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Oil Sector Spillover Effects to the Kuwait Stock Market in the Context of Uncertainty

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ABSTRACT. Three major events associated with significant levels of market uncertainty – the Iraq invasion, the global financial crisis, and the Arab Spring revolution – are studied in this paper with the aim of identifying if there are connections between oil prices and the performance of the Kuwait stock market during these events. The study is supported by the traditional Engle and Granger cointegration test, the Granger causality test and Frequency Domain Causality Analysis. The frequency domain causality analysis brings a dynamic dimension to the study, and facilitates the examination of potential relationships between oil prices and the Kuwait stock market over the period under study (1995 to 2016). Interestingly, the research findings did not offer significant evidence on the existence of a long run association between Brent oil prices and Kuwait's major stock price index. Short-run dynamics were identified as follows: i) unidirectional causality was found between Brent and the Kuwait stock market, a result was not confirmed during the Arab Spring event; ii) the dynamic causality test revealed a unidirectional relationship from oil to the stock market only during the Iraq invasion. The findings indicate that market players should benefit from monitoring short-run dynamics in the context of the Kuwait Stock Exchange.

JEL codes: D53; D81; E44; N25; O16

Keywords: Kuwait; stock market; oil prices; market uncertainty; causality

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Introduction

Oil is considered as the most important energy resource worldwide due to its role in economic development and the lack of alternatives that share similar properties, uses and costs. The relationship between oil prices and stock markets performance has enjoyed a significant level of attention among the research community (Arezki et al., 2017; Al-Qudsi and Ali, 2016). To name a few studies, Driesprong et al. (2008) studied stock market data from 48 countries, a world market index, and oil spot prices for three main indices – Oil-Brent, Dubai and West Texas Intermediate – concluding that stock returns seem to underreact to oil price fluctuations. Narayan and Gupta (2015) implemented a least square estimator using over 150 years of monthly data and found evidence of nonlinear predictability, suggesting that negative oil prices have predictive power on US stock returns. Hamilton and Herrera (2002) found that oil price shocks in the 1970s had a negative impact on stock returns. Malik and Ewing's (2009) findings suggest that oil price shocks and stock returns are negatively correlated, indicating that higher oil prices raise production costs and eventually stock returns decline. According to Jones et al. (2004), oil prices could influence stock markets through numerous channels, as increasing oil prices can indirectly impact on interest rates that seek to control inflationary pressures, increase business costs and as such reduce potential gains that impact negatively on the performance of stock returns (Jiang et al., 2017; Grima and Caruana, 2017; Ansani and Daniele, 2012; Filis et al., 2011; Adrangi et al., 2014; Gil-Alana and Yaya, 2014). Schubert (2014) and Kisswani (2014) argue that oil prices directly and indirectly impact core macroeconomic indicators like inflation, aggregate demand, imports, exchange rates, exports, real economic development, and employment. Guesmi et al. (2018) argue that oil prices fluctuations are a risk factor on their own leading to potential effects of market contagion towards equity markets with origins in oil price fluctuations. Researchers have highlighted the significance of oil prices to the business and economic cycle, offering significant evidence on the importance of oil prices to the global economy. However, there is a general lack of research studying oil prices and stock markets interlinkages in the context of small oil exporting economies, a research gap that is addressed on this paper.

This study seeks to understand oil prices and the stock market dynamics during times of sustained levels of political and economic uncertainty in Kuwait. Kuwait is a small open economy highly dependent on oil exports that has been affected by regional and global uncertainty over the past few years. Due to data limitations, this paper examines Kuwait's stock market reaction to severe market uncertainty associated with two political events – the case during the Iraq invasion and the Arab Spring revolution. The study also incorporates the 2008/09 Global Economic and Financial Crisis (GEFC)

to bring further insights with regard to Kuwait's exposure to global economic and financial uncertainty.

Effects of Regional and Global Uncertainty on the Kuwait Stock Exchange

Kuwait is a leading producer of oil (see table 1 below), and as such it was included in the top eight countries in the crude oil production ranking in 2017 (OPEC, 2017). The country's government budget revenues, earnings, and aggregate demand are positively influenced by higher oil prices, and they are severely impacted when oil prices decline. Kuwait is considered one of the major oil suppliers in the world energy markets with crude oil reserves of around 102 billion barrels representing more than 6% of the world's reserves. The economy of Kuwait largely relies on petroleum exports that account for 60% of its GDP (IMF, 2017), as petroleum accounts approximately 95% of export revenues, and 95% of the government income (CIA World Factbook, 2016).

Table 1 Top ten crude oil producing countries (2016)

Ranking	Country	Value
1	Saudi Arabia	10,460.20
2	Russia	10,292.20
3	United States (U.S.)	8,874.60
4	Iraq	4,647.80
5	China	3,981.80
6	Iran	3,651.30
7	United Arab Emirates (UAE)	3,088.30
8	Kuwait	2,954.30
9	Brazil	2,510.00
10	Venezuela	2,372.50

Note: Value is measured in 1,000 barrels/day.
Source: OPEC Annual Statistical Bulletin (2017).

The increase in oil prices between 2003 and 2007 brought inflows of money to Kuwait's economy and its stock market signaling the positive influence of oil prices on Kuwait's stock market over the period. On the other hand, the dramatic drop of oil prices that took place in 2014 had ramifications that have been reflected by a noticeable drop in trading indicators, and primary price levels in the Kuwait stock market (Central Bank of Kuwait Annual Report, 2014). The impact of oil price changes on oil-exporting economies varies greatly when compared to those of oil-importing countries, as increases in oil prices are strongly correlated to increases in national income (Hammoudeh and Alesia, 2008). Previous studies have been mainly concerned about the analysis of oil-importing countries, with only a few studies analyzing the interactions between oil prices and equity prices and their dynamics in oil-exporting countries. As a result, there is a significant lack of attention

regarding the specific case of Kuwait; as most of the existing research focuses its attention on the Gulf Cooperation Council (GCC) countries as whole (Arouri et al., 2010; Mohanty et al., 2011; Azar and Basmajian, 2013; Mohanty et al., 2011; Cunado and Perez de Gracia, 2014; Demirer et al., 2015). Table 2 below shows the degree of dependence of Kuwait on oil revenues, with the value of oil revenue reaching its peak in 2012 of nearly $112,933 million and dropping to $41,461 million in 2016, quite a worryingly outcome that clearly signals the lack of diversification in this economy and its significant exposure to the oil sector. The level of decline experienced by oil revenue is explained by Gause (2015) who identified how the decline in world oil prices in 2014 was explained by geopolitical issues, mainly due to the ongoing struggle for regional influence between Saudi Arabia and Iran.

Table 2 Value of petroleum exports by top ten producers from OPEC ($m)

Country	2010	2011	2012	2013	2014	2015	2016
Algeria	40,113	52,883	49,993	44,462	40,639	21,742	18,638
Angola	49,379	65,634	69,954	66,652	57,609	31,929	25,936
Ecuador	9,685	12,925	13,750	14,103	11,401	6,660	5,442
Iran	72,228	114,751	101,468	61,923	53,625	27,308	41,123
Iraq	51,589	83,006	94,103	89,402	84,303	49,249	43,753
Kuwait	61,753	96,721	112,933	108,548	97,537	48,444	41,461
Libya	47,245	18,615	60,188	44,445	14,897	10,973	9,313
Nigeria	67,025	87,839	94,642	89,314	76,925	41,818	27,788
Qatar	43,369	62,680	65,065	62,519	56,912	28,513	22,958
Saudi	214,897	309,446	329,327	314,080	285,139	152,910	134,373
Total	794,238	1,104.24	1,204,977	1,104,024	964,643	508,518	441,486

Source: OPEC (2017).

The country's stock market has been quite sensitive to regional political unrest and to global market uncertainty. The removal of the political regime in Iraq back in 2003 had a myriad of effects on Kuwait's economic performance. One of the most prominent outcomes was the reduction of the market risk premium. This change affected corporate profitability greatly, as it reflected how markets movement improved by more than 100% during the first nine months of 2003 (Global Investment House Market Outlook January, 2004; Milyo, 2012). Another event that created significant disruption was the GEFC that originated in the US subprime market with negative spillover effects with global implications, and where Kuwait's stock exchange and its overall economy were negatively affected. At the time, the stock exchange index plummeted by 50%, with the largest fall experienced by the investment and real estate sectors. $1.4 billion was lost by the country's third largest bank due to its involvement in derivative transactions. Moreover, in December 2008, $3 billion of debts were defaulted by the largest investment company in Kuwait, and a large Islamic investment company was seeking to refinance up to $1 billion in debt (IMF, 2009). The 2008 crisis is widely regarded as one of the most detrimental shocks to ever hit the Kuwait stock exchange.

Before the first quarter of 2008, the KSE price index had increased by 13.7% and the value traded averaged was 200 mn KD. In April 2008, the price index increased by only 403.10 points (2.82%), while the average value traded decreased 160 mn KD, marking the beginning of the downfall of the exchange (Global Investment House Market report February 2009).

After the critical situation faced during the GEFC, another event spooked the country's stock market. The 2011 Arab Spring revolution led to significant falls in the Kuwait stock index resulting in the KSE's worst first half market performance since 1988. This was the result of selling pressures that arose from political unrest within the region. The analysis of the KSE revealed that during the first half of 2011 all sectoral indices were negative, with the global services index experiencing the worst effects with loses up to 23.72% of its value. Within this sector Kuwait National Airways was the biggest loser, with a loss of 76.25% of its share value. The "Arab Spring" offers some potential insights into the negative relationship that exists between political unrest within the region and stock market performance. It has been shown, for example, by market reactions in Kuwait, where the KSE has exhibited high sensitivity to political uncertainty (Global Investment House, 2011). Kuwait's economy is heavily exposed to the oil sector, to regional and global dynamics, and as such a study examining its stock market reaction to oil prices shocks due to political and economic uncertainty is more than justified.

Methodology and Model Selection

A variety of econometric techniques were considered to examine the short and long run association between oil prices and the Kuwait stock market as outlined in the sections that follow. Daily data for Brent prices were collected from the US Energy Information Administration (EIA) and stock prices were obtained from the Kuwait stock market over the period 1995 to 2016. Following common practice in the field, stock prices are transformed into returns by using natural logarithms – $SR_t = ln\ (SP_t)\text{-}ln\ (SP_{t-1})$; similarly, Brent oil prices are also converted into returns $BR_t = ln\ (BP_t)\text{-}ln\ (BP_{t-1})$; where SR = stock return; SP = stock price; BR = Brent oil returns; and BP = Brent oil price.[1]

Preliminary tests

A vector autoregressive (VAR) models was implemented to ensure the selection of the optimal number of lags that would be considered in econometric modeling. The lag selection process is relevant and requires attention, as the addition of lags to time series models has a direct impact on the estimation process. For example, a very short lag length can be a cause of autocorrelation that can lead to inefficient estimators. Moreover, a larger lag length enhances

the parameter size, which in turn reduces the degrees of freedom and it infers huge standard errors and confidence intervals for the coefficients of the model (Ivanov and Kilian, 2005).

As this study focus on three major shocks that have impacted the Kuwait's economy and its stock market since early 2000s, structural break analysis was needed. In this regard, the Chow test is used to confirm if the identified shocks should be considered a breakpoint with confirmation of a change of pattern on the series that allow for an adequate division of the sample that facilitated the study of market performance over the identified periods.

Table 3 Structural breaks of Kuwait economy

No.	Break (period)	Market shock	Effects
1	19 March 2003	Iraq invasion	Adversely affected the economy of Kuwait
2	15 September 2008	US financial crisis	Affected the world economies
3	25 January 2011	Arab Spring revolution	Affected the whole Arab region

The identified shocks, i.e. Iraq invasion, the US financial crisis, and the Arab Spring, as shown in Table 3, are recognized by researchers as shocks that generated a significant impact in the whole economy of Kuwait, and as such they need to be considered when looking at market uncertainty in this country (Baker, 1997; Khatib et al., 2000; Kandiyoti, 2012; Ak and Bingül, 2018). For instance, oil prices experienced a significant decrease and regional stock markets were disturbed leading to a number of subsequent crises that created substantial levels of uncertainty in the region. The Augmented Dickey Fuller (ADF) test was implemented based on the equation given below:

$$\Delta y_t = \beta_1 + \beta_2 t + \delta y_{t-1} + \alpha_i \sum_{t=1}^{m} \Delta y_{t-1} + \varepsilon_t \qquad (1)$$

In order to cross-check the outcomes of the ADF test, due to the significant number of breaks two additional tests were performed: i) the Phillips–Perron (PP) test that is similar to the ADF test, but it incorporates an automatic correction of the DF procedure to allow for auto-correlated residuals; ii) the Kwiatkowski–Phillips–Schmidt–Shin test that allows a null hypothesis, which claims that an observable time series is stationary around a deterministic trend. Three stationarity tests were considered for robustness purposes and due to significant levels of criticism associated with the performance of the ADF test.

Testing for long-run dynamics

Two cointegration techniques (Engle–Granger and Johansen–Juselius) were used to examine the existence of long-run dynamics between oil prices and the Kuwait stock prices. The literature in the field informed the selection of the cointegration techniques with studies examining the long run relationship between oil prices and stock markets with an interest in the GCC countries

(Granger et al., 2000; Arouri and Fouquau, 2009; Miller and Ratti, 2009; Imarhiagbe, 2010; Chau et al., 2014; Bouri et al., 2016). Other researchers have developed studies testing cointegration between stock prices and oil prices in a broader context, like, for example: Constantinos et al. (2010); Asteriou and Bashmakova (2013); Bahmani-Oskooee and Saha (2015) and Muhtaseb and Al-Assaf (2017). These studies offer up-to-date evidence on the value and significance of the selected econometric models, and as such they contribute to ensure that the selected research framework to support this study is appropriate. Engle and Granger (1987) recommend a two-step procedure for cointegration analysis that involves the estimation of the base-line equation as follows:

$$y_t = \beta_0 + \beta_1 x_t + \mu_t \quad (2)$$

The OLS residuals from the equation above are a measure of disequilibrium

$\hat{\mu}_t = y_t - \hat{\beta}_0 - \hat{\beta}_1 x_t$, where $\hat{\mu}_t$ is tested for stationarity.

The baseline of the Johansen and Juselius (JJ) (1990) test is as follows:

$$\Delta Z_i = \alpha + \tau_1 \Delta Z_{t-1} + \tau_2 \Delta Z_{t-2} + \cdots + \tau_{k-1} \Delta Z_{t-k-1} + \pi_k Z_{t-k} + \mu_t \quad (3)$$

where Z_t and μ_t are (n *x 1*) vectors. The Johansen (1988) methodology requires estimating the system of equations above and examining the rank of matrix P_k. Specifically, if rank (P_k) equals to zero, then there is not any stationary linear combination of the variables in Z_t, the variables are not cointegrated. Since the rank of a matrix is the number of non-zero Eigen-values (r), the number of $\rho > 0$ represents the number of cointegrating vectors among the variables. Two cointegration techniques were considered to allow cross-checking the research outcomes.

Testing for short-run dynamics

Granger causality deals with linear prediction and it only comes into play if some event happens before another (i.e., if we find Granger causality in one way only). The traditional Granger test was applied to understand if there is evidence of a causal link between the variables in a static dimension. To bring a dynamic dimension to the study, the frequency domain causality analysis was considered to help examining frequency-varying causal effects. Breitung and Candelon's (2006) study is based on earlier work by Geweke (1982) and Hosoya (1991) that considered the two-dimensional vector containing Y_t *and* X_t with a finite-order VAR representative of order p. A brief insight into the test is presented below.

$$\Theta(\mathbf{L})\begin{pmatrix}Y_t\\X_t\end{pmatrix}=\begin{pmatrix}\Theta_{11}(L) & \Theta_{12}(L)\\ \Theta_{21}(\mathbf{L}) & \Theta_{22}(L)\end{pmatrix}\begin{pmatrix}Y_t\\X_t\end{pmatrix}=\varepsilon_t \tag{4}$$

where, $\Theta(L)=I-\Theta_1 L-\cdots-\Theta_p L_p$ is a 2x2 lag polynomial and $\Theta_1,\ldots,\Theta_p$ are 2x2 autoregressive parameter matrices, with $L^k X_t=X_{t-k}$ and $L^k Y_t=Y_{t-k}$. The error vector ε_t is white noise with zero mean and $E(\varepsilon_t\varepsilon_t^{'})=\Sigma$, where Σ is positive and finite. The MA representative of the system is

$$\begin{pmatrix}Y_t\\X_t\end{pmatrix}=\psi(L)\eta_t=\begin{pmatrix}\psi_{11}(L) & \psi_{12}(L)\\ \psi_{21}(L) & \psi_{22}(L)\end{pmatrix}\begin{pmatrix}\eta_{1t}\\\eta_{2t}\end{pmatrix} \tag{5}$$

with $\psi(L)\eta_t=\Theta(L)^{-1}G^{-1}$ and G is the lower triangular matrix of the Cholesky decomposition $G'G=\Sigma^{-1}$ such that $E(\eta_t\eta_t^{'})=I$ and $\eta_t=G\varepsilon_t$. The causality test developed by Geweke (1982) can then be written as:

$$M_{X\Rightarrow Y}(\Upsilon)=log\left[1+\frac{|\psi_{12}(e^{-i\gamma})|^2}{|\psi_{11}(e^{-i\gamma})|^2}\right] \tag{6}$$

within this framework no Granger causality from X_t to Y_t at frequency γ corresponds to the condition $|\psi_{12}(e^{-i\gamma})|^2=0$. Breitung and Candelon's (2006) main contribution is to show that this condition leads to

$$\sum_{k=1}^{p}[\![\Theta_{k,12}\cos(k\gamma)\Big|-i\sum_{k=1}^{p}[\![\Theta_{k,12}\sin(k\gamma)\,\Big|=0,]\!]\!] \tag{7}$$

where, $\Theta_{k,12}$ is the (1,2)th element of Θ_k, such that a sufficient set of conditions for no causality is given by

$$\sum_{k=1}^{p}[\![\Theta_{k,12}\cos(k\gamma)\,\Big|=0]\!] \quad \text{and} \quad \sum_{k=1}^{p}\Theta_{k,12}\sin(k\gamma)=0 \tag{8}$$

Hence, we can test the null hypothesis of no Granger causality at frequency γ using a standard F-test for the linear restrictions imposed by the VAR representative of order p, which follows an F(2, T-2p) distribution for every γ between 0 and π, where T is the number of observations in the series (Breitung and Candelon, 2006).

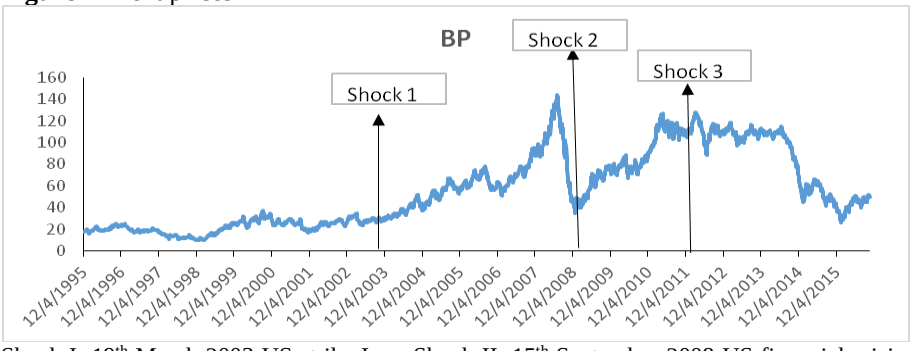
The selected methodological framework helped to identify the existence of long run and short run dynamics between oil prices (Brent Index) and the

Kuwait Stock Exchange (KSE) by using well-known and established econometric models and by bringing new insights through the application of dynamic causality.

Empirical Findings

After the Iraq invasion in 2003, a persistent increase in prices was experienced up to 2008 and then a sudden drop in prices took place. Figure 1 shows how Brent prices are quite stable until the year 2003, afterwards they started to exhibit an upward trend through the first half of 2008 and falling during the second half of 2008. The disruption in Iraqi and Kuwait's oil production associated with the Iraq invasion played an important role in causing this spike in the price of oil (Kilian and Murphy, 2014). Brent prices rose again after 2008 and reached $120 and remained stable over the 2010–2014 period, with prices remaining well below the levels reached during 2008 and 2009. This is a situation that could be justified by the hit of the US financial crisis. Uncertainty over the side of the oil supply associated with the Arab Spring revolution helped oil prices to return to previous levels and prices remained stable for over three years (Bchir and Pedrosa-Garcia, 2015).

Figure 1 Brent prices



Shock-I: 19th March 2003 US strike Iraq, Shock-II: 15th September 2008 US financial crisis, Shock-III: 25th January 2011 Arab Spring.

Figure 2 Kuwait stock prices

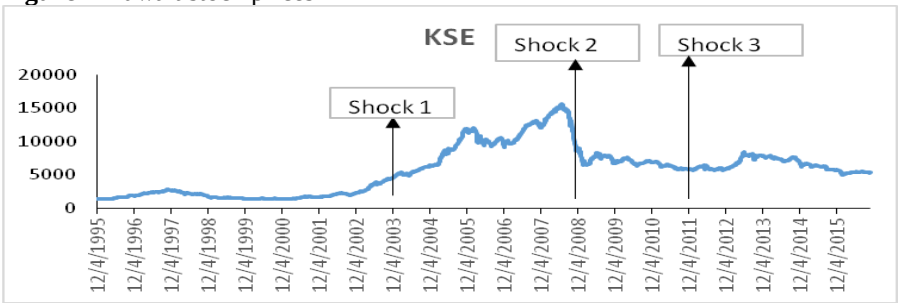


Figure 2 displays Kuwait stock prices for the entire sample. Before the invasion of Iraq in 2003, stock prices remained quite low during the years 1995 to 2002 and dramatically rose to their peak in 2008. However, after the US financial crisis in 2008, stock prices declined gradually until 2012 and a slight upward movement can be seen late in 2012 that lasted until late 2013 and that was followed by a gradual decline for the rest of the sample size. Oil prices went through different stages of increasing and decreasing prices, where the price of oil rose by up to 140% between 2003 and 2007 (Schubert, 2014). By comparing stock prices with oil prices, it can be observed that the trend is the same in both cases, the upward movement of both prices started in the year 2003 and later declined in 2008 and hence the trend was the same for the entire sample. As per Table 3, the mean value for Brent and stock returns remained positive for the entire sample and during the Iraq invasion 2003. In addition to this, the mean of Brent returns also showed a positive average during the US financial crisis however, stock returns are negative. Furthermore, both returns are found to be negative during the Arab Spring event. Brent and stock returns appear to be less volatile during the Arab Spring and exhibited relatively high volatility levels during the US financial crisis, highlighting the severity of the global downturn and its effect on the Kuwait stock market.

Table 3 Descriptive statistics

Shocks	Variables	Descriptive statistics					
		Mean	SD	SK	KT	JB	Obs
Full sample	BP	59.2603	35.1698	0.38531	1.79876	294.834	3474
	KSE	5870.77	3445.66	0.5622	2.92203	183.883	3474
	BPR	0.0003	0.02898	0.01605	8.18432	3890.62	3474
	KSER	0.0004	0.01062	-0.679	17.0627	28892.5	3474
Iraq invasion 2003	BP	62.5287	27.8587	0.81762	3.13606	96.3686	859
	KSE	9280.23	3567.38	-0.0657	1.8199	50.4621	859
	BPR	0.00129	0.02664	-0.0939	4.64717	98.372	859
	KSER	0.00173	0.01157	-0.4703	8.40668	1077.94	859
US financial crisis 2008	BP	70.4957	14.8011	-0.5043	2.59435	22.3084	453
	KSE	7507.77	1164.49	2.73036	11.3321	1873.2	453
	BPR	0.00013	0.0339	0.3727	11.2777	1303.81	453
	KSER	-0.0013	0.01271	-1.3619	9.33294	897.041	453
Arab Spring 2011	BP	88.4355	29.8372	-0.6418	1.72301	150.669	1103
	KSE	6429.59	831.234	0.50092	2.13633	80.41	1103
	BPR	-0.0006	0.02305	-0.0052	7.43786	905.136	1103
	KSER	-0.0002	0.00862	-0.4892	61.0279	154797	1103

BP: Brent Prices, KSE: Stock Prices, BPR: Brent Returns, KSER: Stock Returns.

Long run and short run markets association

The research findings, summarized in table 4, point to a lack of evidence on the existence of a long run relationship between Kuwait stock prices and Brent prices for the entire period. In either way, we can say that the variables do not have a long run link between each other. The results from

the Johansen test are consistent with those of the Engle-Granger test allowing us to conclude the nonexistence of long-run linkages between examined prices (Billgili, 1998). The general absence of a long-run equilibrium between oil and stock prices in Kuwait indicates that information contained in oil prices does not help to predict future movements in stock prices and that the inverse is also true (Arouri et al., 2012; Hammoudeh and Aleisa, 2008; Bashar, 2006).

Table 4 Key research outcomes[2]

Sampling	Lags	Unit root	Cointegration				Granger causality	
			EG		JJ			
			BP	KSE	BP	KSE	BPR → KSER	KSER → BPR
Full sample	3	I (1)	0.6165	0.7626	0.9537	0.7426	0.00001*	0.3446
Iraq invasion 2003	1	I(1)	0.1864	0.173	0.051***	0.073***	0.0056*	0.6037
US financial crisis 2008	2	I(1)	0.8607	0.000*	0.000*	0.298	0.0005*	0.7262
Arab Spring 2011	1	I(1)	0.8865	0.82	0.902	0.911	0.121	0.1197

Cointegration and Granger causality columns represent p values. *, **, ***: Level of significance at 1%, 5% and 10% respectively.

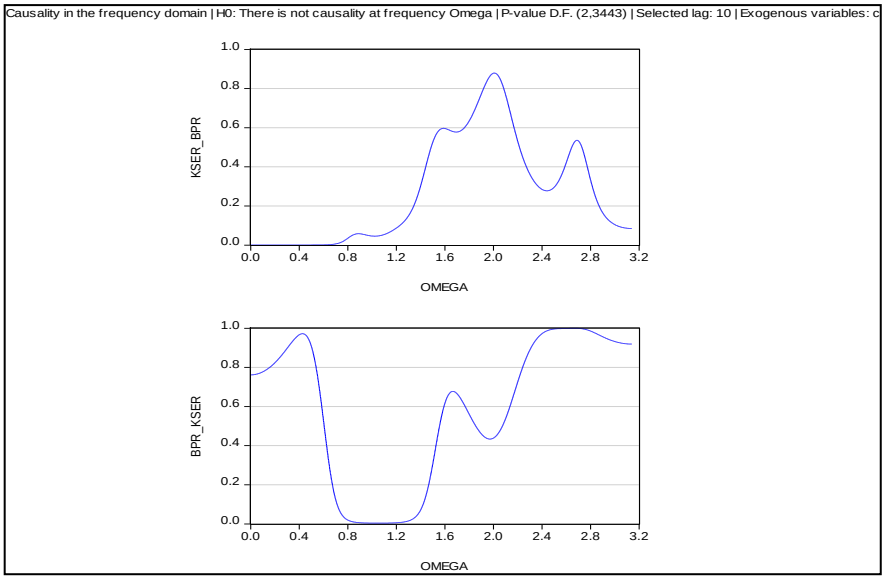
The results for the Granger causality test reveal that Kuwait stock returns do not Granger-cause Brent returns. The overall results indicate that in the case of Kuwait, Brent returns are causing stock returns. The analysis for the three different shocks under consideration can be summarized as follows: i) during the first shock (Iraq invasion), there was evidence of unidirectional causality between Brent and the Kuwait stock market; ii) similarly, shock II (GEFC) found evidence of unidirectional causality between Brent and the Kuwait stock market; iii) insignificant outcomes during the Arab Spring revolution. Oil prices changes appear to exert a critical and wide prominent impact on most economic activities where the stock market acts as a barometer of an economy and where oil price changes have a dominant influence on stock prices, and outcome that is confirmed in the case of Kuwait (Arouri, Jouini, and Nguyen, 2012).

Frequency domain causality test

The frequency domain causality test was applied to understand the dynamic relationship between oil and stock market. It is quite interesting to consider the outcomes for the static causality test that overall, found evidence of unidirectional causality from oil to the market returns and not vice versa, while the dynamic test has found bidirectional causality at different time periods. The conventional causality tests yield a single test statistic for the interaction between variables, while the frequency domain methodology generates test statistics at different frequencies across spectra allowing for a dynamic analysis of the linkages between the variables. This is contrary to the implicit assumption of the conventional causality analysis that a single test statistic

summarizes the relation between the studied variables, which is expected to be valid at all points in the frequency distribution. The frequency domain approach to causality permits to explore causality dynamics at different frequencies rather than relying on a single statistic (Ciner, 2011). Figure 5 represents the frequency domain causal relationship for Brent oil and KSE returns.

Figure 5 Frequency domain causality test



The outcomes show evidence of dynamic causality between KSE and Brent during the Iraq invasion (2003), while from oil to KSE there is a causal effect during the Iraq invasion (2003), which further highlights that this event remained quite sensitive to oil price fluctuations in the Kuwait stock market. However, there is no effect found during the US Financial Crisis (2008) and the Arab Spring revolution (2011). The first panel of Figure 5 shows that the dynamic causality estimated between stock to Brent returns and its outcomes indicates causality until angular frequency 0.8. However, for the remaining frequencies, there is no causal relationship between stock returns to Brent returns. The second panel of Figure 5 represents the dynamic causality from Brent returns to stock returns establishing the existence of a casual effect early in the sample. If we compare these results with the static causality outcomes where we found causality running from Brent to stock returns for the full sample, during Iraq invasion and in US financial crisis, the results of the dynamic causality test also support the existence of causality but only during the Iraq invasion period. Furthermore, the results of dynamic causality also established a causal link between stock returns to Brent returns during the Iraq invasion. Therefore, the overall analysis revealed that the

Kuwait stock market was quite sensitive to market uncertainty derived from the Iraq invasion. According to Zhang et al. (2017), equity and oil markets are significantly connected to oil prices reflecting market fundamentals, risk aversion and investors sentiment. Consequently, understanding changes in oil prices and implications for the Kuwait stock market can help investors to make more educated investment decisions and offer new information to policy-makers on how to regulate stock markets in an efficient manner, especially when considering short run dynamics that appear to characterize the associated between the oil sector and the stock exchange in the case of Kuwait. Private investors and core market players in the context of Kuwait should consider monitoring short run dynamics between oil and the stock exchange. Potential benefits could be reaped from the additional knowledge gained from analyzing the behavior of asset prices by detecting profitable trading opportunities and optimizing portfolio diversification strategies. In other words, by making the distinction between pure industry-specific returns, the market players may gain knowledge that could harbor benefits such as, robust risk management, performance attribution, and investment skills evaluation over the short run.

Conclusions

The purpose of this study was to identify how episodes of sustained market uncertainty can affect oil prices behavior and potential spillover effects to the Kuwait stock market. The main research outcomes revealed the non-existence of a long run relationship between Brent and stock prices for the full sample and during the specific shocks under consideration. Unidirectional Granger causal effects from Brent returns to stock returns were found for all cases except for the Arab Spring revolution, with bidirectional dynamic causal effects between oil and stock returns during early stages of the analyzed sample that connected to the Iraq invasion period. The study sheds light on key issues related to long-run relationships, causality patterns, and their implications for the stock market of Kuwait highlighting the importance of short run dynamics in the case of Kuwait that should be carefully considered by relevant market players.

Author Contributions
All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

Conflict of Interest Statement
The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

NOTES

1. Prices and returns are used depending on the requirements of the econometric model under consideration.

2. This table includes outcomes of estimated lags based on a VAR model. Implemented unit root tests are ADF, PP, and KPSS with the results for the three tests being similar. EG and JJ stand for Engle-Granger and Johansen cointegration tests. In JJ Column only, the trace p-value is reported, and results are similar with the Max-Eigen statistics.

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