

A continuous-time model for the mortality surface of multiple populations

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April 13, 2015

Abstract

We formulate, study and calibrate a continuous-time model for the joint evolution of the mortality surface of multiple populations. Up to our knowledge, no such models have previously been proposed in the literature. This model is based on the application of affine time-(in)homogenous stochastic processes. More specifically, a doubly stochastic approach is used where mortality intensity by age and population is modelled as a mixture of stochastic factors, which can be either population-specific or common to all populations. Despite being parsimonious, the model allows for imperfect correlation of mortality intensities across generations and populations. We provide an application based on UK mortality data for males and females. The calibration procedure entails the use of centralized data fusion Kalman filter. The model can be conveniently applied to the pricing of longevity-linked securities.

Keywords: multi-population mortality forecasting, mortality surface, Kalman filter, centralized data fusion

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