

Title: A Tale of Two Risk Management Strategies: Risk Measure Based Reserving and Net Liability Hedging of Variable Annuity Guaranteed Benefits

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Abstract: Variable annuity guaranteed benefits are enhanced life insurance products that offer policyholders participation in equity investment with minimum return guarantees. There have been two well-established risk management strategies for variable annuity guaranteed benefits in the insurance industry, namely, (1) stochastic reserving based on risk measures such as Value-at-Risk(VaR) and Tail-Value-at-Risk(TVaR), etc; (2) dynamic hedging. The latter is increasingly more popular than the former, as the latter is believed to be less costly than the former. While both have been extensively used in practice, scarce academic literatures have been written on the comparison of the two approaches. The present paper provides a quantitative framework in which two risk management strategies are mathematically formulated and their objectives can be computed analytically. In addition, the paper proposes managing net liabilities as a more effective and cost-saving alternative to the common practice of dynamic hedging of gross liabilities. The finding of this paper does not support the general perception that dynamic hedging is always more affordable than stochastic reserving, although in many cases it is with the TVaR risk measure.