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Variable Annuities with VIX-linked Fee Structure under a Heston-type Stochastic Volatility Model

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The Chicago Board of Options Exchange (CBOE) advocates linking variable annuity (VA) fees to its trademark VIX index in a recent white paper. It claims that the VIX-linked fee structure has several advantages over the traditional fixed percentage fee structure. However, the evidence presented in the white paper was largely based on non-parametric extrapolation of historical data. Our work lays out a theoretical basis with a parametric model to analyze the impact of the VIX-linked fee and test some claims from the CBOE white paper. In a Heston-type stochastic volatility setting, we jointly model the asset underlying a VA policyholder's account and the VIX index. In this framework, we price a guaranteed minimum maturity benefit (GMMB) with VIX-linked fees. Through numerical examples, we show that the VIX-linked fee reduces the sensitivity of the insurer's liability to market volatility, when compared to a VA with the usual fixed percentage fee.