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State Space Representation of Lee-Carter Stochastic Mortality Model: Application to Modelling of Insurers' Solvency Capital

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In the presentation we show how state space methods can be used as an alternative fitting procedure for Lee-Carter stochastic mortality model. Such modelling approach substantially increases model's flexibility and, in contrast to the two-stage estimation strategy of the classic Lee-Carter, ensures a coherent statistical estimation of the parameters. We also show how Kalman filter in combination with Gibbs sampler can substantially simplify Bayesian data analysis for such models. The application of the methods is illustrated with the results of calculations on the mortality data of Lithuania and Sweden using both the classic Lee-Carter model specification and its extensions. Finally, we demonstrate how the results of the calculations are used to perform the assessment of the solvency capital of insurance companies.