



Mortality and Longevity



Aging and Retirement

# Calibrating Mortality Processes with Trend Changes to Multi-Population Data





# Calibrating Mortality Processes with Trend Changes to Multi-Population Data

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## Abstract

The uncertainty in future mortality rates is typically quantified by stochastic mortality models. To this end, the time dependent parameters in these models are projected by stochastic processes. Thus, the choice of these processes and their calibration have a crucial impact on estimates of future uncertainty. Since the commonly applied random walk with drift process has some structural shortcomings (see e.g. Börger et al. (2014)), alternative processes with random changes in the long-term mortality trend have been proposed by several authors. Such trend changes can be observed in the historical data for almost every population. However, data on such trend changes is sparse, and thus, the parameter estimation of these trend processes involves a significant degree of uncertainty.

In this paper, we explain how data on trend changes from several populations can be combined in order to improve the reliability of trend process calibrations for individual populations. We discuss different assumptions on the “similarity” of parameters for different populations and implement those assumptions for the case of the trend change process proposed by Börger and Schupp (2018). In a numerical example we find that the impact on parameter estimates can be substantial. Thus, relying on the sparse data for individual populations only can lead to significant misestimation of future mortality and its uncertainty.

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