Incorporation of stochastic policyholder behaviour in analytical pricing of GMABs and GMDBs

Variable annuities represent certain unit-linked life insurance products offering different types of protection commonly referred to as guaranteed minimum benefits (GMXBs). Usually, they meet the increasing demand of the customers for private pension provision. In this paper we propose a pricing framework for variable annuities with guaranteed minimum repayments at maturity as well as in case of the insured’s death. If the policyholder prematurely surrenders the considered contract, his right of refund is restricted to the current value of the fund account potentially reduced by the prevailing surrender fees. In case of the financial market and the mortality model an affine linear setting has been chosen. The surrender model represents a deterministic function (s-curve) with stochastic inputs of the financial market. Consequently, the policyholders’ surrender behavior depends on the performance of the financial market and is also stochastic. The presented pricing scheme is able to incorporate the policyholders’ surrender behavior, even though
it is only based on suitable closed-form approximations. Therefore, the presented paper offers a substantial contribution to the current state of the art in the literature.

Stichworte: variable annuities, surrender behavior, closed-form approximation, pricing, affine linear model

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