Bayesian portfolio specific mortality

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Abstract

Literature on mortality modelling focussed primarily on population mortality. Recently, an increasing number of papers consider portfolio specific mortality ([GSD11, Oli11, Pla09, RKR13]. In these papers, however, population mortality and portfolio specific mortality are treated as separate processes. [CBD2011] consider two populations in which the mortality trends in different (sub)populations are related, but this approach may pose problems if for a subpopulation only few years are available.

We propose adjustments which may improve the quality of estimates by introducing a Bayesian framework in which population and portfolio specific mortality are modelled simultaneously. We illustrate this framework using the Lee-Carter model for population mortality using a difference stationary process to project the period effect. This population mortality rate is multiplied with a random portfolio specific effect with prior expectation equal to one. For this portfolio specific effect we consider both a Gamma prior and a multivariate lognormal prior. The first implies independence over the ages of the portfolio specific effects, whereas the second imposes nearby ages to be more strongly correlated than ages further away. We compare our proposed method with existing approaches.

Key words: Portfolio specific mortality, Bayesian statistics, MCMC

References

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