

Hedging against volatility, jumps and longevity risk in participating life insurance contracts – a Bayesian analysis

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This paper introduces a Bayesian approach to market consistent valuation and hedging of a participating life insurance contract. The contract is valued in a general and realistic framework allowing interest rate, volatility and jumps in the asset dynamics to be stochastic. In our set-up we also incorporate stochastic mortality and study its effect on pricing and hedging. All underlying models are estimated using the Markov Chain Monte Carlo method, and their simulation is based on their posterior predictive distribution. In our case the contract is an American-style path-dependent derivative, and we value it using the regression method. As a hedging strategy we employ minimum variance hedging which relies on the underlying asset as a single hedging instrument. We compare its hedging effectiveness with a conventional delta-neutral hedge which uses a simpler model for asset dynamics.

Key Words: American-style option, jump-diffusion, risk-neutral valuation, single-instrument hedging, stochastic interest rate, stochastic mortality, stochastic volatility