

Prediction of daily gold prices in Sri Lanka: A comparison of time series and artificial neural network models

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Gold is an ancient and one of the most precious and popular commodities in the world. Investors at all levels are attracted to gold in all times as gold is a solid and tangible long term store of value. Gold can be used in portfolios to reduce volatility, to protect global purchasing power and minimize losses during times of market shock. Therefore, a more accurate forecast of gold prices can help the investors in their decision making. The main objective of this study is to develop a more accurate and efficient model to forecast daily gold prices in Sri Lanka. For this study, the daily gold prices (LKR/Troy Ounce), published by the Central Bank of Sri Lanka from 10th June 2014 to 30th November 2016 were used. During the past decades, Traditional Time Series Modelling was used in forecasting financial data but recently, Artificial Neural Networks are used in many researches of forecasting. Hence, both traditional time series modelling and artificial neural network approaches were considered in developing a more accurate and efficient model in the study. Autoregressive Integrated Moving Average model (ARIMA); a traditional time series model and Feed Forward Neural Network model (FFNN); an artificial neural network model, were compared. The model evaluation was carried out using performance measures; Normalized Mean Squared Error (NMSE) and Directional Symmetry (DS). ARIMA (2,1,2) model with NMSE and DS values, 0.1358 and 71% respectively, was selected as the best model among the fitted traditional time series models. FFNN model containing two hidden layers, with 4 and 5 neurons respectively in each layer with model parameters; mu of 0.00061 and minimum gradient of $0.7e^{-7}$ was selected as the best model among the trained FFNN models. The NMSE is 0.000139 and DS is 78% of the final ANN model. The deviation between the actual and forecast values (NMSE) is very low in the fitted FFNN model and the accuracy of the predicted direction (DS) is more than that of ARIMA (2,1,2) model. The above results prove that the ANN outperforms traditional time series modelling techniques in forecasting highly volatile financial data such as daily gold prices.

Keywords: Artificial Neural Networks (ANN), Autoregressive Integrated Moving Average (ARIMA), Gold, Sri Lanka