Static risk measurement of life annuity products: the equity-longevity model

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Abstract

There are many advantages to purchase life annuity products. However, both the insurers and the policyholders are often reluctant to respectively sell and buy annuities. This is due to the continuous increase of the population life expectation observed over years; hence there is a need of making life annuity products attractive and competitive in the market for both insurers and policyholders. To overcome this problem, a strategy can consist of reducing and sharing the longevity risk among these two parties. On the insurer side, an increase of longevity risk also increases its solvency capital (SC) and hence implies the increase of the annuity prices for policyholders. The risk of a population living longer than expected is called the longevity risk. In this work, we measure both the equity and the longevity risks. Our measurement method is based on the computation of the solvency capital of an insurer with respect to his investment strategy of the initial premium paid by the policyholders for a life annuity; this latter refers to a series of payments at fixed intervals, paid while the policyholder is alive. The Solvency II framework in which we consider the VaR as our (static) risk measure with a confidence level of 99.5% is used throughout our work. Moreover, in order to model the force of mortality process we use of the Hull-White model with the mean reversion parameter following the Gompertz mortality model. We obtained three main investment strategies for which we plotted out the SC by the use of Monte Carlo method. The obtained figures show that the SC decreases with respect to the time-to-maturity.

Keywords: Life annuity, solvency capital, longevity, equity, risk.

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