England & Wales mortality monitor – January 2019

Summary

Mortality in the final quarter of 2018 was relatively light compared to the 2008-2017 average. This counteracted relatively heavy mortality early in the year and led to an annual mortality improvement for 2018 close to zero.

Background

This is the second in a series of quarterly updates monitoring mortality in England & Wales. It is based on provisional weekly deaths data to 4 January 2019 (i.e. week 1 of 2019), published by the Office for National Statistics (ONS) on 15 January 2019. We intend to publish the next update, for data to the end of week 13 of 2019, in April 2019.

All updates are publicly available from the CMI pages of the Institute and Faculty of Actuaries website: https://www.actuaries.org.uk/learn-and-develop/continuous-mortality-investigation/other-cmi-outputs/mortality-monitor.

The previous update, dated October 2018, was the first in the series. It was described as "provisional" as we sought comments on our proposals, in Working Paper 111. Following feedback that was generally supportive, we have not changed the underlying method but we have added some further commentary and added Charts D2 and E2.

Notes

All of our analysis is based on Standardised Mortality Rates (SMRs). These adjust the provisional weekly deaths data published by the Office for National Statistics (ONS) to allow for changes in the population over time.

Charts A, B and C show centred averages of weekly SMRs. The annual averages smooth out seasonal variations. The quarterly averages smooth short-term variations but still show seasonal patterns, allowing the identification of, for example, winters with particularly heavy or light mortality.

Chart D shows cumulative standardised mortality (cSMR) for each year, relative to the average for 2008-2017, and Chart E shows cumulative standardised mortality improvements (cSMRI) for each year (i.e. the progression of annual mortality improvements over the course of each year). Charts D2 and E2 show the same information as charts D and E respectively in a different format and may be easier to interpret for those with colour vision deficiency.

Charts A to E show results for males and females combined, for ages 20-100. Charts F and G show variations in the cSMR and cSMRI by gender and age band.

The numerical results underlying the charts are provided in an accompanying spreadsheet, together with further results, including SMRs by gender and age band.

Full details of the methods used are included in Working Paper 111.

Use of this document

Please note that:

- The CMI disclaims any liability from use of or reliance on these calculations, including in relation to financial transactions such as longevity swaps; and
- The CMI does not guarantee that it will continue to publish quarterly updates.

Please also see the disclaimer and copyright notice on the final page of this document.

TAS compliance

This paper is intended to analyse recent mortality in England & Wales. It complies with the principles in the Financial Reporting Council's Technical Actuarial Standard "TAS 100: Principles for Technical Actuarial Work". Any person using this paper should exercise judgement over its suitability and relevance for their purpose.

Smoothed mortality at a point in time

Chart A shows quarterly (13-week) and annual (53-week) centred averages of SMR, since weekly deaths data became available. Note that although we have used data from 31 July 1999 to 4 January 2019, the quarterly and annual averages start 6 and 26 weeks later and stop 6 and 26 weeks earlier.

The annual average SMR shows a fairly steady fall from 1.75% in early 2000 to 1.30% by mid-2011. Since 2011, the annual average SMR has been fairly flat, remaining within the range from 1.24% to 1.34%.

The quarterly average shows that mortality peaks each winter. Winter mortality in 2017/18 was higher than in seven of the previous eight winters, the exception being 2014/15, but quarterly average mortality in the summer of 2018 was lower than at any other point in the dataset, and was likely lower than at any earlier time. Mortality continued to be lower than average in the final quarter of the year.

Chart A: Quarterly and annual centred average SMRs – whole period

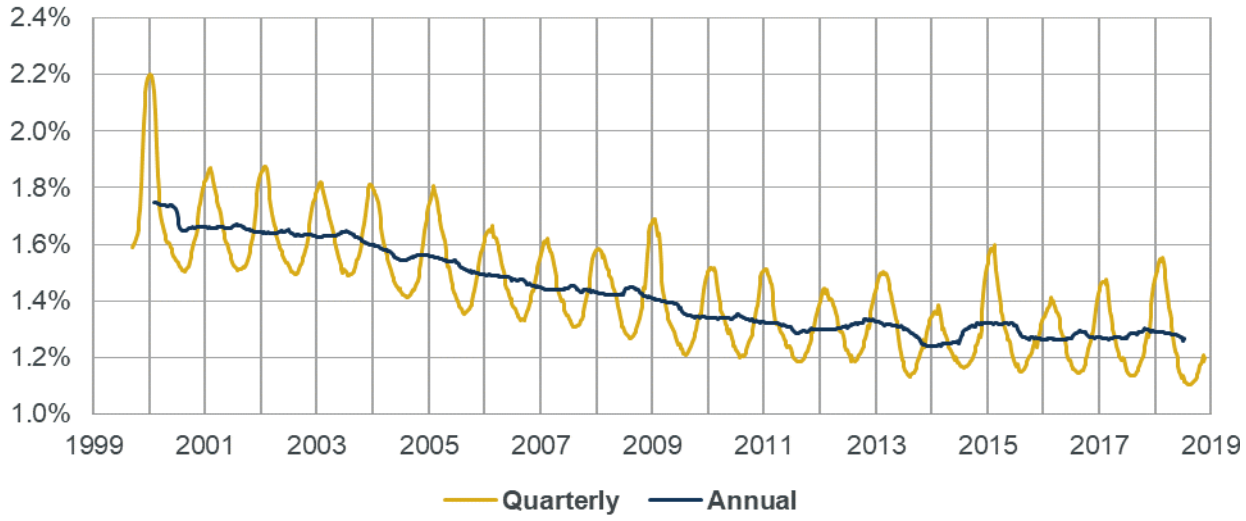


Chart B shows the same information as Chart A, magnified to show the current year and the previous five years more clearly.

Chart B: Quarterly and annual centred average SMRs – current and previous five years

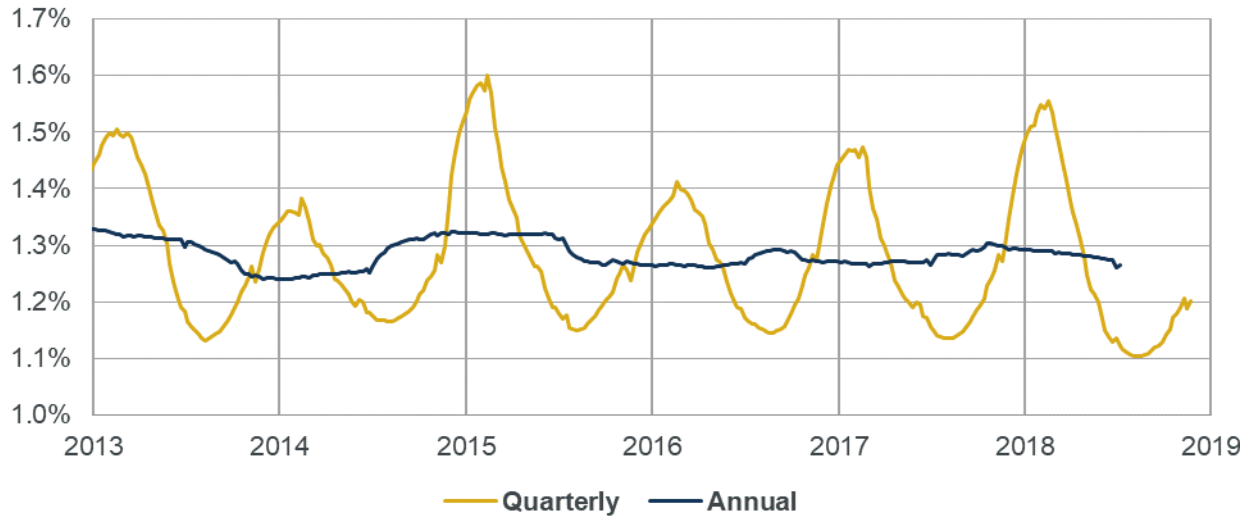
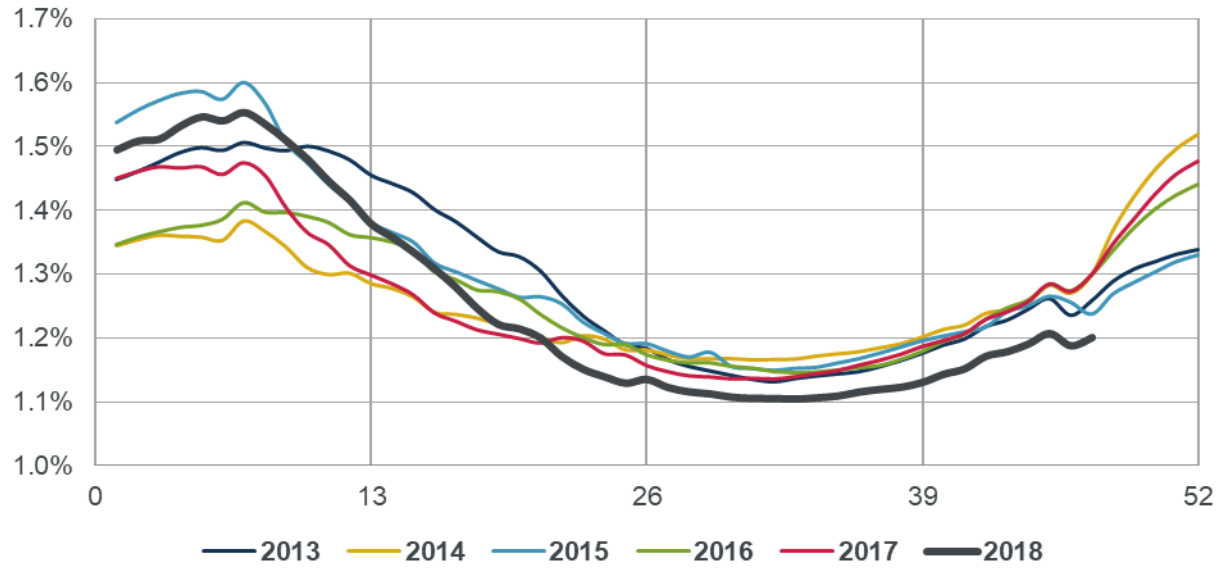


Chart C shows the quarterly average SMRs from Chart B for each year, with values plotted by week number to aid comparison. We note that although lines are labelled by calendar year, the quarterly averages for weeks towards the start and end of each year will be affected by mortality in earlier and later years respectively. The chart again illustrates the relatively high level of mortality in the early part of 2018, but comparatively light mortality in the latter part of the year.

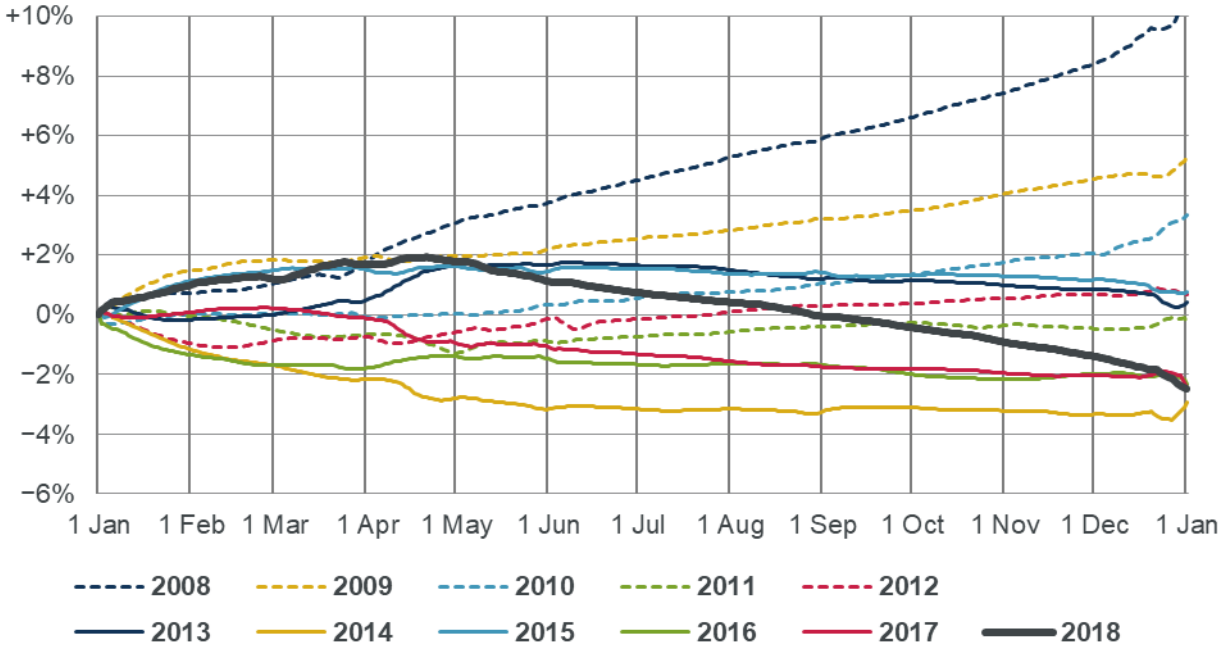
Chart C: Quarterly centred average SMRs, by week number



Cumulative mortality

Chart D shows cumulative standardised mortality rates for 2018 and for the previous ten years compared to the 2008-2017 average. (The calculation method is described in Section 4.2 of Working Paper 111.) Chart D2 shows the same information in a different format and may be easier for those with colour vision deficiency.

Chart D: Cumulative standardised mortality rate (cSMR) compared to the 2008-2017 average



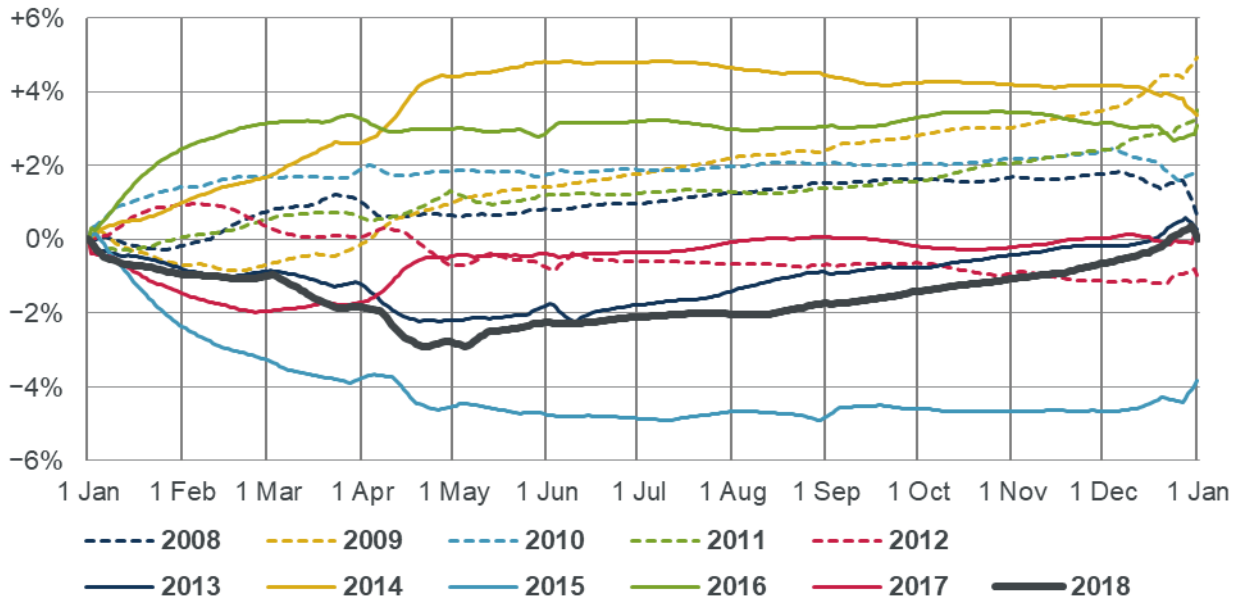
All years have a value of 0% at the start of the year, by definition, as there has been no mortality at that point of the year. If mortality improvements had been constant throughout the period considered then the lines for each year would form a "fan", with the end-year values decreasing steadily from year to year. While we see a decrease of this sort from 2008 to 2011, there is no clear pattern to the end-year values for later years, as mortality has been volatile with low improvements. Mortality for complete calendar years was lowest in 2014.

Chart D shows that cumulative standardised mortality in 2018 is below the ten-year average, despite heavy mortality in the first quarter, and is similar to mortality in 2017; i.e. the mortality improvement between 2017 and 2018 has been close to zero.

Chart E shows the cumulative annual standardised mortality improvement (also described in Section 4.2 of Working Paper 111) for 2018 and for the previous ten years. Chart E2 shows the same information in a different format and may be easier for those with colour vision deficiency.

Note that Chart E shows cumulative improvements, so a higher value represents a higher improvement and lower mortality; whereas in Chart D a higher value represents higher mortality.

Chart E: Cumulative annual standardised mortality improvement (cSMRI)



The cumulative mortality improvement for 2018 at the end of the year is +0.01%; i.e. mortality in 2018 has been essentially identical to mortality in 2017. The cumulative improvement for 2018 is lower than in eight of the previous ten years. The final cumulative improvement is much higher than might have been thought in May, showing that care is needed when estimating full year experience from partial year information, particularly over short periods.

Note that:

- The cumulative values at the end of the year in Charts D and E may not necessarily agree precisely with the corresponding values based on annual data. This is because some weeks span two years, requiring us to estimate in which year those deaths were registered.
- Mortality improvements vary by age (as shown later in this report) and the mortality improvements shown in Chart E are sensitive to the age distribution of the chosen standard population.

Chart D2: Cumulative standardised mortality rate (cSMR) compared to the 2008-2017 average, showing 2008-2018 and highlighting individual years

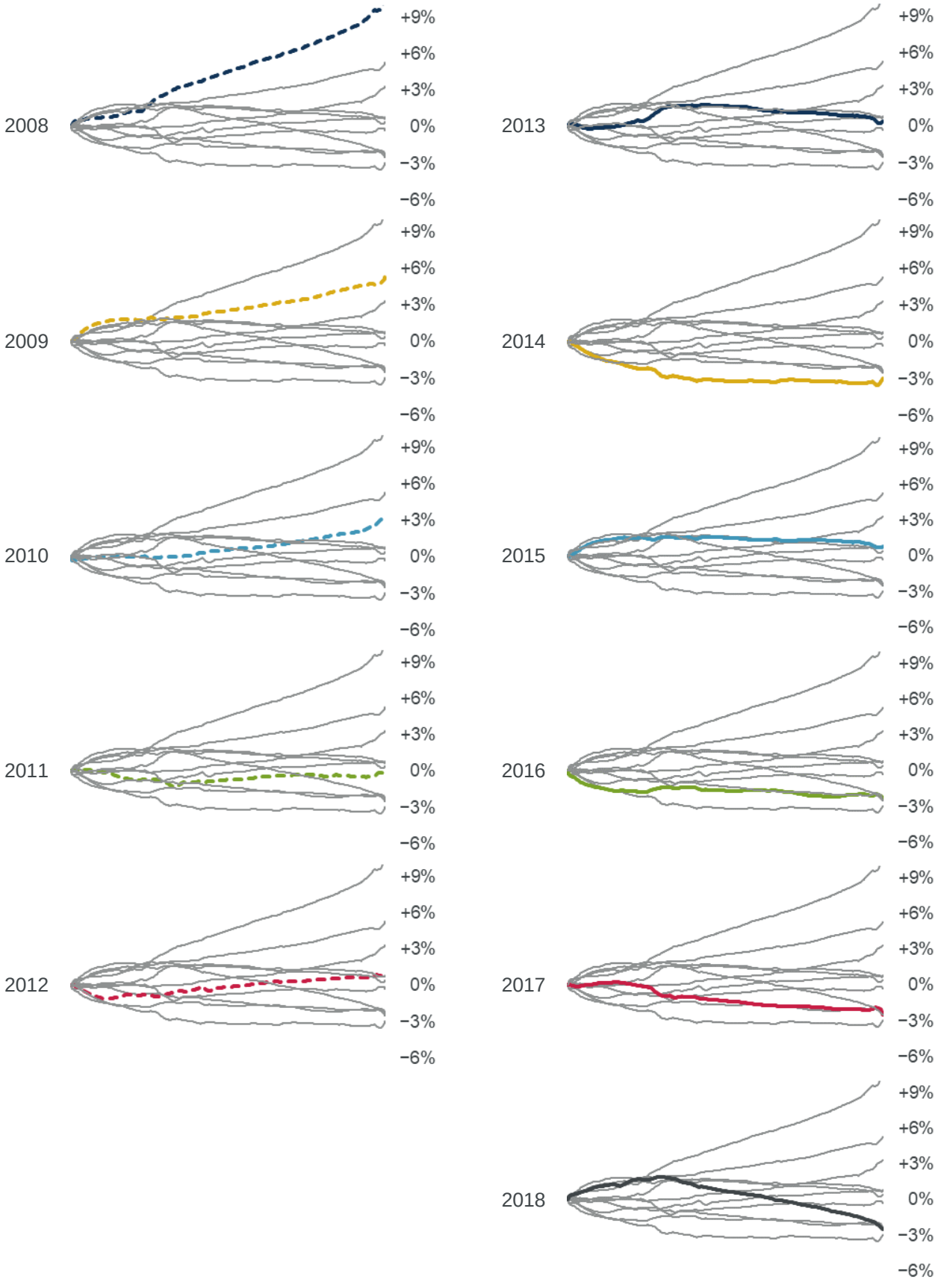
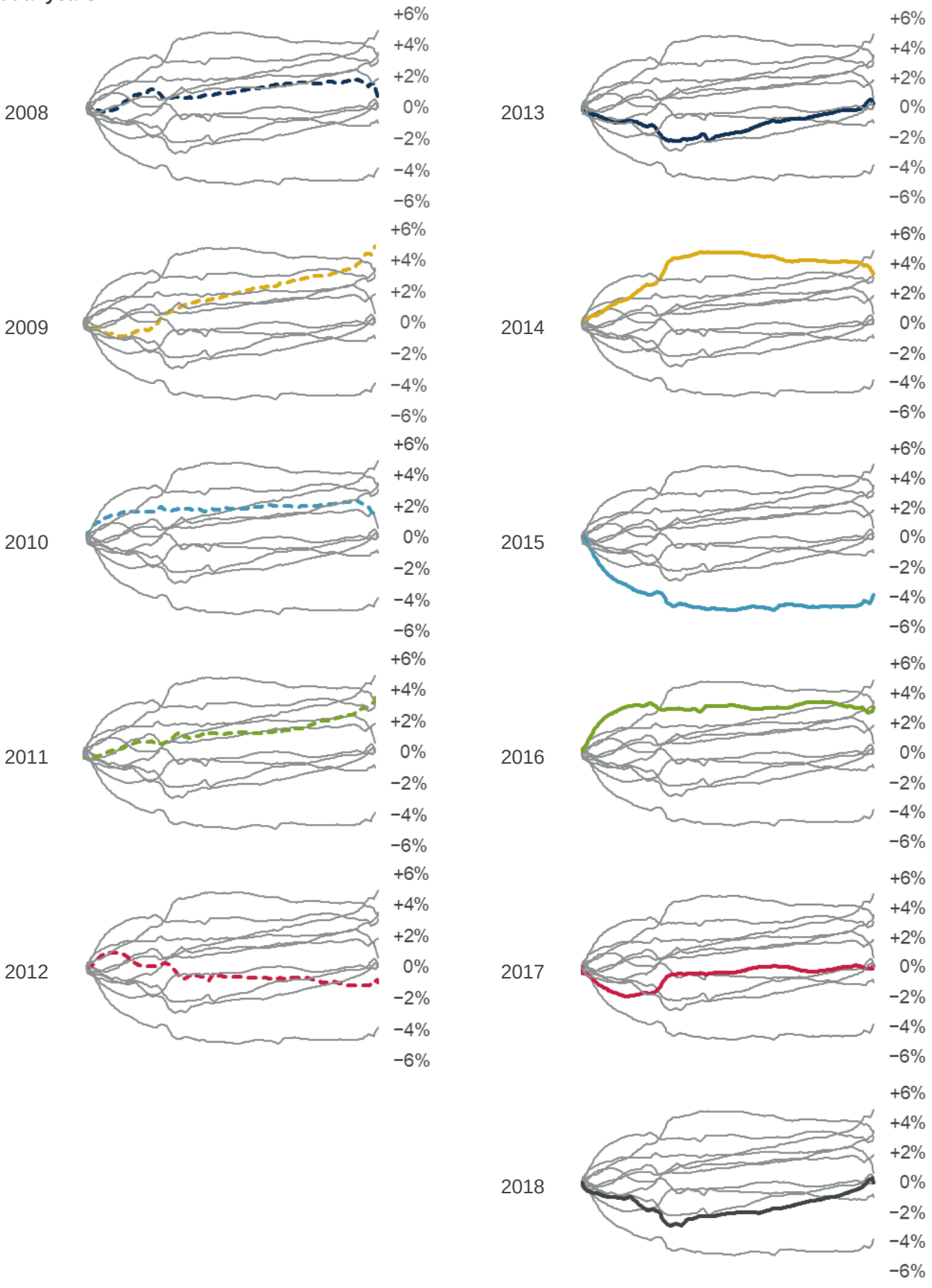


Chart E2: Cumulative annual standardised mortality improvement (cSMRI) for 2008-2018, highlighting individual years



Implication for CMI_2018

Table 1 is based on Section 7 of Working Paper 105 and shows how life expectancy might change between CMI_2017 and hypothetical versions of CMI_2018, based on a range of possible mortality improvements and assuming no change in method.

Based on the table, and a mortality improvement of 0.01% in 2018, we might have expected a fall in life expectancy very similar to that in the "Nil improvement" row. However, the change to the period smoothing parameter, S_κ, proposed in Working Paper 114 and confirmed in Working Paper 116, would lead to a larger fall.

Table 1: Percentage difference in life expectancy between CMI_2017 Core and CMI_ 2018 Core for different levels of mortality improvement in 2018, assuming no change in method

Gender and age	Male 45	Female 45	Male 65	Female 65	Male 85	Female 85
+6% improvement	+0.3%	+0.4%	+0.4%	+0.4%	+0.7%	+0.7%
+3% improvement	−0.3%	−0.1%	−0.4%	−0.3%	−0.4%	−0.3%
Nil improvement	−0.8%	−0.6%	−1.2%	−1.0%	−1.4%	−1.3%
−3% improvement	−1.4%	−1.1%	−2.1%	−1.8%	−2.5%	−2.3%

Variation by gender and age

Charts F and G shows how cSMR and cSMRI have varied by gender and age band.

Chart F shows considerable variation by age band:

- The spread of mortality rates over the period is widest for ages 65-84 and narrowest for ages 85+, for both genders.
- Mortality for ages 65-84 in 2018 was well below the 2008-2017 average. For both males and females aged 65-84 mortality in 2018 was lower than in any other year shown.
- Mortality in the early part of 2018 was particularly high, compared to the 2008-2017 period, for females in the 85+ age band. However, over 2018 as a whole, mortality for females aged 85+ was broadly in line with the 2008-2017 average.

Chart G shows that:

- Mortality improvements in the 2008-2018 period have been most volatile for the 85+ age band, particularly for females.
- For the 0-64 age band, improvements in 2018 are −1.7% for males and −1.8% for females, similar to the lowest improvements seen in 2008-2017.
- Mortality improvements in 2018 as whole have been close to zero for ages 65-84 and 85+ for both genders.

Chart F: Cumulative standardised mortality rate (cSMR) compared to the 2008-2017 average, by gender and age-band

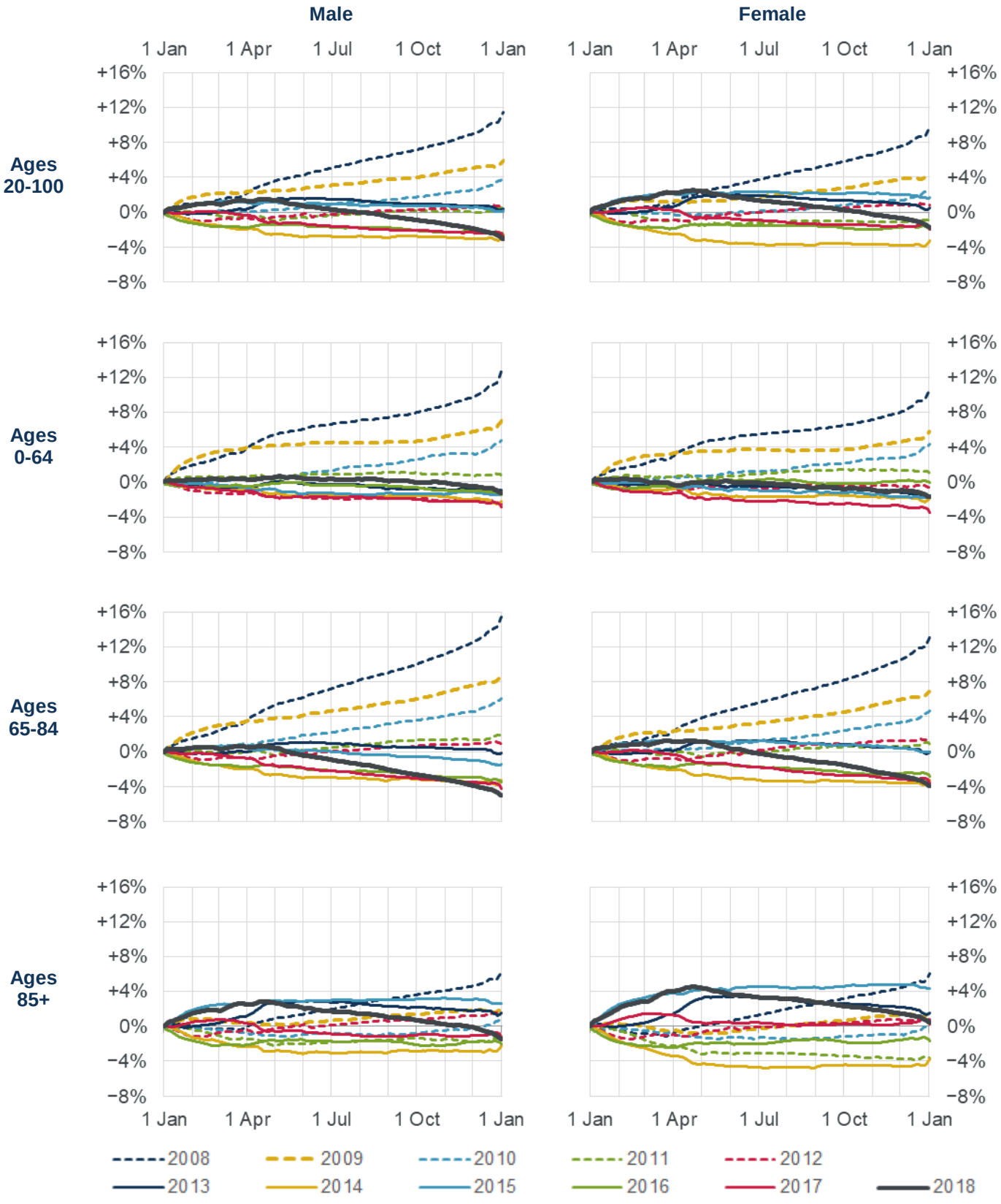
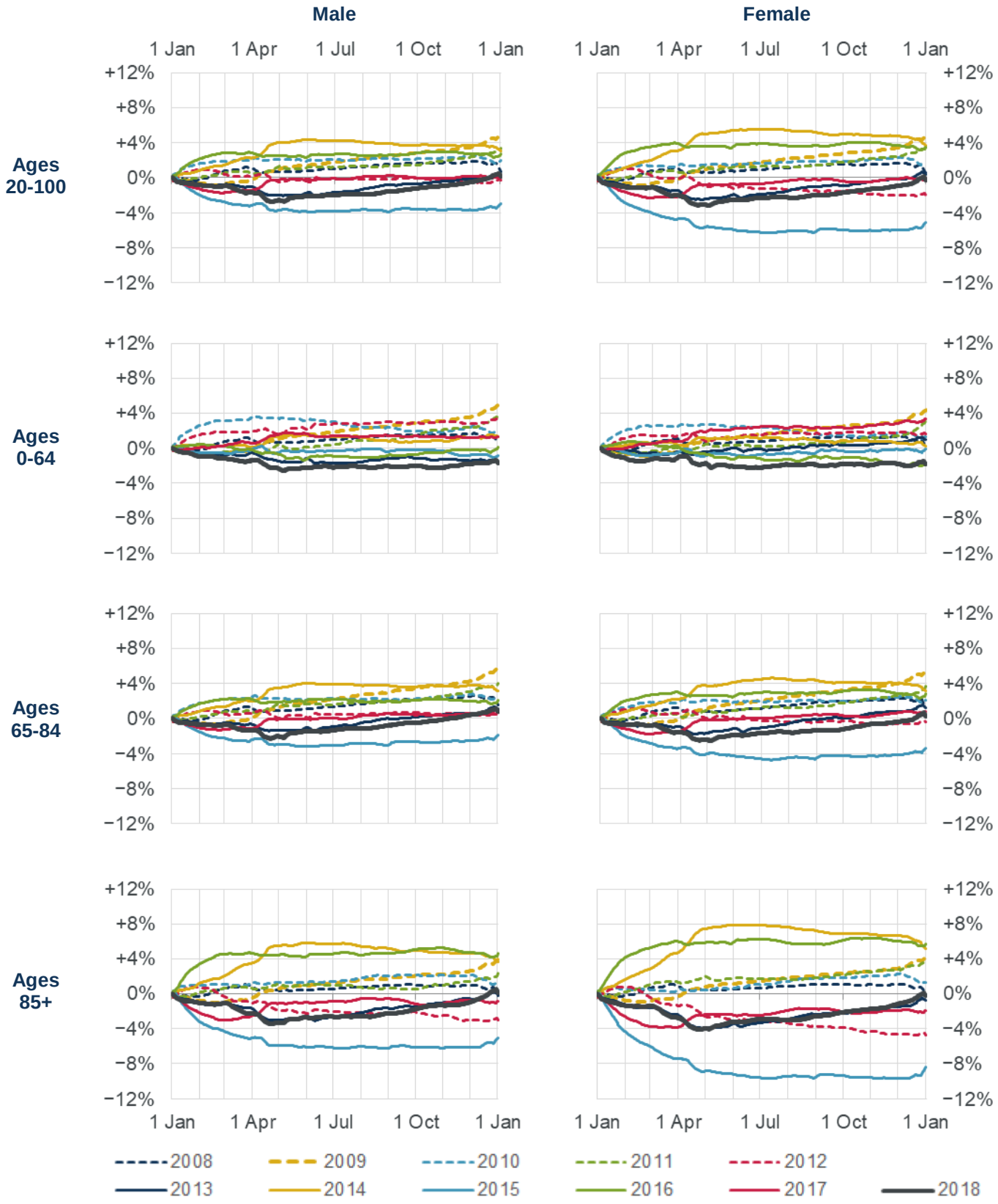


Chart G: Cumulative annual standardised mortality improvement (cSMRI), by gender and age band



Disclaimer: This Document has been prepared by and/or on behalf of Continuous Mortality Investigation Limited (CMI). The CMI does not accept any responsibility and/or liability whatsoever for the content or use of this Document. Whilst care has been taken during the development of the Document, CMI does not (i) warrant its accuracy; or (ii) guarantee any outcome or result from the application of this Document or of any of CMI's work (whether contained in or arising from the application of this Document or otherwise). You assume sole responsibility for your use of this Document, and for any and all conclusions drawn from its use. CMI hereby excludes all warranties, representations, conditions and all other terms of any kind whatsoever implied by statute or common law in relation to this Document, to the fullest extent permitted by applicable law. If you are in any doubt as to using anything produced by CMI, please seek independent advice.

Copyright: You may reproduce the contents of this Document free of charge in any format or medium provided it is:

1. reproduced accurately and is unaltered;
2. not used in a misleading context; and
3. correctly referenced and includes both CMI's Disclaimer notice set out above and CMI's copyright notice, as follows:

© Continuous Mortality Investigation Limited.

Continuous Mortality Investigation Limited ("CMI") is registered in England & Wales
Company number: 8373631
Registered Office: 7th floor, Holborn Gate, 326-330 High Holborn, London, WC1V 7PP

Correspondence address: Two London Wall Place, 123 London Wall, London, EC2Y 5AU
Email: info@cmilimited.co.uk
Tel: 020 7776 3820

Website: www.cmilimited.co.uk (redirects to www.actuaries.org.uk)

Continuous Mortality Investigation Limited is wholly owned by the Institute and Faculty of Actuaries.