

Assessing and Extending the Lee-Carter Model for Long-Term Mortality Prediction

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Abstract

The prediction performance of the Lee-Carter model for long-term mortality forecast is our focus in this paper. To make a sound assessment, we set up a backtesting methodology to evaluate the prediction performance of the Lee-Carter model. We propose to use the Kolmogorov-Smirnov test to assess how close the percentile histogram resembles uniform distribution, which can complement the assessment of probabilistic prediction. We address two issues with implementing the Lee-Carter model: robustness and drift uncertainty. We propose quantile regression (QR) for robust parameter estimation of the model for time-varying index kt . We use the bootstrap method to incorporate the drift uncertainty. Finally, we illustrate our proposed methods through examining the model performance on our simulated data as well as actual mortality data from different countries. The findings of this study suggest that the QR method improves the prediction performance of the Lee-Carter model and there exists evidence for trend changes in male mortality in the last century.