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Original Research

Dynamic Connectedness between Global Commodity (Fuel and Non-fuel) Prices and Middle East Stock Market: Stock Exchange Perspective

Nastaran Shahvari[1]
Department of Business Administration, Shariaty Technical and Vocational College, Tehran, Iran

Abstract

In this article, we provide an in-depth study of the link between global commodity prices and the shocks market. Many Middle East countries are exports dependent and rely heavily on the global price of their primary commodities to make rational economic decisions. It is against this background that this study investigates the level of interdependence between global commodities prices and stock market returns in selected Middle East countries. For this empirical investigation, the two largest stock markets were selected based on market capitalization namely Tehran Stock Exchange (TSE) and Saudi Stock Exchange, TADAWUL (TASI). Specifically, we examined the relationship between global commodities prices and stock market returns and the direction of causality between the variables following Eagle Granger causality procedures. In addition, we determined the effect of global commodities` price movement on stock market returns using the ARDL estimation technique. The results of our analyses show that there is a significant long-run relationship between global commodities prices and stock market returns. Also, there exists a largely bidirectional causal relationship between global commodities prices and stock market returns in the two markets. Furthermore, the results of ARDL estimation reveal that global commodities prices have short-run and long-run effects on stock market returns in the two markets. These findings are robust to a battery of robustness checks. These results support the investor's decision-making process. In addition, the results of this survey are important for policymakers to strengthen the stock market to drive economic growth.

Keywords: Commodity, Stock Market, Causality, ARDL.

JEL Classification: G1, C2, C5

[1] *Corresponding author's Email: shahvarinastaran@gmail.com*

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Introduction

The entire world has become a global village, which is affecting the speed of information transfer from one market to another, including the Tehran stock market. Around the world, more and more attention is being paid to the relationship between global commodity prices and stock price performance. However, most of these studies focus on market equities in developed countries. (Choi and Hammoudeh, 2010). In recent times, studies that focused on emerging market stocks are also springing up (Chebbi and Derbali, 2015); (Ben Rejeb and Arfaoui, 2016). Generally, many of these studies mostly determine the movement or otherwise between the global commodity prices and stock performances without examining the issue of causality. Supposedly, if a relationship exists between commodity prices and stock performances, is it a short-term relationship or long-term relationship? More importantly, various types of commodities exist in the market namely hard commodities and soft commodities. The nature of the commodity price index included in the study may influence the outcomes of the empirical investigation. Volatile commodity prices have impacted the global economy. Especially due to the expansion of the global economy after the 2000s, investors are paying more and more attention to commodity prices. Policymakers and market participants have focused on the dynamics of commodity price volatility because of its impact on economic growth and financial development. On the other hand, the main research area in finance deals with the factors that affect stock prices and the sensitivity of stock prices to these factors. As a result, understanding the behavior of stock markets has become a primary goal of investors is emerging. The interaction of commodity markets with financial markets is an important area of study. There is increasing evidence that fair markets and commodities are linked and that commodity-equity correlations have increased since the early 2000s., (Vivian & Wohar, 2012).

Due to oil price uncertainty, regional political tensions, and improvements and innovations in the Middle East stock markets over the last decade, we should focus on these markets and look at their relationship to global factors. became. In particular, to ensure the uniqueness of this study and generally enrich the literature in this direction, the causal relationship between global commodity prices using different commodity indexes and the stock performance of the two selected Middle Eastern countries. Examine you. It also determines if the relationship is short-term or long-term. We will also consider the impact of global commodity price indexes on subregion stock market returns. This is very important as it provides potential investors and market analysts with more information related to the two variables. Apart from this introductory section, this study is divided into four sections. Section 2 focuses on global commodity prices and financial variables in the two selected countries, while Section 3 outlines existing literature. Methods and empirical analyses are presented in sections 4 and 5, and the final section focuses on the results and their discussion.

Global Commodity Prices and Stock market performances in The Middle East

Figure 1 shows a graph of the annual rate of change of the TSE Index from 2008 to 2020 in Iran and the Global Fuel and Non-Fuel Commodity Price Index. Primarily, there is evidence of periodic movements common to the three variables. It is also noteworthy that expansion stage of the TSE index precedes the expansion stage of the fuel commodity price index, but it is consistent with the non-fuel commodity price index from 2008 to 2020. However, the 2008 financial crisis seems to have put pressure on the three variables to shrink at the same time. After that, the three variables show a higher degree of cooperation. In summary, as an oil-producing economy, Iran's stock performance appears to be more linked to the fuel commodity price index than to the non-fuel commodity price index.

Figure.1. TSE Index and Global Commodity Prices

In Figure 2., the graphs show annual percentage change in the TASI index and global prices indices of fuel and nonfuel commodities between the years 2008-2020 in the Middle East. Just like the situation in Iran, there is discernible evidence of cyclical movement in the TASI stock index and global commodity prices for fuel and nonfuel. By expectation, the Middle East is a net importer of fuel, and should not ordinarily have its stock price index moving together with the price of fuel commodity index but this seems to be the case in the years 2008-2020. In the year 2008, the Fuel and Nonfuel commodity prices index experienced simultaneous contraction with the TASI stock price index and they faced expansion in the year 2009. This movement seems to be persistent till 2012 when there is a bit of divergence in their movements. However, there is still evidence of shock and response in the three variables in the figure. As expected, the non-fuel price index and the Tokyo Stock Price Index show better evidence of joint movement than the fuel price index.

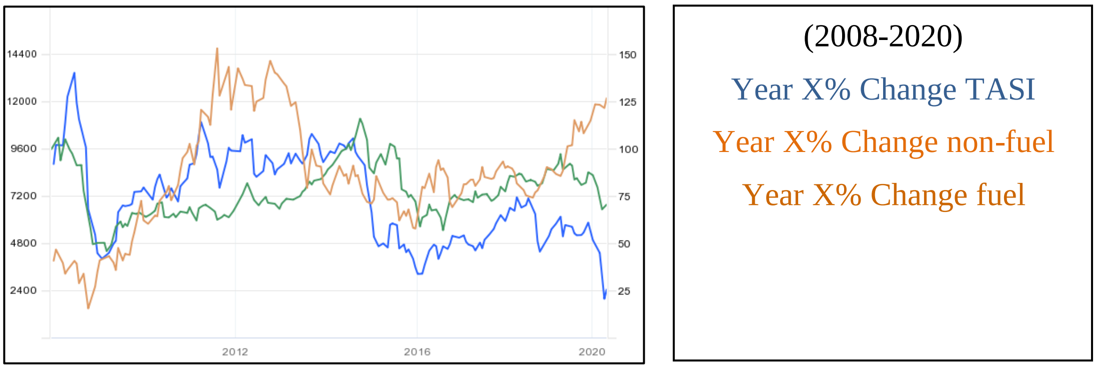

Figure 2. TASI Index and Global Commodity Prices

Table 1. shows selected key indicators of the TSE and TASI exchange markets. Looking at the first column, there are quite a few listed companies in the two markets. However, the number of listed companies is constantly increasing. The second and third columns show the total value and market capitalization of the traded stocks as a percentage of GDP. The reported figures show that there is a significant difference between TSE and TASI based on these two indicators. The total TSEC value of equities traded as a 227.3% percent of GDP in 2020 shows high liquidity in the economy compared to TASI's 69.3. TSEC market capitalization will account for 598.8% of GDP in 2020. This shows a high degree of fiscal deepening in Iran's economy, in contrast to Saudi Arabia, which accounted for 347% during the same period.

Table. 1. Indicators of TSE and TASI

Listed domestic companies, total				Stocks traded, total value (% of GDP)			Market capitalization of listed domestic companies (% of GDP)		
Year	2008	2014	2020	2008	2014	2020	2008	2014	2020
TSEC	356	315	367	3.5	5.4	227.3	11.8	27	598.8
TASI	127	169	207	100.7	75	69.3	74.3	63.9	347

In figure 3. The graphs show the annual percentage change in the TASI index and TSE index with global prices indices of fuel and non-fuel commodities between the years 2008 and 2020.

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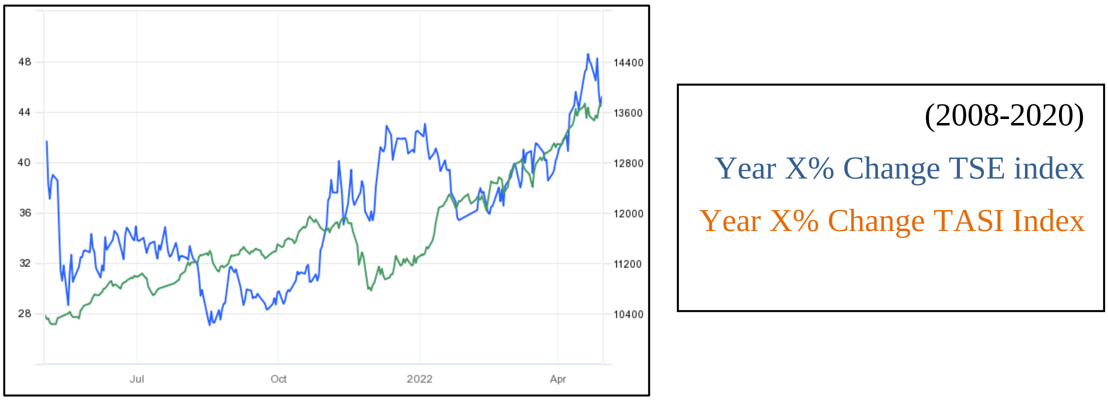

Figure 3. TASI Index and Global Commodity Prices

Literature Review

The issue of the relationship between global commodity prices and stock performance has received a great deal of attention in the literature. However, the lack of consensus between the important places these variables occupy in the economy and the literature required constant rethinking of the relationships between these variables. Some authors have used different methods to study this association and sell it in both developed and developing countries.

Developed Countries and Global Commodity

Starting with developed countries, (Henriques, Irene, Sadorsky, and Perry, 1999) used vector auto regression to investigate the impact of oil price shocks on equity returns in OECD countries. After rigorous analysis, the study concluded that fluctuations in oil prices account for the majority of the actual stock return forecast error variance. The study further argued that oil price shocks were more important to stock returns than interest rates in OECD countries. (Papapetrou, 2001) adopting a similar technique on monthly data for Greece concludes that oil prices drive stock price dynamics. This finding downplays the assertion of (Adelman, 1993), however, most of these studies only identified oil prices from available commodity prices without investigating how other commodity prices could affect stock returns. Another study by (Park, Jungwook, Ratti, Ronald, 2008), using multivariate VAR analysis, reported that oil price shocks have a significant effect on real stock returns for the US and 13 European countries from 1986 to 2005 using monthly data. A separate study by (Malik et al., 2009) used the bivariate GARCH model to study the transfer of volatility between weekly WTI oil prices and equity sector returns from 1992 to 2008 provided evidence of a spillover effect. Stay away from the oil price, study by (Choi and Hammoudeh, 2010) investigated the relationship between Brent crude, WTI oil, copper, gold, and silver commodity prices and the S & P 500 Index and concluded that global commodity prices are affecting the stock market portfolio.

Developing Countries and Global Commodity

In developing countries, the study (Johnson, 2009) applied Geweke feedback measurements to study the interactions between global commodity markets and stock markets in the Americas. They reported the existence of a simultaneous relationship between commodity prices and the stock market, after considering changes in exchange rates and interest rates. Therefore, there are no signs of a lead or lag relationship. Similarly, Chebbi and Derbali (2015) using Dynamic Conditional Correlation established a high correlation between commodity returns and QE Al Rayan Islamic index. On the contrary, the study by (Ildırar and Iscan, 2016) used panel data from 10 countries from 2012 to 2015. We investigated the interaction between stock prices and commodity prices in Eastern Europe and Central Asian countries. They argued that there was no relationship between commodity prices and the stock market. Another study (Iscan, 2015) also provided evidence of the non-association by examining the association between commodity prices and the Turkish stock market using the multivariate Johansen test. In SSA, the study by (Kusi et al., 2016) Using the bivariate VARGARCH BEKK model, we analyzed the impact of oil and gold prices on Ghana's stock market performance, and research provided evidence of a two-way link between Ghana's stock market and gold and oil prices. A similar study in South Africa (Sadorsky, 2014) used quarterly statistics cowl the length from 1994 to 2013. With the useful resource of the Engle-Granger steps econometric technique, the examination reaffirmed that the boom in commodity fees is related to advanced inventory marketplace performances in South Africa. A recent study by (Musawa, 2017) for Zambia arrived at a similar conclusion.

Fuel Commodities and Stock Market

(Chen, Rogoff, & Rossi, 2010), Studies on the relationship between commodity prices and stock returns have mainly focused on oil using the single frequency VAR method. Keep in mind that oil prices in the UK, US, and Granger have spurred both resumption and production, except for the UK. (Huang, Masulis and Stoll, 1996) Using the VAR method, no relationship was found between the daily returns of oil futures and the daily returns of US equities between October 9, 1979, and March 16, 1990. The VAR method was also used by (Sadorsky, 1999), This confirms that both monthly oil prices and fluctuations in oil prices play an important role in US economic performance. The authors state that changes in oil prices are predicting market inventories. Rising global profits and oil prices have significantly reduced future equity returns. They also did not predict future market returns in three of the 18 developed markets (Hong Kong, Japan, and Singapore) where oil price changes were surveyed, while oil prices were among the 30 emerging markets surveyed. Forecast future market returns in 11 (Brazil, Finland, India, Ireland, Israel, Jordan, New Zealand, Portugal, South Korea, Taiwan, Thailand). In addition, (Cong et al., 2008) No evidence of a relationship between Chinese oil prices and real stock returns using the standard VAR framework was found. As mentioned at the beginning, several papers report evidence of a time-varying relationship between oil and the stock market. (Ciner, 2001) Using a non-linear Granger causal approach, we will study the dynamic relationship between future daily oil prices and the US stock market. The author uses two data samples from October 9, 1979, to March 16, 1990. (Huang, Masulis and Stoll, 1996), In this study, the S & P 500 indexes returned in both samples showed a significant non-linear Granger causality of crude oil futures returns. (Park and Ratti, 2008) We use linear and non-linear multivariable VAR specifications to estimate the impact of oil price shocks and oil price fluctuations on the actual stock returns of 14 developed country samples. They found that oil price shocks had a statistically significant impact on actual stock returns, either simultaneously or with a one-month delay. (Apergis and Miller, 2009), Find out if oil price changes from 1981 to 2007 affect inventory returns for samples from eight developed countries in the United States. In Australia, only oil supply shocks temporarily increase inventory revenue, while in France, only global oil demand shocks temporarily increase inventory revenue in Canada and Japan. These have no causal relationship. (Kang, Ratti and Yoon, 2015) use the time-varying VAR model to investigate the impact of oil price shocks on US stock market returns based on monthly data for the period ending January 1, 2015. They state that while oil price shocks contain information for predicting actual equity returns, the coefficients and nature of the shocks change over time. Several articles have investigated the relationship between commodity prices and stock market returns in developing countries. (Yang, 2012; Yang et al., 2012) During the period, limited evidence of the impact of monthly oil prices on stock market returns was found for groups of nine oil importers and seven oil exporters. Empirical testing has shown that the oil crisis is more likely to affect stock market returns in oil-exporting countries than in oil-importing countries. However, in most of the countries included in the sample, there is no significant (non-linear) causal link between oil price changes and stock market returns. Use daily data to calculate variability between commodity prices. H. Gold and oil, and the BRICS stock market from September 29, 1997, to March 4, 2016.Non-fuel Commodities and Stock MarketUsing a vector automatic regression (VAR) model, (Sadorsky, 2014) pointed out the importance of oil prices for industrial production, (Basher and Sadorsky, 2016). (Barsky and Kilian, 2004) In her dissertation, she experimented with the volatility of Asian stock markets, crude oil futures prices, and the interaction between gold. They found that the stock market volatility shock was related to the oil and gold futures markets. (Arestis and Demetriades, 1997). A closer look at the relationship between stock markets, commodities and exchange rates found that the value of a country's stocks is likely to match the expectations of the commodity price index of some commodities exporters. (Cong et al., 2008) investing in commodity markets has been shown to increase commodity volatility between 2006 and 2010 by increasing changes in current commodity prices in the stock markets of South American countries. (Chen, Rogoff and Rossi, 2010) Return on equity was found to be affected by financial assets, commodities, and real estate assets using a common Markov transformation model. Their results, based on the wavelet method, show that BRICS stock returns are subject to long-term WTI crude oil prices. In addition, the authors found a strong copper movement at the start of GFC.

Methodology

Objectives of Study

The main purpose of this study is to analyze the impact of the global market on selected Middle Eastern indexes. In addition, evaluating interrelationships and integration of TSE and TASI validates the dynamic links between these markets.

Data

To carry out the empirical studies required for this study, we obtained monthly data on fuel and non-fuel global commodity prices from the IMF Global Commodity Index. Also, in the case of the Tehran Stock Exchange (TSE) and the Saudi Stock Exchange (TASI), data on the stocks that specifically sell all stock indexes were obtained from the Stock Exchange Commission. Income data per, used as control variables for the two markets, was taken from the WDI database. All data were taken on a monthly basis, except for per capita income, which was converted to a monthly series using a quadratic polynomial.

Table 2. Stock Exchange Markets

Type	Markets	Nations
Bahrain	Bahrain Bourse	BHBX
Cyprus	Cyprus Stock Exchange	CSE
Egypt	Egyptian Exchange	EGX30
Iran	Tehran Stock Exchange	TSE
Iraq	Iraq Stock Exchange	ISX
Israel	Tel Aviv Stock Exchange	TASE
Jordan	Jordan Stock Market	ASE
Kuwait	Boursa Kuwait	BK Main 50
Lebanon	Beirut Stock Exchange	BLOM
Oman	Muscat Securities Market	MSM 30
Palestine	Palestine Exchange	PEX
Qatar	Qatar Stock Exchange	QE General
Saudi Arabia	Saudi Exchange	TADAWUL
Syria	Damascus Securities Exchange	DSE
Turkey	Borsa Istanbul	BIST
United Arab Emirates	Abu Dhabi Securities Exchange	ADX
Yemen	Yemen does not have a stock exchange	
Fuel Global Commodity		FGC
Non-fuel Global Commodity		NFGC

Table 3. The dataset contains a daily timeline of the Middle East stock market covering the period from January 1, 2008, to December 30, 2020. Iran has the highest standard deviation (3305.19), followed by Saudi Arabia (1063.962)., Israel, Turkey, Cyprus, Qatar, Lebanon, United Arab Emirates, Syria, Jordan, Palestine, Egypt, Kuwait, Iraq, Bahrain, Oman (0.019430). This shows that the Iranian and Saudi Arabian markets are

showing strong fluctuations from average yields. All 16 countries have a positive distribution of excess altos and a strong tail. H. They are Lepontic compared to normal. This means that the distribution of stock returns on these exchanges tends to be extreme. According to the Jacque Berra test, normality is rejected for all returned series tested. The Cypress, Qatar, and United Arab Emirates stock exchanges show the most extreme daily return values compared to other markets. This suggests that the volatility of these markets is much higher. Syria has the lowest median yield of 0.265474, followed by Iraq, Saudi Arabia, Turkey, Bahrain, Kuwait, Israel, Lebanon, Iran, Egypt, Jordan, Oman, Palestine, UAE, Qatar, and Cyprus. The ADF shows the results of a unit root test that examines the stationarity of all-time series, both at the level and at the first difference.

Table 3. Data Description

Country	Stock Exchange	Mean	S.D	Skew.	Kurt.	JB	ADF
Bahrain	BHBX	0.602693	0.075791	-0.470617	2.744717	0.515174	0.0992
Cyprus	CSE	1.33276	19.00584	2.020323	5.849137	10.18517	0.0000
Egypt	EGX30	0.679723	0.255206	0.752652	3.163126	0.859706	0.0994
Iran	TSE	5.97554	3305.19	0.306594	1.956141	0.793890	0.5635
Iraq	ISX	1.166269	0.092614	0.109372	2.029868	0.288460	0.3310
Israel	TASE	5.7569	199.4862	-0.350842	2.110958	0.694826	0.1498
Jordan	ASE	3.599566	0.656597	0.725395	2.419577	1.322577	0.1546
Kuwait	BK Main 50	0.57374	0.246836	0.63684	2.217849	0.67384	-4.420245
Lebanon	BLOM	1.84258	2.307510	0.482519	2.271359	0.792032	0.6795
Oman	MSM 30	0.154633	0.019430	0.932396	2.369583	1.614530	0.1687
Palestine	PEX	0.826794	0.425110	0.832287	2.011160	2.030498	0.6051
Qatar	QE General	3.169405	5.48365	1.767275	4.668692	8.275357	-3.175352
Saudi Arabia	TADAWUL	7.8074	1063.962	0.185772	2.359547	0.296956	0.0983
Syria	DSE	1.23675	0.861473	0.987537	1.23648	0.265474	-4.322528
Turkey	BIST	4.3956	95.13165	-0.155788	1.885774	0.501967	0.9344
United Arab Emirates	ADX	2.670874	2.095114	0.987316	2.722750	2.153688	0.2991
Fuel Global Commodity	FGC	4.8114	149.9855	0.377374	1.582690	1.396641	0.5695
Non-fuel Global Commodity	NFGC	1.7725	17.19260	0.239005	2.374957	0.335385	0.0219

Note: JB stands for the Jarque-Bera normality test; the ADF is the unit root test with a constant and trend. a denotes the statistical significance at the 1% level.

Tanble 4. examines dynamic connectivity to show the spillover of volatility between the Middle East stock market and the global commodity market (fuel and non-fuel). Conversely the second-highest pairwise association is between MSM (Oman) and CSE (Cyprus) (94%). This indicates that pairwise connectivity measurements in the Middle East stock market are relatively high and that the spillover effect of volatility between

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them is high. The next largest pairwise associations are MSM (Oman) and EGX30 (Egypt) (94%), suggesting a spillover effect of volatility from the Middle East stock market. pairs. This shows that these stock markets in the Middle East are well connected. However, the results of pairwise relevance are very low in other Middle Eastern markets. Pairwise connectivity with other markets, including BHBX, NFC, and ISX, is also low. Our results show that the Middle East stock market can offer investors and portfolio managers the benefits of diversification.

Table.4. Descriptive Statistics

	ADX	ASE	BHBX	BIST	BLOM	CSE	EGX30	FC	ISX	MSM	NFC	PEX	TASE	TDW	QE	TSE	BK50	DSE
ADX	1	0.83	-0.29	0.86	0.33	0.37	0.48	0.14	0.46	0.23	-0.68	-0.78	0.95	-0.17	0.59	0.63	0.31	0.24
ASE	0.83	1	-0.17	0.59	0.35	0.04	0.18	-0.16	0.35	-0.04	-0.39	-0.68	0.73	-0.19	0.43	0.50	0.24	0.49
BHBX	-0.29	-0.17	1	-0.11	0.11	0.43	0.34	0.50	-0.84	0.57	0.27	-0.19	-0.39	0.76	0.35	0.31	-0.32	0.12
BIST	0.86	0.59	-0.11	1	0.43	0.66	0.78	0.46	0.18	0.60	-0.72	-0.82	0.90	0.13	0.77	0.78	0.37	0.11
BLOM	0.33	0.35	0.11	0.43	1	0.49	0.47	0.41	-0.33	0.32	0.24	-0.73	0.47	0.24	0.67	0.69	0.41	0.11
CSE	0.37	0.04	0.43	0.66	0.49	1	0.97	0.96	-0.48	0.94	-0.36	-0.71	0.43	0.69	0.89	0.85	0.01	-0.10
EGX30	0.48	0.18	0.34	0.78	0.47	0.97	1	0.90	-0.39	0.94	-0.51	-0.75	0.54	0.67	0.92	0.90	0.46	0.29
FC	0.14	-0.16	0.50	0.46	0.41	0.96	0.90	1	-0.63	0.92	-0.24	-0.54	0.21	0.81	0.80	0.75	-0.28	0.46
ISX	0.46	0.35	-0.84	0.18	-0.33	-0.48	-0.39	-0.63	1	-0.56	-0.41	0.12	0.44	-0.89	-0.40	-0.36	-0.18	-0.67
MSM	0.23	-0.04	0.57	0.60	0.32	0.94	0.94	0.92	-0.56	1	-0.38	-0.58	0.27	0.77	0.80	0.76	0.32	0.18
NFC	-0.68	-0.39	0.27	-0.72	0.24	-0.36	-0.51	-0.24	-0.41	-0.38	1	0.33	-0.63	-0.03	-0.38	-0.38	-0.19	0.38
PEX	-0.78	-0.68	-0.19	-0.82	-0.73	-0.71	-0.75	-0.54	0.12	-0.58	0.33	1	-0.79	-0.29	-0.90	-0.90	-0.13	0.21
TASE	0.95	0.73	-0.39	0.90	0.47	0.43	0.54	0.21	0.44	0.27	-0.63	-0.79	1	-0.18	0.62	0.65	0.12	0.23
TDW	-0.17	-0.19	0.76	0.13	0.24	0.69	0.67	0.81	-0.89	0.77	-0.03	-0.29	-0.18	1	0.63	0.59	0.48	0.01
QE	0.59	0.43	0.35	0.77	0.67	0.89	0.92	0.80	-0.40	0.80	-0.38	-0.90	0.62	0.63	1	0.99	0.76	0.60
TSE	0.63	0.50	0.31	0.78	0.69	0.85	0.90	0.75	-0.36	0.76	-0.38	-0.92	0.65	0.59	0.99	1	0.28	0.18
BK50	0.31	0.24	-0.32	0.37	0.41	0.01	0.46	-0.28	-0.18	0.32	-0.19	-0.13	0.12	0.48	0.76	0.28	1	0.60
DSE	0.24	0.49	0.12	0.11	0.11	-0.10	0.29	0.46	-0.67	0.18	0.38	0.01	0.23	0.21	0.23	0.01	0.60	1

Model Specification

To empirically estimate the relationship between Global Commodity Price and stock performances in TSE and TASI, we estimated the following models within the framework of ARDL using monthly data between 2008 and 2020.

$$\Delta \ln NINDEX_t = \lambda_0 + \sum_{j=1}^{n1} a_{j_i} NINDEX_{i,t-j} + \sum_{j=1}^{n2} b_{j_i} \Delta FUEL_{t-j} + \sum_{j=1}^{n3} c_{j_i} \Delta NFUEL_{t-j} + \sum_{j=1}^{n4} d_{j_i} \Delta PNGDP_{t-j} \quad (1)$$
$$\phi_1 NINDEX_{i,t-j} + \theta_1 FUEL_{t=1} + \theta_2 NFUEL_{t=1} + \theta_3 PGDP_{t=1} + \varepsilon_t$$

$$\Delta \ln JINDEX_t = \lambda_0 + \sum_{j=1}^{n1} g_{j_i} JINDEX_{i,t-j} + \sum_{j=1}^{n2} h_{j_i} \Delta FUEL_{t-j} + \sum_{j=1}^{n3} i_{j_i} \Delta NFUEL_{t-j} + \sum_{j=1}^{n4} j_{j_i} \Delta PGDP_{t-j} \quad (2)$$
$$\phi_1 JINDEX_{i,t-j} + \varphi_1 FUEL_{t=1} + \varphi_2 NFUE_{t=1} + \varphi_3 PGDP_{t=1} + \varepsilon_t$$

Each equation contains both short-term (first derivative) and long-term (single-period delay level) variables. For short-term coefficients, each delay length n is selected by minimizing the Akanke Information Criterion (AIC), and each model is estimated with the optimal delay. In Equation 1, TASI represents a return on equity and is a substitute for the performance of the Saudi Arabian Exchange (TADAWUL) stock market. It acts as the dependent variable of the model. FUEL and NFUEL also represent the model's independent variables, the global commodity price index for fuels and non-fuels. Similarly, PIGDP represents per capita income. It is introduced into the model as a control variable and also serves as one of the model's independent variables. Equation 2 repeats all variables in Equation 1 except TSE and PEGDP. Equation 1 focuses on the Tehran Exchange Market (TSE) variable and the Global Commodity Price Index, while Equation 2 focuses on the TSE variable and the Global Commodity Price Index. This means that the only difference is the introduction of TSE and PEGDP as dependent and control variables, respectively. TSE will introduce equity returns to replace the stock market performance of the Tehran Stock Market.

Empirical Result

Econometric Properties of Data

To base this research on solid econometrics, we conducted a study of the econometric properties of the data to determine its suitability for ARDL analysis. For this purpose, unit root and co-integration tests have been performed and the results are shown in Tables 5 and 6. The results of the Phillips-Peron (PP) unit root test are shown in Table 5 for both the level and the first difference. From the results, we can accept the hypothesis that there is a root of unity for all variables. However, all variables are resting at the first difference, indicating that the first-order I (1) is integrated. Based on the criticism offered by (Schwert, 1989) on traditional unit root tests Phillips-Peron (PP) inclusive, we performed a robustness check on these results obtained from Phillips-Peron (PP) unit root tests using one of the modified unit root tests. Specifically, Dickey-Fully GLS (ERS) proposed by (Bonel-Elliot, 1996) The results used are shown in Table 6. The results show that we can accept the hypothesis that there is a root of unity for all variables. All other variables are resting on the first difference, as obtained by the Phillips-Peron (PP) unit root test. This confirms the results obtained in the previous test.

Table 5. Phillips-Peron (PP) unit root test

Level				First Difference		
Variables	constant	Constant and Trend	None	Constant	Constant and Trend	none
TSE-Index	-0.079	-3.56	2.362	-1.2	-57.82	-2.3
TASI-Index	-0.001	-5.2	-0.406	-1.21	-48.39	-3.4
Fuel	-0.05	-3.9	0.05	-1.17	-21	-3.5
Non-Fuel	-0.052	-4	-5.2	-0.88	-25.90	-3.4
PEGDP	-1.012	-0.83	1.32	-7.38	-2.284	-1.45
PIGDP	-1.820	-0.72	1.01	-.6.28	-2.240	-1.12

Table 6. Dickey-Fully GLS (ERS)

	Level		First Difference	
Variables	Constant	Constant and Trend	Constant	Constant and Trend
TSE-Index	1.12	-1.25	-1.72	-3.26
TASI-Index	0.64	-1.02	-1.35	-2.87
Fuel	-0.75	-0.54	-2.28	-2.95
Non-fuel	-0.34	-0.25	-2.10	-2.34
PEGDP	0.276	-1.28	-2.09	-3.87
PIGDP	0.14	-1.02	-1.98	-3.21

Bound tests Co-integration

Since the data on the plane are non-stationary, it is essential to perform a co-integration test to determine their long-term equilibrium behavior. For this purpose, we used the join co-integration test. The boundary test can be thought of as a test based on the combined F statistic using the null hypothesis that there is no co-integration. According to (Pesaran, 2001) two sets of critical values for a given significance level can be established in the bounds test. The first level is estimated assuming that all variables are integrated into the 0th-order ARDL model, and the second level is estimated assuming that the variables are integrated into the 1st-order ARDL model. The rule of digging is that the null hypothesis without co-integration is rejected if the value of the test statistic is greater than the upper critical limit and accepted if the F statistic is less than the lower limit. To get the most out of the ARDL model estimates, we investigated the optimal delay length for all estimated models. The optimal delay length was selected based on Akaike's Information Criterion (AIC). Based on these criteria, the optimal delay of 2 was selected for all models. Subsequently, co-integration tests were carried out using the bound test approach with the stock markets variables as dependent variables. The results are reported in table 7. Following the rule of the tomb, the hypotheses of no co-integration can be rejected in the two cases. This provides shreds of evidence to support the fact that there is long-run equilibrium between stock returns and global commodity prices in the two markets.

Table 7. Bound tests

Product	F-Statistics	lower critical value5%	Upper critical value 5%	Co-integrated
TSE-Index	1.76	-4.20	-2.72	Yes
TASI-Index	5.63	-4.12	-2.71	Yes

Granger Short Run and Long Run Causality Tests

In general, establishing a co-integration indicates that there is at least one long-term equilibrium relationship between the variables. Therefore, it is convenient to say that there is Granger causality between these variables in at least one way, but the direction of the causality is not indicated (Granger and Engle, 1987). Similarly, when two unsteady variables are co-integrated, it is argued that specifying a vector auto-regressive (VAR) with the first difference is equivalent to a specification error. It is consistent with the work of (Narayan and Smyth, 2006), We specify the following dynamic error correction representation for TSE and TASI.

$$\Delta \ln NINDEX_t = \theta_{1i} + \sum_p \theta_{11ip} \Delta \ln NINDEX_{it-p} + \sum_p \theta_{12ip} \Delta \ln FUEL_{it-p} + \sum_p \theta_{13ip} \Delta \ln NFUEL_{it-p} + \sum_p \theta_{14ip} \Delta \ln NGDP_{it-p} + \sum_p \theta_{15ip} \psi ECT_{t-1} \quad (3)$$

$$\Delta \ln FUEL_t = \theta_{1i} + \sum_p \theta_{11ip} \Delta \ln FUEL_{it-p} + \sum_p \theta_{12ip} \Delta \ln NINDEX_{it-p} + \sum_p \theta_{13ip} \Delta \ln NFUEL_{it-p} + \sum_p \theta_{14ip} \Delta \ln NGDP_{it-p} + \sum_p \theta_{15ip} \psi ECT_{t-1} \quad (4)$$

$$\Delta \ln NFUEL_t = \theta_{1i} + \sum_p \theta_{11ip} \Delta \ln NFUEL_{it-p} + \sum_p \theta_{12ip} \Delta \ln NINDEX_{it-p} + \sum_p \theta_{13ip} \Delta \ln FUEL_{it-p} + \sum_p \theta_{14ip} \Delta \ln NGDP_{it-p} + \sum_p \theta_{15ip} \psi ECT_{t-1} \quad (5)$$

$$\Delta \ln NGDP_t = \theta_{1i} + \sum_p \theta_{11ip} \Delta \ln NGDP_{it-p} + \sum_p \theta_{12ip} \Delta \ln NINDEX_{it-p} + \sum_p \theta_{13ip} \Delta \ln FUEL_{it-p} + \sum_p \theta_{14ip} \Delta \ln FUEL_{it-p} + \sum_p \theta_{15ip} \psi ECT_{t-1} \quad (6)$$

$$\Delta \ln JINDEX_t = \theta_{1i} + \sum_p \theta_{11ip} \Delta \ln JINDEX_{it-p} + \sum_p \theta_{12ip} \Delta \ln FUEL_{it-p} + \sum_p \theta_{13ip} \Delta \ln NFUEL_{it-p} + \sum_p \theta_{14ip} \Delta \ln SGDP_{it-p} + \sum_p \theta_{15ip} \psi ECT_{t-1} \quad (7)$$

$$\Delta \ln FUEL_t = \theta_{1i} + \sum_p \theta_{11ip} \Delta \ln FUEL_{it-p} + \sum_p \theta_{12ip} \Delta \ln JINDEX_{it-p} + \sum_p \theta_{13ip} \Delta \ln NFUEL_{it-p} + \sum_p \theta_{14ip} \Delta \ln SGDP_{it-p} + \sum_p \theta_{15ip} \psi ECT_{t-1} \quad (8)$$

$$\Delta \ln NFUEL_t = \theta_{1i} + \sum_p \theta_{11ip} \Delta \ln NFUEL_{it-p} + \sum_p \theta_{12ip} \Delta \ln JINDEX_{it-p} + \sum_p \theta_{13ip} \Delta \ln FUEL_{it-p} + \sum_p \theta_{14ip} \Delta \ln JGDP_{it-p} + \sum_p \theta_{15ip} \psi ECT_{t-1} \quad (9)$$

$$\Delta \ln SGDP_t = \theta_{1i} + \sum_p \theta_{11ip} \Delta \ln SGDP_{it-p} + \sum_p \theta_{12ip} \Delta \ln JINDEX_{it-p} + \sum_p \theta_{13ip} \Delta \ln FUEL_{it-p} + \sum_p \theta_{14ip} \Delta \ln FUEL_{it-p} + \sum_p \theta_{15ip} \psi ECT_{t-1} \quad (10)$$

All variables are as previously defined in the ARDL specification, where it represents the difference between the variables and p represents the delay length selected based on the Akaike's Information Criterion (AIC). In addition, the first derivative indicates the direction of short-term Granger causality, and the t-statistic of the error-correction term with a one-period delay indicates long-term Granger causality. The results of the TSE and TASI markets are shown in Tables 7 and 8. The results shown in Table 7 show that there is a long-term causal link between global fuel, non-fuel commodity prices, and per capita income to a significant level of stock market returns of 0.10 on the TSE. is showing. However, in the short term, only global non-fuel commodity prices have a strong causal link to TSE stock market returns. There is also evidence of weak causality, from per capita income to stock market returns. As expected, global fuel and non-fuel commodity prices show evidence of a two-way causal relationship at a significance level of 0.56 in the short term. Similarly, non-fuel stock market returns and global commodity prices show evidence of a two-way causal relationship at a significance level of 0.028. In addition, the results in Table 8 provide evidence of a causal link between TASI stock market returns and global commodity prices. The results show that there is a long-term causal link between global fuel and non-fuel commodity prices to TASI stock market returns at a significance level of 0.10. In the short term, there is a strong causal link between global fuel and non-fuel commodity prices to TASI stock market returns (0.95). It seems that the short-term relationship is stronger than the long-term one. Similarly, there is evidence of a causal relationship of feedback from stock market returns to global commodity prices. This means that in TASI there is a bidirectional causal link between stock market returns of 0.001 and 0.63 and global commodity prices (fuel and non-fuel).

Table 7. Granger causality for TSE

Source of causation	ΔlnTSE	ΔlnFuel	ΔlnNFuel	ΔlnEGDP	$ECT_{(t-1)}$
ΔlnTSE		0.053	0.028	2.12	-0.03
ΔlnFuel			0.56		-0.06
ΔlnNFuel	0.69	0.04			-0.03
ΔlnEGDP					

Table 8. Granger causality for TASI

Source of causation	ΔlnTASI	ΔlnFuel	ΔlnNFuel	ΔlnIGDP	$ECT_{(t-1)}$
ΔlnTASI		0.001	0.63		-0.03
ΔlnFuel	0.58		0.95		-0.06
ΔlnFuel	0.05	0.56			-0.03
ΔlnIGDP					

Effect of Global Commodity Prices on Stock Market Returns

The need to investigate the effect of the global commodity prices index (fuel and nonfuel) on stock market returns is principally to determine the degree of responsiveness of stock market returns to movement in the global commodity prices index. Also, it presents an opportunity to determine the relative importance of the global commodity prices index of fuel and global commodity prices of nonfuel on stock market returns. To this effect, Table 9 shows the results of the estimated ARDL model stated in equations one and two for TSE and TASI markets respectively. The results in Table 9 show that in the Saudi market, global commodity prices have a statistically significant effect on stock market returns at 5.4 and 0.12 significant levels in the short-run and long-run respectively. This implies that global commodity prices have a weak effect on stock market returns in the short run but the effect is much stronger in the long run. In the short term, unit fluctuations in the global fuel commodity price index will contribute 0.26 to stock market return performance, and similar fluctuations in the global non-fuel commodity price index will contribute 0.42 to TSE. Long-term contributions will increase to 0.46 and 0.61 in the Global Fuel and Non-Fuel Commodity Price Index, respectively. Contrary to expectations in this market, the global non-fuel commodity price index has a significant impact on NSE stock market returns, both short-term and long-term. The results in Table 9 show that in the TASI market: Global commodity prices have a statistically significant impact on short-term and long-term stock market returns at significance levels of 0.34 and 0.23, respectively. This means that global commodity prices have a weak impact on stock market returns in the short term, but much more in the long term. In the short term, a single move in the global fuel commodity price index will contribute 0.12% to stock market return performance, while a similar move in the global non-fuel commodity price index will contribute 0.35% to TASI. To do. Long-term contributions will increase to 0.09 and 0.23 in the Global Fuel and Non-Fuel Commodity Price Index, respectively. As expected in this market, the global non-fuel commodity price index will have a significant impact on TSE stock market returns, both short-term and long-term.

Table 9. Short–run and Long-run Co-efficient of ARDL Model

	dlnFuel	dlnNfuel	dlnEGDP	dlnIGDP	CointEq (-1)	InFuel	InNfuel	InEGDP	InIGDP
TSE-INDEX	0.26	0.42	0.54		-0.12	0.46	0.61	0.59	
TASI-INDEX	0.12	0.35		0.34	-0.23	0.09	0.23		0.46

Conclusion

Consequently, upon the thorough econometric investigation of the nexus between global commodity prices and stock market performances in the Middle East, the following conclusions can be inevitably arrived at. There is a long-run relationship between the global commodity prices index (fuel and nonfuel) and stock market returns in the Middle East. Also, the global commodity prices index (fuel and nonfuel) has both short-run and long-run effects on stock market returns in TSE and TASI. Thus, it is safe to conclude that the global commodity prices index affects stock market performance in the Middle East. The most important conclusion from this study is that there is a bidirectional causal relationship between global commodity prices and stock market returns in TSE and TASI. This conclusion confirms that the Middle East stock market is integrated into the global market and is part of the global interdependence and commodity market monetization process. Therefore, individual investors in the region need to take this established connection into account when making investment decisions, especially when it comes to portfolio diversification. Governments in the region can also use this relationship to design mechanisms to drive growth and mitigate the global impact.

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