Unravelling the contribution of financial and longevity risks to stochastic changes in life annuities

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Abstract

Actuaries and risk managers are interested in developing strategies to ensure that changes in interest rates do not affect the value of a portfolio (commonly known as immunization). Similarly, there is a long-standing tradition among demographers to measure how changes over time in mortality affect summary measures such as life expectancy. In this paper, we bring these two perspectives together. We develop a new decomposition method to quantify the contribution of changes in mortality and interest rates to the change in life annuity prices. We introduce neat and intuitive formulations that allow actuaries and risk managers to easily asses stochastic changes in financial and longevity risks embedded in their life annuities' portfolios. To illustrate our method, we look at the long-term development of life annuity prices using financial and mortality data from the United Kingdom since 1841. We found that there is clear interplay between longevity and financial risk, where the former one is at times masked by high financial risk. Furthermore, we look at the sources of longevity risk. Specifically, we decompose this component by age groups and major causes of deaths.

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