Oil Deregulation - Impact on Oil Marketing Stocks and Airlines in India- An Event Study Analysis

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Post liberalization, there have been lot of efforts to remove subsidies for various industries with stronger pressure on petroleum industry. Although the Indian polity was interested in deregulating prices of petroleum related products, volatility of global crude oil prices proved a dampener time and again. The policy shift of deregulation of crude oil on the 25th of June 2010 therefore was 'late' according to some and 'untimely' to others although there were people who welcomed the move and called it 'better late than never'. These sentiments made deregulation a very important event in the stock market. An event in stock market analysis is information in the public domain which may affect the financial performance of companies thereby the return on their shares. As forecasting stock prices and making high returns is the purpose of investment and analysis, event studies provide an efficient method of understanding stock market dynamics. This paper is an attempt to understand the impact of a major policy shift on the stock prices of companies affected by the change. As oil marketing companies are expected to be directly hit, it is expected that there would be a significant impact on its stock prices. To understand the efficiency of stock market in India, shares of airlines have also been taken as this sector is the worst hit by prices of ATF and the sector is already struggling with accumulated losses. A comparative study finds that abnormal returns, cumulative abnormal returns and standardized abnormal returns of oil sector stocks are significant whereas the airlines stocks are not affected. Results have been tested using constant mean returns model with three different event windows. We found also found a semi-strong efficiency in Indian stock market.

Keywords : Oil deregulation, event study, market efficiency, constant mean return model

Introduction

Since industrialization became a norm for assessing economic development crude oil acquired a position of significance. This became more marked when crude oil became a scarce commodity and the auto and airline revolution only intensified the process. With the formation of OPEC, conditions in the international crude oil market worsened with higher prices and oil attained the status of a necessity whose prices can tumble the world economy in a matter of days. Oil in India is a state regulated commodity with the simultaneous existence of both private and state players. The industry is controlled by the dedicated ministry – Ministry of Petroleum and Natural Gas. Oil India Limited is the flagship company in this sector operated and controlled by the ministry. India produces as well as imports crude oil so that it can feed its growing demand.

Market of oil and its components in India

The petroleum industry includes the processes of exploration, extraction, refining and transportation by oil tankers and pipelines and marketing petroleum products. The largest volume products of the industry are fuel oil and gasoline.

Petroleum is also raw material for many chemical products including pharmaceuticals, solvents, fertilizers, pesticides and plastics. The industry is generally divided into three categories such as upstream, midstream and downstream.

As petroleum is useful for many industries, it is of vital concern in any economy. Gasoline, Petrol, Liquefied petroleum gas, Detergents and Chemical fertilizers ETC are obtained from refining crude oil.

Oil Deregulation

Post liberalization, there have been lot of efforts to remove subsidies for various industries with stronger pressure on petroleum industry. Hence the policy shift of deregulation of crude oil on the 25th of June 2010 became a very important event. Prior to July 2010, the oil industry was a closely regulated one. Each link in the chain: exploration, extraction, refining, marketing and distribution were completely under check. The oil crisis of the 1970's was a major driver for India to intervene in the sector. The intervention led to a metamorphosis in the sector as the import parity in pricing gave way to Administered price mechanism. Under the APM, all entities are assured a minimum return on their investments. Criticism of oil sector regulation and the need to attract private investment has caused far-reaching changes in the regulation of the oil industry. The objectives of this deregulation are as follows:

- Increase competition in the industry by

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allowing the entry of more players. Only a competitive market can spur oil companies to deliver value to consumers and ensure the international competitiveness and long-term survival of the Indian oil industry.

- Attract private capital which, in turn, requires that market forces be allowed to operate freely.
- Remove constraints on economic pricing of products and services to enable the industry to earn a reasonable return on investment.

With the government's decision to begin deregulating the petrol and diesel markets, the Indian energy retail sector is likely to go through major pricing reforms. The June 25th decision of the Indian government's to free petrol and diesel prices and cancels subsidies on diesel is a step-by-step process to completely de-regulate the sector. This is very good news to oil marketing companies (OMCs). The move will improve the cash flows of the public as well as private OMCs. They can also now expect a level playing field in which to compete with their public counterparts. Post this private refiner and marketer Essar Oil has already started considering an effort to expand its retail network.

However, the country's past track record of excessive political interference in oil product pricing policies suggests that the change into a liberalized retail environment may not be straightforward. Although Government tried this policy in 2002, the effects were short lived as the government did not allow OMCs to increase product prices when crude prices soared during 2007-08.

This event affected all the industries in the Indian sub-continent, more those that were directly linked to it. The private OMCs will closely monitor the government's commitment in the next couple of years before finalizing their future marketing strategies. The oil extracting, refining, marketing will be affected by this major decision. The costliest of the petroleum products is ATF or air turbine fuel used by airline industry in a large measure. The price of this fuel will affect the airline industry to a very significant manner. Hence we can say that other than oil industry, airline is the main industry that will be significantly affected by the deregulation.

Event Study Analysis

An event in stock market analysis is information in the public domain which may affect the financial performance of companies thereby the return on their shares. In an efficient capital market, stock prices on any day fully reflect available information about the present value of the stream of profits that a firm is expected to earn in the future (Fama, 1991). Hence one can expect an immediate and persistent impact on the share prices.

Literature Review

An event study is a method to explore the reaction of investors to events such as policy announcements, dividend announcement etc. This method was introduced by Fama, Fischer, Jensen, and Roll (1969) for measuring the response in terms of stock market returns to company stock splits. As per Fama (1991), in an efficient capital market, stock prices on any day fully reflect available information about the present value of the stream of profits that a firm is expected to earn in the future. Any new information which affects the profitability of the firm and is different from investors' expectations can cause abnormal changes in the stock price. Event study as a methodology has been used as a tool for stock market analysis with different purposes. This review therefore encompasses all the purposes and a few reviews on each of them. A number of studies have been trying to find the cause of a mishap such as Asian crisis or global crisis whereas others tried to measure stock market efficiency on the happening of an event. These analyses used aggregate data for finding the cause of a major event or mishap. Delhaise (1998) found that Asian crisis was caused by an overgenerous and indiscreet lending by banks especially western banks, and then switching to overly strict lending policies when market turned sour. Radelet and Sachs (1998) find that financial panic caused the Asian financial crisis. There were also analyses that measured the impact of major policy measures on the stock market valuations. Stiglitz (1998) posits that developing economies are rendered more vulnerable because of unregulated capital flows which cause fluctuations in supply of international capital. These cannot be for a particular industry but for a sample of industries or the stock market indices. These are generally post event in nature and are useful for academic purpose and do not affect future policy or prediction purposes. Foreign investors tend to follow positive feedback strategies which cause markets to overreact to fundamental changes in value (Dornbusch and Park, 1995). Kim and Singal (2000) posit that in developing nations "movement of hot money" is the major concern for policy makers. They find that 'hot money' is highly sensitive to interest rate and future growth expectations of an economy and any adverse change in these factors will throw investments into chaos trend reversal over night destabilizing an economy.

The third category of studies analyzes the impact of an announcement by a company of its financial performance, bonus issue, mergers etc. These can be called micro studies when compared to the others. Miller and Modigliani (1961) was the first to show that certain events such as bonus issue will have no impact on share holder wealth. Sloan (1987) showed that bonus issues have no impact on stock prices at Australia. Peterson (1971), Bal, Brown and Finn (1977) found a positive impact on stock prices due to company announcements. Mishra (2005) found, on studying a sample of forty three companies that bonus issues cause a significantly positive change in stock prices and hence valuations of companies in India. Doran and Nachtmann (1988) using a sample of 879 firms issuing stock dividends and 898 firms announcing stock splits found that immediately after the announcements, there are significantly positive results immediately after the announcements. The methodology used in these studies measure abnormal returns that are arrived at based on expected returns using an estimation window for predicting returns. There are also studies that measure changes in stock price valuations after unconnected events such as changes in political scenario, terrorist attack etc which are macro in nature. These studies measure stock price fluctuations for a large group of companies after and before the event. These events are also not predictive in nature and may not check stock market efficiency as much as sector wise analyses.

In this paper, we are finding the impact of the event on stock prices of ten companies, four airline companies and six oil producing and marketing companies. The results will be grouped into oil exploration, oil refining and oil marketing companies into one group and airline companies in the second one.

Data

This paper is an attempt to understand the impact of the policy shift on the stock market of the sectors that are directly linked to it such as oil exploration, oil marketing and airlines. We use data on stock prices for 4 firms that belong to the airline industry and 6 firms that belong to the oil industry. (List attached in Appendix) To carry out the analysis, adjusted closing stock prices for the selected firms for 140 trading days prior to the announcement of the change in policy and 15 trading days after the announcement have been taken from yahoo finance and the corporate database of Centre of Monitoring Indian Economy (CMIE) – Prowess.

Event Study Methodology

Event study methodology tries to identify abnormal returns to certain changes in the environment that will affect that industry or firm. In this paper, the event under consideration is the policy shift of deregulation of crude oil that happened on the 25th of June 2010.

There are a number of parametric and non-parametric models for event Study analysis. In our study we have used constant-mean –return model. According to Brown and Warner (1980, 1985), the model is relatively uncomplicated but it yields more or less the same result when it is compared to sophisticated models.

Using event study methodology requires defining the event window. Event window is the period around the event during which the value of a stock is supposed to be impacted abnormally as a result of the event. Here, the event is defined as the date on which there was a policy change of de regulation of crude oil, i.e. 25th June 2010. A 1, 5 and 15 day - event window covering the announcement date is chosen. To evaluate whether information about the policy change might have been known to the markets prior to the announcement, a 20 day event window covering the day preceding the announcement is also analyzed.

Under constant mean- return model, the normal return is found for the estimation window by taking the simple average nominal daily return of the sample security for a relatively long period prior to event window

The estimation window has been taken as 120 days i.e.-140 days to -21 days. Daily return R_{it} of each of the companies are calculated as

$$R_{it} = \frac{(P_{it} - P_{it})}{P_{it-1}} \qquad (1)$$

Where P_{it} and P_{it-1} respectively represent closing share price of company i, at day t and t-1 respectively. The daily returns are derived for both the estimation window and event window.

Under constant-mean-return model the expected return of company i during estimation window is the average daily return of company denoted by μ_i

$$R_{it} = \mu_i + e_{it} \qquad (2)$$

For our study e_{it} is the disturbance term such that $E(e_{it})=0$ and $Var(e_{it}) \sigma_{it}^2$

Abnormal Returns

The abnormal return is the actual *ex post* return of the security over event window minus the normal return of the firm. We compute the 'abnormal return' for each sample company during the event window period. Abnormal return of a company

$$AR_{it} = R_{it} - \mu_i \qquad (3)$$

Cumulative Abnormal Returns

To be able to draw overall inference on the abnormal returns, the abnormal returns of the securities are summed up trading day wise.

In order to find out the impact the announcements have on the stocks, we calculate the average of the Abnormal Returns (AAR). We use the period of (-20, 0), (0,1) ,(0,5) and (0,15) to calculate the following:

$$AAR_t = \frac{\sum_{t=0}^{-20} AR_{it}}{n} \text{ and } AAR_t = \frac{\sum_{t=1}^{0} AR_{it}}{n},$$

$$AAR_t = \frac{\sum_{t=5}^{0} AR_{it}}{n} \text{ and } AAR_t = \frac{\sum_{t=15}^{0} AR_{it}}{n} \qquad (4)$$

Where AR_{it} is the abnormal return for the ith firm on day 't' and n is the length of the event period.

Cumulative Average Abnormal Return (CAAR) is the sum of AAR_t of the firms during the event period and N is the no of the firms taken for analysis

i.e. 4 companies for the airlines industry and 6 companies for the oil industry

$$CAAR_{t1,t2} = \frac{\sum_{i=1}^{N} AAR_{(t1,t2)}}{N} \qquad (5)$$

The t statistic of the CAAR and AAR is used to test the hypothesis whether the AAR on the exact day of the announcement and the CAAR during the event period are both zero. Since the event dates spread into periods, we can assume cross sectional independence of the data. The t statistic of AAR is calculated as follows:

Then, t statistic then is $t = \dfrac{AR_{it}}{SD_{AR}}$ $\qquad (6)$

Where SD_{AR} is the average standard deviation of the mean abnormal returns in event period?

Testable Hypothesis

The null hypothesis being tested is 'the abnormal returns around the de regulation of oil policy announcements are less or equal to zero'. If AAR, CAAR are statistically significant, it indicates that the stock prices either reacted positively or negatively to the policy announcement.

Results

Table 1

Airlines Industry

Event window	CAAR	t stats	Significance
(0,+15)	0.32	2.35	significant
(0,+5)	0.27	0.56	not significant
(0,+1)	-0.08	-0.06	not significant
(-20,0)	0.49	6.81	significant

Table 2

Oil Industry

Event window	CAAR	t stats	Significance
(0,+15)	0.10	0.79	Not significant
(0,+5)	0.43	0.7	Not significant
(0,+1)	1.91	0.54	Not significant
(-20,0)	0.56	6.6	Significant

The findings in the above table show average cumulative abnormal returns (CAAR) for one, five, fifteen days after the event, and 20 days before the event for the airline and the oil sector. The average cumulative abnormal return for the oil firms for 1, 5 and 15 days after the announcement of the policy change is positive but not statistically significant. That is not the case with event windows before the announcement. The cumulative abnormal returns averaged across the oil firms (CAAR) are positive and statistically significant for the twenty trading day's period (-20, 0). This indicates that the markets are semi strongly efficient.

The average abnormal return for the airline firms taken together on the first day and five days after the announcement of policy shift is positive but not statistically significant. For the 15-days period following the announcement, the cumulative abnormal return is 0.32 on average, which is statistically significant. Results similar to oil firms are also found for the airline firms in the 0,-20 day event window The cumulative abnormal returns averaged across the oil firms (CAAR) is 0.49 on an average which is statistically significant for the twenty trading days period (-20, 0).

Generalised Sign Test

We also carry out a non parametric test, to test for the significance of the abnormal returns. The sign test is a simple binomial test of whether the frequency of positive abnormal residuals equal 50%. The generalized test is a refined version of this test by allowing the null hypothesis to be different from 0.5.

To carry out this test under the null hypothesis of no abnormal performance we determine the proportion of stocks in the sample of 11 companies that have non negative abnormal returns. The value is estimated as the average fraction of stocks with non-negative abnormal returns in the estimation period.

The following statistic has an approximate unit normal distribution.

$$GS = \frac{|p_o - p|}{\sqrt{p(1-p)/N}} \qquad (7)$$

H0- If abnormal returns are independent across securities; number of non-negative values of abnormal returns has a binomial distribution with parameter p.

H1- the proportion is different than that prior to the event period and the abnormal returns are independent across securities.

Taking P_o as the fraction of positive returns computed across stocks of oil companies and airline companies in the three different event weeks, we calculate the statistic and the results are as follows:

Table 3

Event Window	Oil	Airlines
0-5	0.446211	5.019871
0-15	2.27986	15.53023
0-20	0.223105	22.08743

Interpretation

1. The statistic for oil sector is found to be significant at 0.05% level of significance for 5 day event window but for the event windows 0-15 and 0-20, the test statistic is significant at 0.01% level of significance.

2. In the case of airlines industry, the statistic is not found significant at all levels

This shows that the oil marketing companies show significant abnormal returns for the oil deregulation policy but that is not so for airlines industry. This shows that investors do not find any impact of oil deregulation on the airlines industry.

As AAR and CAAR have not been found statistically significant, which proves that the information about oil deregulation had mixed response from the investors? It was there fore decided to find **Standardized Abnormal Returns to find if the standardized abnormal returns across firms is equal to zero. In case it is equal to zero, it shows that the market discounted the information regarding oil deregulation.**

Standardised Abnormal Return: SAR

The purpose of standardization is to ensure that each abnormal return will have the same variance. By dividing each firm's abnormal residual by its standard deviation (obtained over the estimation period), each residual has an estimated variance of 1. The standardised residuals are given by:

$$AR_{i0} = \frac{AR_{i0}}{S(AR_i)} \qquad (8)$$

In a particular event week, the test statistic of the hypothesis that the average standardised residuals across firms is equal to zero, is computed as:

$$z = \frac{\overline{AR_0}}{S(AR_0)} = \frac{1/N \sum_{i=1}^{N} AR_{i0}}{S(AR_0)} \qquad (9)$$

Considering independence across firms and that ARi are id, AR'i are assumed distributed as unit normal and the standard error of the average standardized residuals is given by:

$$S(AR_0) = \frac{1}{\sqrt{N}} \qquad (10)$$

By the Central Limit Theorem, the statistic is distributed unit normal for large N.

The results are as follows:

Table 4

Event window	All firms	Oil Refining firms	Airlines
(-20,0)	0.347852	-6.45549	6.803339
(0,+15)	-1.07006	-5.87511	4.805046
(0,+5)	1.417914	-0.58038	1.998293
(0,+1)	2.41	2.21	0.20

The above results show that the average standardized residual across firms is not equal to zero. This shows that inter-firm dependence is absent in the stock market related to the industry. Based on the result we find that the market efficiency is semi strong.

Conclusion

The study found that the oil market indications of getting deregulated in the near future was in the knowledge of the players that they responded to the expected change well before the event would take place. We also find that inter industry dependence was not present neither in the oil industry nor in the airlines industry. We also infer that the stock market in India does discount for oil deregulation and the impact was on the oil marketing companies' stock but not on the airline industry as it was considered away from the event. We can say based on the above analysis that the Indian stock market has semi-strong information efficiency

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Appendix

Table 1

Airlines Industry

	Global vectra	Spice jet	Jet airways	Kingfisher
AAR(0,+15)	0.29	-0.42	0.73	0.70
AAR(0,+5)	1.33	-0.72	-0.60	1.06
AAR(0,+1)	0.32	-0.91	-1.45	1.71
AAR(-20,0)	0.40	0.38	0.22	0.96

Table 2

Oil Industry

	Cairn	Gail	Hindustan oil	IOC	ONGC	Selan
AAR(0,+15)	0.05	-0.55	0.60	0.54	0.37	-0.41
AAR(0,+5)	-0.76	-0.59	0.20	2.64	1.61	-0.48
AAR(0,+1)	0.54	-0.29	-0.72	7.76	4.78	-0.60
AAR(-20,0)	0.35	0.19	1.27	0.40	0.59	0.54