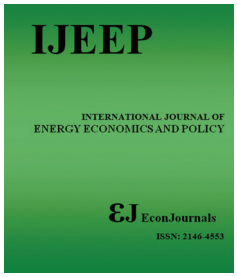


International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2022, 12(1), 217-224.

Influence of Oil Factor on Economic Growth in Oil-exporting Countries

Marina A. Osintseva*

Industrial University of Tyumen, Russian Federation. Email: osintsevama@mail.ru

Received: 04 August 2021 **Accepted:** 16 November 2021 **DOI:** https://doi.org/10.32479/ijeep.11794

ABSTRACT

Traditional types of energy resources, among which oil is primary, have a huge influence on economic development in various manifestations. In our research, we discuss dependence of economic growth in oil-exporting countries on first-order factors, such as oil prices, oil production, and structural shift in a share of oil exports. To review 2005-2019, we chose leading oil-exporting nations, including the OPEC members (Iraq, Iran, Libya, Saudi Arabia, and Nigeria), as well as countries outside this group (Russia, Kazakhstan, Azerbaijan, and Norway). Having used statistical and regression techniques, we confirm that the correlation between oil price fluctuations and economic growth raises with the scale effect. Larger economies (by absolute GDP in oil-exporting nations and hydrocarbon production) might generate more intensive economic growth from positive changes in oil prices than small economies. Also, the OPEC members show the strongest structural shifts in the change of the share of oil exports than the other countries. Resulting regression dependences led us to the conclusion that in oil-exporting countries, economic growth largely depends on an increase in oil prices and changes in oil production rates. But contrary to the expectations saying that in time of downturns, as far as global oil prices fall, nations will reduce oil exports, we observe the reverse picture – changed role of the price factor. We explain this with the keeping income-balance strategy, where the oil price parameter is a tool to choose ideal production. Our findings show that with the 1%-increase in oil production, the countries under considerations (the OPEC members) might reach GDP from 0.0367% (Iraq) to 0.437% (Libya). For countries outside OPEC, such a GDP growth might be more intensive. For instance, in Russia, it might be up to 1.559%. This also points out that the joint coordinating policy in oil production affects the economic growth potential.

Keywords: Oil Market, Oil Prices, Economic Growth, Sustainability
JEL Classifications: L21, G31, Q49

1. INTRODUCTION

Efficient functioning of national economies largely depends on their structures, proportions of leading sectors, and performance. Economy performance evaluation is of particular relevance for the nations that might be classified as non-diversified in terms of a market power of one or a number of related sectors (Kuboniwa, 2012; Figueroa and Calfucura, 2010; Litau, 2018; Kheyfets and Chernova, 2021). This statement is also true for the nations that specialize in exports of natural energy resources, such as oil and gas (Xiong et al., 2015; Al-Rawashdeh et al., 2013; Ji et al., 2014; Illig and Schindler, 2017).

The upward trend in the cost of energy resources has dramatically changed a nature of international relations. They did not only become a commodity, but also a tool for influence in geoeconomy and geopolicy. The balance of power has shifted towards the developing countries that export large volumes of oil and gas. Despite steady growth in alternative (renewable) energy sources, they are not yet able to meet needs of global economy in full (Kuzmin et al., 2019). However, the global oil market has significant fluctuations. So, for 9 months of 2020, the fall in prices of Brent crude oil was 67.9% (Fusion Media Limited, 2021), whereas a year earlier, growth in oil prices was over 22.2% (Fusion Media Limited, 2021). Such variability, in turn, causes significant

economic shocks in the countries that specialize in oil production and exports as dependence on market conditions creates many risks for economic growth in such countries. Therefore, it remains important to clarify a nature of the influence of the dominating oil export on economic development.

These circumstances governed the purpose of our research, which we state as evaluating an influence of oil prices, oil production, and structural changes in exports on economic growth of oil-exporting countries. To do this, we solved the following tasks: explore export orientation in oil-exporting countries (define a share of oil exports of total exports in the countries under consideration), analyse structural changes in oil exports, evaluate the interrelations between oil prices, changes to oil exports share, oil production, and economic growth rates (GDP).

2. LITERATURE REVIEW

In the 1980-ies-1990-ies, people mostly believed that natural resource endowment slows down economic growth (Gylfason et al., 1999; Sachs and Warner, 1995). Auty (2001) shows that such large resource-based economies, as Russia, Nigeria or Venezuela have lower rates of GDP growth than many countries that possess significant natural resources (Japan, South Korea, Ireland, etc.). The concept of *resource curse* or *resource surplus paradox* has become widely known. The natural resource surplus might cause very diverse effects: from low budget deficits and high living standards of the population to weak institutions and slowdown in economic growth rates (Sim, 2013).

Regarding economies in transition, Kronenberg (2004) points out to the essential inverse correlation between availability of raw materials and economic growth. Esanov et al. (2001) made similar conclusions for some CIS countries. Turkmenistan and Uzbekistan are illustrative cases. Both countries, as well as Azerbaijan and Kazakhstan, are described with authoritarian rule and monopolization in economic environment. The resource rent provides for functioning of a kind of political and economic oligopoly that impedes economic reforms and growth.

The need to maintain export earnings of countries means the influence of the price factor on export positions. The influence of the price factor on countries depends on aggregate structures of exports and imports. For instance, many developing countries export raw materials, but import energy resources (Spatafora and Tytell, 2009). Accordingly, the price boom in commodity markets does not necessarily lead to significant countries improvement. At first glance, declined commodity prices might neutralize the trend towards excessive strengthening of national currencies in exporting countries and thus neutralize the *Dutch disease* threat. However, functional dependencies are thought to be much more complicated.

Ftiti et al. (2016) proposed the econometric methodology from the evolutionary spectral analysis to distinguish between short-term coincidence and long-term dynamics. Their findings show that oil price fluctuations have both medium and short-term influence on economic indicators in the OPEC countries. At the same time, medium-term effects were significantly larger than short-term ones.

Umar et al. (2017) identified cause-and-effect relations between oil price volatility and economic performance in Nigeria. Based on vector autoregressive patterns, they found the close connection between oil price fluctuations and GDP growth. Gross domestic product was considered as a dependent variable with such main explanatory factors, as oil price, direct foreign investments, total export, parameters of trade openness and level of human capital. However, in time of simulation efforts, Umar et al. found no correlation between variables in the long term horizon of their review. They concluded that to keep sustainable economic growth, we need to keep less volatile world oil prices as this parameter is indeed a significant factor in terms of influence on economic growth in oil-exporting countries.

Shibinskaya and Burakova (2017) explored dependence between oil prices and growth in U.S. economy in the long term. For an analysis, they applied the VAR method, which shows that abrupt changes in oil prices in part suppressed GDP growth.

Since Russia is one of the leading oil and gas exporters, numerous research describe dependence of Russia's GDP on levels of oil prices. So, for their calculations, Shestukhina and Fomin (2016) applied the least squares method. They found the close relationship between the indicators under consideration. Rau (2017) also shown the effect of the changed oil prices on GDP.

The finalised literature review shows ambiguity in views of researchers on a nature of the influence of national resource bases on economic indicators of development. There are still in place unsolved questions that relate in particular to transformation of macroeconomic policies of raw-exporting countries in terms of abrupt price changes, observable in the active phase of the COVID-19 pandemic. Thus, keeping economic development sustainable is an adaptational task aimed at structural changes. In this context, we try to clarify the strength of the influence (sensitivity) that oil prices make on economic growth in some countries, considering the latest trends in the market environment.

3. MATERIALS AND METHODS

Economic growth models are based on various approaches, from production functions and vector autoregression to non-parametric design (Jiménez-Rodríguez and Sánchez, 2005). However, in our research, we apply the aggregate indicator of gross domestic product as a simple alternative to estimated dynamics of economic growth. Coming from the finalised literature review and own observations, we believe that the relationship between fluctuations in oil prices and economic growth is stronger in large economies (by absolute GDP of oil-exporting nations and hydrocarbons production).

To make the review, we chose leading oil-exporting nations. Among them, there are the OPEC countries (Iraq, Iran, Libya, Saudi Arabia, and Nigeria), as well as the countries outside this group (Russia, Kazakhstan, Azerbaijan, and Norway). We applied

the heterogeneous sample of countries (that includes non-OPEC countries) to reduce factors of mutual influence within the OPEC group. The sample was also promising as the countries varied by level of socio-economic development.

The research of oil price and production influence on economic growth included three stages:

1. At the first stage, we explored foreign trade focus in the countries under consideration, for which we applied the export quota (EQ) indicator:

$$EQ^t{}_j = \frac{Export^t{}_j}{GDP^t{}_j} \times 100\%, \quad (1)$$

2. At the second stage, we calculated the share of oil exports of total exports in the countries, as well as analysed changes to structural shifts in this share. To process the data, we applied the structural-dynamic analysis. It assumes that we find individual and summarising indicators of structural changes (using linear and root-mean-square coefficients of absolute and relative structural shifts with variable or fixed comparison base). We calculated the structural indicator using the formula by Sivelkin and Kuznetsova (2002).
3. At the third stage, we reviewed the relationship between the share of oil exports in total exports and rates of economic growth (GDP). To carry out the correlation analysis, we applied the multiple linear regression. It assume the calculation of the linear dependence in the group of independent variables.

To estimate the relationship between structural shifts in the share of oil exports, changes in oil prices, and GDP dynamics rates in oil-exporting countries, we found the correlation coefficient (Ishkhanian and Karpenko, 2016):

$$r_{xy} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{n \cdot \sigma_x \sigma_y}, \quad (2)$$

Where n is size of the population under consideration (sample size); $\bar{x}$, $\bar{y}$ are average values of parameters; $\sigma_x{}^2$, $\sigma_y{}^2$ are dispersions of time-series parameters; and σ_x, σ_y are root-mean-square (standard) deviations of parameters.

The multivariate regression model might look like the following:

$$GDP = f(x_1, x_2, x_3), \quad (3)$$

where x_1 is change in structural shifts in the oil exports share; x_2 is oil production growth rates; x_3 are oil prices in a respective country.

We tested overall quality of the multiple regression equation using Fisher's criterion. H_0 is the hypothesis for statistical insignificance of the regression equation and strength of the relationship index. If $F_{calc} \geq F_{table}$, we reject H_0 hypothesis and recognize significance and reliability of estimated parameters of the regression equation.

The research information base included data on socio-economic situations of countries in the sample, i.e. GDP in raw numbers, GDP per capita, data on proven oil reserves and production, oil exports in kind (barrels), value of total exports and value of exports of the oil they produce, as well as the data on oil national demand (consumption).

Research assumptions and constraints included cost characteristics of oil. Allowing for the cost of oil, we applied oil grades prevailing in exports.

Research sources of information included data from annual statistical bulletins issued by the Organization of the Petroleum Exporting Countries (2009; 2012; 2016; 2020), websites of public authorities and statistics of the countries under consideration (The State Revenue Committee of the Republic of Kazakhstan Ministry of Finance, 2021; Oil Industry in the Republic of Kazakhstan, 2011; State Statistical Committee of the Republic of Azerbaijan, 2021; Federal State Statistics Service, 2021; Bank of Russia, 2021) and the data provided by international statistical offices (The World Bank Group, 2021a; Sönnichsen, 2021). 2005-2019 was a research horizon period.

4. RESULTS

The research background includes the review of socio-economic conditions in the countries under consideration. The sample includes small-size countries with the population of not more than 10 million people (Norway, Azerbaijan, and Libya) and large-size countries with the population of more than 50 million people (Iran, Russia, and Nigeria). See the indicators that describe levels of socio-economic development of these countries in Table 1.

In 2019, in most of the countries under consideration, the export quota was over 0.3 (Iraq, Libya, Kazakhstan, Azerbaijan, Norway, and Saudi Arabia). Export was not so significant for Iran, Nigeria, and Russia. Many countries under consideration were highly dependent on oil exports as its share in total value of exports was over 70% (Iraq, Libya, Saudi Arabia, Nigeria, and Azerbaijan). In Iran, the share of oil exports of total export was about 28%, while in Russia, it was 29%, in Kazakhstan, it was 68%, and in Norway, it was 39%. See the data on dynamics of oil production in 2005-2019 in Table 2.

In 2005/2019, Iraq (+246.9%), Kazakhstan (+57.1%) and Azerbaijan (+54.8%) had the highest oil production growth rates. Some countries had a decrease in oil production: Libya (−35.2%), Nigeria (−26.6%), and Norway (−44.8%). At the same time, by comparing the data on dynamics of changes in production and oil exports in kind, we might observe that oil exports in Iran increased 2.69 times, and in Azerbaijan - 2.57 times. In Russia, the increase in oil exports was only 8.6%. In the rest of the countries under consideration, the growth in oil exports declined. This might be due to increased national consumption. See graphical representation of average annual growth rate (crude oil production and exports) in Figure 1.

Despite the slight decrease in oil exports in kind, in value terms, almost all countries had growth (Table 3). We might explain this

Table 1: Principal social and economic indicators for selected countries, 2019

Indicator	IRO	IRN	LBY	SAU	NGA	RUS	KAZ	AZE	NOR
Population, million	39.1	83.3	6.6	34.2	208. 3	146.7	18.6	10. 0	5.3
Area, thousand sq. km	438	1,648	1,760	2,150	924	17,098	279 5	8 7	385
GDP per capita, USD	6,719	5,704	5,019	23,174	2,284	432 1	11,518	5,880	92,556
GDP, USD bln	262.9	474.9	33.0	792.9	475.8	1,701.9	180.2	48.0	403.3
Export value, USD billion	82.3	69.3	25.7	261.5	64.8	422.8	57.3	19.6	149.0
Oil export value, USD bln	80.0	19.2	24.2	202.4	46.1	122.2	38.7	14.4	58
Proved crude oil reserves, billion barrels	145.0	208.6	48.4	258.6	36.9	80.0	30.0	7.0	8.8
Crude oil production, 1,000 bpd	4,576.1	2,356.2	1,096.6	9,808.2	1,737.4	10 625	1,549.8	678.5	1,408.5
Crude oil export, 1,000 bpd	3,968.2	651.1	1,035.7	7,038.1	2,008.2	5,253	1,817.6	788.8	1,233.5
Oil demand, 1,000 bpd	1,838	716	214	3,199	470	3,608	317	n/a	n/a

IRQ is Iraq, IRN is Iran, LBY is Libya, SAU is Saudi Arabia, NGA is Nigeria, RUS is Russia, KAZ is Kazakhstan, AZE is Azerbaijan, and NOR is Norway. Source: (Organization of the Petroleum Exporting Countries, 2021; Federal State Statistics Service, 2021, Bank of Russia, 2021, The World Bank Group, 2021, Sönnichsen, 2021)

Table 2: Crude oil production dynamics, 2005-2019, 1,000 bpd

Year	Country								
	IRO	IRN	LBY	SAU	NGA	RUS	KAZ	AZE	NOR
2005	1,853	4,092	1,693	8,353	2,366	9,148	987	438	2,553
2006	1,957	4,073	1,751	9,208	2,234	9,359	1,057	643	2,354
2007	2,035	4,031	1,674	8,816	2,059	9,572	1,079	855	2,210
2008	2,281	4,056	1,722	9,198	2,017	9,499	1,143	900	2,108
2009	2,336	3,557	1,474	8,184	1,842	9,650	1,256	1,014	1,989
2010	2,358	3,544	2,048	8,166	2,048	9,841	1,333	1,027	1,799
2011	2,653	3,576	490	9,311	1,975	9,787	1,326	872	1,680
2012	2,942	3,740	1,450	9,763	1,954	9,953	1,307	817	1,533
2013	2,980	3,575	993	9,637	1,754	10,047	1,373	815	1,464
2014	3,111	3,117	480	9,713	1,807	10,088	1,345	793	1,512
2015	3,504	3,504	404	10,193	1,748	10,111	1,322	787	1,567
2016	4,648	4,648	389	10,460	1,427	10,292	1,295	770	1,615
2017	4,469	4,469	811	9,959	1,536	10,349	1,467	729	1,588
2018	4,410	4,410	951	10,317	1,602	10,527	1,547	725	1,487
2019	4,576	4,576	1,097	9,808	1,737	10,525	1,550	679	1,409

Source: OPEC (2009; 2012; 2016; 2020)

Table 3: Crude oil exports in 2005-2019, USD million

Year	Country								
	IRO	IRN	LBY	SAU	NGA	RUS	KAZ	AZE	NOR
2005	22,950	53,218	28,300	161,784	49,722	83,438	17,395	4,436	47,190
2006	29,500	59,131	35,700	188,468	54,607	102,283	23,612	9,162	51,000
2007	39,433	69,248	42,852	205,452	51,170	121,521	28,126	16,135	54,340
2008	61,111	89,855	60,199	280,998	74,305	161,147	43,508	26,927	66,869
2009	41,668	55,746	36,966	161,914	44,732	100,593	26,207	17,684	39,932
2010	52,290	72,228	46,115	215,385	65,674	135,799	36,956	22,626	47,779
2011	83,006	114,751	18,615	317,614	88,449	181,812	55,174	29,755	59,315
2012	94,103	101,468	60,188	337,480	95,131	180,930	56,442	27,510	54,656
2013	89,402	61,923	44,445	321,888	89,930	173,668	57,250	27,395	49,721
2014	83,561	53,652	10,424	284,424	77,489	153,896	53,630	26,471	46,255
2015	54,394	27,308	4,975	152,910	41,168	89,588	26,773	13,342	26,098
2016	43,684	41,123	9,313	136,194	27,295	73,713	19,378	10,080	22,832
2017	59,730	52,728	15,014	170,241	37,983	93,377	26,584	12,470	25,975
2018	84,218	60,519	25,386	231,585	54,513	129,202	37,796	16,780	32,965
2019	80,027	19,233	24,188	202,370	45,106	122,229	33,563	17,800	58,000

Source: (Organization of the Petroleum Exporting Countries, 2009, 2012, 2016, 2020; Bank of Russia, 2021; National Bank of Kazakhstan, 2021; The Observatory of Economic Complexity, 2021)

with the corresponding rise in oil prices. In 2005-2019, the price of Iran Light oil shown the growth of 23.9%, Brega Libyan oil - of 21.2%, Forcados Nigerian oil – of 19.0%, Ekosfisk Norwegian oil - of 19.8%. The price of Urals Russian oil shown the growth of 26.8%, and Arab Heavy Saudi Arabia oil shown the growth of 41.0%. Reference Brent shown the growth in price of 17.9% up to USD 64.2 per barrel.

Research sources of information included data from annual statistical bulletins issued by OPEC (2009; 2012; 2016; 2020), websites of public authorities and statistics of the countries under consideration (The State Revenue Committee of the Republic of Kazakhstan Ministry of Finance, 2021; Oil Industry in the Republic of Kazakhstan, 2011; the State Statistical Committee of the Republic of Azerbaijan, 2021; Federal State

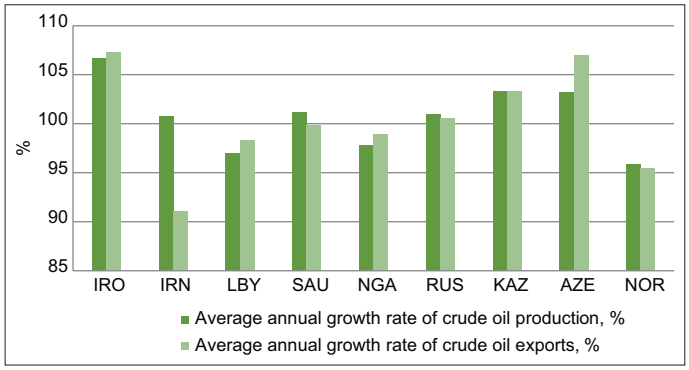
Statistics Service, 2021; Bank of Russia, 2021) and the data provided by international statistical offices (The World Bank Group, 2021; Sönnichsen, 2021). 2005-2019 was a research horizon period.

Based on available data, let us calculate the structural indicator of the share of crude oil exports in total exports (Table 4) and examine its change in dynamics. For this, we calculated the individual index of absolute structural shifts with constant Δ_1 (Table 4) and variable comparison base $\Delta_{2.}$

In 2005-2019, we found the largest structural changes in exports in such countries, as Iran (decrease by 60.94% in the share of oil exports), Nigeria (decrease by 29.63% in the share of oil exports), and Libya (decrease by 12.27% in the share of oil exports). In Azerbaijan, growth in the share of oil exports was 32.82%, in Kazakhstan +13.14%, and in Norway + 10.29%. Russia slightly reduced the share of oil exports (by 5.64%).

In Iran, individual indicators of absolute structural shifts with the variable comparison base were the highest. The heavy increase in growth of the oil export share was in 2008 (by 17.81%), 2012 (by 15.26%), and 2018 (by 9.18%). The heavy decline in the share of oil exports was found in 2006 (by 11.90%), 2009 (by 25.03%), 2013 (by 27.01%), 2015 (by 27.10%), and 2019 (by 29.50%).

Figure 1: Average annual growth rates (crude oil production and exports), 2005-2019



Similar trends in dynamics of oil exports might be found in Libya, where we also recorded the significant increase of the share in 2008, 2012, 2018, and 2019. The significant decrease in the share of oil exports was in 2009, 2011, and 2014.

Saudi Arabia, Russia, and Kazakhstan, unlike Iran and Libya, had no periods of shock changes in the share of oil exports (both decrease and increase in the share were not over 10%). Nigeria had the period of strong growth (over 10%) in the share of oil exports only in 2013 (by 32.86%), and periods of strong decline in 2010 (by 13.71%), 2016 (by 10.56%), and 2019 (by 17.75%). Norway had the significant increase in the share of oil exports in 2019 (by 28.89%). Azerbaijan had significant (over 10%) structural shifts in the share of oil exports in 2006 (increase by 12.40%), 2008 (increase by 11.90%), and 2019 (by 20.12%). At the same time, we did not found any significant reductions.

Thus, the OPEC member states show the strongest structural shifts in the changed share of oil exports than other oil-exporting countries.

In the review of time periods of change structural shifts, we might mention that in 2008, three out of nine countries under considered shown the increase in the share of oil exports (Iran, Libya, and Azerbaijan). This was accompanied by significant growth in prices on the oil market. This what the reason for changes in oil exports. The opposite fluctuation was in 2009, when oil prices were strongly corrected. Iran Light had the price reduction of 35.29%, Brega had the price reduction of 36.65%, Arab Heavy' price decreased by 31.63%. As a result, substantial reduction in the share of oil exports was showed by Iran, Libya, and Saudi Arabia (countries most sensitive to the price factor).

The influence of the price factor gradually escalated. In 2015, five out of nine countries under consideration reduced the share of oil exports (Iran, Saudi Arabia, Russia, Kazakhstan, and Azerbaijan). At that time, the decrease in the price of Iran Light, Arab Heavy, Urals, and Brent was 47-49%.

Behaviours of exporting countries in the oil market have changed in recent years. Maintaining the balance of incomes has become a

Table 4: Structure indicator of share of crude oil export of total export, %

Year	Country								
	IRO	IRN	LBY	SAU	NGA	RUS	KAZ	AZE	NOR
2005	96.85	88.68	47.16	89.60	99.24	34.55	57.22	58,00	45.48
2006	96.63	76.78	46.36	89.19	92.22	33.95	57.17	70.40	41.73
2007	97.49	70.90	43.88	88.11	94.82	34.53	58.90	77.20	39.85
2008	95.90	88.71	59.43	89.64	90.81	34.46	61.13	89.10	38.60
2009	98.26	63.68	42.23	84.20	89.58	33.35	60.67	85.60	34.82
2010	95.77	70.85	45.23	85.76	75.86	34.20	64.56	87.90	36.57
2011	99.74	79.21	12.85	88.20	70.40	35.19	62.62	87.52	36.98
2012	99.69	94.47	56.04	86.89	66.46	34.48	61.16	86.30	33.96
2013	99.62	67.46	48.42	85.64	99.31	33.02	67.59	86.20	32.01
2014	99.50	62.95	12.23	82.95	93.83	30.94	67.49	93.67	31.99
2015	94.47	35.84	6.53	75.13	93.56	26.08	58.26	85.60	25.15
2016	93.28	43.81	9.92	74.18	83.01	25.81	52.69	76.30	25.47
2017	93.91	48.07	13.69	76.73	85.42	26.10	54.81	82.30	25.47
2018	90.72	57.24	24.01	78.67	87.36	28.74	61.85	80.70	26.88
2019	97.23	27.74	34.89	77.38	69.61	28.91	70.36	90.82	55.77
Δ_1 2019/2005	0.38	−60.94	−12.27	−12.22	−29.63	−5.64	13.14	32.82	10.29

priority (when the price factor is compensated by supply volumes). Therefore, in 2019, five out of nine countries increased the share of oil exports (Iraq, Libya, Kazakhstan, Azerbaijan, and Norway), even though in that time oil prices were in decrease. Thus, the cost of Brent, Brega, Urals, and Ekosfisk reduced by 8-9%. This was influenced by double term extension of the OPEC+ agreement, trade war between the USA and China, peak growth in shaly production in the United States and other countries, tankers seizures, attacks on oil treatment plants in Saudi Arabia, and sanctions against Iran and Venezuela (Deynego, 2020).

The analysis performed makes it possible to move on to the next research stage. The raw data (to make regression model) included GDP growth rates of 2005-2019 in the countries under consideration (Table 5).

Based on the earlier estimated structural shifts in the share of oil exports, oil production growth rates, as well as dynamics of oil prices, we made regression dependencies for each country.

The regression equation for Iraq is as follows: $Y=-0.4132+0.2074x_1+0.4267x_2+0.04098x_3$, We tested statistical significance of the equation using the determination coefficient and Fisher's criterion. Overall variability of GDP in Iraq is due to 55.1%-change to x_i factors by R^2. Tabular value $Fkp(3,10)=3.71$, Ffact=4.09. When Ffact>Fkp, the determination coefficient is statistically significant and regression equation is statistically reliable. From the highest coefficient β we conclude that the greatest influence on GDP in Iraq is made by the magnification factor of oil production growth rates.

The regression equation for Iran is as follows: $Y=0.8186+0.07857x_1+0.2096x_2+0.06918x_3$. We tested statistical significance of the equation using the determination coefficient and Fisher's criterion. Overall variability of GDP in Iran is due to 18.7%-change to x_i factors by R^2. Tabular value $Fkp(3,10)=3.71$, Ffact=0.77. When Ffact<Fkp, the determination coefficient is not statistically significant and regression equation is not statistically reliable. From the highest coefficient β we conclude that the greatest influence on GDP in Iran is made by the magnification factor of oil production growth rates.

The regression equation for Libya is as follows: $Y=-0.06079+0.478x_1+0.4373x_2-0.2056x_3$. We tested statistical significance of the equation using the determination coefficient and Fisher's criterion. Overall variability of GDP in Libya is due to 92.7%-change to x_i factors by R^2. Tabular value $Fkp(3,10)=3.71$, Ffact=42.29. When Ffact>Fkp, the determination coefficient is statistically significant and regression equation is statistically reliable. From the highest coefficient β we conclude that the greatest influence on GDP in Libya is made by the magnification factor of oil production growth rates.

The regression equation for Saudi Arabia is as follows: $Y=0.0816+0.1037x_1+0.3364x_2+0.00189x_3$. We tested statistical significance of the equation using the determination coefficient and Fisher's criterion. Overall variability of GDP in Saudi Arabia is due to 70.8%-change to x_i factors by R^2. Tabular value $Fkp(3,10)=3.71$, Ffact=8.09. When Ffact>Fkp, the determination coefficient is statistically significant and regression equation is statistically reliable. From the highest coefficient β we conclude that the greatest influence on GDP is made by the magnification factor of oil production growth rates.

The regression equation for Nigeria is as follows: $Y=1.9662+0.10563x_1+0.033667x_2+0.01268x_3$. We tested statistical significance of the equation using the determination coefficient and Fisher's criterion. Overall variability of GDP in Nigeria is due to 7.0%-change to x_i factors by R^2. Tabular value $Fkp(3,10)=3.71$, Ffact=0.25. When Ffact<Fkp, the determination coefficient is statistically non-significant and regression equation is not statistically reliable. From the highest coefficient β we conclude that the greatest influence on GDP is made by the magnification factor of the individual structural shift in the oil export share.

The regression equation for Russia is as follows: $Y=-0.8788-1.2874x_1+1.5587x_2+0.1846x_3$, We tested statistical significance of the equation using the determination coefficient and Fisher's criterion. Overall variability of GDP in Russia is due to 68.6%-change to x_i factors by R^2. Tabular value $Fkp(3,10)=3.71$, Ffact=7.28. When Ffact>Fkp, the determination coefficient is statistically significant and regression equation is statistically reliable. From the highest

Table 5: Economic growth rates in 2005-2019, %

Year	Country								
	IRO	IRN	LBY	SAU	NGA	RUS	KAZ	AZE	NOR
2006/2005	8.0	3.8	4.9	−0.1	3.3	8.6	9.5	33.0	1.6
2007/2006	−0.3	7.0	4.8	−0.9	3.8	8.7	7,7	24.0	1.9
2008/2007	6.4	−0.9	1,2	3.4	4.0	5.2	2.0	8.3	−0.8
2009/2008	1,3	−0.1	−2.0	−4.8	5.2	−7.8	−1.4	7.1	−3.0
2010/2009	3.7	4.6	3.9	2.0	5.2	4.5	5.8	3.5	−0.5
2011/2010	4.1	1.4	−62.4	6,7	2.5	4.2	5.9	−2.8	−0.3
2012/2011	9.8	−8.6	121.8	2.2	1.5	3.8	3.3	0.9	1.4
2013/2012	3.5	−1.4	−−14.1	−0.4	3.9	1.5	4.5	4.5	−0.2
2014/2013	−3.0	3.3	−24.5	0.8	3.5	−1.0	−1.5	1.5	0.8
2015/2014	−0.9	−2.6	−9.7	1.5	0.0	−2.2	−0.3	−0.1	1.0
2016/2015	11.9	11.9	−3.9	−0.6	−4.2	0.0	−0.3	−4.1	0.2
2017/2016	−4.9	2,3	25.0	−2.7	−1.8	1.7	2.7	−0.8	1.5
2018/2017	−2.8	2,3	13.4	0.6	−0.7	2.5	2.7	0.6	0.6
2019/2018	2.1	2,3	1.0	−1.3	−0.4	1.4	3.2	1.4	0.5

Source: (The World Bank Group, 2021b)

Table 6: Regression influence of factors

Country	Influence of factor (*Xi*), % of GDP			The greatest influence of factor	Regression significance
	x_1	x_2	x_3		
IRO	0.207	0.041	0.041	Increase in oil production growth rates	+
IRN	0.0786	0.21 0	0.069	Increase in oil production growth rates	-
LBY	0.487	0.437	−0.204	Increase in oil production growth rates	+
SAU	0.104	0.336	0.00 2	Increase in oil production growth rates	+
NGA	0.056	0.037	0.01 3	Increased individual structural shift in oil exports share	-
RUS	−1.287	1,559	0.185	Increase in oil prices growth rates	+
KAZ	0.041	0.048	0.07 5	Increase in oil prices growth rates	-
AZE	0.831	0.218	0.061	Increase in oil production growth rates	+
NOR	0.009	0.11 0	0.018	Increase in oil prices growth rates	-

coefficient β we conclude that the greatest influence on GDP in Russia is made by the magnification factor of oil prices growth rates.

The regression equation for Kazakhstan is as follows: Y=2.7 881+0.04114x_1−0.0148424x_2+0.07488x_3, We tested statistical significance of the equation using the determination coefficient and Fisher's criterion. Overall variability of GDP in Kazakhstan is due to 38.7%-change to x_i by R^2. Tabular value F*kp*(3,10)=3.71, Ffact=2.11. When Ffact<Fkp, the determination coefficient is statistically non-significant and regression equation is not statistically reliable. From the highest coefficient β we conclude that the greatest influence on GDP in Kazakhstan is made by the magnification factor of oil prices growth rates.

The regression equation for Azerbaijan is as follows: Y=0.8945+ 0.8312x_1−0.2182x_2+0.06053x_3. We tested statistical significance of the equation using the determination coefficient and Fisher's criterion. Overall variability of GDP in Azerbaijan is due to 59.6%-change to x_i by R^2. Tabular value F*kp*(3,10)=3.71, Ffact=4.92. When Ffact>Fkp, the determination coefficient is statistically significant and regression equation is statistically reliable. From the highest coefficient β we conclude that the greatest influence on the result of GDP in Azerbaijan is made by the magnification factor of oil production growth rates.

The regression equation for Norway is as follows: Y=0.6723+0 .00859x_1−0.1098x_2+0.01839x_3. We tested statistical significance of the equation using the determination coefficient and Fisher's criterion. Overall variability of GDP in Norway is due to the 13%-change to x_i factors by R^2. Tabular value F*kp* (3;10) 3.71, Ffact=0.50. When FFact<Fkp, the determination coefficient is not statistically significant and regression equation is not statistically reliable. From the highest coefficient β we conclude that the greatest influence on the result of GDP in Norway is made by the magnification factor of oil prices growth rates.

See Table 6 for summarized simulation results for the influence of selected factors on economic growth in the countries under consideration.

Note: *x1* is 1%-increase in individual structural shift in oil exports share, *x2* is 1%-increase in oil production growth rates, and *x3* is 1%-increase in oil prices growth rates.

Findings show statistical significance of regression equations in case of Iraq, Libya, Saudi Arabia, Russia, and Azerbaijan. Thus, we generally confirmed our assumption, i.e. the correlation between fluctuations in oil prices and economic growth is stronger in large economies (by absolute value of GDP of oil-exporting countries and hydrocarbons production). We also observed that economic growth in a number of countries largely depends on growth in oil prices and changes to oil production rates. We explain this with the strategy for keeping the balance of income, where the oil price parameter is a tool to choose an ideal production volume. Such strong sensitivity to the price factor does not make it possible to provide for a sustainable export structure (sustainable structure of economy). Therefore, in the long-term, non-resource export development will make it possible to reduce dependence on the influence of oil price fluctuations and achieve sustainable economic growth.

5. CONCLUSION

Energy resources are of particular strategic importance in global economy development. If at the micro level, we generally talk about an important connective role of energy resources and their involvement in the production process, then, at the macro level, in some countries, exported natural resource is a key source of income, and, consequently, economic growth. From findings we confirm that such an influence grows with economy of scale: larger economies (by absolute figure of GDP in oil-exporting countries and absolute figure of hydrocarbon production) can generate greater economic growth from positively changed oil prices than small economies. We also found the influence of joint coordination policy in oil production on economic growth of nations. The countries under consideration (the OPEC members) might achieve GDP growth from 0.0367% (Iraq) to 0.437% (Libya) in case of 1%-increase in oil production. The OPEC members show the strongest structural shifts in the changed share of oil exports than the other oil-exporting countries under consideration. Resulting regression dependences show that economic growth of oil-exporting countries largely depends on the very increase in oil prices and changes in oil production rates. This has recently changed behaviours of exporting countries in the oil market as well as the role of the price factor. Maintaining the income balance has become a priority when price shocks are compensated by volumes of oil supply.

REFERENCES

Al-Rawashdeh, R., Al-Nawafleh, H., Al-Shboul, M. (2013), Understanding oil and mineral resources in a context political economy: The case of the Middle East and North Africa (MENA). Mineral Economics, 26, 13-28.

Auty, R.M. (2001), A growth collapse with high rent point resources: Saudi Arabia. In: Auty, R.M., editor. Resource Abundance and Economic Development. Oxford: University of Oxford. p. 193-207.

Bank of Russia. (2021), Available from: http://www.cbr.ru

Deynego, Y. (2020), Rating of the Most Significant Events in the Oil and Gas Industry in 2019-2020 in Assessments and Comments. Available from: https://www.oilcapital.ru/article/general/16-01-2020/reyting-naibolee-znachimyh-sobytiy-neftegazovoy-otrasli-2019-2020gg-v-otsenkah-i-kommentariyah

Esanov, A., Raiser, M., Buiter, W. (2001), Nature's Blessing or Nature's Curse: The Political Economy of Transition in Resource-based Economies. United Kingdom: EBRD Working Paper, 65.

Federal State Statistics Service. (2021), Available from: https://www.rosstat.gov.ru

Figueroa, B.E., Calfucura, T.E. (2010), Sustainable development in a natural resource rich economy: The case of Chile in 1985-2004. Environment, Development and Sustainability, 12, 647-667.

Ftiti, Z., Guesmi, K., Teulon, F., Choachi, S. (2016), Relationship between crude oil prices and economic growth in selected OPEC countries. Journal of Applied Business Research, 32, 11-22.

Fusion Media Limited. (2021), Brent Oil Futures-Oct. '21 (BV1). Available from: https://www.ru.investing.com/commodities/brent-oil

Gylfason, T., Herbertsson, T., Zoega, G. (1999), A mixed blessing: Natural resources and economic growth. Macroeconomic Dynamics, 3(2), 204-225.

Illig, A., Schindler, I. (2017), Oil extraction, economic growth, and oil price dynamics. Biophysical Economics and Resource Quality, 2, 1.

Ishkhanian, M.V., Karpenko, N.V. (2016), Econometrics. Part 1. Pairwise regression. Moscow: MGUPS (MIIT).

Ji, K., Magnus, J.R., Wang, W. (2014), Natural resources, institutional quality, and economic growth in China. Environmental and Resource Economics, 57, 323-343.

Jiménez-Rodríguez, R., Sánchez, M. (2005), Oil price shocks and real GDP growth: Empirical evidence for some OECD countries. Applied Economics, 37(2), 201-228.

Kheyfets, B., Chernova, V. (2021), Comparative assessment of the influence of a technological factor on economic growth. Eastern-European Journal of Enterprise Technologies, 1(13-109), 6-15.

Kronenberg, T. (2004), The curse of natural resources in the transition economies. The Economics of Transition, 12(3), 399-426.

Kuboniwa, M. (2012), Diagnosing the "Russian Disease": Growth and structure of the Russian economy. Comparative Economic Studies, 54, 121-148.

Kuzmin, E.A., Volkova, E.E., Fomina, A.V. (2019), Research on the concentration of companies in the electric power market of Russia. International Journal of Energy Economics and Policy, 9(1), 130-136.

Litau, E. (2018), Entrepreneurship and Economic Growth: A Look from the Perspective of Cognitive Economics. United States: ACM International Conference Proceeding Series. p143-147.

National Bank of Kazakhstan. (2021), Available from: https://www.nationalbank.kz

Oil Industry in the Republic of Kazakhstan. (2011), Neftegazovaya Vertikal. Vol. 18. Kazakhstan: Oil Industry in the Republic of Kazakhstan. p28-33.

Organization of the Petroleum Exporting Countries. (2009), OPEC Annual Statistical Bulletin 2009. Available from: https://www.clck.ru/WcnKu

Organization of the Petroleum Exporting Countries. (2012), OPEC Annual Statistical Bulletin 2012. Available from: https://www.clck.ru/WcnNk.

Organization of the Petroleum Exporting Countries. (2016), OPEC Annual Statistical Bulletin 2016. Available from: https://www.clck.ru/WcnRj

Organization of the Petroleum Exporting Countries. (2020), OPEC Annual Statistical Bulletin 2020. Available from: https://www.clck.ru/UAkoV

Organization of the Petroleum Exporting Countries. (2021), Available from: https://www.opec.org/opec_web/en

Rau, E.I. (2017), Assessment of the dependence of the GDP of oil exporting countries on the change in the factor of oil prices. Bulletin of the Surgut State University, 1(15), 60-64.

Sachs, J.D., Warner, A.M. (1995), Natural Resource Abundance and Economic Growth. United States: NBER Working Paper, 5398.

Shestukhina, E.A., Fomin, V.I. (2016), Application of the least squares method to determine dependence of GDP volumes on oil price level. Izvestia of the Institute of Control Systems of SGEU, 1(13), 236-240.

Shibinskaya, K.V., Burakova, Y.G. (2017), Oil world prices and economic growth: Whether there is always dependence? Chronoeconomics, 1(3), 81-84.

Sim, P. (2013), Natural resources and economic growth: The conditional curse. IJEPS, 8, 113-145.

Sivelkin, V.A., Kuznetsova, V.E. (2002), Statistical Analysis of the Structure of Socio-economic Processes and Phenomena. Orenburg: OSU.

Sönnichsen, N. (2021), Norway's Oil Production in Barrels Daily 2000-2020. Available from: https://www.statista.com/statistics/265186/oil-production-in-norway-in-barrels-per-day

Spatafora, N., Tytell, I. (2009), Commodity Terms of Trade: The History of Booms and Busts. United States: In IMF Working Paper (09/205).

State Statistical Committee of the Republic of Azerbaijan. (2021), Trade. The Foreign Trade of Azerbaijan. Available from: https://www.stat.gov.az/source/trade/?lang=en

The Observatory of Economic Complexity. (2021), Azerbaijan. Available from: https://www.oec.world/en/profile/country/aze

The State Revenue Committee of the Republic of Kazakhstan Ministry of Finance. (2021), Foreign Trade Indicators. Available from: http://www.kgd.gov.kz/ru/exp_trade_files.

The World Bank Group. (2021a), GDP (Current US$)-Azerbaijan. Available from: https://www.clck.ru/Wcndq

The World Bank Group. (2021b), GDP Per Capita Growth (Annual%). Available from: https://www.clck.ru/Wcngn

Umar, M.G., Aliyu, B., Ahmad, M. (2017), Oil price fluctuations and economic growth in Nigeria (Evidence from Granger causality test). Australasian Journal of Social Science, 3, 1-16.

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, 706-715.