Oil Price Fluctuation and Stock Market Performance: Evidences from India

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Abstract: The performance of stock market is largely depends on the performance of various macroeconomic factors and one such factor is oil prices. India is one of the largest importers of crude oil and as result of same large amount of foreign currency reserve goes into purchase of crude oil from international market. This puts pressure on the current account balance of Indian economy and the overall perception of investors in stock market. In this background, the present study is designed to assess the impact of oil price fluctuations on the performance of Indian stock market. The study considers the daily data of BSE Sensex and Oil prices (in US $) for period of 2009(FY) till 2017 (FY) as sample of the study. The long run association between the oil prices and index prices is assessed using Johansen co-integration test. The long causality between the crude oil prices and Indian stock market is assessed using Error Correction Mechanism while the short run causality is assessed using Wald test. The results of the study are indicating that the fluctuations in the oil prices cause the changes in the stock market of Indian economy.

Key words: stock market, crude oil prices, Johansen co-integration, error correction mechanism, Wald test

1. Introduction

Oil market facilitates the mobilizations of funds from surplus to deficient units and result into productive investment of funds. The fluctuation in stock market is the function of demand and supply for, which equity stocks are underlying financial assets. Intrinsic value of stocks are expected to represent the present value of all future cash flows that company will generate. The optimisms of good return and pessimism of under performance of the company, leads to the fluctuation in the market price of all stocks.

A Company's performance largely depend on factors which are intrinsic to the organization as well as external or macroeconomic systematic factors like inflation, interest rates, GDP, tax regime and others. Often observed that macroeconomic factor have significant bearing on the company's performance and influences the asset price in the stock market.

Representative stock market indices are not only significantly influenced by country specific macroeconomic factors like GDP, money supply, exchange rate, inflation , interest rate but also impacted by global factors like trade liberations, oil price, interest rate, climate change, political situation, gold price and others. Oil price shocks of 1970s intrigued the academic researcher to explore the relation between oil price shocks and macroeconomic factors. In the past recessionary impact of the oil price shocks have been too obvious to be overlooked.

Oil and its derivatives are widely used for production as well as a fuel, to meet the growing energy requirement. Any adverse movement in its price results in reduction of economic activities. Further rise in oil price fuels inflation in energy depended countries. The present time of heightened growth, development and prosperity has led to the substantial increase in the demand for the energy, which is increasingly coming from developing economies particularly from Asia rather than traditional markets (BP Statistical Review, June 2017).

In the above backdrop, the present study tries to assess the long run association between the oil price fluctuations and performance of stock market in Indian economy. The study also tries to assess the long run and short run causality between the oil prices fluctuations and performance of Indian stock market. Further, the study is organized in following sections; section 2 of the study discusses the review of existing literature, followed by data and methodology in section 3. The results are discussed in section 4 of the study while the findings and conclusions are discusses in section 5 of the study.

2. Review of Related Literature

A substantial amount of empirical research is available studying relationship between oil price shocks and macroeconomics variables. However not much empirical research work is available studying the relationship between oil price movement and stock market. This empirical study

gap becomes more profound in respect of Indian stock market.

Jones & Kaul (1996) studied the reaction of International stock market due to oil shocks. They studied the impact of oil shocks on changes in current and future real cash flow as well as changes in expected return. They attributed changes in US and Canadian stock markets' real return to the oil stocks. But result for the UK and Japan markets were not so strong. Huang et al. (1996) studied the relationship between daily oil future returns and daily US market returns and formal that oil return do influence the return of some oil company stocks, but oil future returns do not have any significant impact and general market indices. Contrary to the general perception, that a changes in crude oil price lead to fluctuations in stock prices, there is no consensus on it amongst the economists. Further the relevant literature offers divergent views regarding the impact of oil price shocks on the stock prices or collectively on stock market return.

Sadorsky (1999) observe an inverse relationship between oil price volatility and stock prices. Kaul & Seyhun (1990) also observed the negative relationship between oil price volatility and stock return. Sadorsky (2001) using multifactor analysis, observed the presence of several risk premiums and identified factor like exchange rate and interest rate, along with the oil prices themselves as major determinants of oil stock returns. His study observed a significant positive relationship between oil prices and stock returns coming from Oil and Gas firms. Papapetrou (2001) applied VAR method to study the relationship among oil prices, interest rates, real stock prices, real economic activity and employment in Greece and found that oil price changes affect employment and real economic activities. He found that an oil price shocks has a negative impact on stocks, as volatility in oil prices adversely effects output and employment growth. Hong et al. (2002) also found negative association between oil price returns and stock market Returns. Cobo-Reyes & Quiros (2005) studied the impact of oil price volatility on industrial production as well as on stock return. The study found that oil price volatility negatively affects the stock returns and industrial production. Though the oil shocks impact on stock return and industrial production are statistically significant, but the impact is stronger on stock return in comparison to industrial production.

Similarly, Basher & Sadorsky (2006) found strong evidence about the oil price volatility on stock price returns, in the case of emerging markets. It was observed that conditional relationship is not symmetrical as oil price increases have a positive impact on excess stock market returns for daily and monthly data, in emerging markets. Nevertheless, for weekly and monthly data, oil price decreases have positive and significant impacts on emerging market returns. Gogineni (2007) and Yurtsever & Zahor (2007) statically found that oil prices are positively associated with stock

prices if oil prices volatility is due to change in demand and found inverse relationship if oil price volatility is due to change in supply. They found that stock prices responds asymmetrically to changes in oil prices and observed that higher oil prices are associated with lower stock prices, whereas lower oil prices are not associated with higher stock prices. Bhar & Nikolova (2007) studied the influence the global oil prices on stock prices creation process and BRIC equity markets and found the time varying conditional correlation between BRIC equity returns and oil prices. They suggested that the quantum of impact of oil prices on stock returns in BRIC economics depends on the extent to which BRIC economics are net importer or exporter of crude oil.

Aloui et al. (2008) in general, oil price volatility has a negative impact on stock market return. Liao & Chen (2008) studied the impact of oil and gold prices on the performance of electronic and rubber industries by observing the performances of sub-indices of individual industries and found that both the electronic and rubber industrial sub-indices are influenced by the volatility in oil prices. In their study they found positive correlations among oil prices, electronic industrial sub- indices and rubber industrial sub-indices.

O'Neil et al. (2008) and Park & Ratti (2008) found that oil price shocks have a statistically significant negative effect on the stock prices. As BRIC economics are gaining ground many researchers have shown their interest in studying the impact of oil price volatility on stock prices. Gay (2008) carried out the time series analysis between stock market index prices and microeconomic variable like exchange rate and oil price for BRIC countries using the Box-Jenkins ARIMA model and concluded that there is no significant relationship between exchange rate and oil price on the stock market index prices of either BRICs. BRIC economics have shown weak form of market efficiency as no significant relationship was observed between present and past stock return.

Earlier conventional studies are criticized by Kilian (2009), as economist, treated oil price shocks as exogenous. He argued that oil prices responds to factors that also affect stock prices. His study suggested to decompose aggregate oil price stocks into the structural factors that reflect the endogenous character of such volatility. Chen (2009) conducted a study to check whether the stock market is pushed by high oil and runs into bear territory considering the monthly returns on S&P 500 Price Indices. The findings of the study indicates that there is high probability of a bear market emergence as a result of increase in oil prices. Ramos & Veiga (2010) studied the asymmetric effects of oil price fluctuations in international stock markets and found that surges in oil price depress international stock markets but drops in oil price do not necessarily result in increase in stock market returns. The study further revealed that the volatility of oil price has a negative impact on international

stock market returns. These results are found valid for stock markets of developed economies and emerging market returns are not proved to be responsive to oil price variations.

3. Data and Methodology

The present study considers the BSE Sensex as proxy stock market and Oil Prices (represented in US $) as sample of the study. The closing price of BSE Sensex and Oil Prices are considered for period of 2009 (FY) – 2017 (FY). To test the stationarity of both the time series variables, the Augmented Dickey Fuller (ADF) test is used. To assess the long run co-integration between the two financial time series variables, the Johansen Co-integration test applied. The long run causality between the oil prices and the closing prices of BSE Sensex is assessed using the Error Correction Mechanism (ECM) while the short run causality is tested using the Wald test.

4. Results and Discussion

The following Table 1 shows the results of Unit Root test conducted to see the stationarity of the oil prices and the closing price of BSE Sensex. From the table, it is evident that at level, the ADF statistics for oil prices and the closing price of BSE Sensex are -1.49756 and -1.64213 with the p-values of 0.5349 and 0.4607 respectively. This shows that at level both the variables are non-stationary. While testing at first difference, the ADF statistics for oil prices and the closing price of BSE Sensex are -44.5267 and -40.5171 with respective p-values of 0.0001 and 0.0000 respectively. This shows that both the time series variables are stationary at first difference. From the above results, it is evident that the oil prices and the closing price of BSE Sensex are integrated of same order and the Johansen co-integration test can be applied.

Table 1: Unit Root Test

Variables		ADF	
		Statistics	P-value
Oil Price	At Level	-1.49756	0.5349
	At 1st Difference	-44.5267	0.0001**
BSE Sensex	At Level	-1.64213	0.4607
	At 1st Difference	-40.5171	0.0000**

** Significant at 5% level of significance.

The following Table 2 presents the Trace Statistics of Johansen Co-integration test between the oil prices and closing price of Sensex. From the results it is clear that the null hypothesis of At Most 1 co-integrating is not rejected as the p-value of 0.5971 is higher than the 0.05 (5% level of significance). This shows that there is one co-integrating relationship between the oil prices and closing price of Sensex.

Table 2: Trace Statistics

	Hypothe-sized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.
Oil Price - Sensex	None *	0.008175	15.9009	15.49471	0.0434**
	At most 1	0.000147	0.279353	3.841466	0.5971

** Significant at 5% level of significance.

Table 3: Max. Eigen Statistics

	Hypothe-sized No. of CE(s)	Eigen value	Max. Eigen Statistic	0.05 Critical Value	Prob.
Oil Price - Sensex	None *	0.008175	15.62154	14.2646	0.0303**
	At most 1	0.000147	0.279353	3.841466	0.5971

** Significant at 5% level of significance.

The above Table 3 presents the Max. Eigen Statistics of Johansen Co-integration test between the oil prices and closing price of Sensex. From the results it is clear that the null hypothesis of At Most 1 co-integrating is not rejected as the p-value of 0.5971 is higher than the 0.05 (5% level of significance). This shows that there is one co-integrating relationship between the oil prices and closing price of Sensex.

After conforming the co-integration between oil prices and closing price of Sensex, the long run causality between the oil prices and the closing price of Sensex is assessed using the Error Correction Mechanism (ECM). From the following Table 4, it is clear that the value of error correction term is -0.005639 which is significant at 5% level of significance. This conforms that there is long run causality between the oil prices and the closing price of Sensex.

Table 4: Error Correction Mechanism

	Error Correction:	D(OIL_PRICES)
Oil Price - Sensex	CointEq1	-0.005639**
		[-3.82880]

** Significant at 5% level of significance.

The short run causality between the oil prices and the closing price of Sensex is assessed using the Wald test. From the following Table 5, it is clear that the value of Chi-square test is 1.058652 which is not significant at 5% level of significance. This shows that there is no evidence of short run causality between the oil prices and the closing price of Sensex.

Table 5: Wald Test Statistics

	Test Statistic	Value	df	Probability
Oil Price-Sensex	F-statistic	1.058 652	(1,1897)	0.3037
	Chi-square	1.058 652	1	0.3035

5. Findings and Conclusions

From the analysis of the study conducted in above section of the study, the results are showing that there is co-integration between oil prices and closing prices of Sensex. The results of ECM are showing that there is long run causality from oil prices to closing price of Sensex. The results of Wald test are showing that there is no short run causality from oil prices to stock market prices.

As the study aims to assess the causality between the oil price fluctuations and the stock market performance, the results of the study are showing that the oil prices affects the stock market in long run as there is long run causality from oil price fluctuations towards the performance of stock market. This indicates that the oil prices can be used as predictor for assessing the movement of the stock market. The investors should consider the oil price movement before taking their investment decision in stock market.

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