Department of Statistics

MASTER'S THESIS PRESENTATION

LU CAO

Department of Statistics
The University of Chicago

Portfolio Value at Risk Backtest: The Geometric-VaR Backtesting Method

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ABSTRACT

This paper compares a newly proposed Value-at-Risk (VaR) backtesting method: geometric-VaR test with three individual backtests: unconditional coverage test, duration independence test, VaR independence test and two joint tests: geometric test and VaR test. VaR is the maximum expected loss for a holding period under certain confidence level. Financial institutions have been using VaR as a standard tool for risk measure and risk management for a long time. There are three typical VaR estimation approaches: Variance-Covariance approach, Historical Simulation approach and Monte Carlo simulation approach. However, these approaches more or less rely on some simplifications and assumptions, which reduce the efficiency of VaR estimates and increase the importance of evaluating the performance of VaR estimates. Various backtesting procedures,which focus on either unconditional coverage rate or independence of VaR estimates, have been proposed. The newly proposed geometric-VaR test, which combines three individual backtests, tests not only the unconditional coverage rate but also the duration and VaR independence. We apply the geometric-VaR test along with other five backtests on a single stock index portfolio with VaRs estimated based on parametric and non-parametric VaR estimation approaches and employ Monte Carlo techniques to test the power of the backtests. Our study shows that the geometric-VaR test performs better than other backtests, especially when VaR estimates show dependence on certain variable while the violation rate is similar to the unconditional coverage rate.

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