Longevity Risk Pricing*

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Abstract

Longevity risks, i.e., unexpected improvements in life expectancies, may lead to severe solvency issues for annuity providers. Longevity-linked securities provide the desirable hedging instruments to annuity providers, and in the meanwhile, diversification benefits to their counterparties. But longevity-linked securities are not traded in financial markets due to the pricing difficulty. This paper proposes a new method to price the longevity risk premia in order to tackle the pricing obstacle. Based on the equivalent utility pricing principle, our method obtains the minimum risk premium required by the longevity insurance seller and the maximum acceptable risk premium by the longevity insurance buyer. The proposed methodology satisfies four important requirements for applications in practice: i) suitable for incomplete market pricing, ii) accurate estimation of the risk premia, iii) consistent with other financial market risk premia and iv) flexible in handling different payoff structures, basis risk and natural hedging possibilities. The method is applied in pricing various longevity-linked securities (bonds, swaps, caps and floors). We show that the size of the risk premium depends on the payoff structure of the security due to the market incompleteness. Furthermore, we show that the financial strength of the longevity insurance seller and buyer, the availability of the natural hedges and the presence of basis risk may significantly affect the size of longevity risk premium.