Nyangarika, Anthony Msafiri; Mikhaylov, Alexey; Richter, Ulf Henning

Article

Influence oil price towards macroeconomic indicators in Russia

International Journal of Energy Economics and Policy

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2019, 9(1), 123-129.

Influence Oil Price towards Macroeconomic Indicators in Russia

Anthony Nyangarika[1*], Alexey Mikhaylov[2], Ulf Henning Richter[3]

[1]School of Management and Economics, Beijing Institute of Technology, Beijing, China, [2]Department of Financial Markets and Banks, Financial University Under the Government of the Russian Federation, Moscow, Russia, [3]Tongji University (School of Economics and Management), Shanghai, China. *Email: nyangarikatz@gmail.com

Received: 21 June 2018 **Accepted:** 20 November 2018 **DOI:** https://doi.org/10.32479/ijeep.6807

ABSTRACT

This paper proposes the effect of oil price shocks on the Russian economic indicators using time series for the period 1991-2016 year to cover all of oil price shocks. The vector autoregressive and the Dickey-Fuller test were utilized to investigate the long-run and the short-run relationships between variables. From the results shows that one of the most important external impact factor is the world price of oil. The research suggests a positive and significant long-term relationship between oil prices and Russian GDP dynamics.

Keywords: Oil Price Shocks, GDP Growth, Forecasting, Oil Impact.
JEL Classifications: C51, C58, F31, G12, G15

1. INTRODUCTION

Changing the price of crude oil, and especially the sharp fluctuations, is definitely an important determinant that determines the world economic architecture. The supply and demand in the oil market, which is perhaps the key commodity now days, has a significant impact on world currencies in exporting countries. In 2014-2016 the oil market can be characterized by extreme volatility.

The aggregate of the fundamental factors that determined its business environment are almost comprehensive: Macroeconomic conditions, market conyctures, transformation of the regulatory component, change in the structure of cost, geopolitical confrontation. In this paper theoretical and empirical aspects of the mutual influence of oil prices and exchange rates are investigated.

Accordingly, if the prices for "black gold" in the world market tend to fall (in dollar terms), then the Russian economy begins to lose a certain part of the profit from the sale of oil, therefore it becomes necessary to devalue the national currency. It is oil and gas that are the main export products of Russia, half of the state budget revenues are their sale. In this regard, it is the size of foreign exchange earnings that depends on the price of oil.

In general, today there are three main marker grades of oil that correspond to three main exchanges: the New York Mercantile Exchange (NYMEX) is the major kind of west light light oil (West Texas Intermediate [WTI]); on the London Oil Exchange (IPE) - North Sea oil of Brent variety (Brent); at the Singapore International Commodity Exchange (SIMEX) - Middle Eastern oil of Dubai variety (Dubai) as found out Amano and Van Norden (1998).

Even earlier there was a OPEC basket, which included 12 grades of oil. In addition, each oil exporting country saves its own benchmarks of oil, which has certain stable parameters (Statfjord in Norway, Kirkuk in Iraq, two varieties in Iran - Iran Light and Iran Heavy). The price of oil is fumigated by differentiation depending on the quality of oil and its location relative to consumers.

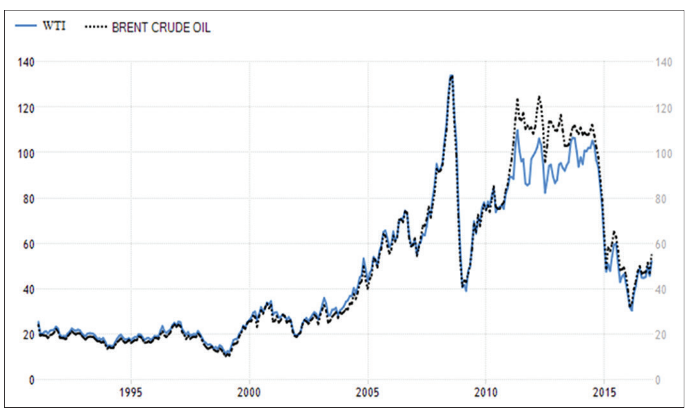
The fall in oil prices during 2014-2015 was so rapid that it became almost the most determinant of the economic and geopolitical architecture of the world. In December 2014, WTI oil prices dropped from $ 100 per barrel to 60; prices for Brent also headed for it. The fall continued in 2015, breaking the level of $ 40 a barrel after a minor recovery (Figure 1).

The main reasons for such a fall are called: The transformation of the conjuncture on the oil market (the United States was the world's first oil producer due to the hydro-fraction of the reservoir, providing 95% of its own needs and ceasing to generate a lion's share of world imports; Saudi production growth; the start of supply of black gold from Libya and Iraq, exports from Iran at dumped prices, sluggish economic growth, increased efficiency and the transition from oil to other fuels reduce demand), a change in the regulatory environment and geopolitical factors.

The market for oil is largely reflected in the currency market. In particular, Figure 2 shows the mirror correlation between the dynamics of the dollar index and changes in the price of oil. True, the strengthening of the US dollar as one of the stimulating factors in reducing oil prices did not attract much attention. Since oil prices are determined in dollars, with the strengthening of the dollar - with all other equal conditions - oil prices for US consumers are reduced.

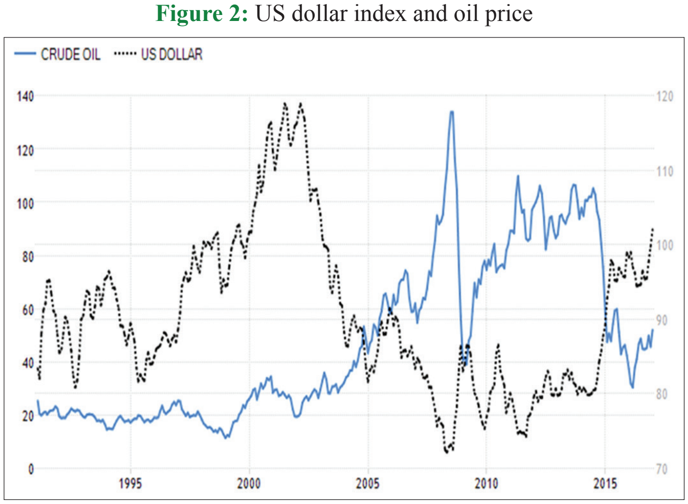
But the purchase of petroleum products by consumers in most countries are determined not in dollars, so they do not feel the decline in oil prices in dollars to the same extent as Americans. These disregarded factors may have global implications for the economic growth of countries, their national budgets and geopolitics.

Figure 1: West texas intermediate and brent prices in 1991-2016



Source: Thomson reuters datastream

Figure 2: US dollar index and oil price



Source: Thomson reuters datastream

2. LITERATURE REVIEW

Various research has be done examining the effect of oil price fluctuations on different economies driven by the importance of oil as a key player on the global economy. Specifically, a great deal of research has been written on the impact of oil prices on developed countries. Buetzer et al. (2012), Backus and Crucini (2000) found evidence that oil price shocks resulted in a recession in the US economy.

Baumeister and Peersman (2008) assessed the impact of oil prices on the US's GDP and consumer price inflation. In addition, Singer (2007) and Hooker (1996) examined oil price shocks and found that the shock on 1973-1974 was the most affecting for the US economy, whereas other shocks had fewer disturbances.

Farzanegan and Markwardt (2009) explored the impact of oil price shocks on the Iranian economy. He found a positive nexus between oil prices and both the Iranian's industrial output and the government expenditures. Akpan (2009) found out that oil price shocks have no substantial effect on inflation and output on Nigeria, mitigated by tradable sector shrinking "Dutch Disease." Moreover, Iwayemi and Fowowe (2011) evaluated the impact of oil prices on the Nigerian's economy by using a VAR model. Results show evidence that the oil prices rise government expenditure, increase inflation and unexpectedly increase the industrial output growth. In addition, It was been investigated the effect of oil prices on Qatar's GDP, using the vector error correction model (VECM). They found that there is a substantial positive effect on Qatar's GDP but with expenses of higher inflation.

Olomola and Adejumo (2006) empirically investigated the impact of oil price shocks on Nigeria economy using the VAR models. With the existence of cointegration and causality, the findings suggest that the fiscal policy (i.e., government stimulant) is the most driver of the economy with absence of monetary policy.

Finally, Eltony and Al-Awadi (2001) tested the impact of oil on inflation in Kuwait and found that inflation is partly driven by high oil prices.

Tuzova and Qayum (2016) pointed to the key role of changing oil prices on the exchange rate, in particular, explicitly states that shock oil prices are the main source of the movement of the real exchange rate of the US dollar. The same conclusions came from on the exchange rate of Russia.

But this only applies to countries that are heavily dependent on oil exports or imports, for example, the Chinese exchange rate is not responding to the sharp fluctuations in the price of crude oil, one of the main reasons is the binding of the rate to the basket of currencies as found out Huang and Guo (2007).

The problem of analyzing the dependencies between oil prices and exchange rates is the possibility of bilateral reciprocal causation of indicators. The main channels of influence (they are distinguished by two), through which fluctuations in oil prices are transmitted to exchange rates, are widely covered by Mikhaylov (2018a) and Mikhaylov (2018b).

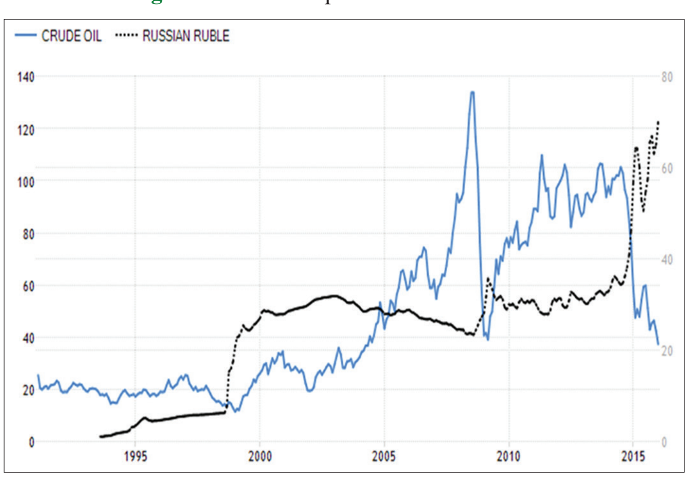
The first channel is based on trading conditions. For oil importing countries, the latter price increase leads to a deterioration of the trade balance and subsequent depreciation of the national currency. In this context, Backus and Crucini (2000) and Mikhailov (2014) demonstrated that variations in oil prices determine the lion's share of variations in terms of trade.

The second channel of influence finds its implementation through the effect of wealth (effects of wealth). Ferraro et al. (2015) have shown that higher oil prices lead to a welfare shift from importers to exporters, which leads to a change in the exchange rate of the importing countries due to the current account deficit and the outflow of investments. On the other hand, a negative correlation may be due to the fact that changes in the dollar also have a significant impact on the price of oil. In particular, the exchange rate can transform oil prices through its impact on demand and supply of oil and through financial markets.

Johansen (1991) and Nyangarika et al. (2018) found out that exchange rates can also affect the price of oil directly through financial markets or indirectly through financial assets, the rebalancing of investment portfolios and, in particular, hedging practices. Since oil prices are denominated in dollars, oil futures may be a good hedging instrument against the expected depreciation of the dollar. The importance of this financial channel may only increase over time as the volume of oil futures at NYMEX has increased fivefold since the beginning of the 2000s.

Unlike literary sources devoted to the causality of exchange rates from oil prices, the empirical evidence of reverse dependence is not so numerous. An empirical confirmation of the influence of oil prices on the exchange rate can be demonstrated by the example of fluctuations in oil prices and the rate of the Russian ruble on Figure 3.

Figure 3: Crude oil price and USDRUB rate



Source: Thomson reuters datastream

In general, the rate of the Russian ruble, to a large extent, is a determinant of oil prices. This is especially evident when the price of oil in rubles is displayed (Figure 3). Due to this feature, a decision was made to study the influence of the price of crude oil on the exchange rate of the Russian Federation.

3. METHODS

In this paper, the real exchange rate of Russia using the time series from 1991 till 2016, we used the vector model of autoregression (VAR-model), which is commonly used for prediction systems of related time series and for analyzing the dynamic effect of random perturbations on a system of variables. The approach to constructing VAR models is based on structural modeling, considering each endogenous variable in the system as a function of the lagged values of all endogenous variables.

A real exchange rate model was constructed using five variables: Consumer price index, gross domestic product (GDP), oil price, total country export, and a real effective exchange rate as a dependent variable. The real exchange rate model is specified as follows;

$$\text{Log}EXCH_t = \alpha + \beta_1 \log CPI_t + \beta_2 \log OIL_t + \beta_3 \log GDP_t + \beta_4 \log EXPORT_t + \varepsilon_t \quad (1)$$

Where, - real effective exchange rate national currency per US dollar (RUB/USD), *CPI* - consumer price index; *GDP* - GDP measured in millions of US dollars, *OIL* - oil price US dollar per barrel; *EXPORT* - total country export measured in millions of US dollars; β_1, β_2, β_3, β_4 - coefficients of the model, α - intercept; ε_t - coefficients of error.

We use time series of GDP, real effective exchange rate, consumer price index, total export oil price from Thomson Reuters Datastream.

4. RESULTS

Since the VAR methodology is used only for stationary rows, the first step in identifying a process is to check the time series for stationary. The need for time series to be stationary in modeling is due to the fact that these models are used for forecasting, and to predict the behavior of only those processes whose main characteristics (average, variance, and coefficients of autocavision) are independent of time.

It is impossible to predict the behavior of the process, based on which the non-stationary time series (mathematical expectation, variance and autocorrelation of it vary depending on time). In this case, it is difficult to find constant averages and variances, so we should look for possible transformations of the series, which can reduce it to the stationary one. To determine stationary we will use the ADF test. The test procedure for the ADF test is the same as for the Dickey-Fuller test, but it is applied to the model.

We used E-views program to test stationarity of variables to guarantee its non-stationarity in order to examine the long-run equilibrium. Generally, the augmented Dickey- Fuller test was conducted to check whether a particular variable is stationary or not with relaxing the assumption that the error term is uncorrelated as follows:

$$\Delta y_t = \alpha + \beta_t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \ldots + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t \quad (2)$$

Where α - constant, β - coefficient of trend, P - lag order of the autoregressive process, y - data value. Imposing the constraints $\alpha = 0$ and $\beta = 0$ corresponds to modelling a random walk and using the constraint $\beta = 0$ to modeling a random walk with a drift.

The result of the ADF (Table 1) indicates that all variables in the model are stationary because the value of the test statistic is rejected at the 5% significance level. Consequently, this series can be used to construct regression models. However, a positive long-run nexus between oil prices and economic growth exists referring to the error correction model's results. In addition, real GDP is impacting the government spending. Definitely, a country as Russia with huge output would require higher government spending to assure sustainability of growth.

Real exchange rate is affecting the output as expected (Table 2) also shows that. Higher exchange rate would trigger economic activity through higher demand. Finally, real trade balance is found to be moving real investment at the Russian economy.

After founding variables non stationary, we should check for the long run nexus between variables. This process is determined via two steps; the first one based on trace statistic and the second is based on the maximum eigenvalue statistic. Prior to the above, the optimal lag order for VAR model must be determined. Based on akaike information criterion, shown in Tables 2 and 3. Next step lets examine the long-term relationship between the variables, we use cointegration analysis, the method proposed by Johansen (1991). Our VAR model generally can be re-written as follows:

$$\Delta y_t = \mu + \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \quad (3)$$

Where,

$$\Pi = \sum_{i=1}^{p} A_i - I \text{ and } \Gamma_i = -\sum_{j=i+1}^{p} A_j \quad (4)$$

If the coefficient matrix Π has reduced rank $r < n$, then there exist nxr matrices α and β each with rank r such that $\Pi = \alpha\beta'$ and $t\,\beta' y$ is stationary. r - number of cointegrating relationships, the elements of

Table 1: ADF unit root test results for exchange rate model

Variable	5% level	t-statistic	P
Log EXCH	−3.603202	−2.226360	0.4557
log CPI	−1.159153	−3.673616	0.8973
log OIL	−3.603202	−3.673616	0.8973
log GDP	−3.612199	−2.002570	0.5706
log EXPORT	−3.603202	−3.5889008	0.0514

Source: Authors' calculation

α are known as the adjustment parameters in the VECM and each column of β is a cointegrating vector. It can be shown that for a given r, the maximum likelihood estimator of β defines the combination of y_{t-1}.

Yields r largest canonical correlations of Δy_t with y_{t-1} after correcting for lagged differences and deterministic variables when present. Johansen (1991) proposes two different likelihood ratio tests of the significance of these canonical correlations and thereby the reduced rank of the Π matrix: The trace test and maximum eigenvalue test, shown in equations (5) and (6) respectively.

$$J_{trace} = -T \sum_{i=r+1}^{n} \ln\left(1-\hat{\lambda}_i\right) \quad (5)$$

$$J_{\max} = -T \ln\left(1-\hat{\lambda}_{r+1}\right) \quad (6)$$

Where T - sample size and λ_i - the largest canonical correlation. The trace tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors. The maximum eigenvalue test, on the other hand, tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of $r + 1$ cointegrating vectors. Neither of these test statistics follows a chi square distribution in general.

We test here is that there are less than or equal to r cointegrating vectors and the alternative is the opposite, which is more or equal to as follows: H_0: $r \leq 1$ and H_1: $r \geq 2$. If the test statistic is greater than the critical value (i.e., probability is <5%), then we reject H_0 and accept H_1.

It is similar to the trace statistics but specifically test whether r is equal to or not. We follow this procedure to determine how many cointegrating vectors are as follows: H_0: $r = 1$ and H_1: $r = 2$. If the test statistic is greater than the critical value (i.e. probability is <5%), then we reject H_0 and accept H_1. We choose 5% level of significance. Hence, two cointegrating vectors are found based on the max eigenvalue statistic.

Johansen test indicate a long-term relationship between the variables consumer price index, GDP, the oil price, total country export and real exchange rate (Tables 3 and 4).

Table 5 shows the normalized cointegration vector. The long run equation for the real exchange rate model can be written as:

$$\text{Log}EXCH = 2.385934 + 2.385934 \log CPI - 1.466842 \log GDP - 1.666902 \log OIL + 0.084569 \log EXPORT \quad (7)$$

The equation above shows that: The consumer price index and export have a long-run positive relationship with the real exchange rate while the GDP and oil price have a long-run negative relationship with the real exchange rate.

An increase in the consumer price index by 1% will lead to a 2.38% increase in the national currency against the US dollar. This is due to rising inflation that grows with the consumer price index, which reduces the exchange rate.

Table 2: Unit root test results for RUBUSD rate and output

Null hypothesis: LGEXCHANGERATE has a unit root		
Exogenous: Constant, linear trend		
Lag length: 0 (Automatic-based on SIC, maxlag=5)		
	t-Statistic	**P***
Augmented Dickey-Fuller test statistic	−1.159153	0.8973
Test critical values		
1% level	−4.532598	
5% level	−3.673616	
10% level	−3.277364	
Null hypothesis: LGEXCHANGERATE has a unit root		
Exogenous: Constant, linear trend		
Lag Length: 0 (Automatic- based on SIC, maxlag=5)		
	t-Statistic	**P***
Augmented Dickey-Fuller test statistic	−2.226360	0.4557
Test critical values		
1% level	−4.374307	
5% level	−3.603202	
10% level	−3.238054	
Null hypothesis: LGEXPORT has a unit root		
Exogenous: Constant, linear trend		
Lag Length: 0 (Automatic - based on SIC, maxlag=5)		
	t-Statistic	**P***
Augmented Dickey-Fullertest statistic	−3.588908	0.0514
Test critical values		
1% level	−4.374307	
5% level	−3.603202	
10% level	−3.238054	
Null hypothesis: LGGDP has a unit root		
Exogenous: Constant, linear trend		
Lag Length: 1 (Automatic - based on SIC, maxlag=5)		
	t-Statistic	**P***
Augmented Dickey-Fuller test statistic	−2.002570	0.5706
Test critical values		
Test critical values		
1% level	−4.394309	
5% level	−3.612199	
10% level	−3.243079	
Null hypothesis: LGOILPRICE has a unit root		
Exogenous: Constant, linear trend		
Lag length: 0 (Automatic - based on SIC, maxlag=5)		
	t-Statistic	**P***
Augmented Dickey-Fullertest stadsdc	−1.159153	0.8973
Test critical values		
1% level	−4.374307	
5% level	−3.603202	
10% level	−3.238054	

Source: Authors' calculation

Growth of GDP by 1% leads to the strengthening of the national currency by 1.47%, this fact can be explained by the growth of the country's economy as a whole with GDP growth.

The most fact is that with an increase of 1% of the price of oil - the national currency is strengthened by 1.66%, which again confirms the fact that the Russian economy depends on oil prices.

The increase in exports by 1% leads to ruble depreciation, as the flow of foreign currency, which leads to an increase in supply on the interbank market, increases.

From above explanation shows the long-term relationship between the variables namely consumer price index, GDP, oil price, total country exports and real exchange rate, its obligatory necessary to conduct a Granger Causality test. The Granger approach to the question of whether *x* causes *y* is to see how much of the current *y* can be explained by past values of *y* and then to see whether adding lagged values of *x* can improve the explanation. *y* is said to be Granger-caused by *x* if *x* helps in the prediction of *y*, or equivalently if the coefficients on the lagged *x*'s are statistically significant. Note that two-way causation is frequently the case; *x* Granger causes *y* and *y* Granger causes *x*.

It is important to note that the statement "*x* Granger causes *y*" does not imply that *y* is the effect or the result of *x*. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term (Table 6).

The results of the F-statistics Granger Causality test for our model, from which it follows that the price of oil on a par with GDP has the greatest impact on the exchange rate in the short run (Figure 4).

The results obtained as a result of Granger's cointegration and causality research show that world prices for crude oil directly affect the exchange rate of the Russian Federation, rising oil prices reduce the real exchange rate of the country. This, in its turn, positively affects the export opportunities of Russia, because the goods manufactured here "get cheaper" abroad. The reason for this dependence is likely to be the percentage of exports of petroleum products to total exports, and the floating exchange rate operating in the country. It can also be concluded that the Russian Federation is extremely dependent on world oil prices, and shocks in this market can become a real problem for the economy of this country.

5. CONCLUSION

The main goal of this work was to confirm the hypothesis of the impact of oil shocks on the exchange rate of the Russian Federation using time series with data from 1991 to 2016. For this, the methods proposed by Granger and Johansen in the VAR model were used, the statistical package Eviews was used to obtain the results. The Johansen-Juselius cointegration result showed the relationship between changes in oil prices on the world market and the exchange rate of the Russian ruble.

From the results of the study it became known that one of the most important external factor that influences the ratio of the dollar to the ruble is the world price of oil. Russia is one of the world's largest suppliers of "black gold," its economy is mainly associated with oil production, so the slightest fluctuations in oil prices have the strongest impact on it.

If oil prices on the world market grow, then, respectively, real exchange rate becomes stronger, but if prices fall, then there are problems. Thus, the result is the following: The higher the oil price, the lower the US dollar rate to the Russian ruble.

Figure 4: Output for granger causality test with lags from 1 to 4

Pairwise Granger Causality Tests
Date: 02/10/18 Time: 19:54
Sample: 1991 2016
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
LGCPI does not Granger Cause LGEXCHANGERATE	25	8.47059	0.0081
LGEXCHANGERATE does not Granger Cause LGCPI		0.04103	0.8414
LGEXPORT does not Granger Cause LGEXCHANGERATE	25	0.24751	0.6238
LGEXCHANGERATE does not Granger Cause LGEXPORT		9.57805	0.0053
LGGDP does not Granger Cause LGEXCHANGERATE	25	0.06323	0.8038
LGEXCHANGERATE does not Granger Cause LGGDP		3.87086	0.0619
LGOILPRICE does not Granger Cause LGEXCHANGERATE	25	0.55790	0.4630
LGEXCHANGERATE does not Granger Cause LGOILPRICE		6.00618	0.0227
LGEXPORT does not Granger Cause LGCPI	25	1.40256	0.2489
LGCPI does not Granger Cause LGEXPORT		16.6151	0.0005
LGGDP does not Granger Cause LGCPI	25	0.02498	0.8759
LGCPI does not Granger Cause LGGDP		1.72659	0.2024
LGOILPRICE does not Granger Cause LGCPI	25	0.33719	0.5674
LGCPI does not Granger Cause LGOILPRICE		1.27392	0.2712
LGGDP does not Granger Cause LGEXPORT	25	4.57058	0.0439
LGEXPORT does not Granger Cause LGGDP		0.01099	0.9175
LGOILPRICE does not Granger Cause LGEXPORT	25	17.4223	0.0004
LGEXPORT does not Granger Cause LGOILPRICE		1.12650	0.3000
LGOILPRICE does not Granger Cause LGGDP	25	9.56136	0.0053
LGGDP does not Granger Cause LGOILPRICE		2.01023	0.1703

Pairwise Granger Causality Tests
Date: 02/10/18 Time: 19:59
Sample: 1991 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LGCPI does not Granger Cause LGEXCHANGERATE	24	6.41730	0.0074
LGEXCHANGERATE does not Granger Cause LGCPI		2.24148	0.1337
LGEXPORT does not Granger Cause LGEXCHANGERATE	24	1.93149	0.1723
LGEXCHANGERATE does not Granger Cause LGEXPORT		2.24195	0.1336
LGGDP does not Granger Cause LGEXCHANGERATE	24	0.47692	0.6279
LGEXCHANGERATE does not Granger Cause LGGDP		5.41659	0.0138
LGOILPRICE does not Granger Cause LGEXCHANGERATE	24	0.32195	0.7286
LGEXCHANGERATE does not Granger Cause LGOILPRICE		2.76468	0.0883
LGEXPORT does not Granger Cause LGCPI	24	0.31521	0.7334
LGCPI does not Granger Cause LGEXPORT		2.74113	0.0900
LGGDP does not Granger Cause LGCPI	24	0.15668	0.8561
LGCPI does not Granger Cause LGGDP		0.31975	0.7302
LGOILPRICE does not Granger Cause LGCPI	24	0.15766	0.8552
LGCPI does not Granger Cause LGOILPRICE		0.51237	0.6071
LGGDP does not Granger Cause LGEXPORT	24	0.66791	0.5244
LGEXPORT does not Granger Cause LGGDP		0.70152	0.5082
LGOILPRICE does not Granger Cause LGEXPORT	24	2.39440	0.1182
LGEXPORT does not Granger Cause LGOILPRICE		0.57257	0.5735
LGOILPRICE does not Granger Cause LGGDP	24	1.89107	0.1782
LGGDP does not Granger Cause LGOILPRICE		0.46944	0.6324

Pairwise Granger Causality Tests
Date: 02/10/18 Time: 20:00
Sample: 1991 2016
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
LGCPI does not Granger Cause LGEXCHANGERATE	23	5.31192	0.0099
LGEXCHANGERATE does not Granger Cause LGCPI		0.63070	0.6058
LGEXPORT does not Granger Cause LGEXCHANGERATE	23	1.51510	0.2488
LGEXCHANGERATE does not Granger Cause LGEXPORT		1.06822	0.3903
LGGDP does not Granger Cause LGEXCHANGERATE	23	0.67551	0.5796
LGEXCHANGERATE does not Granger Cause LGGDP		3.14305	0.0543
LGOILPRICE does not Granger Cause LGEXCHANGERATE	23	0.92217	0.4525
LGEXCHANGERATE does not Granger Cause LGOILPRICE		1.63779	0.2202
LGEXPORT does not Granger Cause LGCPI	23	0.25370	0.8576
LGCPI does not Granger Cause LGEXPORT		0.59078	0.6299
LGGDP does not Granger Cause LGCPI	23	0.08031	0.9698
LGCPI does not Granger Cause LGGDP		1.19168	0.3444
LGOILPRICE does not Granger Cause LGCPI	23	0.51066	0.6806
LGCPI does not Granger Cause LGOILPRICE		0.42646	0.7367
LGGDP does not Granger Cause LGEXPORT	23	0.08600	0.9667
LGEXPORT does not Granger Cause LGGDP		1.12840	0.3672
LGOILPRICE does not Granger Cause LGEXPORT	23	1.07275	0.3885
LGEXPORT does not Granger Cause LGOILPRICE		1.28574	0.3132
LGOILPRICE does not Granger Cause LGGDP	23	1.40840	0.2768
LGGDP does not Granger Cause LGOILPRICE		0.93986	0.4445

Pairwise Granger Causality Tests
Date: 02/10/18 Time: 20:01
Sample: 1991 2016
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
LGCPI does not Granger Cause LGEXCHANGERATE	22	64.9593	2.E-08
LGEXCHANGERATE does not Granger Cause LGCPI		32.5649	1.E-06
LGEXPORT does not Granger Cause LGEXCHANGERATE	22	2.43971	0.0994
LGEXCHANGERATE does not Granger Cause LGEXPORT		0.84889	0.5191
LGGDP does not Granger Cause LGEXCHANGERATE	22	0.55863	0.6967
LGEXCHANGERATE does not Granger Cause LGGDP		2.13177	0.1347
LGOILPRICE does not Granger Cause LGEXCHANGERATE	22	0.75645	0.5716
LGEXCHANGERATE does not Granger Cause LGOILPRICE		1.64106	0.2232
LGEXPORT does not Granger Cause LGCPI	22	1.84220	0.1810
LGCPI does not Granger Cause LGEXPORT		0.55799	0.6971
LGGDP does not Granger Cause LGCPI	22	1.63195	0.2253
LGCPI does not Granger Cause LGGDP		1.20235	0.3561
LGOILPRICE does not Granger Cause LGCPI	22	1.84572	0.1803
LGCPI does not Granger Cause LGOILPRICE		0.86227	0.5119
LGGDP does not Granger Cause LGEXPORT	22	1.19112	0.3604
LGEXPORT does not Granger Cause LGGDP		3.27445	0.0460
LGOILPRICE does not Granger Cause LGEXPORT	22	0.56538	0.6922
LGEXPORT does not Granger Cause LGOILPRICE		0.88408	0.5002
LGOILPRICE does not Granger Cause LGGDP	22	0.96250	0.4603
LGGDP does not Granger Cause LGOILPRICE		0.61970	0.6564

Source: Authors' calculation

Table 3: Cointegration test result (trace)

Unrestricted cointegration rank test (trace)				
Hypothesized number of CE (s)	**Eigen value**	**Trace statistic**	**0.05 critical value**	**P****
None*	0.999280	279.0095	69.81889	0.0000
At most 1*	0.982634	127.0381	47.85613	0.0000
At most 2*	0.765192	41.91969	29.79707	0.0013
At most 3	0.398545	11.49097	15.49471	0.1830
At most 4	0.038044	0.814508	3.841466	0.3668

Trace test indicates 3 cointegrating eqn (s) at the 0.05 level. *Denotes rejection of the hypothesis at the 0.05 level. ** MacKinnon-Haug-Michellis (1999) P values. Source: Authors' calculation

Table 4: Cointegration test result (maximum eigenvalue)

Unrestricted cointegration rank test (maximum eigenvalue)				
Hypothesized number of CE (s)	**Eigen value**	**Max-Eigen statistic**	**0.05 critical value**	**P****
None*	0.999280	151.9714	33.87687	0.0000
At most 1*	0.982634	85.11839	27.58434	0.0000
At most 2*	0.765192	30.42872	21.13162	0.0019
At most 3	0.398545	10.67646	14.26460	0.1712
At most 4	0.038044	0.814508	3.841466	0.3668

Max-Eigen value test indicates 3 cointegrating eqn (s) at the 0.05 level. *Denotes rejection of the hypothesis at the 0.05 level. ** MacKinnon-Haug-Michellis (1999) P values. Source: Authors' calculation

Accordingly, if the prices for "black gold" in the world market tend to fall (in dollar terms), then the Russian economy begins to lose a certain part of the profit from the sale of oil, therefore it becomes necessary to devalue the national currency. It is oil and gas that are the main export products of Russia, half of the state budget revenues are their sale. In this regard, it is the size of foreign exchange earnings that depends on the price of oil.

Proceeding from all of the above, as a recommendation, reducing the dependence of the Russian economy on energy resources,

Table 5: Normalized cointegration vector

Normalized cointegrating coefficients (Standard erorr in parentheses)				
LGEXCHANGE	**LGCPI**	**LGEXPORT**	**LGGDP**	**LGIOLPRICE**
1.000000	2.385934 (NA)	0.084569 (NA)	−1.466842 (NA)	−1.666902 (NA)

Source: Authors' calculation

Table 6: Granger causality results

Indicator	F-stats.
∑log *CPI*	0.951094
∑ log *GDP*	1.795367
∑ log *EXPORT*	0.632294
∑ log *OIL*	2.406444

Source: Authors' calculation

including oil. Translation of the economy from industrial to innovative. Improvement of the investment climate in the country for a foreign investor.

According to above conclusion several suggestions have be provided;

1. The stabilization of foreign economic policy, which should lead to the abolition of anti-Russian sanctions. Apart from the fact that this will make the Russian economy more attractive for foreign investments, the opportunity will again become one of the main players in the market.
2. The second step is the diversification of exports. The task is to turn this wealth from oil revenue into a tool that enhances the quality of the development of the Russian economy and the life of society as a whole.
3. The Russian oil brand Urals must be recognized in the world as one of the world's oil brands.
4. The calculations for Russian oil and gas in rubles. The real convertibility of the ruble largely depends on its attractiveness as a means used for settlements and savings. In particular, the ruble should become a more universal means for international settlements and should gradually expand its zone of influence. For the same purposes, it is necessary to organize exchange trade in oil, gas, and other goods on the territory of Russia.

REFERENCES

Akpan, E.O. (2009), Oil Price Shocks and Nigeria's Macro Economy. A Paper Presented at the Annual Conference of CSAE Conference. Economic Development in Africa. Available from: http://www.csae.ox.ac.uk/conferences/2009-EDIA/Papers/252-Akpan.Pdf.

Amano, R.A., Van Norden, S. (1998), Exchange rates and oil prices. Review of International Economics, 6, 683-694.

Backus, D.K., Crucini, M.J. (2000), Oil prices and the terms of trade. Journal of International Economics, 50, 185-213.

Baumeister, C., Peersman, G. (2008), Time-Varying Effects of Oil Supply Shocks on the US Economy. Available from: http://www.dx.doi.org/10.2139/ssrn.1093702.

Buetzer, S., Habib, M., Stracca, L. (2012), Global Exchange Rate Configurations: Do Oil Shocks Matter? Working Paper, European Central Bank.

Eltony, M.N., Al-Awadi, M. (2001), Oil price fluctuations and their impact on the macroeconomic variables of Kuwait: A case study using a VAR model. International Journal of Energy Research, 25(11), 939-959.

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

Ferraro, D., Rogoff, K., Rossi, B. (2015), Can Oil Prices Forecast Exchange Rates? Available from: http://www.econ.upf.edu/~brossi/OilAndExchangeRates.pdf.

Hooker, M. (1996), Oil prices and the rise and fall of the US real exchange rate. Journal of Monetary Economics, 25, 195-213.

Huang, Y., Guo, F. (2007), The role of oil price shocks on China's real exchange rate. China Economic Review, 18, 403-416.

Iwayemi, A., Fowowe, B. (2011), Impact of oil price shocks on selected macroeconomic variables in Nigeria. Energy Policy, 39, 603-612.

Johansen, S. (1991), Estimation and hypothesis testing of cointegration vectors in gaussian vector autoregressive models. Econometrica, 59(6), 1551-1580.

Mikhailov, A. (2018), Pricing in oil market and using probit model for analysis of stock market effects. International Journal of Energy Economics and Policy, 4, 43-53.

Mikhailov, A.Y. (2014), Faktory razvitiya ekonomiki Rossii v 2015 godu [Factors of development of the Russian economy in 2015]. Voprosy Regulirovaniya Ekonomiki [Questions of Economic Regulation], 4, 62-69.

Mikhaylov, A. (2018), Volatility spillover effect between stock and exchange rate in oil exporting countries. International Journal of Energy Economics and Policy, Econjournals, 8(3), 321-326.

Nyangarika, A., Mikhaylov, A., Tang, B.J. (2018), Correlation of oil prices and gross domestic product in oil producing countries. International Journal of Energy Economics and Policy, 8(5), 42-48.

Olomola, P.A., Adejumo, A.V. (2006), Oil price shock and macroeconomic activities in Nigeria. International Research Journal of Finance and Economics, 3(1), 28-34.

Singer, E. (2007), Oil Price Volatility and the US Macroeconomy: 1983-2006. Working Paper, Minnesota of USA: Carleton College.

Tuzova, Y., Qayum, F. (2016), Global oil glut and sanctions: The impact on putin's Russia. Energy Policy, 90, 140-151.