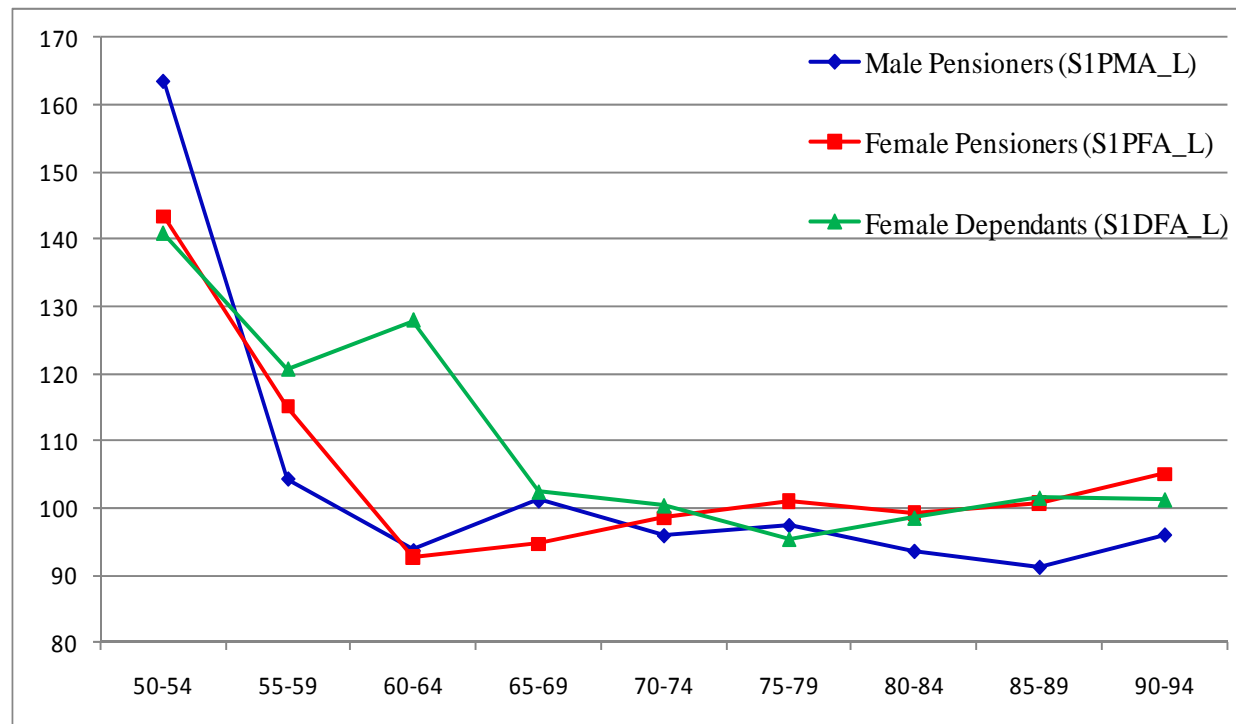
Female Dependants Amounts compared against S1DFA

2002-2009 mortality experience: "Heavy" tables

SAPS Amounts compared against "Heavy" tables

Legend:
- Male Pensioners (S1PMA_H)
- Female Pensioners (S1PFA_H)
- Female Dependants (S1DFA_H)

2002-2009 mortality experience: "Light" tables

SAPS Amounts compared against "Light" tables

Legend:
- Male Pensioners (S1PMA_L)
- Female Pensioners (S1PFA_L)
- Female Dependants (S1DFA_L)

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- **Analysis of mortality improvements**
- Analysis of experience by industry
- Future work
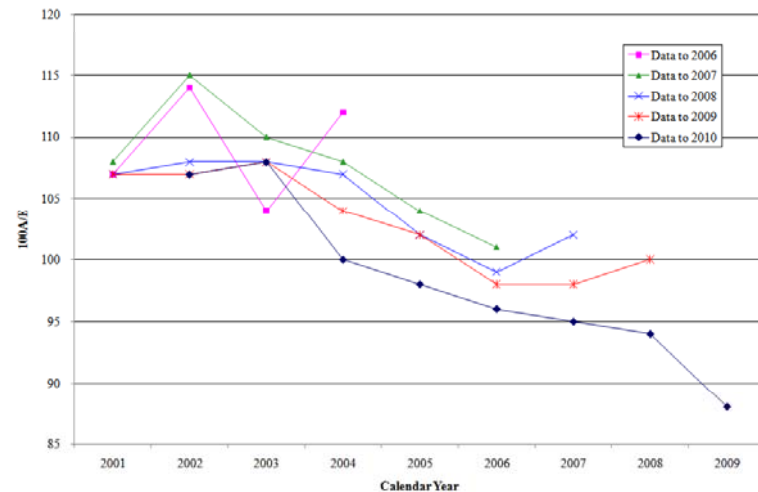- Updates to the CMI Mortality Projections Model and Library

Mortality improvements: trends

- Shown trends in mortality in annual experience papers

Male Pensioner Lives compared against PNML00
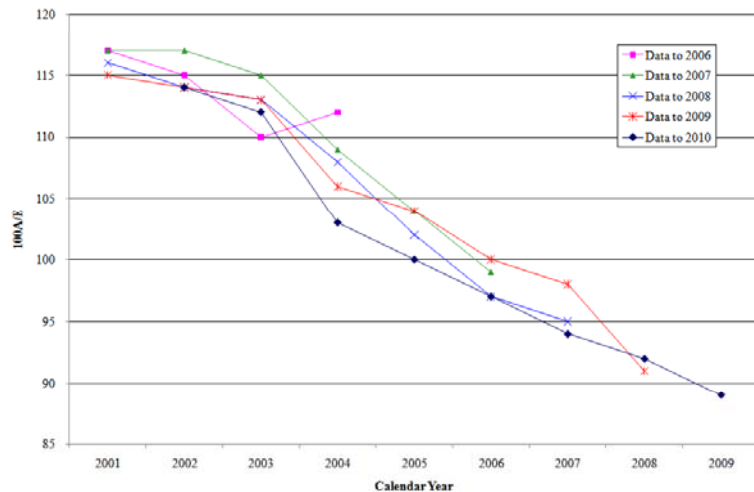
Female Pensioner Lives compared against PNFL00

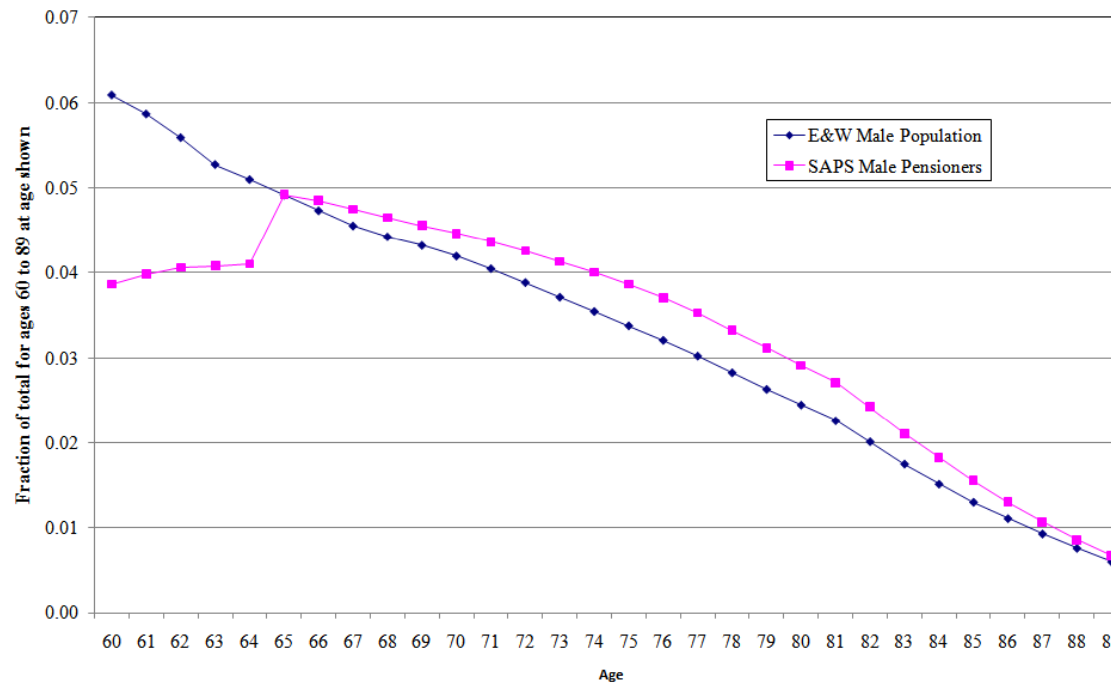# Mortality improvements: methodology

- Commonly used to compare populations with different age structures

$$SMR_y = \frac{\sum(\text{Reference Exposure}_x \times \text{Dataset } m_x)}{\sum(\text{Reference Exposure}_x \times \text{Reference } m_x)} \times 100$$

- Age range of 60-89 used for all datasets analysed

Mortality improvements: age structures (males)

Age distribution of SAPS Pensioners and E&W Population datasets – Males

Mortality improvements: ONS vs SAPS (males)

SMRs for SAPS Pensioners and E&W Population – Males
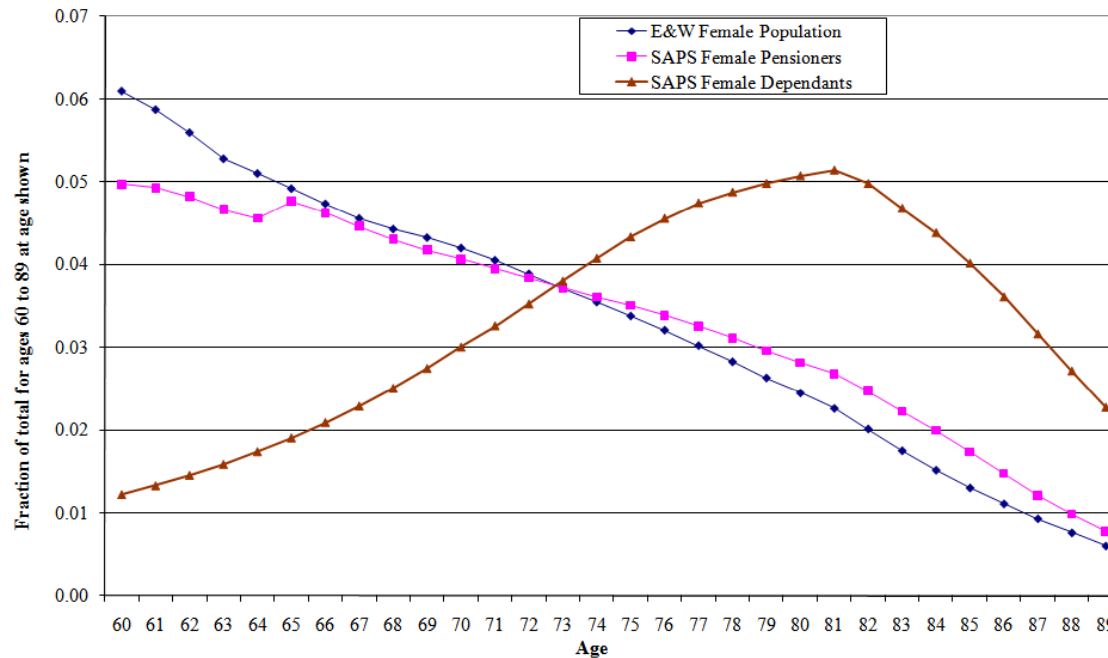
Mortality improvements: ONS vs SAPS (males)

Improvement in SMRs for SAPS Pensioners and E&W Population – Males
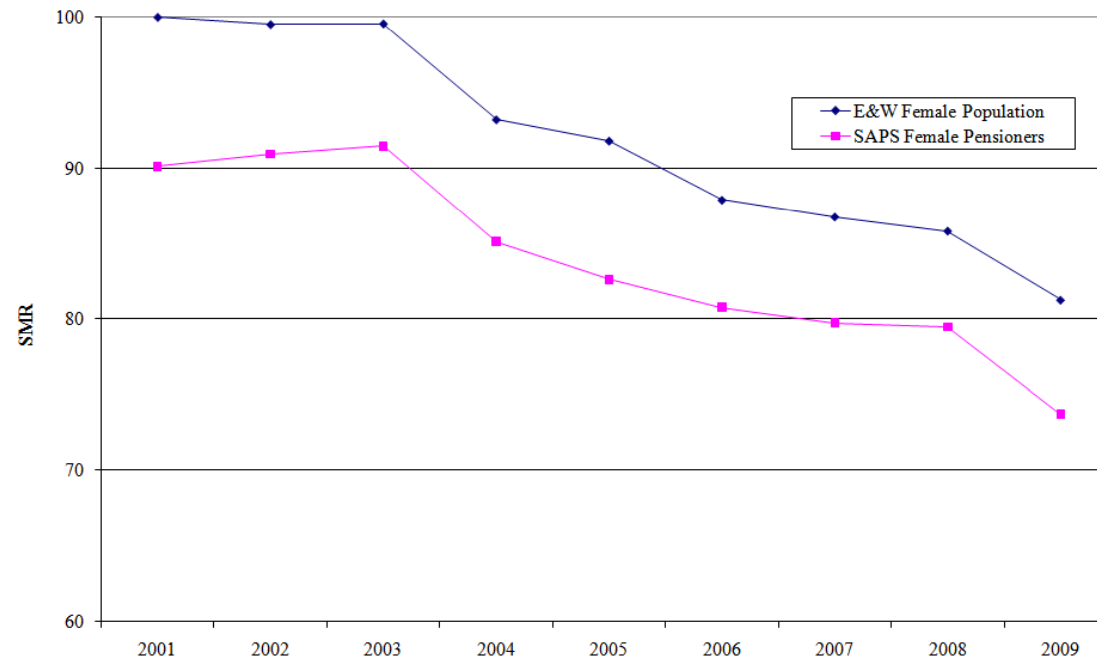
Mortality improvements: age structures (females)

Age distribution of SAPS and E&W Population datasets – Females

Mortality improvements: ONS vs SAPS (females)

SMRs for SAPS Pensioners and E&W Population – Females

Mortality improvements: ONS vs SAPS (females)

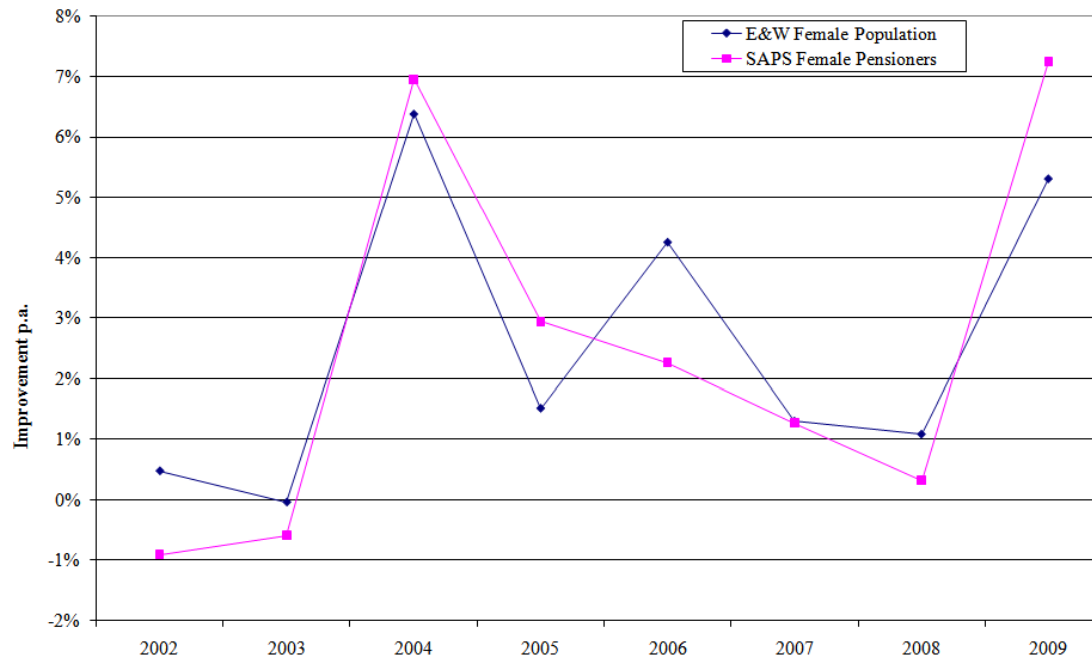Improvement in SMRs for SAPS Pensioners and E&W Population – Females

Mortality improvements: ONS vs SAPS (females)

SMRs for SAPS Dependants and E&W Population – Females

Mortality improvements: ONS vs SAPS (females)

Improvement in SMRs for SAPS Dependants and E&W Population – Females

Mortality improvements: SAPS high vs low

Male Pensioners

Female Pensioners

Mortality improvements: SAPS males vs females

Improvement in SMRs for SAPS Males and Females

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- Updates to the CMI Mortality Projections Model and Library

Industry analysis: overview

- Last analysis of experience by industry in WP29 (Oct 2007)

- Current paper will update this analysis and provide additional information about variation within industry categories

- Hope to issue latest analysis in Q4 2011

Industry analysis: overall mortality by industry
Draft

Relative mortality experience by industry classification and average pension

(Male Pensioners Amounts compared against S1PMA)

Industry analysis: variation – box & whisker plots
Draft

Variation of experience within industry classifications

(Distribution of scheme 100A/Es – Males)
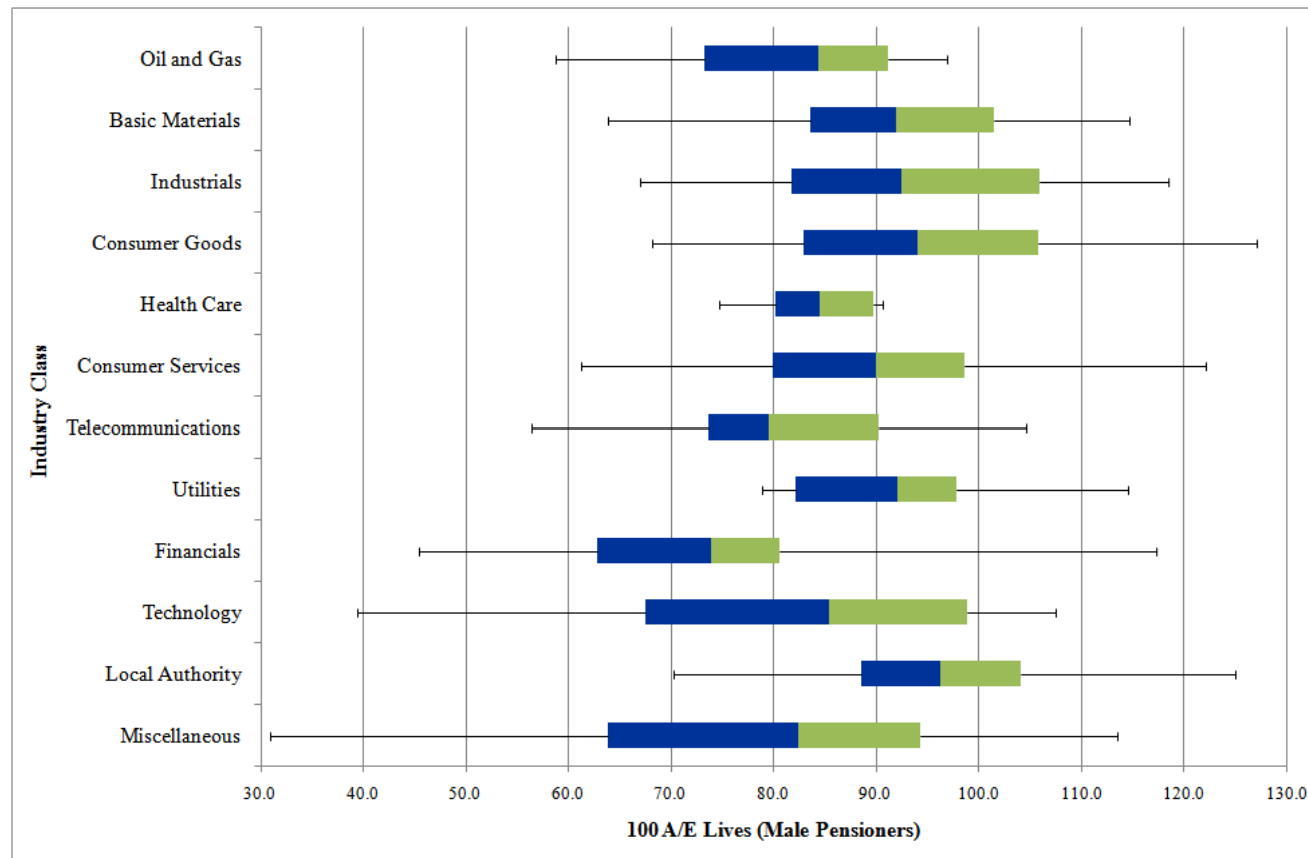
Industry analysis: variation – confidence intervals
Draft

Variation of experience within industry classifications
(Distribution around overall 100A/E – Males)
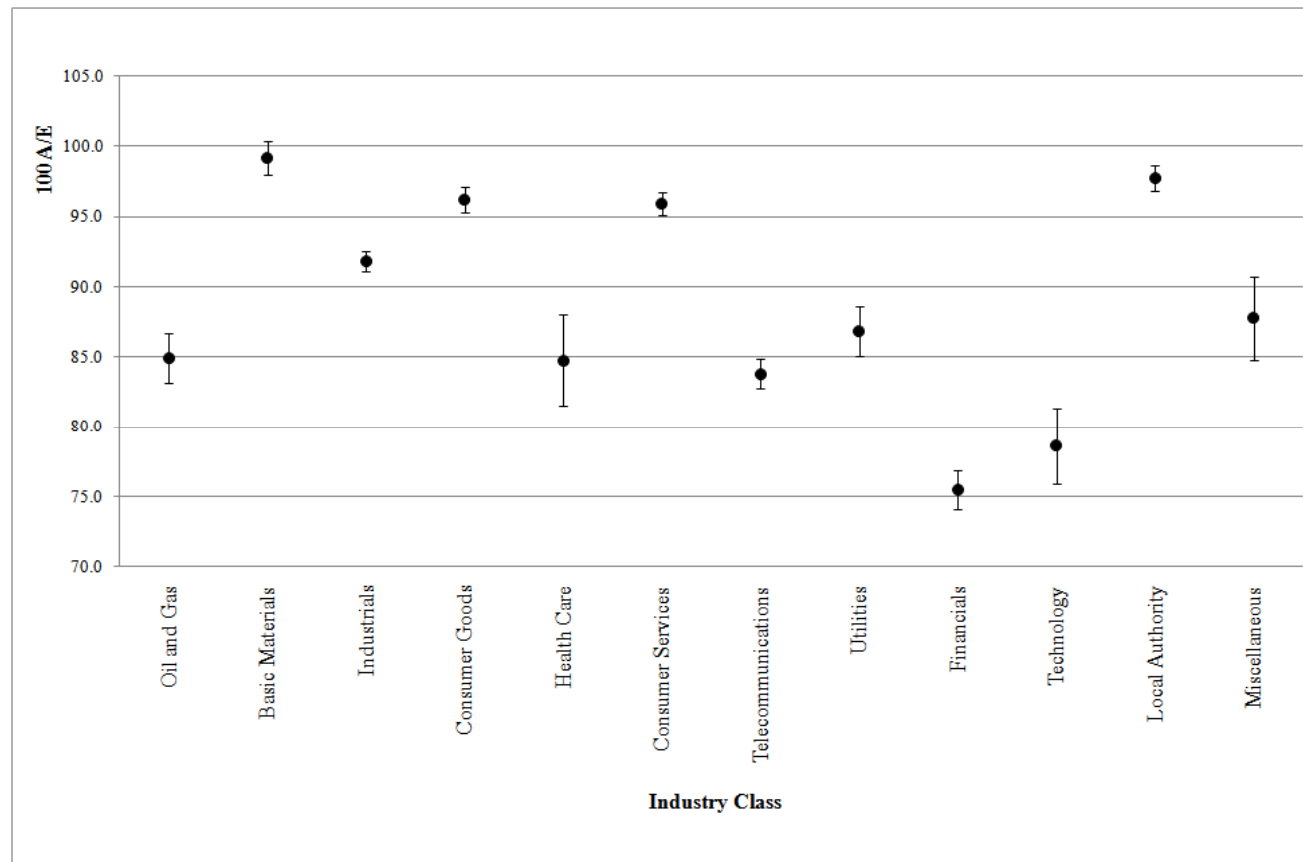
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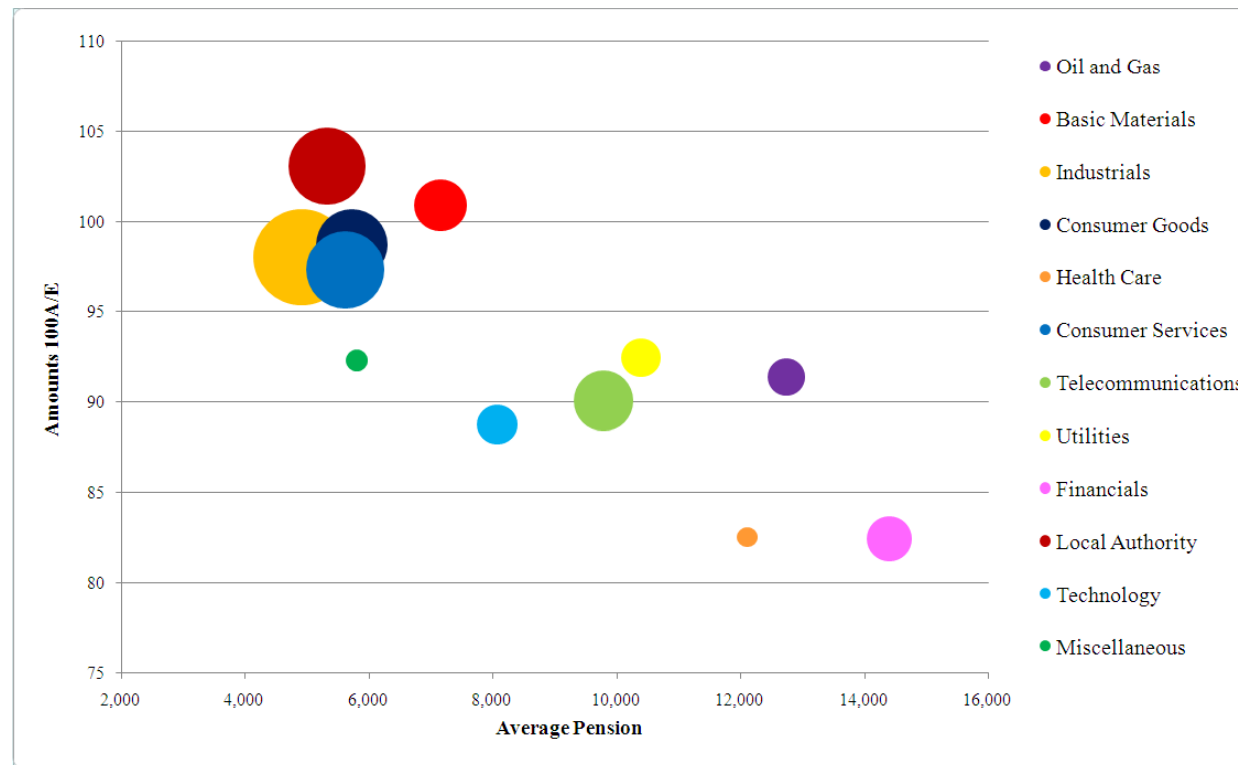- Updates to the CMI Mortality Projections Model and Library

Future/other work:

- Currently working on next annual experience analysis (using data to 30 June 2011)

- Extending industry analysis – effect of pension amount and industry classification

- Considering "S2" graduations

- Late reported deaths – suitability of current adjustment

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- **Updates to the CMI Mortality Projections Model and Library**

The CMI Mortality Projections Model
Advancing the annual release date

- Previous versions released in late November each year due to availability of ONS data

- Not enough time for users to make use of the Model that year-end

- Much of the ONS data released by mid-July, with the exception of high-age population estimates

- WP54 proposed to mirror ONS process to produce high-age population estimates

- Proposal back-tested and showed no material loss of accuracy

- All feedback received to the proposal was supportive

- CMI_2011 released in September 2011.

The CMI Mortality Projections Model
2011 Update - Release of CMI_2011

An updated version of the Model & User Guide

- Updated Initial Rates of Mortality Improvement for 2010 data

- No other material change from CMI_2010

- Described in CMI Working Paper 55.

Default values for Core parameters of CMI_2011

- Initial Rates of Mortality Improvement

  – Use E&W population data to 2010; estimate rates for 2008

  – Maintained methodology used for CMI_2010

- Convergence Period

  – Maintained periods / rules as for CMI_2010.

CMI_2011: Emerging Patterns of Mortality Change
Change arising from incorporation of data for 2010

Annual rates of mortality improvement, by age, year and data
P-Spline models; population of England & Wales; males
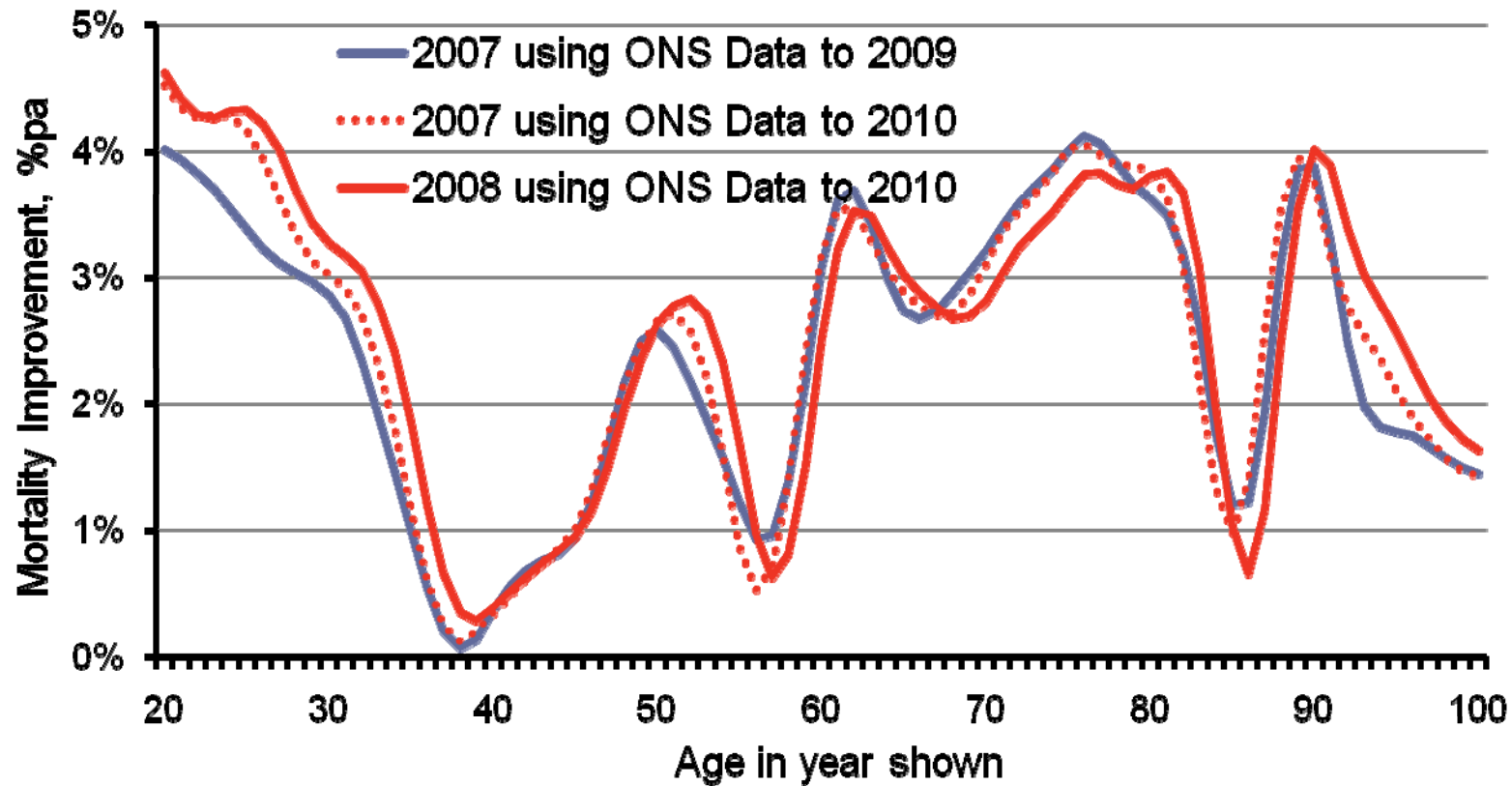
The CMI Mortality Projections Model
Change arising from incorporation of data for 2010

Addition of data leads to revision of estimates

- Revised estimates show modest shape changes by age

- Revisions fall within expected range

- … and show methodology gives relatively stable results

Cohort EoLs: CMI_2011 vs CMI_2010 on like-for-like basis

- Generally slightly lower for CMI_2011 for males

- … and slightly higher for females

- Differences less than +/– 0.5% up to age 90

- [+1% on long-term rate increases EoL by 5% at age 65].

The CMI Mortality Projections Library

- v1.2 published in June 2011

- Work now underway on v1.3 which will contain the following additional projections:

  - Sample P-Spline age-cohort and Lee-Carter projections using ONS data to 2010

  - Same set of sample projections from CMI_2011 as for CMI_2009 and CMI_2010

  - ONS 2010-based national population projections

- Anticipated that v1.3 will be published in November

AOB

Questions?

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