

Financial Analytics: Time Series Analysis Impact of Crude oil Prices on Automotive Stock

A. Pappu Rajan, S.A.Lourthuraj

Abstract— The financial times series methods for analyzing data and predict future values based on fast available data and it consists of four components such as seasonal, trend, cyclical and random variations. This study attempts to understand the impact of crude oil prices in automotive stock. Crude oil being an important economic factor, studying it with respect to automotive stock is imperative its effect, in order to build portfolio. The research problem is framed to reduce the uncertainty factor regarding crude oil. The study checks whether crude is a considerable macro-economic factor to look upon during the investments. Moreover, it also contributes in constructing the investor's portfolio in an efficient way. This research problem of the study is to identify the impact of crude oil prices on automotive stock of a company using various statistical tools and also to provide insights with regard to investing in automotive sector and understanding the impact of crude factors on company's performance. This day in financial analytics innovation gives solutions for econometrics analysis, forecasting and simulation. For achieving the research objectives, the research has used the statistical tool are Excel and Eview for data analysis. The secondary data were collected from different online resources. The time series method employed to find the tests result implied that there was a significant relationship between the variables. This paper discusses the basic concepts of time series analytics, related literature review, business analytical process, data insights and conclusion.

Index Terms— Time series, Business Analytics, Financial Analytics

1 INTRODUCTION

Significant ascents in crude costs set the entire economies caution and their effect can be felt on the nervousness of open, costs of products, and furthermore on the execution of the securities exchanges. This truly examines the development of market as per development of crude oil cost, with the assistance of specific criteria. The return on equity, profit margin, market capital of these stocks are examined against the changing unrefined petroleum costs. Financial analytics is an analytical concept that provides different insights on the business' financial business data. It helps give deep knowledge and take strategic actions to improve business performance in different vertical. Time series analysis is used to examine the main changes connected or associated with the chosen data point to other variables over the same time period in successive order and historical values with associated patterns to predict future. This paper discusses the relationship between crude oil prices and Indian automotive stocks with other variables which influences the crude oil prices identification number. Click the forward arrow in the pop-up tool bar to modify the header or footer on subsequent pages.

2 REVIEW OF LITERATURE

Ankit Sharma (2018). et.al. they have explained the estimation of the linear interdependencies between international crude oil prices and stock market indices of India for using vector autoregressive (VAR) framework duration of January 2010 to January 2017. The time series method used for the analysis are crude oil futures prices, nifty index, and BSE energy

index.

S. Sathyanarayana (2018). The volatility in crude price has influenced the uncertainty in the price expectation in the country's economy. Apart from that the study concluded that the Crude prices was significant in the volatility of the Sensex and have the competency to transmit shock on Sensex. The study gave the idea about the movement of the crudes prices and the policies that affect the economy at large level and particularly in stock market.

Harnesh Makhija et.al.(2016) in the study on Impact of Oil Prices on Emerging Market Stock Indices, in general volatility of stock prices in India and China have marginal impacts on the volatility of oil prices in the short run or long run. This research paper attempted to analyze the short term and long- term relationship between oil prices and stock market indices of emerging markets for the period July 2005 to June 2015 by using Vector Auto Regression model. The results obtained from the study suggest that Sensex does granger cause oil prices in India whereas

oil prices in India do not granger cause Sensex, which is the same case in China also SSE Composite index does granger cause oil prices, whereas oil prices does not granger cause SSE Composite Index. The study revealed that in the short run or long run volatility of stock prices in India and China have marginal impacts on the volatility of oil prices. But volatility in oil prices does not have impact on stock prices of both India and China.

Saif Siddiqui Neha Seth (2015). The article titled Do Global Oil Price Changes Affect Indian Stock Market Returns? Findings of the study have suggested that there is no long term integration between oil price and Indian stock index series, while there is no short term integration. This paper has given guidance to fill the research gap that exists for Indian stock market in terms of its relationship with global oil prices.

3. BUSINESS RESEARCH

3.1 Research Problem

The automobile sector in India has emerged as one the largest and fastest growing automotive markets in the world, particularly strong in subsectors like light passenger and commercial vehicles, two wheelers and automotive components. This study contributes in understanding the effect of crude oil in sectoral indices. It will help in identifying the automotive stocks that are more volatile towards crude oil. The study plays a vital role in finding volatile stock

movements, thereby helps the investors form their portfolio according to their risk appetite. It will help us in knowing the investors behavior towards crude oil prices and stocks it affects and it will facilitate the decision-making process of investors regarding their equity funds in automotive sector. The study plays a vital role in connecting commodity and equity market. Automotive stocks, being a major sectoral index, studying it can help in constructing efficient portfolio. The study also opens up the opportunity to learn about various other impacts made by crude oil in equity market. Macroeconomics is an important factor deciding the country's future and growth. Crude oil is one of the important indicator to the economy. Demand and supply of crude decides various economic factors. India being a major importer of crude oil, it plays a vital role in impacting the macroeconomic indicators like Inflation, and interest rate. Crude is not a sole industry, it is inter-related with various sectors like paint, automobile, fuel industry. Thus it becomes imperative to study the crude's impact on the automotive stocks. This study concentrates on studying the impact made by the crude on automotive stocks. On the other side automobile sector in India is one of the largest among the world. In this connection the research problem is framed to reduce the uncertainty factor regarding crude oil. The study checks whether crude is a considerable macroeconomic factor to look upon during the investments. Moreover, it also contributes in constructing the investor's portfolio in an efficient way. This research problem of the study is to identify the impact of crude oil prices on automotive stocks using various statistical tools and also to provide insights with regard to investing in automotive sector and understanding the impact of crude factors on companies' performance

¹Associate Professor
Department of Management Studies
St. Joseph's Institute of Management
St. Joseph's College (Autonomous)
Tiruchirappalli, Tamil Nadu
Aprajan2001@gmail.com

²Associate Professor
Department of Management Studies
Jamal Institute of Management
Jamal Mohamed College (Autonomous).
Tiruchirappalli, Tamil Nadu
Rajsa@gmail.com

2.2 Objectives of the Research Study

To study the relationship between crude oil prices and Indian automotive stocks.

To understand the crude oil volatility and its impact on trade volume.

To understand the factors affecting automobile stocks volatility with respect to its earnings per share.

2.3 Hypothesis of the Research Study

There is no significant relationship between crude oil prices and stock prices of the company.

There is no significant relationship between crude oil prices and Trade volume of the company.

There is no significant relationship between crude oil prices and Earnings per share of the company.

2.4 Research Design

The research design used to carry out this study is descriptive research design. Since the research deals with statistical data and main aim to describe the factors affecting the problem mentioned. The secondary data is used for analysis and to reach the objective of the study. The major variables are Crude oil prices, Stock prices of the company, Trade volume of the company, Earnings per share of the company. This study is used secondary data for data collection. Secondary data is a second hand information obtained from the authentic resources. The companies were chosen on the basis of stability over ten years. All the three companies are regulated and listed under NSE. These data were obtained for the purpose of calculation and analysis from investing website. Secondary data obtained from these sources are published after systematic expert analysis companies' annual reports. This information is most widely used to take investment decisions and stock research purposes. Monthly stock prices of the company, monthly stock prices for crude and monthly trade volume was extracted from Investing.com website and was made use in the analysis of data. The crude oil price and the stock price of Maruthi Ltd was collected for the time period of ten years from 2008-2017 in a monthly basis from Investing website. This data was later converted into yearly average. The trade volume was collected in the same manner, where the monthly basis data for 10 years was collected and then was sampled by calculating yearly average from 2008-2017. Earnings per share was directly collected from Money control website on yearly basis from the balance sheet of the company. Yearly earnings per share data obtained from Money control website was made use in analysis of data.

4.0 BUSINESS ANALYTICS

Data was analysed with both econometric and excel tools. Soft wares like MS Excel and Eviews were employed to analyse the data. MS Excel was used to conduct Anova, correlation and regression analysis. Eviews was used to conduct ADF-Unit root test and granger causality.

TABLE 1.0
ADF-UNIT ROOT TEST FOR
CRUDE SERIES

Augmented Dicki fuller test	Probability	Coefficient
Level with Intercept	0.164	-0.788
Level with trend and intercept	0.531	-0.724
Level with None	0.5212	-0.029
1 st Difference with intercept	0.2869	-0.787
1 st difference with intercept and trend	0.347	-1.800
1 st difference with none	0.037	-0.790

Source : Primary - Eviews

The Table 1.0 shows the results of Unit root test that was conducted in step by step manner. Crude oil being a continuous time series data. It is essential to conduct the test in order to obtain a stationary data 1st difference with intercept was conducted.

The test was conducted for the purpose of identifying the presence of unit root. The hypothesis can be accepted or rejected only on the basis on probability and coefficient. First step was to run a unit root test with a level and an intercept which obtained the probability of 0.164 and Coefficient of -0.788. Here the data is still non stationary and has unit root because the probability is higher than significant value. Hence the null hypothesis of crude series having a unit root

is accepted at the significance level 0.164.

Next Stage was to conduct a unit root test of level with trend intercept which gave the probability value 0.531 which is higher than the significant value. This leads to accepting the null hypothesis that the crude oil series has unit root, which implies that it's not stationary. Thus the null hypothesis is accepted at the significance of 0.531. This step was followed by another unit root test in order to make the data stationary. This continuous integration could extract the stationary data. This level was done with same Lag length, which included the level with neither intercept nor the trend. This produced the output as probability with 0.5212. Again the null hypothesis is accepted at the level of 0.5212. Since the data didn't become stationary with level, it is then continued with 1st difference. The data was manipulated with 1st difference with intercept, intercept with trend and none which gave the probability of 0.2869,0.347,0.037. Here the probability is 0.037 which is lesser than the significance level, which implies that null hypothesis of unit root test is present is rejected at the significant level of 0.037. Hence the crude series has become stationary at 1st difference with Neither intercept nor the trend.

TABLE 1.1

ADF-UNIT ROOT TEST FOR CRUDE SERIES

Augmented Dicki Fuller Test	Probability	Coefficient
Level with Intercept	0.999	0.45
Level with trend	0.995	0.21
Level with none	0.994	0.49
1 st difference with intercept	0.923	-0.014
2 nd difference with none	0.003	-2.31

Source: Primary - Eviews

The same procedure was followed for the stock price series. The table 1.1 shows that the raw data of stock price series was not stationary since the probability of the level with intercept is 0.999. thus the null hypothesis is accepted at the significance level 0.99. Continuous series of unit root test was conducted with varied intercepts and differences, at last the Crude price series became stationary at 2nd difference with none. The probability of 2nd difference with neither intercept and trend is 0.003 which is lesser than the assumed significance level 0.05. Hence the null hypothesis is rejected. Hence the alternate hypothesis that Unit root test is not present in Crude series is accepted and thus the data becomes stationary.

TABLE 1.2
ADF FOR TRADED VOLUME

Augmented Dicki Fuller Test	Probability	Coefficient
Level with Intercept	0.3428	-0.75
Level with Trend	0.023	-2.41

Source: Primary - Eviews

Trade volume series for ten years was subjected to unit root test. Table 1.2 shows it that was started with level with intercept which gave the probability of 0.34. This implies that we cannot reject the null hypothesis, Since the probability of 0.3428 is higher than the significance level. This will lead to the consequent test to be carried out, such as level with trend. The results are obtained as probability value of 0.023. This probability will let us to reject the null hypothesis at the significance level 0.023. This will give us the stationary data of traded volume which can be subjected further econometric analysis such VAR, Co-integration as well as Granger causality test. These stationary data are employed further develop VAR model and Granger causality. This stationarity test helps us assure that the data is stationary. This stationarity can help us proceed with the further econometrics. Unit root is efficient and significant tool for economic data. It helps to understand more about the time series. Though it does not help us with forecasting and understanding the causation it still regulates the time series and eliminates the effect of exogenous factors in correlation.

Granger causality test is conducted for the data which was made stationary through Augmented Dicki Fuller test. Hence the data employed for granger causality test does not possess unit root. This test is primarily employed to understand the causation. So far the study briefed about the relationship and correlation. This test go further deeper gives the causation.

TABLE .1.4
GRANGER CAUSALITY TEST

Null hypotheses	Probability	
Stock prices does not granger cause Crude oil	0.23	Rejected
Crude oil prices does not granger cause stock prices	0.31	Rejected
Trade volume does not granger cause Crude oil price	0.45	Rejected
Crude oil price does not granger cause trade volume	0.04	Accepted
Trade volume does not granger cause stock price	0.34	Rejected
Stock price does not granger cause trade volume.	0.04	Accepted

Source: Primary -Eviews

From the table 1.4. it is implied that 1st null hypothesis, that crude price does not granger cause stock prices is rejected at the significance of 0.23. While the hypotheses which states the causal relationship of crude oil price and trade volume is rejected at the significance of 0.04. This implies that the alternate hypotheses which states that there is a causal relationship between crude oil prices and trade volume is accepted.

This chapter dealt about the performance of technical analysis of data and its interpretation. The mathematical results that were obtained through analysis is helpful in next chapter for converting it as meaningful results. The tests to understand the significance of variable groups were conducted. These time series data were also made stationary with the help of unit root tests. At last the Granger causality test was conducted for understanding the causation between the groups.

5.0 BUSINESS INSIGHT

It is observed that there was negative correlation between crude oil price and stock prices. When subjected to further testing of hypothesis it proved to be insignificant impact. There is no significant relationship between stock prices and crude oil prices – Crude oil price is a significant macro-economic factor that affects the environment of trading, but there is no significant level of impact made by the crude oil on stock price of the company, which implies that investors can consider looking upon the factor crude oil during investing but it does not play a critical role in deciding forthcoming returns of the stock prices. In India, major economic indicators like inflations and interest rates may be affected due to rise in crude oil which can directly or indirectly influence the stock prices of automotive stock. It also implies that investors need not consider crude oil as a risk factor while including an automotive stock in their portfolio. Automotive stock like company is affected by company and industry performance and also various other macro-economic factors such as crude oil price, Inflation and interest rates in a lesser significant Level.

Observation from analysis implies that there is a significant relationship between Trade volume of the company and Crude oil prices. It is observed that there is a significant correlation between crude oil price and independent variable and trade volume as dependent variable which implied that crude oil price and the trade volume are negatively correlated.

The results of the regression statistics from analysis, implied that 21% of variation caused in dependent variable stock prices of the company is due to Independent Variable Crude oil. This infers the investors response to crude oil volatility. There is a significant level of reaction in automotive equity stock for the crude oil prices. Though the impact does not reach the stock price, it could be felt in volume of shares traded, which implies that investors active response in traded volume due to crude oil price.

Observation regarding significant relationship between Crude oil price and earnings per share of the company. It is observed that earnings per share and crude oil prices have a significant relationship. This implies that crude oil price has directly or indirectly can affect the performance of the company. The result in earnings per share can also signify the impact made on Net profit. Thus it can be inferred that crude oil prices can affect the 18% variation of Earning per share of the company. Though the crude oil price didn't directly impact the

company's stock price. It impacted the earning capacity of the firm through turnover and net profit which is indicated through Earnings per share.

Observation regarding Grangers Causality was observed that neither crude oil nor the Trade volume granger cause each other in short run. But trade volume of the company and crude oil prices granger caused each other in the short run.

The general suggestion of the study that investing automotive stock does not require to look upon the crude oil prices as a significant factor to consider. But still it partly affects the performance by influencing the fuel rise thereby indirectly affecting the performance of the Company. It also suggests that the investor behaviour in the related to automotive equity is not erratic with respect to Crude oil. Thus it is relatively stable sector to invest with the significantly less impact of crude oil prices. It can be suggested that investor behaviour is not erratic with regards to crude rise

6.0 CONCLUSION

The study concludes that there is a significantly lesser impact of crude oil prices in automotive stock. Though it does not influence the stock price through investors behavior in market, it can be felt in the sales of the fuel automobiles, which affects the net profit. Since, unit root test is the basic requirement for conducting the Granger causality test, so it was conducted and found that all the series are non-stationary at level but stationary at first difference. Thereafter, Granger causality test was applied and it was found that stock prices and crude are not integrated only in long run but these series do not even cause each other in short run. Individual or institutional investors, portfolio managers, corporate executives, policy makers and practitioners may draw meaningful conclusions from the findings of the present study while operating in stock markets.

The study has concluded that the impact made by crude oil prices is felt among the earnings of the company, which implies that these increase in

prices can affect the turnover, thereby affecting the ultimate performance of the company. It also concludes that the crude oil prices do not impact the volatility of the corresponding automotive stock. These rise in crude oil prices could affect the other aspects of company like their overall sales, by indirectly increasing the price of fuel in spite of smoothening the fuel prices for resisting the public from feeling the adverse impacts.

Working paper series. U.S. Independent Statistics and Analysis. Energy Information Administration Washington, DC 20585.

REFERENCES

- [1] Ankit Sharma, Sasmita Giri, Harsh Vardhan, Sujeet Surange, Rohan Shetty, Vishwaroop Shetty (2018). Relationship between Crude Oil Prices and Stock Market: Evidence from India. International Journal of Energy Economics and Policy. ISSN: 2146-4553. Volume.8, Issue.4. Pp:331-337.
- [2] Abdurrahman Adnan Alqattan, Ahmed Alhayky (2016). Impact of Oil Prices on Stock Markets: Evidence from Gulf Cooperation Council (GCC) Financial Markets. Amity Journal of Finance. Volume 1. Issue 1.
- [3] Bishal Ghimire, Parvathy VK (2018). Impact of Crude Oil Prices on the Exchange Rate of Indian Rupees Against USD. Journal of Emerging Technologies and Innovative Research. ISSN-2349-5162. Volume 5, Issue 3.
- [4] Sathyanarayana, S N Harish. Sudhindra Gargasha (2018). Volatility in Crude Oil Prices and its Impact on Indian Stock Market Evidence from BSE Sensex. SDMIMD Journal of Management. ISSN: 0976-0652. Volume 9. Issue 1.
- [5] Harnesh Makhija, P.S. Raghukumari (2016). A Study on Impact of Oil Prices on Emerging Market Stock Indices. IOSR Journal of Economics and Finance (IOSR-JEF.e-ISSN: 2321-5933, p-ISSN: 2321-5925., PP 35-40.
- [6] Saif Siddiqui, Neha Seth (2015). Do Global Oil Price Changes Affect Indian Stock Market Returns? Journal of Management & Public Policy. ISSN: 0976-0148. Vol. 6, No. 2, June 2015, Pp. 29-41.
- [7] Stavros Degiannakis, George Filis, and Vipin Arora (2017). Oil Prices and Stock Markets