Annals of Actuarial Science (2022), **16**, pp. 425–427
doi:10.1017/S1748499522000197

EDITORIAL

Managing the risk of mortality shocks

Michel Dacorogna[1], Runhuan Feng[2], Johnny Siu-Hang Li[3]* and Annamaria Olivieri[4]

[1]University of Zurich, Prime Re Solutions, Zürich 8006, Switzerland; [2]University of Illinois at Urbana-Champaign, Champaign, IL, USA; [3]University of Waterloo, Waterloo, ON N2L 3G1, Canada; and [4]University of Parma, 43121 Parma PR, Italy
*Corresponding author. E-mail: shli@uwaterloo.ca

(Received 03 October 2022; accepted 05 October 2022)

1. Introduction

The recent Covid-19 pandemic has had a profound impact on every walk of life over the last few years. While much attention has focussed on how the COVID-19 pandemic spreads and may be brought under control, financial institutions face medium- to long-term consequences, which will take time to understand. There has been a great amount of research work in the actuarial literature, dedicated to the understanding of the financial impact of mortality shocks. This special issue was created to capture leading actuarial thinking as the shape of the new landscape emerges and as we look ahead. Topics that have been published in this special issue include: direct effects on liabilities linked to mortality and longevity risks; capital market and insurance innovations for pandemic risk management; impacts on the provision of, and demand for, healthcare; and changes in investor/policyholder behaviour. The special issue also includes papers on innovations in mortality modelling that can explain or capture shocks and are relevant to the understanding of industry impacts.

2. Summary of Papers

This edition features an editorial by a practicing actuary and five research papers by actuarial scientists for this special topic.

M. Edwards (*How actuarial perspectives can help in a pandemic*) offers an overview of the critical roles and functions of actuaries on a wide range of issues regarding the pandemic. He argues that actuaries could have played a more prominent role in government policy-making and public understanding of pandemic risks. He calls for life and pension actuaries to study the large economic and societal impacts of the pandemic on mortality.

S.J. Richards (*Real-time measurement of portfolio mortality levels in the presence of shocks and reporting delays*) focusses on the need to track the very short-term mortality fluctuations emerging in a portfolio because of a pandemic event, such as COVID-19. Traditional methods may prove inadequate in this respect, due to the extent of the usual time unit (1 year). A semi-parametric approach is adopted to identify short-term mortality shocks separately from other seasonal patterns. Such a model, however, is vulnerable to reporting delays for deaths. The impact of such delays on mortality forecasts is discussed by adopting a parametric model providing continuous forecasts of emerging portfolio mortality.

R. Zhou and J.S.-H. Li (*A multi-parameter-level model for simulating future mortality scenarios with COVID-alike effects*) broaden the framework of stochastic mortality models, including

information taken not only from historical data, but also from other (in particular, subjective) sources. Considering that information concerning the mortality arising from a pandemic event is limited, the approach suggested in the paper makes it possible to simulate mortality scenarios with the effects of a pandemic event, such as COVID-19. A model arranged on three-parameter levels is presented. The first and the second levels are based on historical data, and are suitable, respectively, for capturing the long-term pattern of mortality and the excess age-specific mortality due to COVID-19. The third level includes parameters based on expert opinions, regarding particularly the future occurrence of a pandemic such as COVID-19. The proposed model is estimated with a one-stage penalised quasi-likelihood approach, disentangling the short-term impact of COVID-19, and the fluctuation in long-term mortality improvements.

M. Caranante, V. D'Amato and S. Haberman (*COVID-19 accelerated mortality shocks and the impact on life insurance: the Italian situation*) focus on the connections among pre-existing co-morbidities and COVID-19, based on the remark that a significant proportion of people who die from COVID-19 are in a frail state. The mortality shock is then interpreted as a mortality acceleration. An Accelerated Mortality Model is proposed, which is implemented to assess the impact of COVID-19 on life insurance portfolios.

S. Schnürch, T. Kleinow, R. Korn and A. Wagner (*The impact of mortality shocks on modeling and insurance valuation as exemplified by COVID-19*) present two contributions to the debate started with the COVID-19 pandemic. They analyse mortality data, with the caveat that it is too early to have completely settled mortality data, and the behaviour of two popular forecasting models: the Lee-Carter (LC) model and the Cairns–Blake–Dowd (CBD) model. Contrary to what was often said by some sceptics at the height of the crisis, they find significant jumps in mortality rates, particularly in Belgium, Poland, and Spain. More generally, the year 2020 appears in all the nine studied European countries among the ten worst years in terms of mortality changes. Based on these empirical findings, they analyse the behaviour of the forecasting models while including or excluding the year 2020. Not surprisingly, they find a significant increase of the prediction uncertainty for the latter sample. When looking at the change in annuity and life insurance policy value, they find a drop of 9% of the annuity values in case of Polish male and an increase of 29% of the life insurance policy value for Italian males. The authors also propose methods for adapting forecasting models to jumps due to pandemic events, which will be undoubtedly very handy in the future we are facing.

G.P. Clemente, D. Della Corte and N. Savelli (*A stochastic model for capital requirement assessment for mortality and longevity risk, focusing on idiosyncratic and trend components*) argue that assessment of capital requirements must be based on actuarial models that are able to capture structural changes and extreme shocks so that insurance companies can cope with the unfavourable effects of new adverse demographic scenarios. Considering this, they propose a framework that models idiosyncratic and trend risks via a risk-theoretic approach which derives capital requirements in an analytical manner. The proposed method is consistent with Solvency II and the Delegated Regulation, making it readily applicable in actuarial practice.

3. Conclusion

This special issue collects five research papers through a selective peer-review process. Each article in this collection represents a recent advancement towards a better understanding of the impact of COVID-19 pandemic on mortality, assets, and liability management. The diverse topics ranging from the modeling of mortality shocks to their impacts on capital requirement assessment show the great interests in the actuarial research community on this life-changing pandemic. As our community moves beyond the pandemic, we hope these research papers can help actuaries, demographers, asset managers, risk management professionals, and policymakers prepare for the next pandemic.

https://doi.org/10.1017/S1748499522000197 Published online by Cambridge University Press

Last but not the least, the guest editors (Dacorogna, Feng, Olivieri) would like to thank Andreas Tsanakas and Johnny Siu-Hang Li, Editors of the *Annals of Actuarial Science*, for their generous guidance and support of this special issue. Many thanks to all the contributing authors for their originality and ingenuity. Special thanks should also go to those who have offered thorough and professional reviews over the course of production for this special issue.

References

Carannante, **M.**, **D'Amato**, **V.** & **Haberman**, **S.** (2022). COVID-19 accelerated mortality shocks and the impact on life insurance: the Italian situation. *Annals of Actuarial Science*, doi: 10.1017/S1748499522000094.

Della Corte, **F.**, **Clemente**, **G.P.** & **Savelli**, **N.** (2022). A stochastic model for capital requirement assessment for mortality and longevity risk, focusing on idiosyncratic and trend components. *Annals of Actuarial Science*, doi: 10.1017/S174849952200015X

Edwards, **M.** (2022). How actuarial perspectives can help in a pandemic. Annals of Actuarial Science, DOI TBD

Richards, **S.J.** (2022). Real-time measurement of portfolio mortality levels in the presence of shocks and reporting delays. *Annals of Actuarial Science*, doi: 10.1017/S1748499522000021.

Schnürch, **S.**, **Kleinow**, **T.**, **Korn**, **R.** & **Wagner**, **A.** (2021). The impact of mortality shocks on modelling and insurance valuation as exemplified by COVID-19. *Annals of Actuarial Science*, doi: 10.1017/S1748499522000045.

Zhou, **R.** & **Li**, **J.S.H.** (2021). A multi-parameter-level model for simulating future mortality scenarios with COVID-alike effects. *Annals of Actuarial Science*, doi: 10.1017/S1748499522000033.

Cite this article: Dacorogna M, Feng R, Li JS-H and Olivieri A (2022). Managing the risk of mortality shocks, *Annals of Actuarial Science*, **16**, 425–427. https://doi.org/10.1017/S1748499522000197