

GENERALISED LAMBDA DISTRIBUTION-BASED QUANTILE REGRESSION MODEL TO ANALYSE THE EXCHANGE RATE MOVEMENTS IN SRI LANKA

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Exchange rates play an important role in currency trading in the financial market. Hence, this study examines the relationship and forecasts close price values of USD, EURO and GBP against LKR using the previous day's low, high and open price values, lags of close price and moving average values. This is the first study that implements quantile regression (QR) incorporating Generalised Lambda distribution (GLD) to model exchange rates due to the non-normal behaviour of the residuals with the presence of heteroscedasticity in Sri Lanka. Daily data was collected from the Yahoo Finance website from 1st January 2008 to 28th February 2022. The current daily close price of exchange rates was modelled using the previous day's low, high and open price values, lags of close price observed in the Autocorrelation function (ACF) plot and moving average (MA) values of MA7, MA14, MA28, MA84, MA168 representing the moving average values for one week, two weeks, one month, one quarter and six months respectively. For heteroscedastic data, QR models were obtained by Case I) fixing the intercept or Case II) allowing all the coefficients to vary using the Nelder-Mead simplex algorithm. The Cramer-Von Mises and Anderson-Darling tests were used to evaluate whether the residuals follow a GLD in the GLD-based QR models. Further, the goodness of fit of these QR models was evaluated using Pseudo-R². This study considered upper, median, and lower quantiles in fitting the QR models. The forecasted accuracy of the QR models was evaluated using mean absolute error (MAE) and mean absolute percentage error (MAPE). It is found that the effects of the input variables on the close price of the exchange rate at different quantiles are different. The minimum MAE and MAPE of 1.3246 and 0.00587 were observed for the 50th QR model with a Pseudo-R² value of 0.4432 in EURO/LKR, for USD/LKR minimum error values (MAE of 1.1369 and MAPE of 0.0057) were observed under Case I in 50th QR model with Pseudo-R² of 0.7541. Similarly, for GBP/LKR, the better-performed model was under Case I in the 10th QR model (MAE of 1.2253 and MAPE of 0.0045) with Pseudo-R² of 0.9255. Overall, this study indicates that QR models can emphasise the complete conditional distribution of the response variable at different quantiles.

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