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Article

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Provided in Cooperation with:
International Journal of Energy Economics and Policy (IJEEP)

Reference: Hawaldar, Iqbal Thonse/Rajesha, T. M. et. al. (2020). Causal nexus between the anamolies in the crude oil price and stock market. In: International Journal of Energy Economics and Policy 10 (3), S. 233 - 238. https://www.econjournals.com/index.php/ijeep/article/download/9036/5018. doi:10.32479/ijeep.9036.

IJEEP
INTERNATIONAL JOURNAL OF ENERGY ECONOMICS AND POLICY
EconJournals
ISSN: 2146-4553

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2020, 10(3), 233-238.

Causal Nexus between the Anamolies in the Crude Oil Price and Stock Market

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Received: 28 November 2019 **Accepted:** 19 February 2020 **DOI:** https://doi.org/10.32479/ijeep.9036

ABSTRACT

The paper attempts to examine the causal association between the crude oil price anomalies and stock market returns in the Indian stock market. The study covers 9 years starting from 2009 to 2018, and the study includes ten companies in the oil drilling and exploration sectors listed in the BSE Sensex and CNX NIFTY indexes. We employed correlation tests in determining the relationships amongst the stock market return, crude oil price and market benchmarking indexes. Our study concludes that the oil price shocks is not directly affecting the stock prices of oil-related firms; instead, its indirectly impacting the economy through different channels such as fiscal, trade and price channels. We also suggest the need for future researches in determining the effect of oil price variations on the macroeconomic factors by precisely diagnosing the role of channels mentioned above.

Keywords: Oil Prices, Stock Market, Crude Oil Price, Emerging Markets, Indian Stock Market
JEL Classifications: G12, G15, Q43

1. INTRODUCTION

The oil price anomalies in the last few years have created colossal attention from the research scholars in exploring the nexus amongst oil price and financial markets. It plays a crucial part in the economy and a slight disparity in the oil price impacts most of the economic variables. Upon the liberalisation and integration of marketing, most of the developing nations resulted in augmented the level of investment, and it made investors susceptible to the stock markets of developing economies, owing to its relationship with oil price variation. Crude oil price volatility is often regarded as a vital factor in determining fluxes in-stock rates and vice versa. Studies found that price anomalies of the crude oil influence the expected earnings thereby affects the stock return value (Jones and Kaul, 1996). It is one among the prime significant economic aspect directing the entire economy at the macro level. Crude oil is the first among the energy sector is quite commonly used as an input by many industries. A minute variation in the crude oil price may affect various economic variables directly or indirectly. As crude oil plays as a significant role in the Indian economy, there is a mass of investigations and studies being conducted to analyse the long and short-run association between oil price and various economic variables since the oil shocks in the year 1973-1974. Examining nexus between these is a crucial issue to explore as the developing economies exert a more significant impact on global economic development. The nature of its interface varies concerning the country and its economic state.

To be more precise, this study is undertaken to study the pattern by which crude oil price affects the firm's stock prices and Stock market indices; which may guide the stakeholders in their investment decision in this sector. The analysis is based on the data of monthly share price of the selected companies in the oil and exploration sector for the past 9 years. India is the major importer of crude oil, and the price anomalies of crude oil affect the most. The historical trend in the oil price is following a random pattern,

and because of this, the capital investment in this sector did not provide any profit; as a result, most of the refinery companies cut back their investments and stopped the rigging activities. The global recession which began in the year 2007 and ended up to 2009 made this sector again fall to the ground as the crude oil price diminished from USD130 to USD30 per barrel. But because of the rapid recovery from the recession and by the technologies, the crude oil prices again reached USD100 per barrel in 2012. The average oil prices between 2011 and 2014 was USD110 per barrel, and it reached to a low of USD 29 in the year 2016, and since 2015 the average crude oil price is closed to USD50.

India ranks in the top ten oil-consuming and importing country. For a country like India, oil price shocks influence the inflation rates leading to trade imbalances, i.e. still higher current account deficit. This will also reduce the private disposable income and the profitability of the companies reducing the demand in the domestic area, reducing the stock prices, which will cause an adversarial effect on India's exchange rates.

Indian stock market is one among the most traded capital market in the world (Iqbal and Mallikarjunappa, 2007; Iqbal and Mallikarjunappa, 2009). It is a growing market provided and equipped where securities transaction can be carried out after their initial offerings which involve the intermediation of brokers, registrars, trading organisation, investors, lead bankers etc. It facilitates the precise and smooth running of corporate sectors where there is a free economy. It is a market for second-hand securities in the sense the securities which have been already traded once will be traded here. This trading can happen only through the authorised members and brokers while the outsiders or the investors are not allowed to enter the trade cycle. Again, this trade must happen following specific rules and regulations put forth by SEBI, deviations from it are not accepted. The origin of the capital market in India was during the eighteenth century. It was the time when the negotiable instruments were first issued used by east India company as loan securities. Indian stock exchange started its operation in the year 1930, where the stocks, shares of the Banks and firms and cotton presses got traded in Bombay, the financial hub of India (Iqbal and Mallikarjunappa, 2007; Iqbal and Mallikarjunappa, 2009). Though the scale of business was massive, the involvement of the brokers was less. There were only half dozens of brokers who took part in trading in the middle 18th century. In 1850 there was a sudden increase in numbers. A group of stockbrokers (22) sat under the banyan tree in Bombay and started trading. As a result, the brokers increased to 60 in 1860. Because of the breakup of American civil war and stoppage of cotton supply from the USA to Europe, the "Share Mania" in India began which increased the brokers' number to two-fifty (Iqbal and Mallikarjunappa, 2007; Iqbal and Mallikarjunappa, 2010). This eventually conceptualized the Bombay Stock Exchange (Iqbal and Mallikarjunappa, 2011).

The trading activities in Indian Stock Exchanges can be done only by its members, and the brokers do not play a direct role; instead, they act as intermediaries. An index is a measure that gives information to the investors about the movement of prices of the products commodities, financial or any other market. They are built to measure the price movements of bonds, stocks, treasury bills etc. It gives an overall picture of the market. A stock market index is done by selecting a group of stocks which represents the whole market or segment of the market, which can be used as a base for the comparison. An index is always calculated using a base period, and it is used as a performance indicator for various stocks and sectors. It indicates the overall performance of an economy and even in micro and the macro level. For instance, if the index goes up by 1%, then it indicates that the value of securities that constitute the index has also gone up by 1%. In a stock exchange, the variations in the prices will not relate to all the shares in the market. Some shares may go up, and some may go down or remain unchanged.

1.1. Objectives

- To check whether the crude oil price exerts any influence on the stock prices of the Indian Refinery sectors' companies
- To understand the nexus among crude oil price and Indian stock market indices. (S&P Sensex and CNX Nifty)
- To determine individual risk and return of selected stocks of Indian Refinery companies.

2. LITERATURE REVIEW

After the end of the second world war, anomalies in the crude oil price played a key role in the US stock market, since then numerous researches have undertaken to analyse the relationship amidst crude oil price and macroeconomic variables (Hamilton, 1983; Huang et al., 1996; Cüppers and Smeets, 2015; Ojikutu et al., 2017; Ulusoy and Ozdurak, 2018). (Henry et al., 2004; Nasseh and Strauss, 2000; Cook, 2006; Singh, 2010) the verified association among two on a postulation that the stock market performance is a significant indicator of economic growth. There exist many results from various studies, and we have summarised four major kinds of nexus amidst the oil price and capital market. (Jones and Kaul, 1996; Papapetrou, 2001; Hammoudeh and Li, 2005; Ghouri 2006; Chen, 2010; Iqbal and Mallikarjunappa, 2010) found significant negative relationship amongst two. Chen et al. (1986), (El-Sharif et al., 2005), (Arouri and Rault, 2011), (Zhu et al., 2014), (Park and Ratti, 2008) and (Cong et al., 2008) found a significant relationship; however, the relationship is positive or negative is contingent on numerous circumstances.

Henriques and Sadorsky (2008); (Apergis and Miller, 2009); (Al Janabi et al., 2010) discovered no significant relationship between oil price and capital market movements. Amongst Asia, Japan is the most explored market in literature. According to Burbidge and Harrison (1984) in OECD countries, the influence of global crude oil price anomalies has got less significance in the inflation and industrial production index as compared to the US market. (Hawaldar et al., 2017a); (Hawaldar et al., 2017b) studied commercial bank performances during the pre and post-oil price crisis and found that even in an oil-dependent country like Bahrain, the effect of oil price anomalies is non-significant. Ratti and Vespignani (2013) determined the relationship between oil price and liquidity for BRIC nations and they found a noteworthy association, primarily in the Indian and Chinese economy. Awerbuch and Sauter 2006, stated that in the recent years, the

nexus between stock returns of a firm and the crude oil price has gained attraction from the public mainly due to the evidence that the oil price exhibiting an extraordinary instability which caused uncertainty and the fluctuations in the oil drilling and exploration sector, which will affect the entire economy including the financial markets. They also argue that the intensification in the oil price led to an increase in unemployment and inflation, lowering the growth of the economy in macro-level.

Shaharudin et al. (2009), Iqbal and Mallikarjunappa (2011) compared the dynamic relationship among oil price volatility and the relative movements of stock price in UK, USA and Indian stock markets in the presence of economic variables, i.e. industrial productions and the interest rates and they found evidence for short as well as long-run nexus amidst the crude oil prices and the stock returns. Negi et al. (2011), based on their co-integration analysis, found the presence of long-term nexus amidst two variables in India and China. (Chittedi, 2012), examined the existence of long-run nexus between oil and stock prices in India and found that the stock price volatilities are affecting oil price and not the vice versa. Arouri and Rault (2012) claimed that the oil price anomalies affect the corporate earnings and the aggregate output dynamisms. The data regarding the levels of risk and how the return from the financial assets react concerning the oil shocks are used. This depicts a clear picture of how significantly the instability of oil prices bear an influence on financial decisions. Nath et al. (2014) suggest examining the nexus among oil and stock market prices is a critical issue to explore as the developing economies exert a more significant impact on the globe. However, the nature by which interferes varies from country to country and its economic state.

3. RESEARCH METHODOLOGY

The study comprises of 10 companies from the Petrochemical sector listed in NSE (CNX Nifty) and S&P BSE Sensex. The study is undertaken for a period of 9 years for all the companies listed below except Essar and Cairn India Limited. The exempted companies study period covers a period of 5 years between 2010 and 2015 and the study utilised monthly closing prices of the specified companies for the analysis. The companies are selected based on their market capitalisation and analysis is done by employing beta analysis and correlation techniques.

List of 10 companies selected for the study:

Benchmarking index	Name of the company
BSE–S&P BSE Sensex	ONGC–Oil and Natural Gas Corporation EO–Essar O CP–Chennai Petroleum MRPL–Mangalore Refinery and Petrochemicals Limited OI–Oil India
NSE–CNX Nifty	GAIL–Gas Authority of India Limited Cairn India Limited IOC–Indian Oil Corporation BPCL–Bharat Petroleum Corporations Limited TP–Tata Power

4. DATA ANALYSIS AND DISCUSSION

The correlation amid the return on a stock and the oil price is −0.0400 is a weak negative correlation indicates that even though the crude oil price increases, the counter effect on ONGC stock return is not reflected. According to Raza et al., 2016 the rise or dip in the oil price will negatively affect the emerging stock exchange markets such as India, China, Russia, Brazil, South Africa, Chile, Thailand, Mexico, Malaysia and Indonesia in the long-run. In the case of India, the impact of oil price rise does not directly result in the negative profitability of the firms listed in the Indian stock market; rather it will result in the fiscal deficit, depreciation of the rupee value against dollar and inflation thereby indirectly affect trading activities in the stock market. Similar outcomes are observed in the case of EO, IOC and BPCL, where the rise or fall in the oil price does not result in establishing a critical relationship with the stock return. The return on stock for the refinery as mentioned earlier companies is found significantly negative during the year 2011 to 2013, and then the crude oil price was ranged between 111.89 and 105.52 US$/BBL. This result compliments with the study of (Jones and Kaul, 1996); (Kilian and Park, 2007); (Sadorsky, 1999); (Papapetrou, 2001); (Hammoudeh and Li, 2005); (Ghouri, 2006); (Chen, 2010).

The rise in oil price resulted in upsurge cost of production, by means diminished the firms stock price and profitability. The study found an important nexus between the stock market index with the stock return value of the listed companies and Crude oil price. The correlation amidst return on crude oil prices and S&P BSE Sensex is 0.2010, which is common to all refinery companies listed in the BSE. The oil price versus stock return value in case of CP, MRPL, OI, GAIL, CAIRN and TP are weekly correlated; thus, we cannot conclude the nexus (Ghosh and Kanjilal, 2016) between the two, indicates the presence of a subcategory within the nexus between oil price and stock market type. The literature in this regard confronts the symmetrical and linear assumptions of past literature. It describes that the nexus of oil price or financial and macroeconomic variables is not only reliant on multiple factors, but it is non-linear and asymmetric (Lee et al., 1995); (Hamilton, 2003).

The Tables 1-3 measures the stock volatility concerning the specified companies against the changing oil price. The beta in case of ONGC indicates that 1% of in the global oil price will diminish the stock return of ONGC by 0.1814%. Negative Beta infers that the return on stock moves in the direction opposite to that of market return and the result is found similar for EO, IOC and BPCL. The beta for crude oil price with BSE Sensex and NSE is 0.1061% and 0.0925% respectively. The global crude oil price plays a vital role in the decision regarding the costs of the shares of the company. In comparison with other Oil Refineries selected for the study, ONGC stock exhibit unwavering returns from their stock. The announcement of the quarterly results, entering into a contract, foreign exchange revenues, revenues of the subsidiaries are the pivotal reasons for the fluctuations in the company's stock returns. The study displays a typical beta of <1, i.e., 0.1061 and 0.0925 for the crude oil prices concerning Benchmark indices. ONGC, Essar Oil, MRPL (listed in BSE) Tata

Table 1: Crude oil import and average price statistics

Year	Import (MMT)	Percentage of growth in export	Crude oil price (US$/BBL)
2009-2010	159.26	19.95	69.76
2010-2011	163.60	2.72	85.09
2011-2012	171.73	4.97	111.89
2012-2013	184.80	7.61	107.97
2013-2014	189.24	2.40	105.52
2014-2015	189.43	0.10	84.20
2015-2016	202.85	7.08	46.17
2016-2017	213.93	5.46	47.56
2017-2018	220.43	3.04	56.43

Content from the Ministry of Petroleum and Natural Gas

Table 2: Correlation among the variables

Variables	Return on stock	Crude oil price
Crude oil price ONGC	−0.0400	1
S&P BSE Sensex	0.1880	0.2010
Crude oil price_EO	−0.0246	1
S&P BSE Sensex	0.4796	0.2010
Crude oil price_CP	0.2732	1
S&P BSE Sensex	0.3364	0.2010
Crude oil price_MRPL	0.1171	1
S&P BSE Sensex	0.5109	0.2010
Crude oil price_OI	0.0910	1
S&P BSE Sensex	0.4618	0.2010
Crude oil price_GAIL	0.0738	
NSE–CNX NIFTY	0.5025	0.1705
Crude oil price_CAIRN	0.4335	1
NSE–CNX NIFTY	0.3153	0.1705
Crude oil price_IOC	−0.1399	1
NSE–CNX NIFTY	0.3404	0.1705
Crude oil price_BPCL	−0.1039	1
NSE–CNX NIFTY	0.5560	0.1705
Crude oil price_TP	0.2542	1
NSE–CNX NIFTY	0.7323	0.1705

Author calculations

Table 3: Beta measurement

Companies	Oil prices and stock price	Oil prices and S&P BSE Sensex
ONGC–BSE	−0.1814	0.1061
ESSAR OIL–BSE	−0.0388	0.1061
CHENNAI PETRO–BSE	0.3564	0.1061
MRPL–BSE	0.1400	0.1061
OIL INDIA Ltd.–BSE	0.0691	0.1061
GAIL–NSE	0.0588	0.0925
CAIRN INDIA-NSE	0.3359	0.0925
IOC–NSE	−0.1340	0.0925
BPCL–NSE	−0.1045	0.0925
TATA POWER–NSE	0.1378	0.0925

Author calculations

power and BPCL (listed in NSE) resulted in high Beta (Stock price and S&P Sensex) which is an indicator of higher volatility and risk from the above study. In contrast, low beta, i.e. <1, resulted in the case of GAIL, Cairn, IOC. ONGC, Essar Oil, Indian Oil Corporation and BPCL result in a negative beta which confirms that stock prices and the oil prices are independent of each other with variables portraying inverse relationship. In the case of ONGC stock, benchmark index (S&P BSE Sensex) and crude oil prices unveil highest positive correlation. Essar Oil, Chennai Petro, Oil India Ltd, MRPL (BSE listed oil stocks), GAIL, IOC, BPCL and Tata Power (NSE listed oil stocks) results in positive correlation among S&P Sensex and stock price. In the case of Cairn India, there lies a robust positive nexus between crude oil and stock prices. Less value of beta indicates that the stock has a below-average risk which means there will be less volatility in return on stock value. The volatility pattern is almost the same for both the indexes as the global oil price shocks impact as all the above-listed companies as all these firms imports crude oil as a raw material.

Our study results indicate that investments in the stocks of Indian oil refinery companies comprise less risk and its evident throughout our study period. Our study covers 9 years where the market has witnessed the rise and dip in the global crude oil price, and the test results indicate that the financial performance of Indian oil companies is marginally affected by the global oil price anomalies. The volatility in the stock return is balanced by the increased consumption and production of oil and its related products and services. The rise in the production, lead the oil price hike and it reached at 111.89 USD per barrel in the year 2011. During our study period, we observed that India is importing crude oil on an average growth rate of 6% every year. As a result, in 2017, India became the world 4th largest auto industry with an average increase of 9.5% in auto sales every year. As per (Nath et al., 2014) the effect of global oil price rise may not significantly impact Indian economy as it is a controlled market and the oil is the price is subsidised, thereby the adverse effect is less evident in the production cost and profitability of the Indian refinery companies. It should also be noted that income generation rate of India is significantly growing and as long as the growth exists the inflation in oil price may not significantly impact the Indian oil industry.

5. CONCLUSION

Despite the Government's initiative of introducing different subsidies to the oil companies, they are always under uncertainties. Our analysis found that the Indian refinery stocks do not provide an unwavering and favourable return except one stock, as the stock returns sensitive to the vicissitudes in the crude oil price. Beta, which indicates the volatility in stock concerning market is found useful for only a few companies, i.e. some companies show a negative beta which portrays that the oil price variations do not impact the stocks. Our findings suggest that impact oil price is not directly affecting the stock prices of oil-related firms rather its indirectly impacting the economy through different channels such as fiscal, trade and price channels (Bhanumurthy et al., 2012) which in overall contribution to the rise in interest rate, decline in industrial production, condensed discretionary income, postponed purchase of buyer durables, CPIetc. (Nazlioglu et al., 2019) (Kumar, 2009) (Bernanke, 1983) thereby threatens the Indian economy with its long-term impacts.

Our research is an attempt to identify the nexus between crude oil price anomalies with the stock market return of refinery companies and with the market indices. This study confirms that there exists an association between oil price and stock market returns. However, the correlation results do not support in establishing a strong relationship among the mentioned variables. As we earlier

described oil price volatility might not directly impact the Indian refinery sector as the state's policies on price regulation and subsidisation of oil price may neutralise the dynamic responses of inflation caused by the oil price shocks thereby positively impacts the GDP of the country.

The current study intended to present some insights for the policymakers and financial regulators in framing nations policies with regards to the economic and financial matters. The current research supports (Nath et al., 2014) as they argue, crude oil price volatility is not only the factor which causes stock market movements in the real-time commercial activities as there exist other macroeconomic factors too. The study also proposes future researches on determining the impact of oil price on the macroeconomic factors by precisely diagnosing the role of channels as mentioned above.

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