"The Relationship between Oil Price and Stock Market Index: An Empirical Study from Kuwait"

The Abstract:

This study attempts to empirically examine the dynamic relationship between Oil Price and Kuwait’s Stock Market Index. The study applied Markov Switching Model to investigate the regime shifts between Low- and High volatility regimes using monthly data from January 2005 to September 2015. The study found that Stock Market Index reacts differently to changes in Oil Price in different regimes. During high volatility regime, there is a positive and significant relationship between Oil Price and Stock Market Index. On the other hand, in the low volatility regime there is no relationship between Oil Price and Stock Market Index. The study also identified four transition episodes of high volatility during (2005M04-06M01, 2006M04-06M06, 2008M10-09M08, 2013M05-13M09). The results of the study could be used by policy makers to reduce the negative effect of Oil Price on the Stock Markets in the GCC region.

Keywords: Oil Price, GCC Stock Markets, Kuwait Stock Market, Markov Switching Model.

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1. Introduction:

In today's world where the globalization of information and investments, the interrelation and integration of economies and financial markets have made the world's economy as one economy affected and effected by each other. The changes in Oil price and its effects on the world's economy is a very clear example of the economic globalization.

Changing Oil price has an effect on the global economy as well as on the macro and micro economic level of any country. Weather this effect in general is positive or negative depends on the nature of the Oil-Economy relationship, means; Oil-exporting economy, Oil-refining economy, and Oil-importing economy (Ha Le et al., 2015; Kilian and Park, 2009).

On the global level, Oil price change affects the global economic activity due to the fact that Oil is an important component of the economy, and plays a major role in transferring wealth from oil importing countries to oil exporting countries (Balcilar and Ozdemir, 2013).

On the macro level the Oil price change affects economic recessions, GDP growth, financial markets, inflation, interest rate, exchange rate, employment, consumer confidence and other economic factors in different levels and with different mechanisms in the developed and developing countries (Davis and Haltiwanger, 2001; Hamilton and Herrera, 2002; Lee and Ni, 2002; Hooker, 2002; Cunado and Perez de Garcia, 2005; Kilian 2008; Balcilar and Ozdemir, 2013)

On the micro level Oil price change affects directly and indirectly the cost of goods and services, the cost of production, the expected cash flows, the variance of the company's returns, the company's profit and as a result the stock's cash dividends (Bouri, 2015; Naifar and Al Dohaiman, 2013; Balcilar and Ozdemir, 2013; Jones et al., 2004). Moreover the stock price of a corporation is affected because of the given effects on the expected future cash flows of the corporation and the effects on the required rate of return based on the increased risk of the investment in the corporation (Filis et al., 2011)

The aim of this paper is to investigate the relationship between Oil price and Kuwait stock market index using Markov Switching Model to investigate the regime shifts between Low- and High volatility regimes analyzing monthly data from January 2005 to September 2015, The
results of the study could be used by policy makers to reduce the negative effect of Oil Price on the Stock Markets in the GCC region.

This paper is structured as follows. Section 2 provides an overview of the related literature. Section 3 presents the methodology and the data used in the analysis. Section 4 discusses the results and its implications. Concluding remarks are summarized in section 5.

2. Literature Review:

The relationship between Oil price and stock markets has been the focus of many researches in the last two decades, most of these researches however, focused on the developed more than on the developing and emerging financial markets. In this section the relationship between Oil price and global stock markets and also the relationship between Oil price and the GCC stock markets including the Kuwait Stock Index is investigated based on the previous research work.

2.1 Oil Price and Stock Markets Globally:

Oil price movements can be used to forecast stock market returns on a global basis (Pollet, 2005; Driesprong et al., 2008). The scale, extent, and direction of movements of stock markets oil price shock is completely diverse from one country to another depending on whether it is oil-exporting or oil-importing country, and if the oil price change is caused by demand or supply (Wang et al., 2013). An oil price shock caused by supply has higher negative effect on stock markets than demand caused oil price shock (Cunado and Gracia, 2014). On another hand however, it is found that the US stock returns is positively effected by an increase in oil price that is caused by a growth of the global economy (Kilian and Park, 2009).

Most of the researches on the impact of Oil price on the stock markets in the developed countries which are mostly oil importing countries have found that there is a negative relationship exists between Oil price and stock markets (Driesprong et al., 2008; Miller and Ratti, 2009; Basher et al., 2012). On other hand, according to some researchers a positive relationship between Oil price and stock market exists in the Oil-exporting countries (Mohanty et al., 2011; Fayyad and
Daly, 2011; Lescaroux and Mignon, 2008; Hammoudeh and Choi, 2006). Other researchers however, suggested that there is no relationship between Oil price and stock markets (Al Jana bi et al., 2010). The contradicting results could be a result of a changing relationship between two variables (Akoum et al., 2012).

It is found that Oil price affects stock market returns on the emerging stock markets both in the short and long term (Papapetrou, 2001; Basher and Sadorsky, 2006; Maghyereh and Al Kandari, 2007). Nguyen and Bhatti (2012) found that left tail dependency between international oil prices and Vietnam's stock market, however, Chinese market appears to have contrary results. Qinbin, Mohammad, and Parvar (2012) indicated that 20% of US industry profits can be forecasted by oil spot price changes. Malik and Ewing (2009), found an evidence of spillover of shocks and volatility between oil price and some of the US equity sectors. Sadorsky (2001) asserted that oil price increase is sensitive to stock market returns of Canadian oil and gas companies. On the same direction, Papapetrou (2001) indicated that stock price movement in Greece is affected by oil price and increased oil price decreases oil return. On the industry sectors level, El Sharif el al. (2005) showed that oil price affected positively oil and gas companies return in the UK. Similarly Balcilar and Ozdemir (2013) found that there is an asymmetric relation from oil futures to all of S&P 500 sub-index returns.

On a different research, Faff and Brailsford (2000) indicated that oil price risk is equally important to market risk in Australian stock market. Another study conducted in Norway by Bjornland (2009) found that there is a significantly positive effect on stock market returns resulted from an increase in oil prices.
2.2 Oil Price and the GCC Stock Markets:

The Middle East Monitor indicated that Saudi Arabia is the biggest exporter and producer of crude oil in the world reaching 11.5 Million barrels a day of crude oil in 2013, totaling 13.1 percent of the world oil production. The GCC countries oil reserves are as follow; Saudi Arabia: 15.8 %, Kuwait: 6 %, UAE: 5.8%, Qatar 1.5%, and the rest for Oman and Bahrain¹.

According to the British Petroleum (BP) Statistical Review of World Energy 2014 report; the countries of the Gulf Cooperation Council have the largest proven oil reserves in the world totaling 30 per cent of the world reserve, moreover the GCC states produced 24 per cent of the world's total crude oil production in 2013 and controls 36 per cent of the world's Sovereign Wealth, which shows the critical role that the GCC countries can play in the global energy investment and production².

On the other hand, the GCC countries are very heavily oil dependant economies, so their economies are very sensitive to changes in oil price. Oil consists more than 75% of the total exports and more than 85% of government revenues of the GCC countries (Sedik & Williams 2011). According to the Arab Monetary Fund, Kuwait has the highest number of listed companies, followed by Oman, the UAE, Saudi Arabia, Bahrain and Qatar. The stock market capitalization is higher than the GDP of each country except Oman.

Mohantry et al. (2011) indicated that there is a positive relationship between Oil price and stock market in the GCC except for Kuwait and oil price has asymmetric effects on stock market return both at the industry and country level. Malik and Hammoudeh (2007) indicated that there is a high volatility transmission from Oil to all GCC stock markets except for Saudi market. On the same direction, Arouri et al. (2011) found a strong volatility linkage between Oil price and all GCC stock markets, as a result of increase of oil price because of shocks and policy changes affecting oil supply and demand. On the other hand, however, Awartani and Maghyereh (2013)

¹ For more information visit this web site: https://www.middleeastmonitor.com/articles/middle-east/12302-the-oil-resources-of-the-gcc-states

² For more information visit this web site: http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html
suggested that the volatility transmission is bi-directional between Oil and GCC stock market especially after the 2008 financial crisis. Maghayereh and Al Kandari (2007) indicated that Oil price impact the stock market indices in the GCC countries in a nonlinear way. According to Arouri and Fouguau (2009) the relationship between oil price and stock GCC markets is asymmetric and regime-switching. Zarour (2006) found that GCC stock markets respond significantly to oil price shocks; Saudi market is more sensitive to oil price movements and vice versa. Arouri et al. (2012) stressed that stock prices respond more to negative oil price shocks than to positive oil price shocks. Hammoudeh and Li (2008) showed that GCC stock markets respond to global factors more than regional and local factors. Abu Zarour (2008) finds that great oil price increase predicts GCC stock market price movements. Akoum et al., (2012) found an evidence of a changing relationship between oil and stock prices in the GCC in the long term, on the short term, however, the relationship is weak. In a different study, Naifar and Al Dohaiman (2013) suggested that the relationship between GCC stock market returns and oil price volatility is regime dependent, excluding Oman market in the low volatility state. On another hand, Jouini and Harrathi (2014) showed that there is a bidirectional and unidirectional volatility interdependence among GCC stock markets, moreover, there is asymmetric spillover to negative shocks among GCC stock and oil market with the exception of the Kuwait/Qatar and Qatar/UAE country pairs where no asymmetric spillovers.

The conflicting results of the many studies mentioned in the literature review above shows the importance of studying each financial market separately. In the next section the particular relationship between oil price and Kuwait Stock Market is examined using Markov Switching Model to investigate the regime shifts between Low- and High volatility regimes analyzing monthly data from January 2005 to September 2015.
3. Methodology and Data:

This section uses Johansen (1988) and Johansen and Juselius (1990) co-integration analysis to determine the long-run relationship of non-stationary variables series, whether these variables are co-integrated or not. In other words, the purpose of this test is to find out if there is a long-run relationship between oil price and Kuwait stock market. In order to apply co-integration series and to determine the order of integration, we use Augmented Dickey Fuller (ADF) and Phillips-Perron test.

Equation (1) shows MS-VEC model:

$$\Delta y_t = \mu S_t + \sum_{i=1}^{p-1} \tau_i^S \Delta y_{t-i} + \prod S_t y_{t-1} + \eta_t$$

(1)

$$\eta_t \sim i.i.d(0, \sum (S_t))$$

Where $y$ is a vector of non-stationary I(1) variables and $\mu$ is the constant, $p$ is the order of the MS-VAR model. $\prod S_t$ matrix contains the long run relationship between variables. The information on the coefficient PP abmatrix between the levels of the $\prod$ is decomposed as $\prod = \alpha \beta'$ and $\beta' y_t$ is $I(0)$ where a the relevant elements the matrix are adjustment coefficients band thematrix contains the cointegrating vectors. $\beta$

$S_t$ is discrete random variable, which use as indicator for the state, has two possible values, i.e., $S_t = 0$ or $S_t = 1$. The unobserved variable $S_t$ is first order Markov-switching process described in Hamilton (1989). The transition between regimes can be shown in the following matrix

$$P = \begin{bmatrix} P_{11} & P_{12} \\ P_{21} & P_{22} \end{bmatrix}$$

3.1 Data:

This paper explores the dynamic relationship between oil price and Kuwait’s stock market index. The data are constructed from Bloomberg database for the period from January 2005 to September 2015.
4. Empirical Results:
4.1 Descriptive Statistics:

Table 4.1 presents the descriptive statistics of monthly KUW and OIL in level and logarithms differences from 2005M01 to 2015M09. Thought the sample period, DLOIL has a mean of 79.44. It records the highest price in June 2008 with a value of 133.88 synchronizing the Global financial crisis. However, its lowest price is 39.09 which was recorded in December in the same year. Its distribution is positively skewed with a value of (0.11) and kurtosis of (2.37). The standard deviation for oil price is 20.73.

KUW’s average value is 8364.91. Expectedly, it records the highest value in June 2008 with a value of 15456.20 synchronizing with highest oil price. KUW’s is positively skewed and its kurtosis is 3.33. It should be noted that both KUW and OIL are not normally distributed.

Table 4.1: Descriptive Statistics:

<table>
<thead>
<tr>
<th></th>
<th>KUW</th>
<th>OIL</th>
<th>DLKUW</th>
<th>DLOIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>8364.91</td>
<td>79.44</td>
<td>-0.0010</td>
<td>0.0001</td>
</tr>
<tr>
<td>Median</td>
<td>7430.54</td>
<td>78.33</td>
<td>0.0067</td>
<td>0.0127</td>
</tr>
<tr>
<td>Maximum</td>
<td>15456.20</td>
<td>133.88</td>
<td>0.1620</td>
<td>0.2041</td>
</tr>
<tr>
<td>Minimum</td>
<td>5720.37</td>
<td>39.09</td>
<td>-0.2712</td>
<td>-0.3320</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>2508.80</td>
<td>20.73</td>
<td>0.0566</td>
<td>0.0918</td>
</tr>
<tr>
<td>Skewness</td>
<td>1.15</td>
<td>0.11</td>
<td>-0.9040</td>
<td>-1.0422</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>3.33</td>
<td>2.37</td>
<td>6.7555</td>
<td>5.0105</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>28.95</td>
<td>2.35</td>
<td>92.6551</td>
<td>44.7297</td>
</tr>
<tr>
<td>Probability</td>
<td>0.00</td>
<td>0.31</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Sum</td>
<td>1079073.00</td>
<td>10247.40</td>
<td>-0.1278</td>
<td>0.0094</td>
</tr>
<tr>
<td>Sum Sq. Dev.</td>
<td>806000000.00</td>
<td>55031.13</td>
<td>0.4068</td>
<td>1.0710</td>
</tr>
<tr>
<td>Observations</td>
<td>129</td>
<td>129</td>
<td>128</td>
<td>128</td>
</tr>
</tbody>
</table>
4.2 Stationary analysis

We transformed all variables into natural logarithm values except NKF due to the negative observations as the first step. Thus, we tested for unit roots in all variables to determine the order of integration of these series. We used the Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test with and without trend as recommended by Engle and Granger (1987).

Table 4.2 shows the result of Augmented Dickey Fuller (ADF) test for all variables. Schwartz Info Criterion (SIC) is used to determine the optimal length of suitable lags for ADF test. According to ADF test all variables in levels are either I(1) or I(0). The null hypothesis of a unit root in the level series cannot be rejected in all variables. In order to achieve stationary, we differenced the data as a result all variables are unit root rejected in the first differences. Therefore, all variables are integrated of same order I (1) which we can carry out to estimate the long run relationship.

Table 4.2 Unit Root Test Applied to Variables:

<table>
<thead>
<tr>
<th>Variables</th>
<th>ADF- Test</th>
<th>Phillips-Perron Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Constant</td>
</tr>
<tr>
<td>LKUW</td>
<td>-0.25</td>
<td>-1.65</td>
</tr>
<tr>
<td>LOIL</td>
<td>-0.16</td>
<td>-1.93</td>
</tr>
<tr>
<td>DLKUW</td>
<td>-7.23*</td>
<td>-7.20*</td>
</tr>
<tr>
<td>DLOIL</td>
<td>-7.67*</td>
<td>-7.64*</td>
</tr>
</tbody>
</table>

*,**,*** indicate significance at 1%,5%,and 10% levels.

4.3 Co-integration test results:

The first step before preforming Johansen cointegration test is to determine the optimum lag length. Kara (2004) mentioned that there is no unique criterion to select the number of lags. Therefore, different criteria may suggest a different number of lags. Table 4.3 presents the results of VAR order selection criteria include Akaike Information Criterion (AIC), Schwarz Bayesian Information Criterion (SBIC), and Hannan-Quinn (HQ). We choose optimal lag length based on the HQIC and SBIC criteria with a maximum of two lags.
Table 4.3: VAR order-selection criteria

<table>
<thead>
<tr>
<th>Lag</th>
<th>AIC</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.473539</td>
<td>-.05009</td>
<td>-5.37237</td>
<td><strong>-5.40307</strong></td>
<td>-5.36346</td>
<td>-5.31229</td>
<td>-5.24887</td>
<td>-5.21341</td>
<td></td>
</tr>
<tr>
<td>HQIC</td>
<td>0.49221</td>
<td>-4.99408</td>
<td><strong>-5.27901</strong></td>
<td>-5.27238</td>
<td>-5.19542</td>
<td>-5.10692</td>
<td>-5.00615</td>
<td>-4.93335</td>
<td></td>
</tr>
<tr>
<td>SBIC</td>
<td>0.519507</td>
<td>-4.91219</td>
<td><strong>-5.14253</strong></td>
<td>-5.0813</td>
<td>-4.94975</td>
<td>-4.80665</td>
<td>-4.65129</td>
<td>-4.5239</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.4 reports the results of the unrestricted Johansen cointegration test. According to the results of cointegration test we conclude that there is cointegration equations existed. The trace statistic and the maximum eigenvalue are both greater than their critical values in the first rank which are accepted at 5 percent level of significance. The result shows cointegration the relationship among the variables which indicate that there is evidence of long run relationship between oil price and stock market.

Table 4.4: Unrestricted Cointegration Test:

<table>
<thead>
<tr>
<th>Hypothesized No. of CE(s)</th>
<th>Eigenvalue</th>
<th>Trace Statistic</th>
<th>0.05 Critical Value</th>
<th>Max-Eigen Statistic</th>
<th>0.05 Critical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td>0.107955</td>
<td>15.68511</td>
<td>15.49471</td>
<td>14.39407</td>
<td>14.26460</td>
</tr>
<tr>
<td>At most 1</td>
<td>0.010194</td>
<td>1.291044</td>
<td>3.841466</td>
<td>1.291044</td>
<td>3.841466</td>
</tr>
</tbody>
</table>

Trace and Max-Eigen test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

4.4 MS-VEC model results:

Table 4.5 shows the regime properties of the model. Two regimes are used to describe the dynamic interactions between stock and oil prices. First regime (regime 1) in MS-VEC model is represented to the high volatility state while the second regime (regime 2) represented to high volatility state. The average probability of long run low volatility regime is equal 0.7054, while the average probability of long run high volatility regime equal 0.2946. This indicates that low volatility state is the dominant economical regime. In other words, we expect the low volatility state to take place on 91 out of 129 observations while high volatility state occurs on 38 occasions. Therefore, the average duration in the low volatility state is 23.6 months whereas 10 months in the high volatility state.
We estimate matrix of transition probability to identify the transfer probabilities from one regime to another. The transition probabilities of MS-VEC model is:

\[
P = \begin{bmatrix}
0.9578 & 0.0422 \\
0.1006 & 0.8994
\end{bmatrix}
\]

This indicates that the probability of transfer from low volatility regime (regime 1) to high volatility regime is 0.0422 and from high to low volatility is 0.1006. Therefore, low volatility regime is more stable than high volatility regime.

**Figure 4.1: Smoothed probability estimates of high volatility (regime 2)**

Figure 4.1 presents the smoothed probability estimates of high volatility (regime 2) of the MS-VEC model in equation (1). The smoothed probability of the high volatility (regime 2) equals or
exceeds 0.5 is represented by grey shaded bars. We identify four transition episodes of high volatility during (2005M04-06M01, 2006M04-06M06, 2008M10-09M08, 2013M05-13M09).

5. Conclusion:

This paper tries to capture the dynamic relationship between Kuwait’s Stock Market Index and Oil Price. The study employs Markov Switching Model to inspect the regime shifts between Low- and High volatility regimes on monthly data from January 2005 to September 2015. The results suggest that Kuwait’s Stock Market Index reacts differently to changes in Oil Price in different regimes. In other words, the results show a positive and significant relationship between Oil Price and Kuwait’s Stock Market Index for the period of high volatility regime while they show no relationship between these two variables for the period of low volatility regime. Moreover, low volatility state is the dominant economical regime. In other words, we expect the low volatility state to take place on 91 out of 129 observations while high volatility state occurs on 38 occasions. The study also identified four transition episodes of high volatility during (2005M04-06M01, 2006M04-06M06, 2008M10-09M08, 2013M05-13M09).

The findings of this study suggests further future research on the relationship between oil price and stock market returns of each GCC country separately, since the relationship could be different from one country to another, which could have an important implications for the GCC countries’ future economic policies and strategies.
References:


