Modeling oil price volatility in South African Economy: A comparison of GARCH and TGARCH models

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Abstract

This study assesses oil price volatility modelling in South African economy by comparing the performance of GARCH and TGARCH model. Monthly time series data on brent oil price from 1960 to 2020 were employed. The data was sourced from South African Reserve Bank. The GARCH (1,1) model performs much better for all the innovation than TGARCH (1,1) model because of the insignificance of the Ljung-Box Statistics of both residuals and squared residuals for all the innovations and lower AIC when compared with TGARCH (1,1) model. The TGARCH model with standardized Student-t distribution fitted the data better than other innovations as the leverage parameter is positive and insignificance of Ljung-Box Statistics of both residuals and squared residuals. The TGARCH (1,1) model with Gaussian innovation, contrary to expectations had negative leverage parameter and the Ljung-Box Statistics of both residuals and squared residuals were found to be significant. The TGARCH (1,1) model with skewed standardized Student-t innovation though had the Ljung-Box Statistics of both residuals and squared residuals to be insignificant but the leverage parameter is negative. The AIC of the GARCH (1,1) is also found to be lower than TGARCH (1,1) for all the innovations. The study concludes that GARCH (1,1) is found to be more adequate in modelling and forecasting oil price volatility in South African economy.

Keywords: Oil Price, GARCH, TGARCH.
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