Chapter 14
Research Data Analysis Using EViews:
An Empirical Example of Modeling Volatility

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ABSTRACT

The aim of this chapter is to provide a detailed empirical example of autoregressive conditional heteroskedasticity (ARCH) model and selected generalized ARCH models. Before the ARCH/GARCH models are estimated, several calculations and tests should be done. The mean model is determined using the autocorrelation function and partial autocorrelation function and also the unit root test. The existence of ARCH effect is tested using ARCH-LM test. After these steps are done, then ARCH/GARCH models can be estimated. All these theoretical aspects are applied to Sofia Stock Indexes (SOFIX) using EViews 9 software package. The windows and output of EViews are presented. To show the output's academic writing format researchers' outputs are presented in a table.

INTRODUCTION

Modeling volatility is an important issue in the finance literature. Over the last decades many models have developed in the literature for modeling volatility. Financial data show the conditional distribution of high-frequency returns this conditional distribution produce some features. The most challenging features are excess of

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kurtosis, negative skewness, and temporal persistence in conditional movements. To cope with these problems many tools have developed not only to model volatility but also forecasting volatility, namely ARCH/GARCH (Auto-Regressive Conditionally Heteroscedastic/Generalized Auto-Regressive Conditionally Heteroscedastic) models. After the GARCH model, many different GARCH-type models are developed such as EGARCH, IGARCH, TARCH so on.

This chapter serves as an overview of important members of the ARCH family, which are an ARCH, GARCH, and EGARCH models. Also, the empirical example is presented using EViews 9 software package. Daily observations of Bulgarian Stock Exchange (SOFIX) data covering the period between 04.01.2010 and 26.01.2017 will be used as an example.

This chapter is organized as follows. The first part is an introduction and the second part covers the history y of the ARCH, GARCH, and EGARCH models. The third part is the core of the paper and provides a guide to the estimation procedure of three models in EViews 9. In the last part, the chapter is, summarized.

BACKGROUND OF GARCH MODELS

Whereas heteroskedasticity is associated with models for cross-section data in textbooks, autoregressive conditional heteroskedasticity (ARCH) can be found in time-series models. Volatility is a vital concept for financial series. It is used in portfolio optimization, risk management, and asset pricing. The main problem of this kind of data is the impossibility of modeling using a linear model because this kind of data includes leptokurtosis, volatility clustering, long memory, volatility smile, and leverage effects. Also, one of the assumptions of linear models, which is homoscedasticity is not appropriate when using financial data (Floros 2008:35). In order to model volatility, Engle (1982) developed the Autoregressive Conditional Heteroscedastic (ARCH) models. Engle observed that large and small errors tend to occur in clusters, and then formulated it as follows: information from the recent past might influence the conditional disturbance variance. After Engle, Bollerslev (1986) extended ARCH to Generalized Autoregressive Conditional Heteroscedastic (GARCH) model. Bollerslev's improvement is to add the forecasted variance from the last period (the GARCH term) to the volatility of the past (ARCH term). Nelson (1991) proposed the Exponential GARCH (EGARCH) model an EGARCH model that is often employed to capture the asymmetric effect of innovations on volatility. It is not the last GARCH type model, but in this chapter, we investigate only these three models.

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