



Mortality Improvement Rates: Modeling and Parameter Uncertainty

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Mortality Improvement Rates: Modeling and Parameter Uncertainty

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Abstract

Rather than looking at mortality rates directly, a number of recent academic studies have looked at modeling rates of improvement in mortality when making mortality projections. Although relatively new in the academic literature, the use of mortality improvement rates has a long-standing tradition in actuarial practice when allowing for improvements in mortality from standard mortality tables. However, mortality improvement rates are difficult to estimate robustly, and models of them are subject to high levels of parameter uncertainty, since they are derived by dividing one uncertain quantity by another. Despite this, the studies of mortality improvement rates to date have not investigated parameter uncertainty due to the ad hoc methods used to fit the models to historical data. In this study, we adapt the Poisson model for the numbers of deaths at each age and year, proposed in Brouhns et al. (2002), to model mortality improvement rates. This enables models of improvement rates to be fitted using standard maximum likelihood techniques and allows parameter uncertainty to be investigated using a standard bootstrapping approach. We illustrate the proposed modeling approach using data for the U.S. population and the England and Wales population.

Keywords: Mortality improvements; Mortality forecasting; Parameter uncertainty

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