THE IMPACT OF CHANGE IN OIL PRICES ON THE EQUITY MARKETS OF OIL EXPORTING AND IMPORTING COUNTRIES

Sadaf Zahid*[1]

[1]*Fatima Jinnah Women University, Old Presidency, The Mall, Rawalpindi, Pakistan, sadafzahid123@gmail.com, sadafzahid@fjwu.edu.pk*

Abstract

This research work examines the level of the integration of equity markets of both oil importer and exporter countries based on impact of change in oil price attained by using the daily stock index data and oil price. The sample comprised of three oil importer countries Pakistan, India and Bangladesh along with three oil exporter countries Saudi Arab, Oman and UAE. For the purpose of analysis, the econometric technique mean and volatility spillover (ARMA 1, 1 and GARCH in Mean) is used. This investigation continues in two steps. First, is the impact of the economic shock in the prices of oil on returns of equity markets of both oil importer and exporter countries is studied and in the next step the impact of the same shock affecting the volatility of equity market of the sample countries is measured. The mean spillover impact from the variation in the oil price is constructive for oil importer and oil exporter countries both except for India. Volatility spillover impact is negative and significant for two oil importing countries like Pakistan, Bangladesh, and two oil exporting countries e.g. Saudi Arab and UAE but positive for Oman and India, one oil importing and one oil exporting country. The negative correlation among the variation in the oil price and equity returns of Pakistan, Bangladesh, Saudi Arab and UAE indicate the presence of portfolio divergence opportunities for foreign stockholders and portfolio executives. India, the only country for which the equity returns and their volatility are not under the influence of the change in the oil rate. Finally it is concluded that prices of oil are the cause of mean and volatility spillover in the Arab countries more significant than in sub-continent countries. The practical implication, limitations as well as directions for future research are discoursed later in this research article.

Keywords

Mean and volatility spillover, GARCH-in-mean, market integration, oil price, equity markets

JEL Classification

D4, D5, E2

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Introduction

The fluctuation in the day to day oil prices are often well-thought-out to be the drive force for the variation occurring in the equity markets (Kilian & Park, 2009). The extensive literature launching vigorous results through many countries on the link amongst the change in the prices of oil and cumulative movement suggests that relationship should also grasp among oil price change and equity marketplaces (Park & Ratti, 2008). On one side, negative relationship is assumed between oil prices and equity markets: when oil prices escalates, price of stock decreases. This is due to fact that due to increase in the oil prices many firms have to expend more to carry out their operations and to complete their ongoing projects e.g. when they ship their products by air, see or through land the oil expenditure is to be paid which increase their cost and ultimately decrease their profit. As a result the firms pay fewer dividends to its shareholders. As a result, the stock price falls down (Naifar &l Al Dohaiman, 2013). But here the question arises: Is the impact of the price change is same for oil producing and oil consuming countries both or not? Other side of picture depicts that the upsurge in the oil price is thought to be an optimistic gesture for oil exporter countries equity marketplaces because the income of respective nation state increases. As a consequence, the investment alongwith the productivity increases and the unemployment decrease. Ultimately the stock market will respond positively to this change (Bjornland, 2009; Jimenez-Rodriguez & Sanchez, 2005). So the jerk in oil price instability has an influence on both oil-exporter and importer countries stock returns (Naifar & Al Dohaiman, 2013). Over past few years, mutual connection among the equity market and the oil prices in the worldwide economy is depending mostly on the energy source particularly oil. Due to this interdependence the variation of oil prices have remarkable impacts on the world equity markets and the related sectors (Chang et al, 2013).

Numerous studies verified the impact of change in oil price on various macroeconomic factors worldwide and country wise. Similar type of study was conducted on the emerging countries by Aktham (2004) showed that oil jerks cause no noteworthy effect on returns of the stock market. Another emerging oil importing country China has the variation in the effect of the oil rates on returns of the equity markets of different sectors. The energy, information, material and telecommunication sectors stock prices are negatively related to the crude oil prices on short-term basis and positively related on medium and long-term basis, while the financial sector showed over all positive results (Huanga et al, 2015). In Spain, where the exposure of the industries are very limited but different in different time frames, in 1990 the association among the prices of stock and oil was very weak later it was increased in 2000 (Moya-Martínez et al, 2014). The Nath, Sahu and Mondal (2014) studied the Indian market which is proved that the causation transfers from Indian stock market to oil market but not in the reverse direction. In most of the research papers the impact of US equity marketlaces was tested on equity market of different economies (e.g. Mensi et al., 2016; Balcilar, Gupta, & Miller., 2015) showed the correlation between the BRICS and US equity market and on the other hand the comparison of the S & P 500 index and world oil rates proved that the oil prices are under the effect of the major worldwide oil companies respectively. Most of the studies in the recent past were carried out on the US equity market and other developed economies but the sub-continent countries have largely been ignored in this domain. The present paper is enlightening the behavior of the equity markets of the sub-continent like Pakistan, India and Bangladesh as oil importing countries which has largely been ignored in the past. Throughout the whole literature as far as my knowledge is concerned in the recent past Pakistan equity market was studied by Nishat and Shaheen (2004) where instead of the oil price, other macroeconomic variables e.g. industrialized manufacturing index, customer price index, worth of investment earning and capital market price were taken as independent variables and its effect on KSE 100 index was found out to be conintegrated on long term basis. In the present research work the association among the stock and oil market of the subcontinent and Arab economies

has been a point of focus. As far as the literature associated with comparison of the oil exporter and importer economies is concerned, this phenomenon has been of little attention in the past, and its inclusion also make this research a remarkable one. In the recent past, one comparative analysis of oil producers and oil consumers industries listed on NYSE, NASDAQ, and S&P500 US exchanges was conducted by Phan, Sharma, and Narayan (2015) concluded that equity returns of the oil producers move positively with the oil price change but for the oil consumers the effect of the oil price change is not significant. Another study of Degiannakis, Filis, and Floros (2013) on the comparative analysis of three oil exporter (Canada, Mexico and Brazil) and three oil-importer countries (US, Germany and Netherlands) by using A DCC-GARCH-GJR approach showed that during eras of noteworthy economic chaos, the oil economy is not a secure place for protecting the risk of the investors. The comparison of the oil exporting Arab countries and oil importing subcontinent areas is taken into consideration for the first time in the present research work. Second significant feature of this research work is the use of the spillover technique. Different econometric techniques have been used in past studying the association of oil prices and equity market. Markov-Switching vector error-correction model was employed by Balcilar, Gupta, and Miller (2015). GARCH (1, 1) regression model was used by Phan, Sharma, and Narayan (2015) to study the comparative analysis of the oil producers and the oil consumers on the industrial level. Similarly the same relationship was studied on different industries i.e. the impact of variation in prices of oil on stock returns of banking, energy, materials, retailing and transportation sector by using probit regression by Angelidis, Filis and Degiannakis (2015). Other econometric techniques used were VAR, local linear quantile regression, descriptive statistics, QQ approach, granger causality test. The present study for the first time using spillover technique (ARMA (1,1) and GARCH in mean) to study exactly how the economic shock in oil rates are effecting equity markets of oil exporter Arab and oil importer countries.

The shocks in oil price in relation to other econometric variables of the stock markets, production sectors and the world economic growth factors have been broadly studied, but the text available on the association among equity market and oil rates is still mounting. To the best of my knowledge and by doing the sharp comparison to bulk of studies observing the relationship of oil price shocks and the returns of stock market and other monetary factors, it was found out that few studies on the relationship regarding change in oil plus equity markets prices are available. All the studies are revolving around oil importer and exporter countries. But issue of comparison of effect of oil prices on stock markets of oil exporter and importer particularly the sub-continent markets has largely been ignored. This study is arranged as follows. Section 2 observes the literature review including theoretical background alongwith hypothesis development. Section 3 is the application of the research methodology includes data and methodology indicating the application of mean and volatility spillover technique by using e-views software. Section 4 is comprised of preliminary analysis followed by the discussion on the results obtained. Section 5 is the conclusion drawn together certain policy implication of the analysis. In addition, this also includes limitations and directions for future research.

Literature Review

Theory of Market Integration

Theory suggests markets are well-thought-out to be integrated once assets belonging to same risk class over and done with the efficiency of market, facilitate the similar predictable return regardless of their location. Rising concern in exercise of integration of worldwide different markets have generated an extensive quantity of effort in the capacity of spillover effect (Bhar & Nikolova, 2007).

The world has become global village. Due to globalization and fast means of communication, all the markets operating in the world are linked and integrated. Any economic shock or event/happening in one market can make a big change in another market due to close integration. Market Integration

shows an important role in worldwide and growth of the economics. The economics worldwide emphasis on the prospective wellbeing improvement of the market integration such as risk diversification advantages. As far as the growth of the economics is concerned, many researchers have begun to trace the investment and developmental advantages of the integration of the equity markets (e.g. Obstfeld, 1992; Bekaert et al, 2001; and Henry, 2000 as cited by Bekaert, Harvey, & Lumsdaine, 2002). Due to economic integration, as the oil price escalates the price of stock decreases. This is because due to upsurge in the oil rates many firms have to expend more to carry out their operations and to complete their ongoing projects e.g. when they ship their products by air, see or through land the oil expenditure is to be paid which increase their cost and ultimately decrease their profit. As a result the firms pay fewer dividends to its shareholders. As a result, the stock price falls down (Naifar &l Al Dohaiman, 2013). The higher oil value is thought to be an optimistic gesture for equity market of oil exporting countries because the income of that country increases. As a result the investment and the productivity increases and the unemployment decrease. Ultimately the stock market will respond positively to this change (Bjornland, 2009; Jimenez-Rodriguez & Sanchez, 2005). This is only possible when the markets are closely integrated.

In the financial integrated markets, the local investors are capable of investing in international assets and the international investors in the local assets. In this way same returns can be expected from the assets of same risk class not dependent on the location of the trading (Bekaert, Harvey, & Lumsdaine, 2002). So integration is directly linked with the stock returns which are more volatile. A far as the integration of the equity markets are concerned, there are three fundamental methodologies for describing the degree to which the equity markets are integrated. They can be further categorized in to two types i.e. direct and indirect measures. The principal methodology (the direct measure) is the degree to which the rates of the return on the financial assets of same risk class and maturity dates are same across political influences. This is the direct measure because it talks about one price. The second methodology talks about the world wide equity market completeness. The third methodology can be defined as the degree to which the local investment is supported from world saving other than from local savings. These two latter methodologies are indirect measures (Kearney & Lucey, 2004).

Prior Literature

This section throws light on the brief literature review about the stock market indices and its integration particularly with the oil market. Rising concern in the practice of integration of worldwide different markets generated an extensive volume of work in the capacity of spillover impact (Bhar & Nikolova, 2007). According to Naifar & Al Dohaiman, (2013) the change in the oil prices upset the economies of oil exporter and importer countries both, GCC economies face uncertainty and abrupt changes in exports and the revenues generated by the Government due to its dependence on oil. The government budget is also affected by such volatilities and can also produce shocks in the stock returns and other macroeconomic factors. The demand and supply of the crude oil shows an important role in all economies. The costly fuel becomes the reason for great transportation costs, production and heating expenditures disturb the inflation rates and house hold budgets. Though we should not lose value of information causing disturbance of oil price could disturb stock marketplaces just because of improbability, they generate in the monetary world, conditioned by the reality of shock (demand-side / supply-side). If the oil price shock generated from the demand side, equity markets could react optimistically to change in oil price, and adversely if shock initiates from the supply side (Filis, Degiannakis & Floros, 2011). Bjornland (2008) studied the effect of the oil price change in Norway, an oil exporter country. High oil price resulted in the increase in the stock returns but for limited time frame (14-15) months. So overall it is beneficial for Norway.

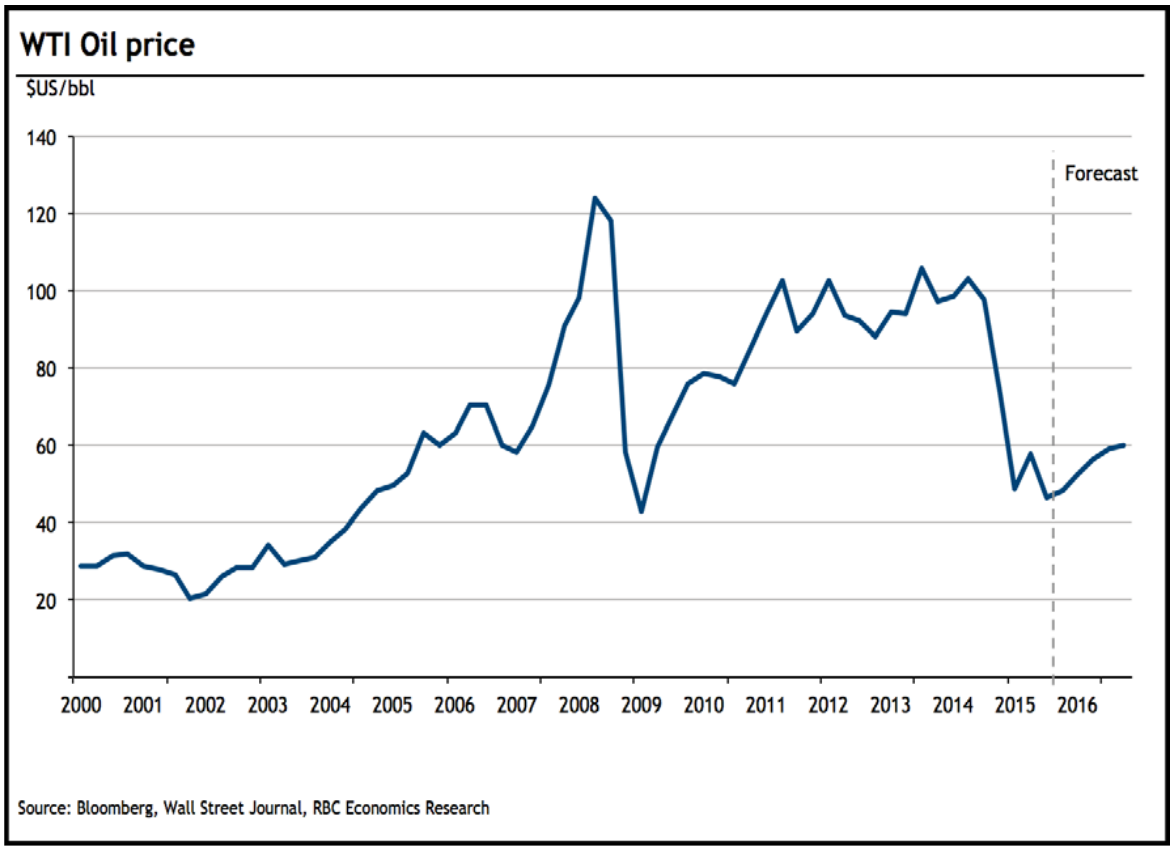

Figure 1. Line Graph showing the variation in oil prices.

Guesmia and Fattoumb (2014) investigated that except for Venezuelan equity market, upsurge in oil prices produced due to demand shocks are in co movement with the equity prices for oil exporting countries, there is correlation in oil exporting countries arises due to supply shocks. As far as if shock is coming from demand side, both oil and stock market prices travel in line with each other in oil exporter and oil importer countries. More specifically, hence proved that US equity market is more under influence of oil price shocks when compared to the Chinese equity market, as it displays a greater level of relationship with oil price shockwaves all over the studied period.

Economy of Iran in danger to the negative oil prices shocks, due to which the exchange rate decreases results in the fall down of the domestic currency. As a result price of the imports increases. In Iran opposite effects are shown, the effect of the inflation is much noticeable during negative shocks, and it is due to the rise in the import prices and the device used for financing the deficit of the budget in Iran (Farzanegan & Markwardt, 2009). Actually the increasing oil prices seem to slow down collected fiscal activity to further extent than the decrease oil prices motivate it. This sensation is not only the part of the US economy but also present in other G7, Europe and Euro area countries (Lardic & Mignon, 2008). The oil price volatility is an essential and attractive case to be studied, because due to the rise of the oil prices some inflationary burden may arise in the economy of the country which proves to be predictable for future investment opportunities. The results found out showed that the oil prices and the oil prices variation are to be taken in to the consideration as an imperative issue affecting economy of any country. It was suggested that variation in oil price can cast an impact on the economy but the vice versa is not true and progressive oil price shock decreases the equity return (Sadorsky, 1999).

Some papers concluded that negative effect of oil rates on the stock marketplaces. Degianakis Filis, & Floros (2013) suggested that during the period of financial turmoil, the changes in the oil market cannot denote a safe place for the investors to keep themselves away for the possible losses in their

equity market portfolios. So the investors are advised to choose other investment options. Non-economic crunches create an adverse association among stock market plus oil prices in difference to economic crunches. Many European countries except USA rise in the variation in the oil prices dominantly decreases real stock returns within one month. In half of the European countries including USA impact of variation in oil prices on the equity returns is more than the effect of the interest rates (Park & Ratti, 2008).

Most of the literature revolves around the fact that link between these two variables does not exist (the oil price change and movement of stock market). A study conducted in Spanish stock market concluded that influence of the alteration in oil price is very small. There would be no significant effect on the large set of industries such as consumer goods, technology, telecommunication, real estate and utilities (Moya-Martínez, Ferrer-Lapeña, & Escribano-Sotos, 2014). Chen et al (1986) analyzed no momentous effect of change in oil rate on the stock marketplaces. Similarly a study in china stock market was carried out by Cong et al (2008) investigated that volatility of oil rates showed insignificant effect on real stock returns of China equity market excluding some manufacturing industries and oil firms. Bjornland (2008) analyzed influence of the oil price shockwaves on equity returns of the Norway, an oil producing country by using VAR model concluded that equity prices are an imperative conduction channel of prosperity in an oil exporting economy. Almost about 10% increase in oil rates resulted in upsurge of equity price by 2.5 percent on the short term basis, but after it the impact ultimately dies out.

This study uses mean stock return and volatility spillover impact calculated from oil market, on three oil importing markets of sub-continent and three equity market of the oil exporter countries. The mean and volatility spillover are the degree of integration established by these countries on the oil market.

In all, this research work is wholly solely different from the above mentioned work. Its a true fact that all the above citation does not employ the spillover ARMA (1, 1) GARCH (M) model to study influence of economic shock of the oil prices on the oil exporting and importing equity markets especially to the sub-continent countries. Although the ARMA and GARCH have different objectives but they are well matched. The present study have incorporated both the models together, because these when used together explain more variance so results can be better predicted than if they are used separately. When both these models are used together, the level of the precision increased and more accurate results can be obtained. Evidence recommends that the procedure of volatility projected from further cultured time series models will give much precise forecasts and option estimates. These are the main significance of this study. The sample countries are all emerging and developing countries. The problem that is involved behind this research area is that these countries are highly volatile just because in the developing and emerging economies, firms have meager investment on research and development when compared to the firms in well developed countries. This may be due to absence of the data or of the non-reliability on the emerging markets. This research work is providing the fact and figures about six emerging markets that is beneficial for these equity markets and in making them less volatile.

The main objective of this research work is to test and conclude hypothesis. The oil importing/ exporting countries are under the influence of the change in the oil prices either positively or negatively. In particular, there are five hypotheses which are as follows.

Theoretically, in oil consuming countries the upsurge in the oil prices happened to be costly for the consumers. They are affected either directly or indirectly by it. This is due to the fact, many firms have to expend more to carry out their operations and to complete their ongoing projects due to upsurge in the oil prices e.g. when they ship their products by air, sea or through land the oil expenditure is to be paid which increase their cost and ultimately decrease their profit. As a result the firms pay fewer dividends to its shareholders. As a result, the stock price falls down (Naifar & Al Dohaiman, 2013).

Because of upsurge of oil price, prices of petroleum and gas or of other consumer goods and services are also increased to compensate it, whose manufacturing is dependent on consumption of oil. In oil importing countries, oil prices and the equity returns are inversely related to each other. So it can be hypothesized:

Hypothesis 1: Oil price changes affect mean returns of equity markets of oil importing countries.

Hypothesis 2: Oil price change affects volatility of equity markets of oil importing countries.

Conversely, above statement cannot be true equally for all oil consuming countries by saying that all the oil consuming countries are not using the same amount of oil for running out its operations or in other sense their level of consumption is different. On this basis it can be also happen that the variation in the oil prices can upset differently the oil importing countries equity markets.

The economy of the oil producing countries is positively affected by variation in the oil prices (i.e. increase in oil prices). This can result in increase in revenue of the oil producing countries and thus economy of the country boost up from the upsurge of the oil prices. So for oil exporting countries there is direct relationship among the variation in the oil prices and stock returns. This side of picture depicts the upsurge in the oil prices is thought to be an optimistic gesture for the markets of the oil exporting countries because income of that country increases. As an outcome the investment and the productivity increases and the unemployment decrease. Ultimately the stock market will respond positively to this change (Bjornland, 2009; Jimenez-Rodriguez & Sanchez, 2005). So it can be hypothesized:

Hypothesis 3: Oil price changes affect mean returns and volatilities of the equity markets of oil exporting countries.

Hypothesis 4: Oil price changes affect volatility of equity markets of oil exporting countries.

So the oil price instability has an influence on both oil-producing and consuming countries stock returns (Naifar & Al Dohaiman, 2013).But here the question arises: Is the impact is same for both types of the countries or not? So it can be hypothesized:

Hypothesis 5: Oil price changes affect differently the mean returns and volatility of the equity market of oil importing and exporting countries.

Research Methodology

Data

Three oil importer countries (Pakistan, India and Bangladesh) and three oil exporter countries (Saudi Arab, UAE and Oman) are taken due to the time limitation. The following criteria had to be satisfied for the inclusion in the sample.

1. The countries studied need to have well established stock markets
2. The oil exporting countries have to be in the top twenty oil exporter countries as declared in 2015.
3. The oil importing countries are the countries of the sub-continent region having approximately same climate, needs and requirements.

Table 1. Time span used for the analysis.

Oil Importing Countries	Time Span	Oil Exporting Countries	Time Span
Pakistan	Jul, 2001-Jun, 2016	Saudi Arab	Dec, 2001-Jun, 2016
India	Jul, 2001-Jun, 2016	Oman	Jul, 2001-Jun, 2016
Bangladesh	Jan, 2004-Jun, 2016	United Arab Emirates	Jul, 2001-Jun, 2016

Note. The time span depend on the availability of the data online

During 2015 the biggest exporters of the oil are Saudi Arab amounting to US$133.3 billion (17% of total crude oil exports), Iraq: $52.2 billion (6.6%) United Arab Emirates: $51.2 billion (6.5%) Oman: $17.4 billion (2.2%) (Workman, 2016). These are the first (Saudi Arab), fourth (UAE) and fourteenth (Oman) biggest exporters of the oil exporting the highest dollar value of crude oil during 2015.

Table 2. Crises during selected time period.

Sr.No.	Period	Oil Prices Movement	Remarks
1.	1973-74	Oil prices increased	OPEC Oil Ban
2.	1978-79	Oil prices increased	OPEC impose restriction on oil drilling
3.	Initial Period of 1980	Oil prices increased	Iran Iraq Battle
4.	In 1986	Oil prices decreased	Oil production increased by Saudi Arab
5.	In 1990	Oil prices increased	Iraq attacked Kuwait
6.	In 1991	Oil prices reverted back	Asian Monetary crises
7.	1999-2000	Oil prices increased	OPEC restricted oil drilling
8.	In 2003	Oil prices increased	Continued till July 2008
9.	2007-2010	Oil prices slowly started decreasing	Financial Crises 2007-2010
10.	January 2011	Oil prices was about $100 per barrel	Political disorder in Egypt
11.	For next three and half years	Oil prices remain stable at $ 90 to $ 120 per barrel	Nil
12.	After 2014	Oil prices reduced	Rise in the production of oil by USA and decline in demand of oil by emerging countries continued till February 2016

The daily stock prices of oil importing and exporting countries and price of oil market employed for analysis for the period from July 2001 to June 2016 for India, Pakistan, Oman and UAE . The data for Bangladesh was not available online so it was requested from the Chittagong stock exchange personally. At last it was found out from 2004 to 2016. The weekends Saturday and Sunday were deleted from the retrieved data. Other holidays and weekends like Thursday, Friday in Arab countries, the missing values are replaced by the previous day's closing price. Daily stock returns were calculated by taking logarithm of oil and stock price. Hetrosikasdasticity test has been applied on the data, significant value of F-statistics and obs* R squared has checked the whether the application of specified ARMA (1,1)-GARCH (1,1)-in Mean model is feasible and mean and volatility spillover can be calculated from this data or not. Following tests has been carried out for data analysis.

1. Descriptive statistics
2. Mean spill over
3. Volatility Spill Over

Methodology

Under the specification of Liu and Pan (1997) and Bhar and Nikolova (2007), the two stages GARCH -in -Mean approach (GARCH-M) applied to study effect of change in oil rates on stock market of oil exporter Arab Countries and oil importer sub-continent countries.

At the first step the oil prices are modeled by using the ARMA (1, 1)-GARCH (1, 1)-M model are specified as follows:

$r_{oil,t} = \beta_{oil,0} + \beta_{oil,1} r_{oil,t-1} + \beta_{oil,2}\sigma^2_{oil,t} + \beta_{oil,3} \in_{oil,t-1} + \epsilon_{oil,t} \sim N(0, \sigma^2_{oil,t})$.....Equation 1

$\sigma^2_{oil,t} = \gamma_{oil,0} + \gamma_{oil,1,t}\epsilon^2_{oil,t-1} + \gamma_{oil,2}\sigma^2_{oil,t-1}$ ……..Equation 2

The terms $\beta_{oil,0}$ and $\beta_{oil,1}$ are factor of estimates and constant and represent an idiosyncratic shock which is supposed normally distributed with zero mean. The term $\sigma^2_{oil,t}$ representing the conditional variance. $r_{oil,t}$ the daily return of oil price at time t and $r_{oil,t-1}$ is lagged return term of oil price at the time t-1. $\epsilon^2_{oil,t-1}$ the square of the lagged error term and $\sigma^2_{oil,t}$ the lagged variance. ARMA (1, 1) is incorporated in model to treat possible serial auto correlation present in data.

At the next stage, effect of the mean and volatility spill over in oil market is projected through process of finding the standardized unexpected series and its square at first step and placing them in to mean and volatility equation of the oil consuming and producing economies.

$r_{coun,t} = \beta_{coun,0} + \beta_{coun,1} r_{coun,t-1} + \beta_{coun,2}\sigma^2_{coun,t} + \beta_{coun,3}\epsilon_{coun,t-1} + \beta_{coun,4}\epsilon_{oil,t} \sim N(0, \sigma^2_{coun,t})$ Equation 3

$\sigma^2_{coun,t} = \gamma_{coun,0} + \gamma_{coun,1}\epsilon^2_{coun,t-1} + \gamma_{coun,2}\sigma^2_{coun,t-1} + \varphi_{coun} e^2_{oil,t}$ …….Equation 4

In the above equation no. (3) the term **ϵ oil** is the standardized unexpected series for the oil market and is showing the mean return spill over from the oil market. For the purpose of calculating the volatility spillover , the exogenous variable $e^2 oil, t$ square of standardized unexpected sequence is placed in conditional volatility equation and can be explained by e^2 oil = **ϵ oil**/$\sqrt{\sigma^2 \text{ coun, t}}$. The symbol (coun) here is representing the countries (oil importer /oil exporter countries) on which effect of change in oil rates is being studied.

Every oil importer and oil exporter countries are situated in varying time zone. So they experience changed trading hours. As the oil prices are reflected in dollars so for the oil market USA is taken as proxy to determine the time difference between oil market and oil exporter and importer economies.

Time difference between USA and Saudi Arab, India, Pakistan, Bangladesh, UAE and Oman is 8 hours, 10 hours and thirty minutes, 10 hours, 11 hours, 9 hours and 9 hours respectively. So it is obvious that economic shock in oil market during time day t will not be exposed in all above said oil importer and oil exporter countries in that specific time zone. For this purpose the paring time is taken by converting the oil market in to t+1 and t for the oil importer and oil exporter countries.

Results and Discussion

Preliminary Analysis

Value of mean and median for all the markets are close to each other but not equal to each other. It means this data is not normally distributed for all these markets. It means that the data is either positively skewed or negatively skewed. The probability for the Jarque Bera Test for oil and stock price returns of all sample countries are 0.0000 so null hypothesis of normality is rejected for all markets. The data of all the market are negatively skewed. The kurtosis result showed that the peakness is high in all the markets, as its value is greater than 3, espatially the Oman data is highly peaked i.e. 38.51756. So there are leptokurtic distribution (i.e. their distributions have fatter tails than consistent normal distributions).

Table 3. Descriptive statistics of returns of oil market and stocks returns of oil importer and exporter countries.

	Oil	Pakistan	India	Bangladesh	Saudi Arab	Oman	UAE
Mean	0.000488	0.000808	0.00058	0.000899	0.00039	0.000435	0.000324
Median	0.000882	0.000491	0.000344	0.000000	0.00000	2.34E-05	0.00000
Maximum	0.164097	0.08479	0.1599	0.143307	0.165886	0.102596	0.12004
Minimum	-0.16545	-0.07741	-0.11809	-0.164205	-0.143261	-0.16396	-0.10624
Std. Dev.	0.024992	0.014687	0.016052	0.015829	0.016969	0.011033	0.012318
Skewness	-0.16113	-0.28655	-0.09331	-0.543085	-0.970725	-1.59735	-0.4797
Kurtosis	7.47669	5.985227	11.02867	19.33447	18.5473	38.51756	17.77521
Jarque-Bera	2273.823	1042.968	7279.808	25292	28251.55	143543.5	24745.29
Probability	0.0000	0.0000	0.0000	0.00000	0.0000	0.0000	0.00000
Sum	1.322757	2.187559	1.571574	2.036823	1.078216	1.177825	0.877329
Sum Sq. Dev.	1.69145	0.58417	0.697723	0.567241	0.795	0.329658	0.410864
Observations	2709	2709	2709	2265	2762	2709	2709

Results of Mean and Volatility Spillover

In order to be capable to forecast the volatility of the equity market, it is important to have better knowhow of the factors that become the cause of it. Both oil importer and oil exporter countries have some common factors for it.

The result of the mean and volatility spillover impact from the oil prices are replicated across each oil importer and oil exporter countries stock prices are tabulated in Table 4-6. The results of all ARCH and GARCH coefficients are taken noteworthy at 5% level for oil market and other countries. The significant value of t statistics shows that conditional mean returns and volatility of oil importer and oil exporter countries are affected in diverse way by the change in oil prices.

Table 4. Mean and Volatility spillovers from Oil Market Price to Pakistan, Indian, Oman and UAE Equity Markets estimated from an ARMA (1, 1)–GARCH (1, 1)–in–mean model (July 2001 to June 2016).

	Oil Price	**Pakistan**	**India**	**Oman**	**UAE**
β0	9.98E-05	0.005751	0.000981	-6.22E-05	0.000312
	(0.9388)	(0.0003)	(0.0263)	(0.7485)	(0.7485)
β1	0.914748	0.443565	0.054467	1.040865	0.376746
	(0.3970)	(0.3550)	(0.8464)	(0.0000)	(0.2567)
β2	-0.001011	-3.640274	0.803257	0.051433	-3.357748
	(0.9994)	(0.3747)	(0.6480)	(0.9816)	(0.5227)
β3	-0.934307	-0.344678	0.019944	-0.918081	-0.248227
	(0.3873)	(0.4719)	(0.9438)	(0.0000)	(0.4561)
ϵ		**0.021835(ns)**	**-0.002160(ns)**	**0.014248***	**0.023140(**
		(0.0843)	**(0.8353)**	**(0.0149)**	**ns)**
					(0.2218)
ϒ0	1.06E-05	0.000100	4.88E-06	3.80E-07	0.000116
	(0.0000)	(0.0000)	(0.0000)	(0.0197)	(0.0000)
ϒ1	0.052836	0.147505	0.128835	0.118934	0.146880
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
ϒ2	0.927976	0.576504	0.849207	0.872090	0.588079
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Φ		**-8.61E-06***	**1.31E-06(ns)**	**1.42E-06***	**-5.83E-**
		(0.000)	**(0.2283)**	**(0.0000)**	**06***
					(0.0000)
	Residual Diagnostics (Hetrosikasdasticity				
F-Statistics	**test)**	183.0991***	104.3683***	56.09124***	
	77.39460***	(0.0000)	(0.0000)	(0.0000)	50.20136*
Obs*R- Squared	(0.0000)	171.6178***	100.5653***	54.99238***	**
	75.29743***	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Resid^2(-1)	(0.0000)	0.251797***	0.192751***	0.142530***	49.32310*
	0.166779***	(0.0000)	(0.0000)	(0.0000)	**
	(0.0000)				(0.0000)
					0.134982*
					**
					(0.0000)

Daily oil market returns and daily equity market returns from Dec 2001 to June 2016 are incorporated. The numbers in the parenthesis under the coefficient reported are representing p values. The p values are to be considered significant at 5%. (But if we take our result at 10% level of significance than the mean spillover is also significant).The p values under the heading of residual diagnostics are represented in parenthesis. The significant p values confirmed that ARMA (1, 1) and GARCH (M) model can be applied on this type of data. Here β0 is the intercept, β1is the coefficient of lagged return, β2 is the coefficient

of conditional variance, β3 is the coefficient of lagged error term and ϵ is the mean spill over factor. Similarly ϒ0 is the constant, ϒ1 is the coefficient of square of lagged error term, ϒ2, coefficient of lagged conditional variance and Φ representing volatility spill over factor.

**p ≤ 0.01, * p ≤ 0.05, *** p ≤ 0.001 and p >.05, (ns)

The result of Table 4 demonstrates that the economic shock in the oil rates is not affecting the returns of the Pakistan stock market. So there is no mean spillover from oil market to Pakistani equity market. Mean spillover effect is positive 0.021835 and insignificant. This result is in collaboration with result of Cong et al (2008) on oil importing country like china. This also shows the positive correlation among the oil market and Pakistani equity market. However the volatility spill over: economic shock of the oil market effect the variance of the Pakistan stock market returns. It is negative -8.61E-06 and highly significant which is in correspondance with results of Naifer and Al-Dohamian (1999) that the variation in the oil price have significant impact. The negative value indicates the negative correlation between oil and Pakistan stock market, so there exist portfolio diversification opportunities for foreign investors. They can take necessary investment decisions. Effect of mean and volatility spillover from oil market to Indian equity marketplace depicts that the coefficient for mean spill over is negative -0.002160 and positive for volatility spillover 1.31E-06 and both are insignificant. This means that as a result of any economic shock produced in oil market, returns and movement of Indian equity market is not affected. This result make it obvious that there exist weak association between alteration in the oil price and Indian equity price returns that according to the findings of Basher and Sardorsky (2006) and (1986) Chen et al showing the weak relationship between both markets. This can also indicate that the alteration in the Indian equity market is not wholly sully dedicated to change in oil prices. There may be other macroeconomic factors such as GDP, inflation and exchange rate is involved. The variation in oil prices are not cause of variation in Indian stock market. The individual or collective impact of these macroeconomic factors on Indian equity market can be a scope for further research. Equity market of Oman has mean and volatility spillover due to the variation in oil prices of the world market. The coefficient for the mean and volatility spillover (0.014248 and 1.42E-06) is positive and noteworthy. This is according to results of the study of Bjornland (2008) on oil exporting country, Norway showing the mean and volatility spillover from oil price change. UAE market for mean spillover the coefficient is positive 0.023140 and insignificant showing that there is no mean spill over. The economic shock in oil prices is not affecting the returns of the stock market of UAE stock market. In case of volatility spillover the coefficient is negative -5.83E-06 and significant providing the portfolio diversification investment opportunities. It shows that variation in the oil prices is affecting the variance of the stock market returns of UAE.

Table 5. Mean and Volatility spillovers from Oil Market Price to Bangladesh Equity Market estimated from an ARMA (1, 1)–GARCH (1, 1)–in–mean model (January 2004-June 2016).

	Oil Price	**Bangladesh**
β0	0.000452	0.002470
	(0.6090)	(0.0268)
β1	0.328098	-3.749763
	(0.6586)	(0.0003)
β2	0.449077	18.94547
	(0.7718)	(0.0000)
β3	-0.357258	3.699659
	(0.6308)	(0.0004)
ϵ		**0.022977***
		(0.0436)
ϒ0	9.37E-06	8.72E-05
	(0.0001)	(0.0000)
ϒ1	0.058423	0.190009
	(0.0000)	(0.0000)
ϒ2	0.922487	0.599491
	(0.0000)	(0.0000)
Φ		**-9.08E-06*** **
		(0.0000)
	Residual Diagnostics (Heteroskedasticity test)	
F-Statistics	86.11744***	169.9515***
	(0.0000)	(0.0000)
Obs*R- Squared	83.03111***	158.2098***
	(0.0000)	(0.0000)
Resid^2(-1)	0.191548***	0.264409***
	(0.0000)	(0.0000)

Daily oil market returns and daily equity market returns from Dec 2001 to June 2016 are incorporated. The numbers in the parenthesis under the coefficient reported are representing p values. The p values are to be considered significant at 5%. (But if we take our result at 10% level of significance than the mean spillover is also significant).The p values under the heading of residual diagnostics are represented in parenthesis. The significant p values confirmed that ARMA (1, 1) and GARCH (M) model can be applied on this type of data. Here β0 is the intercept, β1is the coefficient of lagged return, β2 is the coefficient of conditional variance, β3 is the coefficient of lagged error term and ϵ is the mean spill over factor. Similarly ϒ0 is the constant, ϒ1 is the coefficient of square of lagged error term, ϒ2, coefficient of lagged conditional variance and Φ representing volatility spill over factor.

**p ≤ 0.01, * p ≤ 0.05, *** p ≤ 0.001 and p >.05, (ns)

Table 5 clearly demonstrates that any variation in oil prices effect the returns and the variance in returns of Bangladesh stock market. The coefficient for mean spill over is positive 0.022977 and for volatility spill over is negative -9.08E-06 and both are significant that is according to the economic theory and theory of market integration that oil prices variation can affect equity market returns and economy of country and other different macroeconomic factors and both markets are economically integrated.

Table 6. Mean and Volatility spillovers from Oil Market Price to Saudi Arab Equity Market estimated from an ARMA (1, 1)–GARCH (1, 1)–in–mean model (December 2001 to June 2016).

	Oil Price	**Saudi Arab**
β0	0.000342	0.005446
	(0.6747)	(0.2919)
β1	0.358554	-1.647395
	(0.6250)	(0.7055)
β2	0.556433	-7.000875
	(0.7283)	(0.1342)
β3	-0.386180	1.656596
	(0.5988)	(0.7033)
ϵ		**0.048891***
		(0.0484)
ϒ0	8.44E-06	0.000243
	(0.0000)	(0.0000)
ϒ1	0.047167	0.140054
	(0.0000)	(0.0000)
ϒ2	0.935906	0.574273
	(0.0000)	(0.0000)
Φ		**-2.00E-05*** **
		(0.0000)
	Residual Diagnostics (Heteroskedasticity test)	
F-Statistics	91.28405***	113.0055***
	(0.0000)	(0.0000)
Obs*R- Squared	88.42361***	108.6363***
	(0.0000)	(0.0000)
Resid^2(-1)	0.178991***	0.198396***
	(0.0000)	(0.0000)

Daily oil market returns and daily equity market returns from Dec 2001 to June 2016 are incorporated. The numbers in the parenthesis under the coefficient reported are representing p values. The p values are to be considered significant at 5%. (But if we take our result at 10% level of significance than the mean spillover is also significant).The p values under the heading of residual diagnostics are represented in parenthesis. The significant p values confirmed that ARMA (1, 1) and GARCH (M) model can be applied on this type of data. Here β0 is the intercept, β1is the coefficient of lagged return, β2 is the coefficient of conditional variance, β3 is the coefficient of lagged error term and ϵ is the mean spill over factor. Similarly ϒ0 is the constant, ϒ1 is the coefficient of square of lagged error term, ϒ2, coefficient of lagged conditional variance and Φ representing volatility spill over factor.

**p ≤ 0.01, * p ≤ 0.05, *** p ≤ 0.001 and p >.05, (ns)

The coefficient for mean spillover is 0.048891 and negative for volatility spillover is -2.00E-05 and both are significant. The negative sign indicate that in Saudi Arab there exist the portfolio diversification investment opportunities for the international investors. Table 6 clearly indicates that in the result of economic shock in the oil prices, it can affect the returns and the movement of the equity market returns of Saudi Arab. Saudian market is efficient and any variation in oil price can instantaneously affect the returns and movement of the Saudian stock returns.

Table 7. Consolidated reporting of result.

Particulars	Pakistan	India	Bangladesh	Saudi Arab	Oman	UAE
Mean spillover Factor ϵ	0.021835(ns) (0.0843)	-0.002160(ns) (0.8353)	0.022977* (0.0436)	0.048891* (0.0484)	0.014248* (0.0149)	0.023140(ns) (0.2218)
Volatility spillover Factor Φ	-8.61E-06*** (0.0000)	1.31E-06(ns) (0.2283)	-9.08E-06*** (0.0000)	-2.00E-05*** (0.0000)	1.42E-06*** (0.0000)	-5.83E-06*** (0.0000)

**p ≤ 0.01, * p ≤ 0.05, *** p ≤ 0.001 and p >.05, (ns)

The change in oil price has insignificant impact on the returns of oil importing countries except Bangladesh, but is significantly affecting volatilities of Pakistan and Bangladesh except India.

In oil exporter countries, impact of change in oil price is significant on returns of Saudi Arab and Oman but insignificant for UAE returns. But are significantly affecting the volatilities of all oil exporting markets returns. So the impact of the alteration in the oil price is strongly affecting the volatilities of oil exporter countries than for oil importer economies. The only exception is the Indian equity market where the change in oil rates does not make a noteworthy difference on the volatilities of equity market returns. Value of coefficient suggests that portfolio managers and the investors can add noteworthy value through fund investments in the markets of India, Pakistan, Bangladesh, Saudi Arab and UAE due to negative value of coefficient. There may be many other factors contributing in causing the mean and volatility spill over.

Conclusion

The research work is to measure the influence of the variable oil prices on the equity economies of oil importing/exporting countries i.e. how the change in the prices of oil market are affecting the mean returns and the volatility of the equity markets of oil importing and exporting countries. The oil prices from July, 2001 to June, 2016 are employed as a substitute for measuring the extent of the incorporation between these markets.

The prescribed GARCH-in-mean approach (two stage) as stated by Liu and Pan (1997) and Bhar and Nikolova (2007) is employed to analyze international conduction of oil price returns and also volatility to the oil importing and exporting countries equity market.

Impact of change in the oil prices varies between the countries. The outcomes of this research study recommend that the mean returns and the variance (conditional) of equity market of the oil consuming and producing economies are affected as following way stepwise according to hypothesis given below. These results are measured at 5% level of significance.

Hypothesis 1: Oil price changes affect the mean returns of the stock market of oil importing countries.

The hypothesis is partially accepted. The mean spillover impact from variable oil prices is constructive for all the oil importing countries except for India. The effect is significant only for Bangladesh (0.0436). This is concluded that the variation in the oil prices is affecting the mean returns of the equity market of Bangladesh only and is insignificant for the equity markets of Pakistan (0.0843) and India (0.8353) at 5% level of significance.

Hypothesis 2: Oil price change affects the volatility of the stock market of oil importing countries.

The hypothesis is partially accepted. The impression of volatility spillover is negative and significant for two oil importing countries Pakistan (0.000) and Bangladesh (0.000) and positive for India (0.2283).

The negative correlation among the variation in the oil prices and equity returns of Pakistan and Bangladesh indicate the presence of portfolio diversification chances for foreign financiers and portfolio executives. The foreign investors and the portfolio managers due to these chances can increase the significant value through fund investment in these equity markets. India is the only country for which the equity returns and volatility are not under the effect of variable oil prices. Indian equity market exercise weak relationship with the variation in oil prices.

Hypothesis 3: Oil price changes affect the mean returns of the stock market of oil exporting countries.

The hypothesis is partially accepted. The economic shock in the oil market is affecting the mean returns of the equity markets of Saudi Arab and Oman only and the result is insignificant for UAE. It means that UAE market is comparatively stable.

Hypothesis 4: Oil price changes affect the volatility of the stock market of oil exporting countries.

The hypothesis is fully accepted. The result of volatility spillover is negative and significant for two oil exporting countries Saudi Arab and UAE but positive for Oman. The negative sign is the indication of presence of portfolio diversification for Saudi Arab and UAE the oil exporting countries. The foreign investors and the portfolio managers due to these chances can increase the noteworthy value through fund investment in these equity markets.

Hypothesis 5: Oil price changes affect differently the mean returns and volatility of the stock market of oil importing and exporting countries.

The hypothesis is accepted and finally it is concluded that the oil prices are the source of mean and volatility spillover and is affecting the oil exporting countries more significantly than in oil importing countries is in line with the study of Wang, Wu, &Yang (2013).

On the other hand, this effect can be both simultaneous and lagged, signifying that sometime the variation in the oil prices are not immediately integrated in equity prices.

Above all, reasons subsidizing to volatility of the market narrate to how fast the shocks are absorbed in to the market and incorporate the related facts and figures into share rates. The rapidity of financial dealings leads to deviations in volatility of market. As a result, the time span of greater than before volatility because of coming of fresh information is tinier. Volatility should express quick mean return in an efficient economy (Cunado, Javier & Fernando 2004).

According to Sadorsky (2014) while studying the link among oil and stock prices of emerging economies find out that oil can be considered as the economical hedge for the stock prices of the developing countries.

Limitation of the Study

There are many other limitations. One is the time constraints, for example only one financial technique has been used to study the effect of the change in the oil price on the stock prices of the oil importing and the oil exporting countries. Many other financial econometric techniques can be used for analysis. The second limitation is the shortage of the stock market data of the Arab countries and Bangladesh. Time span is also limited otherwise large sample size can be employed to generalize the results.

Directions for Future Research

This research study employed the mean and volatility spillover technique to study the effect of the shock in the oil market on the returns and the movement of the stock price returns of the oil importing sub-continent counties (Pakistan, Bangladesh and India) and the oil exporting Arab countries (Saudi Arab, Oman and UAE). This study can be extended in future for many other oil importing and exporting countries. Two way causality between the oil market and the equity markets can also be studied. In future, this research can be repeated at the industry level of the selected sample countries by taking the effect of the oil price change on the equity markets of different countries industries having the similar geographical locations. We can also conclude from the finding of this research work that further research can be conceded to include other petroleum products like petrol, diesel and kerosene oil instead of oil. In addition to that the comparative effect of the oil prices on the different sectors of the countries can also be studied. The individual as well as the collective impact of other macroeconomic factors affecting the stock returns of different countries can be analyzed in future. In addition to that efforts can be made to analyze the effect of structural oil price shocks on the equity returns in the manufacturing industries for different countries. So this will be helpful for the investors who have to apprehend the real impact of the change in the worldwide oil price on the share price of different industries across different countries. Although this research have not taken in to consideration the reasons or the factors of all the variations happening in the equity markets of the oil importing and exporting countries that can be the direction for future research.

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