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Continuous Mortality Investigation

Gordon Sharp – Chairman, CMI Executive Committee
Bristol Actuarial Society



Agenda

- Changes to CMI structure and funding
- Mortality Projections: CMI_2012 and consultation
- SAPS
- Life Office Mortality
- Critical Illness
- Income Protection



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The CMI Review – why?

- Risks borne by Actuarial Profession – and not understood
- CMI funding basis had inherent flaw:
 - Voluntary financial contributions
 - Output freely available



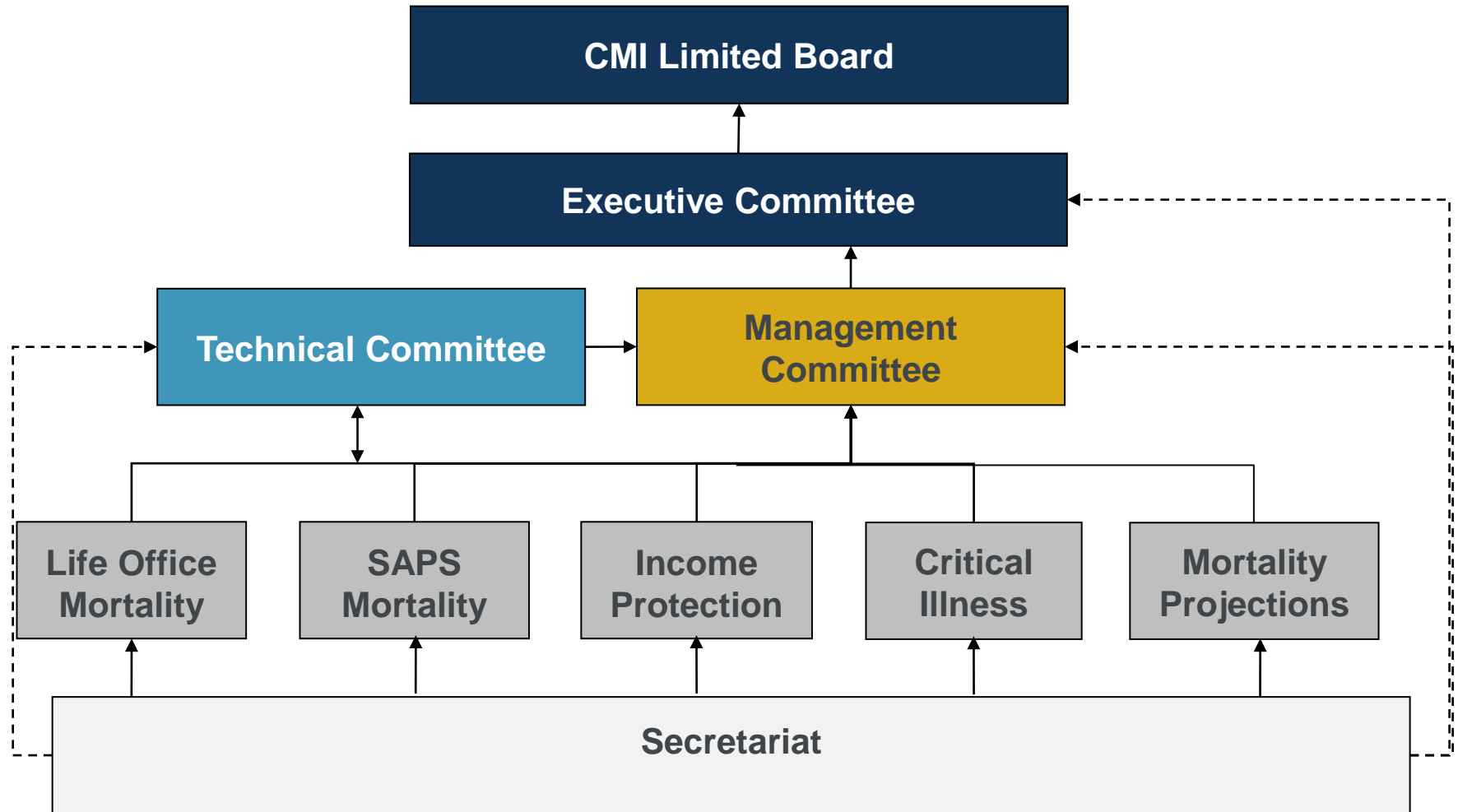
CMI Limited

- New UK private company, CMI Limited:
 - Limited by shares
 - Wholly owned by the Institute and Faculty of Actuaries
 - Company number: 8373631
- Board of directors:
 - The Chief Executive of the I&FoA (Derek Cribb); and
 - A nominated member of the CMI Executive Committee (Peter Banthorpe)
- Risks borne by CMI Limited
- Revised funding basis
- Outputs only available to fee-payers



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Structure of CMI Ltd



CMI Limited - Key changes for users

Subscriptions

- Structure modified for existing contributors:
 - Life insurers now based on reserves on annuities in payment + capital at risk
 - Reinsurers now flat fee (£20,000 p.a.)
 - Consultancies – small increase in fees for 2013/14 plus new “per actuary” fee introduced for very small firms: £250 per qualified actuary per year

Registration system

- Full outputs – e.g. working papers – accessible only to registered users
- All actuaries at existing firms have been pre-registered (normal log-in details for the IFoA website)
- Use subject to Terms & Conditions

Any questions please e-mail info@cmib.org.uk



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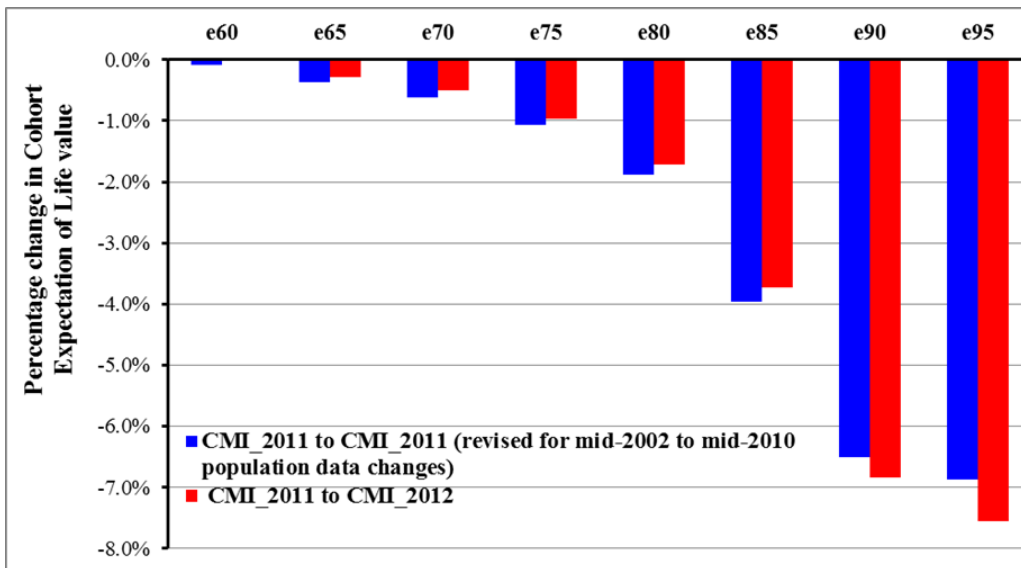
CMI_2012

- Release of CMI_2012 deferred to await revised population estimates (mid-2002 to mid-2010) following the 2011 Census.
- ONS published the revised estimates in December 2012:
 - Changes vary significantly by age (typically greatest for ages 10 to 39)
 - For the highest ages (90+), significant reductions to the population estimates (particularly for males).
- CMI_2012 published in February 2013 alongside Working Paper 63
- Core Projections produce lower expectations of life (generally!) than those produced by CMI_2011 (most significant reductions for males age 80+, driven by the revisions to population estimates)

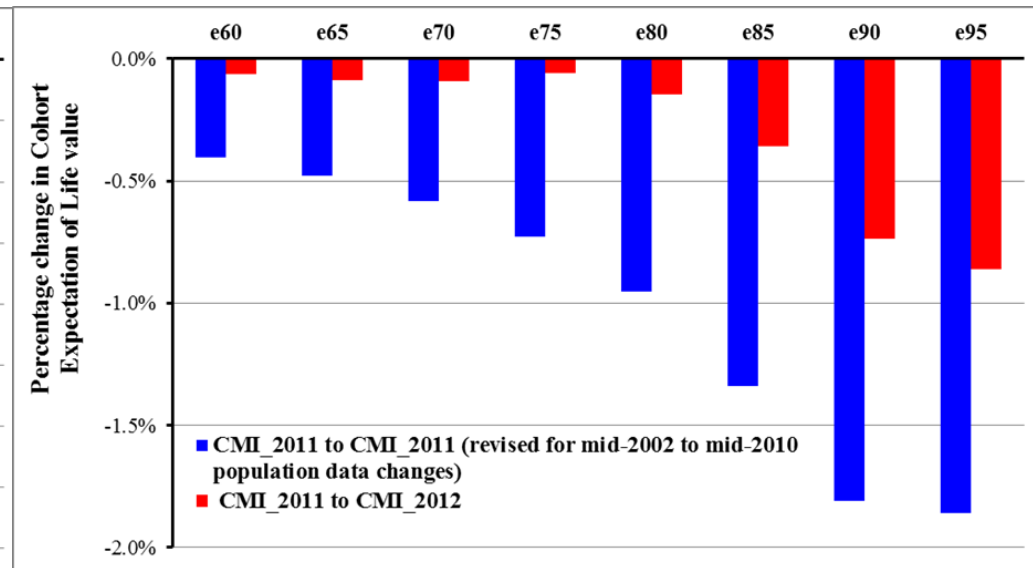


CMI_2012

Percentage change in Cohort Expectation of Life Value compared with CMI_2011; Males



Percentage change in Cohort Expectation of Life Value compared with CMI_2011; Females



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Consultation

- CMI Working Paper 64, released in April, consults on:
 - Structure and parameterisation of CMI Mortality Projections Model
 - Future of the Library of Mortality Projections
 - Further research and projection tools that the CMI should consider
- Propose to cease updating Library
- CMI_2013 may incorporate “quick fixes” when released in October 2013 (subject to ONS data release schedules)
- More significant changes to Model that result from feedback received will be incorporated into CMI_2014
- Responses are requested by **31 May 2013**



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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.
- Produces mortality tables (“S1”, “S2”, etc) based on pension scheme data



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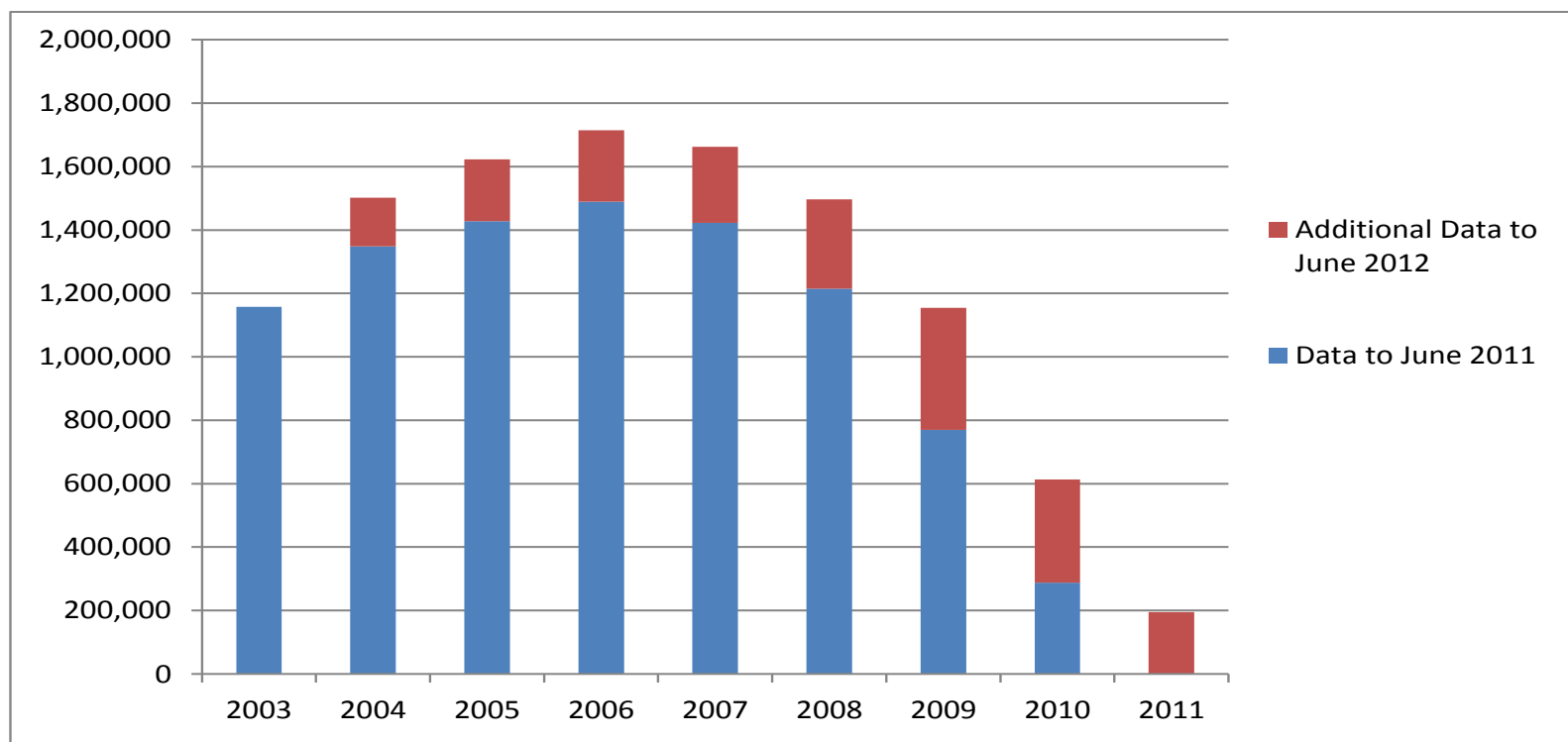
2004-2011 mortality experience: overview

- CMI Working Paper 65 was issued to subscribers in April
- Increase in the volume of data – approximately 8% increase in exposure over latest 8-year period
- PPF data was included for the third time
- Same dataset used for “S2” Series



2004-2011 mortality experience: data by year

Male pensioners



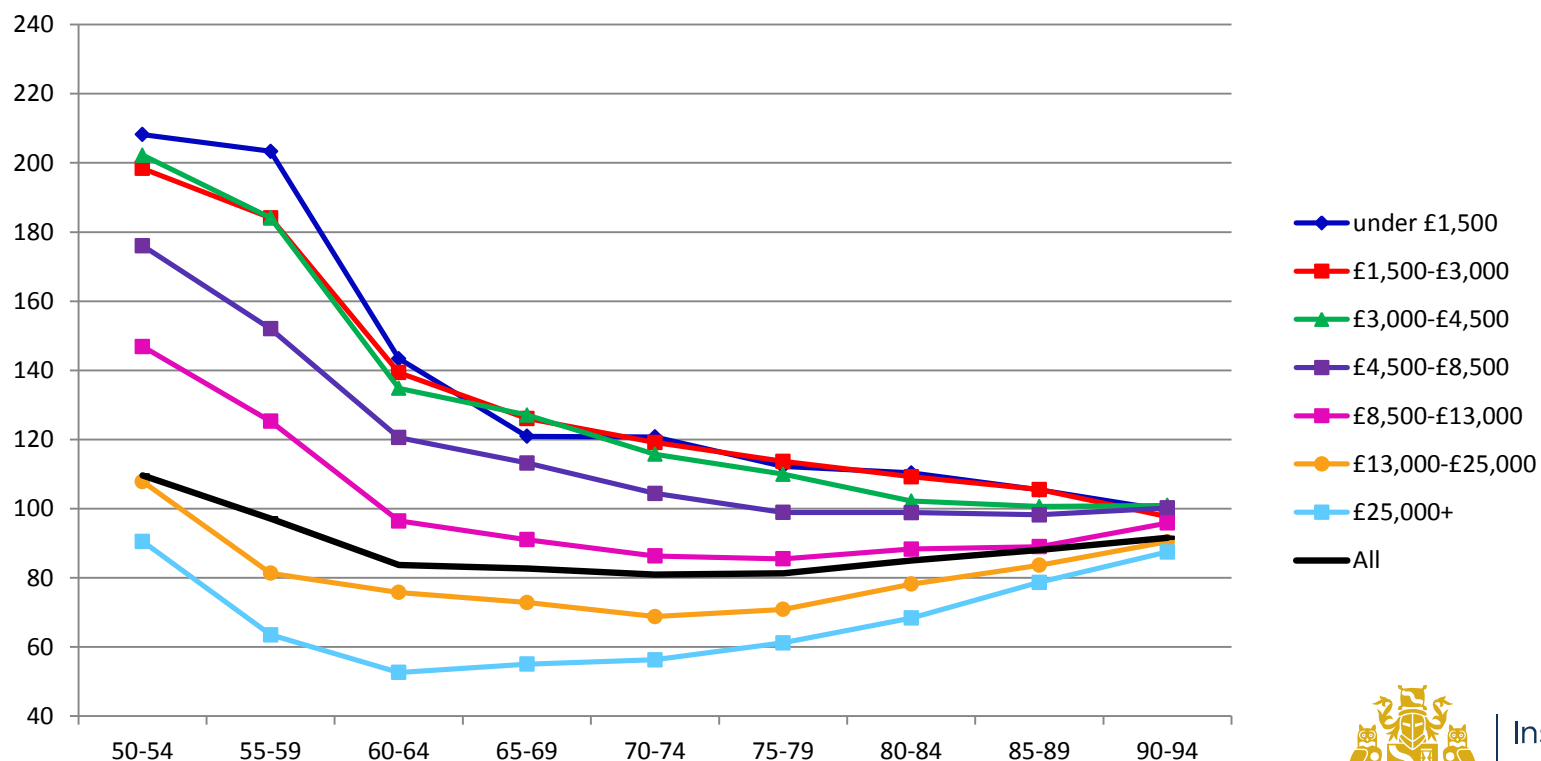
N.B. Additional data for 2003 may have been submitted up to June 2012 but analysis only covered 2004-2011. Similarly some 2011 data may have been submitted up to June 2011 but the analysis only covered 2003-2010.



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2004-2011 mortality experience: amounts bands

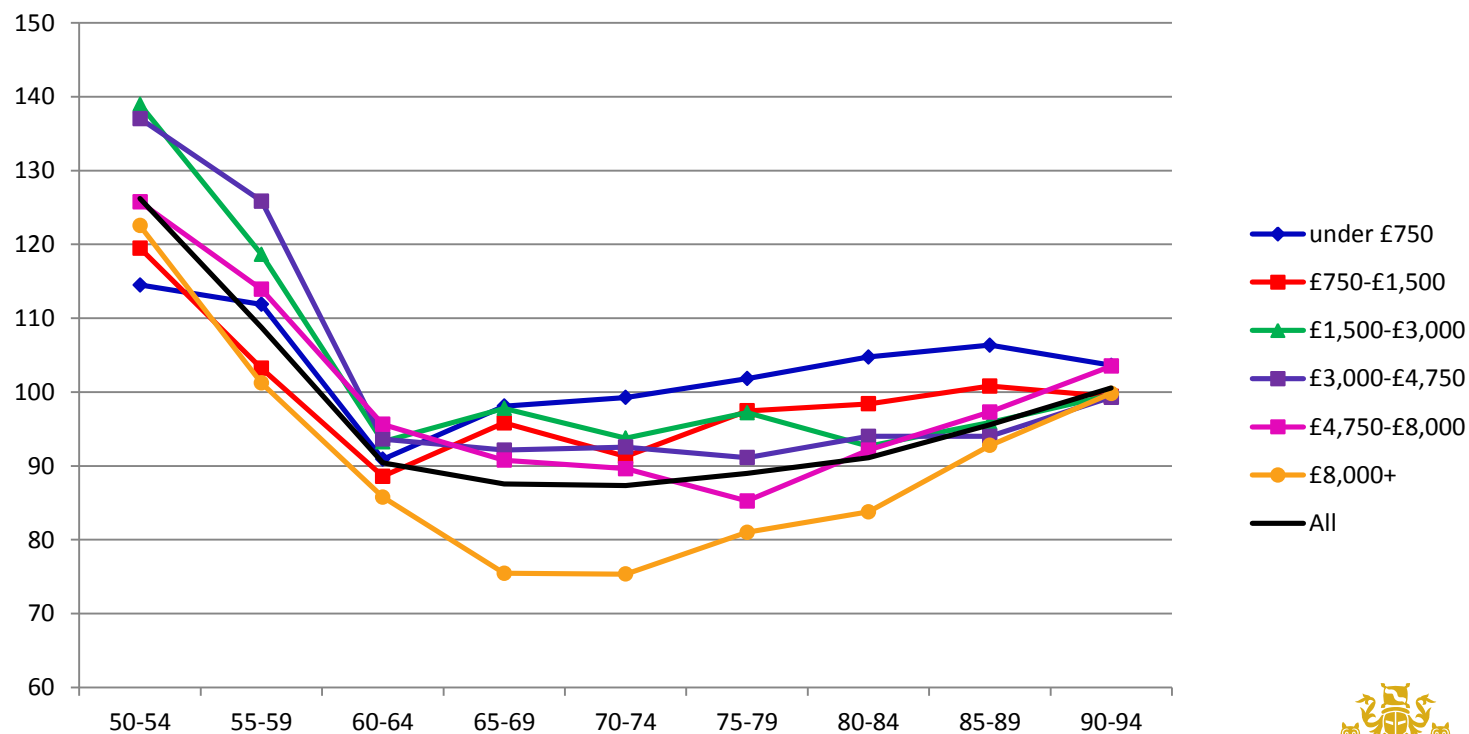
Male Pensioners Amounts compared against S1PMA



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2004-2011 mortality experience: amounts bands

Female Pensioners Amounts compared against S1PFA



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“S2” Series: Summary of “S1” Series

“S1” tables recap

- Covered the period 2000-2006, data submitted by 30 June 2007
- Designated mid-point for μ_x of 1 March 2003
- 20 different tables produced:
 - Male and female pensioners
 - Female dependants
 - Normal health and ill-health
 - Heavy and Light (for some categories)
- Gompertz-Makeham graduation approach



“S2” Series: Summary of “S2” Series

“S2” tables summary

- CMI Working Paper 66 was issued to subscribers in April
- Covers the period 2004-2011, data submitted by 30 June 2012
- Designated mid-point for μ_x of 1 March 2007
- Tables proposed:
 - Male and female pensioners
 - Female dependants
 - Normal health and ill-health
 - Heavy, Middle and Light (for some categories)
- Gompertz-Makeham graduation approach



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“S2” Series: Proposed tables

Pensioner type	“S1” Series	Proposed “S2” Series
All pensioners	Males/Females Lives/Amounts Amounts: Light/Heavy	Males/Females Lives/Amounts Amounts: Light/ Middle /Heavy
Normal Health	Males/Females Amounts only Amounts: Light/Heavy	Males/Females Amounts only Amounts: Light/Heavy
Ill-health	Males/Females Amounts only	Males/Females Amounts only
Combined	None	None
Dependants	Females only Lives/Amounts Amounts: Light/Heavy	Females only Lives/Amounts Amounts: Light/Heavy
Unknown	None	None



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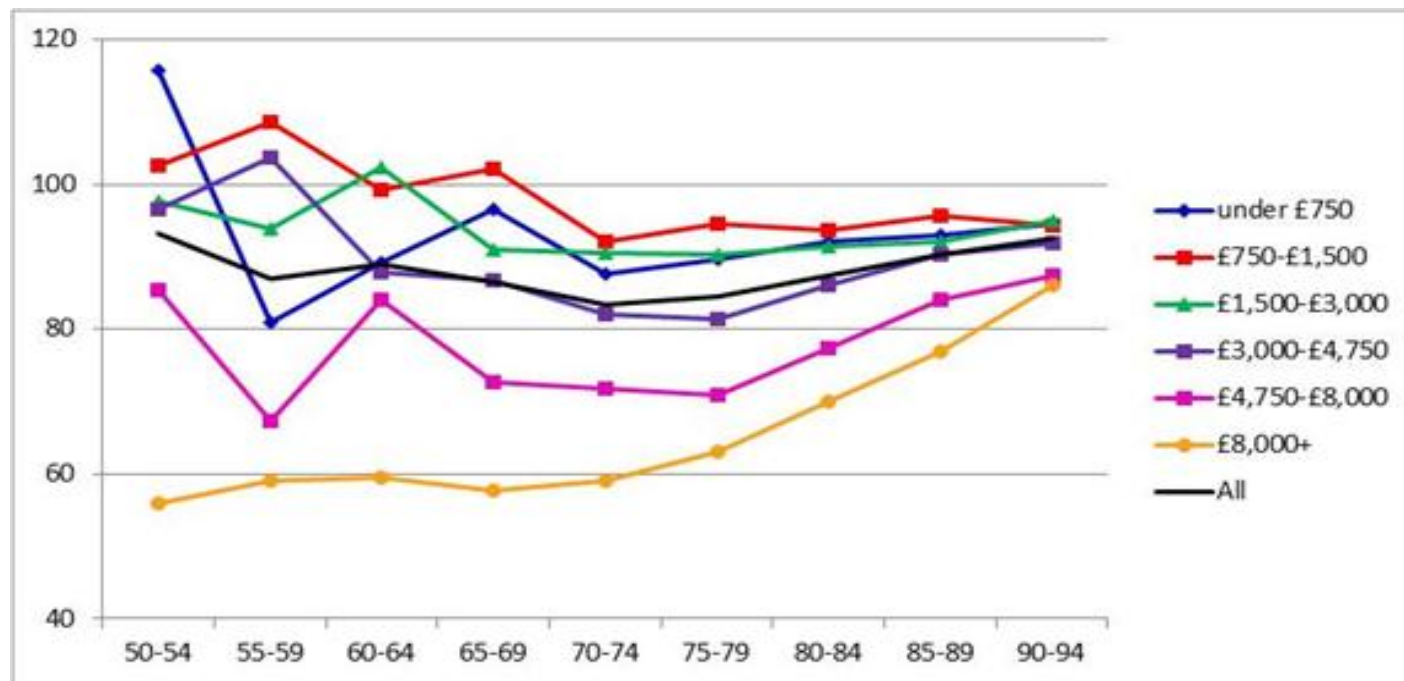
“S2” Series: Consultation

- CMI Working Paper 66 consults on various aspects of “S2” Series, including:
 - Whether the graduations should be adjusted to a particular date, using CMI_2012
 - Naming convention
 - Introducing ‘Middle’ tables between ‘Light’ and ‘Heavy’
 - Extensions to younger and older ages
 - Limiting the tables at age 120
- Responses are requested by **31 May 2013**



“S2” Series: Not producing Light and Heavy graduations for Female Dependants

100A/E values for Female Dependants Lives compared to S1DFL



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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



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CMI Life Office Mortality & Critical Illness

2007-2011 data collection exercise

- Considerable concern over data collection:
 - Slow progress to Per Policy – data requirements over-ambitious;
 - All Office results out of date; and
 - Fall in market coverage for Life Office Mortality
 - Compounded by limited resources in offices (Solvency II etc)
- 2007-2011 data collection exercise – Mortality & CI
- Flexible data requirements – what data can you provide?
- Intended to make data submission as easy as possible
- Annuity data volumes initially most encouraging
- Hope to release 2007-2010 results this summer



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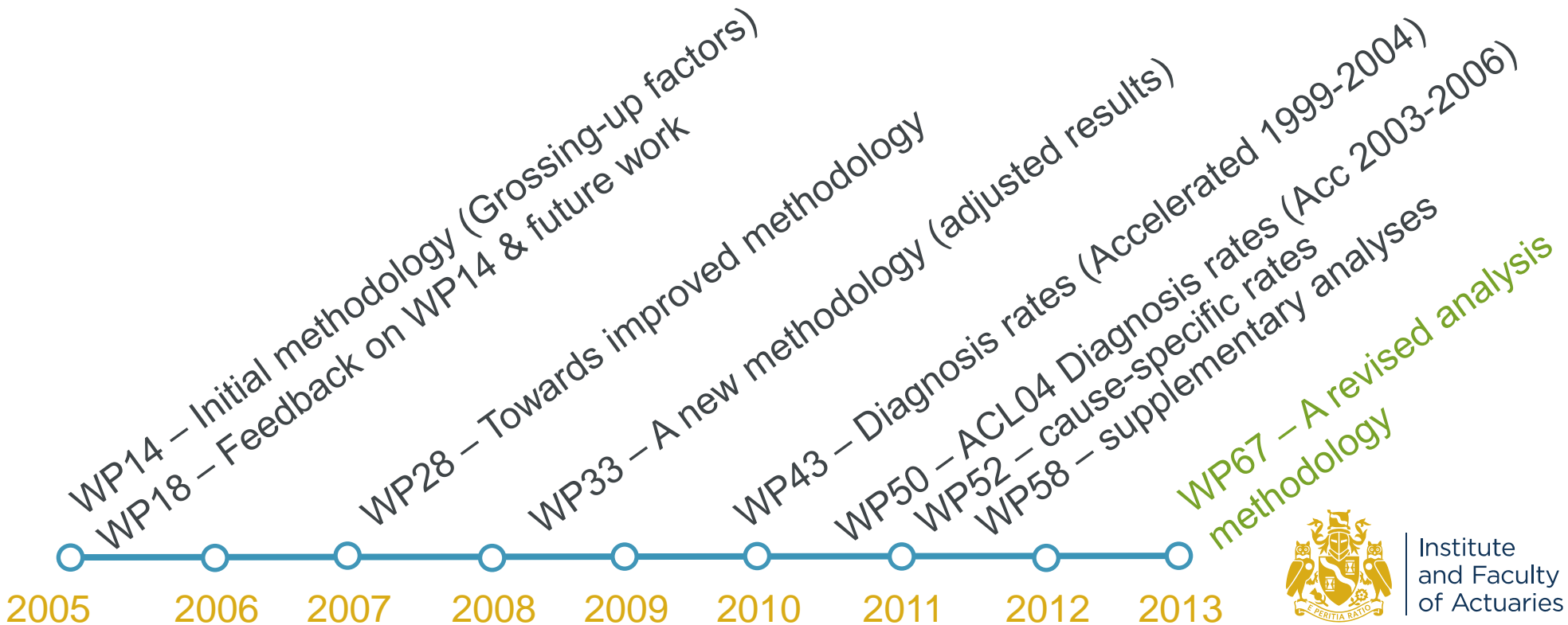
Critical Illness Investigation

- 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



CMI Critical Illness – Scope of AC04 rates

- All-causes accelerated critical illness; Lives table only
- Based on claims settled in 2003-2006
- Four tables for each gender/smoker status
- Durations 0,1,2,3,4 and 5+ for ages 18 to 65; ultimate only for ages 66+:
 - Different selection patterns by gender/smoker status derived from data
 - Rates have been extended outside the age range where there is credible volumes of data
- Age exact basis
- No stand-alone tables



2003-2006 All-Causes Diagnosis Rates (AC04 rates)

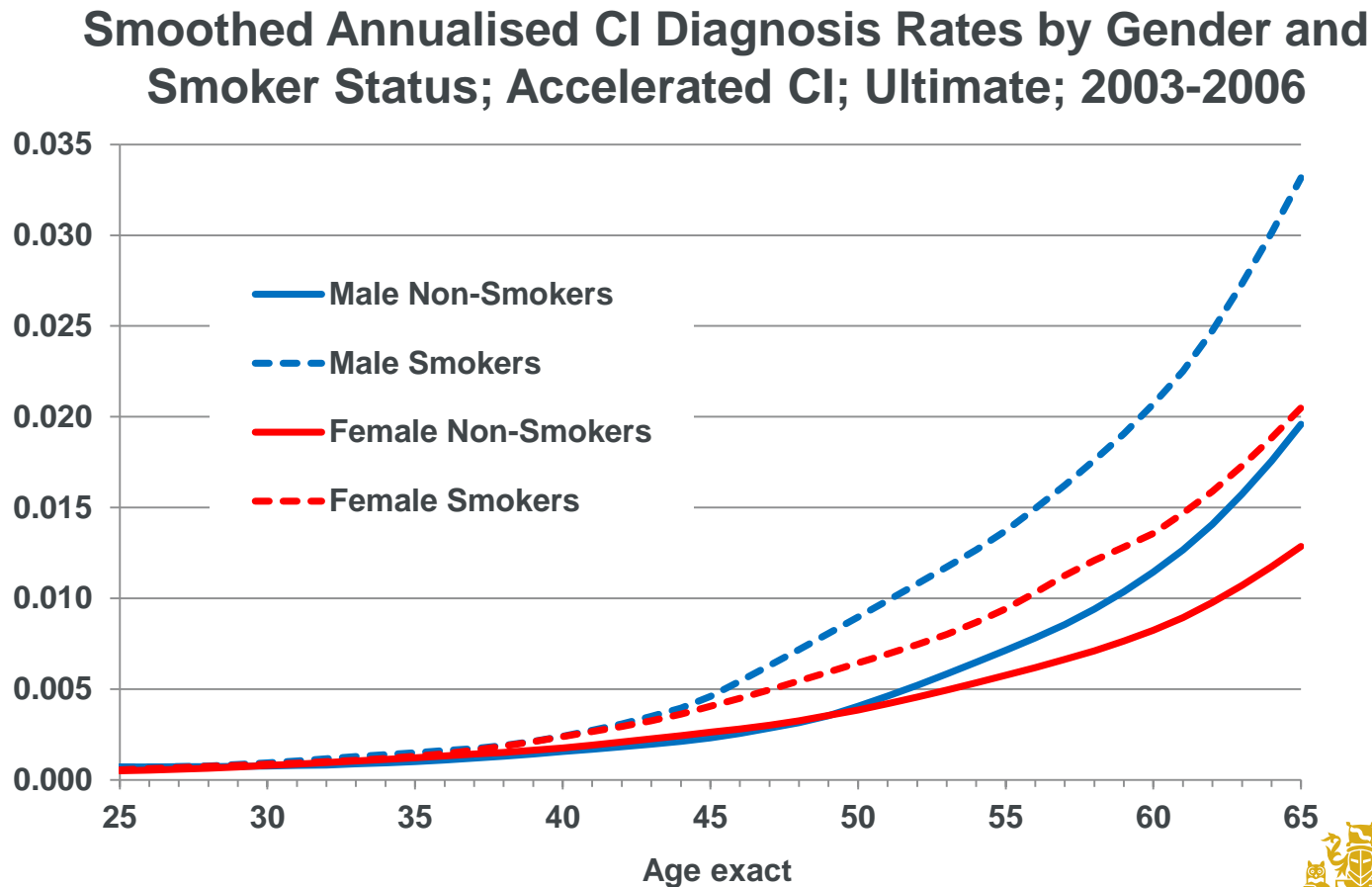


Figure 8.2 from Working Paper 50



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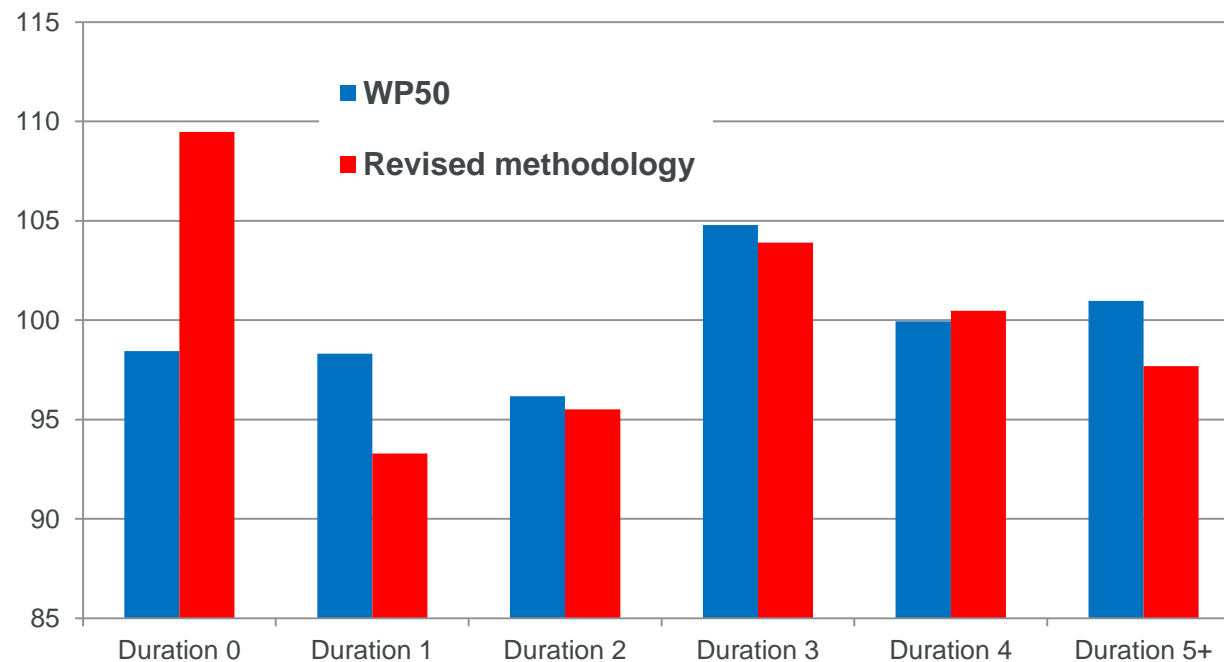
CMI Critical Illness – Revised methodology

- CMI CI data / analysis problem:
 - Claims collected by year of settlement; diagnosis date often unknown; material lag from diagnosis to settlement
- Start with the known in-force and settled claims
- Revised methodology uses:
 - In-force to estimate exposure in current period
 - Only claims diagnosed and settled in period are retained
 - Claims diagnosed in period but yet to be settled have to be estimated
 - (Methodology underlying adjusted results detailed in the appendix)



CMI Critical Illness – 2003-2006 results

Comparison of the values of **100xActual Diagnosed Claims/Expected Diagnosed Claims** from Working Paper 50 against those calculated using AC04 rates and including estimated IBNS (replaced by 2007 settled claims, where known), by age and duration for male non-smokers only



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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)



CMI IP Committee

Recent activity and outputs

- Graduations of the 1991-98 IIP, Male, Occ. Class 1 experience
 - CMI Working Papers 5, 6, 7 (Terminations) and 46, 47 (Inceptions)
 - Overview of IPM 1991-98: CMI Working Paper 48
- Reporting experience for 1991 – 2006 using IPM 1991-98
 - CMI Working Papers 59 (reference paper) and 60 (experience report)
 - Improved reporting format using MS Office Excel spreadsheets
- Data Collection
 - 2007, 2008 and 2009 results issued to CMI member offices
 - Collecting data for 2010 – 2012
- Current research and developments
 - Experience by cause of sickness (WP and database)
 - Calculation tools for practitioners.



Experience results database and methodology

Features of IPM 1991-98

- IPM 1991-98 has been used as the comparison basis (for E)
- Underlying dataset:
 - CMI Individual IP, Standard* data, Males, CMI Occ. Class 1, 1991-98
 - No adjustments made for females or other occupation classes so differences in A/E directly represent differences in observed claim rates
 - Aggregate causes / all-cause rates
- Claims Inceptions – rates vary with age and Deferred Period (DP)
 - Separate basis for each DP
- Claimant Recoveries – rates vary with duration sick, age and DP
 - Single ‘shape’ but different levels / multipliers for each DP
- Claimant Deaths – vary with duration sick, age, DP
 - Single ‘shape’ but different level / multiplier for DP1.

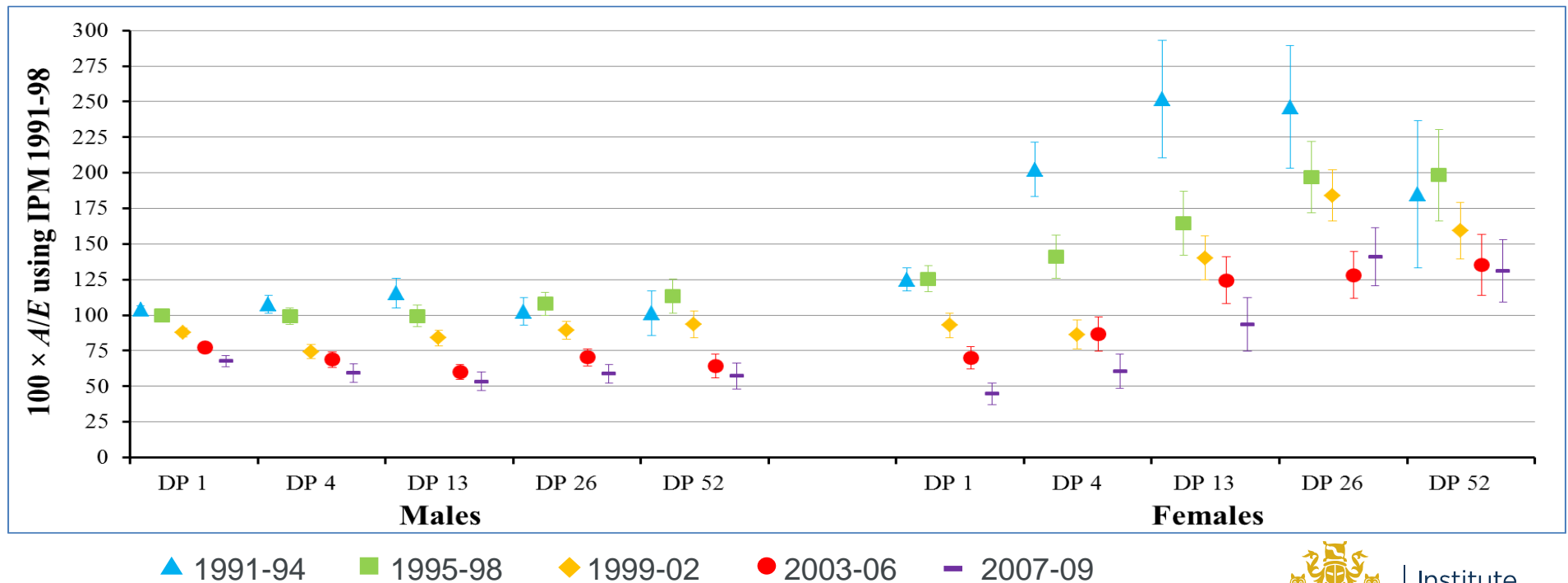


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Claim inception experience, 1991 – 2009

Trends over 1991 – 2009 by sex and DP

Comparison of actual claim inceptions with those expected using IPM 1991-98
 Individual IP *Standard** experience for CMI Occupation Class 1
 1991-2009 by quadrennium, sex and DP; all ages combined



The error bars show approximate 95% confidence intervals, $100 \times A/E \pm 1.96\sigma$, where $\sigma = 100 \times \sqrt{A/E}$.
 Data points based on fewer than 10 actual claim inceptions are omitted from the above chart.



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Features of claim inceptions experience, 1991-2009

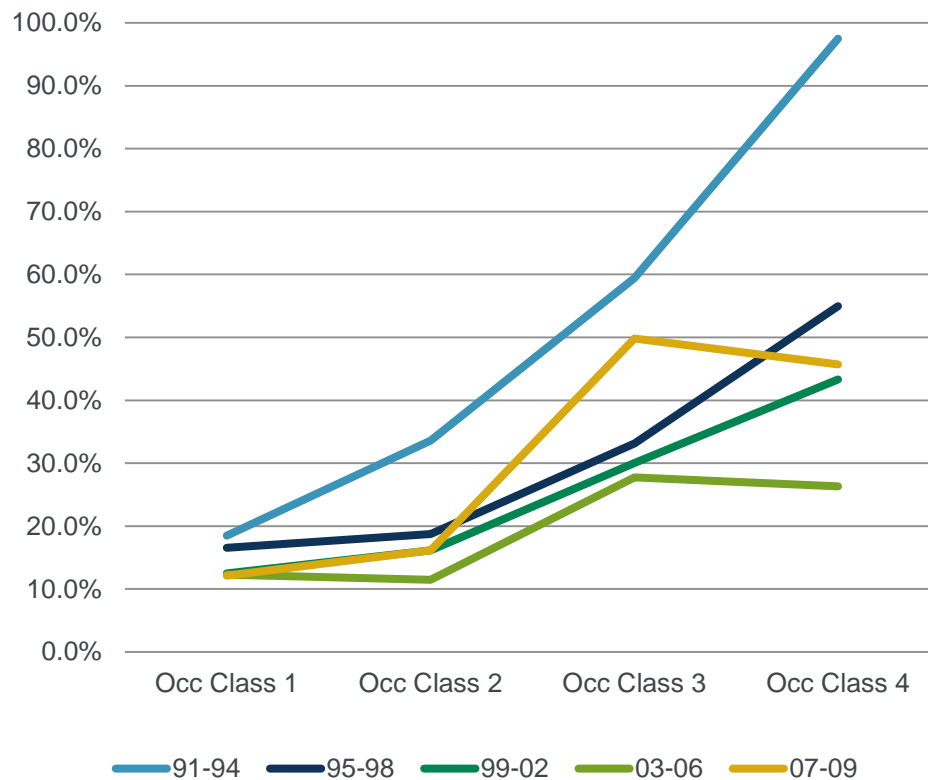
Reduced differentials between Occupation Classes

Comparison of actual claim inceptions with those expected using IPM 1991-98

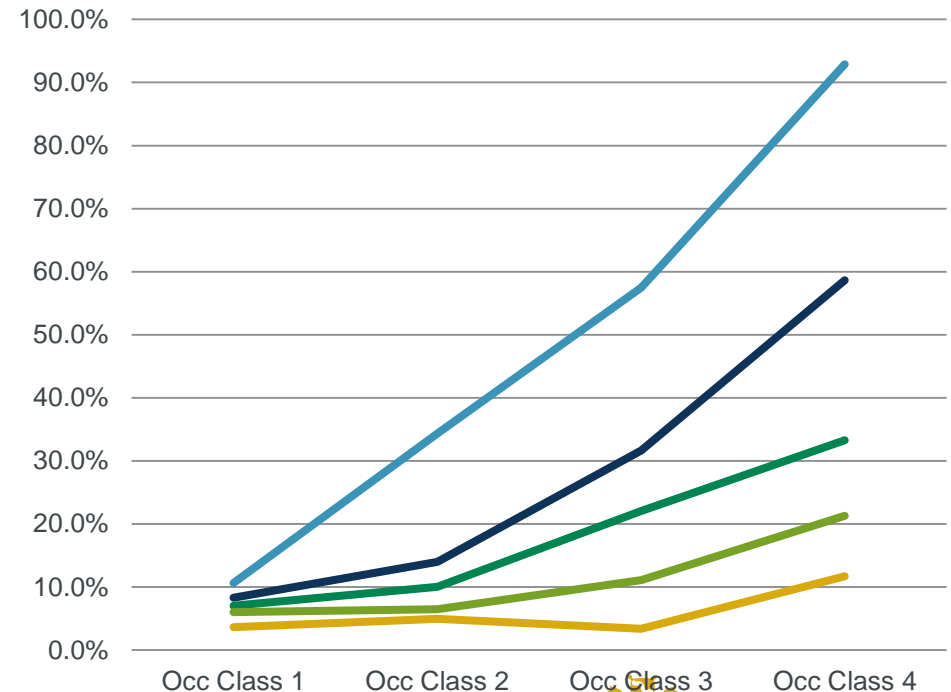
Individual IP *Standard** experience by Occupation Class for males

Selected cause groups only; 1991-2009 by quadrennium; all ages and DPs combined

Musculoskeletal - Males



Injuries - Males

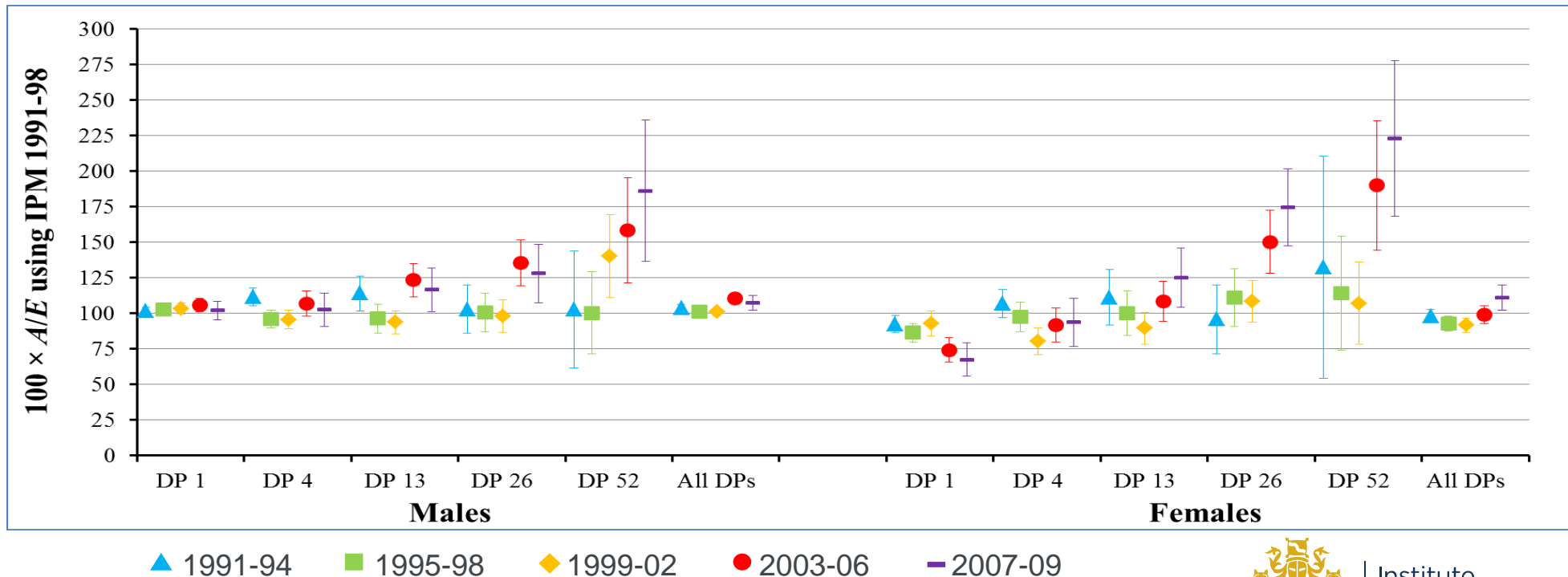


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Claimant recoveries experience, 1991 – 2009

Trends over 1991 – 2009 by sex and DP

Comparison of claimant recoveries with those expected using IPM 1991-98
 Individual IP *Standard** experience for CMI Occupation Class 1
 1991-2009 by quadrennium, sex and DP; all ages and durations sick combined



The error bars show approximate 95% confidence intervals, $100 \times A/E \pm 1.96\sigma$, where $\sigma = 100 \times \sqrt{A/E}$.
 Data points based on fewer than 10 actual claimant recoveries are omitted from the above chart.



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CMI IP Committee – future plans

- CMI Working Paper will be released in the summer
 - Summary of data and methodology
 - High-level analysis of experience by cause of sickness
 - Sample breakdown of typical claim annuity values by cause of sickness
- Databases of IP experience by cause of sickness, 1991-2009
 - Low-level results in database format
 - Separate tables for Inceptions and Terminations, in Excel spreadsheets
 - Enable practitioners to pursue analysis in areas of interest to them
- Data collection for 2010 to 2012
- Improving data quality and volumes
- Considering further graduations work in 2014+



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Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

Any queries or feedback should be sent to:

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