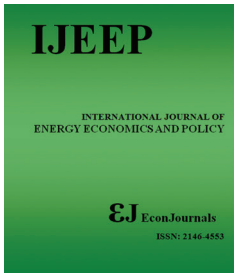

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2023, 13(5), 8-14.

The Relationship between Gold and Oil Prices and the Stock Market Returns of Kazakh Energy Companies: Comparison of the pre-COVID-19 and post-COVID-19 Periods

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Received: 25 April 2023 **Accepted:** 04 August 2023 **DOI:** https://doi.org/10.32479/ijeep.14554

ABSTRACT

This study analyzes the relationship between gold and oil prices and the stock market returns of Kazakh energy companies during and after the COVID-19 pandemic. We considered the period between 01.01.2020 and 31.12.2021 as the pandemic period and the period between 01.01.2022 and 31.03.2023 as the post-pandemic period. Then we performed a Granger causality analysis to identify the effect of gold and oil market returns on assets traded in the stock exchange. The data was retrieved from the website https://www.marketwatch.com/. Our findings are important in terms of proving the existence of an interaction between the Kazakhstan stock market and international markets. We have found that the gold prices had a causal effect on KZAP both in the pandemic period and in the post-pandemic period, while the oil prices had a causal effect on KZAP only during the pandemic period. We also found no causal effect of the international market prices on the KEGC and KZTO returns. However, this does not prove that there is no relationship between the international market returns and the returns of energy companies traded on the Kazakhstan stock exchange. The relationship between the international market returns and the returns of Kazakhstan stock market energy companies, if there is any, and whether it can be generalized to the long term can be analyzed by cointegration analysis and Vector Error correction model (VECM) methods.

Keywords: Kazakhstan, Energy Companies, KASE, COVID-19, Gold Market, Oil Market, Granger Causality Analysis
JEL Classifications: C13, C20, C22

1. INTRODUCTION

Kazakhstan gained its independence in 1991 after the collapse of the USSR and took important steps towards integrating its national market with world markets by switching to the free market economy. Despite difficulties in this transition period, the Kazakh economy has started to recover and boom as of 2000. Besides successful structural decisions and practices, Kazakhstan's natural resources had a great impact on its successful recovery from this transition. Kazakhstan has approximately 3% of the world's total oil reserves and is the second largest oil exporter after Russia among the ex-USSR countries (Xiong et al., 2015; Myrzabekkyzy et al., 2022; Bolganbayev et al., 2022; Taibek et al., 2023; Sabenova et al., 2023). Therefore, oil price changes directly affect Kazakhstan's macroeconomic indicators. In this respect, Kazakhstan Stock Exchange transactions are also important. The Kazakhstan Interbank Currency Exchange was established on November 17, 1993, and was renamed as Kazakhstan Stock Exchange (KASE) in 1996. KASE has been the only trading platform for stock, currency, and money markets in Kazakhstan since its establishment (Gnahe, 2020; https://kase.kz/en/history/).

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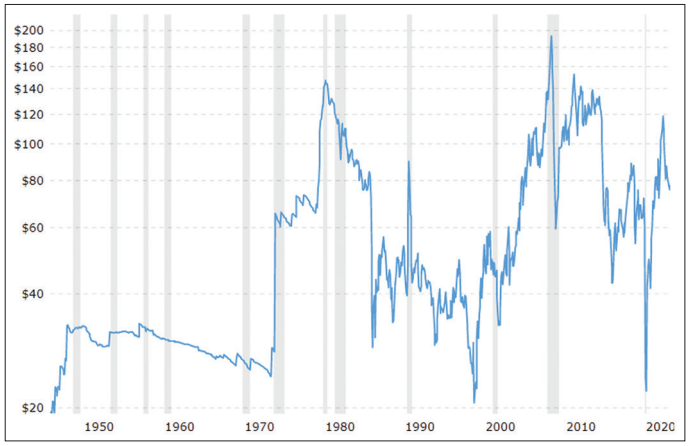
The rapid change in transportation and communication technologies has also triggered changes in the macroeconomic structure of world trade. Financial markets and the financial asset spectrum traded in these markets are constantly evolving and the importance of international trade is constantly increasing. These developments also affected local macroeconomic indicators. Today, the globalization of information and financial structures has accelerated the integration of local economies and financial markets and globalized world markets (Konuşkan and Kocabıyık, 2019). Gold and oil prices are the main macroeconomic indicators that shape the world economy. Therefore, they also affect the economy of Kazakhstan, a country that has taken important steps towards integrating with world markets.

Although the world has turned to alternative energy sources, oil continues to be the most important energy source for modern economies. Therefore, oil prices continue to affect the world economy, whereas an increase in oil prices leads to recessive periods and a decrease leads to expansionist periods (Basher and Sadorsky, 2006). On the other hand, oil-exporting and oil-importing countries are also affected differently. Therefore, the change in oil prices needs to be examined more closely. Although oil prices sometimes show sharp increases and decrease, the general trend is a regular increase since the 19th century, when oil started to be used as an energy source. This is also true for the fluctuations in oil prices for the period 1950-2020 given in Graph 1. These fluctuations are mostly the results of political problems such as the 1973-1974 Arab-Israeli war, the 1979 Iranian revolution and the Iran-Iraq war (Nandha and Faff, 2008), and the 1990 Gulf crisis (Lee and Ni, 2002). Oil prices, which have been in a constant upward trend since the end of 1999, can experience sudden increases and decreases due to the increase or decrease in oil supply in parallel with the changes in the world economy and politics (İşcan, 2010).

Gold is a rare metal that has preserved its value over thousands of years. Therefore, gold, whose price is one of the most important macroeconomic indicators, has continued to be the most reliable investment for centuries. The main reason behind this is that it is used both as a reserve and a medium of exchange and is an important precious metal. For this reason, it has been an alternative investment tool to stock markets, especially in times of crisis (Ocaklı, 2020).

The declaration of the COVID-19 contagion, which started in December 2019 as a pandemic by the World Health Organization, caused panic and an economic crisis that shook the whole world. The main reason for this is that human behavior is one of the most important factors that direct financial markets. People all over the world have undergone behavioral changes due to the COVID-19 pandemic. This, along with the increasing uncertainty, caused fluctuations in the financial markets. Therefore, the COVID-19 outbreak has caused serious financial problems beyond being a health problem. The extent of this effect is revealed every day by academic studies on financial markets during the COVID-19 pandemic period and post-pandemic. It is a well-known fact that gold and oil prices, which have high liquidity values, have a worldwide financial impact.

Graph 1: Line chart of research variables



Source: http://www.macrotrends.net/1369/crude-oil-price-history-chart (Access Date: 01.04.2023)

During the COVID-19 pandemic, gold and oil prices experienced significant fluctuations, and these fluctuations had significant effects on financial markets. Based on this fact, this study examines the relationship between the changes in international gold and oil prices during and after COVID-19, and the stock market returns of Kazakh energy companies traded on the Kazakhstan Stock Exchange.

We considered the period between January 01, 2020 and December 31, 2021 as the pandemic period and the period between January 01, 2022 and March 31, 2023 as the post-pandemic period. Then we performed a Granger causality analysis to identify the effect of gold and oil market returns on assets traded in the stock exchange. The data was retrieved from the website https://www.marketwatch.com/.

2. LITERATURE REVIEW

We can find many academic studies on both the changes in gold and oil prices and the effects of these changes on stock market returns. There are also plenty of academic studies on the effects of other epidemic diseases such as AIDS and SARS-EBOLA, which affected the world before COVID-19, on world stock markets (Bloom and Mahal, 1997; Beutels et al., 2009). The effect of the changes in gold and oil prices on the stock markets during the COVID-19 pandemic has been among the topics that researchers have been interested in recently. Here we will mention only some of these works.

Levin and Wright (2006) examined the relationship between stock prices and gold prices in the USA between 1976 and 2005 and found a positive relationship between these two.

Gay (2008) examined the relationship between oil and stock prices in Brazil, Russia, India, and China using Box-Jenkins time series analysis and found a significant relationship between oil prices and stock prices.

Hussin et al. (2013) examined the effect of oil and gold prices on Islamic stock markets and used the monthly data of the Malaysian Sharia Exchange for the period 2007-2011. They found no long-term relationship between the oil and gold prices and the stock market prices.

Basit (2013) studied the relationship between stock returns in Pakistan Karachi Stock Exchange (KSE) and oil and gold prices using monthly data for the 2005-2011 period and his regression analysis results showed that oil and gold prices did not affect stock returns.

Bhunia (2013) examined the relationship between the stock index of the Indian Stock Exchange and the oil and gold prices using monthly data for the period 1991-2012 and found a long-term and positive relationship between these variables. Causality analysis showed a bidirectional causality relationship between oil prices and the stock index, one-way causality between the stock index and gold prices from stock index to gold prices, while it did not show any causality relationship between oil and gold prices.

Monjazeb and Shakerian (2014) examined the relationship between bank stock returns and oil and gold prices and found a positive relationship between oil prices and stock returns and a negative relationship between gold prices and stock returns.

Gökmenoğlu and Fazlollahi (2015) analyzed the S&P 500 index, oil price, and gold price and their fluctuations using daily data for the 2013-2014 period. They found a long-run relationship between the variables and the effect of gold prices on stock prices is significant. While the fluctuations in oil and gold prices did not have an effect on the S&P500 index in the short term, they found an effect in the long term.

Khan et al. (2016) examined the relationship between oil prices, gold prices, and the KSE 100 stock index using the monthly data from the 2000-2013 period for the Pakistan Karachi Stock Exchange, and their regression analysis showed a significant relationship between the variables. They found a negative relationship between gold prices and the KSE 100.

Delgado et al. (2018) analyzed stock prices, oil prices, and exchange rates for Mexico using monthly data between 1992-2017 and performed a cointegration test. They found a negative and significant relationship between the Mexican stock market and the exchange rate.

3. ECONOMETRIC METHOD AND ANALYSIS

This study examines the effects of fluctuations in international gold and oil markets on energy companies traded on KASE using Granger causality analysis. Research variables are given in Table 1. All variables are in the form of daily returns and data are taken from https://www.marketwatch.com/website.

Our research examines the effect of the COVID-19 pandemic on economic assets, by formulating separate models for the pandemic period and the post-pandemic period. We considered the period between January 01, 2020 and December 31, 2021 as the pandemic period and the period between January 01, 2022 and March 31, 2023 as the post-pandemic period. Then we performed a Granger causality analysis to identify the effect of gold and oil market returns on assets traded in the stock exchange.

Table 1: Research variables

Variable code	Explanation
GOLD	International gold price
OIL	International oil price
KEGC	KEGC return in KASE
KZAP	KZAP return in KASE
KZTO	KZTO return in KASE

H_1: During the pandemic, oil returns are the Granger cause of KEGC returns.

H_2: In the post-pandemic period, oil returns are the Granger cause of KEGC returns.

H_3: During the pandemic, the gold returns are the Granger cause of the KEGC return.

H_4: In the post-pandemic period, gold returns the Granger cause of KEGC returns.

H_5: During the pandemic, oil returns are the Granger cause of KZTO returns.

H_6: In the post-pandemic period, oil returns are the Granger cause of KZTO returns.

H_7: During the pandemic, the gold returns are the Granger cause of the KZTO return.

H_8: In the post-pandemic period, gold returns the Granger cause of KZTO returns.

H_9: During the pandemic, oil returns are the Granger cause of KZAP returns.

H_{10}: In the post-pandemic period, oil returns are the Granger cause of KZAP returns.

H_{11}: During the pandemic, the gold returns are the Granger cause of the KZAP return.

H_{12}: In the post-pandemic period, gold returns the Granger cause of KZAP returns.

As required by our analysis methodology, we first examined the stationarity of the data with the Augmented Dickey-Fuller (ADF) test. In the second step, we determined the appropriate lag lengths with the vector autoregressive (VAR) model. The VAR model decides the lag length based on sequentially modified LR, final prediction error (FPE), akaike ınformation criterion (AIC), schwarz ınformation criterion (SC), and Hannan-Quinn ınformation criterion (HQ). In this study, we determined the lag length of each model using the statistical value that gives the longest lag value.

Causality analysis for econometric time series data is an important research problem in terms of both practical and theoretical studies. Whether any of the variables subject to the research has a causal link to another variable is examined by Granger causality analysis. Following the models used in this study, the matrix representation of the VAR model for bivariate and p-lag Granger causality analysis is as follows:

$$\begin{bmatrix} r_t^y \\ r_t^z \end{bmatrix} = \begin{bmatrix} \alpha_{10} \\ \alpha_{20} \end{bmatrix} + \begin{bmatrix} \alpha_{11}^1 & \alpha_{12}^1 \\ \alpha_{21}^1 & \alpha_{22}^1 \end{bmatrix} \begin{bmatrix} r_{t-1}^y \\ r_{t-1}^z \end{bmatrix} + \ldots + \begin{bmatrix} \alpha_{11}^p & \alpha_{12}^p \\ \alpha_{21}^p & \alpha_{22}^p \end{bmatrix} \begin{bmatrix} r_{t-p}^y \\ r_{t-p}^z \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \quad (1)$$

Table 2: Explanatory statistics of research variables for the pandemic period

	GOLD	KEGC	KZAP	KZTO	OIL
Mean	−0.019855	−0.213706	−0.013692	−0.393890	−0.019855
Median	0.000000	0.000000	−0.003096	−0.267273	0.000000
Maximum	1.830770	7.583220	7.654727	13.06289	1.830770
Minimum	−1.325922	−7.783766	−5.462445	−25.099600	−1.325922
SD	0.433119	2.082708	1.213352	3.852400	0.433119
Observations	497	497	497	497	497

Table 3: Explanatory statistics of research variables for the post-pandemic period

	GOLD	KEGC	KZAP	KZTO	OIL
Mean	−0.00249	0.009351	0.197059	0.173552	0.016201
Median	−0.03404	0.000000	0.065898	0.127694	−0.24392
Maximum	2.831206	1.436364	8.428390	7.746531	12.12611
Minimum	−2.84353	−1.22418	−6.20714	−4.63867	−8.35438
SD	0.899599	0.371448	1.955072	1.620776	2.804648
Observations	312	312	312	312	312

Table 4: ADF unit root test findings of the series during the pandemic period

Variable code	t-Statistics	P value
GOLD	−20.67721	0.0000
KEGC	−20.06977	0.0000
KZAP	−23.18995	0.0000
KZTO	−12.70617	0.0000
OIL	−18.86002	0.0000
Test critical values		
1% level	−3.443307	
5% level	−2.867147	
10% level	−2.569818	

Table 5: ADF unit root test findings of the series in the post-pandemic period

Variable code	t-Statistics	P value
GOLD	−17.07997	0.0000
KEGC	−24.46816	0.0000
KZAP	−16.30837	0.0000
KZTO	−16.37490	0.0000
OIL	−17.08619	0.0000
Test critical values		
1% level	−3.451214	
5% level	−2.870621	
10% level	−2.571679	

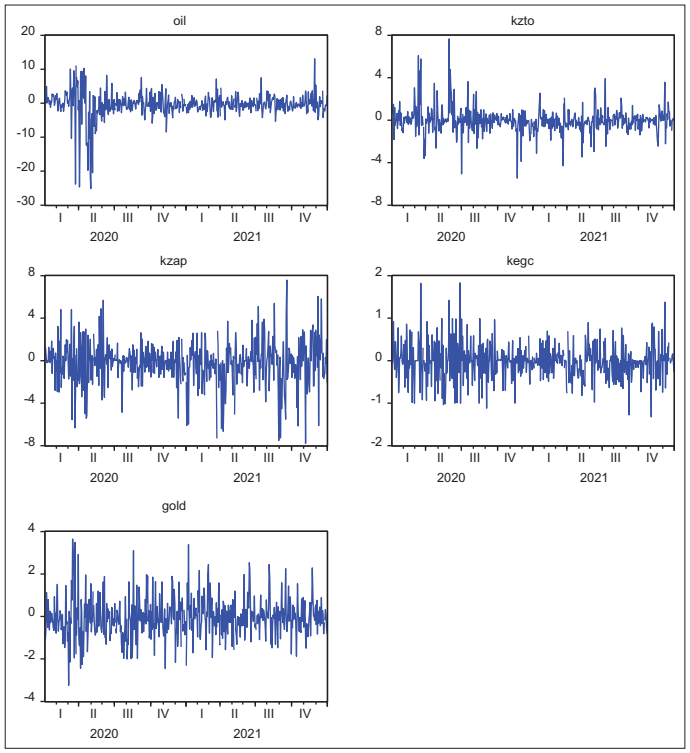
When the right-side coefficients are all equal to zero, the lagged values of the variables are said to have no Granger cause on the left side (Sevüktekin and Nargeleçekenler, 2007; Çil, 2018).

4. FINDINGS

Explanatory statistics of research variables for the pandemic and post-pandemic period are given in Tables 2 and 3, and line graphs expressing the changes over time are given in Graph 2 and 3.

The averages of pandemic statistics for all research variables are negative. However, when we look at the median values, we see a negative median for KZAP and KZTO, and a zero value for GOLD, KEGC, and OIL. These results indicate a negative trend in the markets during the pandemic period.

Graph 2: Time graph of research data for the pandemic period



When we examined the line graphs of the variables for the pandemic period, we see a high fluctuation in the oil variable at the beginning of the pandemic and a more stable structure with a lot less fluctuation in the following period.

When we examine the post-pandemic statistics of the research variables, we see that only the mean of the GOLD variable is negative. However, when we examine the median values, we see that the value of GOLD and OIL is negative and the KECG is zero. Compared to the pandemic period, these findings point to a positive trend in the post-pandemic markets.

When we examine the line graphs of the post-pandemic values of the variables over time, we see a high fluctuation in all variables. Compared to the pandemic period, we see that the fluctuation in

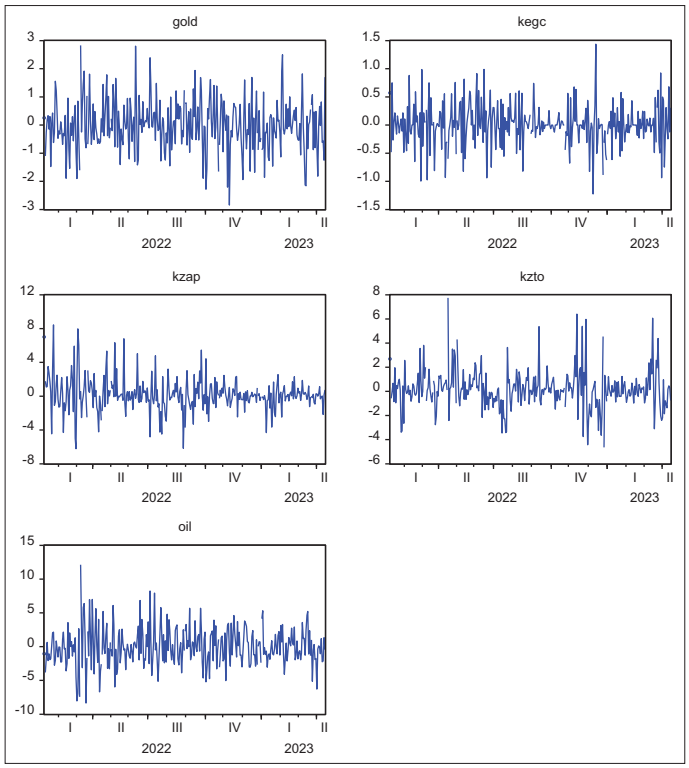
Table 6: Lag length values for pandemic period models

Model	LogL	LR: sequential modified LR test statistic (each test at 5% level)	FPE: Final prediction error	AIC: Akaike information criterion	SC: Schwarz information criterion	HQ: Hannan-Quinn information criterion
GOLD KEGC (2)	−929.659	2	2	2	1	1
GOLD KZAP (4)	−1706.983	3	4	4	0	0
GOLD KZTO (5)	−1437.055	5	2	2	0	0
OIL KEGC (7)	−1580.914	7	3	3	1	3
OIL KZAP (7)	−2371.156	7	3	3	0	3
OIL KZTO (8)	−2094.855	8	8	8	0	2

Table 7: Lag length values for post-pandemic models

Model	LogL	LR: sequential modified LR test statistic (each test at 5% level)	FPE: Final prediction error	AIC: Akaike information criterion	SC: Schwarz information criterion	HQ: Hannan-Quinn information criterion
GOLD KEGC (1)	−514.118	1	1	1	1	1
GOLD KZAP (2)	−1021.12	0	2	2	1	1
GOLD KZTO (7)	−954.542	7	0	1	1	1
OIL KEGC (5)	−848.23	5	1	1	1	1
OIL KZAP (2)	−1370.88	2	1	0	2	2
OIL KZTO (2)	−1320.43	0	2	2	1	0

Graph 3: Time graph of research data for the post-pandemic period



the oil variable continued throughout the entire period. The other four variables present continuous fluctuations both during and after the pandemic.

In the first stage, we examined the stationarity of each series by applying unit root tests for both the pandemic period and the post-pandemic period.

ADF unit root test values of the series for the pandemic period are given in Table 4. The findings show that all variables are stationary at the level ($P < 0.05$).

ADF unit test values of the series for the post-pandemic period are given in Table 5. Findings show that all variables are stationary at the level ($P < 0.05$). ADF findings in two periods show the stationarity of the series.

In the second stage, we calculated the lag length values using the VAR model for a total of 12 models, 6 for the pandemic period and 6 for the post-pandemic period. The lag length value to be used in the Granger causality test for each model is shown in parentheses.

The lag length values of the models for the pandemic period are given in Table 6. For each model, the largest lag length value obtained from the six criteria was accepted as the lag length of the model. The shortest lag length determined for the pandemic period was 2 (GOLD KEGC model), and the longest was 8 (OIL KZTO model).

The lag length values of the models for the post-pandemic period are given in Table 7. For each model, the largest lag length value obtained from the six criteria was accepted as the lag length of the model. The shortest lag length determined for the post-pandemic period was 1 (GOLD KEGC model), and the longest was 7 (GOLD KZTO model).

At the last stage, the Granger causality test was performed for the selected lag length and the test findings for the pandemic period are given in Table 8, and the test findings for the post-pandemic period are given in Table 9.

The findings of the pandemic period show that international gold and oil returns are the Granger reason for KZAP returns ($p<.05$). Accordingly, the change in gold and oil returns in international markets during the pandemic period had a causal effect on KZAP returns.

In the post-pandemic period, we see that only the oil return is the Granger cause over the KZAP return. Unlike the pandemic period,

Table 8: Granger causality test findings for the pandemic period

Hypothesis	Observations	F-Statistic	Prob.
GOLD does not Granger Cause KEGC	495	0.86061	0.4235
GOLD does not Granger Cause KZTO	492	1.59236	0.1606
GOLD does not Granger Cause KZAP	493	2.96517	0.0194
OIL does not Granger Cause KEGC	490	0.67310	0.5688
OIL does not Granger Cause KZTO	489	0.98465	0.4471
OIL does not Granger Cause KZAP	490	3.65989	0.0125

Table 9: Granger causality test findings for the post-pandemic period

Hypothesis	Observations	F-Statistic	Prob.
GOLD does not Granger Cause KEGC	311	0.05174	0.8202
GOLD does not Granger Cause KZTO	305	1.84705	0.0782
GOLD does not Granger Cause KZAP	310	3.73043	0.0251
OIL does not Granger Cause KEGC	307	1.80616	0.1115
OIL does not Granger Cause KZTO	310	0.30570	0.7368
OIL does not Granger Cause KZAP	310	0.71713	0.4890

it is seen that the gold return has no causal effect on the KZAP. Under these results, hypotheses H9, H11, and H12 are accepted.

5. CONCLUSION AND RECOMMENDATIONS

This study examines the effect of the pandemic period and the post-pandemic period on the returns of companies traded in KASE, by focusing on the international market data and energy oil companies traded in the KASE. It also examines the possible impact of international markets on the KASE with Granger causality analysis. Our findings are important in that they indicate an interaction between the Kazakhstan stock market and international markets. Our research has concluded that the gold return in the international market has a causal effect on CIRP both in the pandemic period and in the post-pandemic period, while the oil yield has a causal effect on CIRP only during the pandemic period.

We also found no causal effect of the international market prices on the KEGC and KZTO returns. However, this does not prove that there is no relationship between the international market returns and the returns of energy companies traded on the Kazakhstan stock exchange. The relationship between the international market returns and the returns of Kazakhstan stock market energy companies, if there is any, and whether it can be generalized to the long term can be analyzed by cointegration analysis and Vector Error correction model (VECM) methods.

REFERENCES

Available from: https://www.marketwatch.com [Last accessed on 2023 Apr 01].

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

Basit, A. (2013), Impact of KSE-100 index on oil prices and gold prices in Pakistan. IOSR Journal of Business and Management (IOSR-JBM), 9(5), 66-69.

Beutels, P., Jia, N., Zhou, Q.Y., Smith, R., Cao, W.C., De Vlas, S.J. (2009), The economic impact of SARS in Beijing, China. Tropical Medicine and International Health, 14, 85-91.

Bhunia, A. (2013), Cointegration and causal relationship among crude price, domestic gold price and financial variables: An evidence of BSE and NSE. Journal of Contemporary İssues in Business Research, 2(1), 1-10.

Bloom, D.E., Mahal, A.S. (1997), Does the AIDS epidemic threaten economic growth? Journal of Econometrics, 77(1), 105-124.

Bolganbayev, A., Sabenova, B., Mombekova, G., Sultankhanova, G., Tazhibayeva, R. (2022), The effect of electricity generation, thermal energy production, fixed capital investment, and consumer price index on economic growth in Kazakhstan. International Journal of Energy Economics and Policy, 12(6), 67-72.

Çil, N. (2018), Finansal Ekonometri, Birinci Basım. İstanbul: Der Kitabevi.

Delgado, N.A.B., Delgado, E.B., Saucedo, E. (2018), The relationship between oil prices, the stock market and the exchange rate: Evidence from Mexico. The North American Journal of Economics and Finance, 45, 266-275.

Gay, R.D. Jr. (2008), Effect of macroeconomic variables on stock market returns for four emerging economies: Brazil, Russia, India and China. International Business and Economics Research Journal, 7(3), 1-8.

Gnahe, F. (2020), Do macroeconomic variables impact stock market returns? Evidence from Kazakhstan. Global Journal of Business, Economics and Management: Current Issues, 11(3), 255-274.

Gokmenoglu, K.K., Fazlollahi, N. (2015), The interactions among gold, oil, and stock market: Evidence from S&P500. Procedia Economics and Finance, 25, 478-488.

Hussin, M.Y.M., Muhammad, F., Razak, A.A., Tha, G.P., Marwan, N. (2013), The link between gold price, oil price and islamic stock market: Experience From Malaysia. Journal of Studies in Social Sciences, 4(2), 161-182.

İşcan, E. (2010), Petrol fiyatının hisse senedi piyasası üzerindeki etkisi. Maliye Dergisi, 158, 607-617.

KASE. KZ. Available from: https://kase.kz/en/history [Last accessed on 2023 Apr 01].

Khan, A., Naseem, I., Khan, M.K. (2016), Relationship of İnternational Oil Prices, Gold Prices and Stock Returns; Evidence from KSE. In: International Conference on Emerging Research for Sustainable Economic Development. Vol. 2.

Konuşkan, A., Kocabıyık T. (2019), Altın, petrol, döviz ve borsa endeksi arasındaki ilişkinin nedensellik analizi ile keşfi: Türkiye örneği. International Journal of Business Economics and Management Perspectives, 3(1), 1-9.

Lee, K., Ni, S. (2002), On the dynamic effects of oil price shocks: A study using industry level data. Journal of Monetary Economics, 49(4), 823-852.

Levin, E.R., Wright, R.E. (2006), Short-run and Long-run Determinants of the Price of Gold. Research Study No. 32. London: World Gold Council. p1-68.

Monjazeb, M., Shakerian, M.S. (2014), The effects of gold price and oil price on stock returns of the banks in Iran. Arabian Journal of Business and Management Review (OMAN Chapter), 3(9), 86.

Myrzabekkyzy, K., Keneshbayev, B., Razakova, D., Kenzhebekova, I., Pirmanova, Z. (2022), Analysis of causality relationship between the economic growth and the energy production and technological investments in Kazakhstan. International Journal of Energy Economics and Policy, 12(6), 123-126.

Nandha, M., Faff, R. (2008), Does oil move equity prices? A global view. Energy Economics, 30(3), 986-997.

Ocaklı, D. (2020), Altın ve petrol fiyatları ile BİST100 endeksi arasındaki nedensellik ilişkisinin incelenmesi. International Journal of Business and Economic Studies, 2(2), 72-84.

Sabenova, B., Baubekova, I., Issayeva, G., Bigeldiyeva, Z., Bolganbayev, A. (2023), Comparative analysis of volatility structures of stock index and energy company returns in Kazakhstan. International Journal of Energy Economics and Policy, 13(2), 200-206.

Sevüktekin, M., Nargeleçekenler, M. (2007), Ekonometrik Zaman Serileri Analizi. Ankara: Nobel Akademik Yayın.

Taibek, Z., Kozhamkulova, I., Kuralbayev, A., Spanova, B., Myrzabekkyzy, K. (2023), Analysis of the effect of oil and energy production on health and education expenditures in Kazakhstan with autoregressive distributed lag (ARDL) method. International Journal of Energy Economics and Policy, 13(2), 215-221.

Xiong, C., Yang, D., Huo, J., Zhao, Y. (2015), The relationship between energy consumption and economic growth and the development strategy of a low-carbon economy in Kazakhstan. Journal of Arid Land, 7(5), 706-715.