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Analysis of the Asymmetric Relationship between Oil Prices and Real Effective Exchange Rate in Kazakhstan

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ABSTRACT

Kazakhstan's export relies heavily on oil and other natural resources. Therefore, fluctuations in world oil prices have important consequences for Kazakhstan's economy. The effect of fluctuations in oil prices on the real exchange rate is very important for economies trying to develop other sectors as well as oil and natural gas sectors such as Kazakhstan. The purpose of this study is to examine the possible asymmetric relationships between oil prices and real effective exchange rate in Kazakhstan for the period January 2010-December 2020. For this purpose, the asymmetric causality analysis method developed by Hatemi-J and Roca (2014) was used in the study. In the study, it was studied with monthly data for the period from January 2010 to December 2020. According to the results of the study, there is a causality relationship from negative oil price shocks to negative real effective exchange rate shocks in Kazakhstan. However, what is interesting is that a causality relationship from positive shocks in oil prices to real effective exchange rate could not be found.

Keywords: Oil Price, Kazakhstan, Real Effective Exchange Rate, Asymmetric Relationship
JEL Classifications: Q43; F41; C32

1. INTRODUCTION

The world economy is witnessing various positive and negative changes in the price of oil. Fluctuations in energy prices affect the foreign trade balance of energy exporting and importing countries in different ways. Rising energy prices can cause the export revenues of oil or natural gas-rich countries to increase and therefore their currencies to appreciate. On the other hand, this situation may result in the decrease in competitiveness of sectors other than oil and natural gas and an increase in the importance of oil and gas sectors in the sectoral structure of the economy. An increase in oil prices in oil importing countries may cause an increase in foreign currency demand through the current account channel, a decrease in the value of the national currency in terms of foreign currency, and an increase in exchange rates. Conversely, a decrease in the demand for foreign currency demand may cause the value of the national currency to rise and the exchange rate to fall. On the other hand, the increase in the oil price causes a shift in terms of trade, causing the income to be transferred from the oil-importing countries to the oil-exporting countries. When the price of an export whose demand is inelastic increases, the demand for the currency of the issuing country increases and the value of that currency tends to increase. Generally, while there is no significant effect on costs, the gains from issuance increase. In other words, the effect of favorable (unfavorable) trade conditions on the oil exporter (importer) triggers upward (downward) pressure on the currency of that country.

Krugman (1980) takes into account the direct negative effects of high oil prices on the balance of payments in the oil importing country, as well as the indirect positive effects that may arise from the expenditure of the revenues obtained by the oil exporting countries on the goods or assets of the importing country. Thus, it states that the initial and final effects of the oil price increase on the exchange rate may differ. According to this view, factors such as the share of the oil-importing country in the world oil imports, the share of the oil-importing countries in the foreign assets of the oil-exporting country, and the share of the oil-importing country in the oil-exporting country's imports, the short and long it leads to the differentiation of period effects.

The share of the oil sector in Kazakhstan's economy and oil exports in total exports is quite high. Therefore, changes in world oil prices are expected to strongly affect the exchange rate in Kazakhstan's economy. The aim of the study is to measure the possible effects of changing oil prices on the real effective exchange rate in Kazakhstan's economy, which has rich oil reserves. For this purpose, the relationship between oil prices for the period from January 2010 to December 2020 and the real effective exchange rate series was analyzed by asymmetric causality method. In the second part of the study, the oil sector, oil prices and exchange rate relations in Kazakhstan's economy are explained. In the third chapter, the relevant literature is summarized. The next section explains the method and data set to be used in analysis. While the results of the implementation are presented in the fourth section, in the last section, the findings are interpreted and policy recommendations are given.

2. OIL SECTOR, OIL PRICES AND EXCHANGE RATE IN KAZAKHSTAN'S ECONOMY

It can be evaluated that the oil sector is the driving force of Kazakhstan's economy. Figure 1 shows the share of the oil sector in GDP. The share of the oil sector in Kazakhstan's GDP was around 15% in the years before 2000. However, this rate has increased significantly since 2000, with the increase in world energy prices and the opening of new oil mines in Kazakhstan. The share of the oil sector in 2005 GDP was 35%. In 2009, with the sharp decline in world oil prices, the share of these sectors in GDP decreased to approximately 27%. The weight of the oil sector in GDP has continuously decreased between 2012 and 2015. This decrease was mainly due to the faster growth of other sectors except oil and also the decrease in oil prices in 2012-2014. The sharp decline in oil prices in international markets had an effect on the decrease of this rate below 15% in 2015. The value of the specified rate for 2019 was 18%.

Most of the financing resources of non-oil sectors in Kazakhstan depend on the oil sector. Indeed, revenues from oil exports are used in other sectors of the economy related to the activities of the oil sector. Investments and revenues in the oil sector contribute to the formation and development of the country's non-oil sectors. Therefore, the decline in oil prices adversely affects the country's budget and GDP dynamics and indicators of non-oil sectors (Azretbergenova and Syzdykova, 2020).

The oil sector has a very high importance in Kazakhstan's exports. Compared to the share of this sector in GDP, its relative importance in exports is extremely high. The values of Kazakhstan's share of oil exports in total exports over the years are given in Figure 2. In Figure 3, the time course of the total export of Kazakhstan, the export of the oil sector and the export values of other sectors are plotted. As can be seen from these two graphs, the share of oil exports in total exports is very high. The share of oil in total exports was over 60% in 2003 and all years after. The low level of oil prices since 2014 has sharply reduced Kazakhstan's oil exports and total export revenues. As can be seen from Graphic 3, the total export figure, which reached 79.46 billion dollars in 2014, was 36.78 billion dollars in 2016.

As can be seen from the above graphs, the oil sector has a very important share in the economy of Kazakhstan. In addition, more than 60% of the exports of this country consist of petroleum products. Therefore, the real exchange rate for Kazakhstan is expected to be significantly sensitive to changes in oil prices.

Figure 4 shows the course of oil prices with the real effective exchange rate of Tenge, which is the Kazakhstan currency, for the period January 2010-December 2020. An increase in the real effective exchange rate means a real appreciation of the Kazakh

Figure 1: Share of the oil sector in GDP (%)

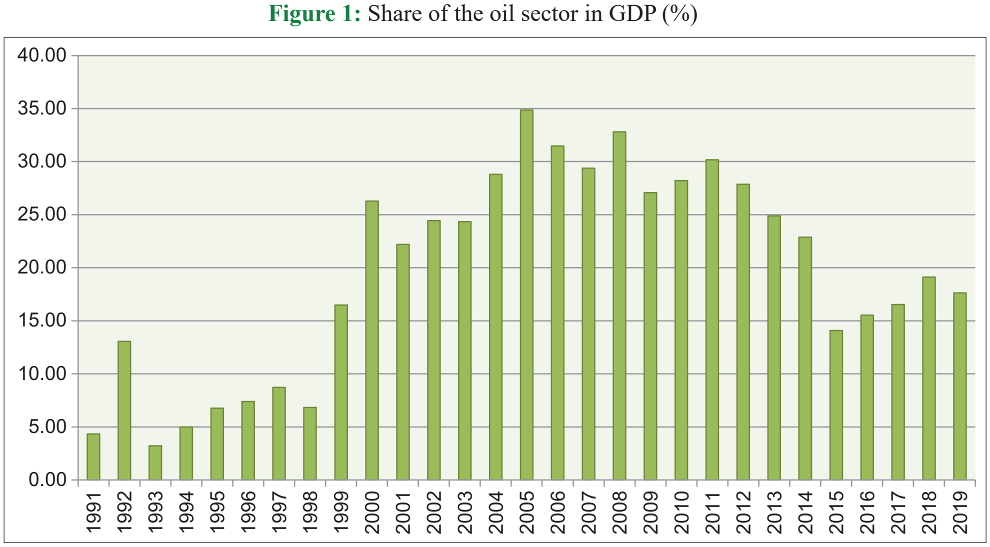


Figure 2: Share of oil exports in total exports (%)

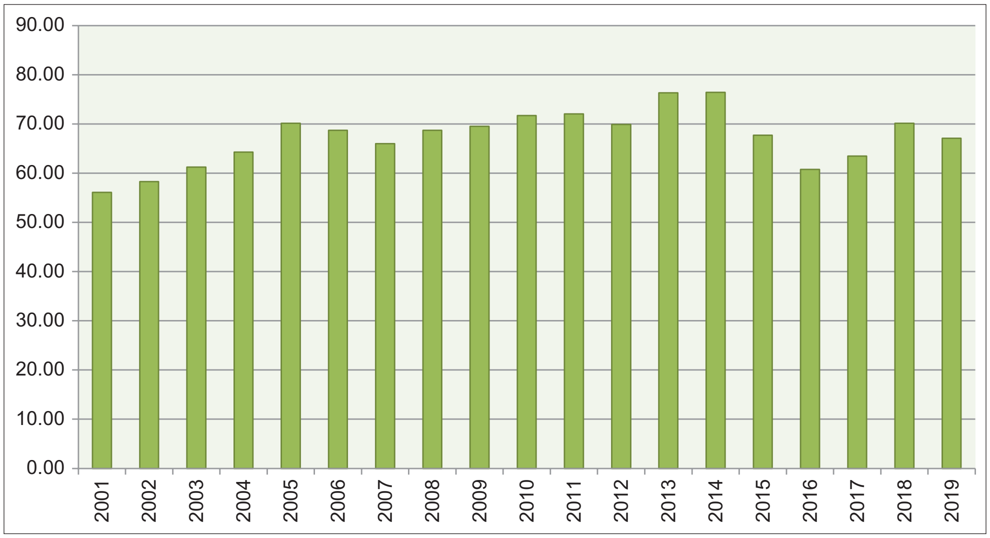
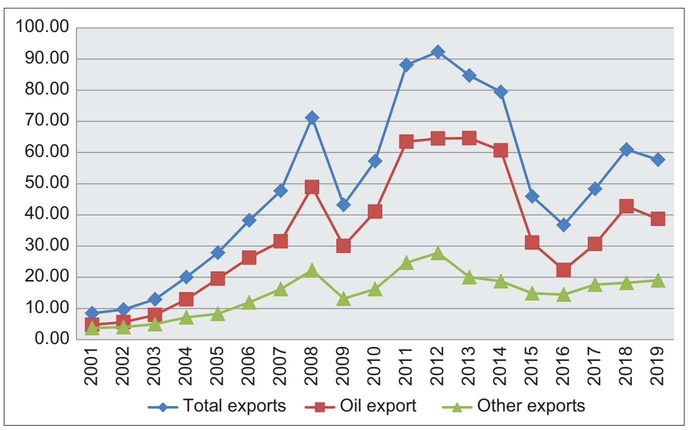


Figure 3: Total exports, oil sector exports and exports by other sectors (Billion USD)



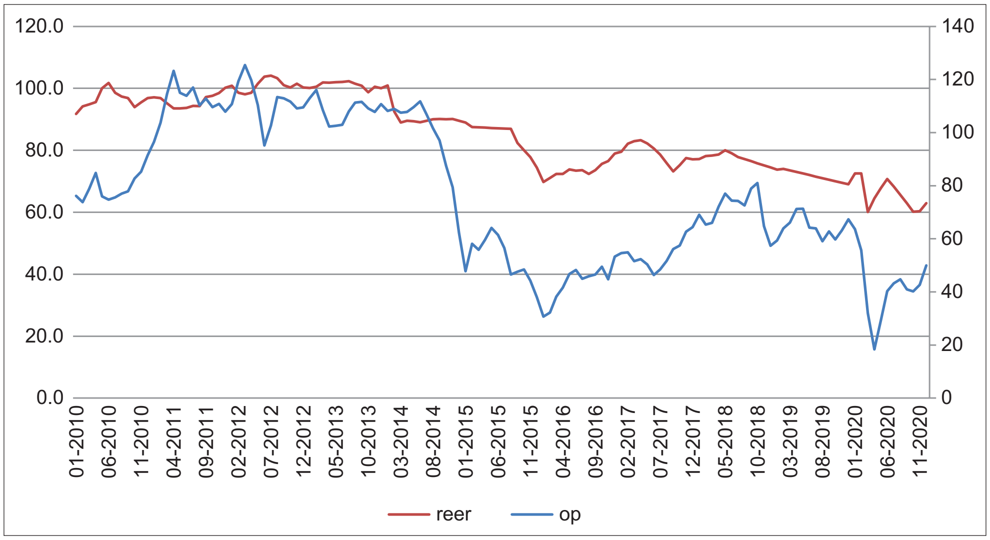
national currency, while a decrease means a depreciation in real terms. As can be seen from the graph, oil prices and real effective exchange rate variables have a significant common tendency in the period indicated.

3. LITERATURE REVIEW

In the literature, the effect of oil prices on the exchange rate has been discussed in theoretical studies on the subject, generally by making a classification as oil importing and exporting countries. The first empirical studies examining the relationship between variables belong to Krugman (1980) and Golub (1983). According to the authors, an increase in oil prices in an energy-importing country may result in a decrease in the value of the national currency. Amano and Van Norden (1998), one of the studies following the authors who stated that the opposite situation is valid for oil exporting countries, emphasize that the fluctuations in oil prices are effective in explaining the fluctuations in real exchange rates.

Some of the studies on the subject in the literature claim that there is a bidirectional relationship between variables, that is, they both affect each other. Huang and Tseng (2010), Chen and Chen (2007), Yanagisawa (2010), Uddin et al. (2013) obtained results supporting the existence of bidirectional causation in their studies. On the other hand, some studies claim that there is no relationship between variables (Habib and Kalamova, 2007; Wu et al., 2012). In these studies, it is claimed that both oil price and exchange rate cannot have the power to explain each other. However, Mohammadi and Parvar (2012) (for Bolivia, Mexico, Norway) and Ngoma et al. (2016) (for Ghana and Niger) have obtained results that support the asymmetric relationship between oil prices and exchange rate. Aedy et al. (2020) argue that the price and volatility of crude oil in Indonesia has an asymmetric effect on the dollar rate in the short term, while in the long term there is no such effect. Dauvin (2014) supports the fact that energy prices affect currencies asymmetrically in his study on ten energy exporting countries and twenty-three commodity exporting countries. Soft transition panel regression findings support that the real exchange rate responds to changes in oil prices above a certain threshold. In addition, panel data results show that the terms of trade turn into an important determinant of the real exchange rate during periods of high volatility in oil prices. Bodart et al. (2015) examined the effect of structural characteristics such as the exchange rate regime, financial openness, trade openness, export diversification and the type of core commodity exported on the real exchange rate for thirty-three developing countries, some of which export oil. In the study, it was found that more flexible exchange rate regimes, openness to international capital movements and foreign trade cause low real exchange rate elasticity of commodity prices. However, contrary to expectations, the degree of diversification in exports for sub-Saharan African countries and oil-exporting countries has been found to increase the flexibility of commodity prices by the real exchange rate. Brahmasrene et al. (2014) examined the short and long-term dynamic relationship between the oil export prices of the USA and the exchange rate with the Granger causality test. The results of the study revealed that the exchange rate is the Granger cause of the oil price in the short run, while the oil price is the Granger cause of the exchange rate in the long run. In addition, this study demonstrates that oil prices are minimally affected by the exchange rate, whereas the impact of oil price shocks on the exchange rate in the medium and long term is significant. However, it was concluded

Figure 4: Real effective exchange rate (left axis) and oil prices (right axis - USD)



that the volatility in oil prices in 2008 had a significant effect on exchange rate volatility and that the fluctuations and uncertainties in the exchange rate were minimized during periods when world oil prices were stable.

The relationship between oil prices and exchange rate has been investigated in some panel studies including Kazakhstan. However, there are very few studies in the literature using time series data for this country. Kutan and Wyzan (2005) are based on the maximum likelihood method within the ARCH model in their studies. In the study using the data set for the period January 1996 - November 2003, it is concluded that the changes in oil prices have a significant effect on the real exchange rate movements. Kose and Baimaganbetov (2015) evaluated the asymmetric effects of real oil price shocks on industrial production, real exchange rate and inflation in Kazakhstan in the 2000-2013 period using vector autoregression model (SVAR). According to the results of the research, it has been revealed that the effect of the decrease in oil prices on the economic indicators of Kazakhstan is more than the increase. The authors found that the real exchange rate reacts positively to negative shocks in oil prices. Increases in the real exchange rate mean the appreciation of the Kazakh Tenge against foreign currencies. The authors argued that as the increase in the real exchange rate will provide a price advantage for imported goods, the imports of Kazakhstan will increase and the formation of such a structure has a decreasing effect on domestic production, especially as the domestic producer becomes disadvantaged in the price of imported goods. Gronwald et al. (2009) came to a similar conclusion. According to the research results, all variables (GDP, inflation, budget revenues, exports and real exchange rate) considered in the VAR model were significantly negatively affected by the decline in oil prices. This shows that Kazakhstan's economy is vulnerable to changes in oil prices. Nurmakhanova (2006) examined the structure of the relationship between the real GDP of Kazakhstan, tax revenues, real exchange rate, general level of prices in the country and oil prices. In his study, the author confirmed the significant effect of oil prices on the economy of Kazakhstan, especially the real effective exchange rate, using statistical data between 2000 and 2015. At the same time, according to the results of this study, oil prices affect the real exchange rate by increasing the pressure on the domestic price level. On the other hand, Korhonen and Mehrotra (2009) stated that oil prices do not have a significant effect on real exchange rate fluctuations. The heterogeneity of these results shows that the effects of oil prices on Kazakhstan's economic indicators should be addressed in a long period of time. In this article, it is aimed to contribute to the studies in this direction.

4. DATA SET AND METHODOLOGY

4.1. Data Set

In this study, the existence of possible asymmetric relations between oil prices and real effective exchange rate for the period January 2010-December 2020 in Kazakhstan is examined. The data on the real effective exchange rate were obtained from the database of the National Bank of Kazakhstan and the data on the oil prices were obtained from the data of the International Energy Agency. Eviews 11 package program was used in the analysis part.

4.2. Econometric Methodology

In the study, the asymmetric causality analysis method developed by Hatemi-J and Roca (2014) is used on the idea that the effects of positive and negative shocks in variables may differ from each other. In Hatemi-J asymmetric causality analysis; it is important to determine the optimal lag length of the VAR model in the first stage, to determine the additional lag length to be added to the model in the second stage, and to determine the critical values for the Wald test statistics in the last stage. As the additional delay length; Toda and Yamamoto recommend adding only one additional delay to the VAR model as much as the maximum stationary degree of variables, while Dolado and Lütkepohl (1996) recommend adding only one additional delay (Hatemi-J, 2014: 450). In this study, following the suggestion of Dolado and Lütkepohl, an additional delay was added to the VAR model whose optimal delay length was determined with the HatemiJ criterion (HJC). Hacker and Khatami-J suggest that in cases where the error term does not have normal distribution properties, the Wald test statistic gives erroneous results in rejecting the H_0 hypothesis, and in such cases, the bootstrap simulation should be used. With this method, the Wald test approaches its true value even in different situations.

This process develops as follows.
P_{1t} and P_{2t} being two co-integrated variables (Hatemi J, Roca, 2014: 7)

$$P_{1t} = P_{1t-1} + \varepsilon_{1t} = P_{1,0} + \sum_{i=1}^{t} \varepsilon_{1i} \quad (1)$$

and

$$P_{2t} = P_{2t-1} + \varepsilon_{2t} = P_{2,0} + \sum_{i=1}^{t} \varepsilon_{2i} \quad (2)$$

Where $t=1,2,\ldots,T$; $P_{1,0}$ and $P_{2,0}$ are constant terms, ε_{1i} , ε_{2i} is like $iid(0,\delta^2)$. Positive and negative changes in each variable, respectively $\varepsilon_{1i}^{+}=max(\varepsilon_{1i},0)$, $\varepsilon_{2i}^{+}=max(\varepsilon_{2i},0)$, $\varepsilon_{1i}^{-}=min(\varepsilon_{1i},0)$ and $\varepsilon_{2i}^{-}=min(\varepsilon_{2i},0)$ will be. The results are estimated as $\varepsilon_{1i}=\varepsilon_{1i}^{+}+\varepsilon_{1i}^{-}$ ve $\varepsilon_{2i}=\varepsilon_{2i}^{+}+\varepsilon_{2i}^{-}$. Thus, it can be written as follows.

$$P_{1t} = P_{1t-1} + \varepsilon_{1t} = P_{1,0} + \sum_{i=1}^{t} \varepsilon_{1i}^{+} + \sum_{i=1}^{t} \varepsilon_{1i}^{-} \quad (3)$$

$$P_{2t} = P_{2t-1} + \varepsilon_{2t} = P_{2,0} + \sum_{i=1}^{t} \varepsilon_{2i}^{+} + \sum_{i=1}^{t} \varepsilon_{2i}^{-} \quad (4)$$

The sum of positive and negative shocks in each variable is $P_{1t}^{+} = \sum_{i=1}^{t} \varepsilon_{1t}^{+}, P_{1t}^{-} = \sum_{i=1}^{t} \varepsilon_{1t}^{-}, P_{2t}^{+} = \sum_{i=1}^{t} \varepsilon_{2t}^{+},$ and $P_{2t}^{-} = \sum_{i=1}^{t} \varepsilon_{2t}^{-}$ (Hatemi J ve Roca, 2014: 8). The vector $P_t^{+}=(P_{1t}^{+},P_{2t}^{+})$ is used to test the causality relationship between positive shocks. In a VAR (L) model with lag k, the vector is defined as shown below.

$$P_t^{+} = v + A_1 P_{t-1}^{+} + A_2 P_{t-2}^{+} + \ldots + A_L P_{t-k}^{+} + u_t^{+} \quad (5)$$

In the above equation v, is the vector of constant 2 × 1 variables. u_t^{+} is the vector of error terms that occurs when -dimensional positive shocks occur. Ar is a 2 × 2 parameter matrix and $r = 1,2,\ldots, k$ (Hatemi J, 2002). The optimal delay length is defined by test statistics developed by Hatemi-J (2003, 2008).

$$HJC = \ln\left(\left|\hat{\Omega}_f\right|\right) + k2T^{-1}\left(m^2 \ln T + 2m \ln\left(\ln T\right)\right) \quad (6)$$

$\left|\hat{\Omega}_f\right|$ shows the covariance matrix of error terms at each length of lag length k. m indicates the number of equations in the VAR model and T is the number of samples (Hatemi-J and Roca, 2014: 9). The null hypothesis is defined as the column (k) and row (j) of the matrix Ar equal to zero. For detailed Wald statistics, see Lütkepohl (2005). If the test statistics are greater than the critical values, the null hypothesis that there is no causation is rejected.

5. RESULTS

According to the descriptive statistics in Table 1, the standard deviation value, which is an indicator of volatility, is higher in both variables, but higher in the oil price variable. Also, when the coefficient of skewness is taken into account, the real effective exchange rate variable is skewed to the left and the oil price variable is skewed to the right. It was found that both variables are flat according to the kurtosis coefficient. In Jarque-Bera test, considering the probability values, the alternative hypothesis that there is no normal distribution for both variables is accepted.

At the application stage, the natural logarithm of variables was taken to avoid the problem of changing variance in the model. Logarithmic values of all variables were used in the analysis. In order to see the dynamic relationships between variables, the VAR (vector autoregression) model is established. First, it is necessary to find the levels at which variables are stationary in the VAR model. Working with series to be stationary causes us to encounter a fake regression problem. In this case, the results of the analysis can be misleading (Syzdykova et al., 2021). Therefore, two different unit root tests were used for the series in the first stage of the analysis. These are the Augmented Dickey and Fuller (1981) unit root (ADF) and Phillips and Perron (1988) unit root (PP) tests. These tests are not described here as they are widely known. However, the differences between the tests can be briefly summarized as follows. In the ADF unit root test, since the error terms of the random walk process can be autocorrelated, the delayed terms of the dependent variable difference are added to the models. In PP test, nonparametric methods are used without including these lag values in the model to account for the autocorrelation problem of error terms. In both tests, the null hypothesis states that the series contains unit root and the alternative hypothesis states that the series is stationary. Results of the stationarity tests are presented in Table 2.

Table 1: Descriptive statistics of the variables

	OP	REER
Mean	76.12871	85.18706
Median	71.71500	87.05000
Maximum	125.4500	104.0798
Minimum	18.38000	60.10000
Std. Dev.	27.42073	12.32105
Skewness	0.139276	–0.114545
Kurtosis	1.709360	1.735967
Jarque-Bera	6.189703	7.889916
Probability	0.044657	0.019352

Table 2: ADF and PP unit root test results

Level	ADF unit root test		PP unit root test	
	Intercept	Trend & intercept	Intercept	Trend & intercept
OP	–1.589153 (0.4852)	–2.547977 (0.3049)	–1.614957 (0.4721)	–2.537660 (0.3098)
REER	–0.208424 (0.9333)	–2.896666 (0.1671)	–0.047105 (0.9517)	–2.938347 (0.1541)
1st difference	ADF unit root test		PP unit root test	
	Intercept	Trend & intercept	Intercept	Trend & intercept
OP	–9.049905* (0.0000)	–9.016775* (0.0000)	–8.910310* (0.0000)	–8.930589* (0.0000)
REER	–10.13514* (0.0000)	–10.15400* (0.0000)	–10.09759* (0.0000)	–10.16406* (0.0000)

*İs statistically significant at 99% confidence level

Table 3: Hatemi-J and Roca (2014) asymmetric causality test results

Direction of causation	MWALD	1% Bootstrap Critical Value	5% Bootstrap Critical Value	10% Bootstrap Critical Value
OP^{+}≠>$REER^{+}$	2.676 (0.104)	8.908	4.093	2.741
OP^{+}≠>$REER^{-}$	1.209 (0.904)	9.836	5.385	4.996
OP^{-}≠>$REER^{-}$	19.963 (0.001)*	10.037*	6.138*	4.201*
OP^{-}≠>$REER^{+}$	3.918 (0.721)	10.924	6.015	4.183
$REER^{+}$≠>OP^{+}	1.821 (0.235)	7.059	4.021	2.094
$REER^{+}$≠>OP^{-}	0.964 (0.982)	8.092	4.097	2.980
$REER^{-}$≠>OP^{-}	0.762 (0.821)	9.908	5.968	3.929
$REER^{-}$≠>OP^{+}	1.298 (0.432)	7.593	4.602	3.095

The notation ≠>shows the null hypothesis that there is no causality. Values in parentheses asymptotically indicate probability values. The * sign indicates the causality relationship between variables at the 1% significance level. Bootstrap count is 10,000

According to the results of the stationarity test, it is seen that both variables have unit root in the level value, and when the first order differences are taken, they are stationary. The first differences of the variables are used when establishing the VAR model. With the VAR model, the optimal lag length is found to be 2 without autocorrelation. The asymmetric causality test developed by Hatemi J-Roca (2014) was applied using the optimal lag length obtained from the VAR model. The asymmetric causality test results (Table 3) provide evidence that the causality between variables is from oil price to real effective exchange rate. However, the causality relationship from oil price to real effective exchange rate is seen to be in an asymmetrical structure. While the causality relation exists from negative oil price shocks to negative real effective exchange rate shock, the same is not seen in the positive oil price shock. This implies that the change in oil prices affects the real effective exchange rate only in case of a decrease and not in the case of an increase.

6. CONCLUSION

The oil sector has an important share in Kazakhstan's economy. Therefore, the exchange rate in Kazakhstan is expected to be sensitive to world oil prices. However, the relationship between exchange rate and oil prices may differ especially due to wealth and portfolio channels, that is, the spending patterns of oil revenues. In this study, the relationship between real effective exchange rate and oil prices for Kazakhstan was analyzed using monthly data for the period January 2010 and December 2020. In the study, the asymmetric causality analysis method developed by Hatemi-J and Roca (2014) was used on the idea that the effects of positive and negative shocks in variables may differ from each other.

According to the analysis results, the existence of a causality from oil prices to exchange rates; It is an inevitable consequence for Kazakhstan, whose economy is dependent on oil. Moreover, the relationship found exhibits an asymmetrical structure and the causality is only from negative oil price shocks to negative real effective exchange rate shocks. This means that while oil prices are falling, the real effective exchange rate is falling in Kazakhstan. However, what is interesting is that there is no causality from positive shocks in oil prices to real effective exchange rate. The increase in the real exchange rate index means that the tenge is appreciated in real terms, while the decrease indicates that it depreciates. On the other hand, it shows that there is no causality relationship from real effective exchange rate to oil prices, and that increases or decreases in exchange rates cannot have an effect on oil prices. This result is also theoretically meaningful, considering that Kazakhstan's share in international oil supply is around 3%. Because, as a result of a change in exchange rate, it is likely that the change in the oil supply of Kazakhstan will have a limited effect on oil prices.

REFERENCES

Aedy, H., Saranani, F., Rosnawintang, R., Adam, P. (2020), Crude oil price and exchange rate: An analysis of the asymmetric effect and volatility using the non linear autoregressive distributed lag and general autoregressive conditional heterochedasticity in mean models. International Journal of Energy Economics and Policy, 10(1), 104-108.

Amano, R.A., Van Norden, S. (1998), Oil prices and the rise and fall of the US real exchange rate. Journal of İnternational Money and Finance, 17(2), 299-316.

Azretbergenova, G., Syzdykova, A. (2020), The dependence of the Kazakhstan economy on the oil sector and the ımportance of export diversification. International Journal of Energy Economics and Policy, 10(6), 157-163.

Bodart, V., Candelon, B., Carpantier, J.F. (2015), Real exchanges rates, commodity prices and structural factors in developing countries. Journal of International Money and Finance, 51, 264-284.

Brahmasrene, T., Huang, J.C., Sissoko, Y. (2014), Crude oil prices and exchange rates: Causality, variance decomposition and impulse response. Energy Economics, 44, 407-412.

Chen, S.S., Chen, H.C. (2007), Oil prices and real exchange rates. Energy economics, 29(3), 390-404.

Dauvin, M. (2014), Energy prices and the real exchange rate of commodity-exporting countries. International Economics, 137, 52-72.

Dolado, J.J., Lütkepohl, H. (1996), Making wald tests work for cointegrated VAR systems. Econometric Reviews, 15(4), 369-386.

Golub, S.S. (1983), Oil prices and exchange rates. The Economic Journal, 93(371), 576-593.

Gronwald, M., Mayr, J., Orazbayev, S. (2009), Estimating the Effects of Oil Price Shockson the Kazakh Economy (No. 81). Ifo Working Paper.

Habib, M.M., Kalamova, M.M. (2007), Are there oil currencies? The Real Exchange Rate of Oil Exporting Countries. ECB Working Paper, No. 839.

Hatemi-J, A. (2002). Export performance and economic growth nexus in Japan: A bootstrap approach. Japan and the World Economy, 14(1), 25-33.

Hatemi-J, A. (2003), A new method to choose optimal lag order in stable and unstable VAR models. Applied Economics Letters, 10(3), 135-137.

Hatemi-J, A. (2008), Forecasting properties of a new method to determine optimal lag order in stable and unstable VAR models. Applied Economics Letters, 15(4), 239-243.

Hatemi-J, A., Roca, E. (2014), BRICs and PIGS in the Presence of Uncle Sam and Big Brothers: Who Drive Who? Evidence Based on Asymmetric Causality Tests. Griffith Business School Discussion Papers Finance.

Huang, Y.H., Tseng, Y.H. (2010), Is crude oil price affected by the US dollar exchange rate? International Research Journal of Finance and

Economics, 58, 109-120.
Korhonen, I., Mehrotra, A.N. (2009), Real exchange rate, output and oil: Case of four large energy producers. Bank of Finland. Institute for Economies in Transition. Discussion Papers, No. 6.
Kose, N., Baimaganbetov, S. (2015), The asymmetric impact of oil price shocks on Kazakhstan macroeconomic dynamics: A structural vector autoregression approach. International Journal of Energy Economics and Policy, 5(4), 1058-1064.
Krugman, P. (1980), NBER Working Paper Series: Oil and the Dollar. Working Paper No. 554 (No. NP-1902616). Cambridge, MA: National Bureau of Economic Research.
Krugman, P. (1983), Oil shocks and exchange rate dynamics. In: Exchange Rates and İnternational Macroeconomics. Chicago, Illinois: University of Chicago Press. p259-284.
Kutan, A.M., Wyzan, M.L. (2005), Explaining the real exchange rate in Kazakhstan, 1996-2003: Is Kazakhstan vulnerable to the Dutch disease? Economic Systems, 29(2), 242-255.
Lütkepohl, H. (2005), New İntroduction to Multiple Time Series Analysis. Berlin, Heidelberg: Springer Science and Business Media.
Mohammadi, H., Jahan-Parvar, M.R. (2012), Oil prices and exchange rates in oil-exporting countries: Evidence from TAR and M-TAR models. Journal of Economics and Finance, 36(3), 766-779.
Ngoma, A.L., Ismail, N.W., Yusop, Z. (2016), An analysis of real oil prices and real exchange rates in five African countries: Applying symmetric and asymmetric cointegration models. Foreign Trade Review, 51(2), 162-179.
Nurmakhanova, M. (2006), Oil and Growth Challenge in Kazakhstan. Economics Education and Research Consortium, Working Paper S. E16/06.
Syzdykova, A., Abubakirova, A., Erdal, F.B., Saparova, A., Zhetibayev, Z. (2021), Analysis of the relationship between renewable energy and economic growth in selected developing countries. International Journal of Energy Economics and Policy, 11(1), 110-116.
Uddin, G.S., Tiwari, A.K., Arouri, M., Teulon, F. (2013), On the relationship between oil price and exchange rates: A wavelet analysis. Economic Modelling, 35, 502-507.
Wu, C.C., Chung, H., Chang, Y.H. (2012), The economic value of co-movement between oil price and exchange rate using copula-based GARCH models. Energy Economics, 34(1), 270-282.
Yanagisawa, A. (2010), Relationship Among Crude Oil Prices, Share Prices and Exchange Rate. Japan: IEEJ, November.