The GARCH and EGARCH Nonlinear Time-Series Models for Volatile Data: An Application

Himadri Ghosh, Ranjit Kumar Paul And Prajneshu

Abstract

Two parametric nonlinear time-series models, viz. the generalized autoregressive conditional heteroscedastic (GARCH) and the exponential generalized autoregressive conditional heteroscedastic (EGARCH) models are thoroughly studied for describing volatile data sets. The procedure for estimation of parameters of these models is also briefly discussed. It is shown that, for all-India month-wise export time-series data of fruit and vegetable seeds, the well-known Box-Jenkins autoregressive integrated moving average (ARIMA) methodology is not able to capture the volatility in a satisfactory manner. The main reason for this is that the underlying assumption of constant error variance is not satisfied. Accordingly, the GARCH and EGARCH models, in which the conditional variance changes over time, are applied. The EViews, Ver. 7 software package is used for data analysis. Comparative study of the fitted GARCH and EGARCH models is carried out on the basis of static one-step ahead forecast as well as the mean square prediction error, mean absolute percent error, and relative mean absolute prediction error. It is concluded that, for the data set under consideration, the EGARCH model has performed better than the GARCH model for both modelling and forecasting purposes.

Keywords : AIC and BIC, EViews software package, GARCH and EGARCH models, India's fruit and vegetable seeds month-wise export data, Volatility.

1. INTRODUCTION

India ranks second in the world in fruit and vegetable production and large quantities of fruit and vegetable seeds are exported worldwide. However, the revenues earned exhibit a lot of variation over time. As emphasized by Jaffee (2005), volatility seems to

J. Stat. & Appl. Vol. 5, No. 2, 2010, pages 161-177
Corresponding Author Email: prajneshu@yahoo.co.in