Running to a standstill: How responsive have successive ONS life expectancy forecasts been to stalling life expectancy gains since 2010?

Abstract

## **Background**

The UK Office for National Statistics (ONS) updates their life expectancy forecasts every two years. During much of the 2000s these forecasts tended to underestimate life expectancy improvement, and were successively uprated, but since 2010 they have tended to underestimate life expectancy improvement, and have been successively downrated. The most recent 2018 forecast was released in 2019. This paper asks whether the assumptions in this most recent forecast is still too optimistic given recent life expectancy improvement rates in the UK have still been very modest.

**Methods**

Period life expectancy at birth (e­­0) was extracted from the Human Mortality Database (HMD) to allow comparison between the UK and other high income nations, and from the ONS to allow comparison within UK nations and groups. Annual change in life expectancy across European and Anglophone nations was calculated to assess the extent to which a slowdown in e0 improvement rates is seen internationally, and within UK nations to assess how similar trends in slowdown are within the UK. For UK nations changepoint analysis is performed to assess whether the slowdown is contemporaneous, suggesting common exposure. ONS forecasts from 2012 onwards for the UK as a whole are shown to demonstrate the extent of the slowdown assumed by each biennial projection, including as heatmaps showing changes in conditional life expectancy between successive projections.

To better determine the amount of annual gain in e0 that should be assumed if current e0 improvement rates were to continue, 101 different e0 gain scenarios, ranging from 0% slowdown, assuming no slowdown since the breakpoint year, to 100% slowdown, assuming no gain since the breakpoint year, and the Bayes Factor (ratio of likelihoods) for each of these scenarios calculated as compared with the 0% slowdown scenario. The scenario that maximises the Bayes Factor is identified. Each ONS biennial projection is converted into an improvement rate scenario, and the Bayes Factor for each of these scenarios calculated as well.

## **Results**

Slowdowns in e0 gain have been observed in a number of high income nations in recent years, but have been more severe in the UK than in all other nations except USA. In all UK nations except Northern Ireland, a breakpoint in improvement rates between 2010 to 2011 was identified. Between 2010 and 2012 ONS life expectancy forecasts were reduced first for females, then for both genders. If average rates of e0 gain since 2010 were to continue then the assumption that life expectancy improvement rates have slowed down by xx% is most likely (Bayes Factor: XX cf no slowdown). This compares with an implied slowdown of xx% for the 2018 ONS life expectancy projection (Bayes Factor: XX cf no slowdown).

**Discussion**  
The most recent ONS life expectancy forecast still appears to be too optimistic, and to underestimate the extent of the slowdown seen in the UK since 2010. Without clear agreement as to the cause of the slowdown, which is more severe than almost any other high income nation, no consistent action is being taken that should cause us to believe that the problems facing UK populations have been addressed, and so there is no good reason to believe that the stalling in e0 gains observed since 2010 will not continue. The Bayes Factor strategy used here can be used to update our beliefs about how life expectancy trends are likely to continue whenever a new observation becomes available, and the addition of observed life expectancies for 2018 added weight to belief that life expectancy improvement rates have, since 2010, slowed to around a fifth their previous levels.