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A General Semi-Markov Model for Coupled Lifetimes

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Abstract

Joint-life annuities with a high last survivor benefit play an important role in the optimal annuity portfolio for a retired couple. The dependence between coupled lifetimes is crucial for valuing joint-life annuities. Existing bivariate modeling of coupled lifetimes is based on outdated data with limited observation periods and does not take into account mortality improvement. In this article, we propose a transparent and dynamic framework for modeling coupled lifetime dependence caused by both marital status and common mortality improvement factors. Dependence due to marital status is captured by a semi-Markov joint life model. Dependence due to common mortality improvement, which represents the correlation between mortality improvement patterns of coupled lives, is incorporated by a two-population mortality improvement model. The proposed model is applied to pricing the longevity risk in last survivor annuities sold in the United States and the United Kingdom.

Discussions on this article can be submitted until October 1, 2019. The authors reserve the right to reply to any discussion. Please see the Instructions for Authors found online at http://www.tandfonline.com/uaaj for submission instructions.

Notes

[1]The abbreviation “RP” represents retirement plans.

[2]Source: U.S. Census Bureau, 2014 American Community Survey 1-Year Estimates, https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk.

[3]Source: U.S. Department of Treasury.

[4]While the unisex pricing regulation applies to employer-sponsored pension plans or government pension plans in the United States, it is not compulsory in the U.S. private annuity market.

[5]Source: Bloomberg and Bank calculations.

Additional information

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