Diversification Benefits of the Variable Annuities and Equity-Indexed Annuities Mixture

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Abstract

A variety of equity-linked insurance contracts such as variable annuities (VAs) and equity-indexed annuities (EIAs) have gained their attractiveness in the recent decade because of the bullish equity market and low interest rates. Pricing and risk management of these products are quantitatively challenging and therefore have become sources of concern to many insurance companies. From a financial engineer's perspective, the options in VAs and those embedded in EIAs can be modeled as puts and calls respectively, whose values move in opposite directions in response to changes in the underlying equity value. Therefore, for insurers that offer both businesses, there are natural offsets or diversification benefits in terms of economic capital usage. In this paper, we consider two specific products: the guaranteed minimal account benefit (GMAB), and the point-to-point (PTP) EIA contract, which belong to the VA and EIA classes respectively. Taking into account mortality and dynamic lapse risk, we build a model that quantifies the natural hedging benefits based on risk-neutral option pricing theory and risk-adjusted performance measure (RAPM). Through a double-tier simulation framework, an optimum product mixture of those two contracts is achieved that provides the best RAPM and therefore deploys capital the most efficiently.