



TITLE Parameter risk in time-series mortality forecasts

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Key words: Mortality projections, parameter risk, ARIMA models, Solvency II, VaR, CTE

Purpose of your paper: To quantify the impact of parameter risk on mortality projections.

Synopsis:

The projection of mortality rates is an essential part of valuing liabilities in life insurance portfolios and pension schemes. An important tool for risk management and solvency purposes is a stochastic projection model. We show that ARIMA models can be better representations of mortality time-series than simple random-walk models. We also consider the issue of parameter risk in time-series models from the point of view of an insurer using them for regulatory risk reporting – formulae are given for decomposing overall risk into undiversifiable trend risk (parameter uncertainty) and diversifiable volatility. Particular attention is given to the contrasts in how academic researchers might view these models and how insurance regulators and practitioners in life offices might use them. Using a bootstrap method we find that, while certain kinds of parameter risk are negligible, others are too material to ignore. We also find that an objective model selection criterion, such as goodness of fit to past data, can result in the selection of a model with unstable parameter values. While this aspect of the model is superficially undesirable, it also leads to slightly higher capital requirements and thus makes the model of keen interest to regulators. Our conclusions have relevance to insurers using value-at-risk capital assessments in the European Union under Solvency II, but also territories using conditional tail expectations such as Australia, Canada and Switzerland.

The presentation is based on the paper by Kleinow, Torsten. and Richards, Stephen J.: Parameter risk in time-series mortality forecasts, *Scandinavian Actuarial Journal*, Published online: 13 Nov 2016, <http://dx.doi.org/10.1080/03461238.2016.1255655>

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