Modeling the Forward Surface of Mortality

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Abstract

In recent literature, different methods have been proposed on how to define and model stochastic mortality. In most of these approaches, the so-called spot force of mortality is modelled as a stochastic process. In contrast to such spot force models, forward force mortality models infer dynamics on the entire age/term-structure of mortality. This paper considers forward models defined based on best-estimate forecasts of survival probabilities as can be found in so-called best-estimate generation life tables. We provide a detailed analysis of forward mortality models driven by finite-dimensional Brownian motion. In particular, we address the relationship to other modeling approaches, the consistency problem of parametric forward models, and the existence of finite dimensional realizations for Gaussian forward models. All results are illustrated based on a simple example with an affine specification.

Keywords: Stochastic mortality, HJM-framework, Musiela parametrization, consistency problems, finite dimensional realization.