

MEASURING MORTALITY USING 2020/2021 DATA

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This article sets out the UK profession's plans regarding the use of 2020 and 2021 data, in particular regarding pensioner, annuitant and life assurance mortality. To what extent can mortality data from 2020 and 2021 be of use, given how abnormal these years have been? Exactly the same question faces actuaries working in life insurance and pensions, in the UK and in virtually all countries affected by the COVID-19 epidemic. The underlying discussions and analysis have been conducted by the profession's Continuous Mortality Investigation (CMI).

BACKGROUND

The year 2020 was an extraordinary (and we hope unique) year for mortality because of the pandemic. In the UK there were approximately 73,000 excess deaths above that expected based on mortality in 2019. We are now most of the way through 2021, and deaths from COVID-19 are still a significant number (70,000 to 5 November 2021, based on national statistical information on deaths with COVID-19 listed on the death certificate). However, the mortality experience of 2021 is unusual owing to factors beyond 'just' the COVID-19 deaths: in particular, increased other-cause (non-COVID) deaths arising from delayed diagnoses and treatment due to the lockdowns, and a reduction in deaths in respect of those people who died from COVID-19 in 2020 who might otherwise have been expected to die in 2021 (the 'forward displacement' effect). It is difficult to reach objective conclusions in this situation.

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The graph below shows how mortality in 2020 and 2021 (to 5 November) compares with 2019 in particular, showing also the range seen in the previous decade. As a simple metric, standardised mortality rates are used.

The chart clearly shows the abnormally high mortality of England and Wales resulting from the pandemic. In particular, we can see that standardised mortality in the first wave of the pandemic in Quarter 2 of 2020 and the second wave of the pandemic in Quarter 4 of 2020 and Quarter 1 of 2021 were materially higher than mortality for the same period in 2019. We can also see some mortality reduction in the second quarter of 2021.

THE CMI'S USE OF EXPERIENCE DATA

The experience investigations we carry out in the CMI fall into broadly two types:

- **'Actual versus Expected' analyses**, where we assess how the experience of a year or group of years compares with what would be expected based on the most appropriate tables.

The CMI will carry on doing this type of analysis on 2020 and 2021 data. This will help subscribers to see how their own experience compares with that of others.

- **Development of new mortality tables**, from analysis of the probability of death at any age followed by smoothing across the age range ('*graduation*', primarily to remove noise). This work aims to derive mortality tables that are predictive of future experience. Clearly, deriving tables based partially on unadjusted 2020 and/or 2021 CMI data is unlikely to be predictive. However, we have not found a satisfactory way to adjust 2020 or 2021 CMI data for

this purpose, as we discuss below. Therefore, as a general principle, the CMI is not intending to develop new mortality tables using data from 2020 or 2021.

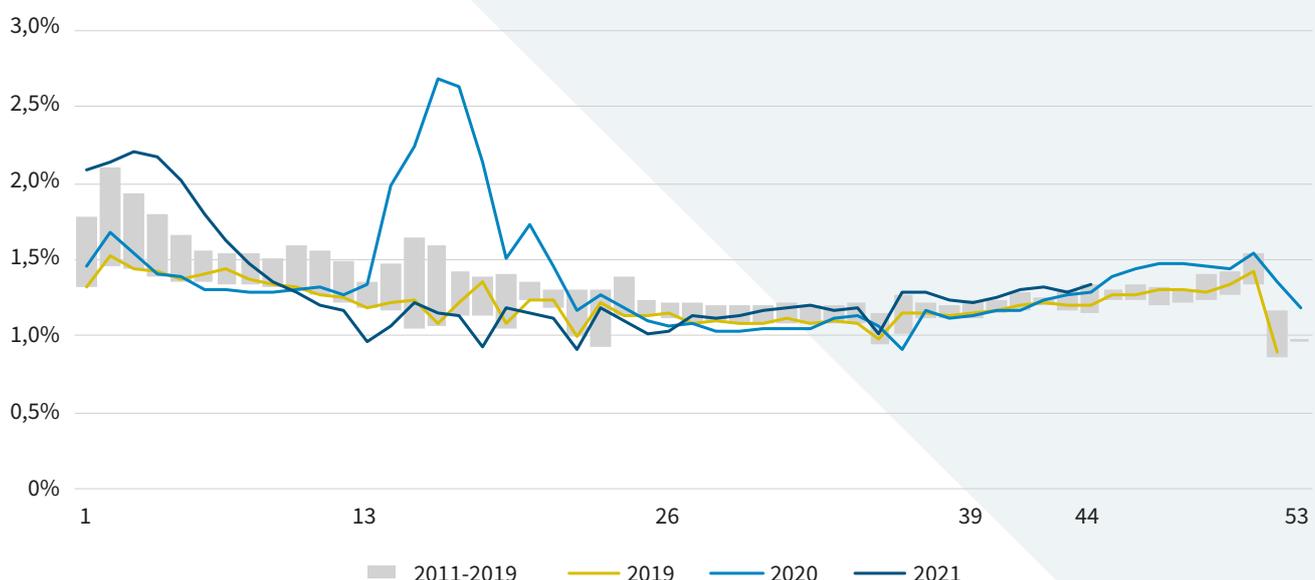
POSSIBLE APPROACHES TO ADJUSTING THE 2020 AND 2021 EXPERIENCE

We have spent considerable time considering whether we can remove the pandemic's effect from the 2020 and 2021 mortality data. We have considered two approaches – a '*bottom up*' approach using data on deaths directly attributable to COVID-19, and a '*top-down*' approach looking at '*excess deaths*' (deaths above those expected, and hence likely attributable to the pandemic).

BOTTOM-UP APPROACH

A bottom-up approach could work using (in the case of the UK) national statistical data on deaths with COVID-19 listed on the death

FIGURE 1: MEASURING MORTALITY USING 2020/2021 DATA



certificate, UK public health data records deaths within 28 days of a positive COVID-19 test. However, there are several areas of difficulty:

- Some COVID-19 deaths are likely to have been assigned as other causes of death.
- We would need to calculate from public domain data a COVID-19 mortality age curve.
- Insurance portfolios and pension funds typically exhibit different socio-economic profiles from the general population, and so we would need to allow for how COVID-19 affects these different ‘insured’ lives.
- We would need to calculate an ‘amounts weighted’ equivalent of the above (without confounding with the socio-economic effect).

Each of these steps involves substantial subjectivity and room for error; the combination of these steps would likely lead to results which would be of little use.

A further concern with this approach is that, while almost plausible in dealing with 2020, the approach would be of no use in 2021 because the other elements making 2021 an abnormal year (for instance, forward displacement and delayed diagnoses) would not be allowed for. But we would want any adjustment approach to work well in both years (and perhaps even 2022).

Overall, therefore, we do not regard this approach as being a useful way to adjust 2020 and 2021 data.

TOP-DOWN APPROACH

A top-down approach would seek to define deaths caused by the pandemic as the difference

between actual deaths, and those that would otherwise have been expected: this difference being the ‘excess’.

This has been a very useful approach for quantifying the pandemic’s overall mortality impact for the purpose of the CMI’s regular **mortality monitoring**.

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However, this approach is not so well-suited to adjusting 2020 and 2021 data for the purpose of subsequent analyses of that adjusted data. The reason is that the ‘*actual less expected*’ method is sensitive to what we define ‘*expected mortality*’ to be. In simple terms, we would be quantifying ‘*non-pandemic deaths*’ as (Actual deaths less Excess deaths), where Excess

deaths are themselves defined as (Actual deaths less expected deaths). In a circular fashion, we end up calculating non-pandemic deaths as expected deaths.

This means we are not bringing into our analysis any information on actual 2020 or 2021 mortality: we have simply brought in a prior expectation through the back door. For this reason, the top-

down approach is of no use in adjusting data to arrive at an idea of what 2020 (or 2021) mortality has been ‘*absent the pandemic*’.

POST-PANDEMIC MORTALITY

Perhaps more importantly, when will we start to understand the shape of post-pandemic mortality?

It may be that the first consecutive four-year period that we are able to use for developing tables is the period 2022-2025, in which case the underlying work would not be done until 2027 at the earliest.

However, work on ‘*Actual v Expected*’ in respect of the individual years (especially 2022 and 2023) will give a much earlier view on what post-pandemic mortality for insured portfolios and pension funds looks like.

FINAL THOUGHTS

This paper outlines the thinking we in the UK have undertaken when looking at how best to manage the use of data from 2020 or 2021, and how difficult it is to extract from these years any clear indication of underlying mortality – whether ‘*non-pandemic*’ mortality, post-pandemic mortality, or yearly mortality trends. Similar arguments will apply to work elsewhere: in many countries there is likely to be little objective data to guide actuaries reliably as to how to adjust reserves or valuations to account for the impact of the pandemic now and in the future.



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