The Actuarial Profession
making financial sense of the future

CMI Update

Mortality and Longevity one-day seminars

Neil Robjohns	Manchester	23 March 2009
Brian Wilson	London	1 April 2009

Agenda

- Life Office Mortality
- SAPS Mortality
- Mortality Projections
  - The CMI Library of Mortality Projections
  - The proposed CMI Mortality Projections Model

Agenda

- “00” Series tables
- Impaired Lives investigation
- ‘Per Policy’ data
- 2003-2006 experience

"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)

Impaired Lives investigation

- Investigation has run from 1 January 1982
- Wide range of impairments
- Working Paper 36 covers results for 1995-2006
- Data volumes have reduced in recent years
- Ceased collecting data in current form
- Strategic importance?
- Working Paper 36 also consults on the future

CMI Life Office Mortality

‘Per Policy’ initiative

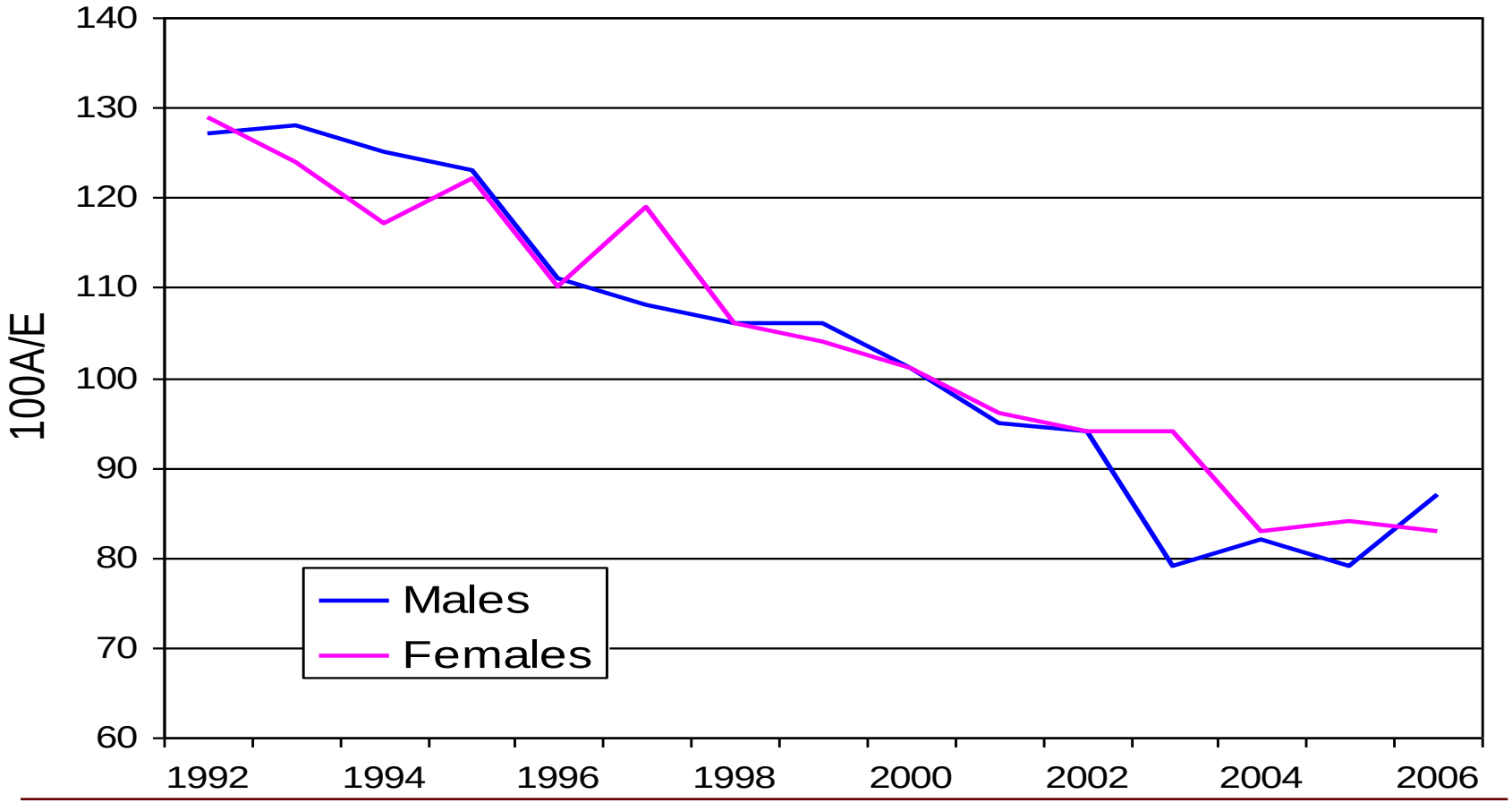
- Background
- Objectives
- Key Differences:
  - Day Count
  - Central Exposures
  - Investigation codes
  - Additional data fields

2003-2006 results

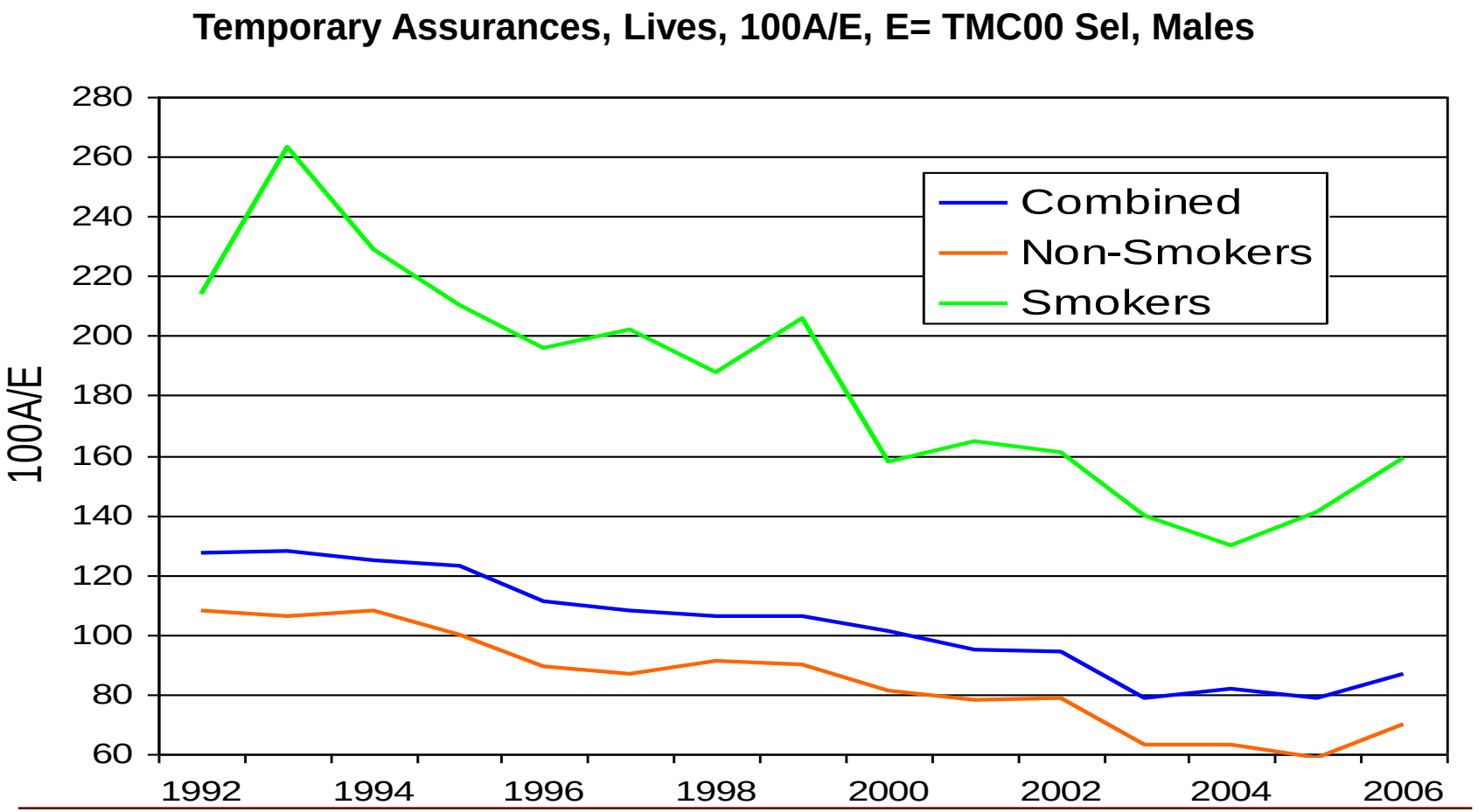
- Results released to members for individual years
- 2003-2006 All Office results sent to members in December
- Summary of experience will be published in CMI Report

Experience subsequent to “00”

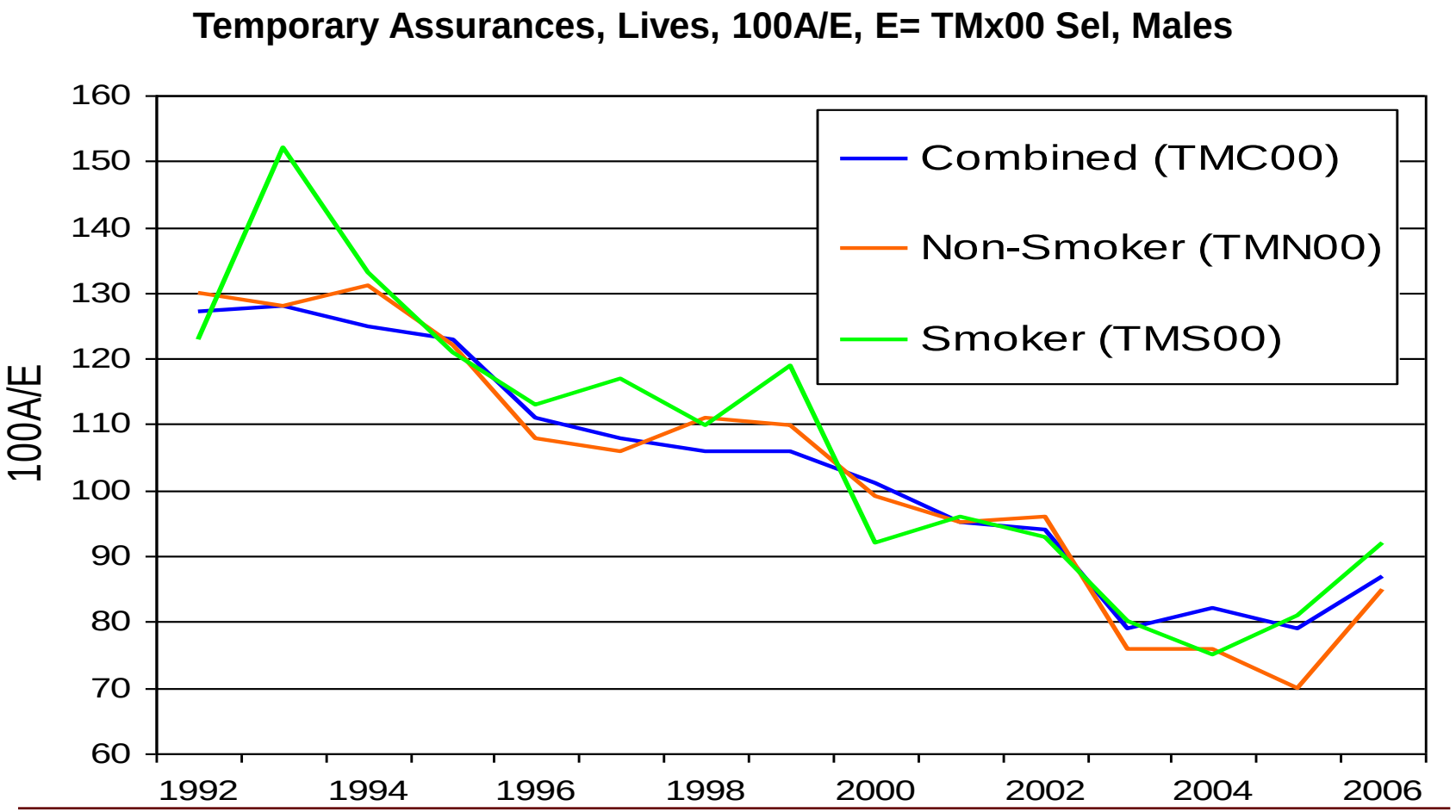
Temporary Assurances, Lives, 100A/E, E= TMC00 Sel / TFC00 Sel



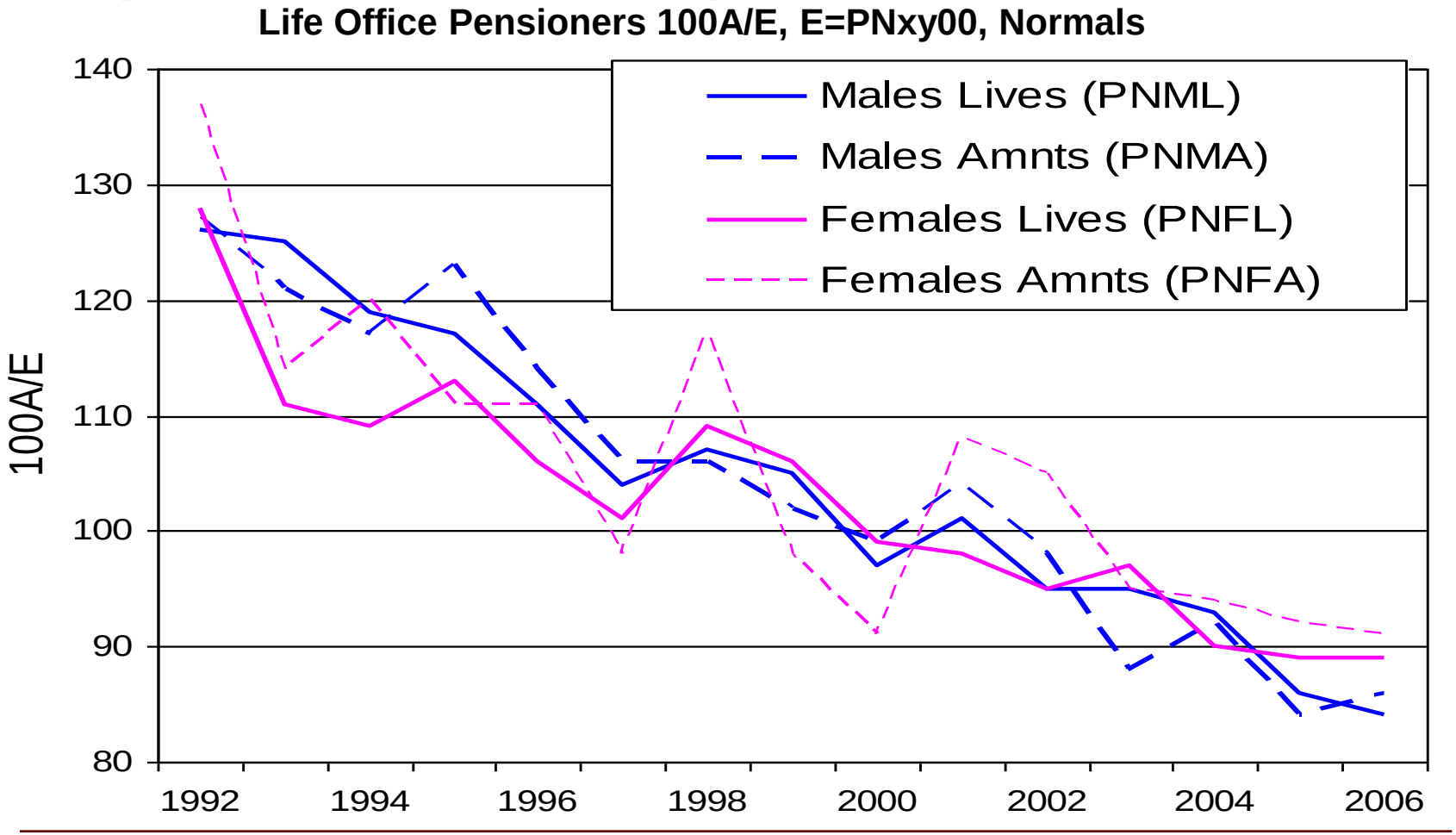
Experience subsequent to “00”



Experience subsequent to “00”



Experience subsequent to “00”



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

Agenda

- Life Office Mortality
- SAPS Mortality
- Mortality Projections
  - The CMI Library of Mortality Projections
  - The proposed CMI Mortality Projections Model

Agenda

Recent work

- S1 Table graduations
- Experience Report on data collected to June 08

New work

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

Series 1 Tables

- There are 20 new sets of mortality tables, approved for adoption by the UK actuarial profession and published on the profession's website on 31 October.
- The tables are the first to be based on the mortality of pensioners of self-administered pension schemes.

SAPS Tables

The S1 tables fall into a number of categories of type of pensioner, as follows:

- All pensioners other than dependants
- Pensioners who retired in normal health
- Pensioners who retired on ill-health
- Dependants (females only - no male dependant graduations were carried out due to the sparsity of data)

SAPS Tables

In addition to graduations of the whole datasets there are also 'Light' and 'Heavy' amounts graduations.

- Light - those with pensions above £13,000 pa (Males, all and normal health), £4,750 pa (Females, all and normal health, and Dependants)
- Heavy - those with pensions under 1,500 pa (Males, all and normal health, Dependants), £750 pa (Females, all and normal health)

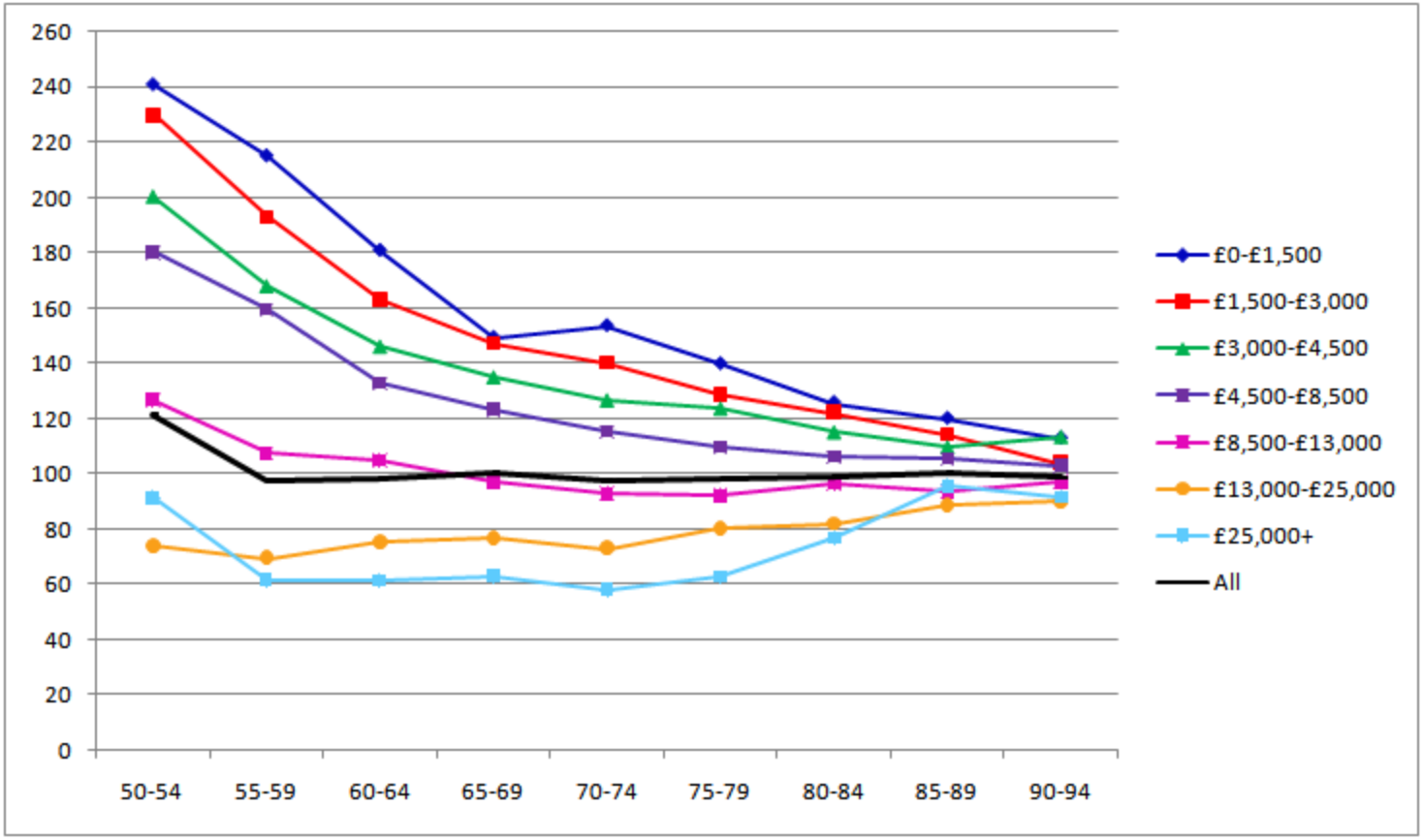
SAPS Mortality

Series 1 Table names

	All Pensioners		Normal Health		Ill-Health		Depts
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Female**
All - amounts	S1PMA	S1PFA	S1NMA	S1NFA	S1IMA	S1IFA	S1DFA
Light - amounts	S1PMA_L	S1PFA_L	S1NMA_L	S1NFA_L			S1DFA_L
Heavy - amounts	S1PMA_H	S1PFA_H	S1NMA_H	S1NFA_H			S1DFA_H
Lives	S1PML	S1PFL					S1DFL

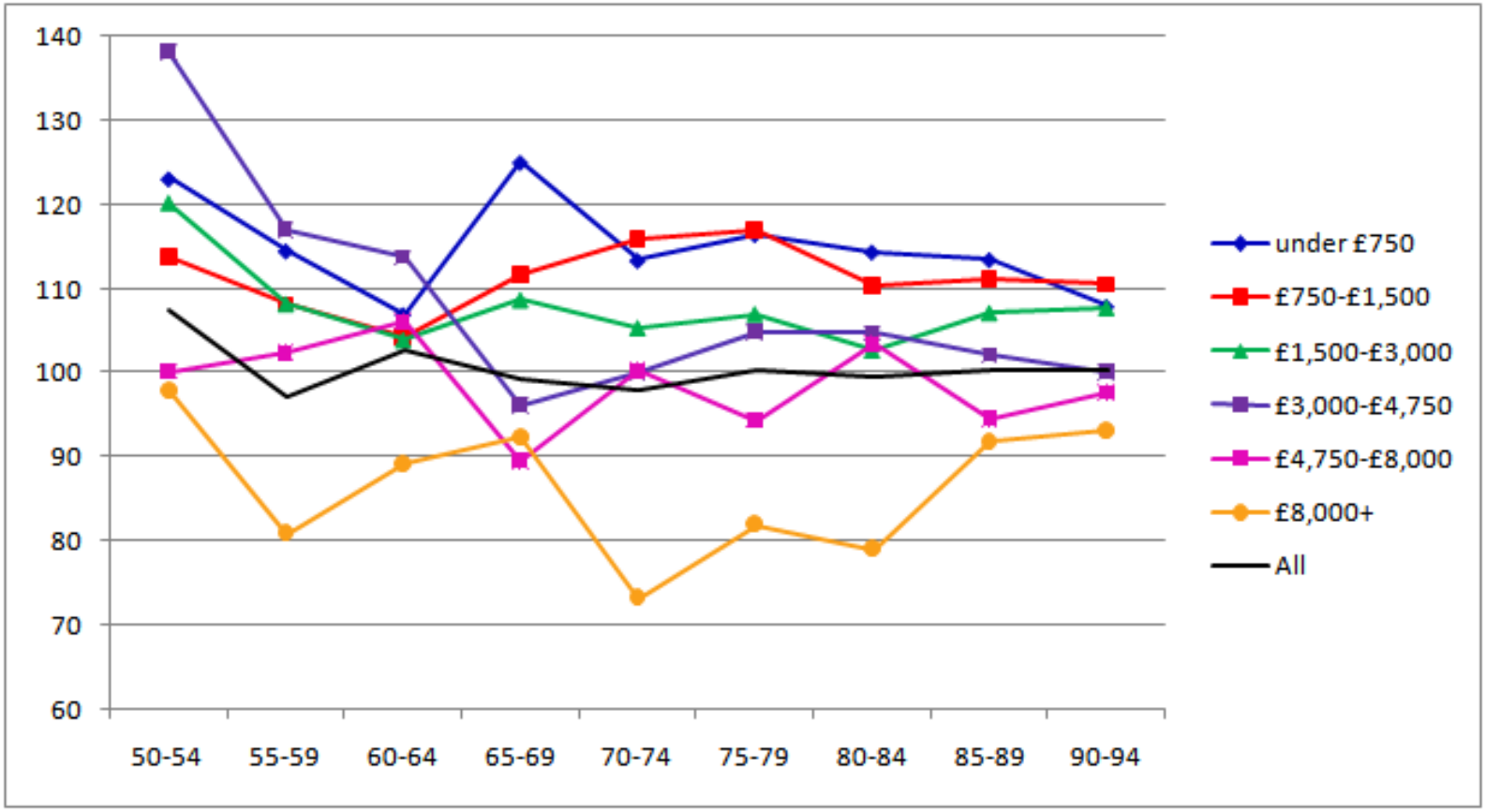
Report on data to June 2008 - Male

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



Agenda

- Life Office Mortality
- SAPS Mortality
- Mortality Projections
  - The CMI Library of Mortality Projections
  - The proposed CMI Mortality Projections Model

Background

- MPWP established to explore possible projection methodologies for use with the “00” Series tables
- Research into P-spline and Lee-Carter
- Issues with both:
  - P-spline – vulnerable to edge effects
  - Lee-Carter – basic L-C doesn’t fit UK data (cohort effects)
- No projections in “00” Series tables
- CMI recognised its research not accessible to many actuaries –> library

The Library of Mortality Projections

- Draft issued in July 2007 with Working Paper 27
- Version 1.0 released in November 2007
- The library collated:
  - 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**

Future Updates

- No set times, updates for:
  - New data
  - Intuitive scenarios
  - New methodologies

- Indicative criteria in User Guide …new projections should be:
  - A worthwhile addition to the current library
  - Publicly available
  - Clearly described and documented
  - 'Road-tested' on different datasets and for different time-periods; and
  - Adequately exposed to the Actuarial Profession for discussion

Version 1.1 of the Library

- Issued in March 2009 with Working Paper 37
- 15 additional projections:
  - PSAP, PSAC and Lee-Carter
  - CMI data to 2006, ONS data to 2006 and 2007 (Male & Female)
- Working Paper illustrates impact of change in ONS practice (from date of occurrence to date of registration)

Agenda

- Life Office Mortality
- SAPS Mortality
- Mortality Projections
  - The CMI Library of Mortality Projections
  - The proposed CMI Mortality Projections Model

Background

- 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

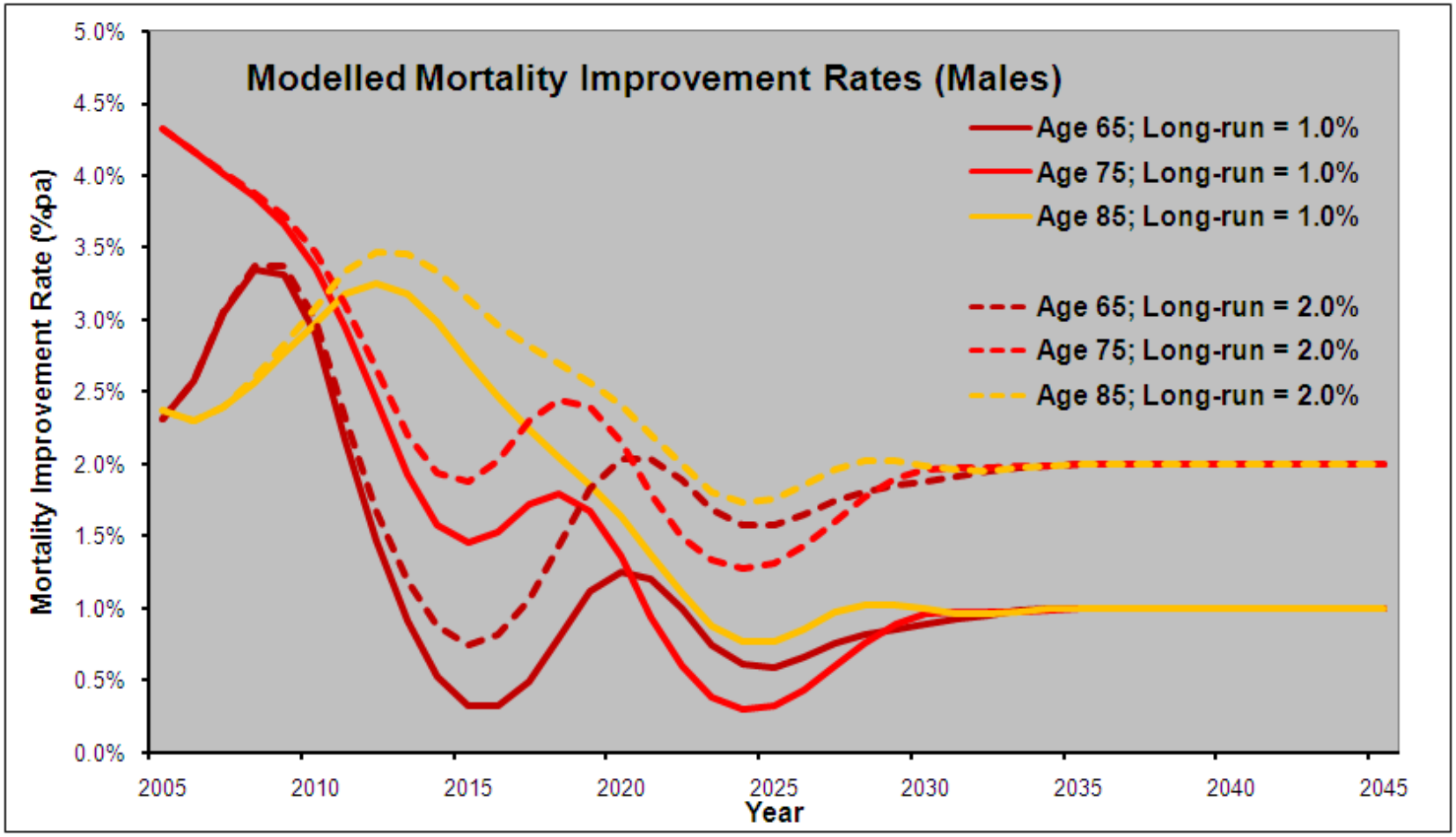
- An illustrative version of the CMI Model
- CMI Working Paper, covering:
  - An overview of the Model structure
  - Analysis to help inform the setting of parameter values
  - Sample projections from the Model
  - Illustrations of sensitivity of results to parameter values
  - A simple analysis and 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

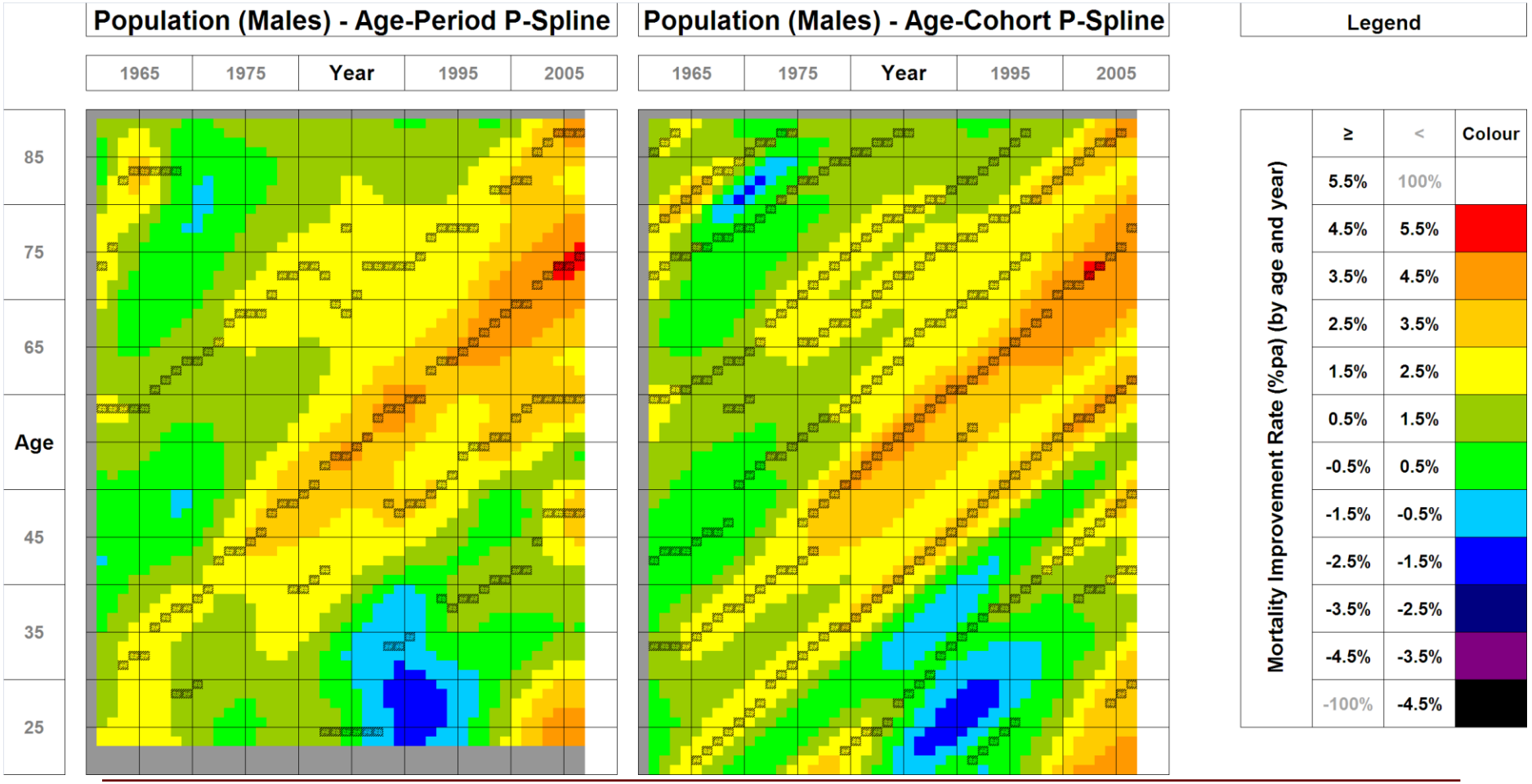
The proposed CMI Mortality Projections Model

Model Structure - Long-term Rate

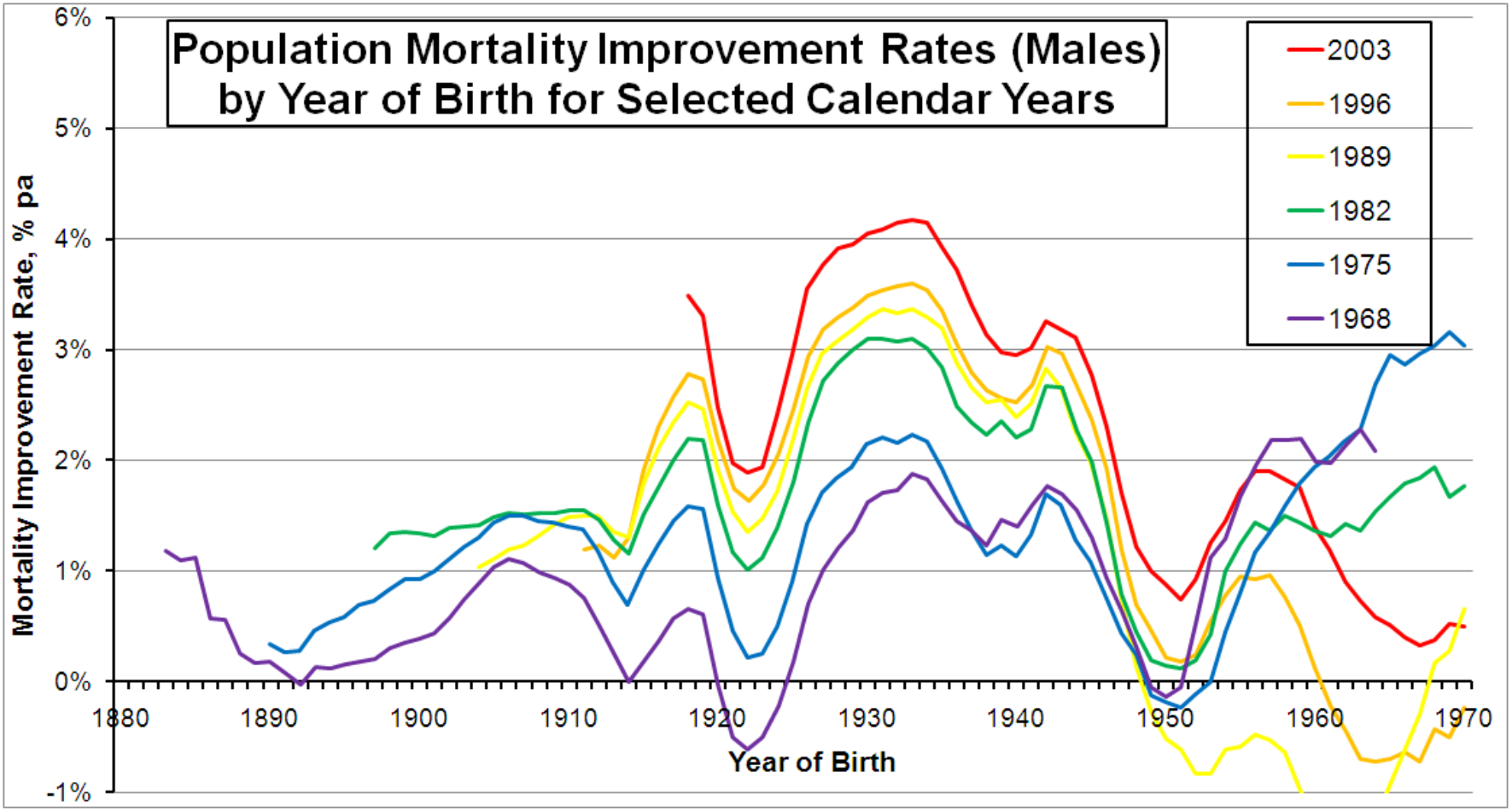


The proposed CMI Mortality Projections Model

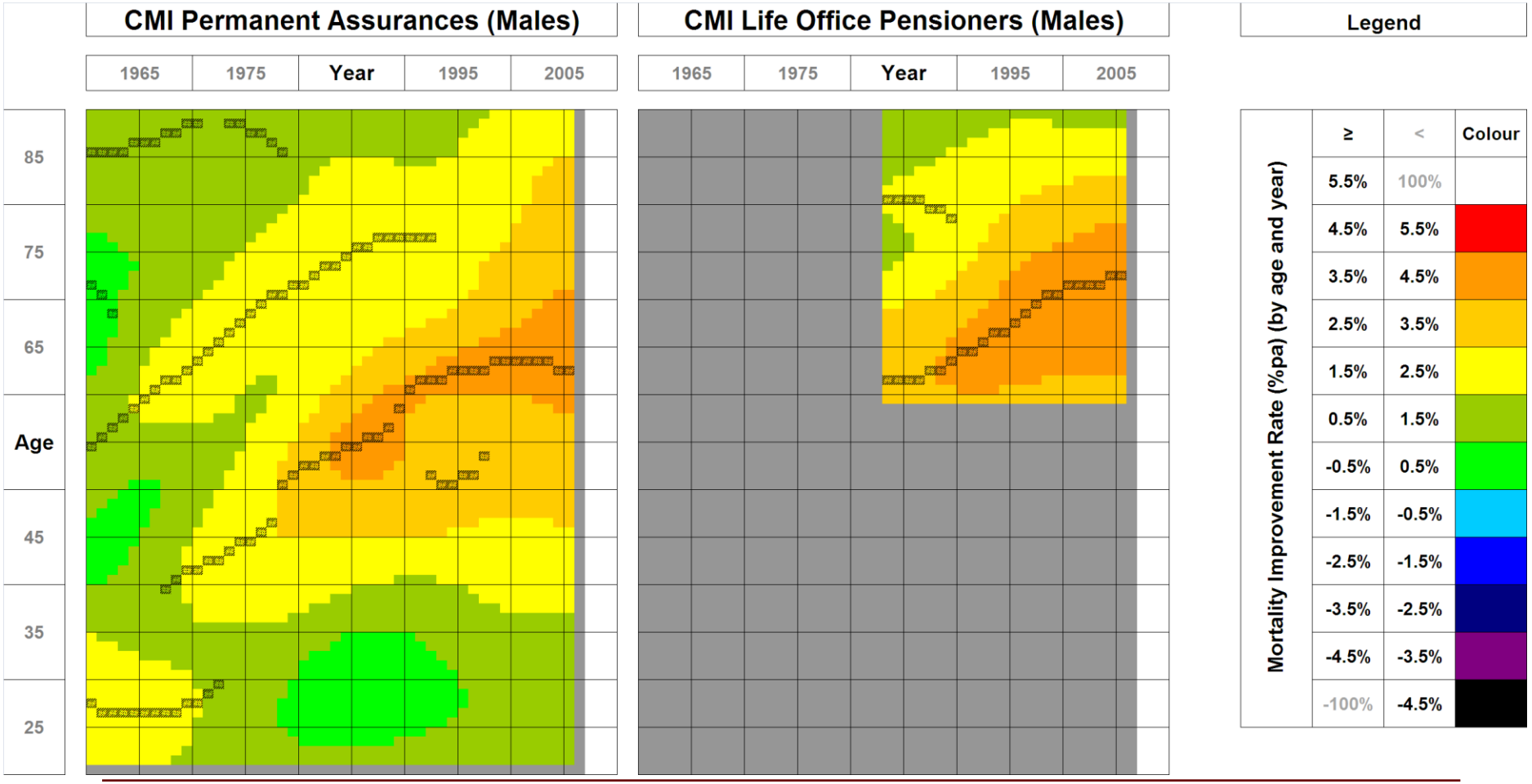
Sample Research - Population Data



Sample Research - Population Data

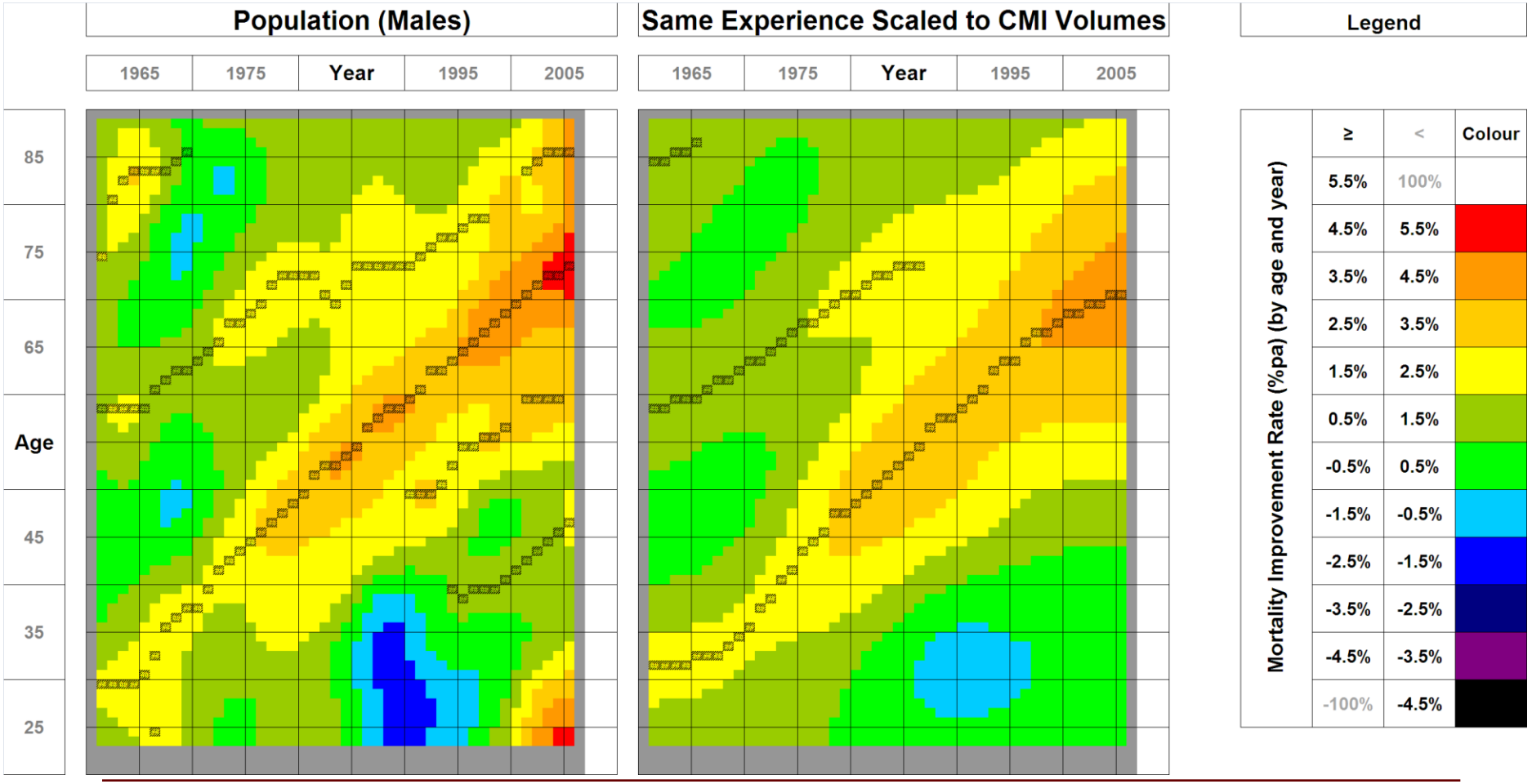


Sample Research - CMI Data



The proposed CMI Mortality Projections Model

Sample Research - Scale of Data



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

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