Using a Prediction Error Criterion for Model Selection in Forecasting Option Prices

Stavros Degiannakis and Evdokia Xekalaki*

Department of Statistics, Athens University of Economics and Business, 76, Patission Street, 10434 Athens, Greece

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Abstract

The common way to measure the performance of a volatility prediction model is to assess its ability to predict future volatility. However, as volatility is unobservable, there is no natural metric for measuring the accuracy of any particular model. Noh et al. (1994) assessed the performance of a volatility prediction model by devising trading rules to trade options on a daily basis and using forecasts of option prices obtained by the Black & Scholes (BS) option pricing formula. (An option is a security that gives its owner the right, not the obligation, to buy or sell an asset at a fixed price within a specified period of time, subject to certain conditions. The BS formula amounts to buying (selling) an option when its price forecast for tomorrow is higher (lower) than today's market settlement price.)

In this paper, adopting Noh et al.'s (1994) idea, we assess the performance of a number of Autoregressive Conditional Heteroscedasticity (ARCH) models. For, each trading day, the ARCH model, selected on the basis of the prediction error criterion (PEC) introduced by Xekalaki et al. (2003) and suggested by Degiannakis and Xekalaki (1999) in the context of ARCH models, is used to forecast volatility. According to this criterion, the ARCH model with the lowest sum of squared standardized one step ahead prediction errors is selected for forecasting future volatility. A comparative study is made in order to examine which ARCH volatility estimation method yields the highest profits and whether there is any gain in using the PEC model selection algorithm for speculating with financial derivatives. Among a set of model selection algorithms, even marginally, the PEC algorithm appears to achieve the highest rate of return.

Keywords and Phrases: ARCH models, Forecast Volatility, Option Pricing, Model selection, Predictability, Correlated Gamma Ratio Distribution, Prediction Error Criterion

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* Corresponding author. Tel.: +30-210-8203269; fax: +30-210-8238798.
E-mail address: exek@aueb.gr .