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基于动态VaR约束与随机波动率模型的最优投资策略

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Optimal investment strategy with stochastic volatility and dynamic VaR constraint

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摘要 研究Stein-Stein随机波动率模型下带动态VaR约束的最优投资组合选择问题. 假设投资者的目标是最大化终端财富的期望幂效用, 可投资于无风险资产和一种风险资产, 风险资产的价格过程由Stein-Stein随机波动率模型刻画. 同时, 投资者期望能在投资过程中利用动态VaR约束控制所面对的风险.运用Bellman动态规划方法和Lagrange乘子法, 得到了该约束问题最优策略的解析式及特殊情形下最优值函数的解析式; 并通过理论分析和数值算例, 阐述了动态VaR约束与随机波动率对最优投资策略的影响.

关键词： 动态VaR约束 随机波动率 最优投资策略 动态规划 效用最大化

Abstract： This paper considers an optimal portfolio choice problem under Stein-Stein stochastic volatility model and dynamic VaR constraint. The investor aims to maximize the expected power utility of the terminal wealth, and the financial market consists of one risk-free asset and one risky asset whose price process is described by Stein-Stein stochastic volatility model. At the same time, the investor hopes to limit the potential risk over investment horizon by a dynamic VaR constraint. Adopting the stochastic dynamic programming approach and Lagrange multiple method, we derive the closed-form expressions of the optimal strategy as well as the optimal value function in a special case. Moreover, economic implications and numerical analysis are proposed to illustrate the impacts of stochastic volatility and dynamic VaR constraint on the investor's optimal strategy.

Keywords： dynamic VaR constraint , stochastic volatility, optimal portfolio strategy, dynamic programming, utility maximization

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