Current Issues In Mortality

GASS

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Agenda

- Introduction

- CMI Research
  - Life Office Mortality Investigation
  - SAPS Investigation
  - Mortality Projections
    - The CMI Library of Mortality Projections
    - The proposed CMI Mortality Projections Model
  - EU Gender Directive

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 - including life insurers, reinsurers, actuarial consultancies and others

- Life insurers and consultancies provide data

- Individual contributors' data is subject to strict confidentiality

- Aggregated data / results are released to contributors and others

Role of the CMI

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

Why offices contribute data

- Helps the market price and reserve rationally
- 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 CMI
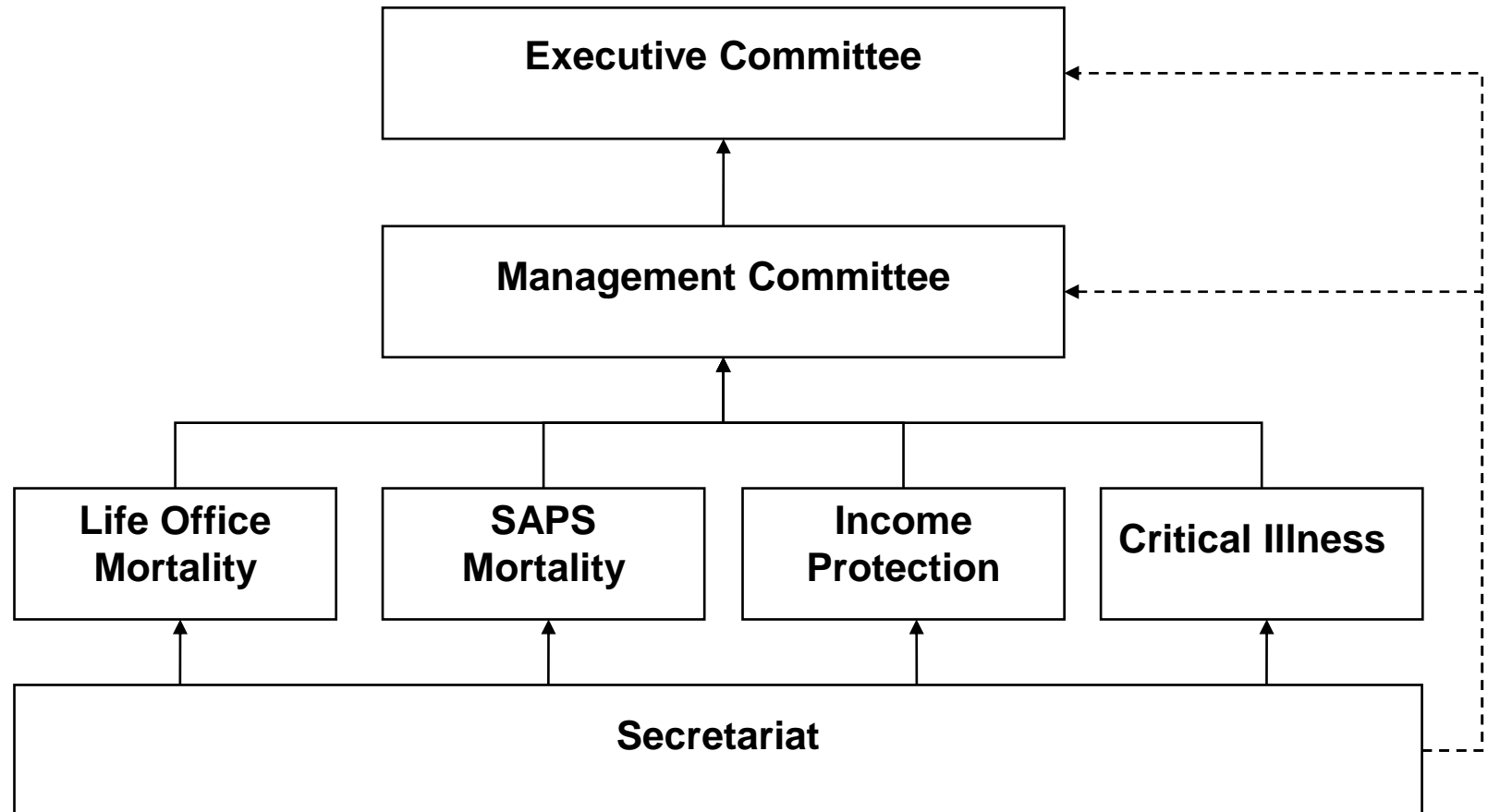
Life Office Mortality Investigation

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

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 based on pension scheme data

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 sickness inception and claim termination, i.e. recovery and death, rates relative to graduated rates

- First graduations published in 1991 based on data for 1975-78 (CMIR 12)

- Data for 1991-98 is being used to produce:

    - Graduations of claim termination rates, published in 2004 (WP5)

    - Graduations of sickness inception rates, currently underway

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 2005 inclusive
- Key challenge currently is to produce realistic claim rates …
- … the difficulty is that we collect settled claims, but want to measure experience in terms of diagnosed claims
- Working Paper 33, published in July 2008, developed methodology and included 'adjusted results'
- Aim to produce realistic claim rates (based on 1999-2004 data) later in 2009

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The CMI LO Mortality investigation "00" Series base tables

- Draft tables published for consultation in:
  - Working Paper 12 (Apr 2005) – assured lives
  - Working Paper 16 (Sep 2005) – annuitant/pensioner
- Final tables published in:
  - Working Paper 21 (July 2006) – assured lives
  - Working Paper 22 (July 2006) – annuitant/pensioner
  - Working Paper 26 (Apr 2007) – Early/Combined pensioner extended to younger ages
- Fully documented in CMI Report 23 (Feb 2009)

The CMI LO Mortality investigation 2003-2006 results

- Results released to members for individual years

- 2003-2006 All Office results sent to members in December

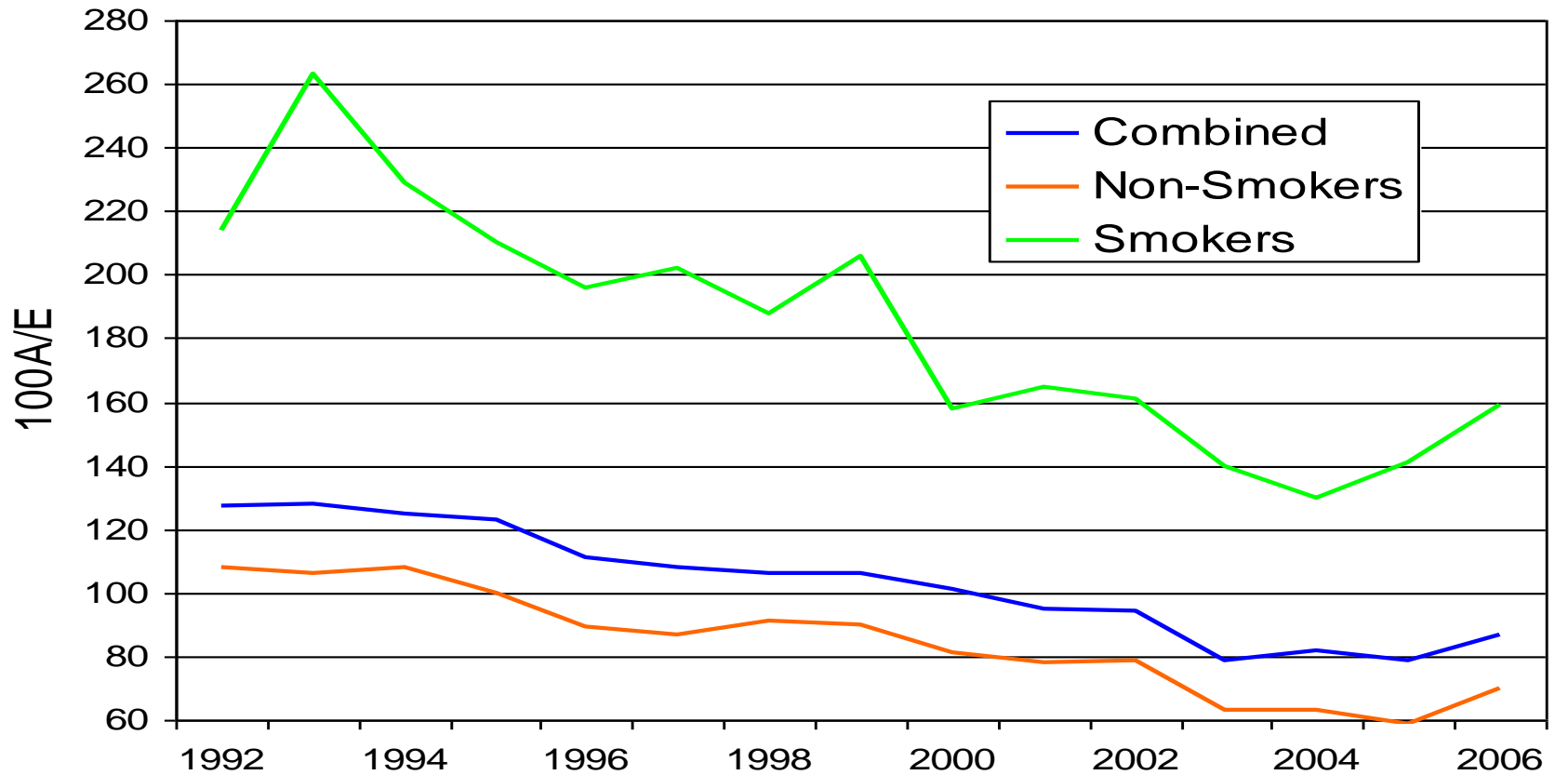- Summary of experience will be published in CMI Report

Experience subsequent to "00"

Temporary Assurances, Lives, 100A/E, E= TMC00 Sel / TFC00 Sel
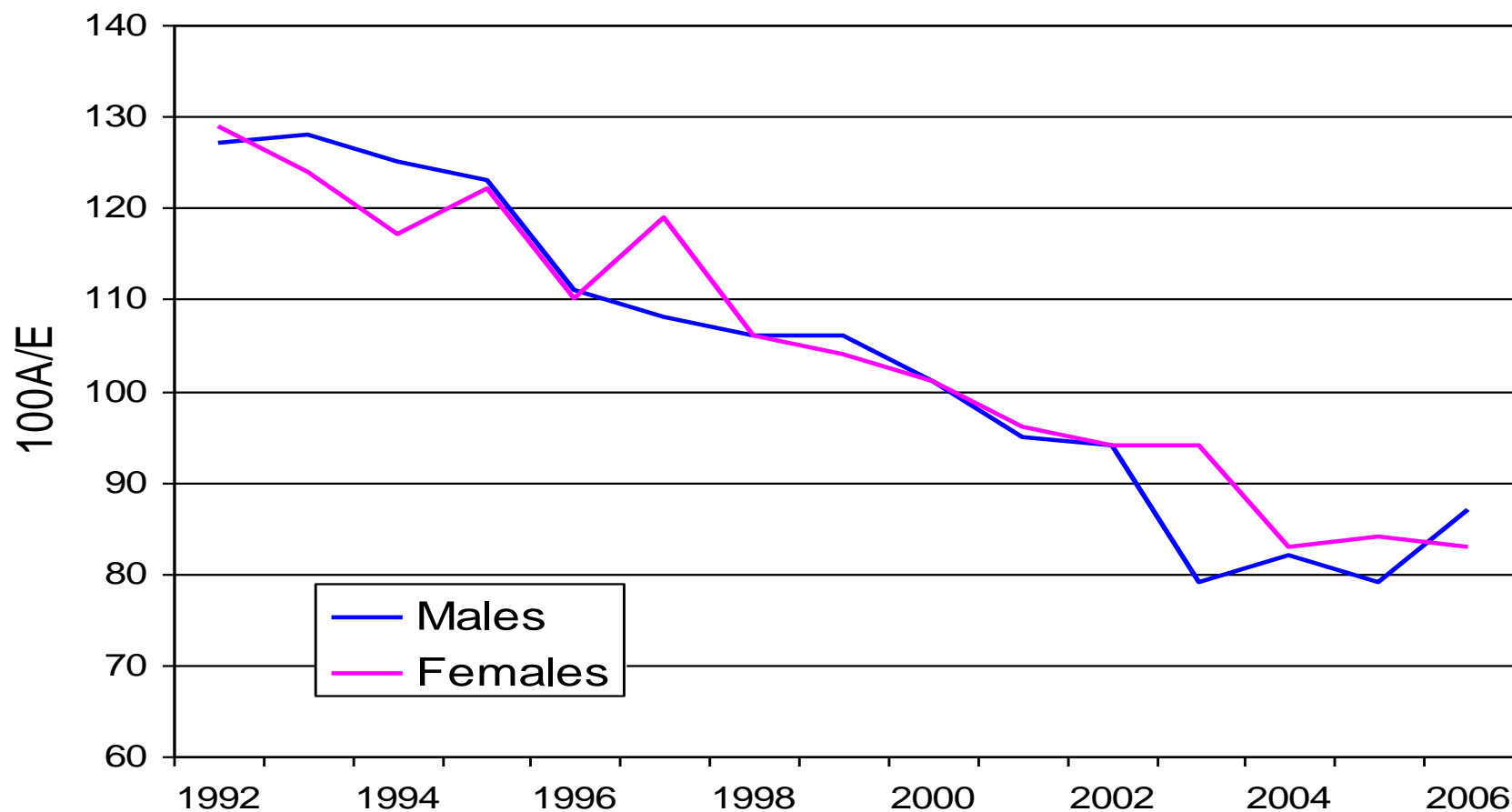
Experience subsequent to "00"

Temporary Assurances, Lives, 100A/E, E= TMC00 Sel, Males

2003-2006 results

- Experience significantly lower than 1999-2002
- Improvement 2002 -> 2003 particularly pronounced for several investigations
- Deterioration in 2006 for Temporary Assurances
- Improvements in Temporary Assurances exist for non-smokers and smokers
- Results vulnerable to changing mix of offices

The CMI LO Mortality investigation 'Per Policy' initiative

- Background
- Objectives
- Key Differences:
  - Day Count
  - Central Exposures
  - Investigation codes
  - Additional data fields

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The CMI SAPS investigation

- Historically, CMI collected life insurers' data
- SAPS commenced as an unfunded working party of the Pensions Technical Support & Research Committee…
- Now the CMI SAPS Mortality Committee
- Data collected from firms of consultants (acting as Scheme Actuary)…
  - who now also contribute financially towards CMI
- 448 validated submissions with 4.5m records (to end-June 2008)
  - Over 380 schemes – remainder are resubmissions
  - Generally triennial
- Richer data than life office (currently), e.g. amounts, industry type and postcode

Recent SAPS work

- **S1 Table graduations**
    - 20 new sets of mortality tables, approved for adoption by the UK actuarial profession
    - The tables are the first to be based on the mortality of pensioners of self-administered pension schemes.

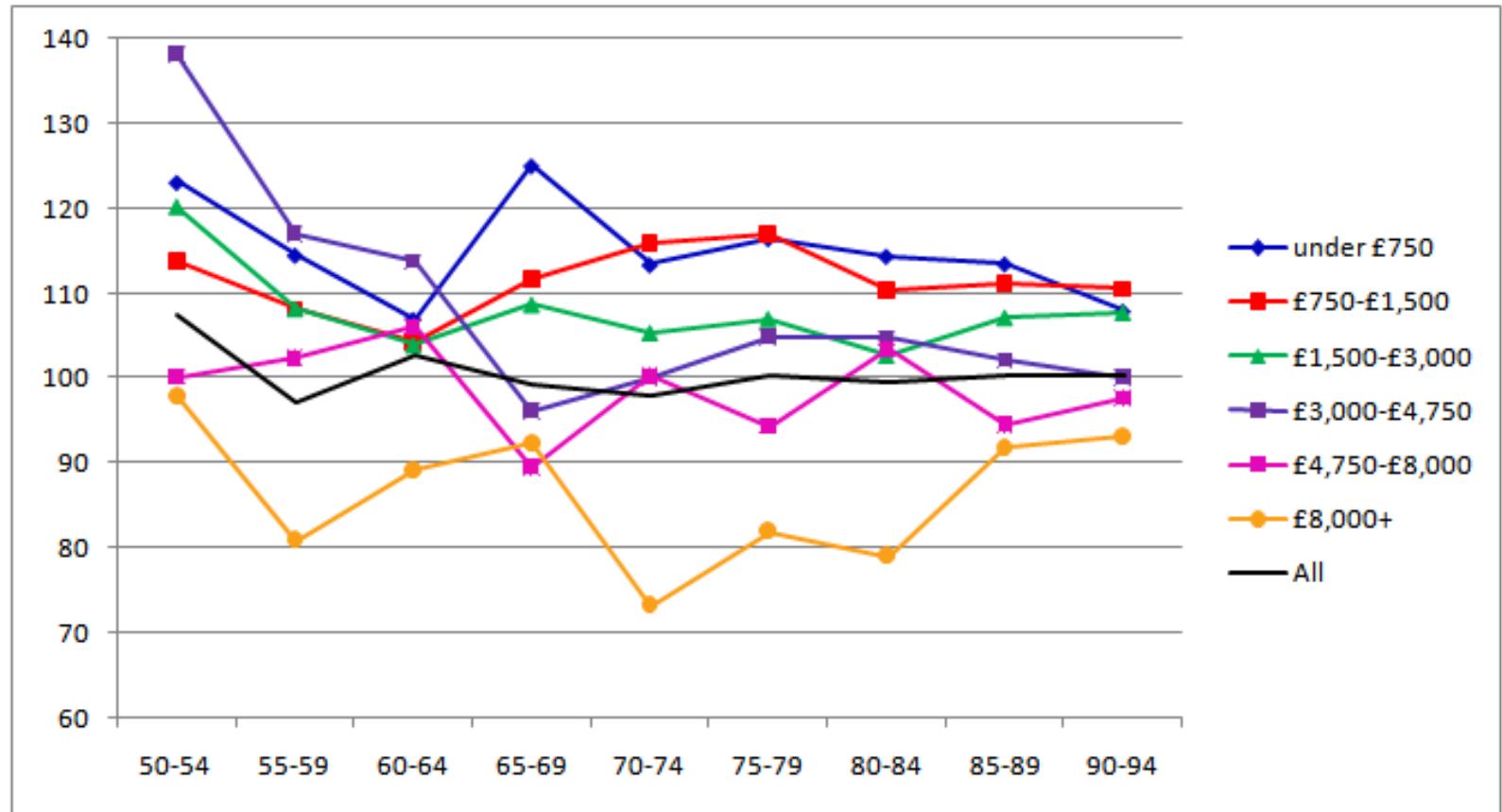- **Experience Report on data collected to June 08**

Report on data to June 2008 - Male

Chart 2: 100A/E values for Male Pensioners Amounts compared to S1PMA
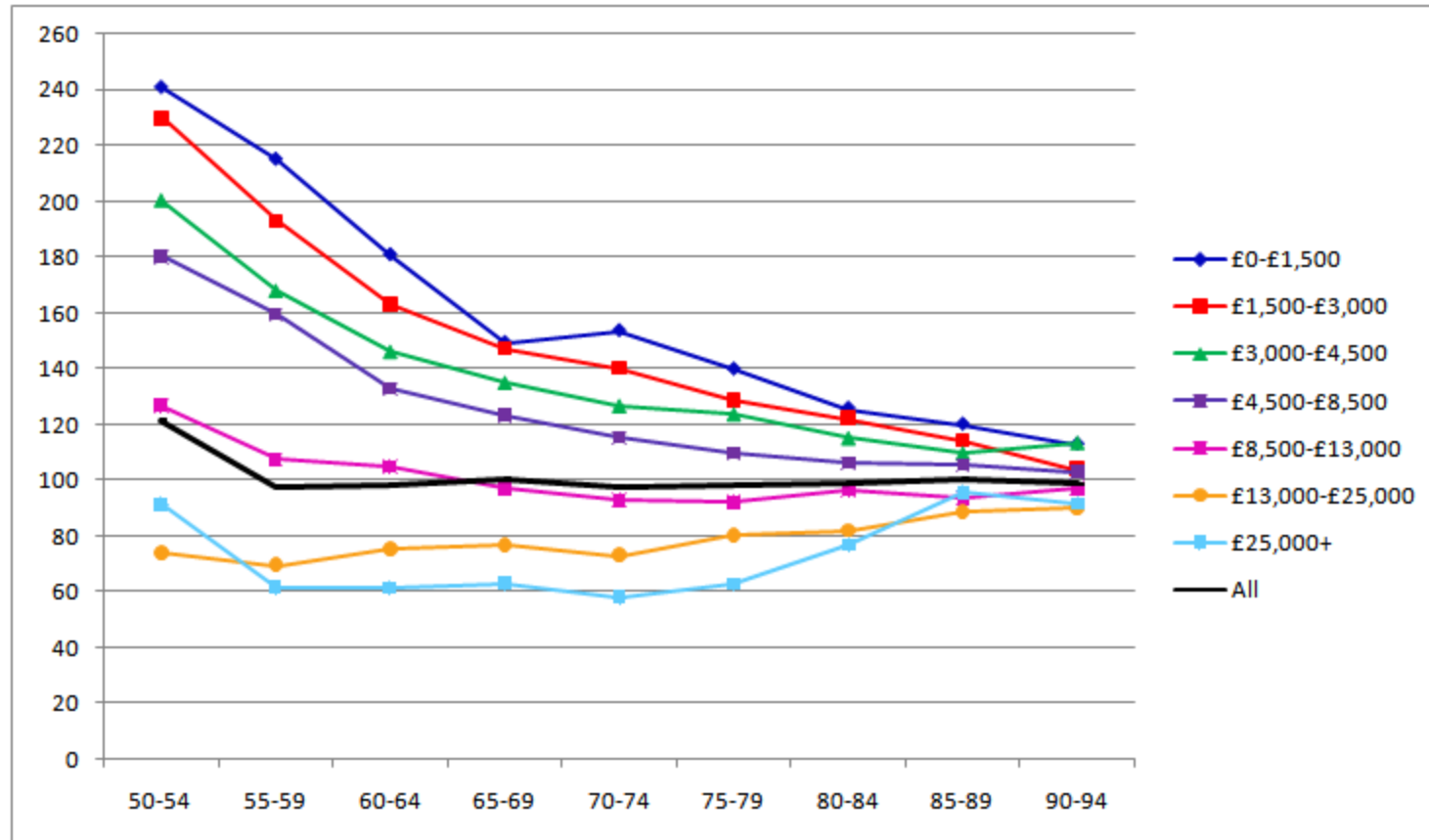
Report on data to June 2008 - Female

Chart 4: 100A/E values for Female Pensioners Amounts compared to S1PFA

Next steps for SAPS research

- Mortality improvements within the SAPS dataset
- Analysis by Industry
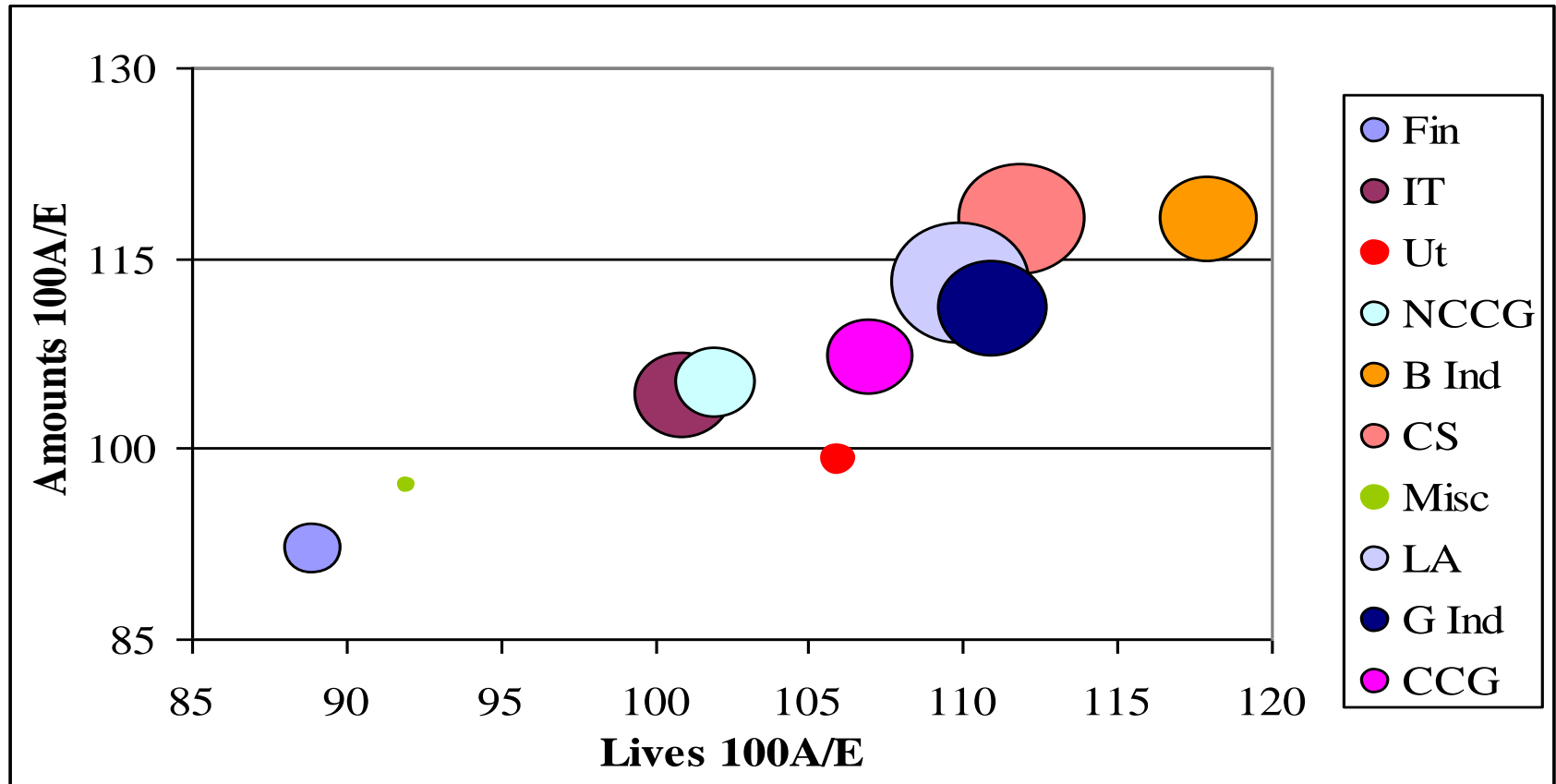- Experience Report on data collected to June 09

Mortality improvements

- Data from a limited period (2000-)
- Limited to older ages
- …so unlikely to shed light on cohort features
- Triennial data submissions create heterogeneity issues
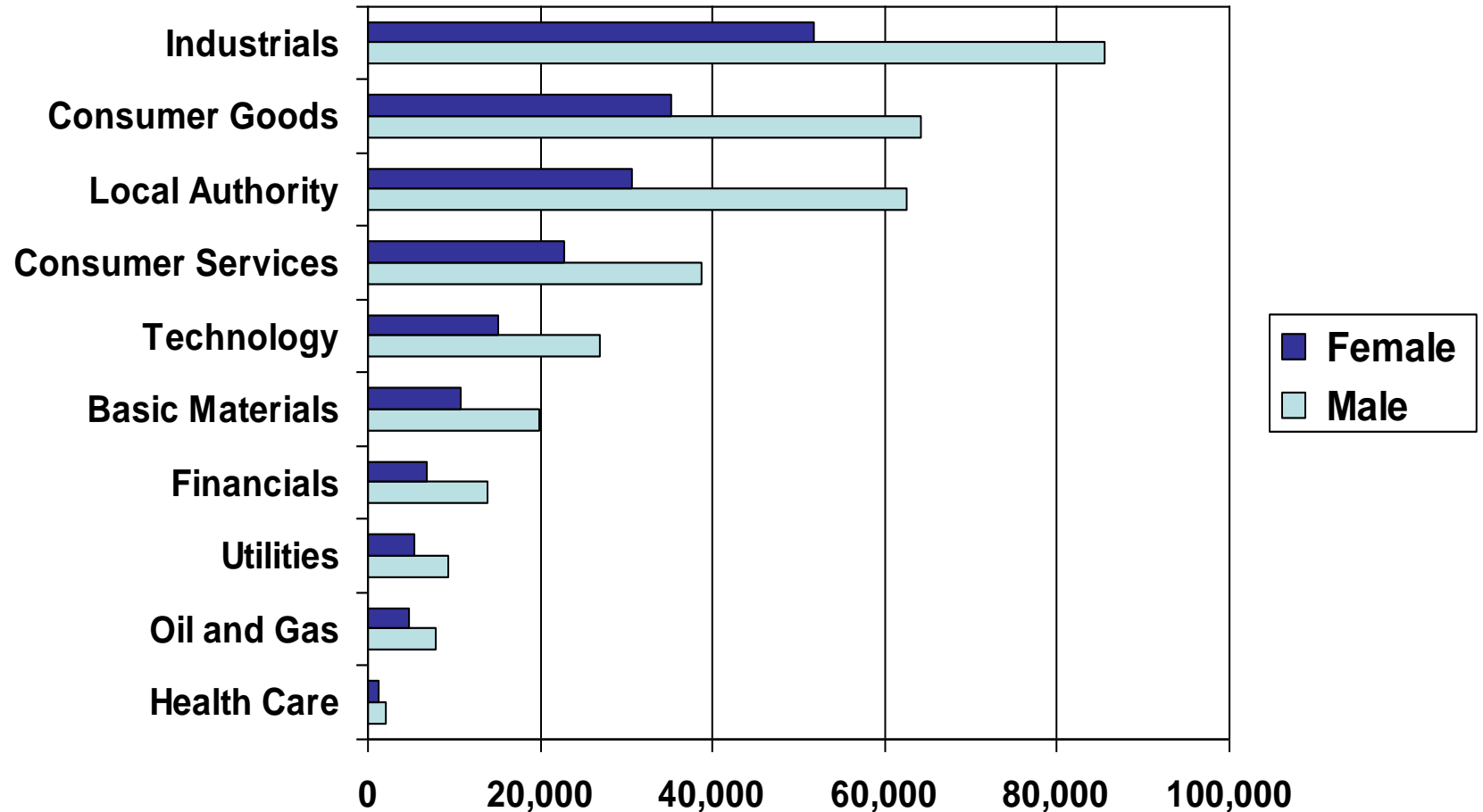
Mortality improvements
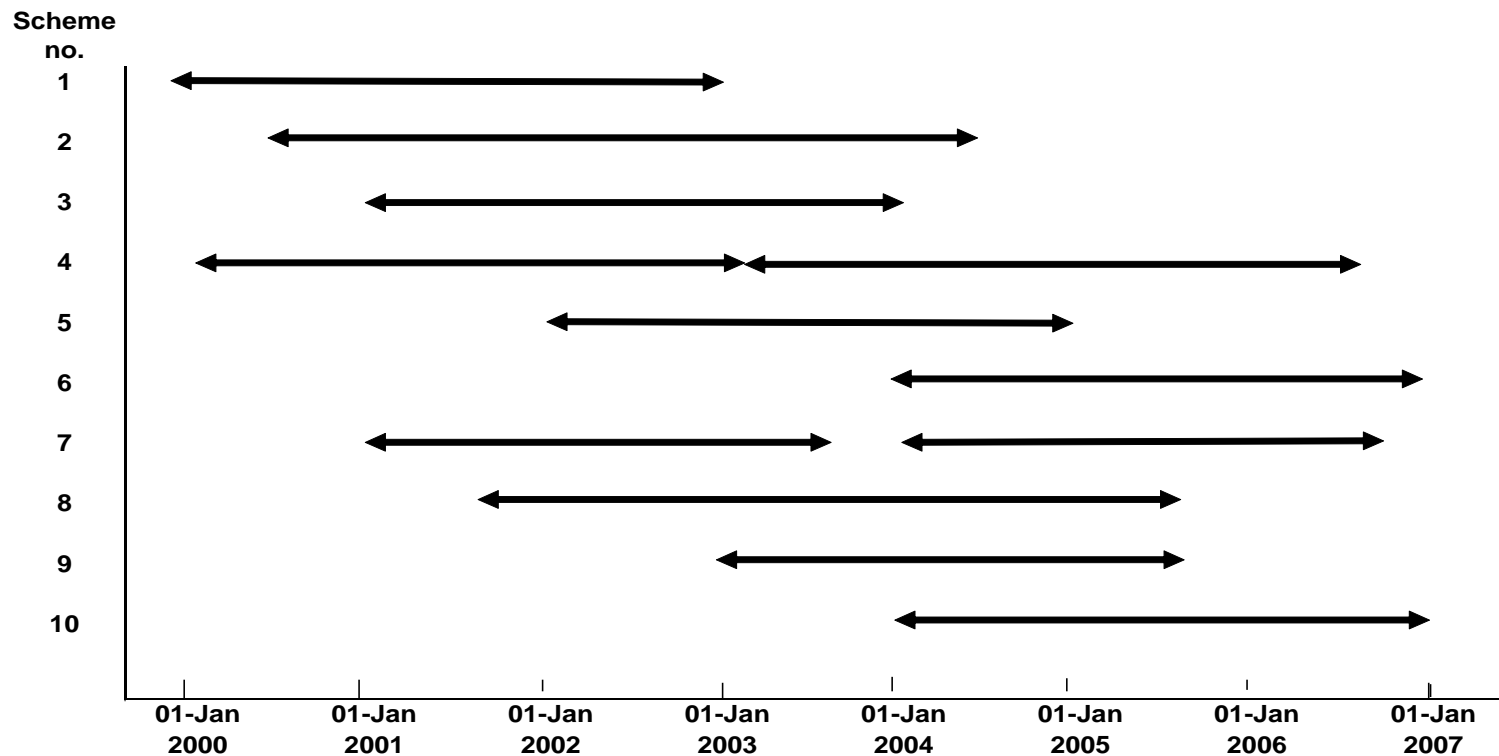
Analysis by Industry - Males

Analysis by Industry

Number of deaths at ages 50+

Calendar years 2000 to 2006

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Mortality Projections – the wider perspective

- (Pension) actuaries slow to adopt Cohort projections
- Responsibility for setting assumptions shifted to trustees/Boards
- Board for Actuarial Standards taken over responsibility for standard-setting
- Absence of projections from "00" Series left a distinct gap…
- FSA seeking to "talk up" mortality projections
- Draft library launched alongside Presidents' letter that had to stop short of setting new standards
- TPR is consulting on a trigger of Long Cohort with a minimum
- BAS announced review of mortality assumptions
- Considering producing scenarios to help evaluate projections (from the library)
- Projections will continue to be a Hot Topic !

Mortality Projections:
Making the CMI's work more accessible

- CMI recognised its research was inaccessible to many actuaries

- Task Force formed to:

  - Illustrate the CMI's recent research to make it more accessible

  - Propose terminology to facilitate disclosure of mortality projections

  - Develop sets of projections which can be used as benchmarks

  - Collaborate with ECPD Board on education needs

- Membership of Task Force included life and pensions actuaries

The structure of the "Library"

- 55 "projections" in version 1.0 of the library
- 15 further "projections" in version 1.1
- Each projection can be combined with any base table
- Each sheet contains data:
  - From age 20 to 120
  - From calendar year 1992 to 2130
- Each cell is the cumulative reduction factor:

$$RF(x,t) = q_{x,t} / q_{x,0}$$

The "Library" of Mortality Projections

- Version 1.1 released in March 2009
- The library collates:
  - Existing projections ("92" Series, Cohort Projections, ONS)
  - Variations on existing projections (e.g. cohort + minimum)
  - Examples of P-spline and Lee-Carter projections
- What was it hoped the "library" would achieve?
  - Single source of "recognised" projections
  - Standardisation of terminology for these
  - **NOT intended to offer guidance on choice of projection**

The proposed Mortality Projections Model

- **Background**
    - Continuing demand for research and guidance
    - Widespread use of (variants of) Interim Cohort Projections

- **Working Party established to:**
    - Examine and report on latest mortality data & trends
    - Develop spreadsheet-based modeling tool

Deliverables

- An illustrative version of the CMI Model

- CMI Working Paper, covering:
    - An overview of the Model structure
    - Analysis to help inform the setting of parameter values
    - Sample projections from the Model
    - Illustrations of sensitivity of results to parameter values
    - A simple analysis and model of mortality by cause-of-death, as a means of sense-checking projections

- A consultation on the Model and its potential uses

Model Structure

- Project mortality improvement rates
  - Relatively simple; Accessible; Flexible
  - Not a mathematical model of mortality fitted to data
- Deterministic projection driven by user inputs
  - Current rates of mortality improvement
  - Long-run rate(s) of mortality improvement
  - Speed & pattern of convergence - current to long-run
  - Split projection by age or by year-of-birth cohort
- 'Core' and 'Advanced' parameter layers

Sample Research - Conclusions

- **Population data**
  - Clearly shows 2 major features of mortality improvement
  - Persistent year-of-birth cohort peaks and troughs
  - A general increase across a wide age range
- **CMI data**
  - Lower data volumes reduce clarity of observations
  - Unable to distinguish between concurrent features ?
  - So much more difficult to interpret trends and estimate mortality improvement rates from sub-population data

The Actuarial Profession
making financial sense of the future

Next Steps

- Timescale

  - Expected issue date ?

- Consultation Exercise

  - Consultation meetings ?

  - Expected close date ?

  - Please do consider the Model and Working Paper and participate in the Consultation Exercise

The Actuarial Profession
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EU Equality Directive

- EU directive requires equal treatment between men and women, including insurance premiums for new policies

- UK government has used an option under the directive to allow insurers to set differential premium rates **as long as there is publicly-available data to support differences**

- The use of gender as a factor in the calculation of premiums or benefits for insurance or related financial services products should not result in differences in the premiums or benefits of individuals

- However, where gender is a determining factor in the assessment of risk based on **relevant and accurate actuarial and statistical data** then proportionate differences in individual premiums or benefits are allowed

- This is subject to **accurate data relevant to the use of gender as a determining actuarial factor being compiled, published and regularly updated**

EU Equality Directive: UK implementation

- Regulations came into effect for new contracts from 5th April 2008
- The Treasury published guidance in March 2008
- Guidance includes minimum content, form and frequency of data to be published for each main policy type
- Data form:
    - Intelligible to someone who is not an insurance expert
    - Table, graph or chart with appropriate explanations
    - Source of data and period to which it relates
    - Technical terms must be explained
- Data may be published by insurers on an individual or joint basis or **collated by a third party**
- Source and accuracy must be attested to

EU Equality Directive: Collective data publication

- Life assurance and annuities .... **)**
- Critical illness .... **) CMI**
- Income protection .... **)**
- Motor insurance .... **ABI**
- Private medical insurance .... **ABI**
- Other types of policies & new policies **?**

Published data:
life assurance and annuities

Ratio of male mortality to female mortality 2003-2006

Most CMI life office mortality investigations combined

Age band	Ratio	Age band	Ratio
26-30	248%	56-60	145%
31-35	215%	61-65	163%
36-40	156%	66-70	165%
41-45	137%	71-75	154%
46-50	128%	76-80	142%
51-55	139%	81-85	137%

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