



## Mortality Projections Committee

### Summary of Working Paper 97: “CMI Mortality Projections Model: CMI\_2016”

March 2017

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#### Introduction

This document provides a brief synopsis of Working Paper 97, which accompanies the publication of the latest update to the CMI Model, CMI\_2016.

For more detailed analysis and full results, readers are encouraged to refer to the full Working Paper<sup>1</sup>.

#### Background

The CMI published the first version of a new Mortality Projections Model (“the Model”) in November 2009. Since then, the Model has been regularly updated, primarily to reflect emerging mortality data, with changes in method being relatively minor.

The latest version, CMI\_2016, is calibrated to England & Wales population (“the general population”) data up to 31 December 2016, and also has some more substantial changes in method. The Committee published its initial proposal for the revised Model in Working Papers 90 and 91 in the summer of 2016. Following consultation, it published its revised proposal in November 2016 in Working Paper 93, which also contains an early estimate of the results of CMI\_2016, based on data to 14 October 2016.

#### New method

The method used for CMI\_2016 is the same as in Working Paper 93. It retains the broad structure of earlier versions of blending between initial mortality improvements, calibrated to historical data, and long-term rates of mortality improvement, determined by users of the Model. The key changes compared with the Model underlying CMI\_2009 to CMI\_2015 are:

- Determining initial improvements by using the new Age-Period-Cohort Improvement (APCI) model, which defines mortality improvements in terms of  $\log m_{x,t}$  and removes the need for a “step-back” from the edges of the data.
- The ability to control the responsiveness of the Model to new data by use of the “period smoothing parameter” ( $S_\kappa$ ).
- Shortening the convergence period for the youngest cohort.
- Tapering the long-term rate between ages 85 and 110 rather than between ages 90 and 120.
- Allowing users to express the pattern of convergence in terms of the slope of mortality improvements (“direction of travel”) as an alternative to the current approach of specifying the proportion remaining at mid-point.

#### Recent mortality

Mortality improvements in the general population since 2011 have been unusually low compared to the earlier part of this century. Standardised mortality rates (SMRs) showed fairly steady improvements of 2.6% p.a. for

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<sup>1</sup> Most of the CMI’s research is only available to employees of subscribers and to researchers, for non-commercial use. Details of how to access the full paper and the CMI’s other research can be found on the CMI’s [web pages](#).



males and 2.2% p.a. for females between 2000 and 2011. Since then, annual improvements have been close to zero, and SMRs for females are slightly higher in 2016 than in 2011. For both males and females, SMRs are about 11% higher in 2016 than an extrapolation of the earlier trend.

The extra data now available provides increasing evidence that the low level of recent mortality improvements may be due to medium- or long-term influences, rather than just short-term events such as influenza in early 2015.

There is still uncertainty about the appropriate level of initial mortality improvements both for the general population and when applying the Model to other populations. Because of this, the Committee encourages users of the Model to consider the impact of different choices for the period smoothing parameter. The Committee has provided further analysis of the responsiveness of the Model, and considered how results change in response to different scenarios for calibration data.

The Committee has carried out analysis on the CMI Self-Administered Pension Schemes (SAPS) dataset. This dataset is smaller and potentially less consistent compared with the general population and therefore the analysis is subject to greater uncertainty. The analysis indicates that improvements in this subset of the general population have been higher than in the general population between 2011 and 2015.

## Results

Initial mortality improvements are materially lower in CMI\_2016 than in CMI\_2015. This is partly due to the continued low mortality improvements in the dataset used to calibrate the Model, and partly due to the method used. Initial mortality improvements are slightly higher for males than females at most pensioner ages but lower than females at the youngest ages.

The Model suggests that mortality improvements peaked some time ago with the highest improvements being seen in 2004 for males and 2006 for females. Consequently the “direction of travel” of mortality improvements is negative.

The combination of lower initial mortality improvements and amended projection assumptions leads to lower life expectancies than in all previous versions of the Model. Compared to CMI\_2015, life expectancies at age 65 are 1.3% lower for males and 2.0% lower for females in CMI\_2016, and falls in life expectancy are greater at the oldest ages.

Life expectancies at age 65 in CMI\_2016 are about 0.25% lower than the early estimate published in Working Paper 93.

## Associated outputs

As well as this working paper, the Committee has also published:

- The CMI Model software.
- Working Paper 98, describing the methods used in the Model.
- Working Paper 99, a user guide for the software.
- Spreadsheets showing the derivation of the CMI\_2016 dataset from data published by the Office for National Statistics (ONS).

## Next steps

The Committee will hold a meeting at Staple Inn on 11 April 2017, in conjunction with the Staple Inn Actuarial Society (SIAS), to discuss recent mortality experience and the prospects for future mortality improvements. Further details are available from the [SIAS website](#).

The next version of the CMI Model, CMI\_2017 is expected to be published in March 2018. Following the recent extensive review of the Model, the Committee does not anticipate significant changes in method in the short term.

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