

## Impact of International Oil Crisis 2014-2016 over Enlisted Marketing Oil Companies Share Prices of Pakistan Stock Exchange

Malik Aftab Ahmed\*

Department of Basic and Applied Sciences, International Islamic University, Islamabad, Pakistan

### Abstract

In the recent years, plethora literature is being provided over the oil crisis since 1973/74 up till the recent oil crisis. Being a developing economy, Pakistan heavily depends over the international oil prices constancy. Oil crises started from December 2014 had crucially decreased the prices breaking record of last 11 years. The primary objective of study is to measure the impact of current regional oil crisis over the market share prices of enlisted oil companies in Pakistan stock exchange study tests the relationship between oil prices and stock prices of oil companies of Pakistan. Results pinpoints the dominance of international oil prices volatility on real stock prices of Pakistani oil marketing companies both at short run and long run.

**Keywords:** Global economy, Energy, International oil prices, Synthetic fuels

### Introduction

It has been more than forty years of the global oil crisis in 1973/74. It was October 1973 when the OPEC proclaimed an oil embargo. Though embargo didn't last more than 5 months but it raised the prices of crude oil from \$3 per barrel nearly to \$12. More ever the US prices were even significantly higher. This short-term embargo caused both short-term and long-term effects over the global economy. Later it was claimed the "The first oil shock" followed by oil crisis of 1979. Although oil price fluctuations occurred at an irregular interval throughout the post war period as documented by Hamilton [1], but any of the increase was not comparable in magnitude as of the last quarter of 1973, prior to 1973 US legislation bodies regulated a constant oil prices. Though the prices of crude oil were fixed but the policy was not smart enough to tackle the Sharpe spikes in the growth rate of their inflation. These consequences lead the oil regulation system to an end ignited in the early 1970s. The reason behind this failure of United States was the lack of tendency to full fill the required domestic demand which unwantedly compelled US for imports from GCC as they were biggest oil extractors.

Being an important source of energy over the world, oil has immense importance for economic growth. Therefore, world's biggest commodity market is crude oil market. Currently oil prices are as important as gold prices are to the people. Literature argues that the prices of oil costed \$18 to \$23 in 1990s but crossed limit to \$40 till 2004. The momentum carried on and in 2005 oil prices were up to \$60 per barrel but the conditions went worst when the oil prices climbed the peak i.e., \$178 per barrel in middle 2008. These oil price crisis influences all the economies though its impact differs from economy to economy. Changes in oil crisis firstly influences the petroleum and petroleum goods afterwards effects the whole economy.

Fluctuations of international oil prices effects different countries with different severity depending on different factors. On the basis of oil concern, countries can be divided into two categories. The countries which are oil producers or oil exporters like Saudi Arabia, Iran and many more and countries which imports oils like Pakistan, China, Bangladesh and many others. Any oil shock will not affect the countries which exports oil as much as it will affect the countries which are importing the oil.

Oil is considered as one of the expensive imports for countries which don't produce their own oil. Importance of oil is not hidden for manufacturing industries because their trade relies heavily over import of oil. Though Pakistan is also amongst the oil producing country but its production is not enough to full fill the demand. Pakistan is also amongst the oil importing country for fueling of its economy. Therefore, minor change in this commodity has a noteworthy contribution in the development. Other studies explore that there might be some probability that stock market could survive under oil crisis if it switches towards gas use, but gas shortage in and its prices are questionable in number of countries.

Number of researchers has some great contribution to literature for examination of association between international oil prices and stock prices. Sadorsky [2], Jones and Kaul [3] and Ciner [4] reported negative but significant relationship between oil and stock prices, while Chen, Roll and Ross [5] and didn't found any relationship. Nandha and Faff [6] found oil prices rise had an unfavorable effect on stock returns in all sectors excluding mining oil and gas industries. Park and Ratti [7] stated a significant high negative impact of oil prices on real stock returns of USA and 12 European oil importing countries.

Being a developing country Pakistan's economy heavily depends over the oil prices. Oil is one of the most prominent and reliable indication of economic growth in Pakistan with increase of its demand, that's why government bodies, investors, consumers and other stake holders keeps close eyes over the international market prices of oil. Economy of Pakistan is deeply related to oil prices, having enlarged imports of oil products. Thus, any fluctuation directly attacks the macro economic factors like BOP, consumption, investment and other pivotal factors.

\*Corresponding author: Ahmed MA, International Islamic University, Islamabad, Pakistan. Tel: 92519257923; E-mail: [aftabkasi1@gmail.com](mailto:aftabkasi1@gmail.com)

Received November 14, 2016; Accepted January 25, 2017; Published February 04, 2017

Citation: Ahmed MA (2017) Impact of International Oil Crisis 2014-2016 over Enlisted Marketing Oil Companies Share Prices of Pakistan Stock Exchange. Arabian J Bus Manag Review 7: 283.

Copyright: © 2017 Ahmed MA. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

When it comes to investment, importance of stock markets is not abstruse. Its importance makes it the most prominent indicator to analyze any economy. Fluctuations in oil prices affects stock markets justified by plethora of researches. Number of oil companies are being enlisted in Pakistan stock exchange and their shares remained eye catching for all the investors but the oil crises has always affected the decision making of investors. The current oil crises have directly affected the market prices of the enlisted oil companies making oil market shares riskier for the investors. The purpose of study is to indicate the impact of international oil prices over the market price of enlisted oil companies. International oil markets play a crucial role in stabilities of local markets. Earnings of the entire companies' falls off due to increase or decrease in international oil prices. Because of its demand oil price always remained a debatable variable for analyzing economy and its impact over the different factors.

Keeping in view the current global oil crises and its reaction over the Pakistan's economy which is amongst the economy of still developing countries the objective of our research is

- Determining the impact of oil crisis of 2014/2016 over the market share prices of enlisted marketing oil companies of Pakistan stock exchange.

## Literature Review

### Historical episodes of major fluctuations in the real price of oil

Amongst the natural energy sources in the world oil, gas and gas condensate are the most prominent source. One thing we must know for sure is that we need oil for most of our energy production. Currently around 90 million barrels of crude oil is needed per day. Usage of oil is not only limited as fuel for transports rather we are constantly hearing new conflicting forecasts about the potential reserves and resources. That's the reason that the crisis of oil prices terribly effects the global economy. Global economy has suffered numerous crises since 1973. Following are some of the major crises faced by global economy in oil sectors.

#### Crises of 1973/74

Oil price shock of 1973/74 appeared to be negative shock to the supply of crude oil. The main reason of this oil shock was the shrinking of production of oil which dramatically increased the prices because the supply was not enough to full fill the demand which shifted the supply curve to the left side along with demand curve. This traditional explanation was reported by Hamilton (2003). On the other sides plethora of researches argued that war between Israel and Arab countries was the basic reason for this crisis but Arab countries which were in state of war were not the major producers of oil. It was deliberate decision of OPEC countries to cut of the supply by 5% from 1973 to 1974. It was a perfect economic reaction because they were the leading exporters of oil. OPEC demanded to increase the prices to their demand and wanted more shares of revenue for the local subsidiaries.

The price increase had dramatically affected the global economy. It had some great effect on oil exporting nations because they were dominating and enjoyed great revenue from higher prices. The oil-exporting nations began to accumulate vast wealth. Control over oil became known as oil weapon. The crises affected USA, the Netherland, Japan, Great Britain and Canada. However, the affected nations did not go for dramatic policy changes because they wanted to develop a strong position against this monopolistic approach of OPEC.

#### Oil crises of 1979/80

The first oil crises were followed by the second major oil crisis of 1979/80 when the prices dramatically from less than \$15 to \$40. According to the traditional view of Hamilton [8] this surge of oil shocks was basically a reaction to the reduction of production of Iranian oil refineries. Barsky and Kilian [9] in their study discussed the Iranian revolution which started gradually in late 1978, when Shah departed and Ayatollah Khomeini arrived. This event was a widespread panic. Although oil output decreased only up to 4% but panic drove prices far higher than the justified decrease. Iran resumed its oil production in March but at abridged pace.

The oil crisis affected different oil consuming regions of the world differently than the oil producing regions. It forced the governments to take initiatives aimed to reduce dependence on fuels like formation of Synthetic Fuels Corporations. Saudi Arabia operated as a chief source to cover the demand of oil output like a balance wheel partially offset the Iranian shortfall and stabilizing the world oil market. Despite of this immediate aftermath of Iranian shutdown, spot market prices spiraled to \$23 per barrel. The crises affected British petroleum which was importing 40 percent of Iran oils.

#### Crisis of 1980s and 1990s

In his study, Hamilton [8] discovered extensive oil supply disruption and identified a large oil supply disruption associated with the discord of Iraq and Iran war of 1980 to 1988. Both states heavily were depending on their oil production and exporting to other nations. Iraq assaulted Iran in September 1980 demolishing the Iranian oil facilities which disrupted Iranian oil supplies. Consequence lead oil prices to increase from \$36 to \$38 in the first month of 1981 but change in the oil prices didn't lasted long. In fact, in preliminary 1980s systematic decline in oil prices was witnessed. Rationale behind this shrinkage was shift of global monetary policy which was led by Mr. Paul Volcker raising US interest rates. The impact further was amplified when industrialized countries decreased their oil usages. Further higher interest rate projected holding securities related to oil prices less attractive for the investors. In fact, investors preferred to deposit their investment in banks because they were availing higher return at lower risk. Another legacy of oil crisis of this era was the self-productions of UK, Mexico and Norway by expanding their very own existing oil production. This lead the OPEC market shares up to 43% in 1980 and 28% in 1985. Though Saudi Arab lowered the productions of oil by breaching the contract with OPEC but it didn't help them and Saudi has to reverse its decision of low production.

#### Oil crises of 2003/08

From mid-1980 to 2003, inflation adjusted price of oil per barrel remained under \$25. But during 2004 prices augmented to \$40 and afterwards \$50 per barrel. Number of events contributed in augmenting prices to \$60 per barrel in August 2005, which further led to a record hike price of \$75 in middle of 2006. Shrinkage was witnessed by early part of 2007 before steeply rising to \$92 by the month of October 2007, and \$99 in December 2007. Fluctuations in 2008 were eye catching because throughout 2008 oil prices regularly constructed a new record of high prices. In last of June 2008 the oil prices shocks shocked the world because in history oil prices never peaked to \$141.71/ barrel, still it was not the end of this crisis. August 2008 recorded price of \$147 marking it has the historic highest price ever. Gradually prices felled to \$100 per barrel in late summer but rose once again in September.

Currently oil crisis of 2014-2016 have again surprised investors,

government bodies regulators and oil producers and importers. Oil prices are decreasing day by day and had made investment in oil to be the riskiest investment for all the stake holders. Oil prices decreased, breaking history of last 11 years. Being an important energy resource it has converged numbers of researcher's attention towards its anomalies.

The very first study over oil prices fluctuations was conducted by Chen, Roll and Ross [5] but study emphasized over the investigation of impact of macro-economic factors like industrial production, bond yield spear and inflation rates over the stock markets. They didn't found any impact of oil prices over stock markets. While in study conducted by Hamilton in 1983 over the economy of USA found a significant impact of oil prices shocks over the economy. He is considered the pioneer of study for relationship of oil prices and macroeconomic indicators. Study revealed that there is a negative relationship between oil price shocks and financial markets which has significant contribution in recession.

Since the study of Hamilton [1] plethora of research over the oil prices is available. Jones and Kaul [3] explored the relationship of oil prices and stock market by taking evidence from Canada, Japan, USA, and UK. Dividend cash flow model was used to evaluate the quarterly data from 1947 to 1991. Study concluded that Japan and UK stock markets were strongly affected from oil prices fluctuations while results from data of Canada and USA contradicted from the results of other two countries. Results further concluded that oil shocks have not affected the stock markets rather it had affected the cash flows of industrial production.

Sadorsky [2] examined the volatility of oil prices and its impact on stock returns. VAR model was used in which he catered USA industrial index, interest rate and oil prices. Data were collected on monthly period of 1947-1996. Results explored a significant negative impact over the stock market. Moreover, study also examined asymmetric relationship of oil prices and concluded that positive change in oil price has larger impact on economy and financial markets. Sadorsky [10] expanded his research by examining the impact of oil price shocks over Canadian stock market. Canadian markets exhibited same sensitivity towards oil prices. This time multifactor arbitrage pricing theory approach was used to analyze the data.

After an extensive research on US and Canadian stock markets, diverged towards developing markets. A thorough research investigated 21 emerging stock markets, including India and Pakistan. For purpose of data analysis capital asset multifactor model was used. Results showed statistically significant influence of oil prices on the emerging markets. So, it means that oil prices not only affect the developed economies rather it also affects the emerging economies.

Maghyreh [11] also contributed in the current literature by investigating the impact of oil prices shocks over the USA and 13 European countries. Multivariate VAR analysis was used. Study explored a statistically significant impact of shocks has a statistical significant impact on the real stock prices of stock exchange rather in the same month as well as the succeeding month. This was a reasonable and robust result. From variance decomposition, it was concluded that oil price shock accounts about 6% of change in the stock prices. Though results varied between countries but overall same affect was examined.

Ono [12] using VAR model analyzed the stock returns of BRIC (Brazil, Russia, India and China.). Research emphasized over the data from 1999 through September 2010. Analysis suggested that real stock returns responds positively to the shocks of oil prices with a statistical significance to Russia, China and India while Brazilian real stock returns

were found statistically non-significant. Further results proposed that Russian stock returns responded positively to oil prices. The thing to notice is that Russia is also amongst the biggest oil producer. Paper also examined the asymmetric effects of oil price shocks. Analysis resulted a statistically significant asymmetric effect in all cases of India; however, Brazil China and Russia markets showed no such response.

Miller and Ratti [13] added something new by analyzing the type of relationship which is found between oil price shocks and stock market returns using co integrated vector error correction model along with additional regresses. Data were over the period of 1971 to March 2008. Effect of oil prices was analyzed both on long term and short run. Study revealed there exists long-run association of oil prices and stock prices for six OECD countries from 1971-1980 and 1988-1999. It concluded that stock market prices increased as the oil prices decreased and vice versa or over long run. Meanwhile the significance was no longer found from 1980 to February 1988. However, it should be considered that though the approximations didn't result to be positive but still they were not even zero. Just after September 1999, supplementary substantial break was revealed, surprisingly with a sign reversal in some cases. Overall results suggested that stock market prices didn't responded to oil price shocks as it was expected would be affected. Such empirical findings will support an estimation of change occurrence in the relationship of oil prices and stock prices as compared to last decade.

According to middle east indicator Saudi Arabia is considered as the biggest exporter and producer of crude oil with 11.5 million barrels' production on daily basis, 13.1 percent of total world production. GCC oil reserves are as follows; Saudi Arabia 15.8% followed by Kuwait 6%, UAE 5.8% Qatar 1.5% and Bahrain and Oman with little productions. According to British petroleum statistical review of world countries of GCC has proven oil reserves of 30% of world.

GCC markets are distinct from those of developed and emerging markets. Developed or developing markets are extensively segmented over equity markets [14] While Kuwait Bahrain and Qatar permit only foreign stock ownership; Saudi Arabia allows foreign ownership through investment in mutual funds only. It is the reason that these markets don't face speculative attacks from rapid flow of capital as in emerging markets. Rather they are effected by the over heat of domestic markets. It is obvious restrictions on foreign ownership limits the flows of 'hot money' into and out of GCC countries. Turn over with exceptions of Kuwait and Saudi Arabia is comparatively low in most markets and publicly traded companies are fewer in numbers and are owned by very few number of indigenous investors.

While on the other hand, volatilities are tracked down to different kinds of publicly traded shares which leads the stock exchange markets. In such markets, real estate banking institutions and telecommunication companies are apparently dominating the other sectors. Fads and speculation attacks are bounded to these companies because of their uncertain returns which change from time to time. It is indisputable that economies of gulf countries are extensively depending over their oil, thus oil sector of GCC adopt cues for the future prices for WTI. For the purpose of decision making the investors ought to cognize the linkage of oil prices and their volatility to GCC markets to make well-established policies for the management of their stocks.

Ravichandran and Alkathlan [14] used GARCH-m model to analyze the influence of oil prices shocks over GCC stock market returns. Some unobservable factors denoted random error terms; and shocks of oil prices. The statistical significance indicated that all

markets in short terms are affected by non-observable speculative factors, whereas insignificance of factors was observed only in Saudi and Bahrain stock markets. However, in rest of the four markets of GCC the projected factors and crude oil prices are associated to each other although in opposite direction. Study concluded that in long term there exists influence of oil prices shocks over the stock markets, but it suggested that it doesn't directly affect the stock market rather its effects are transmitted to macroeconomic indicators and further those macroeconomic indicators affects the stock markets.

GCC countries economy heavily depend over oil, so their economies crucially are sensitive to oil price changes. The rationale behind this dependency is that more than 75% of their exports and more than 85% of their revenues are generated from oil production [15]. According to Arab Monetary Fund, Kuwait has highest number of listed companies of oil followed by Oman, Saudi Arabia, UAE, Bahrain and Qatar. Revealed that there exists a positive relationship between Oil prices and stock markets in GCC except Kuwait. Oil price has asymmetric effect on stock market returns on industry and country level. Maghyreh and Al-Kandari [16] indicated that stock markets of GCC except Saudi Arabia have highly volatility transmission by oil. Likely Arouri and Rault [17] also found strong volatility linkages between oil price and all GCC stock markets, as result of changes in oil supply and demand.

However, Awartani and Maghyreh [18] suggested that volatility transmission observed is not unidirectional rather it is bi-directional between oil prices and GCC stock markets particularly after financial crisis of 2008. Oil prices effects GCC stock markets nonlinearly. On the other hand, Arouri and Fouguau [19] suggested that the relationship between oil prices and stock market is asymmetric and regime-switching. While Zarour [20] also investigated impact of oil prices shocks over GCC stock market prices. By using data from 2001 to 2005 with help of VAR model he concluded that during this period the oil prices during this period had doubled and with huge excess of cash it had affected market performance positively. Arouri and Rault [17] stressed that stock prices show more sensitivity to negative oil prices as compared to positive oil prices. Akoum et al. [21] found that the relationship between oil prices and stock prices changes with the conditions in GCC stock markets in both long term and short term. Naifar and Dohaiman [22] suggested that the relationship of oil price volatility and GCC stock prices volatility changes is regime dependent excluding Oman stock market in low-volatility state. Jourini and Harrathi [23] explored a bidirectional and unidirectional volatility. Moreover, there exists asymmetric spillover to negative oil prices shocks than positive oil prices shocks.

Similarly, analyzed the same relationship in GCC countries. The distinctiveness of this study from the rest of the studies was he studies relationship of oil prices shock and stock prices in context of non-linearity by using nonlinear cointegration analysis which was newly developed. Other studies suggested that oil price and GCC stock markets are linearly related to each other but his study concluded that oil prices affected GCC countries non-linearly.

Though there are limited studies in context of Pakistan which has emphasized over the impact of oil prices on stock prices but still literature exists. Shafi and colleagues [24] studied the impact of oil prices over the Karachi stock exchange and Bombay Stock Exchange. Data were collected from year 1990 to 2010. Using descriptive analysis mean and standard deviation was used to measure the deviation of data from their mean point. Further correlation analysis showed a positive correlation between oil prices and, the Karachi stock market

and Bombay stock market, although the sensitivity of Bombay stock market was observed to be greater than Karachi stock exchange (KSE 0.77 & BSE 0.832).

Further regression equation was used for both stock markets. The model showed that there was a negative relationship between oil price and, Karachi stock exchange and Bombay stock exchange. Through regression analysis it was shown that there was a significant negative relationship between oil prices and stock prices. Correlation between oil prices and stock prices was 32.42 and (R-Sq.) revealed that all independent variable has 59.4% variation on the dependent variable and rest of the variation were due to other factors. Through ANOVA the model was described to be fit.

Ansar and Asghar [25] also investigated the relationship of oil prices and Karachi stock market and CPI. Johnson cointegration test was used to find the impact of oil prices over the stock market and inflation. Results showed that the oil prices had positive and significant impact on the stock market and inflation. It means that the oil prices increase it affects the stock markets returns also affecting the inflation rates. Further inflation also increases the severity of effectiveness over the stock returns of markets.

Using Johanssen cointegration test results revealed that there is a positive and significant association between the oil and stock prices. Inflation was also accounted in the structural equation. From the research, it was argued that increasing oil prices directly influences the stock market returns which further effects the inflation rates. Further increase or decrease in inflation bounces backs its affect over the stock markets. The study concluded that oil importer countries are affected more than the oil producer companies. Mostly all industries are affected by the oil prices which affects their stock returns.

Fatima and Bashir [26] using cointegration test investigated the impact of oil prices over stock prices fluctuations of Karachi stock market and china stock market. Unit root test suggested that unit root exists in all variable therefore not stationary. Results showed that stock markets show very low level of reaction from fluctuations in international oil prices. They argued that stock markets of Pakistan are not developed. The paper concluded that stock market is depending upon the international oil prices. Oil prices are amongst the most expensive imports for countries which are not producing their own oil or producing less oil like Pakistan. Asian countries oil prices are of much importance as this paper has concluded the results that stock market is a depending upon the international prices. Indisputably nations with less or no oil production like Pakistan profoundly rely heavily over the imports of oil from the oil exporters. Therefore, their all trade balances are negatively affected because of imports. This is the rationale which makes this commodity a noteworthy fuel for development. Other studies reveal that there might be a chance that stock market could get itself save from fluctuations in international oil prices in such a way by switching towards gas, but the issue in country like Pakistan is that gas prices and its supply to the industries is also a big question to ask. So, to rely on gas seems not to be a good option.

## Empirical Methodology

From the literature, it is being observed that vector auto regression is the most robust model which could be used for this study. [12,13,17]. VAR approach can examine the dynamic interaction of oil prices shocks and stock prices of oil companies. The VAR model is a well-known econometric model presented by Sims in 1980 which empowers users a multivariate framework with help of which one can express variables

as functions of their own lag as well as to the lag of other variables. Highlighted advantage of using this model is that it has tendency to capture the dynamic association amongst the economic variables which are key interests of the research. As preliminary condition, key variables are preserved as joint endogenous variables to properly estimate the multivariate stable VAR. Endogenous variables should be stationary or nonstationary. For determining rather, the variables are stationary or not unit root test is the most common known test. It can be observed by “Augmented Dickey-Fuller (ADF hereafter) test and the Kwiatkowski, Phillips, Schmidt, and Shin (KPSS hereafter) test. Vector auto regression can be expressed as

$$y_t = \sum_{j=1}^p B_j y_{t-j} + u_t,$$

Equation explains that Y is n Vector of the endogenous variables and B<sub>j</sub> is representing matrix of regression which is to be estimated. In the current study, Y is the oil prices of all enlisted marketing oil companies of PSX. While it reports the possible error term which is based on assumption to be identically and independently distributed with mean of zero and with a constant variance. Vector auto regression is an econometric estimation technique. It is necessary that each variable is integrated in first order lag then first difference VAR estimation is possible and a conventional asymptotic theory building is possible for hypothesis.

### Data

Monthly data for international oil prices is collected from www.indexmundi.com from Dec 2013 to Dec 2015. which is sourced from world bank website. Further data of enlisted oil companies share prices are sourced from website abbasiancompany.com. The data are collected on the monthly basis

### Descriptive statistics

For descriptive statistics data of four companies (Attock petroleum, Pakistan State oil, Byco Company and Shell Petroleum) were used. Following are the results of the descriptive statistics.

From the Table 1 it is concluded that the data is approximately normally distributed. Standard deviation value shows that data are not very deviated from the mean point. Preliminary assessment of correlation from Table 1 enables us to visualize some interesting features. We can observe that correlation don not remain constant for all companies rather they vary from each other. This finding reinforces our conjecture that relationship between oil prices and stock prices should not be examined in a purely static environment because all correlations fluctuates but with positive significance. Further correlations magnitude is different with different companies. Correlation shows that all the companies are significantly correlated with international oil prices except Attock petroleum limited. Purpose of applying correlation was to find the initial evidence, rather is research hypothesis supported or not.

	IOP	PSO	APL	SPL	BPL
Mean	7620	363.31	541.01	14.00	64.66
Maximum	11298.81	426.71	598	18.71	144.45
Minimum	3831.17	288	482	11.23	31.99
S.d	2622.65	33.46	31.14	1.70	30.77
Skewness	.112	-.097	.047	1.169	.112
Kutosis	-1.801	.002	-.543	2.040	.138
Corr. with IOP	1	.489	.315	.525	.740

Table 1: Descriptive statistics.

### Unit root test

For checking the data state most of literature preferred ADF test to identify the presence of unit root test in each series. For analyzing Toda and Yamamoto [27] lag augmented VAR, it is mandatory to first determine data’s integration order. Augmented dickey – fuller test is commonly used for this purpose. Before applying test, there are two possible hypotheses for the variables data:

Hypothesis: The data have no unit root.

Null Hypothesis: Data series has unit root.

From the above Table 2, we conclude that all the data of oil companies is stationary at first difference along with international oil prices. So, we accept the alternative hypotheses that “data have no unit root” while rejecting the null hypothesis that data have unit root. It means that Johansson co integration test is applicable over the data.

### Cointegration

Preliminary test before Johansson cointegration test is to choose the most optimum lag length. For determination of optimum lag, suggested that there are no unique criteria to select the numb of lags, because of which different criteria may suggest different number of lags. Table 3 presents results generated from VAR order selectin criteria including Schwarz Bayesian Akaike information Criterion and Hannan Quinn. For this study, we choose optimal lag length based on AIC and HQ criteria with maximum three lags.

For assessing the relative strength of relationship, Johansson and Juselius in 1993 formulated a cointegration vector analysis. To check the cointegration we used Johansson cointegration test. It enables us to test several hypotheses proposed for all four companies. Table 4 reports the result of unrestricted Johansen cointegration test. From results, we conclude that there is cointegration equation. It is concluded from analyzing the trace statistics and maximum eigenvalue. Both are greater than their critical values which are at first rank and accepted at 95% of confidence interval. From results, it is concluded that there

Unit root test	IOP	PSO	BPL	SPL	APL
Level	-3.4706	-6.2932	-7.3819	-5.935	-5.99881
1 <sup>st</sup> difference	-5.99	-10.10	-7.38191	-5.4497	-6.27672
P value	0.004	0.002	0.001	0.004	0.0003

Table 2: Unit root test.

Lag	0	1	2	3
Log L	114.3295	124.859	153.219	220.7597
LR	NA	15.0425	27.0089	32.16244
FPE	2.07E-11	8.91E-11	1.06E-10	1.13E-11
AIC	-10.4123	-9.03421	-9.35415	-13.40569
SC	-10.16364	-7.54204	-6.6185	-9.42655
HQ	-10.3584	-8.71037	-8.76045	-12.54211

Table 3: VAR lag order selection.

Hypothesized	Trace	0.05			
No. of CE(s)	Eigenvalue	Statistic	Critical value	Maximum eigenvalue	Critical eigenvalue
None	0.900580	99.77240	69.81889	50.78	33.8
At most 1	0.664954	48.98763	47.85613	24.05	27.58
At most 2	0.345036	24.93093	29.79707	9.3098	21.13

Table 4: Unrestricted Johansson cointegration test.

is cointegration amongst the oil price and stock prices. So, we can conclude that change in international oil prices have significant change over stock prices of enlisted companies.

### Impulse response

Figure 1 explains the response of each company in the system to the shocks of oil prices. At initial level the stock prices of companies responded positively to each oil price change but trend varied after period of time. It shows that international oil prices are correlated to the stock prices of enlisted marketing oil companies.

### Variance decomposition test

Because of limited data Granger-causal chain amongst variables was not a robust test that is why we used variance decomposition test. Variance decompositions enables study to provide a literal breakdown of change in value of one variable from changes in the same variable as well as to the other variables. Optimally forecasted variable from its own lagged values can forecast the error variance accounted for by its own disturbances.

From Table 5 it is observed that in short run shock to international oil prices can cause 13.32% of fluctuation to the prices of Attock petroleum limited. While in long run shock to international oil prices can cause 19.19% of fluctuations in Attock petroleum limited companies share prices. It shows that the impact increases in long run as compared to short run. From Table 5 it could be observed that in short run the fluctuation caused by international oil prices over Byco petroleum company is 17% which increases up to 19%. Reason for this abnormality could be the size and share price of Byco company. In short run fluctuation caused by international oil prices of Pakistan state oil company is 1%. It means it has not responded to fluctuations at the initial state but in long run it has also been affected up to 18%. Pso is one of the strongest company in oil sector. It sustained its prices in

short run but could not sustain it in long run. The last company affected by the fluctuation of international oil prices is shell petroleum limited. In short run its price is fluctuated by 10% and the impact remained same in the long run.

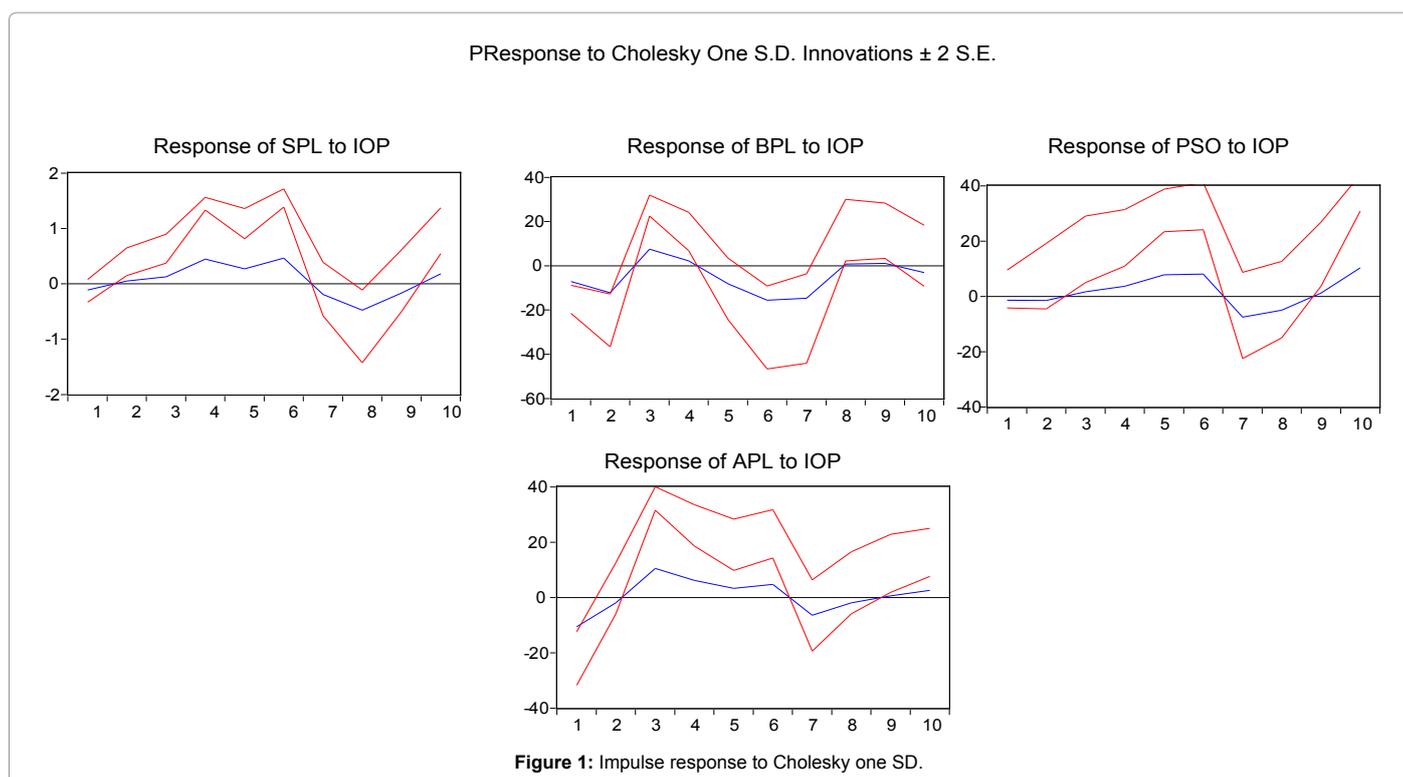
### Main Findings and Conclusion

Number of studies are limited which have thus far examined the impact of oil price fluctuation on the enlisted oil stock prices. Our study emphasizes over capturing the stochastic properties and relationship between oil prices and stock prices of Pakistan stock exchange. Study is unique in nature by others because our focus was over the stock prices of enlisted oil marketing companies of Pakistan stock exchange.

The very first result of our study indicates that the data are normal by using the skewness and kurtosis measured with the help of descriptive statistics. Initially correlation enhanced our hypothesis that there exists a relationship between oil prices and stock prices. Main conclusion from correlation matrix is that there exists significant correlation between international oil prices and stock prices of enlisted stock markets.

Unit root test indicated that there is no unit root in any of companies' data. Means that the data of all companies was stationary which allowed us to measure the cointegration test introduced by Johansson. Johansson cointegration test revealed that the oil prices and stock prices are cointegrated at first level of difference, means there exists stochastic trend in the data. Variance decomposition enhanced our study by revealing that all stock prices of companies fluctuate because of fluctuation of fluctuation in oil prices.

Due to short time span, impact of just recent oil crisis was observed over the stock prices of enlisted oil companies. Further only oil marketing companies' data was used for the study ignoring the oil exploring companies. Study could have used number of other models



VDC of APL	SE	APL Change	BPL Change	PSO Change	SPL Change	IOP Change
1	0.049017	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.056334	77.88813	8.304735	0.716072	7.846265	5.244794
3	0.060316	68.04800	7.404750	4.303338	6.919738	13.32417
4	0.064873	58.91301	9.461322	6.228459	6.879904	18.51730
5	0.065087	58.55798	9.400589	6.719814	6.910678	18.41093
6	0.066121	57.85845	9.819425	6.519557	6.886881	18.91569
7	0.066455	57.55013	9.725481	6.644677	6.818541	19.26117
8	0.066485	57.49825	9.761801	6.661607	6.817756	19.26058
9	0.066589	57.38240	9.899673	6.692447	6.824161	19.20132
10	0.066603	57.37107	9.917168	6.689716	6.826033	19.19601
VDC of BPL	SE	APL Change	BPL Change	PSO Change	SPL Change	IOP Change
1	0.232312	0.087704	99.91230	0.000000	0.000000	0.000000
2	0.308001	4.174806	79.56473	10.68673	4.299202	1.274538
3	0.355850	3.585748	64.05537	11.19803	3.513421	17.64743
4	0.361861	4.092671	61.95334	12.09571	3.552604	18.30567
5	0.364472	4.738561	61.44868	11.97719	3.567954	18.26761
6	0.368757	5.484143	60.26053	11.73115	3.562568	18.96161
7	0.368999	5.501236	60.19220	11.79760	3.560848	18.94812
8	0.369209	5.506967	60.16202	11.80731	3.565469	18.95824
9	0.369534	5.536115	60.15372	11.80625	3.577788	18.92612
10	0.369552	5.537523	60.15325	11.80618	3.577624	18.92543
VDC of PSO	SE	APL Change	BPL Change	PSO Change	SPL Change	IOP Change
1	0.077683	31.41293	0.969711	67.61736	0.000000	0.000000
2	0.092710	25.18279	12.05824	51.70886	10.79220	0.257909
3	0.095605	23.85963	12.49873	51.60974	10.26957	1.762330
4	0.107831	19.92305	11.57310	43.57646	8.216055	16.71134
5	0.111385	19.04144	11.64079	43.18075	7.964704	18.17231
6	0.112039	19.43983	11.79968	42.71784	7.900724	18.14192
7	0.113349	19.92569	12.24188	41.73647	7.854611	18.24134
8	0.113455	19.94811	12.22060	41.71892	7.840408	18.27196
9	0.113471	19.94389	12.21792	41.71099	7.838879	18.28832
10	0.113560	19.93083	12.28694	41.67469	7.840550	18.26698
VDC of SPL	SE	APL Change	BPL Change	PSO Change	SPL Change	IOP Change
1	0.081024	0.546672	41.07052	22.09395	36.28886	0.000000
2	0.096288	15.48244	41.31665	16.26445	26.52159	0.414879
3	0.105699	17.72074	35.57094	14.09858	22.17511	10.43462
4	0.107637	17.32034	34.39761	16.01122	21.40416	10.86667
5	0.107940	17.22335	34.66038	15.96158	21.30183	10.85287
6	0.108968	17.37865	35.18551	15.77547	21.00840	10.65198
7	0.109008	17.39377	35.18439	15.76784	21.00438	10.64962
8	0.109038	17.38762	35.21268	15.76077	20.99449	10.64444
9	0.109062	17.38018	35.20795	15.76229	20.98568	10.66390
10	0.109073	17.37696	35.21088	15.76418	20.98340	10.66458

Table 5: VDC of all companies.

to strength the results but due to limited time it was not possible. One of the highlighted limitation of study is ignoring the other factors like inflation, interest rates etc., which also influences the stock markets and stock prices.

In future researchers, could expand this research to measure the impact of oil crisis over other sectors also. Researchers could consider other variables which indirectly or directly affects the stock prices. We analyzed the impact of recent crisis only but in future, researchers could use number of oil crisis of different periods instead of limiting to the current oil crisis.

## References

- Hamilton JD (1983) Oil and the Macroeconomy since World War II. *JPE* 91: 228-248.
- Sadorsky P (1999) Oil Price Shocks and Stock Market Activity. *Energy Economics*, 2: 44969.
- Jones CM, Kaul G (1996) Oil and the Stock Market. *Journal of Finance* 51: 463-491.
- Ciner C (2001) Energy Shocks and Financial Markets: Nonlinear Linkages. *SNDE* 5: 203-212.
- Chen NF, Roll R, Ross SA (1986) Economic Forces and the Stock Market. *JOB* 59: 383-403.
- Nandha M, Faff R (2008) Does oil move equity prices? A global view. *Energy Economics*, 30: 986-997.
- Park J, Ratti RA (2008) Oil price shocks and stock markets in the US and 13 European countries. *Energy Economics* 30: 2587-2608.
- Hamilton JD (2003) What is an Oil Shock? *Journal of Econometrics* 113: 363-398.

9. Barsky RB, Kilian L (2004) Oil and the Macroeconomy since the 1970s. *JEP* 18: 115-134.
10. Sadorsky P (2001) Risk Factors in Stock Returns of Canadian Oil and Gas Companies. *Energy Economics* 23: 17-28.
11. Maghyereh A, (2004) Oil price shocks and emerging stock markets: a generalized VAR approach. *IJAEQS* 1: 27-40
12. Ono S (2011) Oil price shocks and stock markets in BRICs. *EJCE* 8: 29-45.
13. Miller JI, Ratti RA (2009) Crude oil and stock markets: Stability, instability, and bubbles. *Energy Economics* 31: 559-568.
14. Ravichandran K, Alkathlan KA (2010) Impact of oil prices on GCC stock market. *RAE* 2: ISSN 1948-5433
15. Sedik TS, Williams MO (2011) Global and regional spillovers to GCC equity markets. *IMF* (No. 11-138).
16. Maghyereh A, Al-Kandari A (2007) Oil prices and stock markets in GCC countries: new evidence from nonlinear cointegration analysis. *Managerial Finance* 33: 449-460.
17. Arouri MEH, Rault C (2012) Oil prices and stock markets in GCC countries: empirical evidence from panel analysis. *IJEF* 17: 242-253.
18. Awartani B, Maghyereh AI (2013) Dynamic spillovers between oil and stock markets in the Gulf Cooperation Council Countries. *Energy Economics* 36: 28-42.
19. Arouri M, Fouquau J, (2009) On the short-term influence of oil price changes on stock markets in GCC countries: linear and nonlinear analysis. *Economics Bulletin* 29: 795-804.
20. Zarour BA, (2006) Wild oil prices, but brave stock markets! The case of GCC stock markets. *Operational Research: An International Journal* 6: 145-162.
21. Akoum I, Graham M, Kivihaho J, Nikkinen J, Omran M (2012) Co-movement of oil and stock prices in the GCC region: A wavelet analysis. *The Quarterly Review of Economics and Finance* 52: 385-394.
22. Naifar N, Al Dohaiman MS (2013) Nonlinear analysis among crude oil prices, stock markets' return and macroeconomic variables. *IREF* 27: 416-431.
23. Jouini J, Harrathi N (2014) Revisiting the shock and volatility transmissions among GCC stock and oil markets: A further investigation. *Economic Modelling* 38: 486-494.
24. Shafi K, Hua L, Nazeer A (2015) oil prices and stock market: evidence from KSE & BSE. *American Journal of Business Economics*.
25. Ansar I, Asaghar MN (2013) The impact of oil prices on stock exchange and CPI in Pakistan. *IOSR IOSR-JBM* 7: 32-36.
26. Fatima T, Bashir A (2014) Oil Price and Stock Market Fluctuations: Emerging Markets (A Comparative Study of Pakistan and China). *IRMBR* 3: 1958-1975.
27. Toda HY, Yamamoto T (1995) Statistical inference in vector autoregressions with possibly integrated processes. *Journal Econometrics* 66: 225-250.