
PETAR JEVTIC, McMaster University

The joint mortality of couples in continuous time

This paper introduces a probabilistic framework for the joint survivorship of couples in the context of dynamic stochastic mortality models. The new framework gives an intuitive and flexible pairwise cohort-based probabilistic mechanism that can accommodate both deterministic and stochastic effects which the death of one member of a couple causes on the other. It is sufficiently flexible to allow modelling of effects that are short-term (called the "broken-heart effect") or long-term (named "life circumstances bereavement"). In addition, it can account for the state of health of both the surviving and dying spouse and can allow for dynamic and asymmetric reactions of varying complexity. Finally, it can accommodate the pairwise dependence of mortality intensities before the first death. Analytical expressions for bivariate survivorship in representative models are given, and their sensitivity analysis is performed for benchmark cases of old and young couples. Simulation and estimation procedures are provided that are straightforward to implement and lead to consistent parameter estimation on synthetic dataset of 10000 pairs of death times for couples.