Oil Prices and Stock Market Returns in Oil Importing Countries: The Case of Turkey, Tunisia and Jordan

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Abstract

This study examines the relationship between changes in oil prices and stock market returns in three oil importing countries, namely Turkey, Tunisia and Jordan. Monthly data of oil prices, interest rate, industrial production and stock market indices are modeled as a cointegrated system in a Vector Error Correction Model (VECM). Based on the data from December 1997 to March 2008, our empirical results do not support the hypothesis that oil prices lead to changes in stock market returns in these countries. However, our results bring evidence that the effect of the local macroeconomic variables on the changes in stock market returns is more important than that of oil prices. The results of this study may have implications for policy makers and portfolio managers who should focus on macroeconomic factors such as interest rate and industrial production rather than focusing on oil prices to be the main factor in predicting future stock returns.

Key Words: oil prices, market index, causality, oil importing countries.

1. *Introduction*

The effect of oil prices on a country's economy has been and continues to be a keen interest to many people, particularly economists. Throughout the history, oil has played a critical role to shape countries development. Given the importance of oil and the attention oil prices receive in the financial press[1], a considerable economic literature has been devoted to study the impact of oil prices on macroeconomic variables such as inflation, growth rates and exchange rates in one country (e.g. Hamilton, 1983; Hooker, 1996; Eltony and Al-Awadi, 2001 and Keane and Prasad, 1996) or using cross sectional data (Cunado and Gracia, 2003, 2005; Jimenez and Marcelo, 2005 and Cologni and Manera, 2008).

The aforementioned strand of literature argued that oil prices affect economic condition and may cause a recession in the economy[2]. However, Bernanke et al., (1997) have argued that it is not the oil price that is the principal cause of recession, but the fact that the central banks have responded to higher oil prices by increasing interest rates in order to control inflation. The confusion between oil shocks and response of monetary policy may explain why oil shocks appear to have an effect that far exceeds what is expected based on a comparison of energy costs to total production cost[3].

Therefore, if oil plays an important role in the economy one would expect oil prices to affect stock markets (Huang et al. 1996), and oil shocks on real cash flows can partly account for fluctuation in aggregate stock prices (Jones and Kaul; 1996). In other words, does a local peak (valley) in the price of oil portend a falling (rising) overall stock market? In sharp contrast to the extensive investigation in the previous literature of the oil prices effect on economic feature, there still little research in the previous literature on how stock market is affected by oil prices movements, most of which concentrate on oil producing or exporting countries and mix of European countries (e.g. Gjerde and Saettem, 1999; Papapetrou, 2001; Gogineni, 2008; and Anoruo and Mustafa, 2007; Agusman and Deriantino, 2008; and Park and Ratti, 2008).

The aim of this paper is to investigate the relationship between oil prices and stock market return in oil importing countries. The investigation of such relationship in these countries is interesting for several reasons. First, while higher oil prices would affect stock markets positively in oil exporting countries by increasing the

[1]The financial press has talked repeatedly about how oil prices are increasing dramatically during the last few years. Where the price of oil hovered around $16 a barrel in 1999, in summer 2008 it begans to approach the $150 a barrel. Although oil prices decreased in fall 2008, still economists' expectations that prices may reach the $200 a barrel in the near future, as stated by Appenzeller (2004), concerns about future oil shortages stem from current estimates that predict world oil production will peak somewhere between 2016 and 2040.

[2] Jones et al. (2004) and Mussa (2000) report that oil prices shock affects GDP and reduces the global output.

[3] As argued by Kilian (2008), it has suggested that the implications of higher oil prices for oil importing countries inflation and GDP depends on the cause of the oil increase. In the case of high global growth at the same time as oil prices increase, oil prices may have been driven by increased demand instead of restrictions on the supply side. Therefore, the negative effect of oil prices changes will be eliminated by the global growth.

government revenues and though increasing the public expenditure on infrastructure and other omega projects, changes in oil prices is presumed to affect stock markets negatively. This negative impact of oil prices on stock prices (returns) can be explained in two ways of explanation: 1) higher oil prices reduce the amount of disposable income that consumers have left to spend on other goods and services, and increase the cost of non oil producing firms. If this production costs have not been covered by consumers, profits and then dividends, key drivers of stock prices, will also decrease and 2) according to the equity pricing model, the price of equity at any point in time is equal to the expected present value of discounted future cash flows (Hung at al., 1996). Increasing oil prices are often indicative of inflationary pressures. Thus, central banks try to control the inflation by increasing interest rate which also directly impact the discount rate used in the equity pricing formula and then decrease share prices. Although this negative relation has been illustrated theoretically, few studies provide empirical support for the reality or myth of this relation (see for example Sadorsky, 1999 among others).

Second, given the importance of oil and the attention oil prices receive in the media and financial press coupled with the high investment risk in such countries poses the needs for investors and professional portfolio managers to find factors, such as oil prices, to improve their price predictability. Third, the price of oil is determined by global oil demand and global oil supply conditions. The increased oil demand by these countries that are not with the largest reserves, coupled with oil supply shortages will lead to much higher future oil prices (Henriques and Sadorsky, 2008). Thus, examining the relationship between oil prices and stock returns became to be more important in oil importing countries

In this study we contribute to the previous studies by consider the case of a group of emerging oil importing countries, namely Turkey, Tunisia, and Jordan. These emerging economies are chosen in this study because they tend to be more energy intensive than more advanced economies and are therefore more exposed to higher oil prices (see Table 1). Consequently, oil price changes are likely to have a greater impact on profits and stock prices in emerging economies. In the selected oil importing countries, the country's energy requirements are met by large volume of imports. Therefore, to meet their growing needs of energy; these economies face both energy constraints from supply side and demand management policies[4].

The paper proceeds as follows. Section 2, summarizes the relevant studies. Section 3, deals with the methodological issues and data used in the empirical analysis. The empirical evidences are presented in Section 4. Finally, the conclusions of the analysis and policy implication are given in Section 5.

2. *Literature Review*

A large body of the empirical research has confirmed that oil prices have negative and strong effect consequences on the world economy (see seminal work of Hamilton

[4] Small- sized economies have been chosen in the study because these economies are expected to be less efficient with oil consumption compared with larger –sized economies that can be more energy efficient because of reduced energy intensity through technological innovation and more reliance on a diversified range of energy sources (see Basher and Sadorsky, 2006).

1983 and for more recent review see Hamilton in 2003). A long line of empirical work finds that oil price increases negatively impact measures of macroeconomic activity**.** It has been estimated that a $5US price increase a barrel reduces global economic growth by 0.3% in the following year[5].

In sharp contrast to the volume of studies investigating the link between oil price shocks and macroeconomic variables, there have been relatively few analyses on the relationship between oil price shocks and financial markets such as the stock market. In this context, Huang et al., (1996) opine that if oil plays an important role in an economy, one would expect changes in oil price to be correlated with changes in stock prices. Driesprong et al. (2007) study whether changes in oil prices predict stock returns. They used stock market data from forty-eight countries, a world market index and price series of several types of oil[6]. They found that oil price changes sensitivity is expected to vary across countries. Jones and Kaul (1996) argue that the impact of oil price changes to a country's economy of which reflected on stock returns are likely to vary across countries depending on their oil production and consumption level. Theoretically, in oil exporting countries[7], stock market prices are expected to be affected positively to oil price changes through positive income and wealth effects. Bjørnland, (2008) argued that higher oil prices represent an immediate transfer of wealth from oil importers to oil exporters. She stated that the medium to long term effect depend on what the government in the oil producers do with the additional income. If this income is used to purchase goods and services in their country, higher oil prices will generate a higher level of activity and though improve stock returns.

In oil importing countries, oil prices are expected to have significant negative effect on the stock market. One of the key researches is done by Sadorsky (1999). He investigates the dynamic interaction between oil price and other economic variables including stock returns using US data. He finds that oil price changes and oil price volatility have a significant negative impact on real stock returns. He also finds that industrial production and interest rates responded positively to real stock return shocks. Jones and Kaul (1996) examine whether stock prices reflect the impact of news on current and future real cash flows. They find that oil price increases in the post war period have a significant detrimental effect for the US, Canadian, Japanese and UK stock market.

Park and Ratti (2008) examines the relationship between oil price shocks and stock markets in the US and 13 European countries using monthly data during the period 1986-2005. This study finds that oil prices play a crucial role in the stock market of oil importing countries. Additionally, Park brings evidence that stock markets in oil

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[5] "The impact of higher oil prices on the Global Economy," prepared by the research department of the International Monetary Fund (2000), www.imf.org/external/pubs/ft/oil/2000/oilrep.pdf.

[6] The sample consists of eighteen developed country Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hong Kong, Italy, Japan, the Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, the United Kingdom and the United States. And thirty developing country: Argentina, Brazil, Chile, China, Columbia, the Czech Republic, Egypt, Finland, Hungary, India, Indonesia, Ireland, Israel, Jordan, Malaysia, Mexico, Morocco, New Zealand, Pakistan, Peru, the Philippines, Poland, Portugal, Russia, South Africa, South Korea, Taiwan, Thailand, Turkey and Venezuela.

[7] Close to 60% of the world's oil reserves are contained in just 5 countries, Saudi Arabia, Bahrain, Kuwait and UAE (see British Petroleum, at www.BP.com).

exporting countries are less affected by oil prices relative to oil importing countries while stock prices in the later countries are less sensitive to interest rate.

Recent papers of the oil prices effect on stock markets distinguished between developed and emerging market response to the changes in oil prices. Sadorsky (2006) argue that developed economies are more energy efficient with oil consumption as a result of their ability to reduce the energy intensity through technological innovation and these countries do rely more on a diversified range of energy sources. In this context, Henriques and Sadorsky (2006) measure how sensitive the financial performance of alternative energy companies are to changes in oil prices. Four variables VAR model has been developed and estimated in order to investigate the empirical relationship between alternative energy stock prices, technology stock prices, oil prices, and interest rates. They show that technology stock price and oil price each individually Granger causes the stock prices of alternative energy companies. Basher and Sadorsky (2006) stated that emerging economies are less able to reduce oil consumption and thus these countries are more energy intense and more exposed to oil prices than more developed economies. Therefore, oil price changes are likely to have a greater impact on profits and stock prices in emerging economies.

Yet, the effect of oil prices shocks on stock market prices in developed and emerging countries is mixed. In this context, Maghyereh (2004) examines the relationship between oil price and stock market returns for 22 emerging economies for the period from 1998 to 2004. He shows very weak evidence that oil price shocks affect stock market returns in emerging economies. He concludes that the higher the country energy intensity consumption, the higher the response to oil prices. He explains these results based on the efficient market hypothesis. Stock markets in the emerging economies are inefficient in the transmission of new information of the oil market, and stock market returns in those countries do not rationally signal changes in crude oil price.

Nandha and Hammoudeh (2007) examine the relationship between beta risk and realized stock index return in the presence of oil and exchange rate sensitivities for fifteen countries in the Asia-Pacific region using the international factor model and weekly data during the period 1994-2004. They document basically no country shows sensitivity to oil price measured in US Dollar regardless whether the oil market is up or down.

In spite of the attention paid to examine the oil price effect on oil exporting countries, no such attention were paid to test the influence of oil prices increase on oil importing emerging countries. In our view, this issue is even more important to examine. Increasing the prices over a short period may created a serious hardship for many non oil exporting countries by raising their costs of imported oil. Therefore, in this study we contribute to the previous literature by focusing on a group of oil importing emerging countries examining the relationship between oil prices and stock market returns, namely, Turkey, Tunisia and Jordan.

3. Data and Methodological Issues

3.1. Data Employed

The main purpose of this study is to examine the relationship between oil prices and stock market prices in a sample of oil importing countries. Table 1 shows that the three chosen countries are oil intensive countries. All of which witnessed a net oil import during the time period from 2000 to 2006 (see Table 1). Generally, emerging markets and particularly Middle Eastern markets are expected to consume an increasing share of the world's oil and become larger player in the global financial markets (see BP Statistical Review of World Energy, June 2007 at: www.BP.com).

Since our focus in this study is on less developed small Middle Eastern countries, three countries data are examined here. Turkey, Tunisia and Jordan specifically are chosen in this study because these countries differ from those of other Middle Eastern countries, especially GCC[8,9] in that they are oil net importers. The risk from oil price changes and the impact on profits of companies in these countries is, thus, likely to play a large role in the development of their economies and financial markets. Additionally, relative to more developed countries (for example USA, UK, and Canada) oil consumption to total market capitalization is high. Consequently, oil price changes are likely to have a greater impact on profits and stock prices in these economies.

Insert Table 1 about here

Monthly data for the period 1997:12-2008:3 were utilized in this study[10]. The data for stock market indices (INDEX) for each of, Turkey, Tunisia and Jordan are shown in Table 2. Brent crude oil price (OIL) is chosen to represent the oil price variable due to two main reasons. Firstly, of total crude oil consumption Brent oil serves as a benchmark for about 60% of Daily barrels (see Magayrah, 2004). And secondly, all crude oil prices have been observed to fluctuate in the same direction empirically (Chang and Wong, 2003). The original crude oil price is quoted in US dollar. Therefore, exchange rates for the respective months are collected and the national oil price series are calculated as the product of Brent oil price and the country exchange rate deflated using each country Consumer Price Index (CPI).

Insert Table 2 about here

Since stock prices are strongly affected by the macro economic conditions, some economic factors which may influence the connection between oil prices and stock returns are included in this study. Industrial Production index (IP) is included because

[8]GCC constitute the Gulf Cooperation Council.

[9]We restrict our analysis to the above mentioned countries due to data limitation. We end off with only three countries after meeting the following conditions: availability of macro and micro economic variables sited in the most important literature in the field, sufficient stock market indexes information, and finally the consistency between the two sets of data.

[10] December 1997 selected as the starting date for our analysis because the Tunisian Stock index (TUNISIA TUNINDEX) is calculated and available in Datastreem Data base since this Date.

an economy's total energy consumption depends on goods and services produced inside the country[9], the main reason behind selecting this variable rather than GDP due to its availability in a monthly basis.

Moreover, short term lending rate (IR) is included due to its influence on stock prices. All countries economic data are collected from IFS CD- ROM data base 2008. Similar to the previous studies, all variables are expressed in logarithmic form. As argued by Eltony and Al-Awadi (2001) logarithmic forms tend to reduce the scale of the variables, which is a desirable quality when analyzing the time-series properties of the variable before their relationship can be established. As interest rates are in percentages, we define the logarithm of IR as log (1+IR/100).

3.2. Methodology

In the empirical analysis we follow Papapetrous (2001), and Hammoudeh and Choi (2006) among others and employ Vector Error Correction Model (VECM), to examine whether oil prices changes can affect stock market prices and to capture the complexities of the dynamic relations between the above mentioned variables included in the model. VECM allows us to test for the endogeneity of all variables. It consists of a system of equations that expresses each variable in the system as a linear combination of its own lagged value and lagged values of all the other variables in the system.

The VECM allows distinguishing between the two types of Granger causality: short-run and long-run granger causality. Long-run Granger causality from variable Y to variable X in the presence of cointegration is evaluated by testing the null hypothesis that the adjustment coefficient in the equation of variable X is zero, using the standard t-statistics. Short run Granger causality from variable Y to variable X is evaluated by testing the null hypothesis that all the coefficients of the lags of the first differences of the variable X are zero in the equation of variable Y, using the standard Wald test. By rejecting either one or both of the two null hypotheses, we conclude that variable Y Granger cause variable X.

However, the essence of the VECM lies in the implication that the series being studied is cointegrated which implies the existence of long run relation-ships between the integrated time series. Thus, to avoid the spurious regression problems, cointegration test has been employed. Variables are cointgrated if a linear combination of the non stationary series is stationary. This study will use the Johansen multivariate cointegration test (Johansen 1988; Johansen and Juselius 1990) based on the maximum eigenvalue and trace statistics.

In statistics, the presence of cointegration among the relevant variables indicates that a linear combination of nonstationary time series exhibits a stationary series (Granger and Weiss, 1983). To test for the presence of stochastic non stationary in the data used in this study it is necessary to investigate the order of integration of the individual time series before any other tests. For this purpose standard unit root tests are conducted Augmented Dickey–Fuller (ADF) test (Dickey and Fuller 1979, 1981); Phillip–Perron (PP) test (Phillip–Perron, 1988) and KPSS Test (Kwaitkowki et al. 1992). If variables are cointegrated, long run relationships are evident between variables. An error correction mechanism is incorporated in the model to capture the variations associated with adjustment to a long-term relationship. The VECM specification can be written as follows:

$$\Delta y_t = \alpha + \sum_{i=1}^{r} \beta_1 \prod_{i,t-i} + \sum_{i=1}^{p-1} \beta_2 \Delta y_{t-i} + \sum_{i=1}^{p-1} \beta_3 \Delta x_{t-i} + \varepsilon_{it} \qquad \textbf{(1)}$$

Where Δy_t is a column matrix of endogenous variables (IR, OP, IP and INDEX) cointegrated of order *r*, "Δy_{t-i} is the lagged values of each variable at time *t-i*". Δx_{t-i} is a vector of lagged value of the rest of the variables in the sample. These two variables interpret the changes of each variable as a result of the short-run effects from past Δy_{t-i} and. Δx_{t-i}. $\prod_{t-1}$ is the error correction term which is calculated as$[y_{t-1} - (a + bx_{t-1})]$. β_i are (K ×K) coefficient matrices parameters which can be represented by:

$$\beta_i = \begin{bmatrix} b_{11,i} & \cdots & b_{1k,i} \\ \vdots & \ddots & \vdots \\ b_{k1,i} & \cdots & b_{kk,i} \end{bmatrix} \qquad \textbf{(2)}$$

P is the order of lags which is determined by the likelihood ratio (LR) test supplemented by the AIC and SBIC information criterion[11]. Unidirectional causality from variable *X* to *Y* (*X* granger causes *Y*) requires that some of the coefficients of β_3 are non zero. If both variables Granger cause each other, then it is said that there is a two way feedback relationship between variable *X* and *Y*. These hypothesis can be tested by applying Wald test's on the joint significance of the lagged estimated coefficient of Δy and Δx .

In addition, variance decomposition (VDC) is applied in this study to confirm the relationship between oil price and stock market returns, if existed. A VDC studies apportions the variance of forecast errors in a given variable to its own shocks and those of the other variables in the VEC model; it assesses the relative importance of oil price shocks to the volatility of other variables in the system. IR variable is placed first in the ordering followed by OP, IP and INDEX. As argued by Sadorsky (1999) this ordering assumes that monetary policy shocks are independent of contemporaneous disturbances to the other variables. Additionally, as stated by Ferderer (1996), this ordering assumes that changes in IR influence OP and IP. Finally, INDEX, is placed last in the ordering.

4. Empirical Results

4.1. Time Series Properties

A unit root test is initially examined in this section to evaluate the properties of variables. To obtain robust results, we choose ADF, PP and KPSS tests here. The

[11] The LR is the ratio of the restricted to unrestricted model and is distributed as $\chi^2(k)$, where *k* is the number of parameters. However, to distinguish between the improvements in the model due to an increase in the number of parameters, the AIC and SBIC criteria can be calculated. These criteria are functions of the log likelihood values as well as the number of free parameters in the estimation.

results are presented in Table 3. The null hypothesis of ADF and PP tests is the series has a unit root while the null hypothesis of KPSS test is the series is stationary. For each test, we examine two different cases: intercept only and intercept and trend in the regression. Table 3 shows that most of the individual oil and the time series are non stationary in levels. On contrast, the results of these tests using the first difference of the logarithms suggest that the individual series are stationary. In summary, we accept that in log levels, the IR, OIL, IP and INDEX have a single unit root or are integrated of degree one *I*(1).

Insert Table 3 about here

Because variables in log level contain a unit root, we conduct cointgration test (Johansen and Juselius, 1990) for common stochastic trend. We employ both the maximum eigen value and trace statistics. Prior to performing the Johansen cointegration test, we follow Chang and Wong (2003) and enter the variables as levels into a VAR to determine the optimal number of lags needed in the cointegration analysis. The Akaike information criterion (AIC) (Akaike, 1969) is applied to determine the optimal lag length needed. With an arbitrary choice of a maximum 12 lag intervals is chosen. A lag structure of 4, 1, and 3 are used for Turkey, Tunisia and Jordan, respectively. Additionally, we allow for linear deterministic trend in the data series, and intercept in the cointegration equation. The results reported in Table 4 show that the null hypothesis of no cointegration is rejected for Tunisia and Jordan (at 5% significance level). This result indicates there is a long run equilibrium relationship between IR, OIL, IP, and INDEX in these two countries. For the case of Turkey the hypothesis of one contegrating vector was rejected indicating the two cointegrating vectors should be included in examining the dynamic short run relationships between variables included in the model using VECM.

Insert Table 4 about here

4.2. Oil Prices and Stock Market Returns

4.2.1 Causality Analysis

The VECM procedure enables us to check Granger causality among the variables both in the short-run and long-run. We incorporate information about the co-integration relationship in our estimation of the vector autoregressive equation. We estimate a multivariate VECM where the four endogenous variables are ΔIR, ΔOIL, ΔIP and ΔINDEX. The VECM includes the co-integrating equations (the error-correction terms (EC)) to test the speed of adjustment to the long run equilibrium between the endogenous variables.

A meaningful coefficient on the error-correction term (also known as the loading factor) must be negative and statistically significant (see Baliamoune-Lutz, 2008). The results reported in Table 5 (columns 7 and 8) indicate that the speed of adjustment to the long-run equilibrium between stock market prices and the rest of the endogenous variables differ among countries[12]. In Turkey, the EC coefficients in

[12] Since our main concern in this paper is to test the influence of oil prices changes on stock market price changes, we will focus on ΔINDEX equation.

ΔINDEX equation have the correct sign and significant at the 1% significance level. This may indicate the presence of a long-run causality linkages running from interest rate, oil prices and industrial production to stock market prices. This means that the long run equilibrium can be attainable in this country. Based on this result, we can argue that Turkish stock market prices are affected by the oil prices and other incorporated factors in the long run which may indicate that this country failed to substitute oil as an input in the long run (see Abu-Bader and Abu-Qarn, 2008). On the other hand, in Tunisia and Jordan, the EC coefficients in ΔINDEX equations are not significant, which indicates no long run equilibrium adjustment appears between the stock market prices and the other three endogenous variables.

Table 5 (columns 3 to 6) presents the direct causality within changes in interest rates, changes in oil prices, changes in industrial production and changes in market index in each country. As evident by the coefficients of oil prices in the VECM system, oil price changes are not statistically significant factor in explaining the changes in stock market index prices in the three countries. The non significant Chi-Square values for the oil variable in the index equations are 1.344, 3.914, and 1.837 for Turkey, Tunisia, and Jordan, respectively. These results may be surprising, because these countries are energy intensive and their stock markets are presumed to be affected negatively by changes in oil prices. One explanation might be that increasing oil cost has been associated by an increase in fees and services revenues for listed firms in the stock market. Thus, the value of these firms is not affected by oil changes since incremental costs are matched with incremental revenues. Another explanation can be presented within the context of efficient market hypothesis. As argued by Maghyereh (2004), stock markets in the emerging economies are inefficient in the transmission of new information of the oil market, and stock market returns in those countries do not rationally signal changes in crude oil price.

In addition, the results in Table 6 show a significant bidirectional relationship between stock return and interest rate in Turkey and Tunisia, and a unidirectional relationship running form interest rate to stock return in Jordan. Finally, the results indicate a significant bidirectional relationship between stock return and industrial production in Jordan, and a unidirectional relationship running from stock return to industrial production in Tunisia. However, an opposite unidirectional relationship between these two variables was found in Turkey.

Insert Table 5 about here

Based on these findings, we can argue that for Turkey, Tunisia and Jordan the effect of the local macroeconomic variables on the changes in stock market returns is more important than that of oil prices.

4.2.2. Variance Decomposition

The causal findings presented in Table 5 give only qualitative relationships. However, the quantitative associations and the precise interpretation of the VECM are brought to light through the generalized variance decomposition analysis to investigate the dynamic properties of the system (Papapetrou, 2001). Table 6 presents the forecast error variance decomposition of ΔIR, ΔOIL, ΔIP, and ΔINDEX. The reported numbers in the table indicate the percentage of the forecast error in each variable that can be explained by the shocks in the other variables at five different horizons: 1 month, 5 months, 10 months, 15 months and 20 months ahead.

Insert Table 6 about here

With glance look into Table 6, we can notify that in all three countries the stock market (INDEX) owns innovations explain most of its forecast error variance during the first horizon. The amount of this explanation ranges from about 93% for Jordan to 95% for Tunisia. However, this explanation has decreased during the longer horizons. During the 20th horizon, the results of the level of exogeneity (presented in Table 7) for both of oil prices and stock market index variables bring evidence that about 65%, 87% and 90% of stock market prices standard error variance could be interpreted through its own innovation in Turkey, Tunisia and Jordan, respectively, leaving the rest of interpretations to the other included variables. Among these variables, the least influential variable is the change in oil prices. This variable only explains 7.1%, 2.1% and 2.4% of the error variance of stock returns in Turkey, Tunisia, and Jordan, respectively[13].

These results also indicate that other economic variables became more important in explaining the variations of stock returns. While interest rate (IR) was the most important economic variable in interpreting the error variance of the Turkish and Jordanian stock markets (about 14% and 5%, respectively), the industrial production (IP) has higher explanation ability in the Tunisian stock market (about 6%).

Insert Table 7 about here

5. *Summary and Conclusions*

There is a growing body in the literature on the relationship between stock markets and oil prices. Most of which do not distinguish between oil importing or exporting countries. The purpose of this study is to contribute to the literature on stock markets and oil prices by studying the impact of oil price changes on a group of oil importing emerging countries (Turkey, Tunisia and Jordan). This is an important and interesting topic to study because Middle Eastern countries are expected to consume an increasing share of the world's oil and become larger player in the global financial markets. Turkey, Tunisia and Jordan differ from those of other Middle Eastern countries, especially GCC. In that they are oil net importers. The risk from oil price changes and the impact on profits of companies

[13] Three adjustments have been made on the included variables. First, the interest rate has not been transformed and kept as natural logarithm of interest rate instead of (1+ir/100). Second, the Money Demand (M2 Definition) variable has been included to capture the effect of money transformation. Finally, the order of the variables has been rearranged to be: oil price, interest rate, M2, industrial production, stock price.
In using this order the stock price is contemporaneously affected by all variables in the system, while oil price is treated as the most exogenous variable since it is ordered first. No different results have been found.

in these countries is, thus, likely to play a large role in the development of these economies and their financial markets.

The examination of the relationship between oil price movements and stock market returns is achieved via a formal empirical framework. An empirical modeling technique using Johansen and Juselius (1990) cointegration methodology is applied to examine the long term relationship between the oil price fluctuations and three oil importing stock markets. Then variables are modeled as a cointegrated system in a VECM. Monthly data of four variables, namely interest rate, oil prices, industrial production and stock market indices, running from December 1997 to March 2008 are employed to meet this objective.

The empirical findings of this paper suggest that changes in oil prices do not adversely affect Turkish, Tunisian and Jordanian stock markets. We find that the effect of the local macroeconomic variables on the changes in stock market returns is more important than that of oil prices. These results are consistent with the findings reported by Maghyereh (2004, 2007), Cong et al. (2008), and Hammoudeh and Choi (2006) which examined developing markets. On the other hand, the results achieved in this study are incompatible with those arrived by Park and Ratti (2008); El-Sharif et al. (2005) and Papapetrou (2001) which concentrate on developed stock markets. Moreover, the results of this study may have implications for portfolio management policy formulation which should focus on macroeconomic factors such as interest rate and industrial production rather than focusing on oil prices to be the only critical factor in predicting future prices. Further research might usefully examined the relationship between oil prices and stock markets within a very different economic and industrial environments to examine the influence of oil prices on stock markets or even individual sectors in the market.

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List of Tables

Table 1
Oil consumption around the world regions

	2000	2001	2002	2003	2004	2005	2006
				Turkey			
Total Oil Production (thousands Barrel per day)	51.42	46.83	47.09	45.82	42.93	45.46	43.95
Consumption (thousands Barrel per day)	666.88	618.62	657.73	644.97	661.37	659.33	669.40
Total Export (Import)	- 615.46	- 571.79	- 610.64	- 599.16	- 618.44	- 613.87	- 625.45
Oil Import to Market Capitalization	0.97	1.13	1.78	0.98	0.93	0.81	0.97
				Tunisia			
Total Oil Production (thousands Barrel per day)	80.50	72.58	78.55	77.37	81.67	76.90	78.34
Consumption (thousands Barrel per day)	84.55	87.22	87.86	87.66	89.40	90.00	91.11
Total Export (Import)	- 4.05	- 14.64	- 9.31	- 10.29	- 7.73	- 13.10	- 12.77
Oil Import to Market Capitalization	0.30	0.33	0.38	0.37	0.47	0.62	0.48
				Jordan			
Total Oil Production (thousands Barrel per day)	0.49	- 0.27	- 0.18	- 0.14	- 0.36	- 0.36	- 0.36
Consumption (thousands Barrel per day)	101.08	98.84	103.33	106.43	106.98	109.00	110.68
Total Export (Import)	- 101.56	- 99.11	- 103.51	- 106.57	- 107.34	- 109.36	- 111.05
Oil Import to Market Capitalization	0.21	0.14	0.13	1.01	0.81	0.57	0.87
				United States			
Total Oil Production (thousands Barrel per day)	9057.78	8957.01	8999.9	8797.29	8700.2	8321.8	8330.51
Consumption (thousands Barrel per day)	19701.07	19648.71	19761.3	20033.51	20731.15	20802.16	20687.41
Total Export (Import)	-10643.3	-10691.7	-10761.4	-11236.2	-12030.9	-12480.4	-12356.9
Oil Import to Market Capitalization	1.33E-02	1.23E-02	1.63E-02	1.46E-02	1.76E-02	2.43E-02	
				United Kingdom			
Total Oil Production (thousands Barrel per day)	2567.02	2594.69	2561.95	2391.53	2074.17	1861.46	2567.02
Consumption (thousands Barrel per day)	1759.39	1743.99	1731.49	1759.07	1799.2	1834.33	1759.39
Total Export (Import)	807.6	850.7	830.5	632.5	275	27.1	807.6
Oil Import to Market Capitalization	6.95E-03	6.96E-03	8.52E-03	7.44E-03	8.86E-03	1.19E-02	-
				Canada			
Total Oil Production (thousands Barrel per day)	2749.44	2812.46	2949.7	3109.65	3135.36	3091.73	3288.03
Consumption (thousands Barrel per day)	2026.67	2056.84	2078.35	2207.15	2299.67	2296.86	2296.66
Total Export (Import)	722.8	755.6	871.3	902.5	835.7	794.9	991.4
Oil Import to Market Capitalization	2.45E-05	2.54E-05	3.31E-05	2.57E-05	2.71E-05	3.08E-05	-

Source: Energy Information Administration on: http://www.eia.doe.gov/ and world development indicators CD 2007

Table 2
Stock market indices

Country	Index	Symbol	Source
Turkey	MSCI TURKEY	MSTURKL	Datastreem*
Tunisia	TUNISIA TUNINDEX	TUTUNIN	Datastreem
Jordan	AMMAN STOCK MARKET	ASM	Datastreem

Source: created by the authors
*see Thomson one Banker on http://banker.thomsonib.com/

Table 3
Stationary Tests

	Log Level				First Log Difference			
	OIL	INDEX	IP	IR	OIL	INDEX	IP	IR
Turkey								
ADF								
C	-1.703 (5)	-2.387(0)	-2.125 (12)	-1.461(6)	-5.714♠(4)	-11.362♠ (0)	-10.4273♠(11)	-6.229 ♠(5)
C&T	-2.352(0)	-2.338 (0)	-1.718 (12)	-1.734(4)	-5.698♠(4)	-11.344♠(0)	-11.569♠(11)	-6.201 ♠ (5)
PP								
C	-1.470 (16)	-2.496 (4)	-2. 192 (13)	-2.939(6)	-14.702♠(25)	-11.361♠(2)	-14.032♠(2)	-35.810♠(11)
C&T	-3.396 * (6)	-2.410 (3)	-1.509 (11)	-9.386♠(7)	-14.651♠(25)	-11.344♠(1)	-18.148♠ (1)	-35.732♠ (11)
KPSS								
C	1.009♠ (9)	1.214♠ (9)	1.167♠ (9)	1.1670♠ (9)	0.1153(31)	0.102(2)	0.186(2)	0.264(67)
C&T	0.1204* (8)	0.201* (9)	0.340♠ (9)	0.341♠(9)	0.114(31)	0.054(1)	0.064(15)	0.055(67)
Tunisia								
ADF								
C	-0.791 (0)	0.344 (0)	-2.039(12)	-2.026 (0)	-11.77 ♠ (0)	-10.493♠ (0)	-3.130* (12)	-9.944♠ (0)
C&T	-2.625 (0)	-0.896 (0)	-2.069(12)	-2.014 (0)	-11.735♠ (0)	-10.600♠ (0)	-3.209* (12)	-10.001♠ (0)
PP								
C	-0.698 (7)	0.307 (1)	-2.392 (6)	-2.011 (15)	-11.819 ♠ (7)	-10.493♠ (2)	-37..970♠(17)	-9.969♠ (18)
C&T	-2.573 (2)	-0.929 (1)	-2.417 (6)	-1.941 (10)	-11.774♠ (7)	-10.600♠ (3)	-39.009♠ (18)	-10.482♠ (23)
KPSS								
C	1.144♠ (9)	0.779♠ (9)	0.78♠ (9)	1.078♠(9)	0.057 (9)	0.310 (0)	0.310 (0)	0.209 (15)
C&T	0.283♠(9)	0.230♠ (9)	0.199^{+} (6)	0.173^{+} (9)	0.0480 (9)	0.112 (2)	0.112 (2)	0.066 (19)
Jordan								
ADF								
C[1]	-0.650 (0)	-0.049 (2)	-.626 (0)	-1.616 (2)	11.984♠ (0)	-5.372♠ (1)	-4.381♠ (11)	-15.785♠ (0)
C&T[2]	-2.954 (0)	-1.871 (2)	-1.474 (0)	0.614 (2)	-11.955♠ (0)	-5.487♠ (2)	-4.369♠ (11)	-11.025♠ (1)
PP								
C	-0.468 (7)	-0.145 (7)	-.626 (0)	-1.317 (0)	-12.088♠ (6)	-9.271♠ (6)	-25.271♠ (12)	-16.208♠ (4)
C&T	-2.916 (1)	-1.812 (7)	-1.543 (2)	-0.179 (3)	-12.059♠ (6)	-9.344♠ (6)	-25.800♠ (12)	16.762♠ (2)
KPSS								
C	1.186♠ (9)	1.174♠ (8)	1.148♠ (8)	1.201 ♠ (9)	0.071 (8)	0.194 (7)	0.243 (32)	0.212 (0)
C&T	0.229+ (9)	0.211^{+} (9)	0.274♠(4)	0.219♠ (9)	0.045 (8)	0.087 (7)	0.143* (3)	0.076(3)

Notes: ADF_ Augmented Dikey Fuller test; PP_ Philips and Perron; KPSS_ Kwiatkowski et al., test; C_ Constant; T_ Trend. *'+' and ♠ denote rejection of the null hypothesis of a unit root at 10%, 5% and 1% level of significance, respectively. OIL, INDEX, IP and IR represent oil prices, stock market indices, industrial production index and interest rate respectively. The appropriate lag length for all tests is between bracts. The lag selection is based on the lowest values for AIC

Table 4
Cointegration Test Results

	The Trace			The Maximal Egenvalue		
Null Hypotheses	*Alternative Hypotheses*	*Test Statistics*	*Critical value (95%)*	*Alternative Hypotheses*	*Test Statistics*	*Critical value (95%)*
			Turkey			
r=0	*r≥1*	55.655+	47.856	*r=1*	22.668	27.584
r≤1	*r≥2*	32.987+	29.797	*r=2*	19.024	21.132
r≤2	*r≥3*	13.965	15.495	*r=3*	7.784	14.265
r≤3	*r=4*	6.180	3.841	*r=4*	6.180	3.842
			Tunisia			
r=0	*r≥1*	70.627+	47.856	*r=1*	44.022	27.584
r≤1	*r≥2*	26.606	29.797	*r=2*	18.218	21.132
r≤2	*r≥3*	8.387	15.494	*r=3*	7.381	14.264
r≤3	*r=4*	1.006	3.841	*r=4*	1.006	3.841
			Jordan			
r=0	*r≥1*	75.011+	47.856	*r=1*	45.3742	27.584
r≤1	*r≥2*	29.636	29.797	*r=2*	21.172	21.132
r≤2	*r≥3*	8.465	15.495	*r=3*	5.525	14.264
r≤3	*r=4*	**2.940**	3.841	*r=4*	2.940	3.842

Notes: Variables are IR, OIL, IP and INDEX all variables are expressed in natural logarithms. Cointegration are estimated using Johansen and Juselius (1990) test statistics. Johansen Cointegration test allows one to examine the number cointegrating vectors that might exists. The hypothesised number of cointgrating equation denoted as "*r =o" exhibits the result of testing the hypothesis of no cointegration condition.* r denotes the number of cointegrating rank.
According to the general guidelines of the LR procedure and the requirement of white noise residuals, the cointgration test uses four lags in Turkey, two lag in Tunisia and three lags in Jordan.
the (non-standard) critical values are taken from Osterwald- Lenum (1992).
+ indicates a rejection of the null hypothesis of cointegration at the 5% level of significance

Table 5
VECM Causality Test Results

Dependent Variable	**Country**	**ΔIR**	**ΔOIL**	**ΔIP**	**ΔINDEX**	EC_1	EC_{t2}
			Wald X^2 Statistics			***t*-statistics**	
	Turkey						
ΔIR			4.630	3.052	6.579*	-5.539*	-2.715+
ΔOIL		1.321		3.605	2.969	0.825	-7.379*
ΔIP		10.265+	0.384		1.392	-1.194	-0.579
ΔINDEX		6.916*	1.344	11.404+		-3.531*	-0.360
	Tunisia						
ΔIR			10.239♠	1.492	5.685*	-1.503	
ΔOIL		4.363		0.370	1.141	0.543	
ΔIP		7.261+	1.614		11.724♠	8.353*	
ΔINDEX		6.746+	3.914	1.095		1.007	
	Jordan						
ΔIR			5.584*	28.341♠	0.817	-6.117*	
ΔOIL		1.060		1.643	3.920	1.050	
ΔIP		10.483♠	0.236		5.975*	2.736*	
ΔINDEX		4.990♠	1.837	1.898*		-1.447	

Notes: this table summerises the VECM results. EC_1 and EC_2 represent long term equilibrium relationships. Figures represented in the last two columns are the t-statistics testing the null hypothesis that the lagged Error correction term is statistically insignificant for each equation. All other estimated are Wald block Chi square statistics, which examined the joint significant of the lags of one variable effect on the other variables in the VEC model. Each entry in the Table denotes the value and the significance level of the variable on the left hand side caused by the variable at the top. Δ indicates first difference.
The optimal lags are determined based on LR.
*' +' and ♠ denote rejection 10%, 5% and 1% level of significance, respectively.
See Table 3 for variable notations.

Table 6
Variance Decomposition Results

Period	Standard	IR	OIL	IP	INDEX
10	0.183	4.354	93.559	0.778	1.308
15	0.214	4.628	93.518	0.714	1.140
20	0.241	4.803	93.487	0.675	1.035
Response of IP					
1	0.090	1.926	1.122	96.953	0.000
5	0.110	10.135	0.949	86.344	2.572
10	0.132	14.691	0.894	82.333	2.081
15	0.150	17.029	0.812	80.505	1.654
20	0.166	18.509	0.755	79.365	1.370
Response INDEX					
1	0.056	0.533	0.555	6.314	92.598
5	0.077	3.690	2.585	4.167	89.557
10	0.098	4.796	2.472	3.007	89.725
15	0.116	5.191	2.407	2.483	89.918
20	0.131	5.409	2.381	2.186	90.024
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0.088	6.377	5.412	86.774	1.437
10	0.092	6.778	5.727	81.148	6.346
15	0.095	7.597	5.974	77.101	9.328
20	0.098	8.307	6.213	73.424	12.057
Response of INDEX					
1	0.154	4.066	1.269	0.283	94.381
5	0.179	8.314	4.691	10.018	76.977
10	0.207	12.890	6.074	11.771	69.265
15	0.228	13.968	6.675	12.767	66.591
20	0.247	14.749	7.157	13.443	64.651
Tunisia					
Response of IR					
1	0.001	100.000	0.000	0.000	0.000
5	0.002	87.673	3.641	4.177	4.508
10	0.003	87.478	3.429	4.766	4.328
15	0.004	87.446	3.404	4.847	4.303
20	0.001	100.000	0.000	0.000	0.000
Response of OIL					
1	0.110	4.105	95.895	0.000	0.000
5	0.152	7.614	89.976	0.835	1.575
10	0.195	7.433	89.910	1.099	1.558
15	0.229	7.489	89.825	1.131	1.555
20	0.259	7.521	89.785	1.149	1.545
Response of IP					
1	0.055	4.273	0.004	95.723	0.000
5	0.074	10.018	0.642	85.963	3.377
10	0.077	14.665	0.964	80.787	3.584
15	0.079	18.488	1.177	76.825	3.511
20	0.081	22.014	1.319	73.231	3.436
Response of INDEX					
1	0.040	0.059	2.315	3.024	94.601
5	0.057	4.414	3.287	5.823	86.476
10	0.073	4.735	2.741	5.702	86.823
15	0.086	4.915	2.321	5.765	86.999
20	0.098	5.021	2.101	5.788	87.091
Jordan					
Response of IR					
1	0.002	100.000	0.000	0.000	0.000
5	0.002	79.127	6.134	12.103	2.636
10	0.003	68.322	5.437	21.933	4.308
15	0.003	61.785	4.748	28.379	5.088
20	0.003	56.923	4.211	33.132	5.734
Response of OIL					
1	0.109	1.511	98.489	0.000	0.000
5	0.145	3.617	94.136	0.802	1.445

Notes: each number in this table denotes the percentage of error variance, measured by the standard error, of the variable at the left hand side explained by the variable at the top.

Table 7
Degree of Exogeneity for Oil Prices and Stock market indexes

Note: the degree of exgegneity is calculated as 100 percent minus other variables explanation of its standard error in the 20th horizon.

Country	Degree of Exogeneity	
	OIL	Index
Turkey	73.575	64.651
Tunisia	89.785	87.091
Jordan	93.487	90.024

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