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Revisiting the Risk-Neutral Approach to Optimal Policyholder Behavior: A Study of Withdrawal Guarantees in Variable Annuities

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Policyholder exercise behavior presents an important risk factor for life insurance companies. Yet, most approaches presented in the academic literature—building on value maximizing strategies akin to the valuation of American options—do not square well with observed prices and exercise patterns. For instance, several papers indicate that Guaranteed Minimum Withdrawal Benefits (GMWB) in U.S. Variable Annuities appear to be significantly underpriced. The present paper demonstrates that this pricing gap vanishes when the value maximization is carried out from the policyholders' perspective, that is when accounting for the fact that variable annuities grow tax-deferred.

To that effect, we develop a risk-neutral valuation methodology that takes different tax structures into consideration, and apply it to a simplified withdrawal guarantee as well as a representative empirical Variable Annuity contract. We find that the consideration of taxes reduces withdrawals, and thus the value of a GMWB, tremendously. In particular, the withdrawal guarantee fee from the empirical product roughly accords with its marginal price to the insurer.