

Stochastic mortality: experience-based modeling and application issues consistent with Solvency II

We take the point of view of a life insurer which aims at building up a (partial) internal model in order to quantify the impact of mortality risks, namely process and aggregate mortality risk, either for capital allocation or for portfolio valuation.

We assume that a life table providing a best-estimate assessment of future mortality is available; conversely, no access to data sets and methodology underlying the construction of the life table is at the insurer's disposal. In spite of this, a stochastic approach is required.

Starting from the information provided by the best-estimate life table, we aim to define a rigorous but also practicable setting for modelling the random number of deaths in a life portfolio so to reflect all the relevant components of mortality risks. In particular, we extend the traditional Poisson-Gamma scheme, by allowing for age- and time-dependent parameters. A Bayesian-inferential procedure is defined, so that the parameters of the mortality model can be updated according to the mortality experienced in the portfolio. The case of life annuities is especially addressed, and thus stochastic mortality at old-adult ages is mainly focussed. The model is then implemented for capital allocation purposes. We investigate the amount of the required capital for a given portfolio, based on solvency targets which could be adopted within internal models, as an alternative to the standard regulatory requirement, with particular emphasis on Solvency II.