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MODELING AND FORECASTING OF CRUDE OIL PRICE

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Crude oil is the most important natural resource sought by the industrialized nations. It is in particular used to generate heat, drive machinery and fuel vehicles and airplanes. The price of crude oil plays a significant role in the global economy. Nowadays, the need of crude oil increases and at the same time the price fluctuates widely. So, the modeling of crude oil price is essential to make effective decisions in the future. In this study two modeling techniques were proposed to model the monthly crude oil prices of Euro Area, based on data obtained from 1985 to 2014. First, the so-called Box-Jenkins's technique was considered to develop an Autoregressive Integrated Moving Average (ARIMA) model for the oil prices of Euro Area. The KPSS test was used to check the stationarity of the series in addition to the graphical identification. Sample Auto Correlation (SAC) and Sample Partial Auto Correlation (SPAC) plots were used to identify the tentative ARIMA model. Initially, several non seasonal ARIMA models were postulated for further analysis. These models were then estimated and compared for their adequacy, based on the significance of the parameter estimates, mean square and Modified Box-Pierce (Ljung-Box) Chi- Square statistic. By means of Mean Square Error, AIC and BIC, the model ARIMA (2, 1, 3) was recommended for short term forecasting. As the second technique, Markov analysis was used to predict the future behavior of the crude oil price by means of long run probability. Under this technique, we first divided the monthly crude oil prices into four non-overlapping intervals as states and verified that the observed crude oil price series during the states follow a Markov Chain by applying the chi-square test. Next, by calculating the transition probabilities the trend of oil prices was observed. Finally, the short term forecasting was made by means of long-run probabilities.

Keywords: Markov chain, Crude oil, ARIMA, Stationarity, Auto-correlation