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Impacts of Crude Oil Price Changes on Capital Market Indexes: Empirical Evidence from Comparing Tehran Securities Exchange with Tadawul Exchange

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Highlights

- Iran and Saudi Arabia are both considered key players in the oil market, but Iran's position has been negatively affected by the economic sanctions.
- Both countries have oil sensitive capital markets, and Iran's capital market shows more sensitivity to oil price movements although it is more diversified and under the influence of various sanctions.
- As suggested by the literature, oil-dependent economies are more affected through adverse oil price movements. The provided data and results support the aforementioned theory for both Tehran and Tadawul's stock markets.

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Abstract

Several studies in the field of capital markets indicate that changes in macroeconomic parameters, including crude oil price changes in many cases, have significant effects on capital market indexes. The present study seeks to investigate the effect of crude oil price changes on the indexes of Tehran Stock Exchange and Saudi Stock Exchange, also known as the Tadawul Exchange, using the two-factor capital asset pricing model with samples gathered from both markets between 2016 and 2022. The results of the study show that both markets are relatively sensitive to the oil price index. Despite severe economic sanctions imposed on Iran, its capital market, more significantly having oil-related indexes, is still more oil-dependent than that of Saudi Arabia. The results also indicate the asymmetric relation with oil price movements in both countries due to their oil-exporting nature, where both markets are more sensitive to negative oil price movements than to its positive ones. Further, it is concluded that due to the diversity of industries in Tehran Stock Exchange, the economic sanctions imposed on Iran have a more direct impact on its capital market rather than affecting it through a mediator parameter such as oil price movements.

Keywords: Economic Sanctions, Saudi Stock Exchange, Tehran Stock Exchange, WTI Oil

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1. Introduction

Over the past century, crude oil has increased its importance as a vital element for the world economy, especially in case of some developing countries. Crude oil is considered the most actively traded commodity in the world. Meanwhile, given the fact that Iran was and Saudi Arabia still is considered a

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potential key player in the production of crude oil in the Middle East and developing countries, both are committed to the excellence of their economies in the coming years. The increase in the price of oil through employment rates, the increase in inflation, and the devaluation of the dollar, which are mainly associated with a decrease in economic growth, has definite effects on the world economy (Hamilton, 1983). Any sudden increase or decrease in the price of crude oil affects the state of stock markets around the world (Ghosh et al., 2016). Further, considering the principle that Iran and Saudi Arabia are considered among the largest producers and exporters of crude oil in the world, the effect of crude oil price on their capital market indices should always be taken into consideration.

Lower crude oil prices help governments manage their finance processes since it leads to low subsidies on petroleum-based products (LPG and kerosene), thereby reducing budget deficiencies. The aforementioned effect would help governments stay committed to fiscal consolidation roadmaps while avoiding the risk of economic growth jeopardy (Hamilton, 1983). The decrease in the global oil price may also be beneficial for its importers, but it will negatively impact the exporters and producers of oil. Global oil fluctuations affect the economy of countries positively and negatively depending on whether the country is importing or exporting crude oil, and it is essential for investors and policy makers to understand the relationship between the crude oil price and the stock market. The present study seeks to investigate the effect of crude oil price changes on the major capital market indexes of two countries, Iran and Saudi Arabia: as the members of the OPEC agreement and as one of the potential symbols of single-product economies. Considering both stock markets emerging while one is affected by severe economic sanctions, the results of the quantitative comparison can better illuminate the role of sanctions and whether or not they have reinforced the oil dependency of emerging capital markets (due to conclusions made by Bashir et al., 2012).

1.1. Tehran Stock Exchange (TSE) and Saudi Stock Exchange (Tadawul)

Established in 1967 as Iran's largest stock exchange and a member of Euro-Asian stock exchanges federation, Tehran's Stock Exchange is consisted of more than 666 firms with a market cap of $145 billion; in the literature, it is considered one of the emerging stock markets. Iran's capital market also has a wide range of industries listed, including but not limited to essential metals, oil products, pharmaceuticals, banks, and financial firms, many of which are formerly state-owned firms that are privatized. The trading process in this market is conducted through licensed brokers which are private firms registered with the Iran's securities and exchange organization; also, as of 2023, there were 108 active brokerages in Iran according to official reports (Wikipedia).

Saudi Stock Exchange (aka Tadawul) is its official stock market established in 2007 as a joint stock company authorized to act as the main stock and securities exchange. As of 2020, there were 203 publicly traded firms listed in Tadawul exchange. In contrast to its Iranian equivalent, industries listed in the Tadawul exchange are more limited both in number and variety, yet yielding a higher market cap equivalent to $2 trillion. Tadawul exchange is also a member of the world federation of exchanges (WFE), United-Nations sustainable stock exchanges (SSE), and Arab federation of exchanges (Wikipedia).

1.2. Statement and significance of the problem

Even though various studies have concluded the existence of a significant relation between oil price changes and capital market returns, most studies have taken a general viewpoint while ignoring specific conditions such as sanctions, war, and political crisis. The detail-oriented cases are also limited in case of Iranian capital market. Given the fact that both TSE and Tadawul are considered emerging capital markets with their national economy classified as oil-dependent, a thorough quantitative comparison

with explicit consideration of the economic sanction of one side as a preventing-presumed factor could help with understanding the role of factors as such in reinforcing or suppressing the already concluded oil-dependency of capital markets.

1.3. Research hypotheses

The present study is divided into four main sections each bearing their own specific hypotheses. First, the empirical section is to study whether or not the main market index of Iran is affected by the economic sanctions. Thus, the first section's null hypotheses are as follows:

H1: There is no statistically significant relationship between economic sanctions and TSE market returns.

H2: There is no statistically significant relationship between economic sanctions and oil-effected TSE market returns.

Next goal is to study whether or not TSE and Tadawul's different industry indexes are oil-related. Hence, the second section's null hypothesis is as follows:

H3: There is no statistically significant relationship between oil price changes and industry-based index returns in both markets.

Third, the asymmetric effect of oil price movements is to be studied in both markets.

H4: Both markets are symmetrically affected by the positive and negative oil shocks.

Fourth, given on the results obtained from testing the aforementioned hypotheses, whether to study or not the sanction affected stock market of Iran is less oil-dependent that the Tadawul exchange.

2. Methodology

Various studies have been conducted on OPEC and Persian Gulf countries as one of the main oil exporters both in the Middle East and West Asia. In the work of Ghosh et al. (2016), the most volatile periods in the history of oil price shocks, better known as the bullish crisis, were studied, and it was concluded that international oil price changes affect the Indian stock market.

Siddiqui et al. (2020) investigated the impact of the drop in oil prices between 2014 and 2019 on the stock markets of the Persian Gulf Cooperation Council countries and the four major oil importing countries, namely China, Japan, India, and South Korea. The results of their studies showed that compared to the period before the recession, negative changes in oil prices had more effects on stock prices in oil exporting countries; however, positive changes in oil prices had more effects on oil importers. They also found a time-dependent relationship between oil prices and stock prices by examining the rate of change in stock prices for both groups.

Investigating political-economic events, Mzoughi et al. (2020) investigated the effect of COVID-19 on oil prices, CO_2 emissions, and stock market volatility from January 22, 2020 to March 30, 2020 using unrestricted the vector auto regressive (VAR) method. Their results indicated that the growth of COVID-19 cases caused a decrease in the price of crude oil, but the mentioned reaction was short-term in terms of time. In addition, it was proven that the stated event had a more direct effect on the capital market than on crude oil prices and CO_2 emissions.

Hung et al. (2020) investigated the relationship between crude oil prices and five developed stock markets in European countries (UK, Spain, Italy, Germany, and France) before and during the outbreak of COVID-19. The results of their studies showed that, contrary to the results of the pre-COVID-19 period, these markets are the net recipients of return spillovers, which reached a maximum level of

about 23% during the COVID-19 outbreak; return transfer is also more evident during the COVID-19 crisis than the pre-COVID-19 period. More importantly, there are significant correlational patterns of information spillovers, and the frequent temporal linkages between crude oil and the five major stock markets may have immediate salient implications for portfolio managers, investors, and government agencies.

Bashir et al. (2012) studied the relationship between oil prices, emerging capital markets, and currency exchange rates using the VAR method. Their result showed that positive oil price shocks decrease the stock prices of emerging markets and the exchange rate of the US dollar in the short term. Further, a positive production shock decreases oil price, while positive economic changes (activities leading to growth) increases it.

Kang et al. (2008) investigated the relationship between oil price shocks and the Chinese capital market using multivariate VAR. Their results showed that oil price shocks do not have any significant effect on the stock returns in most indexes, with the manufacturing index and some oil companies being the exception. Some oil price shocks reduced oil companies' stock prices. It was concluded that higher oil price volatility may result in higher speculation in the mining and petrochemical index, which increases the return on their stocks.

Farzangan et al. (2009) reported that Iran's economy is highly vulnerable to oil price fluctuations. The analysis performed on the dynamic relationship between oil price changes and macroeconomic variables in Iran using the VAR method pointed out the asymmetrical effects of oil price shocks, significantly increasing inflation. Their results also implied a strong positive relationship between positive oil price changes and industrial production growth.

Arori et al. (2011) studied the returns and volatility transfer between oil prices and capital markets in the GCC countries from 2005 to 2010. The multivariate moving average (MA) method was used as the empirical configuration to detect spillovers between markets. The result of this study showed that there are significant volatility spillovers between oil and stock markets in half of the cases (3 out of 6 countries), where the transfer of volatility from oil to stock markets is more obvious.

According to the related literature, the actual relationship between oil price changes and a firm's stock returns depends on the net effects resulting from expected cash flow changes and expected discount rates. First, the impact of oil price changes on stock markets for a particular country (or industry) can be positive or negative depending on whether the country (or industry) is an importer or exporter of oil resources. Second, rising oil prices can cause a reallocation of resources (Hamilton, 1996) from more adversely affected to less adversely affected sectors, which will eventually affect industry cash flows and profits. Third, Killian (2009) indicated that oil price shocks can have different economic effects depending on whether the price changes are attributed to global supply or demand shocks. Killian and Park (2009) found evidence that the impact of oil price shocks on stock returns varies significantly from industry to industry, depending on the underlying causes of the oil price shocks.

In the present study, the monthly returns on West Texas Intermediate oil prices as the oil price reference for both countries and the monthly return on the market index of the Tehran Stock Exchange and that of the Saudi Stock Exchange were used as independent variables. The monthly return on essential metals, banks and financial institutions, industry, transportation, oil products, and food industries in Iran as well as monthly returns on energy index, materials, banks and financial institutions, transportation, utilities, and food industry in Saudi Arabia are used as dependent variables.

In order to estimate the effects of macroeconomic risk bearing factors on stock returns, we should apply the linear factor pricing model as a special case of a consumption-based asset pricing model (for

example, the Cochrane (2005) model). Based on this, the following yield generation process will be applicable:

(1)

where is the risk parameter at time *t*. The following conditions must also be met:

As mentioned earlier, one of the macroeconomic factors that has attracted empirical attention is the price of oil. This study also focuses on measuring oil price sensitivity in the stock markets of the Islamic Republic of Iran and Saudi Arabia for some important industrial indexes. According to the yield generation process in Equation (1), the relationship of oil price changes and capital market return with the return of different indexes is modeled using a two-factor model as follows:

(2)

where is the logarithmic return on the country's capital market index and indicates the logarithmic return on the crude oil price index. Previous studies by Kilian (2008) and Nandha and Fal (2008) have also expressed an asymmetrical relationship to measure the effect of oil prices on the performance of various indicators; by combining it with Equation (2), the following equation is obtained:

(3)

where *D* is a dummy variable taking the value of 1 in positive and 0 in negative oil price changes.

Further, in order to take the sanctions into account in case of Iran, we add another dummy variable to Equation (2) to indicate both direct and through-oil effects of economic sanctions on different industries of TSE as follows:

(4)

where *S* is the sanctions dummy variable taking the value of 1 when sanctions are in effect and the value of 0 in any other counter-situation; denotes the event parameter defined to measure the through-oil effects of economic sanctions.

2.1. Data

The present study uses the real-time data gathered from official website of both markets and various studies (Mohanty et al., 2011; Ghosh et al., 2016; Nandha et al., 2008; Cong et al, 2008). Being recommended as the measuring base for price shocks due to being accepted in international commodity spots and future markets, the West Texas Intermediate oil price is used herein for calculating the oil price returns. The observations were made from 2016 to 2022, with sanctions beginning to intensify in 2018 due to USA's default in Iran's nuclear agreement. The Wald test is used for testing the issued hypothesis, and the logarithmic return is used to maintain stationary condition of data through time as follows:

(5)

Moreover, as already stated, the indexes used in the empirical study are industry index, essential metals, banks and financial institutions, transportation, oil products, and food industries for Iran and energy index, materials, banks and financial institutions, transportation, utilities, and food industry for Saudi Arabia.

3. Empirical results

First, the relation between TSE's main index and oil price with the effect of sanctions is estimated using Equation (1). The risk parameters of oil price, sanctions, and the effect of sanctions on oil price are used to obtain a proper model as follows:

(6)

The results of Equation (6) are listed in Table 1.

Table 1

The impact of oil on the TSE Index

Index					**Adj. R^2**	**DW**	**H1: (p-value)**	**H2: (p-value)**
Market	0.080*** (3.898)	0.098 (0.954)	–0.072** (–2.258)	–0.293 (–1.083)	0.11	1.48	5.101** (0.023)	1.174 (0.278)

Note: The T-statistic values are reported in parentheses; ***, **, and * indicate the significance level of 1%, 5%, and 10% respectively.

Next, the relations between TSE and Tadawul's industry indexes and oil price changes are to be estimated using Equation (2) for Saudi Arabia and Equation (4) for Iran to take the sanctions into account. The results of these equations are presented in Table 2.

Table 2

The symmetric results

Index						**Adj. R^2**	**DW**	**H3: (p-value)**
Tehran Stock Exchange								
Financials	0.008 (0.874)	0.887*** (8.319)	–0.088** (–2.115)	–0.022** (–1.668)	0.087 (0.791)	0.84	1.85	4.474** (0.034)
Food Industries	0.010 (0.142)	1.380*** (3.153)	–0.180 (–0.540)	0.016 (0.153)	–1.557** (–1.796)	0.31	2.25	0.244 (0.620)
Industry	–0.006 (–1.095)	1.075*** (3.241)	0.000 (0.126)	0.008 (1.048)	0.011 (0.166)	0.95	3.13	0.000 (0.989)
Metals	0.000 (0.019)	1.042*** (8.902)	0.080** (1.906)	0.000 (0.018)	–0.002 (–0.025)	0.88	2.07	4.034** (0.046)
Oil Products	–0.019 (–1.223)	1.265*** (13.979)	0.233*** (3.334)	0.029 (1.291)	–0.227 (–1.238)	0.79	2.18	11.118*** (0.000)

Index						Adj. R^2	DW	H3: (p-value)
Transportation	–0.038** (–1.770)	1.386*** (10.970)	–0.023 (–0.242)	0.036 (1.161)	–0.015 (–0.060)	0.68	1.90	0.058 (0.808)
Tadawul Exchange								
Energy	0.000 (0.076)	0.572** (2.278)	0.064 (0.809)	-	-	0.29	2.02	0.065 (0.798)
Financials	0.004 (0.004)	1.235*** (9.319)	–0.005 (–0.246)	-	-	0.90	2.11	0.060 (0.805)
Food Industries	–0.004 (–0.751)	0.645*** (5.206)	–0.015 (–0.375)	-	-	0.38	1.81	0.090 (0.763)
Material	–0.002 (–0.760)	0.928*** (5.293)	0.054** (1.788)	-	-	0.77	2.44	3.997** (0.049)
Transportation	–0.003 (–0.611)	0.908*** (7.171)	0.077** (1.867)	-	-	0.64	1.80	4.040** (0.047)
Utilities	0.003 (0.464)	0.872*** (5.343)	–0.044 (–0.837)	-	-	0.37	1.76	0.701 (0.402)

Note: The T-statistic values are reported in parentheses; ***, **, and * indicate the significance level of 1%, 5%, and 10% respectively.

Third, the asymmetric relations between the TSE and Tadawul industry indexes and oil price changes are estimated using Equation (3), and Table 3 presents the corresponding results.

Table 3

The asymmetric results

Index					Adj. R^2	DW	H3: (p-value)
Tehran Stock Exchange							
Financials	–0.021*** (–2.760)	0.905*** (9.855)	–0.240*** (–4.676)	0.133** (2.117)	0.87	2.04	16.802*** (0.000)
Food Industries	–0.025 (–0.318)	1.241*** (2.661)	–0.528 (–1.006)	–0.259 (–0.404)	0.13	2.95	0.083 (0.773)
Industry	0.001 (0.302)	1.064*** (4.410)	0.033 (0.951)	–0.033 (–0.791)	0.95	3.14	1.172 (0.278)
Metals	0.011* (1.308)	1.036*** (7.355)	0.143** (2.538)	–0.045 (–0.655)	0.88	2.14	4.550** (0.039)
Oil Products	0.002 (0.198)	1.250*** (4.634)	0.296*** (3.083)	0.086 (0.731)	0.79	2.18	1.525 (0.216)
Transportation	–0.012 (–0.629)	1.343*** (11.312)	0.054 (0.410)	–0.107 (–0.658)	0.68	1.86	0.469 (0.493)
Tadawul Exchange							
Energy	–0.007 (–0.501)	0.761*** (2.824)	–0.041 (–0.331)	0.090 (0.694)	0.15	2.68	0.490 (0.483)

Index					Adj. R^2	DW	H3: (p-value)
Financials	0.005* (1.567)	1.226*** (8.673)	0.009 (0.325)	–0.021 (–0.675)	0.90	2.12	0.466 (0.494)
Food Industries	–0.015** (–2.224)	0.707*** (5.824)	–0.114** (–2.048)	0.093* (1.593)	0.43	1.82	7.028*** (0.009)
Material	–0.001 (–0.379)	0.939*** (10.453)	0.046 (1.130)	0.038 (0.883)	0.78	2.62	0.018 (0.893)
Transportation	0.008 (1.271)	0.842*** (6.835)	0.184*** (3.248)	–0.040 (–0.683)	0.68	1.76	6.852*** (0.009)
Utilities	0.000 (0.009)	0.890*** (5.296)	–0.072 (–0.935)	–0.013 (–0.169)	0.36	1.71	0.250 (0.617)

Note: The T-statistic values are reported in parentheses; ***, **, and * indicate the significance level of 1%, 5%, and 10% respectively.

4. Discussion

The effect of crude oil price changes on the industry indexes was investigated using the values of monthly returns on each of the mentioned indexes from January 2016 to January 2022 (72 working months). The following conclusions can be drawn from the obtained results:

- For the first section, it is observed that economic sanctions have direct significant impact on Tehran Stock Exchange and its financial index, rejecting hypothesis (1) where no statistically significant relation is assumed; however, the empirical study does not possess the sufficient evidence to reject hypothesis (2), assuming indirect (oil-through) impact of sanctions on the market and considering the food industry index of Tehran Stock Market an exception.
- In the studied sample, both markets show relative sensitivity to oil price changes: Iran's market has more significant relations than Saudi Arabia's market, implicitly rejecting the assumption that Iran's market is less oil-dependent due to severe economic sanctions limiting its oil sale and revenue potentials. Further, hypothesis (3), assuming no statistically significant relation between the market indexes, is rejected for financials, metals, and oil product indexes of TSE and food industries and transportation indexes of Tadawul.
- In the asymmetric analysis of the effects of oil prices on industrial indexes in the studied sample, both markets show statistically significant relation with negative oil price movements; further, the asymmetric impact assumption of oil price movements is explicitly rejected for the financials and metals indexes of TSE and the food industries and transportation indexes of Tadawul.
- The results in Tables 1–3 possess the sufficient evidence to reject the hypothesis that the Tehran Stock market is less oil-dependent than Tadawul's market since the number of significantly related indexes is more in Tehran's observed sample.

5. Conclusions

Based on the obtained results, we can conclude that:

- Changes in oil price can affect the monthly returns on both indexes of the Tadawul and Tehran Stock exchanges; therefore, the market indexes such as oil products, metals, financials, transportation, and food industries are significantly related in both cases of symmetric and asymmetric price movements. The aforementioned results are consistent with those of Bashir et al. (2012), indicating the existence of the relation between oil price movement and emerging

capital markets. The results also approve the conclusions drawn by Killian and Park (2009), stating the oil sensitivity of an index depending on its oil consuming or oil producing nature. The asymmetric results are also consistent with those of Farzanegan (2009) regarding Killian's viewpoint indicating that the oil-related nature of an index affects the asymmetric movement of its monthly return. In addition, the results approve the work of Siddiqui et al. (2020), implying that oil exporting countries and their capital market are more affected by negative oil price movements rather than positive ones.

- Even though economic sanctions have negative effect on TSE's main index, the indirect or oil-through effect of sanctions cannot be proved: a statement consistent with the results of Mzoughi et al. (2020), indicating that an economic crisis such as COVID-19 pandemics can have direct impacts on capital markets rather than affecting it through a mediator parameter such as currency exchange or oil price movements.

Nomenclature

D	Positive oil price dummy variable
R_{it}	Return on industry index
R_{mt}	Return on market index
R_{oil}	Return on West Texas Intermediate oil price
$R_{x,t}$	Natural Logarithmic return of variable x
S	Sanctions dummy variable
t	Time indicator
TSE	Tehran Stock Exchange
WTI	West Texas Intermediate Oil
X	Assumed risk bearing parameter

References

Arouri, M.E.H., Lahiani, A., Nguyen, D.K. (2011), Return and volatility transmission between world oil prices and stock markets of the GCC countries. Economic Modelling, 28(4), 1815–1825.

Aydogan, B., Berk, İ. (2015), Crude oil price shocks and stock returns: Evidence from Turkish stock market under global liquidity conditions. International Journal of Energy Economics and Policy, 5(1), 54–68

Basher, S.A. and P. Sadorsky (2006). ''Oil price risk and emerging stock markets.'' Global Finance Journal 17(2): 224–251.

Basher, S.A., Haug, A.A., Sadorsky, P. (2012), Oil prices, exchange rates and emerging stock markets. Energy Economics, 34(1), 227–240.

Ciner, C. (2001), Energy shocks and financial markets: nonlinear linkages. Studies in Nonlinear Dynamics and Econometrics, 5(3), 203–212.

Cochrane, J. H. (2005). Asset pricing. Princeton: Princeton University Press.

Cong, R.G., Wei, Y.M., Jiao, J.L., Fan, Y. (2008), Relationships between oil price shocks and stock market: An empirical analysis from China. Energy Policy, 36(9), 3544–3553.

Farzanegan, M.R., Markwardt, G. (2009), The Effects of oil price shocks on the Iranian economy. Energy Economics, 31(1), 134–151.

Filis, G. and I. Chatziantoniou (2014). Financial and monetary policy responses to oil price shocks: evidence from oil-importing and oil-exporting countries. Review of Quantitative Finance and Accounting 42(4): 709–729.

Filis, G., Degiannakis, S., Floros, C. (2011). Dynamic correlation between stock market and oil prices: The case of oil-importing and oil-exporting countries. International Review of Financial Analysis 20(3): 152–164.

Ghosh, S., Kanjilal, K. (2016), Co-movement of international crude oil price and Indian stock market: Evidence from nonlinear cointegration tests. Energy Economics, 53, 111–117.

Hamilton, J.D. (1983), Oil and the macroeconomy since World War II. Journal of Political Economy, 91(2), 228–248.

https://en.wikipedia.org/wiki/Tadawul

https://en.wikipedia.org/wiki/Tehran_Stock_Exchange

Huang, R., Masulis, R., and Stoll, H. (1996). Energy, shocks, and financial market. Journal of Futures Markets, 16, 1–27.

Hung, N. (2020). Dynamic spillover effects between oil prices and stock markets: New evidence from pre and during COVID-19 outbreak, AIMS Energy, 8, 819–834.

Jimenez-Rodriguez, R., Sanchez, M. (2005). Oil price shocks and the real GDP growth: Empirical evidence for some OECD countries. Applied Economics, 37(2), 201–228.

Kilian, L. (2008a). The economic effects of energy price shocks. Journal of Economic Literature, 46, 871–1009.

Kilian, L. (2009). Not all oil price shocks are alike: Disentangling demand and supply shocks in the crude oil market. American Economic Review, 99, 1053–1069.

Mohanty, S.K., Nanha, M., Turkistani, A.Q., Alaitani, M.Y. (2011). Oil price movements and stock market returns: evidence from Gulf Cooperation Council (GCC) countries. Global Finance Journal, 22, 42–55

Mzoughi, H., Christian, U., Uddin, G.S., Guesmi, K. (2020). The Effects of COVID-19 Pandemic on Oil Prices, CO 2 Emissions and the Stock Market: Evidence from a VAR Model. Available at SSRN: https://ssrn.com/abstract=3587906

Nandha, M., Faff, R. (2008). Does oil move equity prices? A global view. Energy Economics, 30, 986–997.

Oberndorfer, U. (2009). Energy prices, volatility, and the stock market: Evidence from the Eurozone. Energy Policy 37(12): 5787–5795.

Park, J., Ratti, R.A. (2008), Oil Price Shocks and Stock Markets in The US and 13 European Countries. Energy Economics, 30(5), 2587–2608.

Sadorsky, P. (1999), Oil price shocks and stock market activity. Energy Economics, 21(5), 449–469.

Siddiqui, A., Mahmood, H., Margaritis, D. (2020), Oil Prices and Stock Markets during the 2014–16 Oil Price Slump: Asymmetries and Speed of Adjustment in GCC and Oil-Importing Countries. Emerging Markets Finance and Trade, 56(15), 3678–3708.