Mean-Variance Investment and Risk Control Strategies -- A New Time-Consistent Formulation

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Abstract

We consider an optimal investment and risk control problem for an insurer under the mean-variance (MV) criterion. By introducing a deterministic auxiliary process, we formulate a new time-consistent problem related to the original MV problem, and obtain the optimal strategy and the value function to the new problem in closed forms. We compare our formulation and optimal strategy to those under the precommitment and game-theoretic framework. Numerical studies show that, when the financial market is negatively correlated with the risk process, optimal investment may involve short selling the risky asset and, if that happens, a less risk averse insurer short sells more risky asset.

Keywords: Optimal Reinsurance; Jump Diffusion; Hamilton-Jacobi-Bellman; Time-consistent Control; Precommitment