A Robust Estimation of Value-at-Risk

Guan-Yi Chian
Institute of Statistics, National University of Kaohsiung

Abstract

Value-at-Risk (VaR) is a fundamental tool for risk management and is also associates with the capital requirments of banks. In practice, banks have to satisfy the minimum capital requirements of Basel regulations, but managements do not like to change their market risk capital levels too often. To achieve both objectives, this study proposes a robust approach for estimating VaR. First, we fit a time series model to the underlying asset returns, and then obtain the convenient VaR etimation at each time point by the fitted model to capture the time-dependent character. Next, the VIFCP algorithm of Shi et al. (2015) is employed to find a candidate set of mean-shift locations in the convenient VaR process. Finally, we propose a criterion to satisfy the capital requirements and reduce the fluctuation of the risk limits simultaneously by using a step function approximation with the candidate set. The stock prices of J.P. Morgan from 2010 to 2014 are used for our empirical investigation. Numerical results endorses the proposed robust method for estimating VaR.

Keywords：Basel II, GARCH model, VaR, VIFCP.