ASSESSING THE IMPACT OF OIL PRICES ON STOCK RETURNS OF DIFFERENT SIZE FIRM’S

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Abstract- The main objective of this study is to examine the impact of oil returns and oil price volatility on stock returns. The study also aims to examine the different impact of oil price volatility on stock returns of small and large firms. The study uses the unbalance panel of 212 manufacturing firms listed at Karachi Stock Exchange (KSE) for the period 2005 to 2012. The Feasible Generalised Least Squares (FGLS) panel data regression technique is used to estimate the empirical models. The results show that both oil price returns and oil price volatility are statistically related to stocks returns. The results also revealed that the impact of oil price volatility is greater for small firms as compared to their counterparts. The results will help firm’s managers and investors to design effective hedging strategies.

Key words: Firm size, stock return, oil prices

1. Background of Study

In any country financial sector plays a very important role in growth of the economy. Stock market is a key institution of financial sector which provides a platform where borrower and lender can easily fulfill their needs. Stock markets are anticipated to accelerate economic growth by providing boost to domestic saving and increasing the quantity of investment. Stock market performance is a real image of a country economic performance. It has captured a great amount of attention of many researchers like Kunt and Levine (1996), Singh (1997), and Livine and Zervos (1998). They found that stock market performs a significant part in country economic growth. However, various factors influence the performance of the stock markets. Such as Spyrou (2001) investigated the link between inflation and stock prices return for the Greece. The result of their study indicates a statistically significant and negative link between inflation and stock returns. Further, the impact of interest rate and foreign exchange rate changes were examined by Joseph (2002) on UK firms for the period of 1988 to 2000. The findings of their study reveal that the negative impact of interest rate changes is greater than foreign exchange rate changes on industry stock return. Mei and Hu (2000) investigated the time variation of property stock returns of some Asian countries and the USA. The variables of their study are spread between short term and long term interest rates, dividend yield on the market portfolio, short term interest rate and changes in the exchange rates. Their results of the study suggest that the risk premium of the real state stock return of Asian countries significantly affected by
macroeconomic risk factors and they varied largely.

Similarly Liow et al. (2006) studied the link between real estate stock market returns and some important macroeconomic risk factors such as inflation, GDP growth, money supply, interest rate, industrial production growth, and exchange rate for some major markets namely Japan, the UK, Hong Kong and Singapore. They found that the impact of macroeconomic risk factors was diverse across the real estate stock markets.

There is another strand of literature that has examined the impact of oil prices on stock prices. Indeed analyzing the link between stock prices and oil prices is one of the growing area of research in these days. Several studies, such as Sadorsky, (1999), Ciner, (2001), Hammoudeh and Li, (2005), Ghouri, (2006), Diesprong et al.,( 2008), Elyasiani et al.,( 2011), Ono (2011) Narayan and Sharma, (2011) Lee et al.,( 2012). The key finding emerging from their studies suggest that their exist a significant relationship between oil prices and stock prices.

Theoretically, changes in oil prices impact returns of stock through various channels as proved by many researchers. In this regard the sum of discounted expected future cash flows is equal to the stock value and depend on oil prices. Suppose an unexpected rise in the prices of oil would increase the cost of energy of various firms (assuming that these firms would not hedge against the risks in oil prices). As a result, the profits and cash flows of firms could drop. In this way the investors and the analyst, while valuing a stock, would anticipate further rise in prices of oil and hence would estimate reduction in expected cash flows, consequently reduced value of stock.

Oil prices may also affect stock return indirectly. For example, if the inflation caused by oil price shocks, the production cost ( labor cost, overheads, and material cost) for most of the companies could be increase and consequently, due to lower cash flows the intrinsic stock prices would be depressed. If the stock markets reflect the intrinsic values of stock in the stock prices, the stocks prices should decrease and consequently lead to a fall in stock price returns.

Overall impact of oil prices on stock returns can be judged from the fact that whether a company is a producer or consumer of oil and oil related product. As for as the world is concerned oil production by companies is low as compare to its consumption, hence stock market are expected to be negatively affected by oil prices.

Many previous studies document that important link exists between change in oil prices and stock prices. For instance, for a sample of four developed countries i.e., United Kingdom, Canada, United States, and Japan; Jones and Kaul (1996) argue in their study that oil price shocks have negative impact on combined stock market return. Faff and Brailsford, (1999) analyzed returns of equity of Australian industry sensitivity to factors of price of oil. Their findings suggest that sensitivities seem to be a long-term, and further maintain that industries are not same and therefore there can be different determents that can potentially affect industry returns of stock. Further, El-Sharif et al. (2005) investigated the link between stock return and oil pricing risk. They found that different risk factors (crude oil prices fluctuation, the rate of exchange and stock market condition) affect oil and gas stock prices return. Basher and Sadorsky (2006) also studied the effect of changes in oil prices on stock prices for a large set of developing countries. The results of their study suggest that, in pricing
emerging stock market returns, oil price risk play an important role. They used conditional risk analysis and found that for monthly and daily data a positive link exists between market betas and returns gaining in up markets while a negative one in down markets, in spite of significant contribution from the mentioned literature but none of them have investigated the link between oil prices, firm size and stock prices of firms.

1.1 Research Gap

Reviewing the existing literature we observe that many researchers have attempted to examine the link between movements in oil prices and stock prices. Nevertheless, very limited researches yet have been conducted to examine the link between oil prices, firm size, and stock prices return. However, the focus of these studies is mostly on developed and emerging countries. Thus we know relatively less how stock prices in developing countries like Pakistan respond to oil prices and oil price volatility. Yet, examination of oil prices effects on stock prices is important as it helps firm managers and investors in designing appropriate hedging strategies.

1.2 Objectives of the Study

The present study focuses on the impact of change in oil prices on firm stock prices in Pakistani perspectives when it varies with respect to its size. Relative to a large firm, do oil price movements have large impact on stock prices of large firms or small impact on small firms stock prices?
Specifically the study has the following two objectives:

1. To examine the impact of oil price returns and oil price volatility on stock returns of listed manufacturing firms in Pakistan.
2. To examine the different impact of oil price volatility on stock return of small versus large firms.

1.3 Significance of the Study

Having an understanding of how the oil prices are linked with stock returns is important for the shareholders, stakeholder and management. Oil which is the important component of product cost, when the burden of oil price increases will not completely shift to the consumers, the dividend and profit of a company will decline due to which its stock prices will fall.

The result of this study may assist the businessmen in managing cost structures to both short term and long term planning and provide investor better picture of the exposure to oil price risk, when investing in Pakistani companies.

1.4 Research Hypothesis

After studying the literature related oil prices and stock returns. We construct the following hypothesis. We formulate these hypotheses in terms of alternative hypothesis.

H1 = firm size has an impact on stock return.
H2 = market return has an impact on stock return.
H3 = interest rate spread has an impact on stock return.
H4 = oil return has an impact on stock return.
H5 = oil price volatility has an impact on stock return.
2. Literature Review

When we review the literature we observe that many studies have been conducted to explore the link between oil prices and stock returns. Relationship between oil prices and financial markets is supposed to be negative, suggesting that stock prices decline when oil prices increase higher oil prices lead many firms to restructure their spending for managing their activities and projects. The reason is that mostly firms make shipment of their product through different mode of transportation such as land, air or by sea and oil is an important factor which contributes to the shipment cost. For instance, the study of Gisser and Goodwin, (1986) showed that increases in prices of oil will raise the firm’s costs of production under the situations when there is absence of substitution possibility between production factors. Thus stock prices will decline due to increase in production costs.

Huang et al. (1996) claimed that oil prices can influence stock prices. Increases in oil prices influence the rate of discount, which is used in the formula of equity pricing for valuing stocks. As increase in prices of oil are often believe to be a sign of inflationary pressure, which can be controlled by central banks by rising interest rates (Henriques and Sadorsky, 2008). Thus higher interest rate affects stock prices negatively.

As a matter of fact, changes in the prices of oil are often considered to be significant determining factor for understanding prices of stock fluctuation. However economists do not seem to be agreed on the link between prices of stock and the price of oil. In fact, the current literature presents mixed views on the effect of oil price shocks on asset prices (stock prices). The pioneering study by Jones and Kaul (1996) examined the effect of oil prices on stock returns in the US, Japan, Canada and the United Kingdom by employing standard cash flow dividend valuation model in their study. They used quarterly data to investigate whether in the international stock markets, the influence of oil price shocks could be justified by changes in expected returns or future and current cash flows. Their study cover the sample period from 1947-1991. The empirical outcomes of their study indicate that, on aggregate real stock return there is a lagged effect of oil prices. Huang et al. (1996) conducted further research study on stock returns by employing unrestricted vector autoregressive (VAR) model. Their study results show no proof of any nexus between stock returns and future oil prices. Thus, they concluded that though the stock return of oil firms could be affected but there is no real impact on the stock price indices like S&P 500.

By contrast to the above study, Sadorsky (1999) adopted unrestricted vector autoregressive (VAR) and conclude that oil price volatility and oil price both play a vital role in impacting real stock returns. He also found that oil prices shock have asymmetric effects on the economy.

Hammoudeh and Li (2005) found a negative relationship between oil prices and stock prices for US oil-sensitive industries and oil-exporting countries. Likewise, Ghouri (2006) found an inverse relationship between oil prices and stock prices for US. Further, the study of Driesprong, et al. (2008) also investigated this relationship and found a significant and negative link between oil prices and returns of stock. They used monthly data in their study. Kilian and Park (2009) in their study found that in the oil market, oil prices fluctuations caused by demand shocks, lead to lower real stock returns of United States. However they found that oil
supply-side shocks have no significant effects on returns.

Miller and Ratti (2009) in their study investigated the long-run relationship between oil prices and stock returns. They employ vector error correction mode in their study. Their results indicate that oil prices have a long-run negative impact on stocks markets. Studying the association between oil prices and stock prices at sectorial level, Nandha and Faff (2008) investigated the association between oil price changes and 35 world industry sector. They found that rise in oil prices negatively affect all industries except oil and gas sector.

Nandha and Brooks (2009) examined the effect of oil prices on stock returns of transport sector. Their findings suggest that oil prices have some impact on transport sector stock return. However, they found no evidence of oil prices significant role in Asian and Latin American countries. In addition to literature related to sectorial level Elyasian, Mansur, and Odusami (2011) found in their study that the variation in oil price lead to asset price risk factor, due to which oil returns and volatility effect industry returns positively and negatively. It is pertinent to mention here that the literature review related to the investigation of association between oil prices and stock prices at sector level change from country to country and from sector to sector.

Some studies focus on major European, American, Latin, Asian and developing countries. The results of these studies indicate a short-term significant correlation between developing stock markets and oil price volatility.

Papapetrou (2001) used (VAR) model and their study result show a significant link between stock market and prices of oil changes, the focus of their study is Greece. Basher and Sadorsky (2006) conducted a study to investigate the impact of oil price fluctuations on a large set of developing market stock returns. In their study they used international multi-factor model. Results of their study suggest that prices of oil risk plays a significant role in pricing developing stock market returns. Hammoudah and Choi (2006) study the impact of oil prices on stock returns and results of their study also confirm negative impact of prices of oil on stock returns. Malik and Hammoudeh (2007) study finding indicate that stock markets of Gulf receive volatility from the international oil market. However in the case of Saudi Arabia where they found a significant volatility spillover from the Saudi stock market to the oil market.

Park and Ratti (2008) focused on 13 European countries and on US to explore the relationship between oil and stock markets, the data period of the study was from 1986 to 2005 and results of their study suggest that volatility of oil prices increases considerably decrease real stock returns within one month and or contemporaneously. Moreover they found that oil price impact is greater then interest rate on real stock prices returns in US and 13 European countries. They investigated asymmetric effects of positive and negative oil price shocks on real stocks returns for US and for the Norway. However not for the European oil importing countries. The study of Nguyen and Bhatti (2012) explore the relationship between stock market returns and oil prices. The results of their finding indicate left tail reliance between global prices of oil and stock market of Vietnam, whereas in case of China they found opposite result.

Aloui et al. (2012) investigated the effects of oil prices shocks on stock market returns. In their study they used conditional multifactor pricing model and found that with
respect to market returns the oil impact is asymmetric.

Fang and You (2013) studied the interaction between price of oil changes and returns of stock market of large emerging economies (China, Russia, and India) using SVAR approach. The data of their study cover the period from 2001 to 2012. Their finding indicate that impact of oil prices shocks on stock prices of these emerging economies have been mixed.

More literature focuses on smaller developing markets, where share exchange is relatively a new phenomenon especially the Gulf Corporation Council (GCC) economies. The study of Hammoudeh and Alesia (2004) investigated that there is a bidirectional relationship between Saudi Arabia stock returns and oil prices volatility. They employed cointegration tests and vector auto regressive (VAR) models for checking this relationship. Zarour (2006) investigated the impact of variations in prices of oil on GCC stock markets and their study results indicate that only the Saudi Arabia and Omani markets have predictive power of increases in oil prices. Mohanty et al. (2011) studied the link between crude oil prices fluctuation and returns of stock in GCC countries. They employed in their study industry level as well as country-level data and finding of their study indicate that oil prices volatility has unequal effects on stock and returns of stock market at the industry as well as country-level.

Naifar and Dohaiman (2013) conducted a study on Gulf Corporation Council (GCC) countries to examine the impact of change in oil prices and movements on stock market prices under regime shifts. The sample size of data covers the period from 2004 to 2011. They used a Markov regime-switching model in their study and found that the link between OPEC oil market fluctuations and GCC stock markets returns is regime dependent. Furthermore they also found that during the financial crises there is a significant symmetric reliance between short-term interest rates and crude oil prices.

Ciner (2001) conducted a study by applying a nonlinear causality test. Their study results indicate a bidirectional causality among oil prices shocks and market index. Further Jammazi (2012) found that prices of stock and prices of oil did not change together up to the intermediate scales.

Reboredo (2010) applied Markov-switching methods to explore the non-linear effect of oil prices changes on returns of stock market. Their results indicate that in one state of economy, oil prices increase have a significant negative influence on prices of stock, but this influence is not consistent significantly in a different state of the economy.

As for as positive link is concerned between oil and stock prices, some researcher in their study found a positive link between oil and stock prices. For example, Sadorsky (2001) found that oil prices rises was positively associated with profitability. El-Sharif et al. (2005) examined the link between equity value and crude oil prices in United Kingdom oil and gas companies. They applied multifactor asset pricing model in their study and found evidence of a positive association between oil prices and stock value. Likewise the study of Faff and Brailsford (1999) also found a positive oil and gas stock sensitivity to fluctuations in Australia oil prices. Narayan and Narayan (2010) found in his study a positive and statistical significant impact of oil prices and stock returns of Vietnam's. The study of Arouri and Fault (2012) used seemingly unrelated regression (SUR) and bootstrap panel cointegration methods, to
investigate a long-run link between oil prices and stock markets Gulf Corporation Council (GCC). Results of their study showed that in Gulf Cooperation Council countries (GCC) positive impact of increases in prices of oil on prices of stock.

Proof on the independence of prices of oil and stock market prices was found in the study of Chen, et al. (1986). They examined that whether in stock markets oil risk was priced, and their results showed statistically insignificant impact of oil prices on stock market return. Similarly, Huang et al. (1996) examined the link between daily US returns of stock and future returns of oil, and applied Vector Auto Regression (VAR) methodology. Their results indicate an insignificant impact of oil prices on the aggregate market index.

Literature related to the impact of oil prices on various capitalization firms can be found in the studies related to small business for instance (Acs, 1996; Storey, 1994). This stream of studies recommends that small size firms have more impacted negatively by increase in oil prices and have difficult to time adjusting their input mix. In contrast (Hansen, 1992; Acs et1991) and (Aiginger and Tichy, 1999) founds in their studies that small size firms may likely be more efficient than large size firms because small size firms have less bureaucratic management structures and more likely to be innovative and less problems of principal agent linked with too many layers of managers and workers.

Nguyen and Reznek (1991) and Nguyen and Lee (2002) conducted a study on US small size firms and found that small size manufacturing firms are likewise as efficient as large ones. One implication of this investigation suggests that small size firms are at least as efficient as large ones, when energy prices start rising, small size firms should be able to substitute as efficiently as the large size firms away from energy inputs to other factors of production. Increase in oil prices should affect large size and small size firms in same ways. Kleijweg et al. (1990) studied Dutch manufacturing firm’s response to oil prices shocks and found that small companies adjust more quickly from large companies to energy price changes.

Narayan and Sharma (2011) investigated that the oil prices have asymmetric impact on companies return, depending on the sector in the case of firms registered on the NYSE. More precisely, they found that for most sectors the prices of oil mostly has inverse relation with firm returns. However for the energy and transport sectors, the oil price has significant positive effect on returns. Given this, and consistent with the argument of Marquering and Verbeek (2004), that there is no reason to accept that the oil price will not affect firm return.

Reboredo et al (2013) investigated the association between oil prices and stock markets in USA and the Europe at the sectorial and aggregate levels. They found that in the pre-crisis period oil prices volatility had no effect on stock returns at either on sectorial and or aggregate level. However, they found evidence of positive interdependence and cointegration between these markets with the start of financial crises. Moreover in the pre-crisis period they found no evidence of lead and lag effects.

Recent study of Narayan and Sharma (2014), in which they examined that whether oil price contribute to stock prices volatility for firms registered on New York Stock Exchange (NYSE). To examined that they used daily data from 2000 to 2008 and used GARCH (1, 1) Model. They found that the oil prices are a key
factor and predictor of firm’s variance and stock prices. Further they also concluded that by using the oil price in predicting firm return variances the investors can make important gains in returns.

As the above literature shows that few studies has been conducted to look at the link between prices of oil, firm size, and prices of stock of companies and the focus of mostly studies is on developed and emerging countries. Moreover the present studies will be focused on the impact of oil prices volatility on firm stock prices in Pakistani perspectives when they very with respect to size.

2.1 Theoretical Framework

**Independent Variables**

- Firm size
- Market return
- Interest rate spread
- Oil return
- Oil volatility

**Dependent Variable**

Stock return

3. Research Methodology

Research means identification of real life problems and providing their possible solutions (Adams & Schvaneveldt 1985). Research help humanity in almost every field of life and real life issues consist of diverse subjects of daily life like business, education, travelling, public affiliation, jobs or personal life. The basic objective of research is to find the actual cause of un present situations and every study provide, logical systematic and detailed explanation of problems and provide possible solutions to satisfy the under research problem (Ghouri, 1995)

3.1 Regression Framework

This study determines empirically the link between movement in prices of oil and stock of different size firms. To check this relationship we use a multifactor market model (Ross, 1976) in this study. This model offers the theoretical basis for studying the link between oil prices and stock prices. The model is estimated by including risk factors for stock returns of
market, spread, oil return, and oil price volatility. Firm size is included as a fundamental factor. Many researcher in their studies previously has been used a multifactor market model such as, Sadorsky (2008), Boyer and Filion, (2007), El-Sharif et al. (2005), Sadorsky (2001), and Faff and Brailsford (1999), to investigate the impact of oil prices on stock prices. The model is given below.

\[ R_{it} = \beta c_i + \beta_s Size_{it} + \beta_m MR_{it} + \beta_r Spread_{it} + \beta_o Oil_{it} + \beta_{ov} Oilvol_{it} + \varepsilon_{it} \]  

(1)

In the above model (1) \( R_{it} \) represent firm stock return for firm \( i \) at period \( t \), \( Size_{it} \) is the size of the firm, \( MR_{it} \) is market return, \( Spread_{it} \) is the spread whereas \( Oil_{it} \) is oil return and finally \( Oilvol_{it} \) is oil price volatility and \( \varepsilon_{it} \) is the error term. \( \beta_s \ldots \beta_{ov} \) are the coefficients of the model.

The second objective of this study is whether oil price volatility has different impact on stock return. For this the purpose size variable is replaced by two size related dummy variable \( DL_{it} \) for large size firm and \( DS_{it} \) for small size firm. Large size firms are identified are those whose market capitalization are above the median value and small size firms are those whose market capitalization are below the median value. To achieve this objective we estimate the following model.

\[ R_{it} = \beta c_i + \beta_s Size_{it} + \beta_m MR_{it} + \beta_r Spread_{it} + \beta_o Oil_{it} + \beta_{ov} Oilvol_{it} \times DL_{it} \\
+ \beta_{ov} Oilvol_{it} \times DS_{it} + \varepsilon_{it} \]  

(2)

In equation (2) the firm size is replaced by two dummy variables \( DL_{it} \) for large size firm and \( DS_{it} \) for small size firm.

### 3.2 Estimation Technique

To estimate these models and hypothesis we use a feasible generalized least square (FGLS) model (which is some time referred to as period seeming unrelated regression model), corrects for auto correlation and heteroskedasiticity in a panel data set (Kmenta, 1986; Wooldridge, 2002). This method is used when covariance of the errors is generally unknown. Feasible generalized least square (FGLS) asymptotically more efficient than other estimator. In Feasible generalized least square (FGLS) estimator we progress in two stages. In first stage model is estimated by Ordinary least square (OLS) or another consistent (but inefficient) estimator, and the residuals are used to build a consistent estimators of the error covariance matrix. In the second stage using the consistent estimator of the covariance matrix of the errors, we implement the Germanized least square (GLS) ideas.

### 3.3 Variables of The Study

#### 3.3.1 Stock Return

Dependent variable of the study is stock return. Stock return is measure by Log Ratio. The formula is given below.
SR_t = ln (P_t / P_{t-1})
Where $P_t$ is current month closing price and $P_{t-1}$ is closing price of previous month. “ln” is the natural log.

The independent variables in this study are firm size, market return, spread, oil return, and oil price volatility.

3.3.2 Firm Size
Size is fundamental variable in this study, we measure size of firm through market capitalization. The measurement of size is consistent with the study of Narayan and Sharma (2011). Further firm’s size is divided into small Capitalization and large Capitalization. For this purpose we take median of market capitalization. Firm whose market capitalization are grater then median are consider large firm and firms whose market capitalization are less than median are consider small firms.

3.3.3 Market Return
Market return is the return of KSE 100 index. Taking log difference between two consecutive month prices Monthly returns were calculated. The equation is given below:

MR_t = ln (P_t / P_{t-1})
Where;
$P_t$ = current closing price index
$P_{t-1}$ = closing price for the previous month
ln = Natural log

3.3.4 Spread
In this study spread is the interest rate variable and is a difference between short and long term interest rate.
Short Term Interest Rate (TBILLS)= interest on loan contracts-or debt,
Long Term Interest Rate (GBONDS)= interest earned on a long term bond.

We use 3-month Treasury bill for short term interest rate and 10 year Pakistani government investment bond for long term interest rate and there difference is taken as spread.

3.3.5 Oil Return
Oil price return is calculated as a log difference of the consecutive month’s oil prices.

3.3.6 Oil Price Volatility
In this study after taking square root of the sum of squares daily returns volatility in prices of oil is measured.

3.4 Data
Secondary data is used in this study to focus on the link between movement in oil prices and stock prices for firms that vary with respect to size. It is essential to consider a sample size which consist of both large as well as small size firms. Consequently we take all large and small firms listed in Karachi stock exchange. Due to missing observations the data set was reduces to unbalanced panel consisting of 212 firms. The data are monthly data and continuously the sample size of the data cover the period from 2005:1 to 2012:12.

3.4.1 Data Source
Oil price data is taken from Economic research (FRED, the St. Louis) website, stock prices date, and Market return data is taken from, Karachi stock exchange (KSE) website, interest rate variable data is taken from state bank of Pakistan (SBP) website.

4. Empirical Results and Analysis
In this chapter we present and analyze some summary statistics and the results of panel regression models. The impact of oil prices on stock return was determined by
considering different risk factors. Feasible Generalized Least Square (FGLS) panel date regression technique is used to test the impact of size, market return, and spread oil price and oil price volatility on stock return. Hausman specification test is applied to check whether the Random Effect regression model is appropriate or Fixed Effect regression model will be used for our study sample.

4.1 Descriptive statistics

In Table 4.1 descriptive statistics such as min, max, mean, median and standard deviation for dependent and explanatory variables are given. From the results in table 4.1 it can be seen that the mean value for the dependent variable (stock return) of this study is -0.002 with a standard deviation of 0.205. In addition, market capitalization which is one of the explanatory variable and is a proxy for firm size has a mean and standard value of 7393.280 and 43195.34 respectively. Furthermore market return which is another independent variable has an average value of 0.009 and standard deviation of 0.082. Spreads which is another variable and represent interest rate has a mean value of 10.033 and standard deviation of 3.699.

Moreover, returns and volatility of oil which are the focus variables of this study have a mean value of 0.011 and 213.580 respectively, and standard deviation of 0.092 and 134.829 respectively.

**Table 4.1: Summary Statistics**

<table>
<thead>
<tr>
<th></th>
<th>RETURN</th>
<th>CAP</th>
<th>MKT</th>
<th>SPREAD</th>
<th>OILRETURN</th>
<th>OILVOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>-0.002</td>
<td>7393.280</td>
<td>0.009</td>
<td>10.033</td>
<td>0.011</td>
<td>213.580</td>
</tr>
<tr>
<td>Median</td>
<td>0.000</td>
<td>444.852</td>
<td>0.019</td>
<td>12.190</td>
<td>0.020</td>
<td>176.598</td>
</tr>
<tr>
<td>Maximum</td>
<td>2.279</td>
<td>828401.8</td>
<td>0.202</td>
<td>14.818</td>
<td>0.276</td>
<td>908.001</td>
</tr>
<tr>
<td>Minimum</td>
<td>-2.777</td>
<td>1.170</td>
<td>-0.448</td>
<td>3.268</td>
<td>-0.349</td>
<td>56.481</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.205</td>
<td>43195.34</td>
<td>0.082</td>
<td>3.699</td>
<td>0.092</td>
<td>134.829</td>
</tr>
</tbody>
</table>

4.2 Correlation Matrix

Correlation is calculated to test the relationship between the studied variables and to test the Multicollinarity among the variables. Multicollinarity in a study represent high serious correlation between any two independent variable is a problem which can be tackled with the help of Pearson’s co-efficient of correlation through using a correlation matrix. However different researchers have different point of views about at what point a correlation should be considered as a high correlation. Any two explanatory variables will have a high correlation or multicolinearity if they have correlation of 0.80 or above Brayman and Cramer (2001). Similarly in support of Brayman and Cramer argument Kennedy (1998) also suggest the same benchmark of 0.80 or higher
correlation. In contrast, Anderson et al. (1999) argues that there will be multicolinearity if their exist a correlation of 0.70 or higher between any two variables. As for as the results of this study is concerned following the majority of previous studies in Table 4.2, I have calculated the correlation matrix to find out multicolinearity between variables. The results is given below in Table 4.2

Table 4.2: Pearson Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>RETURN</th>
<th>CAP</th>
<th>MKT</th>
<th>SPREAD</th>
<th>OILRETURN</th>
<th>OILVOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>RETURN</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAP</td>
<td>0.011</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MKT</td>
<td>0.168</td>
<td>0.006</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPREAD</td>
<td>-0.012</td>
<td>-0.003</td>
<td>-0.125</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OILRETURN</td>
<td>0.051</td>
<td>0.005</td>
<td>0.286</td>
<td>-0.155</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>OILVOL</td>
<td>-0.077</td>
<td>-0.004</td>
<td>-0.299</td>
<td>0.500</td>
<td>-0.392</td>
<td>1.000</td>
</tr>
</tbody>
</table>

The results in table 4.2 show that there is no multicolinearity among the variables, the highest correlation is 0.286 between market return and oil return meaning a positive relationship between the two an increase in market return will bring an increase in oil return and vice versa and this correlation of 0.286 is well below the benchmark of high correlation suggested by different researchers mentioned above. However the lowest correlation is between 0.005 which exist between market capitalization and oil return suggesting a positive correlation between the said variables.  

4.3 Hausman Specification Test

Hausman test is a classical test used for checking whether random effect or fixed effect model is appropriate. For this purpose we conduct the Hausman specification test to determine which model is used for our study, whether fixed effect or random effect model.  

Hypothesis of Hausman test is as follow .

$H_0$ = Random effect model is appropriate instead of Fixed effect model.

$H_1$ = Fixed effect model is appropriate instead of Random effect model.

The results of Hausman specification test is presented in Table 4.3
In our sample data we reject the null hypothesis based on p-value at 5% level of significance. Which means fixed effect model is appropriate instead of Random effect model. In this case, a Fixed effect estimator gives efficient results and take care of heteroskedasticity and auto correlation problems.

4.4 Regression Results

From the results in Table 4.4 and Table 4.5, we come to the conclusion that the relationship between firm size variable and stock prices return have a positive correlation and statistically significant as shown by the p-value 0.000. This indicates that firms which are large in size on average have higher return of stock as compare to firms which are small in size. Moreover 1% increase in size variable brings an increase of 0.67 and 0.71 % in stock returns as can be seen in Table 4.4 and 4.5 respectively. Thus our first hypothesis about the relation between size and returns is accepted.

Similarly as for as the variable market return is concerned, at the 1% level the estimated coefficient on the market return variable is positive and statistically significant was found in each model as shown in Table 4.4 and 4.5, which suggest that the average firm in the sample has a market beta of approximately 0.4. Thus our second hypothesis cannot be rejected.

Oil price return has significant negative effects on stock market returns. However the results are statistically insignificant. In order to support their projects and activities different firms needs to spend extra money when the prices of oil increases; because oil prices is a key factor in the shipping cost. Thus company returns and dividends can be decreased by this higher cost, which results in stock price reduction. This result is against the findings of Asnsar and Asghar (2013) who found positive association between oil prices and stock price returns. However the result is in line with the finding of Cunado and Perez De Gracia (2013), who examined the relationship between returns of stock and oil price shocks in 12 oil importing European economies and found that due to higher energy costs, oil prices may be negatively affect stock returns.

Oil price volatility has a significantly negative influence on the stock returns at the 1% level as can be seen in Table 4.4 and 4.5. Similar results was found by Park and Ratti (2008) For a sample of United States and European union counties during the period 1986- 2005. They examine whether returns of stock are affected by shocks in oil prices. By applying Multivariate VAR model and found that a statistically significant relationship between oil price shocks and real stock returns in the same month or within one month.

Furthermore, returns of stock and oil volatility have significant interaction between them. However, there is not enough evidence to say that oil price volatility affects which Capitalization firms the most. Therefore our fourth hypothesis cannot be accepted.
Therefore in order to investigate this question, two size-related dummy variables are used in place of the size variable. Similar significant negative association was found for both small and large capitalization firms, indicating that oil price volatility of both small and large capitalization firms have the same negative effect on stock prices return. It is also shows that oil price volatility has more impact on large size firm as compare to small firms as shown by beta values. Similarly H5 is also accepted.

After reviewing the literature related to spread and stock prices. I come to the conclusion that considerable attention is given to their association, interest rate. We have studied the relationship between interest rates and stock prices using regression analysis. and found that spread has a positive impact on stock prices return. Our result is also in line with the Fama (1981) that interest rates spread have a positive impact on stock returns. So we will accept H3.

In the present study, the R square value indicated that a total of 66% and 67% variation as shown in table 4.4 and 4.5 in dependent variable stock return is explained by all 5 explanatory variables. Over all goodness and fitness of model is shown by F test value. It determines that significance of relationship between independent variables and dependent variable. The Prob (F- statistic) is 0.00 in both models. Which show both the models are overall significant.

### 4.4 Regression results: Baseline Model

#### Table 4.4: The Impact of Oil Prices and Firm Size on Stock Prices

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>0.067***</td>
<td>0.002</td>
<td>0.000</td>
</tr>
<tr>
<td>MR</td>
<td>0.040***</td>
<td>0.018</td>
<td>0.000</td>
</tr>
<tr>
<td>Spread</td>
<td>0.005***</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Oil Return</td>
<td>-0.020</td>
<td>0.017</td>
<td>0.231</td>
</tr>
<tr>
<td>Oilvol</td>
<td>-0.983***</td>
<td>0.137</td>
<td>0.000</td>
</tr>
<tr>
<td>C</td>
<td>-0.462***</td>
<td>0.018</td>
<td>0.000</td>
</tr>
</tbody>
</table>

| R-square  | 0.661       |
| Adjusted R- square | 0.551 |
| Log likehood  | 3702       |
| F- statistic  | 6.052      |
| Prob (F-statistic) | 0.000 |

*Note: return is dependent variable, (*** ) significant at 1% level*
Regression Results: Augmented Model

Table 4.5: Different Impact of Oil Price Volatility on Stock Returns

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std.Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>0.071***</td>
<td>0.002</td>
<td>0.000</td>
</tr>
<tr>
<td>MR</td>
<td>0.403***</td>
<td>0.018</td>
<td>0.000</td>
</tr>
<tr>
<td>Spread</td>
<td>0.005***</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Oil Return</td>
<td>-0.020</td>
<td>0.017</td>
<td>0.228</td>
</tr>
<tr>
<td>Oilvol*DL</td>
<td>-0.000***</td>
<td>0.165</td>
<td>0.000</td>
</tr>
<tr>
<td>Oilvol*DS</td>
<td>-0.617***</td>
<td>0.165</td>
<td>0.000</td>
</tr>
<tr>
<td>C</td>
<td>-0.482</td>
<td>0.018</td>
<td>0.000</td>
</tr>
</tbody>
</table>

R-squared      0.671
Adjusted R-squared 0.562
Log likehood 3710
F-statistic 6.102
Prob(F-statistic) 0.000

Note: return is dependent variable, (*** ) significant at 1% level

5. Conclusion and Recommendation

5.1 Conclusion

Although a huge body of empirical research has studied the relationship between oil prices and stock prices, it is surprising that little research has been conducted on the relationship between oil price, stock returns and firm’s size. Therefore, the main goal of this study is to examine the impact of oil prices and stock prices when the size of firms is allow to vary. A multifactor model is employed in this study to examine the relationship between firm size, oil prices, and stock prices. Feasible general least square (FGLS) panel data regression technique is used for estimation of model. 8-year monthly data is used for the period of 2005 to 2012. Empirical results indicates that increases in firm size, market return, and interest rate spread increases stock return, whereas increases in oil price and oil price volatility have negative impact on stock return, further the impact of oil price volatility is greater on large firms.
stock return as compared to their small counter parts.

5.2 Policy Implication

The findings may deliver useful information for investors or money managers in their decision making process to develop strategies for portfolio diversification and to better understand the importance of various risk factors to stock returns. The important implications for policy makers are as follow:

One implication of these results for policy makers to recognize that large firms stock prices impacted more than their small counter parts by oil price volatility. Even in a span of time, there are an equal number of similar size oil prices increases and oil prices decreases, the net effect it is expected to decrease the stock prices of large firms, since stock prices are seen as an indicator of financial health of the firm, this oil price volatility different impact can affect the risk and return tradeoff of investing in firms that are large in size and it becomes difficult for large- size firms to secure funding and increase their growth rate.

Government should perform their role for encouraging all size of firms for the adaptation of methods related to energy risk management, especially for large-sized companies. One approach would be for governments to sponsor programs that provide either financial support or technical support for energy use efficiency or energy use reduction.

The finding may help the firm’s managers and investor to design effective hedging strategies.

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