TITLE: Spectral Methods for the Valuation and Risk Management of Investment Guarantees

ABSTRACT: Spectral expansion techniques have been extensively exploited for the pricing of exotic options. In this work, we present novel applications of spectral methods for the valuation and quantitative risk management of variable annuity guaranteed benefits such as guaranteed minimum maturity benefit (GMMB), guaranteed minimum death benefit (GMDB) and guaranteed minimum withdrawal benefit (GMWB). The objective is to find efficient and accurate solution methods for the computation of risk measures, which is the key to determining risk-based capital according to regulatory requirements. Our sample calculations show that spectral methods are highly efficient and numerically more stable than conventional methods such as Monte Carlo simulations in the existing literature. Hence these approaches are more suitable for intensive calculations involving death benefits..