

A Comparison Between ARCH and GARCH(1,1) Models Fitted to Nasdaq Nordic Indices

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Abstract

A financial time series is a set of variables observed at different time points. A major concern of financial time series study is to evaluate the changes in the values of an underlining asset and to forecast losses or gains in the future. One distinct characteristic of a financial time series is that it contains a factor of uncertainty. Volatility is a conditional standard variance for an underlying asset. In empirical study, volatility is difficult to measure, and yet it is a key to building a model for a financial time series. In this study, we will study two most representative volatility models, namely the autoregressive conditional heteroscedastic (ARCH) models, and the general autoregressive conditional heteroscedastic (GARCH) models. These two models will be fitted to Nasdaq Nordic indices, the Large Cap and the Small Cap - two market segment indices with different dynamics. This study has two main purposes. First, we want to see if these two models are adequate to describe the two different data sets even though these data sets have different dynamics. If that is not the case, we want to see which model is more adequate to describe a certain data set. Second, we want to see which model has better forecasting power. To measure forecasting power, we will use backtesting based on value at risk, a risk measure that gives a point estimate for a potential loss. The study results show that the differences between the models are not as distinctive as the differences between the data sets. For a same index, both ARCH models and GARCH models show fairly similar results. Backtesting results, however, show that the most distinctive differences in forecasting power come from distribution assumption for innovation of a model. When it comes to forecasting power, differences between distribution assumption for innovation seem more distinctive than differences between ARCH and GARCH models.

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