SJCC Management Research Review
Printed ISSN - 22494359
Vol: 4 No : 1 June 2014, Page No: 1-20

Impact of Crude Oil Price Volatility on Stocks of Oil Companies and other Industries

*Prof. Anand Patil, **Dr. V.K. Sawant

Abstract

In this era of economic growth the oil price changes have a significant effect on the development of the global economy. Crude oil is an important raw material for many industries, for some it is a primary raw material and for some it is a secondary raw material, so the extraordinary increase in the price of the oil is bound to warn the economy with inflationary tendencies. Hence most of the industries are affected directly or indirectly by the increase in the oil price. This report has analyzed the performance of stock market and the performance of various industries towards the crude oil price changes. For this purpose, this study has considered mainly BSE (Bombay Stock Exchange). This study has established the relationship between stock market with their crude oil benchmarks, MCX Crude Oil (Multi Commodity Exchange of India). It is based on the daily price stock price movement and crude oil price movement from 2008-2009 to 2012-2013. For analysis the first degree asset pricing model CAPM (Regression model) and different statistical tests have been applied using MS Excel.

Keywords: Stock Markets, Crude Oil Prices, Daily Market Returns, Correlation, Regression

*Alliance University, Anekal, Bangalore,**Savitribai PhuleMahilaMahavidyalaya, Satara, Maharastra

Introduction

In this new era, it is very much relevant to say that crude oil price is the perfect example of macroeconomic factor which can affect the movements of stock market and also the economy of any country. Crude oil is a worldwide required and essential commodity. Any variations in Crude Oil Prices have both direct and indirect pressure on the economy of different countries. Various transmission channels exist through which oil price fluctuations may affect stock prices. Indeed, the value of a stock in theory is equal to the sum of discounted expected future cash-flows. These discounted cash-flows reflect economic conditions (inflation, interest rates, production costs, income, economic growth, investors' and consumers' confidence, etc.), and then they are affected by macroeconomic events that possibly can be influenced by oil shocks. Thus, oil price changes may impact stock prices. India, which relies on import for 79 per cent of its oil needs, bought a total of 182.5 million tonnes crude in 2012-13. It had in the previous fiscal year imported 171.7 million tonnes of crude oil, up from 163.4 million tonnes in 2010-11 and 159.2 million tonnes of 2009-10. The volatility of crude oil prices drove many companies away and has affected the stock market also. For example in the context of Indian economy, oil prices, after hovering around $113 a barrel in the quarter ending March 2013, have dropped to $103 a barrel in??. The fall in Brent crude oil price could ease the cost pressure of a large number of companies, especially of those which use petrochemical products as a key input. Paints companies such as Asian Paints and Berger will be cheering the fall in the prices of crude oil, which accounts for almost a third of its raw material cost. For instance, titanium dioxide alone accounts for about 20 per cent of raw material cost. Textile companies, too, will benefit, especially those operating in the man-made fiber space like synthetic yarn. Crude oil derivatives such as purified terephthalic acid and mono ethylene glycol are the primary raw materials constituting about 50-70 per cent of the total sales value for polyester yarn. In the case of Sintex Industries, materials like plastic granules and PVC resins form a major part of the plastics division, accounting for over 70 per cent production cost. These materials are supplied by companies like Reliance Industries, GAIL and others. Companies like Jain Irrigation and Finolex Industries, which manufacture PVC pipes, will have a similar positive impact. Tyre companies – Apollo, CEAT and MRF among others – will also benefit, though to a lesser extent. These companies use carbon black and

synthetic rubber, which are crude oil derivatives. Analysts suggest that a 10 per cent hike in prices of these products could push up operating margins to the tune of 100-200 basis points. With the effect of the above the variation in share prices of various industries depending directly or indirectly on the oil as a raw material is reflected in the stock market. Any market-wide consequence may mask the performance, not necessarily uniform, of various sectors. Sector sensitivities to changes in the price of oil can be asymmetric; some sectors may be more severely affected by these changes than others. The sector sensitivities to oil depend on whether oil is an input or an output for the industry on the indirect effect of oil prices on the industry, on the degree of competition and concentration in the industry, and on the capacity of the industry to transfer oil price shocks to its consumers and thus to minimize the impact of these shocks on its profitability. Also from the point of view of portfolio management, indentifying the heterogeneity of sector sensitivities to oil implies that there are sectors that can still provide a channel for international diversification during large swings in oil prices.

Need of the Study

Changes in crude oil prices are often considered to be an important factor for understanding fluctuations in stock prices. With the advent of the knowledge of impact of Oil price variations on the stock market return, the investors and management can measure oil price exposure on equity values of firms operating in different industries and can thus decide to hedge or invest depending on whether the oil price exposure is economically significant or not.

Literature Review

The review of the different past studies can provide an idea for understanding the situations and finding on the different grounds by which the researcher elaborates the finding with logical reasoning.

In the case of Indian oil stocks the impact of oil price is negative, while in case of UK, the impact is mixed, negative for Royal Dutch Shell and positive in the case of Gazprom. One way to explain the variation in these results would be based on the oil reserves owned by these countries. The Oil & Gas Journal, Vol. 103, No. 47 (Dec. 19, 2005) estimated that the

US has oil reserves of 21.4 billion barrels while India has only 5.8 billion barrels. Thus, increase in oil price is good news to US and not for India. Accordingly, after acquisition of the oil company Sibneft, Gazprom, with 119 billion barrels (1.89×1010 m3) of reserves, ranks behind only Saudi Arabia, with 263 billion barrels (4.18×1010 m3) and this explains the positive relationship of its stocks with the increase in oil price while this is not the case with Shell. The industrial production index except for India does not have any influence on the stock prices. The effect of interest rates on the stock prices of the oil companies can relate to the D/E ratio of the company. It was seen that the D/E ratio for Exxon Mobil, Chevron, Reliance and IOCL was over 0.5 and they have a negative impact of the interest rates. While, Royal Dutch Shell and Gazprom have a debt to equity ratio (D/E) of less than 0.4 and are positively related with interest rates. If the oil company has high liability the effect on its stock is negative and vice versa. Cassar, Gavin John (2005) explains that financing-investment linkages play an important role in both the future operating performance of firms and how the market prices the firm.

Samuel Imarhiagbe (2010) analyzed the impact of oil prices on stock prices of selected major oil producing and consuming countries with nominal exchange rate as additional determinant. Daily stock prices, oil prices, and exchange rates for six countries (Mexico, Russia, Saudi Arabia, India, China, and the US.) from January 26, 2000 to January 22, 2010, are modeled as a co- integrated system in Vector Autoregressive analysis.

Miller J. Isaacc and Ronald A. Ratti (2008) have analyzed the long run relationship of oil prices and international stocks by using VECM. Kilian Lutz and Park Cheolbeom (2007) illustrated that the response of aggregate U.S. real stock returns may differ greatly depending on whether the increase in the price of crude oil is driven by demand or supply shocks in the crude oil market.

Jones and Kaul (1996) study the reaction of international stock markets (Canada, UK, Japan and USA) to oil price shocks on the base of the standard cash-flow dividend valuation model. The authors found that for the USA and Canada changes in market returns can be accounted for entirely by the impact of the oil shocks on cash-flows. The results for Japan and the UK were inconclusive. Using an unrestricted vector autoregressive model,

Huang *et al*. (1996) fail to establish a link between oil prices and market indices such as the S&P500. In contrast, Sadorsky (1999) applies an unrestricted vector autoregressive model with Generalized Autoregressive Conditional Heteroscedasticity (GARCH) effects to American monthly data and shows a significant relationship between oil price changes and aggregate stock returns in USA.

Park and Ratti (2008) show that oil prices have a negative impact on stock returns in the USA and in 12 European countries respond positively to rises in the price of oil. Finally, Apergis and Miller (2009) have examined whether structural oil-market shocks affect stock prices in eight developed countries. Using different econometric techniques, the authors find that international stock market returns do not respond overmuch to oil price shocks.

Very few studies have investigated whether oil price changes impact stock prices by sector. In addition, most of these studies are country specific and thus do not provide a global perspective. For instance, Sadorsky (2001) and Boyer and Filion (2007) show that oil price increases affect the stock returns of Canadian oil and gas companies positively. El-Sharif *et al*. (2005) reach the same conclusion for oil and gas returns in the UK. However, the authors show that non-oil and gas sectors are weakly linked to oil price changes. More recently, Nandha and Faff (2008) study the short-term link between oil prices and 35 Data Stream global industries and show that oil price rises have a negative impact on all but the oil and gas industries. Finally, Nandha and Brooks (2009) look into the reaction of the transport sector to oil prices in 38 countries and find that, in developed economies, oil prices have some influence on the returns to the sector. Taken together, the results from the work on the relationships between oil prices and sector stock returns differ from country to country and from sector to sector. The aim of this paper is to extend the understanding of the relationship between oil prices and stock returns at the disaggregated sector level in India by investigating short-term links using different econometric techniques over the last turbulent decade. Studying the short term effects of oil price fluctuations is important for several reasons. First, any market-wide consequence may mask the performance, not necessarily uniform, of various sectors. Sector sensitivities to changes in the price of oil can be asymmetric; some sectors may be more severely affected by these changes than

others. The sector sensitivities to oil depend on whether oil is an input or an output for the industry, on the indirect effect of oil prices on the industry, on the degree of competition and concentration in the industry, and on the capacity of the industry to transfer oil price shocks to its consumers and thus to minimize the impact of these shocks on its profitability.

Secondly, the industrial base varies from one market to another. Finally, from the point of view of portfolio management, identifying the heterogeneity of sector sensitivities to oil implies that there are sectors that can still provide a channel for international diversification during large swings in oil prices.

Objectives of the Study:

This research paper addresses the following objectives:

1. Does oil price volatility affect oil stock returns of Indian oil companies?
2. Does oil price volatility have the same effect on stock returns of various other subsectors?
3. To study the impact of oil price movements on various firms operating in different sectors.

Research Methodology

The aim of this paper is to look into the existence of relationships between oil price changes and sector stock returns in India. Our sample data include S&P BSE SENSEX and 6 Indian sector indices, namely *Automobile& Parts*, *Information Technology*, *Oil & Gas*, *power, realty and consumer durables. The study has been based on secondary data.* For the purpose of the study, daily market returns S&P BSE stock exchange as per its benchmarks SENSEX, and crude oil prices (spot rates) of MCX crude benchmark for India have been taken into account. Information regarding the SENSEX figures has been taken from the authentic and official website of Bombay Stock Exchange (www.bseindia.com). For gathering the data of crude oil benchmark as MCX CRUDE (spot) the official website www.mcxindia.com has been used.

The study is an empirical one which has been carried out by using the daily market returns, and also the daily crude oil prices (spot) of different crude benchmarks for five years from 2008-09 to 2012-13.

Tools: To judge the impact of crude oil price changes on stock market, the study has % changes in the figures of both variables. For this purpose correlation, regression and coefficient of determination have used through MS Excel software.

Overview of oil Industry in India

Indian oil and gas sector is highly regulated by the Ministry of Petroleum and Natural gas. The ministry influences exploration, production, distribution and marketing activities of companies in the sector. It has also a hand in the pricing of oil, natural gas and petroleum products to some extent. Despite the tight regulation, however, the private sector plays a major role, particularly in the downstream business. Oil was first struck at Digboi in Assam in 1889 and the total amount of Oil production was not more than 250,000 tonnes per year. Since then the sector has not seen back and has emerged as one of the core sectors for the country's economy. The Government of India declared the Oil industry in India as the core industry under the industrial policy resolution Bill in the year 1954. In pursuance of the 1954 Industrial Policy Resolution, Government-owned National Oil Companies ONGC (Oil & Natural Gas Commission), IOC (Indian Oil Corporation), and OIL (Oil India Ltd.) were formed. In 1955, ONGC was formed as a Directorate and then in 1956 became a Commission. Indian Refineries Ltd, a government company, was set up in 1958. Later In 1959, for marketing of petroleum products, the government set up another company called Indian Refineries Ltd. Then in 1964, Indian Refineries Ltd was merged with Indian Oil Company Ltd. to form Indian Oil Corporation Ltd. During 1960's, a number of oil sites were discovered by ONGC in Gujarat and Assam. Discovery of oil in February 1974 of significant quantities in Bombay High opened up new avenues of oil exploration in offshore areas. During 1970's and till mid 1980's exploratory efforts were made by ONGC and OIL India which resulted in the discovery of oil in Bassein, Tapti, Krishna-Godavari-Cauvery basins, Cachar(Assam), Nagaland, and Tripura. The National Oil Corporation during the 1970's used to produce and supply more than 70 percent of the domestic need for the petroleum, but by the end of 1980, this amount dropped to near about 35 percent. This was because the demand on the one hand was increasing at a good rate and the production was declining at a steady rate. The peculiar feature of the reform process in the oil industry is that it has a large and intimate global interface besides the domestic aspect of liberalization largely centering on licensing policies, pricing, restructuring and customer focus. Rapid industrialization necessitated that the economic policies be more focused towards achieving self-sufficiency. This goal manifested itself in a trade system where all imports were controlled through comprehensive exchange controls, quantitative trade

restrictions, canalization which was supplemented by a complex structure with high and differentiated rates. There was no scope for the export of Oil as India's Oil consumption was growing at the rate of 8.5 per cent during 1950s, 9.7 per cent in 1960s, 5.9 per cent during 1970s.

The Oil that is produced by the Oil Industry in India provides more than 35% of the energy that is primarily consumed by the people of India. This amount is expected to grow further with both economic and overall growth in terms of production as well as percentage. The demand for oil is predicted to go higher and higher with every passing decade and is expected to reach an amount of nearly 250 million metric ton by the year 2024. India was the fourth largest consumer of oil and petroleum products in 2011, after the United States, China and Japan. To satisfy demand, Indian upstream oil companies have acquired stakes in overseas assets. Existing domestic oil reserves and production is insufficient to meet the demand in India. More than 80% of India's crude oil demand was met through imports as of FY12. India also has crude oil reserves which are located offshore, in the west and onshore in the northeast. Substantial reserves, however, are located offshore in the Bay of Bengal and in Rajasthan state. India's largest oil field is the offshore Mumbai High field, located north-west of Mumbai and operated by ONGC. Another effort in India's large oil fields is the Krishna-Godavari basin which is located in the Bay of Bengal to meet the existing demand for Oil.

The sector also acts as a major source of tax revenue generation for India's central and state governments. Prices of many oil, natural gas and petroleum products are controlled by the central government. This sometimes forces downstream companies to sell finished products at unprofitable prices. Government subsidies partially cover the shortfall, but this puts a strain on central government finances and bloats the fiscal deficit. In FY13, the government instituted a slew of reforms geared toward reducing the subsidies, such as limiting the number of subsidized cylinders and incremental decontrol of diesel prices. These moves are expected to improve the earnings of industry operators in comingquarters. During FY13, Indian crude oil and natural gas (upstream) production declined. However, refining and other downstream activities registered growth.

According to Eia, India has approximately 5.7 billion barrels of proven Oil reserves, the second largest amount in Asia Pacific region after China primarily light and sweet crude. In 2010 India produced roughly 750,000 barrels crude oil per day. In 2010 India consumed 3.2 million bpd, and imports are rising, the cost of which represents a growing strain on India's Treasury. In 2010 India was the world's fifth largest net importer of oil, importing more than 2.2 million bpd, roughly 70 percent of its indigenous consumption, primarily from the Middle East, with Saudi Arabia and Iran supplying the largest shares.

Accordingly, Indian crude oil imports bill for 2011-12 now stands at $150 billion, of $475 billion, producing a trade deficit of $175 billion, with oil imports now comprising a massive 85 percent of India's total trade deficit. However ONGC has recently made a huge Oil discovery off west coast that will help the state owned firm raise its sagging Oil output. The new discovery was made in the currently producing D1 oilfield. The find "will catapult D1 to become the third largest field in western offshore after prolific Mumbai High and Heera. D1, which is currently producing 12,500 barrels per day (bpd), had an approved peak output of 36,000 bpd. With the new discovery, the peak output would jump to 60,000 bpd or three million tons a year. Currently, D1 is producing on an average of 12,500 bpd." ONGC accounted for 62 percent of India's crude oil and 49 percent of its natural-gas output in the first quarter of 2012 which ended 30 March. When D1 comes fully online by 2016-17, it will only replace India's Iranian exports, which are already due to shrink under UN sanctions, which India has agreed to observe. Today to meet its growing petroleum demand, India is investing heavily in oil fields abroad. India's state-owned oil firms have stakes in oil and gas fields in Russia, Sudan, Iraq, Libya, Egypt, Qatar, Ivory Coast, Australia, Vietnam and Myanmar. Indian Oil and Gas Industry has a vital role to play in India's energy security if India has to sustain its high economic growth rate.

Classification of sectors in Indian Oil industry

Indian Oil Industry is mainly classified into three main sectors:

- Upstream sector.
- Midstream sector.
- Downstream sector.

SJCC Management Research Review
Printed ISSN - 22494359
Vol: 4 No : 1 June 2014, Page No: 1-20

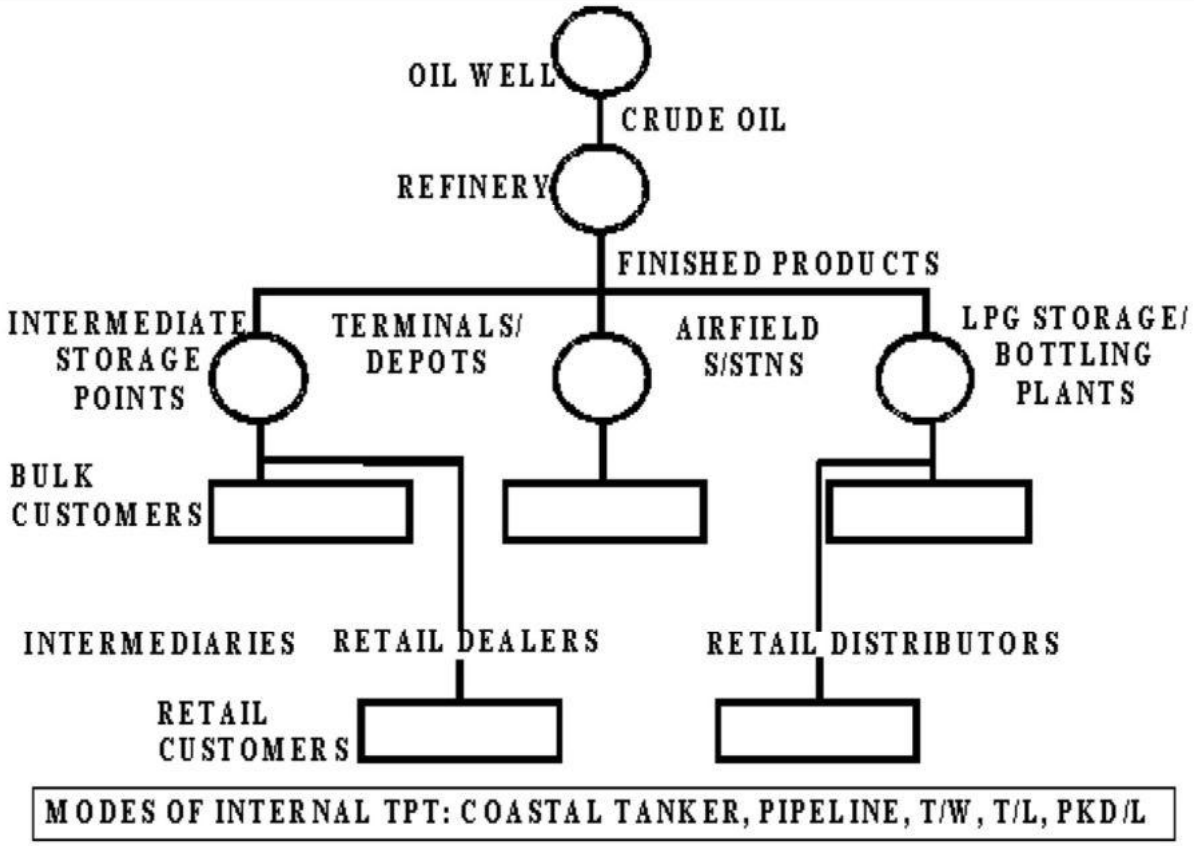


Figure1: Classification of sectors in Indian Oil industry

The flow chart above shows Oil Value Chain depicting the entire process under which both upstream and downstream segments are covered. Firstly, the crude oil is explored and produced (Upstream) and then transformed into various petroleum products with different end uses in refineries and finally marketed to retail customers (Downstream). Except Aviation Turbine Fuel (ATF) and Liquefied Petroleum gas (LPG), all the end products are sent to intermediate storage plants through terminal/depots and finally to retail customers. As regards ATF it is distributed directly to the Airfields or Air stations and refined LPG is dispatched to LPG storage/bottling plants for liquefaction and marketing to retail customers. Pipelines are mostly used to transfer the petroleum products and by-products. For onshore fields, coastal tankers are used.

Production and consumption trends

India has total reserves (proved & indicated) of 760 million metric tonnes of Crude Oil and 1330 billion cubic meters of natural gas as on 1.4.2012. The total number of exploratory and development wells and metreage drilled in onshore and offshore areas during

2011-12 was 756 and 1631 thousand meters respectively. The present Indian refinery capacity as on 01.08.2012 is 215.08 MMT which is expected to reach 218.40 MMT by the end of 2012-13. Refinery production (crude throughput) during 2011-12 is 211.42 MMT (including crude throughput by RIL SEZ Refinery).

During the financial year 2011-12, crude oil production was about 38.09 million metric tonnes (MMT), with share of national oil companies at 72.4%. The projected crude oil production in 2012-13 is about 41.12 MMT which is about 8% higher than the previous year crude oil production. The increase in crude oil production is mainly due to higher crude oil production from Barmer Fields, Rajasthan. However the provisional figures for the fiscal, released by the Ministry of Petroleum and Natural Gas, show that public and private/joint venture companies' crude oil production was 37.864 million tonnes as against the 2011-12 achievement of 38.089 million tonnes. The planned target for 2012-13 was 40.046 million tonnes. The reasons for the shortfall in crude and natural gas production in the eastern offshore-KG-DWN-98/3 fields, were water/sand ingress blocking the flow from nine wells in D1, D3 and two wells in MA. Elsewhere in the eastern offshore, the production gain was less than expected due to water loading in PY-1 while PY-3 field remained completely shut down since July 30, 2011, after the expiry of the contract for existing production facilities.

The reasons attributed by Oil and Natural Gas Corporation for the relatively less crude oil production at Mumbai High Offshore included a less than anticipated oil gain from new development wells. For Oil India, the shortfall in crude oil production from Assam and Arunachal Pradesh fields was a consequential effect of bandhs and blockades in the past several months. The trend in production of Crude Oil during the period 2004-05 to 2011-12 has remained in the range 33 to 38 MMT with year to year variations. During the year 2011-12, production of Crude Oil is 38.09MMT, which is about 1.08% higher than the actual crude oil production of 37.684 MMT during 2010-11.

SJCC Management Research Review
Printed ISSN - 22494359
Vol: 4 No : 1 June 2014, Page No: 1-20

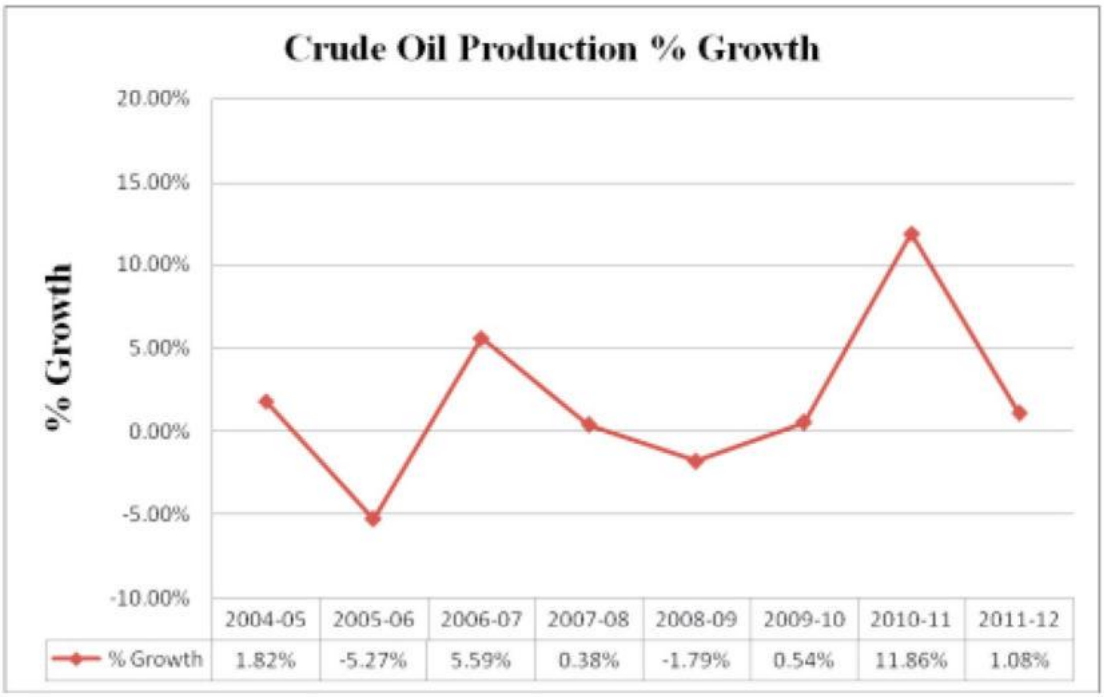


Figure2: Crude Oil Production Percentage Growth

India's crude oil production rose barely 1% in 2011-12 over the previous year to 7,63,000 barrels per day. Meanwhile, India's energy needs are exploding. The mismatch between domestic crude production and imports has dire consequences on Indian economy. India spent a staggering $ 160 billion to import crude oil in 2011-12, an amount equivalent to more than half of the country's total earnings from exports. For the past five years, crude oil imports have been equivalent to about 40 per cent of the country's total exports. In 2011-12, the figure was at an astonishing high of over 53 per cent. India's exports crossed $ 300 billion in 2011-12, while imports stood at $ 485 billion.

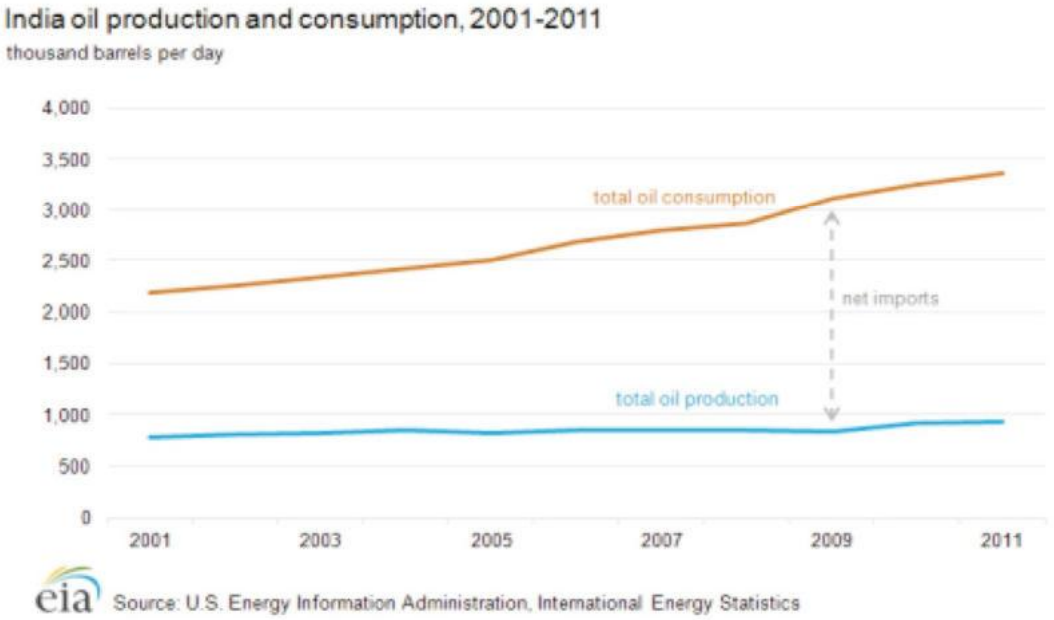
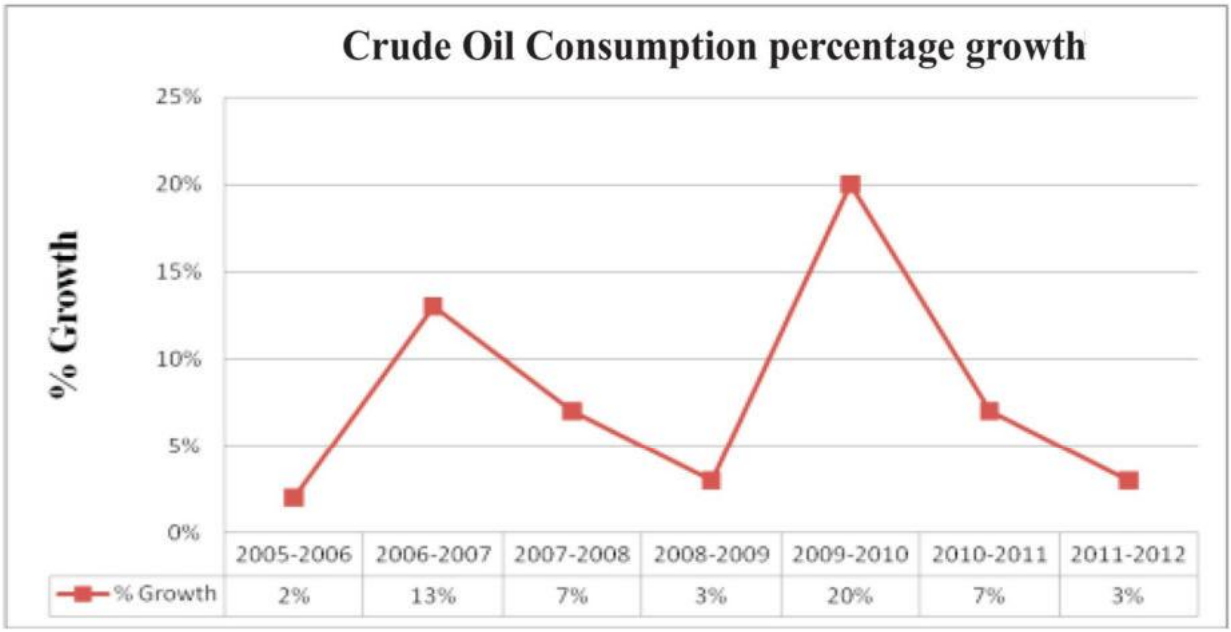


Figure3: India Oil Production and Consumption ,2001-2011

Of this, nearly a third, or $150 billion, comprises crude oil imports. The trade deficit has bloated to $175 billion. Oil imports now comprise a gargantuan 85% of the country's total trade deficit. India's total crude oil requirement in 2013-14 is expected to rise to well over four million bbd. Crude imports, however, should fall from the current level of 80% of total consumption to 75% if new oilfields prospected by Cairn and ONGC deliver on their promise by 2014.

Fig 3: shows the gap between total oil production and total oil consumption has been increasing since 2001.The total crude oil production is almost steady while the consumption has been increasing every year.



Source:http://www.eia.gov/countries/cab.cfm?fips=in

Figure4: Crude Oil Consumption Percentage Growth

The indigenous consumption of petroleum products increased by 3% during 2011-12 compared to the previous year 2010-11, while the production increased by barely 1% which resulted in escalating import bill.

3. Data Analysis:

Relationship between Oil Price changes and Stock market Returns

As a first step towards exploring the effect of oil price changes on market returns, the study estimates the regression for this as:$\mathbf{Rst} = \alpha + \beta\mathbf{Rot} + \varepsilon\mathbf{t}$ Where, **Rst** is the daily market returns (BSE), **Rot** is the oil price changes. The study included the MCX as the independent

variables. The results of this goal are discussed below:

Series	S&P BSE SENSEX	MCX CRUDE OIL	S&P BSE AUTO	S&P BSE IT	S&P OIL AND GAS	S&P BSE POWER	S&P BSE REALTY	S&P BSE CONSUMER DURABLES
Observation	1044							
Mean	0.000194	0.000496	0.000594	0.000691	(0.000173)	(0.000626)	(0.001163)	0.000395
Standard Deviation	0.011086	0.0178302	0.0129767	0.014182	0.013141	0.012593	0.021851	0.015248

The result of descriptive study shows that the mean of % changes in BSE returns is .000194 and the MCX Crude Oil mean is .000496. Std. Deviation for the two series is 0.011086 and 0.0178302 respectively.

Results of correlation and regression

	α	15786.8483 [0]
	β	0.52894333 [1.63687E-30]
BSE WITH MCX CRUDE OIL	Multiple R	0.344798595
	R Square	0.118886071
	Adjusted R^2	0.118040472

For the analysis purpose we have used the degree of relationship (R), regression (β) and coefficient of determination (R^2). We have assumed that there is no significant relationship between changes in oil prices and changes in stock market returns. The results are shown in the tables. For analysis the study includes the results of MS Excel software. The results also show the p value of t statistics in square brackets. In the case of BSE and

MCX oil prices, there is moderate relationship between the two variables; 0.344798595 and the p value for two tailed significance test is 1.63687E-30 which is significant at .05 levels. The beta coefficient and R^2 are 0.52894333 and 0.118886071, reflecting that 11.89 % changes occurred in BSE Sensex daily returns are due to the changes in MCX daily oil prices

	α	4383.789989 [9.3825E-132]
	β	1.08082954 [8.902E-165]
CRUDE OIL PRICE ON S&P AUTO	Multiple R	0.715925554
	R Square	0.512549399
	Adjusted R^2	0.512081597

In the case of BSE AUTO and MCX oil prices there is a very stronger relationship between the two variables as compared to BSE Sensex and MCX oil prices; 0.715925554 and p value for two tailed significance test is 8.902E-165 which is significant at 0.05 level of significance. The beta coefficient and R^2 is 1.08082954 and0.512549399, reflecting that the 51.25 % changes occurred in BSE AUTO daily returns are due to the changes in MCX daily oil prices.

	α	2810.963424 [1.348E-128]
	β	0.685848109 [1.0912E-158]
CRUDE OIL PRICE ON S&P IT	Multiple R	0.706588691
	R Square	0.499267578
	Adjusted R^2	0.498787029

In the case of BSE IT and MCX oil prices the relationship between the two variables is 0.706588691 and p value for two tailed significance test is 1.0912E-158 which is significant at .05 level of significance. The beta coefficient and R^2 are 0.685848109 and 0.499267578, reflecting that the 49.93 % changes occurred in BSE IT daily returns are due to the changes in MCX daily oil prices.

	α	12409.18215 [0]
	β	(0.707181478) [8.8844E-144]
CRUDE OIL PRICE ON S&P OIL AND GAS	Multiple R	0.682051725
	R Square	0.465194555
	Adjusted R^2	0.464681306

There is a strong positive relationship between the two variables as compared to the above sectors in BSE Oil & Gas and MCX oil prices; 0.682051725 and p value for two tailed significance test is 8.8844E-144 which is significant at 0.05 level of significance. The beta coefficient and R^2 are (0.707181478) and 0.465194555, reflecting that the 46.52 % changes occurred in BSE Oil & Gas daily returns are due to the changes in MCX daily oil price

	α	4988.133908 [0]
	β	(0.57144014) [0]
CRUDE OIL PRICE ON S&P BSE POWER	Multiple R	0.888693488
	R Square	0.789776116
	Adjusted R^2	0.789574365

In the case of BSE Power and MCX Oil prices the relationship between the tw variables is 0.888693488 and p value is 0 which is significant at .05 level of significance. The beta coefficient and R^2 are (0.57144014) and 0.789776116, reflecting that only 78.97 % changes occurred in BSE Power daily returns, and they are due to the changes in MCX daily oil price.

	α	5884.721405 [0]
	β	(0.774521889) [8.2909E-259]
CRUDE OIL PRICE ON S&P BSE REALTY	Multiple R	0.823538269
	R Square	0.67821528
	Adjusted R^2	0.677906466

In the case of BSE Realty and MCX oil prices, there is a very positive relationship between the two variables; 0.823538269 and the p value for two tailed significance test is 8.2909E-259 which is not significant at 0.05 level of significance. The beta coefficient and R^2 are (0.774521889) and 0.67821528, reflecting that only 67.82 % changes occurred in BSE Realty daily returns; they are due to the changes in MCX daily oil prices. On this ground the null hypothesis is accepted that there is no significant relationship or impact of MCX crude on BSE Sensex during the study period 2008-09 to 2012-13

	α	3566.771351 [3.3572E-92]
	β	0.529934785 [6.07148E-51]
CRUDE OIL PRICE ON S&P BSE CONSUMER DURABLES	Multiple R	0.441116365
	R Square	0.194583647
	Adjusted R^2	0.193810695

In the case of BSE Consumer durables and MCX oil prices, there is a low positive relationship between the two variables; 0.441116365 and the p value for two tailed significance test is 6.07148E-51 which is significant at 0.05 level. The beta coefficient and R^2 are 0.529934785 and 0.194583647, reflecting that the 19.46 % changes occurred in BSE consumer durables daily returns are due to the changes in MCX daily oil prices. On this ground the null hypothesis is rejected.

Findings

- 11.89 % changes occurred in BSE Sensex daily returns are due to the changes in MCX daily oil prices
- 51.25 % changes occurred in BSE AUTO daily returns are due to the changes in MCX daily oil prices.
- 49.93 % changes occurred in BSE IT daily returns are due to the changes in MCX daily oil prices.
- 46.52 % changes occurred in BSE Oil & Gas daily returns are due to the changes in MCX daily oil prices.
- 78.97 % changes occurred in BSE Power daily returns are due to the changes in MCX daily oil prices.
- 67.82 % changes occurred in BSE Realty daily returns are due to the changes in MCX daily oil prices.
- 19.46 % changes occurred in BSE consumer durables daily returns are due to the changes in MCX daily oil prices.

Recommendations

- Investors who are interested in investing in Oil sensitive stocks in India may, when oil prices are expected to remain high, select stocks from sectors, such as Power sector with high positive sensitivity to oil prices.
- When there is a decrease in oil price they may select sectors with negative sensitivity or less sensitive sectors to oil prices such as Consumer Durables sector.
- Since most of the sectors in India have different sensitivities to oil price changes, it means great risk diversification possibilities across industries in India. Selecting portfolio across rather than within sectors would be more efficient.
- Power industry, Auto industry and IT industry are more sensitive to Oil price fluctuations; so one can manage and diversify its portfolio more efficiently in the sectors.

Conclusion

This report presents the comprehensive view of stock market reaction to the crude oil prices changes on daily basis. The study provides some insights on the impact of crude oil fluctuations on different sectors operating in Indian economy. The research has focused largely on broad market indices (national indices) BSE and MCX crude oil for analyzing the relationship between oil prices and the stock market in India, sector by sector. The nature and sensitivity of the reaction of stock returns to oil price shocks change considerably across sectors. By this study, as per the first Among all the sectors analyzed, the consumer durables are least affected by the changes in crude oil prices. The second most affected sector due to oil price fluctuations is realty sector which shows about 67.82 % change due to change in oil price.

The study period does cover only the aspect of change of crude oil price on stock market. However it does not cover the other aspects which may also affect the stock market returns like euro zone crisis, recession, political imbalances etc. Our findings could be of interest to researchers, regulators and market participants. First, traders who are interested in investing in Oil sensitive stocks in India may, when oil prices are expected to remain high, select stocks from sectors, such as Oil & Gas, with high positive sensitivity to oil prices and alternatively when they expect decrease in oil price they may select sectors with negative sensitivity or sectors less sensitive to oil prices. They can also use oil-related derivatives. Thus, our results can be used to build profitable investment strategies. Second, that sectors in India have different sensitivities to oil price changes means great risk diversification possibilities across industries in India. Selecting portfolios across rather than within sectors would be more efficient. Finally, investors and portfolio managers should rebalance their portfolios in keeping with their views of the sign of coming changes in oil prices (rises or falls), and our findings suggest that diversification can be achieved across sectors in all cases of oil.

Limitations of the study

1. Research paper is based on secondary data collection technique
2. Research methodology does not go beyond the single factor CAPM model.
3. The research findings are limited as the research has been done considering the period 2008-2013 only.
4. Stock market returns may also be affected by many macroeconomic factors besides oil price fluctuations, which has not been taken into consideration.

References

- Shaharudin, Roselee S (2009) Performance And Volatility Of Oil And Gas Stocks: A Comparative Study On Selected O&G Companies *International Business Research,* Vol. 2, No. 4 Www.Csenet.Or/Journal.Html.

- Zhang, D. (2008). 'Oil Shock and Economic Growth in Japan: a Nonlinear Approach', *Energy Economics*, Vol. 30, No. 5, pp. 2374–2390.

- Ewing, B. T. and Thompson, M. A. (2007). 'Dynamic Cyclical Components of Oil Prices with Industrial Production, Consumer Prices, Unemployment and Stock Prices', *Energy Policy*, Vol. 35, pp. 5535–5540.

- Imarhiagbe Samuel (2010), "Impact of oil prices on stock markets: empirical evidence from selected major oil producing and consuming countries", global journal of finance and banking issue vol 4 no. 4 2010. Available onhttp://www.globip.com/pdf_pages/globalfinance-vol4-article2.pdf

- Glosten, L. R., R. Jagannathan, and D. E. Runkle, (1993) "On the relation between the expected value and the volatility of the nominal excess return on Stocks," Journal *of Finance* 48, p.1779-1801.

- Mossin, J., 1996. Equilibrium in a capital asset market, Econometrica 22, 265-290.

- Sharpe,w., 1964. Capital asset prices: a theory of market equilibrium under conditions of risk. Journal of Finance 19, 425-442

- Sunil K. Mohanty,Mohan Nandha, (2011) "Oil Risk Exposure: The Case of the U.S. Oil and Gas Sector" The Financial Review 46 (2011) 165–191

Website

http://petroleum.nic.in/