

Newsflash

First look at the CMI_2023 model release

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The release of the latest Continuous Mortality Investigation (CMI) model is a key event within a life actuary's calendar. Following consultation on the core parametrisation, CMI_2023 was published on 18 April. In this newsflash, we discuss the details of the latest model and what this means for (re)insurers.

Changes to the model

The CMI model is the most popular model used by insurers in the UK to express views of future mortality. It is calibrated to population mortality data, with recent trends used to inform the short-term rate of improvement.

Following the COVID-19 pandemic and continued high excess mortality, the model has become highly sensitive to data updates. In the past few iterations of the model, the CMI has limited the extent to which recent data informs their "core" (i.e. default) projection via the introduction of "weight" parameters. The previous version of the model (CMI_2022) had a core parametrisation which placed 25% weight on 2022 data (and 0% weight on 2020 and 2021 data).

In February 2024, the CMI consulted with the industry to understand views of their proposed core calibration for CMI_2023. Following this consultation process, the CMI have now released an update to the model including details of the core parametrisation.

The two key updates to the model from CMI_2022 are:

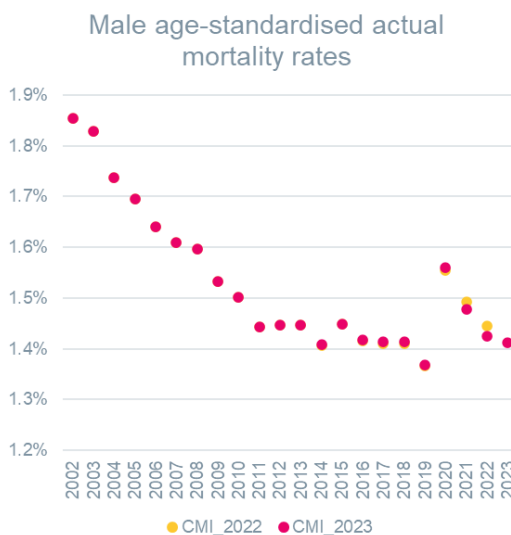
- Updates to data, including moving to the period 1983-2023 and **replacing population estimates with ONS figures** following the 2021 census.
- Choosing to place a **single weight of 15%** on 2022 and 2023 data within the core parametrisation.

These changes are discussed in more detail below.

The CMI also suggested that they are considering a range of options, including structural changes, for CMI_2024 so that the model responds in a more robust manner to a range of scenarios.

Updates to data

The main update to the data, in addition to the normal shifting of the calibration period from 1982-2022 to 1983-2023, is to the population data. The CMI had to estimate population numbers for recent years within CMI_2022 as the 2021 census values were not published until late last year.



Hymans Robertson analysis of CMI_2022 and CMI_2023 (WP183)

Updating this data in CMI_2023 results in a reduction in the crude mortality rates for 2021 and 2022 (relative to that implied by CMI_2022) and therefore a reduction in the excess mortality seen for those years. This has a small positive impact on the overall projection (relative to CMI_2022).

Following negative excess mortality in the second half of the year, 2023 population mortality was comparable to that seen during 2015-2018, reflecting a c1% improvement from that seen in 2022. Some may see the return to pre-pandemic levels as positive news. However, compared to historical mortality improvements seen in the 2000s (which were of the order of 2-3%p.a.), this reflects a very stagnant period for mortality improvements. Inclusion of this latest data point therefore has a negative effect on the overall projection.

The challenge that many are facing is judging what direction the data will move in going forward; will the 0%p.a. improvement trend persist, or could we revert to something closer to the pre-pandemic trajectory? The first quarter of 2024 is currently tracking 2019 levels, which was the lightest year of mortality on record.

15% weight on 2022 & 2023 data

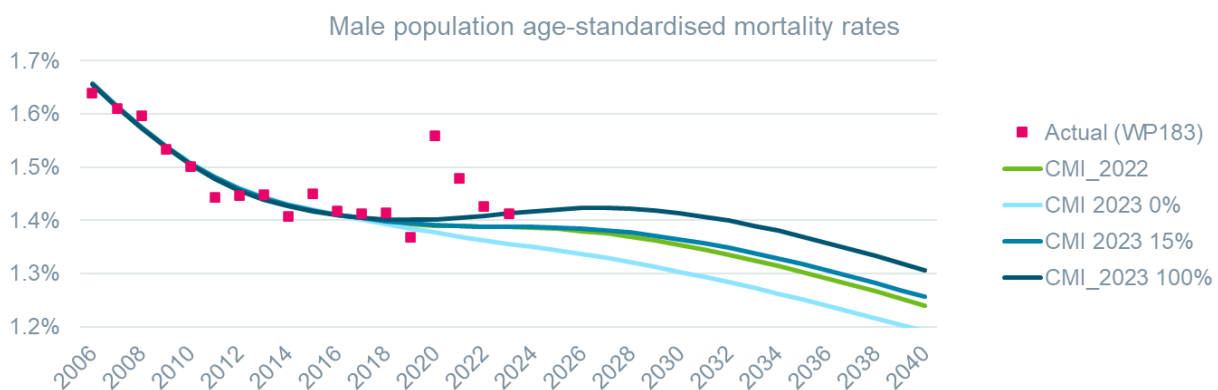
The CMI have also chosen to place a single weight of 15% on 2022 and 2023 data within their core parametrisation.

The rationale for choosing a single weight was set out in the consultation paper. Firstly, in late 2022 and early 2023 there was an increase in the time between when deaths occurred and when deaths were reported. Using a single weight reduces the sensitivity of the model to this variation. Secondly, it was thought that having fewer parameters which could be varied independently would ensure the model met its purpose as a common language for users to articulate their assumptions. Users can still choose to use different weights for each year, but within the “Advanced parameters” of the model.

Using a 15% parameter value results in a slightly lower life expectancy projection than under core CMI_2022; a reduction of 0.43% for men and 0.16% for women at age 65¹. CMI_2023 results in life expectancies (at all ages and genders) which are lower than that calculated using every previous version of the model (i.e. since CMI_2009).

The choice of weights on recent data is much more cautious than the original intentions proposed alongside the CMI_2022 publication. Previously, expectations were that the default parametrisation would increase by 25% each year from 2023 (i.e. 25% and 50% weight on 2022 and 2023 data respectively). The model projection would have resulted in an even lower life expectancy projection under this parametrisation, with the consultation paper suggesting that taking this approach would result in the largest fall in life expectancy between two model transitions. The choice of weight within the core parametrisation therefore reflects an understandable desire within the CMI committee for the model to produce stable results year on year and not overreact to recent data.

We note that, as seen for CMI_2022, the relationship between the weight parameter and the impact on the projection is non-linear. Although 15% intuitively sounds like not much weight, it results in a projection which is closer to 100% weight than 0% weight, as shown on the following graph. Here we have plotted the age-standardised male population mortality rates observed (pink dots) and the expected mortality rates under several projections. The CMI_2022 series is the core projection (i.e. 25% weight on 2022 data), whereas the three CMI_2023 series represent projections under different weights placed on 2022 & 2023 data. An illustrative long-term rate of 1.5% has been used for each projection.



Hymans Robertson analysis of CMI_2022 and CMI_2023 (WP183) data

The default weight of 15% is also an increase on the 10% weight that was proposed in the consultation. This reflects a change in committee members views following the consultation responses. Prior to this, the

¹ Assessed by calculating life expectancies using S4 base table, assuming a long-term rate of 1.5%, and includes updates to population data.

consultation paper suggested there was not a consensus in the committee, but that the initial proposal reflected a majority view.

Our view of the changes

The choice of weight to place on recent data is a key expert judgement which materially changes the overall projection. The CMI have historically chosen to not set default values for parameters (e.g. the long-term rate) which involved significant judgement. Given the approach taken in CMI_2022, it would be difficult to not set a default weighting for CMI_2023.

There is some concern that the use of a single weight parameter for years 2022 onwards may lead to an illusion of simplicity. Overall, it is difficult to explain in simple terms what a specific weight means in an intuitive way. Given the non-linear relationship discussed above, there is also some risk that the parameters are misinterpreted.

On the face of it, placing less weight on recent data (relative to the 25% weight in CMI_2022) feels like a step backwards, rather than a return to normality. The proposal is difficult to understand when 2022 mortality rates have reduced (following the updates to population data) and 2023 mortality rates are comparable to pre-pandemic levels. We no longer have a clear road map of how the model's default parametrisation will evolve for future years, although this is perhaps understandable given the need to change direction this year.

The default view is reasonably consistent with the projection from CMI_2022, which to some extent may be seen as anchor of what is deemed reasonable. We consider the change to 15% instead of 10% fairly arbitrary (in the absence of any further information to justify the overall projection) but it does demonstrate that the collective views of industry have had some influence on the final core values.

Overall, we recognise the challenging position the CMI are in to come up with a default projection. The provision of the model as a framework gives the industry a language to be able to debate these judgements. Their choice of weight represents a balanced view which recognises the divergence in experience from a pre-pandemic trajectory, whilst not allowing the model to fully reflect moving to a stagnant period of 0%p.a. improvements (which is suggested from recent data).

What does this mean for insurers and reinsurers?

Many insurers and reinsurers will want to move to the most recent version of the model, which might be only to reflect the revised population data values following the 2021 census. This change in isolation will have a positive effect on life expectancy if moving from CMI_2022 model, but a negative impact if moving from earlier versions.

The core parametrisation presented by the CMI will have a limited direct impact on insurers and reinsurers as many will have their own in-house view and methods for deriving their own view of post-pandemic trends. These views will consider the real-world drivers which have emerged in recent years and have the potential to change the outlook for mortality from a pre-pandemic trajectory.

The core parametrisation will, however, be seen as a benchmark for a reasonable trend projection. This could result in some herding around the 15% single weight parameter which (as discussed above) reflects a slightly more negative outlook of mortality from last year. We saw some evidence of herding last year, our benchmarking survey found that roughly half of those who were placing weight on 2022 data were using the core weight of 25% (most other firms used 0%). Pension schemes will also be more likely to adopt the core approach, which is relevant for those active in the buoyant pension risk transfer market.

Another point to consider is that the current structure of the model doesn't capture the unusual experience we have seen in recent years, where actuals have diverged materially from the expected projection. (Re)insurers may make adjustments to the historical data in the projection to avoid the results of mortality experience investigations being distorted.

The CMI's choice to use a single parameter for 2022 and 2023 as the default may encourage others to do the same. This in theory should make it easier for (re)insurers to compare the strength of their assumptions with peers. However, there is a significant interaction between the weight parameter and other key parameters (for example, the period smoothing parameter). Many firms are also choosing to express their view of improvements using out of model adjustments (such as via an overlay). Comparing improvements across the industry is therefore still quite challenging, and the CMI model has become less of a common currency to make these comparisons.

What next?

Along with many insurers and reinsurers, we will be monitoring the mortality experience for 2024. We are also continuing to develop and refine our in-house view of mortality improvements, which considers what has driven a change in views of mortality trend relative to a pre-pandemic trajectory. This has been a helpful resource for those looking to justify a change in their assumptions and as a source of independent validation.

We will also shortly be kicking off the eighth edition of annual longevity benchmarking survey, to help gauge how the market is responding to recent data. Last year we had responses from 33 firms. We look forward to discussing the results of this with those who are participating.

If you have any questions or comments on setting mortality trend assumptions, please [get in touch](#).

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