ALTERNATIVE FAIR VALUATION MODELS FOR OPTIONS EMBEDDED IN LIFE INSURANCE CONTRACTS

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In this communication, we develop suitable valuation techniques for a with-profit/unitized with profit life insurance policy providing interest rate guarantees, when a more realistic formulation of the stochastic model for the dynamics of the asset fund backing the policy is made, than the usual geometric Brownian motion. In particular, we set up a market framework based on a jump-diffusion process for the evolution of the underlying reference portfolio; in this framework, we consider the problem of determining the fair value of a with profit policy in which the reversionary bonus rate is based on the idea, widely adopted in the UK, of smoothed asset scheme. Under the assumption of rational economic agents operating in a continuous time frictionless market, closed analytical formulae are obtained for the value at inception of the policy reserve. The special case in which the underlying process is the traditional Brownian motion, and the more general case of a Lévy process are considered. Particular attention is given to the mispricing generated by the misspecification of a jump-diffusion process for the underlying asset as a pure diffusion process, and to which extent this mispricing affects the profitability and the solvency of the life insurance company issuing these contracts.

Keywords: Esscher transform, fair value, incomplete markets, Lévy processes, participating contracts.