

The Continuous Mortality Investigation (1924 -)

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Agenda

- Introduction
- Life Office Mortality
- Critical Illness
- Income Protection
- SAPS
- Mortality Projections
- EU Gender Directive

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Background to the CMI

- Largest single research project organised by the UK Actuarial Profession
- Collected and analysed data on mortality and morbidity for over 80 years
- Constituted independently as a research organisation
- Financed by members - life insurers, reinsurers, actuarial consultancies
- Life insurers and pensions consultancies provide data
- Individual contributors' data is subject to strict confidentiality
- Aggregated data / results are released to contributors and then to others

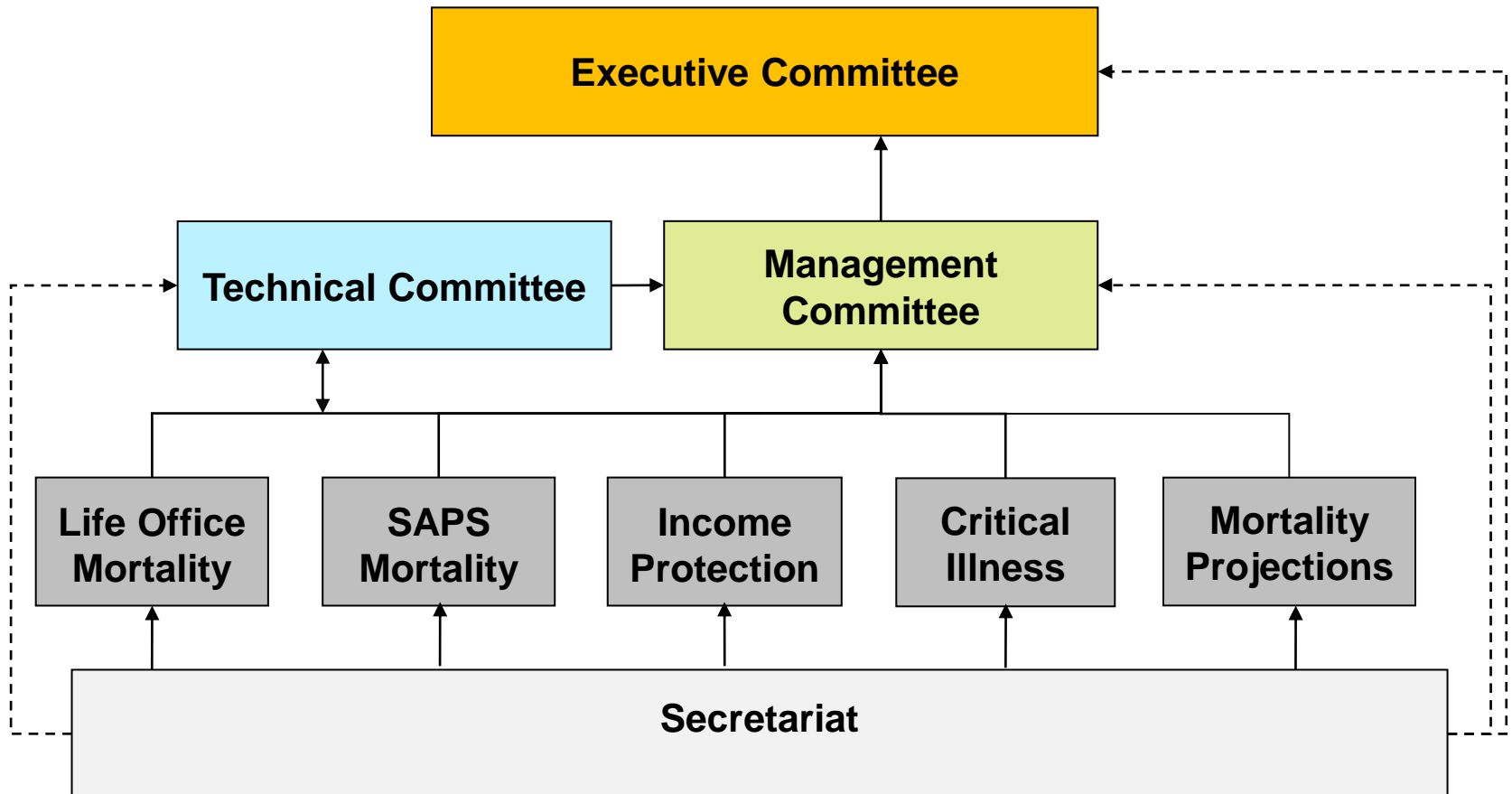
Role of the CMI

- Data collection / validation
- Regular reporting on experience
 - To each data contributor – own results
 - To CMI members – aggregate results
 - Published (via the Actuarial Profession) – less frequent aggregate results
- Research
 - Data analysis methodologies
 - Models to describe experience
 - Calibrations of models (i.e. graduations of rates)

Why firms contribute data

- Helps to price and to reserve rationally and consistently
- Acts as a check on own assumptions
 - Comparison with industry experience and trends
 - Small areas of experience e.g. Cause of Claim
 - Limited resources and expertise within offices
- Benefit from new research and ideas
 - CMI provides interface for exchange of ideas between academics and the commercial world
 - e.g. promote understanding and research

Structure of the CMI



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- Income Protection
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- Mortality Projections
- EU Gender Directive

Life Office Mortality Investigation

- Longest running – from the 1920s
- Data from UK life offices
- Assurances, annuitants & pensioners
- Smoker / Non-smoker
- Graduated mortality tables
- (Impaired lives)

Per Policy: Aims

- In recent years the CMI has been switching to 'Per Policy' data collection for life office mortality and critical illness data.

Aims

- Capture more detailed information
- Improve accuracy
- Allow different analyses

Per Policy: Work completed

- Version 1.0 of Per Policy coding guide published in Dec 2005 – latest version published Sept 2011 (v1.7)
- Significant number of offices have submitted data – good progress but considerable time and effort
- Data converted into previous formats to produce Individual Office results
- WP56 – set out initial methodology and results format
- WP57 – consultation on developing the results format

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Critical Illness Investigation

- Started life in 1995 reporting to the Life Office Mortality Committee
- Initial attempts at data collection failed
- Investigation re-launched from 1998 data
- Most analysis carried out on data from 1999 and beyond
- Results have been released for 1999 to 2006 inclusive

CMI Critical Illness – Recent Focus

- Key challenge has been to produce realistic claim rates ...
- ... the difficulty is that we collect settled claims, but want to measure experience in terms of diagnosed claims

2008	WP33 – A new methodology (Adjusted Results)
2010	WP43 – Diagnosis Rates (Accelerated 1999-2004)
2011	WP50 – Diagnosis Rates (Accelerated 2003-2006)
	WP52 – Cause-specific rates
	WP58? – Supplementary Analyses

CMI Critical Illness: Scope of AC04 rates

- All-causes accelerated critical illness; Lives table only
- Based on claims settled in 2003-2006
- Four tables:
 - ACMNL04
 - ACMSL04
 - ACFNL04 and
 - ACFSL04.
- Durations 0,1,2,3,4 and 5+ for ages 18 to 65; ultimate only for ages 66+
- Age exact basis

2003-2006 AC04 Diagnosis Rates

Smoothed Annualised CI Diagnosis Rates by Gender and Smoker Status; Accelerated CI; Ultimate; 2003-2006

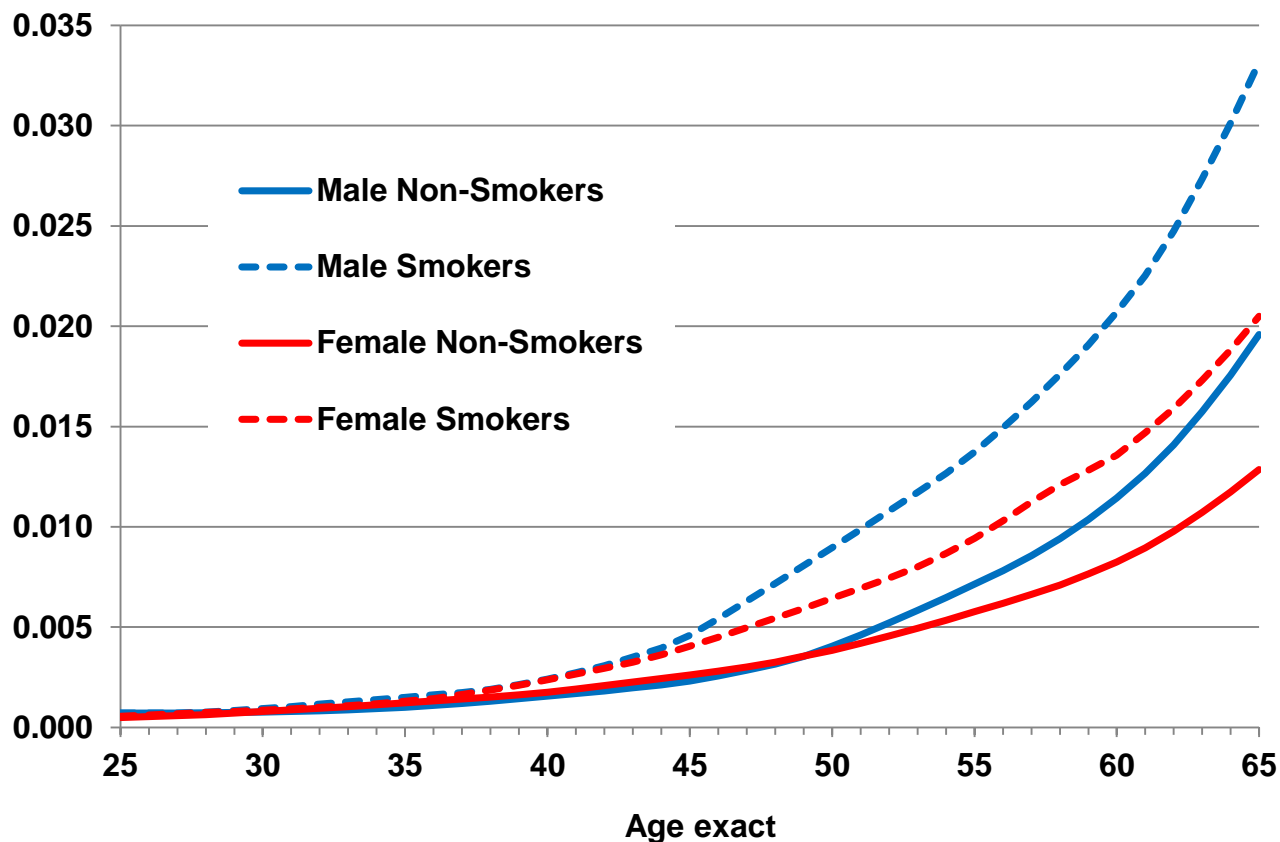


Figure 8.2 from Working Paper 50

2003-2006 AC04 Diagnosis Rates

Smoothed Annualised CI Diagnosis Rates by Gender and Smoker Status; Accelerated CI; Ultimate; 2003-2006 as % of CIBT02

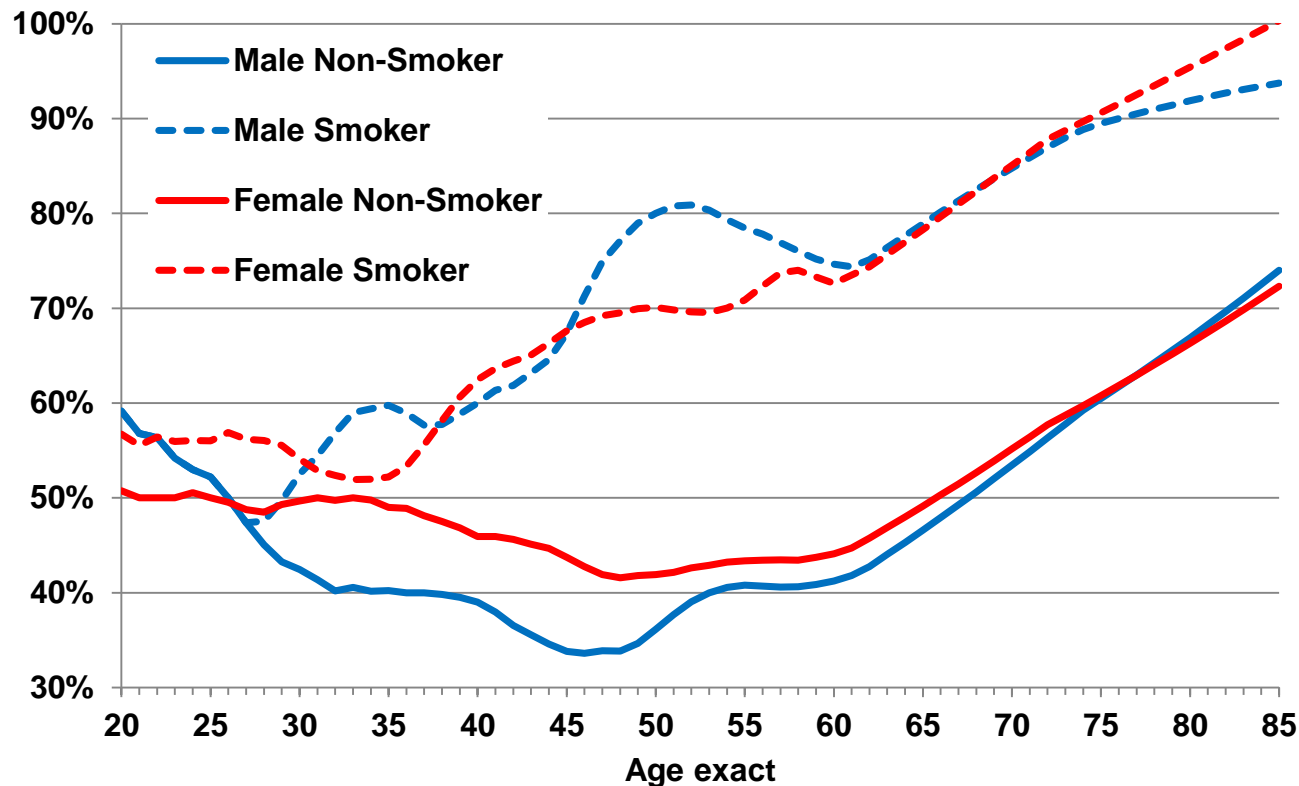
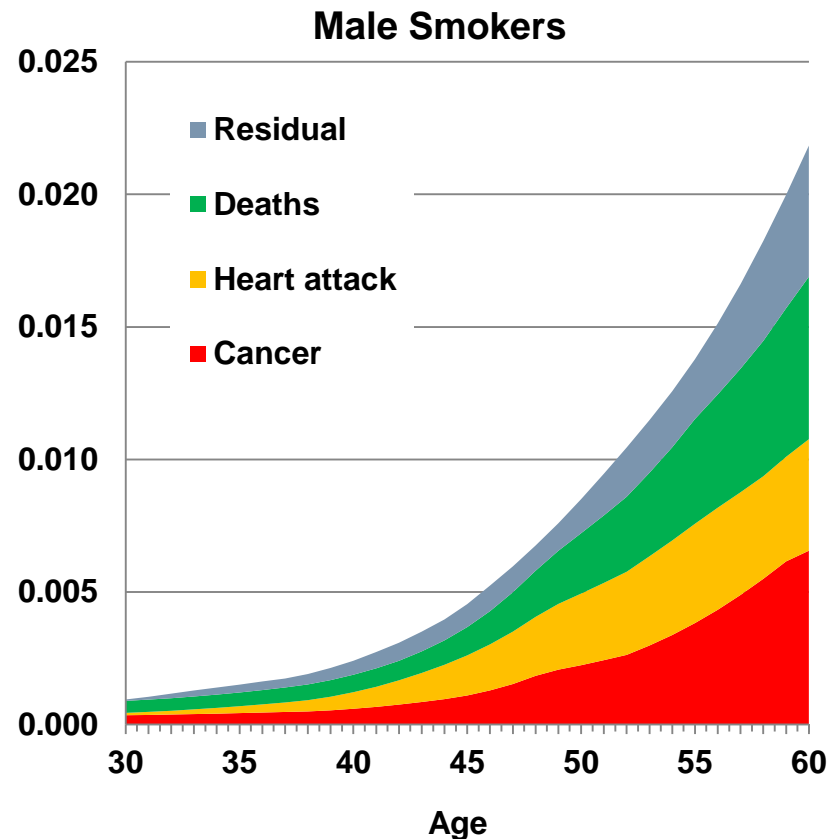
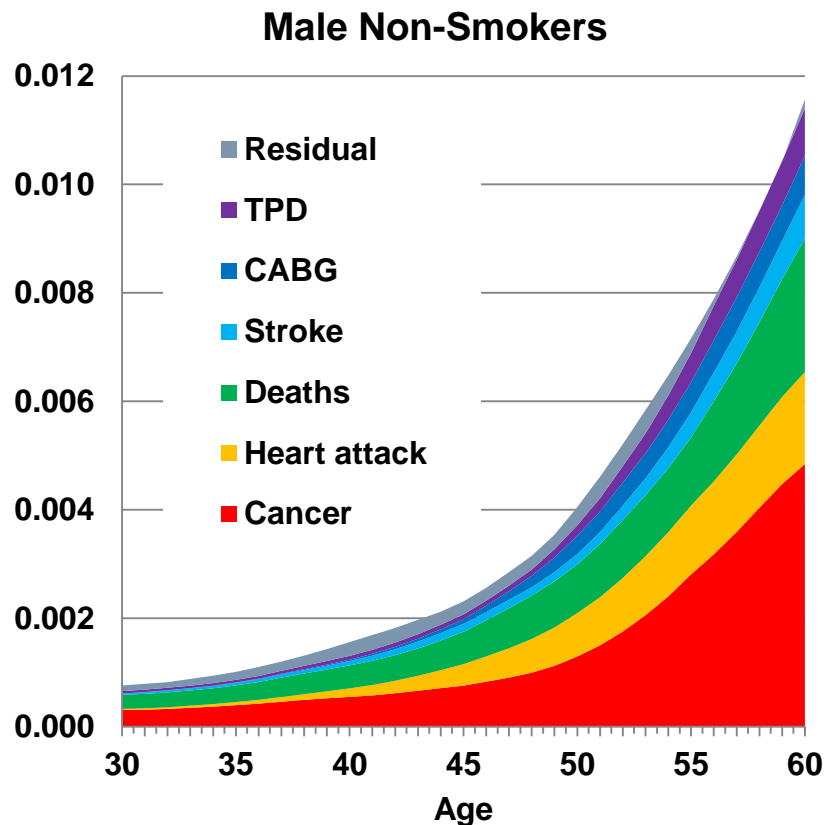


Figure 8.5 from Working Paper 50

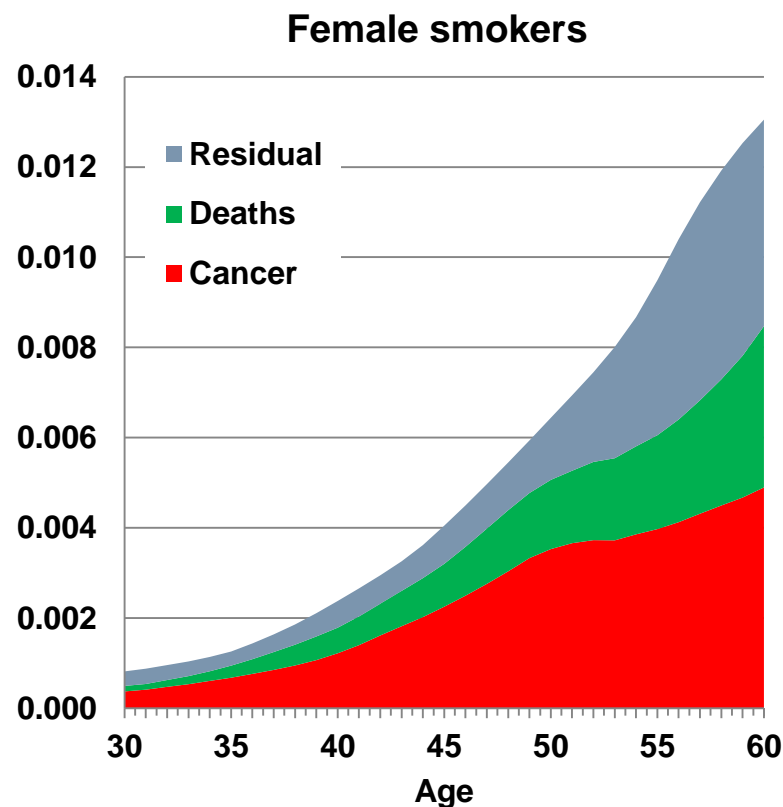
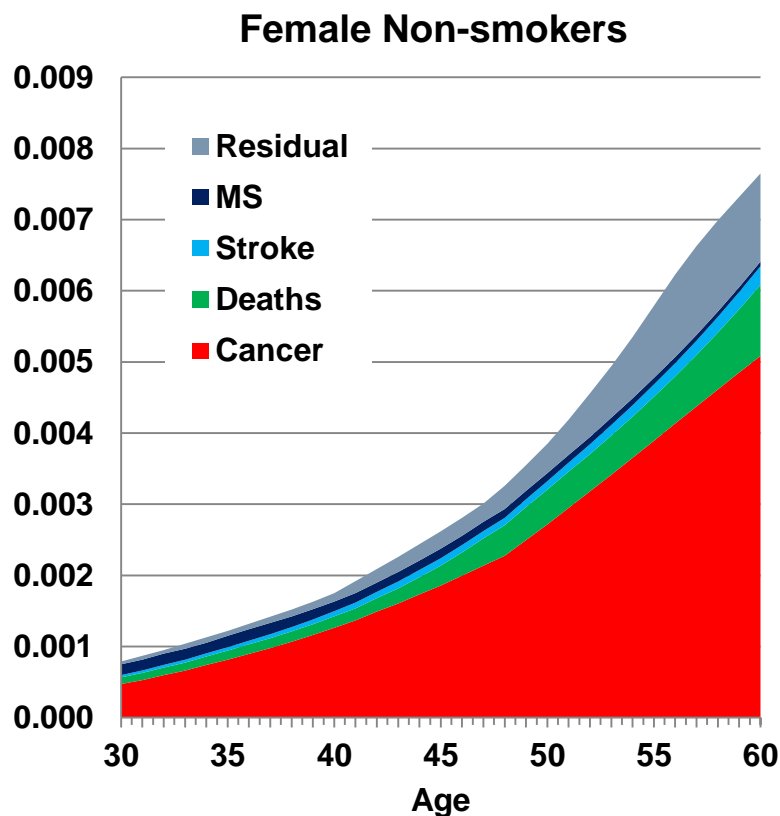
2003-2006 Cause-specific Diagnosis Rates

Smoothed Annualised CI Diagnosis Rates by Cause Accelerated CI; Durations 5+; 2003-2006



2003-2006 Cause-specific Diagnosis Rates

Smoothed Annualised CI Diagnosis Rates by Cause Accelerated CI; Durations 5+; 2003-2006



CMI Critical Illness: Supplementary analyses

- Illustration of uncertainty in rates
- Experience split by
 - Office
 - Sum assured band
 - Distribution channel
 - Year of commencement
 - Product Type
- Experience of stand-alone business
- Expected to be published in Working Paper very shortly!

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Income Protection Investigation

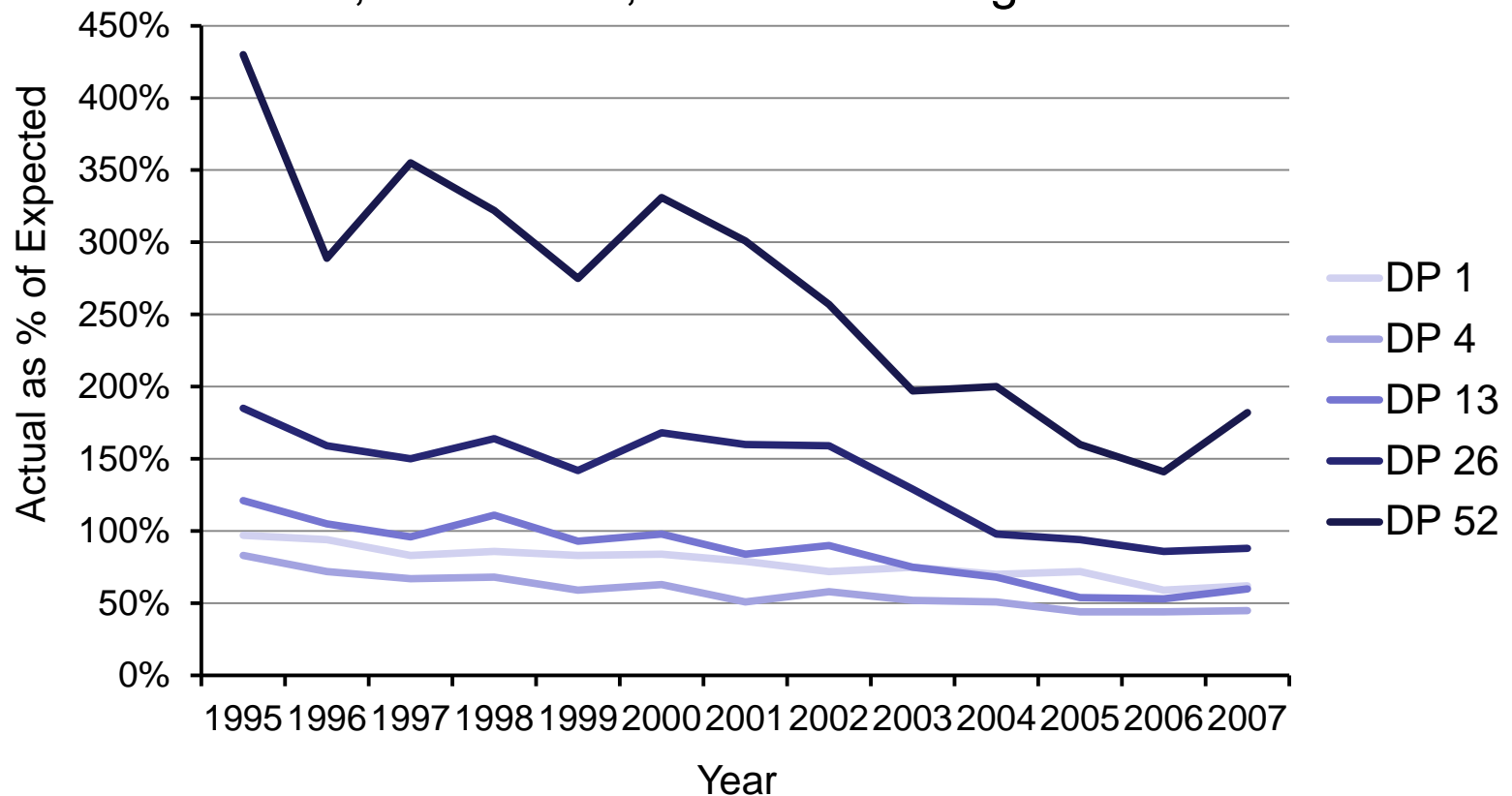
- Formerly known as the Permanent Health Insurance Investigation
- Data collection commenced in 1972
- Multi-State Model was introduced in 1991 (CMIR 12)
- Analyses of claims inceptions and terminations, i.e. recovery and death, rates relative to graduated rates
- First graduations published in 1991 based on data for 1975-78 (CMIR 12)

IP Experience Summary – Recent Focus

- May 2004: WP5-7 - Graduation of termination rates (IPM 1991-98 – males, occupational class 1)
- Jul 2010: WP46-48 - Graduation of inception rates (IPM 1991-98 – males, occupational class 1)
- Next WP – comparison of 1991-2006 experience with new graduations

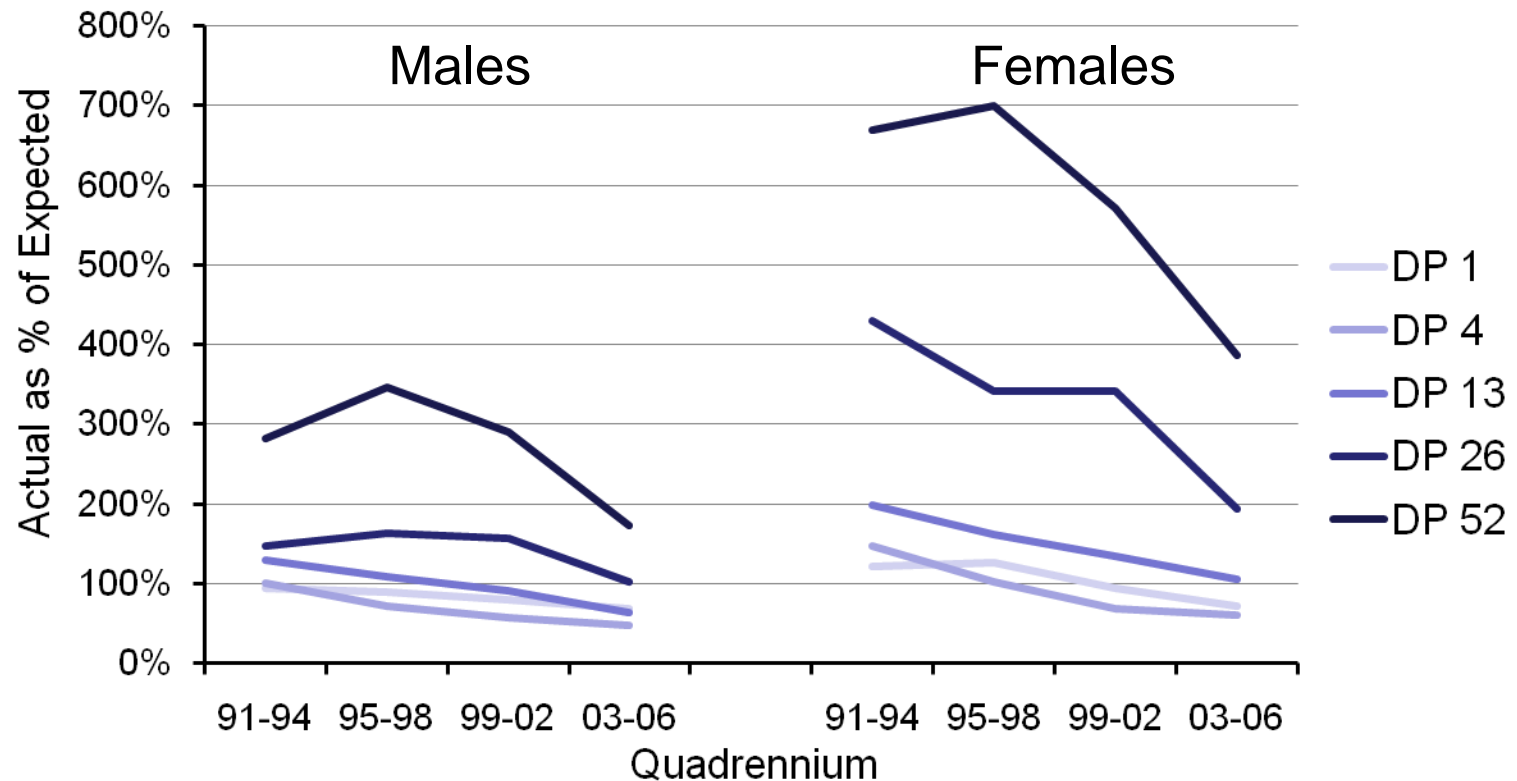
IP Experience Summary - Inceptions

Claims Inceptions; A÷E using SM1975-78; by Deferred Period
Males; Standard *; all Occ's and ages combined



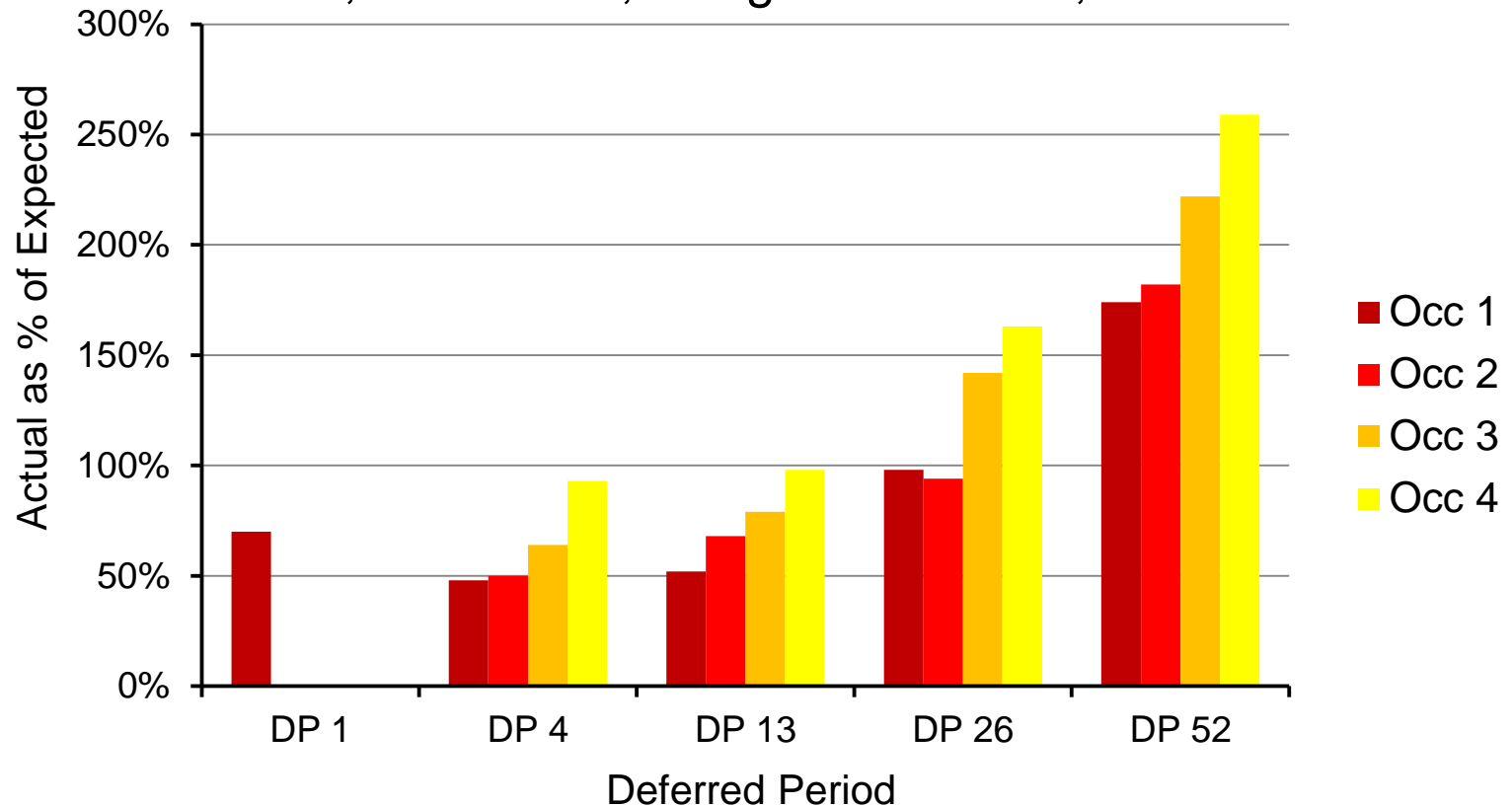
IP Experience Summary - Inceptions

Claims Inceptions; A÷E using SM1975-78; by Deferred Period
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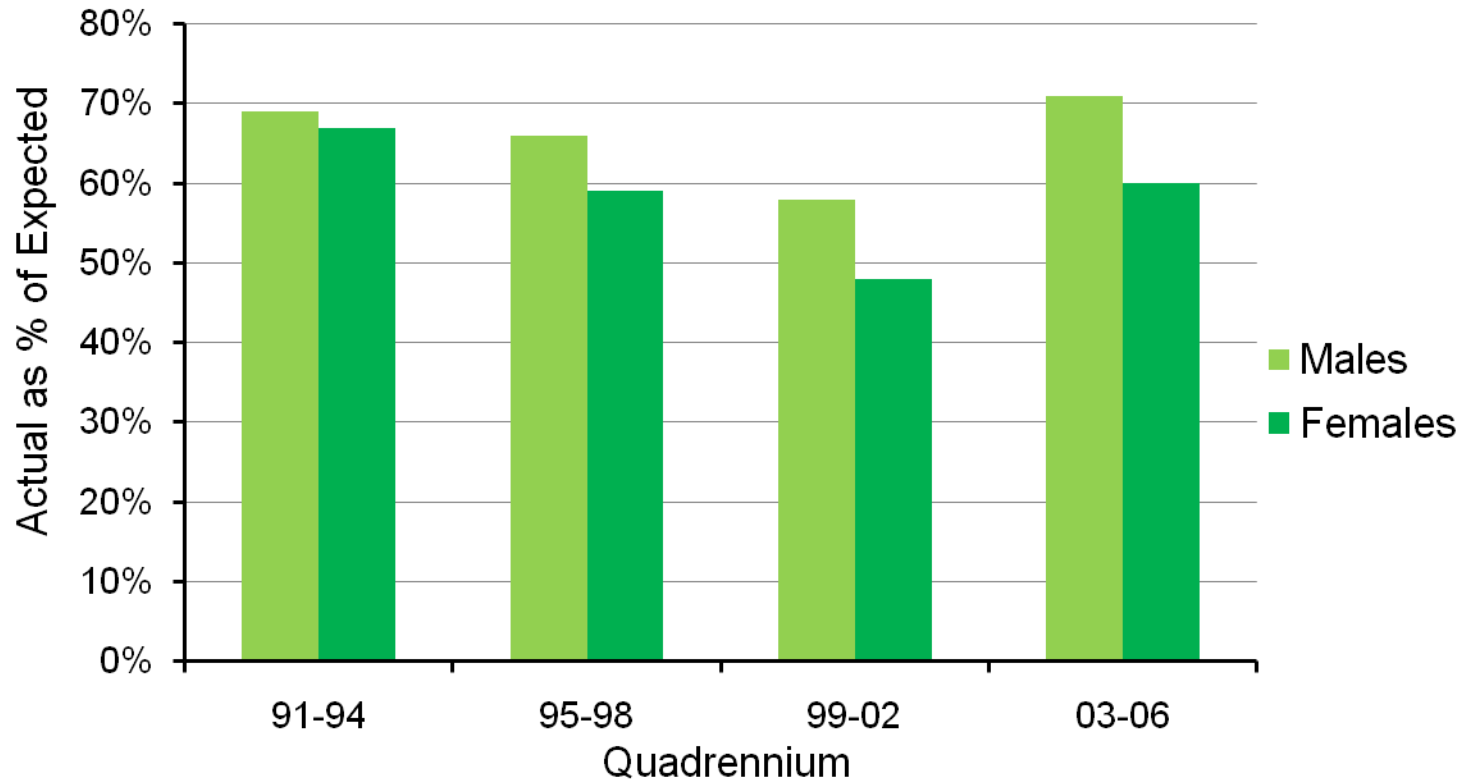
IP Experience Summary - Inceptions

Claims Inceptions; A÷E using SM1975-78; by Occupation Class
Males; Standard *; all ages combined; 2003-06



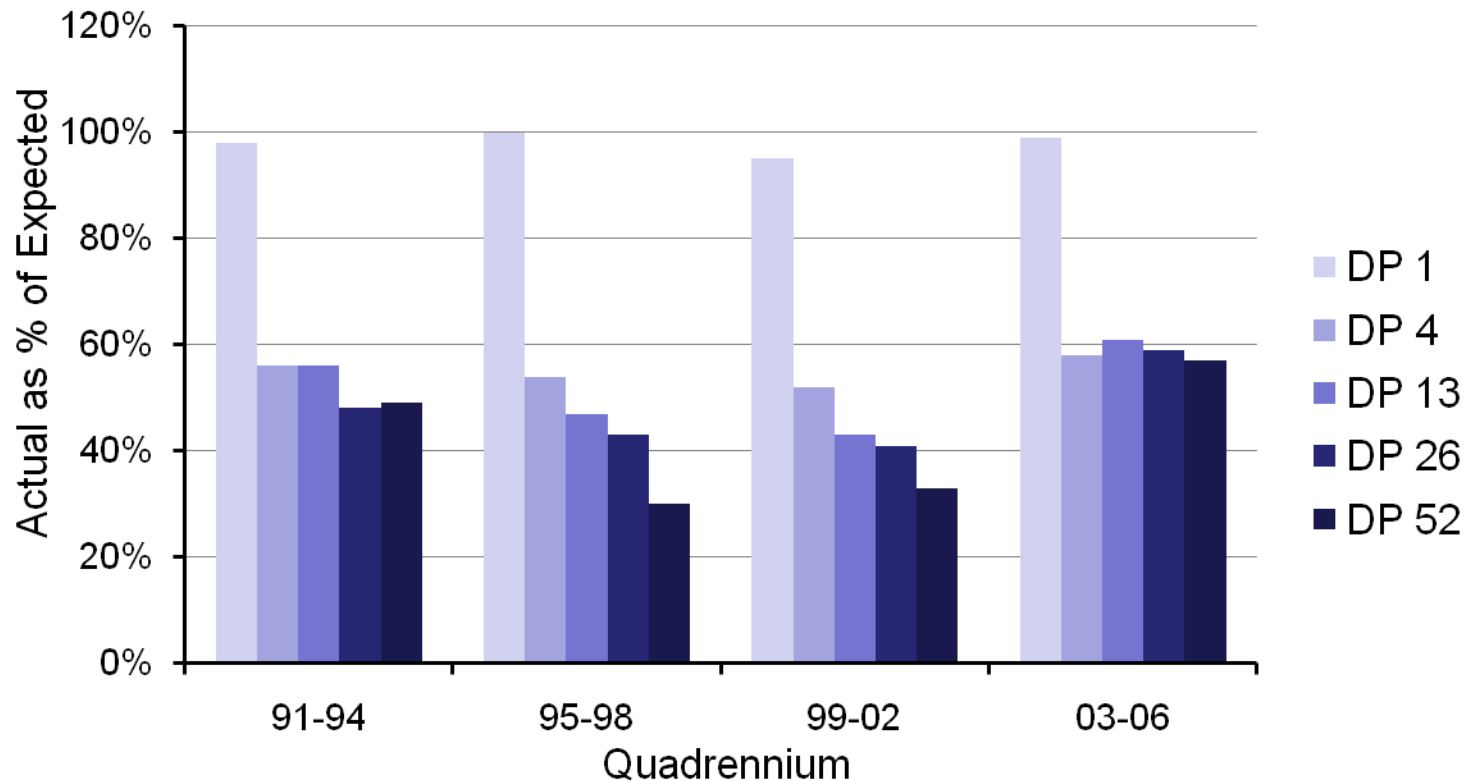
IP Experience Summary - Recoveries

Claims Terminated by Recovery; A÷E using SM1975-78
Standard *; all DP's, Occ's, ages and durations sick combined



IP Experience Summary - Recoveries

Claims Terminated by Recovery; A÷E using SM1975-78; Males
Standard *; all Occ's, ages and durations sick combined



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SAPS Mortality Investigation

SAPS = Self-Administered Pension Schemes

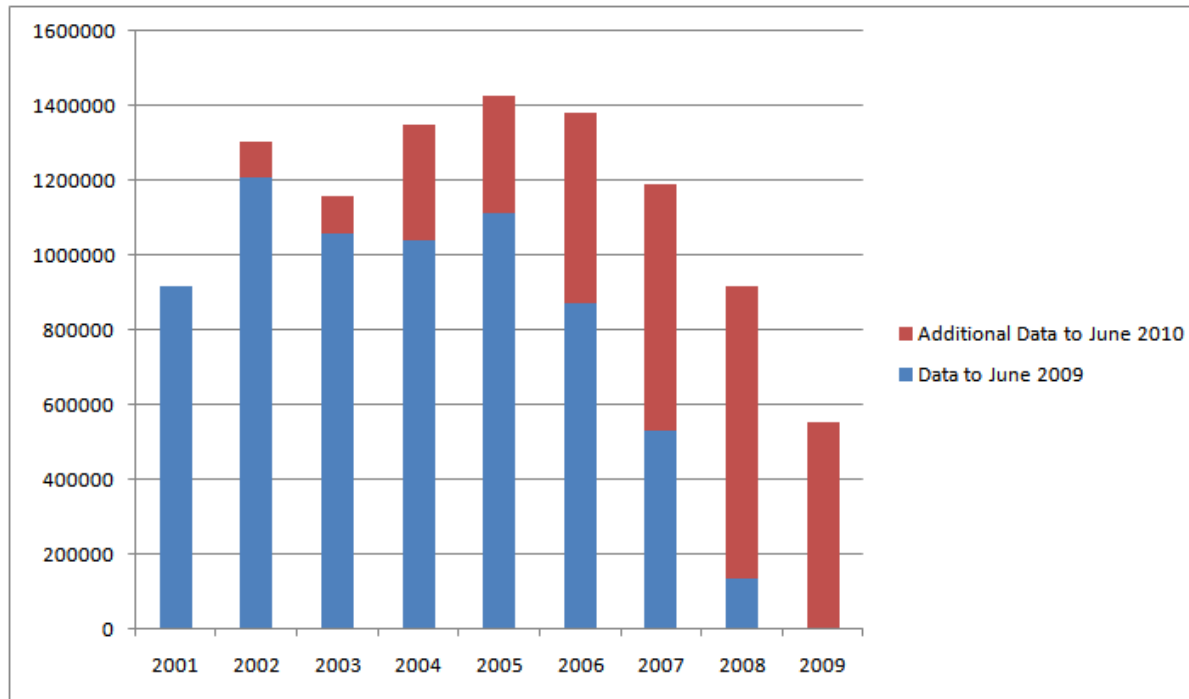
- Data collection commenced in Jan 2003 following pilot scheme.
- Pension scheme mortality shown to be different from experience underlying insured pensioner population.
- Became formal CMI investigation in July 2006
- Produces individual analyses on all scheme data submitted
- Analyses aggregate SAPS dataset approx annually, including features of different
 - pensioner types
 - industry types
 - pension amounts bands etc.
- Produced first mortality tables (S1) based on pension scheme data

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

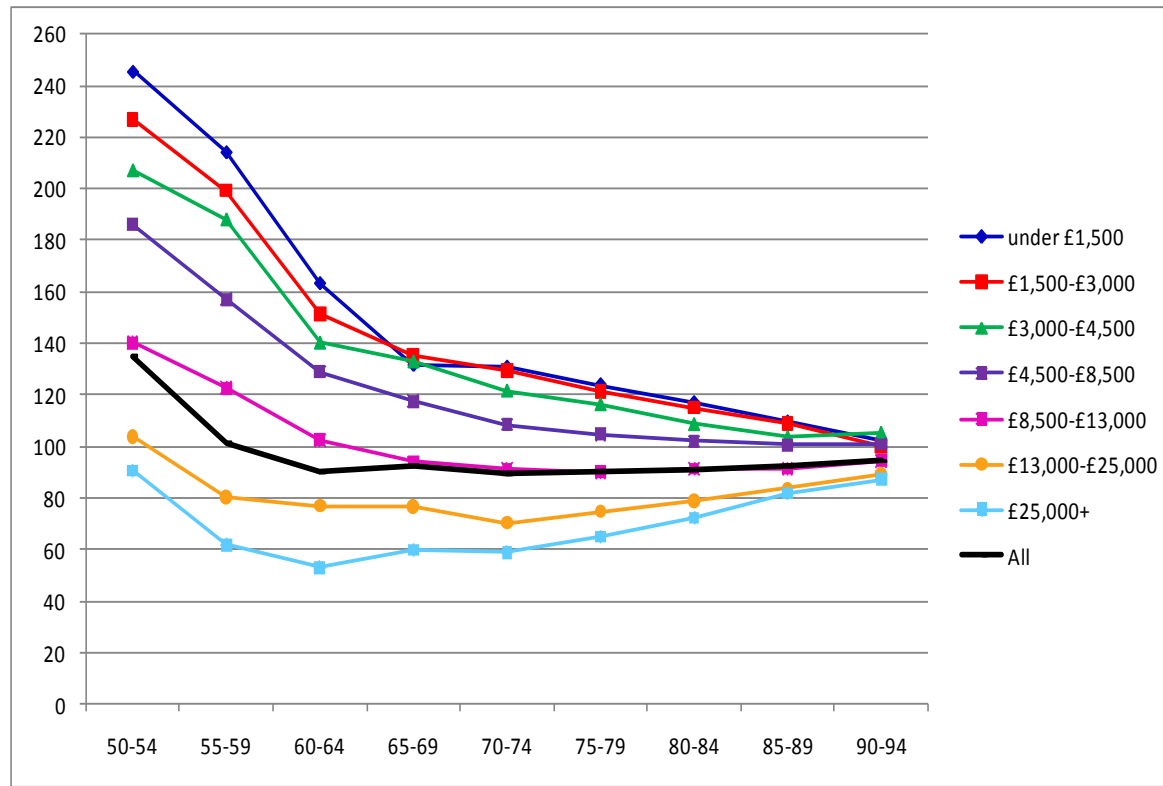
Male pensioners



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.

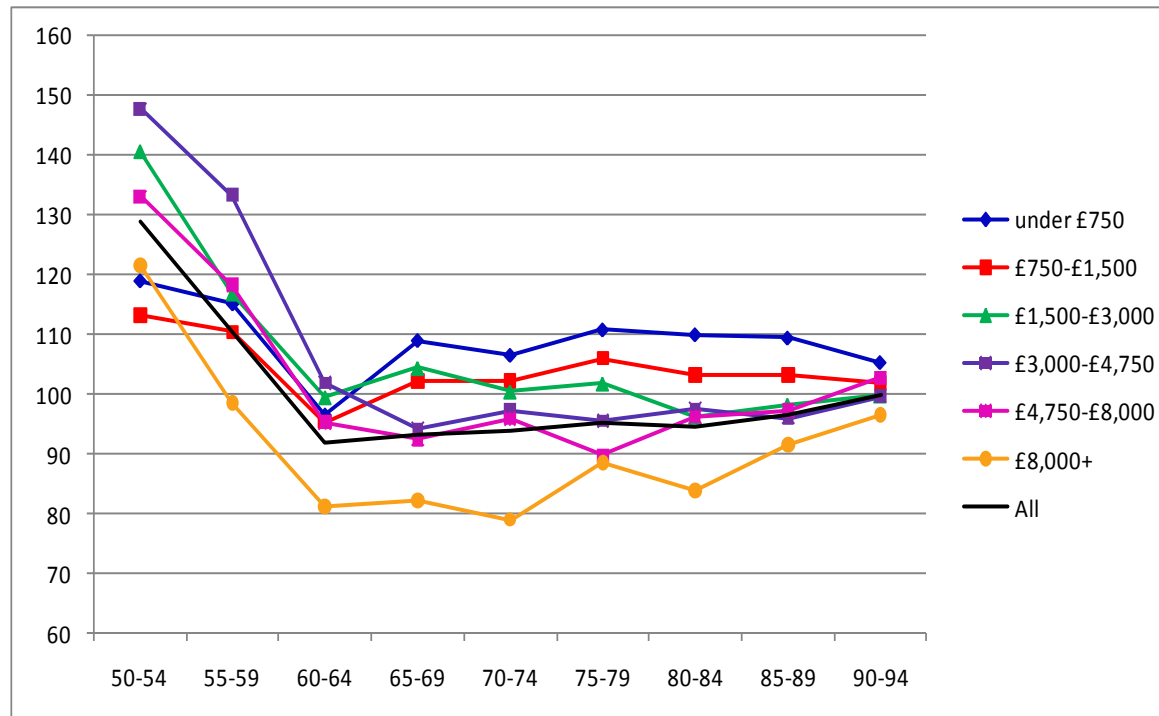
2002-2009 mortality experience: amounts bands

Male Pensioners Amounts compared against S1PMA



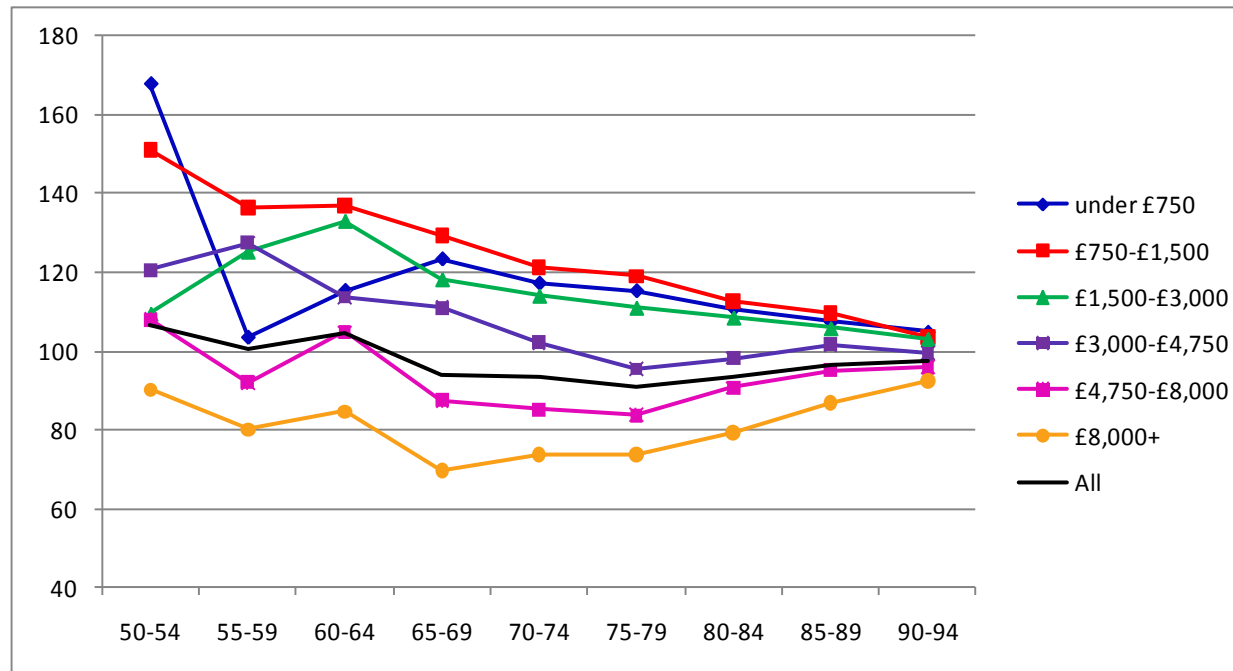
2002-2009 mortality experience: amounts bands

Female Pensioners Amounts compared against S1PFA



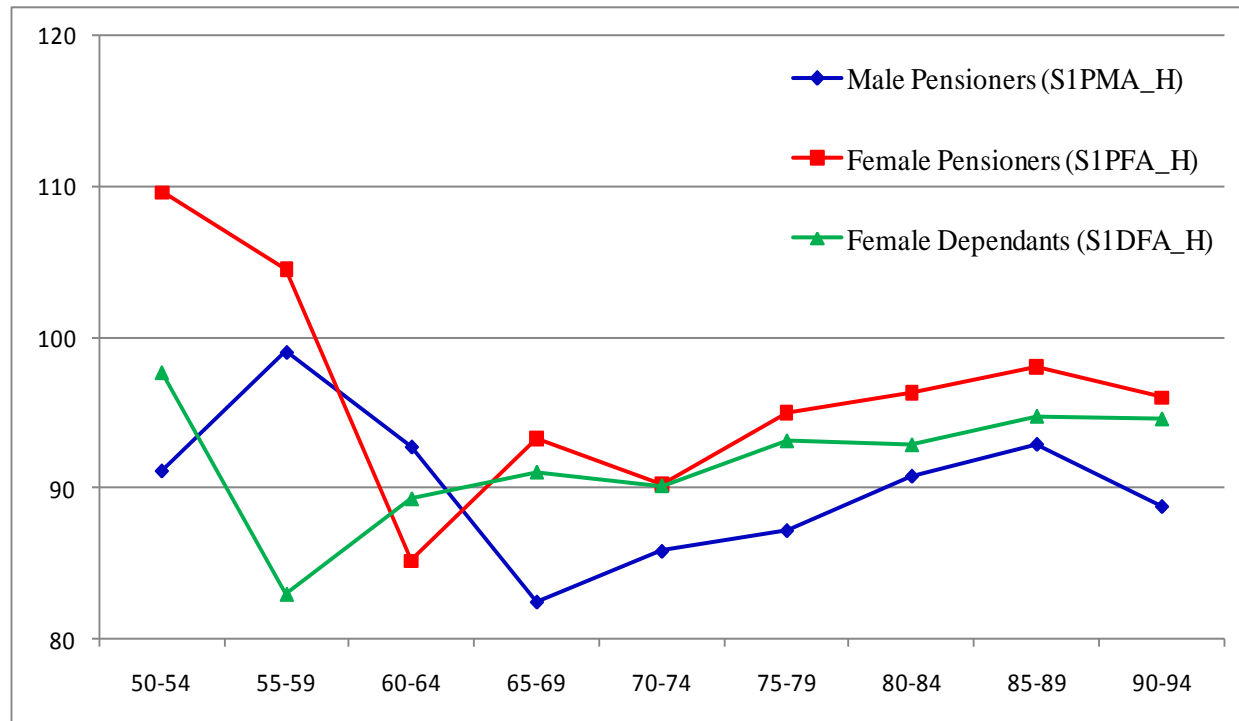
2002-2009 mortality experience: amounts bands

Female Dependants Amounts compared against S1DFA



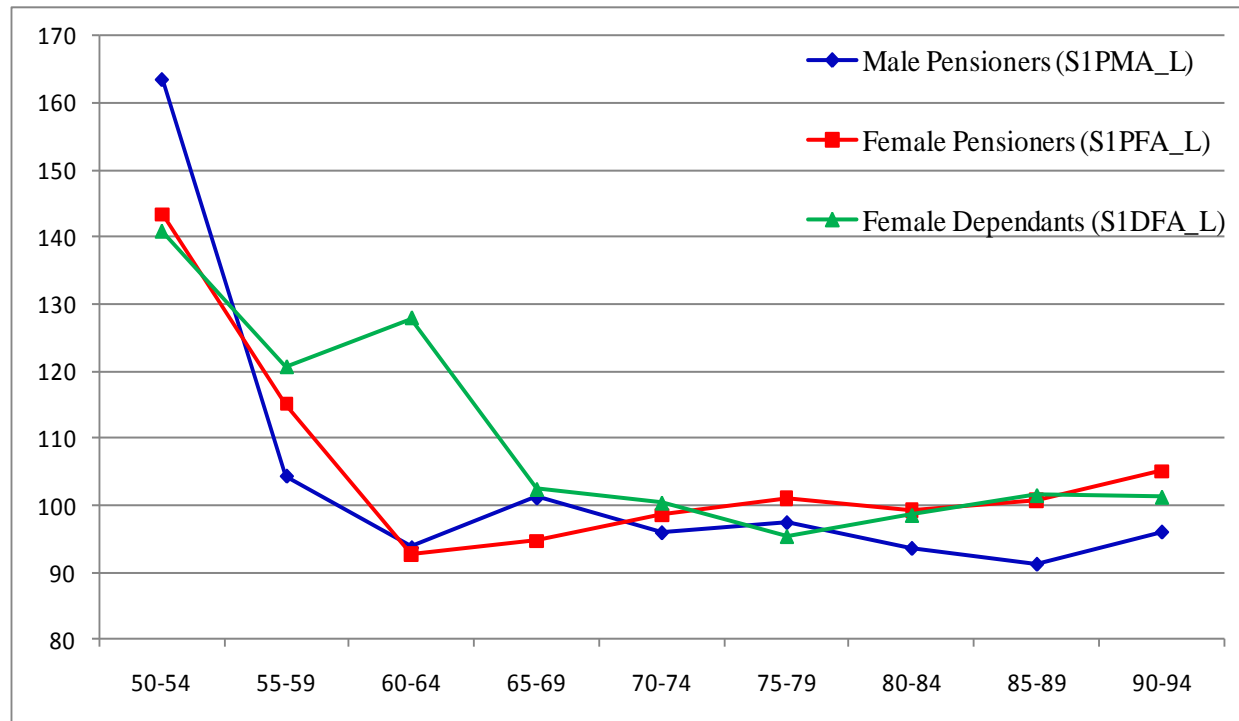
2002-2009 mortality experience: “Heavy” tables

SAPS Amounts compared against “Heavy” tables

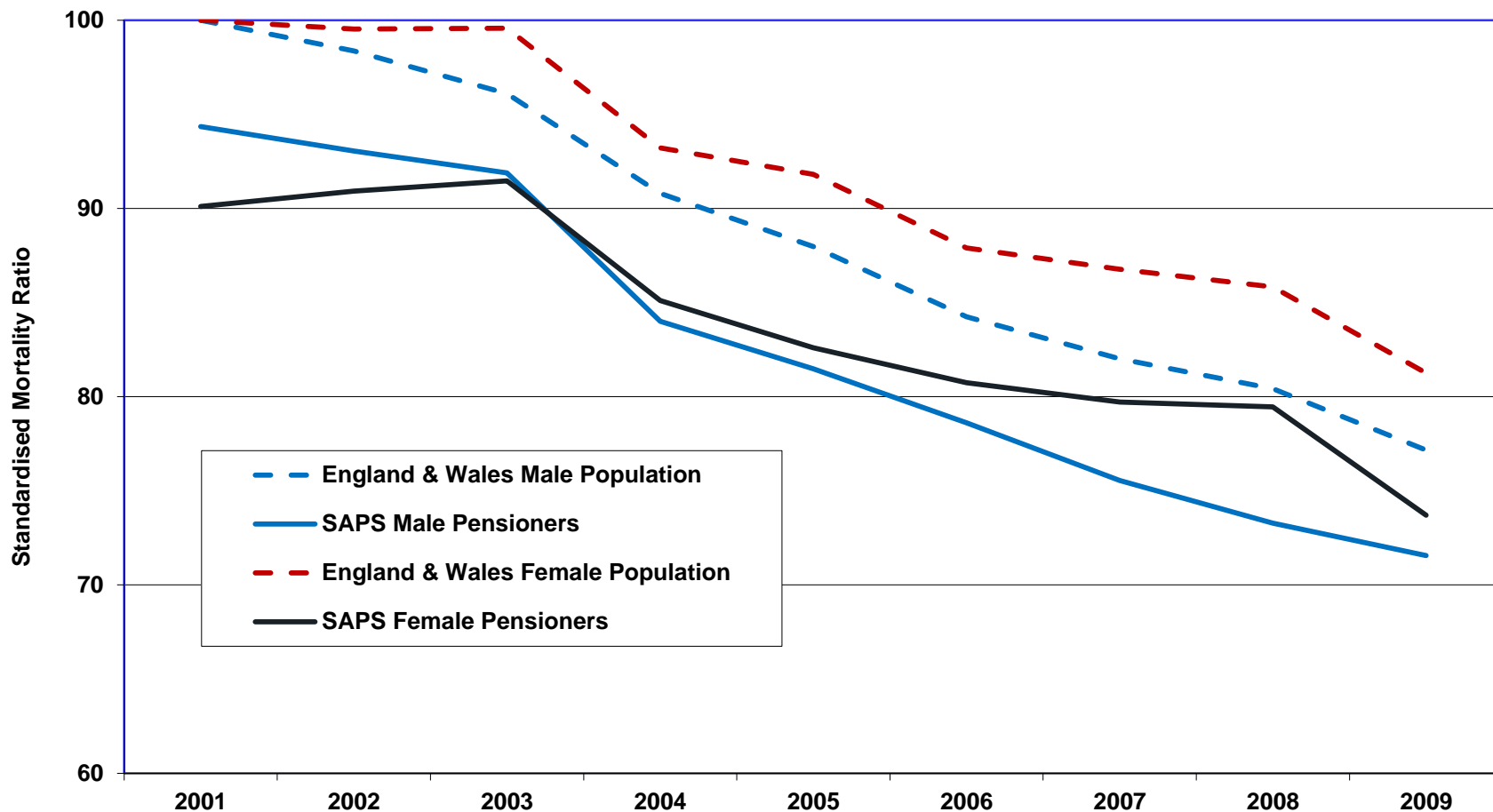


2002-2009 mortality experience: “Light” tables

SAPS Amounts compared against “Light” tables



Mortality improvements: ONS vs SAPS



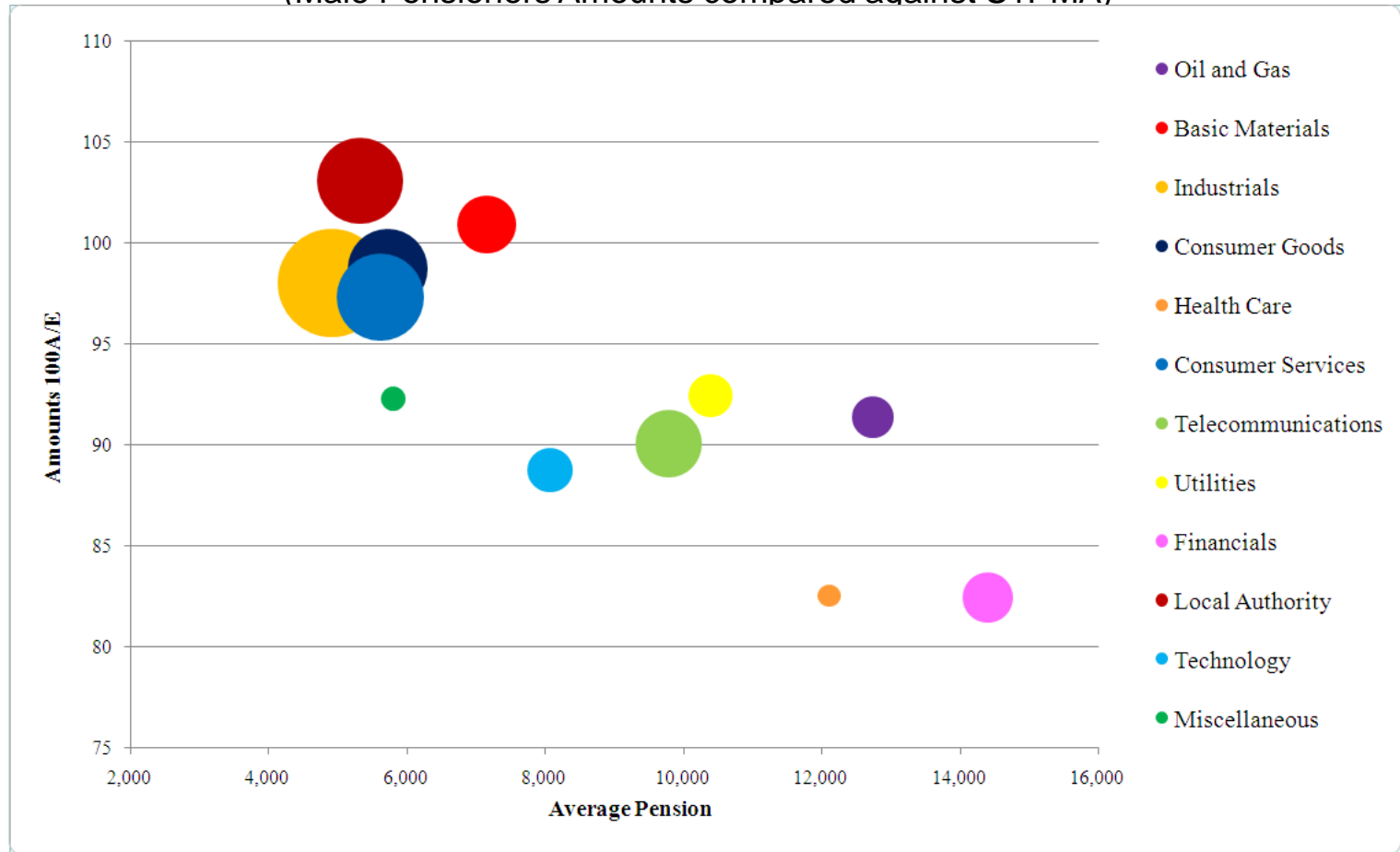
Industry analysis: overview

- 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 to members in Dec 2011
- Subsequent publication as Working Paper

Industry analysis: overall mortality by industry

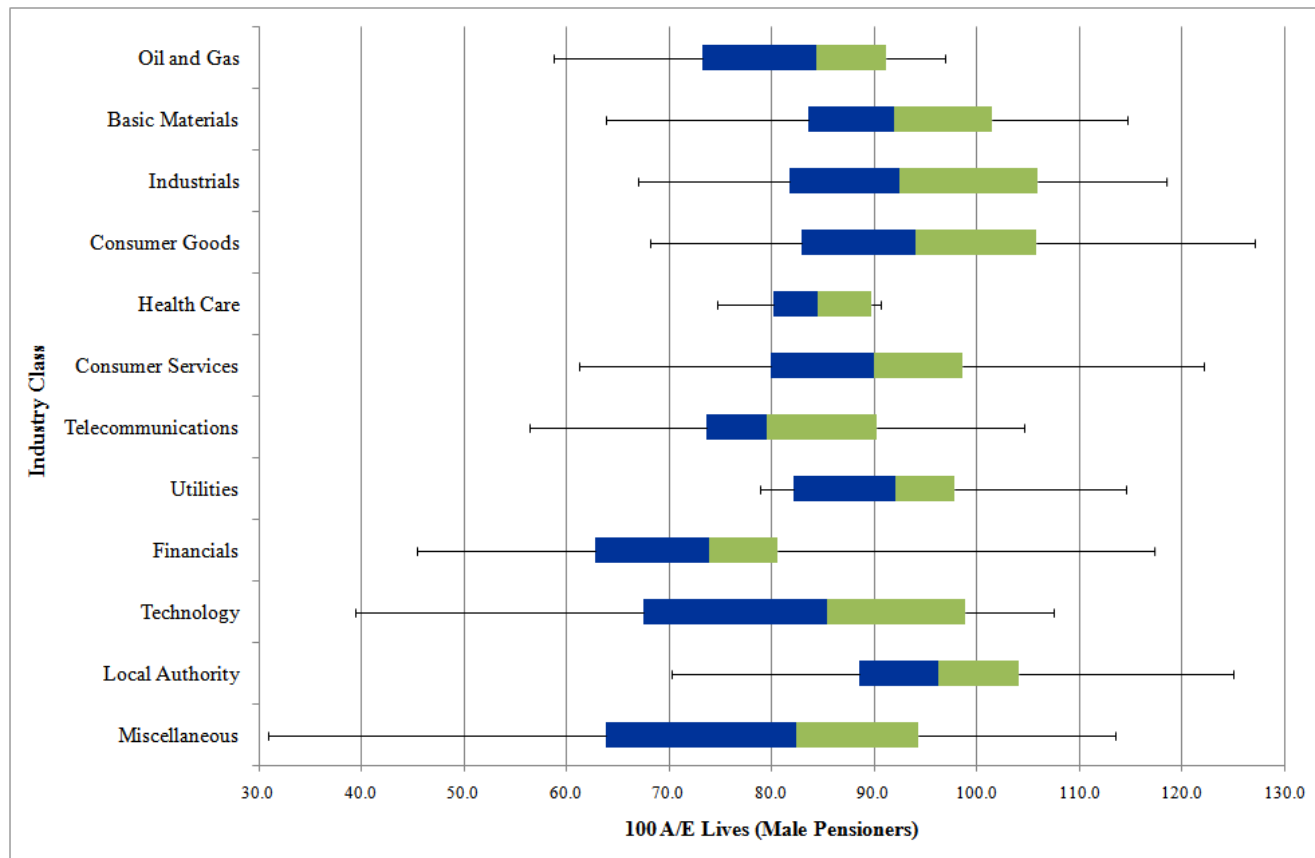
Relative mortality experience by industry classification and average pension

(Male Pensioners Amounts compared against S1PMA)



Industry analysis: variation – box & whisker plots

Variation of experience within industry classifications
(Distribution of scheme 100A/Es – Males)



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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

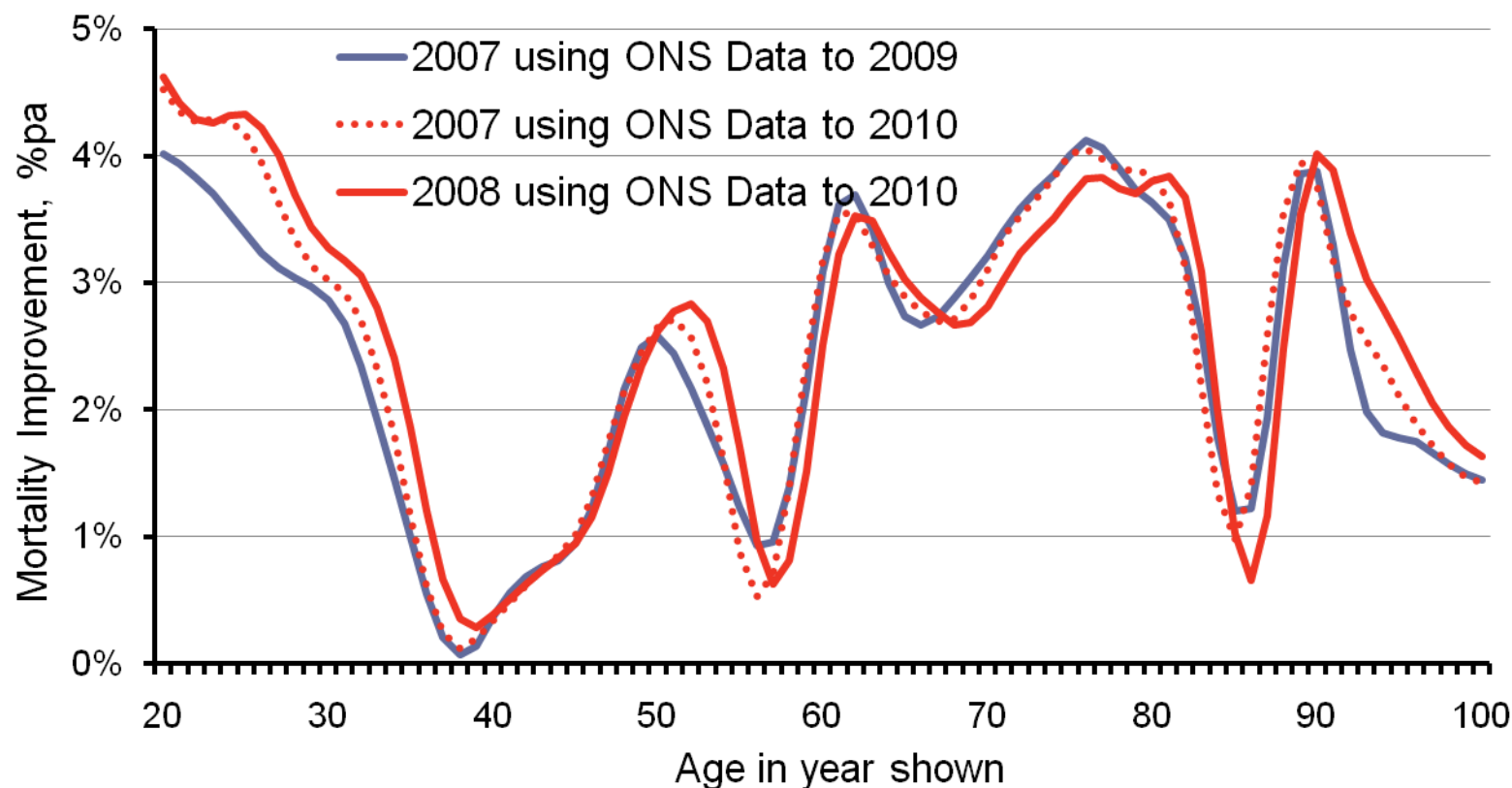
- Initial Rates of Mortality Improvement
 - Use E&W population data to 2010; estimate rates for 2008
 - Maintained methodology used for CMI_2010
- Convergence Period
 - Maintained periods / rules as for CMI_2010.

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 $\pm 0.5\%$ up to age 90
- [+1% on long-term rate increases EoL by 5% at age 65].

The CMI Library of Mortality Projections

- v1.3 published in November 2011, which contains 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

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EUGD & Test-Achats

- 2004 Directive allowed use of gender in premium rates subject to publication of justifying data
- CMI worked with HMT and ABI to establish basis for publication
- CMI published data for mortality, critical illness and income protection
- Test-Achats case successfully challenged the use of gender for pricing insurances
- What rating factors will be used? What should CMI collect?
- Will this also happen to pensions?

Questions?

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<http://www.actuaries.org.uk/research-and-resources/pages/continuous-mortality-investigation>