Oil Price Volatility and its Impact on the selected Economic Indicators in India

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ABSTRACT

Crude oil is the most widely used energy resource in the world and it accounts for nearly 40% of the global energy demand and its consumption is estimated to be over 85 million barrels per day. As India is one of the non-OPEC (Organization of the Petroleum Exporting Countries) countries it fulfills its domestic demand by way of import as India has a much lower level of production. Any slight fluctuation in the oil prices can have both direct and indirect influence on the economy of the country. This research paper aims to analyze the impact of oil price volatility on the selected economic indicators of India. Growth in GDP, employment, inflation, industry and business, trade etc is the various economic indicator of a country. For the purpose of this study, GDP, inflation and stock market (NSE) are analyzed to know the impact of oil price volatility on it for the period 2003 to 2013. It evaluates the GDP growth performance and assesses the historical trends of the CPI, NSE and oil price in India. The relationship among oil price, gross domestic product, NSE index and inflation is measured with the help of multiple regression models individually. The study has been made by taking GDP, NSE and CPI as dependent variables and oil price as an independent variable. It is found that there is significant positive relationship between oil price and inflation. Gross domestic product and stock market of India are also affected by the oil price.

Keywords: OPEC, GDP, NSE, CPI, Crude oil.

INTRODUCTION:

Crude oil has been vital to the world economy since its discovery. Recently international crude oil price has experienced a sharp increase. Most countries are significantly affected by the hike in the oil market, either as producers, consumers, or both. In 2008, oil provided about 34% of the world's energy needs, and in the future, oil is expected to continue to provide a leading component of the world’s energy mix. As India is one of the non- OPEC (Organization of the Petroleum Exporting Countries) countries, it imports crude oil to fulfill the domestic requirements as it has much lower level of production. Oil and gas contribute to around 45% of country’s total energy consumption. India occupies the 4th place in the list of world’s largest oil importers. It imports 30, 60,000 billion barrels per day. Now-a-days, every trader in India thinks twice before trading in crude oil because of its fluctuating levels. There are innumerable factors which influence the price movement of crude oil throughout the world. As far as the price of crude oil is concerned, there are a number of factors responsible for influencing the price. They are as follows:

- OPEC output, supply and spare capacities.
- Increased demand from emerging and developing countries.
- Geopolitics.
- Currency fluctuations.
- Weather conditions.
- Speculative buying and selling.
- Changes in the refining sector, for example, a drop in the refinery utilization rate.

CRUDE OIL AND INDIA: AN OVERVIEW

Crude oil production recorded a decline of 1.6 percent in March 2014 over March 2013. The nation's 22 refineries produced 18.63 million tons of fuel last year, whereas it was 18.95 million tons in
the corresponding period last year. Production performance of Crude oil for the month of April, 2014 remained 3104.326 Thousand Metric Ton against the target of 3121.351 TMT. Oil imports of India during April, 2014 were valued at US$ 12977.8 million which was 0.6 percent lower than oil imports valued at US$ 13053.5 million during the previous year. On the other hand India overtook Japan to become the third largest crude oil importers in the world. India imported 3.86 million barrels of crude oil per-day in the year 2013. As India imports about 80 percent of its crude oil requirements, the international oil prices necessarily have an impact on the domestic prices of petroleum products and other commodities. Based on the recommendations of the expert group and decisions taken in the meeting of the Empowered group on ministers, the government decided on: a) the growing imperative for restoring fiscal balance of Government’s budget; (b) the need for reducing the subsidy burden on certain petroleum products in order to allocate more funds to social sector schemes; (c) improving the financial health of the Public Sector Oil Marketing Companies which are instrumental in maintaining the country’s energy sector. The international crude oil price of Indian Basket as published by Petroleum Planning and Analysis Cell (PPAC) under the Ministry of Petroleum and Natural Gas went up to US$106.64 in the first week of June 2014.

LITERATURE REVIEW

Various studies on the subject of oil price volatility, inflation, Indian stock market and growth have been made. The majority of the research work has been done internationally. Some of these important empirical studies have been reviewed critically to develop objectives in the context of India, and further to analyze it and draw some important conclusions and policy recommendations.

Kapil Jain (2013) conducted a study on oil price volatility and its impact on the selected economic indicators in India. The study measures the relationship between crude oil price and selected macroeconomic variables i.e. NSE and CPI. The period 6 years from 2007-2008 to 2012-2013 was taken for analysis. The data was analyzed by using regression analysis. The study found that there is a significant positive relationship between Crude oil price and inflation in India. On the other hand, Stock market of India (NSE) was also affected by the changes in the crude oil price.

Syed Kaiser Mukhtar (2011) had made a study on Crude oil price volatility-role of Speculation, Market Fundamentals and its effect on Indian Economy. The paper analyzed the crude oil price trends witnessed in recent years along with the high level of volatility associated with it. The relationship between crude oil prices, market fundamentals and speculation were analyzed. The overall impact of rapidly changing crude prices on India with respect to its inflation rate, external balances and overall growth was also studied by him. The empirical data ranging from 2000 to 2008 was taken to establish the driving force behind crude price fluctuations especially the rise. It has been established that the changes in demand and supply throughout this period cannot justify more than 100% increase in crude oil prices and hence speculative trading has acted as the major force behind crude price hike.

Similarly another important study by Muhammad Akram (2011) analyses empirically the effect of crude oil price changes on the economic growth of Indian – sub continent (India, Pakistan and Bangladesh). Gross Capital Formation and Labour Participation Rates are the variables taken for the study. Multivariate Vector Auto Regression (VAR) analysis followed by causality test and Impulse
Response Function (IRF) were used. The causality test results show that only India's economic growth is significantly affected when crude oil price decreases. The impact on economic growth is negative when the crude oil prices increase but it is insignificant. In case of Pakistan, crude oil price increase is negative for the first year and positive for the second year. The impact on economic growth is positive when the crude oil prices decrease insignificantly. Crude oil price change has no significant impact on the economic growth of Bangladesh.

Ruhul Salim has made a study of the volatility of the impact of crude oil price on Asian emerging economies like China, India, Indonesia, Malasiya, Philippines and Thailand. Oil prices, GDP growth and inflation are the variables taken for the study. Vector Auto Regression analysis followed by Granger-Causality test has been used. In China oil price volatility impact GDP growth in the short run and both GDP growth and inflation are strongly tied together. Impact analysis for India shows that oil price volatility has significant negative impact on GDP growth and positive impact in inflation. The result of Indonesian study reveals that oil price volatility impact both GDP growth and inflation. As for as Malasiya is concerned, oil price volatility impacts GDP growth. Like all other economies GDP growth and inflation seem to be strongly tied together in the Malasian economy. In Philippines, oil price volatility impacts inflation; and GDP growth and inflation are closely related in the short run. For Thailand, oil price volatility impacts output growth for the whole study period. However, after the Asian financial crisis the impact seems to disappear.

OBJECTIVES:

The study is aimed to measure the relationship between Crude Oil price and Indian Stock Market, Gross Domestic Product and Inflation. To analyze the impact of Crude Oil price changes on Gross Domestic Product, Indian Stock Market and Inflation Rate.

RESEARCH HYPOTHESIS:

a. Null hypothesis:
H0= There is no significant relationship between Crude oil Price and Gross Domestic Product.

Alternative Hypothesis:
Ha= There is a significant relationship between Crude oil Price and Gross Domestic Product.

b. Null hypothesis:
H0= There is no significant relationship between Crude oil Price and Indian Stock market

Alternative Hypothesis:
Ha= There is a significant relationship between Crude oil Price and Indian Stock market

c. Null hypothesis:
H0= There is no significant relationship between Crude oil Price and Inflation

Alternative Hypothesis:
Ha= There is a significant relationship between Crude oil Price and Inflation.

RESEARCH METHODOLOGY

Data collection

The basic purpose of this paper is to empirically analyze the impact of oil price volatility on Indian GDP, Stock Market and Inflation. Study covers the time period from 2003 to 2013. As trading economics is considered as an authentic source of data collection, the secondary data of the mention variables is collected from this reliable source. To examine the impact of oil price volatility on GDP, NSE
The theoretical framework

\[ GDP = \alpha + COP\beta + \mu \quad \text{(1)} \]
\[ NSE = \alpha + COP\beta + \mu \quad \text{(2)} \]
\[ CPI = \alpha + COP\beta + \mu \quad \text{(3)} \]

Where,
- COP = Crude Oil Price
- GDP = Gross Domestic Product
- NSE = National Stock Exchange
- CPI = Consumer Price Index

The aforementioned simple regression models were individually run on SPSS to find out the impact of COP on GDP, NSE and CPI of India. In this model COP is measured as independent variable whereas NSE, CPI and GDP are used as dependent variables. To estimate the impact, simple regression model is applied over the period 2003-2013.

**Empirical Result:**

**Impact of oil price volatility on GDP:**

The impact of oil price on GDP is measured with the help of simple regression analysis. The fixed regression models,

\[ Y = a + bX \]

Where,
- \( Y = GDP \), \( X = \) oil price, \( b = \) Regression coefficient, \( a = \) Constant \( e = \) error term. The results are given in the following table 1,

It could be observed from the table 1 that, the correlation value is 0.947 which denotes a high degree of positive correlation between oil price and GDP. In order to ascertain the extent of the impact of oil price on GDP, the following null hypothesis was framed “There is no significant relationship between oil price and GDP”. To test the above hypothesis regression analysis was used.

The slope coefficient of the input (oil price) in the regression analysis has positive impact on GDP. 1% of change in the oil price will bring out 0.947% change in GDP when other variables are constant. As the value of F is 77.979 and the value of P is too small (i.e.) 0.000, we can deduce that model is overall significant and the results are not by chance and hence the null hypothesis framed is to be rejected. It can be concluded that oil price has a positive impact on the Gross Domestic Product.

**Impact of oil price volatility on NSE:**

The impact of oil price on NSE is measured with the help of simple regression analysis. The fixed regression models,

\[ Y = a + bX \]

Where,
- \( Y = NSE \), \( X = \) oil price, \( b = \) Regression coefficient, \( a = \) Constant \( e = \) error term. The results are given in the following table 2,

It has been understood from the table 2 that there is a high degree of positive correlation that (0.916) exists between oil price and NSE. In order to ascertain the extent of impact of oil price on NSE, the following null hypothesis was framed “There is no significant relationship between oil price and NSE”. The hypothesis was tested through regression analysis.

The slope coefficient of the input (oil price) in the regression analysis has
positive impact on NSE as shown by the beta value. 1% of change in the oil price will bring out 0.916% change in NSE when other variables are constant. As the value of F is 46.798 and the value of P is too small (i.e.) 0.000, we can deduce that the model has overall significance and the results are not by chance and hence the null hypothesis framed is to be rejected. It can be concluded that oil price has a positive impact on the Indian Stock Market.

**Impact of oil price volatility on CPI:**

The impact of oil price on CPI is measured with the help of simple regression analysis. The fixed regression models,

\[ Y = a + bX \]

Where,

\[ Y = \text{CPI}, \; X = \text{oil price}, \; b = \text{Regression coefficient}, \; a = \text{Constant} \; e = \text{error term}. \]

The results are given in the following table 3,

The table 3 reveals the correlation value as 0.787 which implies a positive correlation between oil price and CPI. In order to ascertain the extent of impact of oil price on CPI, the following null hypothesis was framed “There is no significant relationship between oil price and CPI”. To test the above hypothesis regression analysis was used.

The slope coefficient of the input (oil price) in the regression analysis has positive impact on CPI. If 1% of change in the oil price occurs, it will bring out 0.787% change in CPI by when other variables are constant. As the value of F is 14.674 and the value of P is too small (i.e.) 0.004, we can deduce that the model has overall significance. At this stage, the framed null hypothesis is rejected.

**CONCLUSION**

Indian economy is a developing economy and to meet its major crude oil requirement, India has to mainly rely on imports. Oil price has positive impact on the Gross Domestic Product, Indian Stock Market and Consumer Price Index besides it has more impact on GDP. Central bank across Asia and in India also has raised rates many times to fight against inflation. The data collected for inflation and crude oil prices also indicate that when crude oil prices move up inflation rate also moves in the same direction in India. Correlation and regression analysis has been put on to unveil the relationship, and the test exposes a positive correlation between crude oil prices and NSE (national stock exchange) and in regression model to the coefficient is significant. Another relationship between crude oil prices and inflation is also explored, and the result of which indicates a moderate relationship between two variables. Furthermore, oil price volatility has major impact on Indian GDP.

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