A NOTE ON 'WHAT DRIVES SHARE PRICES IN THE MIDDLE EAST?'

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Abstract

There are several hypotheses suggesting that some properties of oil prices make it interesting to focus on the predictive ability of oil prices for stock returns. This paper reviews some models recently used in the literature and selects the most suitable one for measuring the relationships and/or linkages of oil prices to the stock markets of the selected five oil producing countries in the Middle East. In particular, the paper uses two methodologies to test for the presence of a cointegrating relationship between the two variables and an unobserved-components model to find a relationship between the two variables. The results rejects convincingly that there is no linkage between the prices of oil and the stock market prices in these oil-based economies.

Keywords: Oil prices, Stock market, Econometrics, Unobserved-components model, Cointegration
JEL Classification: G15

1. Introduction

Oil, as a major source of inputs for a variety of petrochemical products, plays an important role throughout most, if not all, economies around the world (Happe, 1984, p. 3). The price of oil had more of an influence on the world economy as compared to the price of any commodity over the past 30 years (Patel, 2003). At least it appears to be so from the volume of reports dedicated to linking oil prices to economic cycles.

Although there has been little done relating the relationship between oil price and the stock market index, it is yet uncertain, in fact unproven, if oil prices contribute to the movements of the stock markets in an important way. There are numerous studies on the effect of oil price changes on the economy. The main objective of this paper is to measure the relationship between oil price and various stock markets. To carry out this research, five oil dependent countries, Kuwait, Oman, United Arab Emirates (UAE), Qatar and Saudi Arabia were selected because of the significance oil plays in their gross domestic outputs. The monthly data were analysed during the period between 01:2000 and 05:2004.

Observing the stock markets, the Gulf Cooperation Council (GCC) countries have brought the highest returns worldwide over the period between 2001 and 2005

(see Woertz, 2005). Stock markets in countries such as the Saudi Arabia and the UAE have had increased more than fivefold in this period (Woertz, 2005). Fadlallah (2005) found that the Saudi Tadawal Index and the UAE General Index outperformed the NASDAQ between January 2002 and September 2006. Considering the importance of oil revenue in the Middle Eastern countries, and these extraordinary performances of the stock markets in the oil dependent countries, it was logical to presume that there might be a relationship between the price of oil and stock market price.

This paper only examines the relationship between the stock prices of the five oil dependent countries and the oil price. The paper uses two methodologies to test for the presence of a cointegrating relationship between the two variables, and then undertakes an unobserved-components model to find a relationship between the two variables. Using these tests and different methodologies, the paper has attempted to draw better conclusions regarding the effect, if any, oil prices may have on the stock markets in the five oil dependent countries.

The rest of the paper is organized as follows. Section 2 presents the relevant literature and methods used by other researchers. Section 3 describes the models development for this study. Section 4 provides the results and a discussion. The paper ends with a conclusion in Section 5.

2. Relevant Literature and Methods

There have been several studies which have examined the relationship between stock prices and the oil price. These studies have examined the relationships through the use of various econometric methods ranging from the Augmented Dickey Fuller test to a number of OLS applications.

The uses of different methods are examined in Bley (2002), Harris (1995), Granger (1969) and Sims (1972). Bley (2002), with the use of the daily historic prices on GCC country market indices, tested for the presence of unit roots using the ADF test. Harris (1995) on the other hand estimated an error correction model to investigate whether each of the exchanges was contributing to price discovery. We consider the use of the ADF test and the error correction model were undertaken by these authors.

The model which is of great importance to the research is the unobserved-components model, which is built with the addition of explanatory variables as in Diebold (1989). This model allows us to observe other unspecified factors, which have not been tested.

The analysis of various papers, allowed us to understand existing results achieved by other researchers. The findings proved to be mixed. Mauldin (2003) for example, found that a rise in oil prices suggested a fall in the stock market prices and a drop in oil prices is associated with a rise in stock prices. On the other hand, Driespong *et al*. (2003), after undertaking various tests, concluded that the initial market reaction to the oil price change depended on whether the country was a net energy importer or exporter. They found that an oil price increase had a significantly positive impact on the Norwegian economy. Similarly, countries such as Venezuela and Canada, which are net energy exporters, all reacted positively to

oil price increases (Driespong *et al*., 2003 and Bhatti *et al*. 2006; Chapter 7). These research indicated that there was usually a relationship between oil price and the stock market price.

The comparison of various articles from different journals reveals some common factors. There has been little done to establish the relationship between oil price and the stock market index, and therefore not too many alternative approaches have been tried. Several researchers used the data to apply differnt multiple regression models, but did not attempt anything new or different. The main difference therefore with this paper, is that we use a new method, the unobserved-components model, not used to date to address this issue. This we consider to be a likely contribution to the future studies on this topic area. The use multi-country data may have also account for the results we observed on the relationship between the oil price and the stock market index.

3. The Model

The Augmented Dickey Fuller test is used for all stock markets and the oil price variables. The method includes the testing for the existence of a unit root in the univariate time series.

When conducting the ADF test, if the null hypothesis was rejected, it implied stationarity of the process meaning that any of the variables tested was stationary. In the situation where the null hypothesis was not rejected, a test for a second root was conducted by testing the null hypothesis H_0: Yt ~ I (2), which can be done by testing H_1: Yt ~ I (1) (Vogelvang, 2005; p. 287). When the variable in this test was rejected, we assumed that the variable was non-stationary.

To conclude the testing of the data, what was then included was long run models and error correction models (ECM), which allowed us to determine whether cointegration exists among the variables in the short run and the long run models tested. When the conditions for cointegration were not satisfied, we assumed that there was spurious regression, and that the two variables were not related. What this then caused was that the residuals were not stationary, $e_t \sim I$ (1), causing them to have a unit root.

The final model that was completed for all five countries was an extended time-series model by the addition of extra explanatory variables, called an unobserved-components model. This meant that the dependent variable, which was the various stock markets, was determined by its various components, while also including the oil price variable as the explanatory variables (Moosa, 2006). The model was displayed as follows

$$y_t = \mu_t + \phi_t + \gamma_t + \Sigma\beta x_t + \varepsilon_t \quad (1)$$

Where x_t was the vector of explanatory variables and B a vector of unknown coefficients. In this case, there was only one coefficient. The explanatory variable for all five countries was the oil price, x_t. Equation (1.1), contains the dependent

variable and explains that it depends on the components trend, cycle, seasonal component, random components and also the oil prices, x_t (Moosa, 2006). The achievement of the coefficient values for the variables was found using a program called STAMP (Structural Time Series Analyser, Modeller and Predictor) enabling us to complete the process of fitting the unobserved-components models (Harvey, 1989; p. 15). The possible outcomes of the equation were as follows:

If the explanatory variables were only partially successful in explaining the dependent variable, so if any of the level, slope, cycle or seasonal components were significant, then there was a role for the components. This demonstrated that there may be an effect of other economic indicators which are not included (Moosa, 2006).

In completing the model, if the outcome was that the explanatory variables (trend, cycle, seasonal, oil prices) were successful in explaining the dependent variable, and the oil prices were also found to be significant, the conclusion was that oil prices play an important role in affecting the stock market prices, though there will still be other unspecified variables still unspecified that are contributing an important role.

The final possible outcome was the situation where the oil price is found solely to explain the dependent variable. This occurred when the other explanatory variables were insignificant, thus leading to the conclusion that oil prices alone will explain the movements of the stock prices (Moosa, 2006; p. 11). This outcome allowed us to conclude that oil prices are of great importance in the movements of the stock prices.

4. Results and Discussion

The results achieved for all the five oil dependent countries were found to be very similar, apart from some small differences. The ADF unit root test was firstly conducted to determine the order of integration. The conclusion from the test was that all the five stock markets and the oil prices were integrated of order one I (1), displayed in Table 1. The conclusion is that all variables were found to be non-stationary.

The integration of order one I (1) allowed for various cointegration tests to be conducted on the relationships between each country's two variables in the model. Examining the long-run relationships between the stock market prices and the oil prices provided mixed results. The residuals of each equation, displayed in appendix 1, Table 1, showed that cointegration existed in the long run for the relationships between the UAE stock market and the oil price and for the Saudi Arabian stock market and the oil price. The remaining country stock markets, which included Oman, Kuwait and Qatar, were not cointegrated with oil prices. Thus three of the five markets exhibited behavior that led us to conclude that there is relationship between oil prices and stock market prices: only for two countries there is a relationship.

Table 1.1: ADF Tests for Stationarity

Country	Variables	No. of Lags	ADF levels	ADF first difference	Conclusion at the 5% level
UAE	Stock Market Index	12	-2.04	-5.27	1 (1)
	WTI Oil Prices		-1.79	-5.63	1 (1)
Kuwait	Stock Market Index	12	-2.67	-5.64	1 (1)
	WTI Oil Prices		-1.79	-5.63	1 (1)
Oman	Stock Market Index	12	-0.94	-6.69	1 (1)
	WTI Oil Prices		-1.79	-5.63	1 (1)
Qatar	Stock Market Index	12	-2.88	-6.88	1 (1)
	WTI Oil Prices		-1.79	-5.63	1 (1)
Saudi Arabia	Stock Market Index	12	0.20	-5.43	1 (1)
	WTI Oil Prices		-1.79	-5.63	1 (1)

* The results include both a constant and a trend. In level, intercept and no intercept or trend, where all were not rejected. Once completed in first difference, the constant and a trend were immediately rejected.

An error-correction model was then tested to examine as to whether any short-run relationships existed: The results are in Appendix Table 2. The conclusion is that the UAE stock market index was cointegrated in the short-run model, leading to the suggestion that oil prices may have been important in the short run changes to market prices. For others, Oman, Kuwait, Qatar and Saudi Arabia, the conditions for cointegration were not satisfied, allowing for spurious regression amongst the oil prices and the respective stock markets.[1]

The implementation of an unobserved-components model provided more detailed results on the relationship of the oil price and the stock market. The first three countries analysed were Kuwait (Table 2), Oman (Table 3) and Qatar (Table

[1] The findings of the Granger Causality test (Appendix 1, table 1.3) found that oil prices do not "Granger cause" the stock market, while on the other hand, causality in the opposite direction was statistically supported. This was not taken into consideration, since in the real world we would not expect the stock market to cause the oil price movements.

4). The coefficients of the unobserved-components models for the three countries provided evidence that there was no apparent significant relationship between oil prices and stock prices. For each model it was found that the level, slope or the seasonal components of the models were significant, providing an indication that for all three countries there were other factors that were affecting the stock market index values.

Table 2: Kuwait

Explanatory Variables	Coefficient(p-value)	Standard Errors
Level (μ_t)	3.449[0.0000]	0.086
Slope (β_t)	-0.020[0.0467]	0.010
Cycle 2_1 (ϕ_1)	-0.0084792	0.007
Cycle 2_2 (ϕ_2)	0.00048114	0.006
Seasonal 1 (γ_1)	0.007[0.2230]	0.005
Seasonal 2 (γ_2)	0.004[0.5209]	0.005
Seasonal 3 (γ_3)	-0.00 [0.9010]	0.003
Seasonal 4 (γ_4)	0.006 [0.0713]	0.003
Seasonal 5 (γ_5)	0.003[0.1589]	0.002
Seasonal 6 (γ_6)	-0.000 [0.8904]	0.002
Seasonal 7 (γ_7)	-0.002 [0.0278]	0.001
Seasonal 8 (γ_8)	-0.000 [0.8492]	0.001
Seasonal 9 (γ_9)	-0.001 [0.1366]	0.001
Seasonal 10 (γ_{10})	-0.001 [0.1106]	0.001
Seasonal 11 (γ_{11})	-0.000 [0.4729]	0.001
Oil Prices (x_t)	-0.024 [0.6503]	0.054

The analysis of the explanatory variable which was the oil price for all three countries led us to conclude that in all cases it was insignificant, putting forward our major conclusion that oil prices did not play an important role in the movement of the stock prices in the five Middle Eastern countries. The outcome that there was no cointegration between the variables of these countries also emphasized the outcome obtained. This did not mean that oil prices had absolutely no affect, as mentioned earlier. Rather discussions about oil prices in the countries may have changed the minds of investors before there were any movements in the oil prices. Factors such as these would not have appeared in the results, since the changes may have already occurred.

The completion of an unobserved-component models on the UAE (Table 5) and Saudi Arabia (Table 6) provided similar results, though with different conclusions. The coefficients of the unobserved-components models for the two countries again provided evidence that there was no apparent significant relationship between oil prices and stock prices, whereas the oil price variable in both cases appear to be

insignificant, allowing us to assume, that oil price did not play an important role in the movement of the stock prices in the other two Middle Eastern countries as well.

Table 3: Oman

Explanatory Variables	Coefficient(p-value)	Standard Errors
Level (μ_t)	3.190 [0.0000]	0.157
Slope (β_t)	0.014[0.1801]	0.010
Cycle 2_1 (ϕ_1)	-0.0046758	0.009
Cycle 2_2 (ϕ_2)	0.0049958	0.009
Seasonal 1 (γ_1)	0.007 [0.3055]	0.007
Seasonal 2 (γ_2)	0.009 [0.2026]	0.007
Seasonal 3 (γ_3)	-0.003[0.4860]	0.004
Seasonal 4 (γ_4)	0.003 [0.3750]	0.004
Seasonal 5 (γ_5)	0.000 [0.9319]	0.003
Seasonal 6 (γ_6)	-0.003[0.3642]	0.003
Seasonal 7 (γ_7)	-0.002[0.5195]	0.003
Seasonal 8 (γ_8)	-0.004[0.1981]	0.003
Seasonal 9 (γ_9)	-0.003 [0.3323]	0.003
Seasonal 10 (γ_{10})	-0.000 [0.9151]	0.004
Seasonal 11 (γ_{11})	0.001 [0.5754]	0.002
Oil Prices (x_t)	-0.035 [0.7193]	0.097

Table 4: Oatar

Explanatory Variables	Coefficient(p-value)	Standard Errors
Level (μ_t)	3.685 [0.0000]	0.085
Slope (β_t)	0.020 [0.0008]	0.006
Cycle 2_1 (ϕ_1)	0.0066202	0.002
Cycle 2_2 (ϕ_2)	-0.0030996	0.002
Seasonal 1 (γ_1)	0.000 [0.8672]	0.005
Seasonal 2 (γ_2)	0.024[0.0000]	0.005
Seasonal 3 (γ_3)	-0.006[0.1615]	0.004
Seasonal 4 (γ_4)	0.004 [0.3185]	0.004
Seasonal 5 (γ_5)	-0.004[0.3068]	0.004
Seasonal 6 (γ_6)	-0.011 [0.0042]	0.004
Seasonal 7 (γ_7)	0.003[0.9824]	0.003
Seasonal 8 (γ_8)	-0.000 [0.9416]	0.004
Seasonal 9 (γ_9)	-0.008 [0.0240]	0.003
Seasonal 10 (γ_{10})	-0.001 [0.7138]	0.004
Seasonal 11 (γ_{11})	-0.001 [0.6832]	0.003
Oil Prices (x_t)	-0.049 [0.3549]	0.053

Table 5: UAE

Explanatory Variables	Coefficient(p-value)	Standard Errors
Level (μ_1)	3.322[0.0000]	0.090
Slope (β_1)	0.009[0.1982]	0.007
Cycle 2_1 (ϕ_1)	0.00079412	0.011
Cycle 2_2 (ϕ_2)	0.0024286	0.010
Seasonal 1 (γ_1)	0.003[0.6169]	0.005
Seasonal 2 (γ_2)	-0.003 [0.5498]	0.005
Seasonal 3 (γ_3)	-0.002 [0.4842]	0.003
Seasonal 4 (γ_4)	-0.002 [0.4631]	0.003
Seasonal 5 (γ_5)	0.005[0.0054]	0.002
Seasonal 6 (γ_6)	-0.000 [0.9224]	0.002
Seasonal 7 (γ_7)	0.001 [0.3897]	0.001
Seasonal 8 (γ_8)	0.000 [0.7478]	0.001
Seasonal 9 (γ_9)	-0.002 [0.0385]	0.001
Seasonal 10 (γ_{10})	-0.001 [0.1738]	0.002
Seasonal 11 (γ_{11})	-0.005[0.9657]	0.001
Oil Prices (x_t)	-0.052 [0.3545]	0.056

Table 6: Saudi Arabia

Explanatory Variables	Coefficient(p-value)	Standard Errors
Level (μ_1)	3.268 [0.0000]	0.098
Slope (β_1)	0.024 [0.0007]	0.007
Cycle 3_2(ϕ_1)	-0.010242	0.006
Cycle 3_2 (ϕ_2)	0.016077	0.005
Seasonal 1 (γ_1)	-0.002 [0.6004]	0.004
Seasonal 2 (γ_2)	0.022 [0.0000]	0.005
Seasonal 3 (γ_3)	-0.002[0.4630]	0.002
Seasonal 4 (γ_4)	0.000 [0.8288]	0.002
Seasonal 5 (γ_5)	0.005[0.0098]	0.004
Seasonal 6 (γ_6)	-0.003[0.1386]	0.002
Seasonal 7 (γ_7)	-0.001[0.6265]	0.002
Seasonal 8 (γ_8)	-0.002[0.3687]	0.003
Seasonal 9 (γ_9)	-0.002 [0.1997]	0.002
Seasonal 10 (γ_{10})	0.001 [0.5272]	0.002
Seasonal 11 (γ_{11})	0.000 [0.8768]	0.001
Oil Prices (x_t)	0.095 [0.1256]	0.061

The results from the cointegration suggested that the UAE stock market is cointegrated in the short-run model, and that cointegration existed in the long-run relationships for both the UAE and Saudi Arabia meant that the two models may be inaccurate. In other words, a relationship may exist between oil price and the stock prices for these two countries.

5. Conclusion

This paper provided a decent test of a relationship between oil prices and the stock market prices. The findings from the unobserved-components model enabled us to reach a more valid conclusion that there appears to be no relationship between the two variables in the five markets. Thus, this paper makes a useful contribution to the literature, since it proves that maybe the effect of oil prices is not the most important influence on the movements of the stock market indices in the five oil dependent countries, something not considered in the literature.

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Appendix 1:

Table 1: ADF Tests of the Residuals

Country	Variables in the equation	No. of Lags	ADF levels	Conclusion at the 5% level against DF stat
Residuals UAE	Stock Market Index and WTI Oil Prices	12	-3.83*	The null hypothesis of no cointegration is rejected
Residuals Kuwait	Stock Market Index and WTI Oil Prices	12	-2.19***	The null hypothesis of no cointegration is not rejected
Residuals Oman	Stock Market Index and WTI Oil Prices	12	-2.87***	The null hypothesis of no cointegration is rejected
Residuals Qatar	Stock Market Index and WTI Oil Prices	12	-3.31*	The null hypothesis of no cointegration is rejected
Residuals Saudi Arabia	Stock Market Index and WTI Oil Prices	12	-3.70*	The null hypothesis of no cointegration is rejected

* There is a trend and intercept
** There is only an intercept
***No intercept or trend
The DF statistic that will be used will be -3.50, the Table of B.9 in Fuller (1976) based on fuller was used.

Table 2: Error Correction Model

Dependent Variables/Independent variables	Saudi Arabia	UAE	Kuwait	Qatar	Oman
β_0	0.006(2.4)	0.0047(2.6)	0.005(2.1)	0.012(3.1)	0.0025(0.7)
$\gamma_0 \Delta X_t$	0.080(0.9)	-0.10 (-2.0)	-0.15 (-2.2)	-0.020(-0.2)	0.04(0.5)
$\sum \gamma_i \Delta X_{t-i}$	-0.013(-0.2)	-0.094(-1.8)	-0.07(-1.3)	0.016(0.2)	0.21(2.2)
$\sum a_j \Delta Y_{t-i}$	0.23(2.1)	0.2(1.2)	0.45(3.9)	0.044(0.3)	0.217(1.4)
γe_{t-1}	0.019(0.7)	0.06 (2.4)	-0.01 (-0.5)	0.027(1.6)	-0.03(-0.6)

Table 3: Granger Causality Test

Granger Causality Test	F - Statistics
Oil prices does not granger cause Kuwait Stock Market	*0.92*
Kuwait Stock Market does not granger cause Oil prices	1.90
Oil prices does not granger cause Oman Stock Market	*0.33*
Oman Stock Market does not granger cause Oil prices	3.18
Oil prices does not granger cause Qatar Stock Market	*1.44*
Qatar Stock Market does not granger cause Oil prices	1.38
Oil prices does not granger cause Saudi Arabia Stock Market	*0.44*
Saudi Arabia Stock Market does not granger cause Oil prices	2.56
Oil prices does not granger cause UAE Stock Market	*3.96*
UAE Stock Market does not granger cause Oil prices	1.26