Modelling the structure of dependence of stock markets in BRICS and KENYA: Copula GARCH approach

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Abstract

Background: Dependence structure is used widely to describe relationships between risks and provides estimation of risks for risk management purposes. Modeling dependence structure of stock returns is a difficult task when returns are having non elliptical distributions.

Objective: To examine dependence pattern between the Kenya stock market return and BRICS stock market returns.

Methods In this dissertation, we estimated the dependence using copula GARCH, an approach that combines copula functions and GARCH models. We applied this method to a stock mar- ket returns consisting of stock indices of Brazil, Russia, India, China and South Africa (BRICS) and Kenya stock market. We first used GARCH (1,1) to model the marginal distributions of each stock returns using different GARCH(1,1) specifications. Copula was used to analyze the dependence between the BRICS stock market returns and Kenya stock market returns using the standardized marginal distributions derived from GARCH (1,1) residuals. The best fitting copula parameter was determined using the log likelihood or AIC.

Results: Empirical results showed that GJR-GARCH model provided the best fit for Brazil, Russia, China and Kenya while E-GARCH model provided the best fit for India and South Africa. As for modelling the dependence structure, student t copula parameter provided the best fit for the marginal distributions of the returns.

Conclusion: To capture the dependence structure for bi variate data sets, Student t copula are considered to be the appropriate copula functions.

Key words : non elliptical distibutions, copula, GARCH model, BRICS, AIC, BIC, GJRGARCH model, E-GARCH model, log likelihood