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Effects of Gasoline Price Changes on Short Term Market Behavior of Energy and Non-Energy Sector: Evidence from Saudi Arabia

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ABSTRACT

The gasoline prices are highly regulated in Saudi Arabia however due to economic reforms government has decided to increase the gasoline and other energy prices in different times in the coming 5 years. This study aims to analyze the impact of domestic gasoline price change on stock market performance of energy and non-energy sectors of the Saudi Arabia. The study has developed hypothesis and used event study methodology. Findings show that in short run increase in gasoline prices has negative effects on market performance of non-energy sector for which gasoline is a major unit in cost of production. The study results are more true for such non energy sector who could easily shift its increased cost to customers by increasing its product prices e.g., transportation sector. However, the study could not find any such evidences in the energy sector. These findings are of great implication to researchers, government regulatory bodies, and other stakeholders of stock markets.

Keywords: Economic Reforms, Gasoline Prices, Event Study Methodology, Tadawul Stock Exchange
JEL Classifications: E3, G1, P11, O13, L78

1. INTRODUCTION

As a part of economic and structural reforms Saudi Arabia has increased its domestic gasoline prices and later on electricity and water rates on 28th December 2015. It results in a 67% increase in the pump price of Octane 91 and 50% increase in Octane 95 price. This action was already taken by other oil exporting countries with an aim of reducing worldwide gasoline prices. MOF also revealed that this plan is further going to be executed over a period of 5 years (News, 2015 December 29).

The objective of this study is to analyze the impact of domestic gasoline price change on stock market performance of different sectors of the Saudi Arabia economy. Unlike other studies who focused on the effect of international oil price change or change in prices due to increase demand on stock market performance, this study has focused on gasoline price change due to the implementation of economic reforms.

The study has focused on Saudi economy due to three reasons. Firstly, it is one of the major participants in international oil supply

economies. Secondly, in Saudi Arabia gasoline prices are highly regulated and are normally not showing fluctuations nearly fixed like other developing economies. Thirdly, energy and non-energy sectors are considered as they both are expected to respond in opposite directions. The reason behind this is for energy sector gasoline is a source of revenue while for the non - energy sector, it is a cost of production. When revenue is expected to increase it should increase stock prices and for cost it is vice versa. Hence the findings of this study would be of great awareness for interested users.

The results of this study are of great implication to various groups, including the researchers, government regulatory bodies, and other stakeholders of stock markets. For the regulators it will give an idea that up to what extent they should control the impact of gasoline price change on different sectors of the stock market. For the investors, they can predict the performance of stock markets in the future when the gasoline will again hike.

The paper is organized as follows. The next section deals with review of literature. Section 3 focuses on data and methodology

of study. Section 4 includes results and discussions followed by last section conclusion and future research.

2. LITERATURE REVIEW

Investigating the oil price effect on stock market performance remains a topic of interest for researchers since long time. Extensive research has been conducted to study impact of oil price change on stock market returns. The phenomena have taken up attention of researchers in testing the hypothesis that oil is major input for many industries and its price fluctuations has an effect on the cost of production for many industries (Anderson and Subbaraman, 1996). Such studies are also important for investors for developing their investment portfolios in a way which increase their profit and reduce risk.

Existing literature shows that some studies carried out in developed countries like USA found mixed results regarding oil price change and equity value. Some of them found a positive effect of oil price change on equity value i.e., Faff and Brailsford (1999) El-Sharif, et al. (2005) and some find negative impact i.e., Kaul and Seyhun (1990); Jones and Kaul (1996) Sadorsky (1999) Cunado and Gracia (2014). Some studies have reported that positive or negative impact is caused by the fact that the rise in price is due to supply side (shortage) or demand side (higher demand) (Kilian and Park, 2009).

Some studies are also carried out in order to test the impact of global oil prices on stock market returns i.e., Nguyen and Bhatti (2012) has studied the effect of global oil price variation on Chinese stock market and could not find any strong presence of effects. The same findings were reported by Wen et al., (2012) while studying the effect of energy on China stock market during the financial crisis. In a study carried out to analyze the effect of global oil price change on Jordanian stock market Bouri (2015) has found that risk spillover was high in the post crisis period while in pre crisis period there was lack of risk spill over. Le and Chang (2015) has examined three Asian economies in order to analyze the impact of oil price change on stock market. They reported that the pattern in which market response to increased oil prices varies in different markets and periods.

Cong et al. (2008) estimated a vector auto regression model and found that the impact of oil price changes on Chinese sectoral stock returns is negligible, except in the case of manufacturing and oil companies. Li et al. (2012) used a panel method and reported a positive long-run effect of real oil prices on sectoral returns. Caporale et al. (2015) has studied the time-varying impact of oil price uncertainty on stock prices in China by using weekly data on ten sectoral indices over the period January 1997-February 2014. The findings showed that during demand side shocks, oil prices change positively affect stock market returns for all sectors except financial, oil and gas sectors who show a negative response to oil price uncertainty during periods with supply-side shocks.

It is evident from the literature review that other studies focused on the effect of international oil price change on stock market performance. Some of them has investigated the effect of such oil prices change due to increase demand on stock market performance. This study has focused on gasoline price change due to structural and economic reforms. Up to researcher knowledge, no study has focused on such economy in which the prices of gasoline are almost fixed and they are changed due to government orders only. Hence this study has considered Saudi Arabia economy for analysis purpose.

2.1. Hypothesis of Study

In order to answer the research question that does domestic gasoline price shift have any effect on stock market performance of energy and non-energy sector, the study has developed following three hypotheses.

- H_{01}: Cumulative mean daily excess return over $(-1,+1)$, $(-3,+3)$, $(0,10)$ and $(-10,+10)$ intervals are equal to zero.
- H_{a1}: Cumulative mean daily excess return over $(-1,+1)$, $(-3,+3)$, $(0,10)$ and $(-10, +10)$ intervals are not equal to zero.
- H_{02}: There is no difference between stock abnormal returns of energy sector and transportation sector due to change in petrol prices.
- H_{a2}: There is a difference between stock abnormal returns of energy sector and transportation sector due to change in petrol prices.
- H_{03}: There is no difference between the stock market abnormal returns of energy (non-energy) sector before and after event day.
- H_{a3}: There is a difference between the stock market abnormal returns of energy (non-energy) sector before and after event day.

3. DATA AND METHODOLOGY

To investigate the short term effect of increased gasoline prices on stock market performance of energy and non-energy sector the study has taken into consideration an estimation window of 252 days before the event date (Figure 1). The study period starts from 11th December 2014 and ends at 31st August 2015. Energy sector includes three companies while in non-energy sector, which is the transportation sector for this study four companies are observed.

In order to compute stock's return the daily prices of each stock was collected from the Tadawul stock exchange and the by using following formula returns were computed.

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \tag{1}$$

Where $P_{i,t}$ is price of security I on day t and $P_{i,t-1}$ is the price of security I 1 day before day t.

In order to compute abnormal returns OLS market model and market adjusted return model by Brown and Jerold (1985) is used. Market adjusted return model was used for the robust testing purpose.

If $R_{i,t}$ is observed mean return for stock I at day t. $AR_{i,t}$ is daily stock excess (abnormal) return of stock I on day t. For every stock daily excess returns are computed by using the following procedure:

3.1. OLS Market Model

$$AR_{i,t} = R_{i,t} - \mu_i - \beta_i R_{m,t} \tag{2}$$

Where α and β are the slope and intercept respectively, computed from estimation window, $R_{m,t}$ is return on All share index of the Tadawul stock exchange.

3.1. Market Adjusted Return Model

$$AR_{i,t} = R_{i,t} - R_{m,t} \tag{3}$$

Cumulative abnormal returns (CARs) are calculated by using the following method:

$$CAR\,(t_1,t_2) = \sum_{t=t_1}^{t_2} AR_{i,t} \tag{4}$$

Where t_1 is the starting time of CARs window and t_2 is the ending time.

The first hypothesis was tested by using one sample t-test while hypothesis 2 and 3 was tested by using independent sample t-test. In order to test the significance of these abnormal returns and CARs, t-statistics was used.

All the analysis was conducted by using Statistical Package for the Social Sciences.

4. RESULTS AND DISCUSSIONS

In order to test the first hypothesis of the study that CARs of energy and non-energy sector are different than zero or not one sample t-test was conducted. Tables 1 and 2 shows the results of the analysis.

Results in Table 1 show behavior of energy sector due to increase gasoline prices. It was found that cumulative mean daily excess returns in any of selected interval did not show

significant difference than zero. Same hypothesis was tested for the transportation sector.

Results in Table 2 show that cumulative mean abnormal returns around the event day were negative, but insignificant for 3 days and 7 days window. But when it was tested for 11 days' interval starting from implementation of the decision means day 0 till the 10th day, the cumulative mean abnormal returns become significantly negative.

Figure 2 shows the daily abnormal returns for both sectors. It could be noticed that on the day of announcement in gasoline prices both the sectors show a drift in stock prices, but immediately on day 2 they have started to fall. A significant decrease in transportation sector is clear from figure as well. In order to test the second hypothesis of study i.e., is there a difference between CARs of energy and non-energy sector over a 3 days event window (0,2), 5 days event window (−2,2) and 11 days event window (−5,5), independent sample t-test was conducted. Results are presented in Table 3.

Results in Table 3 show that in all the three selected time intervals it was found that with the increase in gasoline price energy sector has shown higher positive CARs as compared to non-energy sector i.e., transportation sector. 3 days event window this difference is significant at 10%, but for the two windows i.e., 5 days and 11 days event window no significance was found.

The study has also investigated the change in market behavior of energy and non-energy sector before and after the change in gasoline prices. Table 4 shows the results around 21 days event window.

Findings in Table 4 show that both the sectors show higher positive returns in the pre event period as compared to post event period.
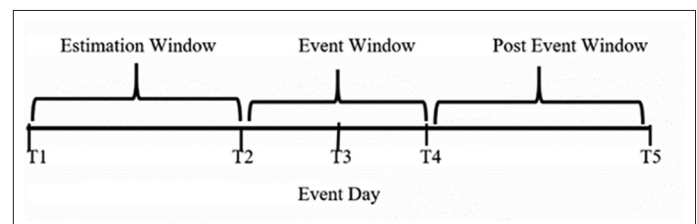
Figure 1: Event study window

Table 1: CARs of energy sector

CARs	Abnormal returns	t-value (significant)
3 days event window (day −1 to +1)	0.00376	0.457 (0.692)
7 days event window (day −3 to +3)	0.001161	0.263 (0.801)
11 days event window (day 0 to +10)	−0.003669	−1.074 (0.308)
21 days event window (day −10 to +10)	−0.003590	−1.371 (0.185)

CARs: Cumulative abnormal returns

Table 2: CARs of transportation sector

CARs	Abnormal returns	t-value (significant)
3 days event window (day −1 to +1)	−0.00208	−0.362 (0.752)
7 days event window (day −3 to +3)	−0.00175	−0.652 (0.538)
11 days event window (day 0 to +10)	−0.13047	−2.289** (0.045)
21 days event window (day −10 to +10)	−0.006741	−1.915* (0.070)

CARs: Cumulative abnormal returns

Table 3: Comparison of energy and non-energy sector CARs

| Event window	Mean difference	t-value (significant)
3 days event window (0,2)	0.0131597	2.300 (0.083)*
5 days event window (−2,2)	0.0038508	0.591 (0.571)
11 days event window (−5,5)	0.0048083	0.879 (0.390)

CARs: Cumulative abnormal returns

Table 4: CARs before and after increase in gasoline prices

Sector	Mean difference	t-value (significant)
Energy	0.0066	0.403 (0.691)
Non-energy	0.0464	1.933 (0.068)*

CARs: Cumulative abnormal returns

Figure 2: Abnormal returns in event window for energy and non-energy sector
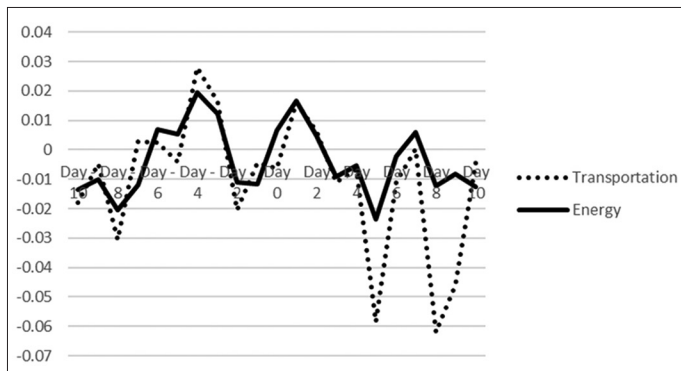
The mean CAR difference between pre and post event for the energy sector is positive but insignificant. However, for non-energy sector the difference between pre and post event CARs is found to be significantly positive at 10%.

5. CONCLUSION

Stock markets are said to be a barometer of the economy, which means they represent changes in the economy. The recent study has analyzed the Saudi Arabia stock market in order to find the answer of research question that how energy and the non - energy sector has responded to increase in gasoline prices which is a part of recent economic reforms in Saudi Arabia. In order to find the answer of research question several hypotheses were tested. Following are the findings of the study:

For energy sector cumulative mean abnormal returns in any of selected intervals did not show significant differences from zero. For non-energy sector cumulative mean abnormal returns around the event day were negative and insignificant for several time intervals.

After the increase in gasoline prices for the 1st day both the sectors have shown a positive trend in prices, but immediately on the 2nd day they show a sudden decrease which was more significant for non-energy sector.

While comparing both sectors energy sector has shown significantly positive response as compared to non-energy sector.

Finally, the comparison of pre-event window CARs with post event window show that non energy sector has faced a significant drop in stock prices after the increase in gasoline prices. However, for energy sector the difference was insignificant.

Summing up, the findings of the study show that in short run increase in gasoline prices has negative effects on market performance of the non - energy sector for which gasoline is a major unit in cost of production. The study results are more true for such non energy sector who could easily shift its increased cost to customers by increasing its product prices e.g., transportation sector. However, the study could not find any such evidences in the energy sector.

A long term impact could be tested after the implementation of the second phase of the gasoline price hike in 2017. Secondly, transportation sector considered as non-energy sector in this study. The advantage in this sector is that it could easily transfer its input cost which is gasoline to the ultimate users by increasing fare prices but for other sectors like food and beverages gasoline is an indirect input so it increases their cost of production. It is not easy for them to increase their product prices. Future studies could also focus on them so that certain course of actions could be recommended to the companies in order to survive in such situations.

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