

## **Abstract**

THESIS: GARCH Models for Forecasting Volatilities of Three Major Stock

Indexes: Using Both Frequentist and Bayesian Approach

STUDENT: Li, Yihan

DEGREE: Master of Science

COLLEGE: College of Sciences and Humanities

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Forecasting volatility with precision in financial market is very important. This paper examines the use of various forms of GARCH models for forecasting volatility. Three financial data sets from Japan (NIKKEI 225 index), the United States (Standard & Poor 500) and Germany (DAX index) are considered. A number of GARCH models, such as EGARCH, IGARCH, TGARCH, PGARCH and QGARCH models with normal distribution and student's  $t$  distribution are used to fit the data sets and to forecast volatility. The Maximum Likelihood method and the Bayesian approach are used to estimate the parameters in the family of the GARCH models. The results show that the QGARCH model under student's  $t$  distribution is the precise model for the NIKKEI 225 index in terms of fitting the data and forecasting volatility. The TGARCH under the student's  $t$  distribution fits the S&P 500 index data better while the traditional GARCH model under the same distribution performs better in forecasting volatility. The PGARCH with student's  $t$  distribution is the precise model for the DAX index in terms of fitting the data and forecasting volatility.