2020 Living to 100 Discussant Comments 6A: Aging Measurement And Mortality Modeling 2

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Discussant Comments Session 6A: Aging Measurement and Mortality Modeling 2

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Rotation of the Age Pattern of Mortality Improvements in European Union Member States, by Péter Vékás

This paper is an interesting contribution to the understanding of mortality dynamics and comparing these across multiple countries. The discussant's personal view is that the concept of mortality improvement rotation may be too simple a dynamic to capture the differences in mortality developments in different countries. However, the implementation is rather original and likely contributes to a vivid discussion on useful mortality dynamics concepts and their relative merits.

The author's key motivation for the research was to find an abstract method of describing the dynamic behavior of mortality improvement trends across multiple countries, especially for countries with relatively little experience data. The method which Péter Vékás proposes is based on the concept of rotating the mortality curve which was introduced by Lee-Li-Gerland (2013) based on an extension of the model proposed by Lee-Carter (1992).

In his application of the concept of mortality rotation, which is a generalization of the Lee-Li-Gerland (2013) paper, Vékás investigates whether mortality rotation is correlated with life expectancy at birth. The concept, which he utilizes is a so-called acceleration factor β_x based on weighted Speerman's ρ for rank correlation.

In my review of the paper, I had a number of questions and observations:

1. Vékás uses logarithmic mortality reduction factors and refers to these as mortality improvement rates, which is imprecise.
2. It would be useful to the reader who wishes to implement and study the method, if Vékás could describe how age-grouped data used are used in relation to single-year mortality reduction factors.
3. The implementation of the Lee-Carter model uses the $ARIMA(0,1,0)$ random walk to project the time series κ_t. The shortcomings of this assumption are broadly discussed in the literature, with many different resolutions proposed. For completeness, the author should at least explain why his chosen method of extending the Lee-Carter model is useful relative to other methods.
4. Further to the point above, would it not be possible to replace the 'acceleration factor' with a curvature term, as done in various extensions of the Cairns-Blake-Dowd model.
5. The paper would benefit from a discussion of the potential benefits of the inter-country comparison hypothesis, as well as a short introduction to the Lee-Li-Gerland model, which Vékás applies, and how the work increases the existing body of knowledge.

Short- and Long-Term Dynamics of Cause-specific Mortality Rates Using the Cointegration Analysis,
by Séverine Arnold and Viktoriya Glushko

This is an exciting contribution to our understanding of the biology of aging based on statistical analysis of cointegrated cause-specific mortality.

The paper is motivated by the idea that cause-specific mortality trends are highly intuitive and can be key to understanding past trends, however, their analysis is challenging due to dependency between different causes of death. By understanding the inter-cause dependency explicitly and using this understanding to infer indirect biological & physiological linkages between the causes, the authors lead us towards better insights for forecasting & predicting future mortality trends.

The discussant has the following questions and comments:

1. The Human Mortality Database now provides data on deaths by cause for a number of countries. It would be useful to check whether the results can be replicated with this new and possibly more robust data set, which has been subject to rigorous validation & preparation for comparability of results.
2. From a conceptual perspective, it would be useful to explain how using age-standardized time series still allows for age-dependency of the inter-dependencies between cause-specific death rates. Which impact does imposing age distributions have on results?
3. Was data from multiple countries combined only to increase the data pool or also for inter-country comparison?
4. For projections, could the authors please confirm that only long-term dynamics are important, and why?
5. Given the high number of parameters required for VECM / VAR lag 2, is the proposed model of practical use in actuarial applications? If so, it would be interesting to call out some applications and maybe even demonstrate them.
6. Assuming we had individual-level data, would we still need to worry about dependency? One could model competing risks at each moment using parametric continuous-time survival models, and thereby avoid dependency issues.

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