Title:

Comonotonic Approximations of Risk Measures for Variable Annuity Guaranteed Benefits with Dynamic Policyholder Behavior

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Abstract:

The computation of various risk metrics is essential to the quantitative risk management of variable annuity guaranteed benefits. The current market practice of Monte Carlo simulation often requires intensive computations, which can be very costly for insurance companies to implement and take so much time that they cannot obtain information and take actions in a timely manner. In an attempt to find low-cost and efficient alternatives, we explore the techniques of comonotonic bounds to produce closed-form approximation of risk measures for variable annuity guaranteed benefits. The techniques are further developed in this paper to address in a systematic way risk measures for death benefits with the consideration of dynamic policyholder behavior, which involves very complex path-dependent structures. In several numerical examples, the method of comonotonic approximation is shown to run several thousand times faster than simulations with only minor comprise of accuracy.