OIL DEPENDENCE OF POST-SOVIET COUNTRIES IN THE CASPIAN SEA REGION: THE CASE OF AZERBAIJAN AND KAZAKHSTAN

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ABSTRACT

The aim of the research is to present oil dependence of Azerbaijan and Kazakhstan from 2000 till 2017. The analysed countries represent two former Soviet Union countries in the Caspian Sea region and are among the world's top 15 oil dependent economies. It is shown that both countries generate high oil rents to GDP ratios. Moreover, the paper reveals that their fuels export constitutes a huge portion of total merchandise export. It implies that majority of Azerbaijani and Kazakhstani export revenues come from resources extraction. The empirical analysis of co-movements between the crude oil prices and chosen macroeconomic indicators shows that correlation between oil prices and Kazakhstani and Azerbaijani public debt to GDP ratios is negative, strong and significant. In addition, there is significant relationship between oil prices and Kazakhstani exchange rate and GDP growth rate.

Key words: crude oil, natural resource dependence, natural resource curse, real effective exchange rate, economic growth, Caspian Sea region

INTRODUCTION

Oil is a natural and non-renewable resource with crucial and significant implications for the real economy and financial markets. Oil reserves are not evenly distributed around the world. Some countries are rich with oil production while some produce none. More than 90% of known oil reserves are located in 15 countries [Dülger et al. 2013]. Oil abundance may generate many positive opportunities for economic development. However, many researchers point out that oil-rich economies tend to develop slower than resource-poor ones. The phenomenon is called in literature as natural resource curse. Vast majority of studies show that more specific resource curse is attributed to heavily natural resource dependent economies [Badeeb et al. 2017]. Therefore, the measurement of country's natural resource dependence constitutes an important part in an analysis of the phenomenon. The paper is focused on country's oil dependence's measures and country's sensitivity to oil price changes.

The aim of the paper is to demonstrate oil dependence of Azerbaijan and Kazakhstan, two post-Soviet countries from the Caspian Sea region. It should be stressed that the region is one of the oldest oil-producing areas in the world. The coastlines of the Caspian Sea is shared by Kazakhstan, Russia, Azerbaijan, Iran and Turkmenistan. The paper concentrates on Azerbaijan and Kazakhstan. It results from the fact that they represent those post-Soviet countries in the Caspian Sea region that are among the world's top 15 oil dependent countries (taking into account the 2016 oil rents as a share of gross domestic product ratio).

The paper is organised as follows. Section 2 contains literature review concerning natural resource dependence issue. Section 3 is focused on methods and

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data applied in the study. Section 4 presents oil dependence of Kazakhstani and Azerbaijani economies. The chosen measures of the countries' oil dependence are calculated and presented. Moreover, the relation between oil prices and Kazakhstani and Azerbaijani nominal and real exchange rates, economic growth and public debt is analysed and discussed. Section 5 summarizes and concludes.

LITERATURE REVIEW

Natural resource dependence may be defined as a degree to which a country economic performance is determined by resource revenues. The literature provides several different ways to measure country's natural resource dependence. The natural resources export as a share of gross domestic product (GDP) and the ratio of natural resources export relative to total export are among the most popular ones [Badeeb et al. 2017]. The International Monetary Fund (IMF) measures a natural resource dependence as an average resource revenues related to total revenues generated over multiple years. This fund claims that country is resource dependent when this measure is greater than 25% [Barma et al. 2012]. Stevens and Dietsche [2008] suggest that natural resource dependent are the countries, whose merchandise export of fuels and minerals exceeds 30% of total export. They study data covering the period from 1965 till 1995 and identify 54 countries that could be classified as natural resource dependent.

The issue of natural resource dependence is related to the resource curse phenomenon. The resource curse paradox pictures the situation when natural resource-rich countries experience slower growth rate than countries with fewer natural resources [Gelb 1988, Auty 1993, Gylfason et al. 1999, Sachs and Warner 1999]. It is believed that a more specific natural resource curse phenomenon is attributed to countries whose economies are significantly reliant on the natural resources' production. Sachs and Warner [1995], Leite and Weidmann [1999], Auty [2001], Manzano and Rigobon [2001], among other, demonstrate that the share of resource rents in GDP is negatively correlated with the GDP per capita growth rate and confirm that resource dependence may lead to negative development of resource-rich country. Mehrara [2008]

also studies oil dependence based on data of oil revenues. He shows that positive oil revenues shocks have a short-term positive and significant impact on economic growth. In addition, Mehrara [2008] reveals that negative oil revenues shocks have negative, significant and, in comparison to positive shocks, over twice larger impact on GDP growth rate. Thus, the overall influence of oil revenues shocks on country's economic growth is very often negative and is associated with natural resource curse. Mehrara [2009] studies a non-linear link between change in oil dependence measured by oil revenues and growth rate of GDP. He shows that there are some adverse effects on output that come out when growth in oil revenues exceeds the threshold level of 18–19%.

Natural resource dependence is very often defined based on the values of country's natural resources export. Daniele [2011] estimates country resource dependence as a share of ores and fuels in total merchandise export. Blanco and Grier [2012] applies a ratio of total export of primary commodities to GDP. Arezki and Van der Ploeg [2011] measure natural resource dependence based on natural resource export and GDP. They show that there is a direct negative effect of natural resource dependence on country's income per capita. It is worth emphasizing that the ratio of resource export to GDP is applied interchangeably in literature as a proxy for both natural resource dependence and natural resource abundance, while it is an appropriate measure only for natural resource dependence [Brunnschweiler and Bulte 2008].

MATERIAL AND METHODS

The paper applies rents from oil over GDP ratio and share of fuels export in total merchandise export for measuring country's oil dependence. Oil rents are evaluated as the difference between the value of crude oil production and total cost of production. An oil rents annual data come from the World Bank database and cover the period from 2000 till 2016. Annual data on merchandise export come from the World Trade Organisation and the World Bank, and cover the period from 2000 till 2017. Merchandise export reflects the country's value of goods provided to the rest of the world. In the paper merchandise export is divided into

five categories according to the Standard International Trade Classification (SITC):

I.   Fuels correspond to the commodities in SITC section 3 (mineral fuels),

II. Ores and metals embrace SITC section 2 division 27 (crude fertilizers and minerals excluding coal, petroleum and precious stones, division 28 (metalliferous ores and scrap) and section 6 division 68 (nonferrous metals),

III. Manufactures comprise commodities in SITC section 5 (chemicals), section 6 (basic manufactures), section 7 (machinery and transport equipment), section 8 (miscellaneous manufactured goods),

IV. Food and agricultural raw materials correspond to commodities in SITC section 0 (food and live animals), section 1 (beverages and tobacco), section 2 (crude materials except fuels) excluding divisions 27 and 28, section 4 (animal and vegetable oils and fats),

V.   Others include all commodities that were not included in above categories.

Additionally, the study employs Pearsons's and Spearman's rank correlation coefficients and corresponding significance tests in order to measure the relationship between crude oil price changes and country's exchange rates, GDP and public debt. Spot exchange rates of Kazakhstan Tenge to US dollar (USD/KZT) and Azerbaijani manat to US dollar (USD/AZM) are applied as country's official, nominal exchange rates. Annual data of nominal exchange rates come from Reuters Datastream. Moreover, the study is carried out based on real effective exchange rates (REER) for Azerbaijan and Kazakhstan. Annual REER indicators are calculated according to the methodology described by Darvas [2012]. Data are obtained from Bruegel. Annual real values of GDP and public debt come from World Bank database and Reuters Datastream. All macroeconomic data, apart from public debt in Kazakhstan, cover the period from 2000 till 2017 and come from World Bank database. Due to data limitations, Kazakhstani public debt data span from 2002 to 2017.

The study uses crude oil prices' daily and annual data from January 2000 to December 2017. Crude oil prices data are obtained from Reuters Datastream.

OIL DEPENDENCE OF AZERBAIJAN AND KAZAKHSTAN

Oil is one of the most important energy sources in the world. Figure 1 presents the volatility of daily crude oil prices in the period from January 2000 to December 2017. Oil prices have recorded large increases between January 2007 and July 2008, and between January 2009 and May 2011. In the period 2011–2014, oil prices maintained at a high level. The situation changed rapidly in 2014. Between August 2014 and
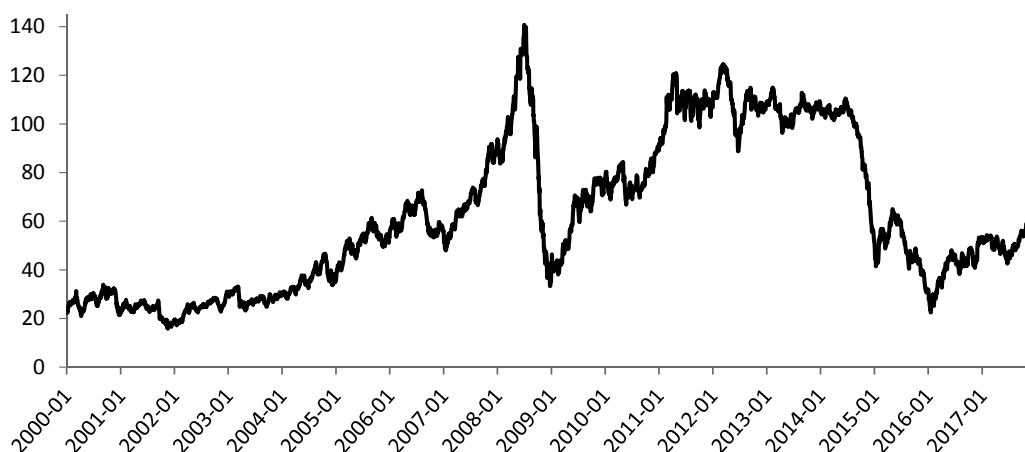

Fig. 1.   Daily crude oil prices from January 2000 till December 2017 (USD/bbl)

Source: Own elaboration based on data from Reuters Datastream.

January 2016 oil prices plunged more than 75%. Oil exporters encountered many challenges after the 2014 oil price collapse. It led to broad-based and negative effects on their economies. Most of them experienced a sharp fall in private consumption and investment. Nearly 70% of oil-exporting emerging markets and developing countries registered significant decline in GDP growth rate [World Bank Report 2018].

The collapse in oil prices that started in 2014 put the issue of country income sources' diversification at the forefront of the policy debate. Many oil exporters decided to reduce their oil dependency by diversification of their economies. It is worth emphasizing that most of the negative effects of oil price decline concern primary countries that highly depend on oil income. The paper is focused on Azerbaijan and Kazakhstan, the economies that represent the former Soviet Union states of Caspian Sea region and are among the world's top 15 oil dependent countries.

Among the most frequently proposed indicators of country's natural resource dependence are rents from natural resources over GDP and share of natural resources export in total export ratios. Figure 2 depicts total natural resources rents as a share of GDP ratios in Azerbaijan and Kazakhstan, in the period from 2000 till 2016. The measure is based on resource revenues. It should be stressed that resource revenues are highly volatile. The variability that results from opening new deposits or closing a depleted ones is easier to predict. However, immense part of resource revenues' variability is hardly predictable and generated mainly by the volatility of commodity prices [Venables 2016]. The World Bank measure of resource rents to GDP illustrates high volatility of natural resources revenues (Fig. 2). The natural resource rents to GDP ratio has fluctuated between 30.84 and 38.28% in 2008 to 13.35 and 10.30% in 2015, in Azerbaijan and Kazakhstan respectively. Oil rents to GDP ratio has also highly fluctuated between 2000 and 2016. It concerns both Azerbaijan and Kazakhstan.

Figure 2 shows that Azerbaijani and Kazakhstani oil rents constitute a large portion of natural resources rents. Moreover, Figure 2 depicts a few spikes that have been observed in oil rents to GDP ratios. The Azerbaijani ratio reached a record high level of 41.81% in 2006. The highest level of oil rents to Kazakhstani GDP was observed in 2005, when the ratio hit the maximum level of almost 26%. It is worth emphasizing that taking into account the 2016 oil rents as a share of GDP ratio Azerbaijan and Kazakhstan are among top 15 world's oil dependent economies.

Resource dependence should express the degree to which country has access to alternative sources of income other than resource extraction. Figures 3 and 4
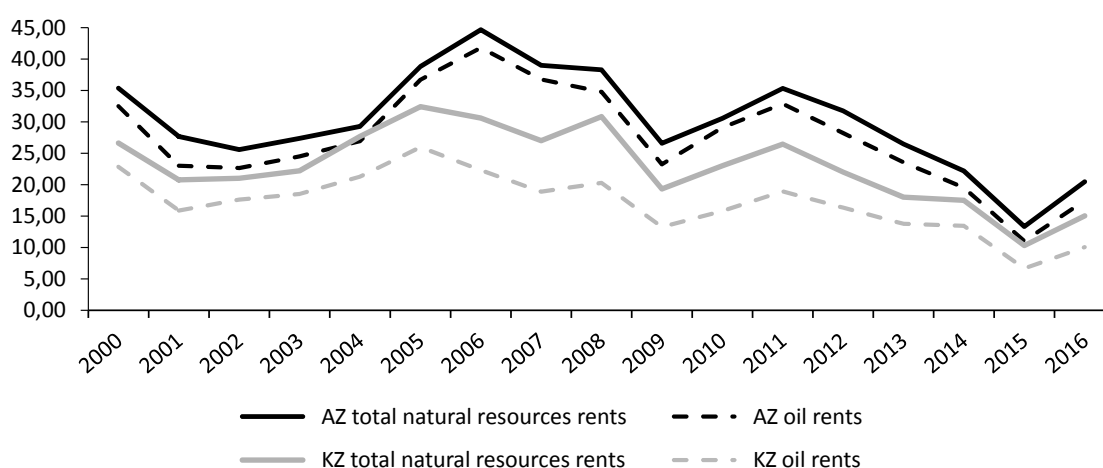

Fig. 2.   Total natural resources rents (% of GDP) and oil rents (% of GDP) in Azerbaijan (AZ) and Kazakhstan (KZ) from 2000 till 2016

Source: Own elaboration based on data from World Bank.

present structure of merchandise export in Azerbaijan and Kazakhstan respectively.

Fuels export constitutes a large portion of the whole merchandise export in Azerbaijan and Kazakhstan. The average 2000–2017 fuels export as a share to merchandise export ratio equals 88.85 and 66.82% in Azerbaijan and Kazakhstan respectively. In Kazakhstan ores and metals, and manufactures exports accounts for, in average, around 30% of total merchandise export, while in Azerbaijan it is only 6%. Both in Azerbaijan and Kazakhstan export of food and agri-

cultural raw materials accounts for around 5% of total merchandise export. Taking into account fuels to merchandise export ratio, Azerbaijan seems to be more oil-dependent economies than Kazakhstan.

The results presented in Figures 2–4 show that both Kazakhstan and Azerbaijan should be considered as highly oil dependent countries. The table presents empirical analysis of co-movements between the crude oil prices and chosen macroeconomic indicators for Azerbaijan and Kazakhstan. It should be stressed that measuring correlation
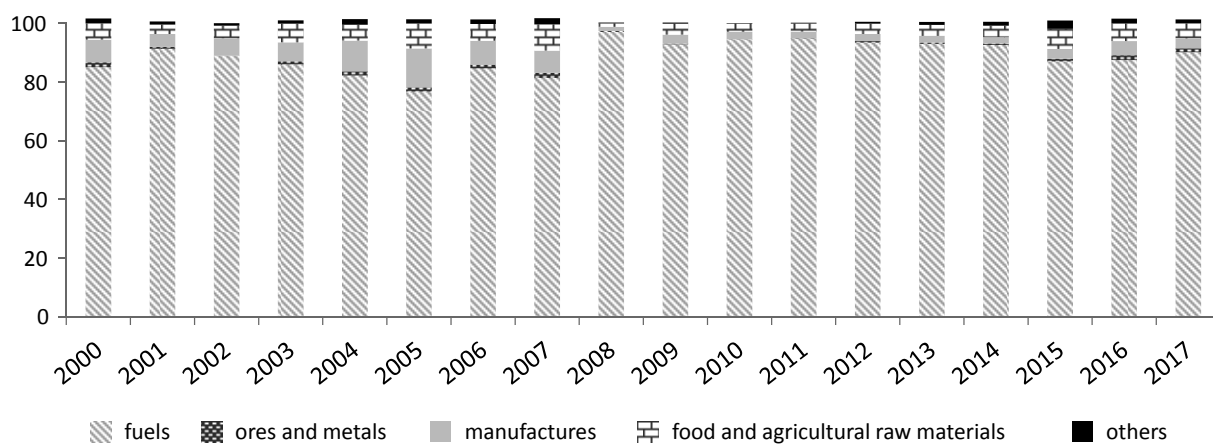

Fig. 3. Structure of merchandise export in Azerbaijan

Source: Own elaboration based on data from World Trade Organisation and World Bank.
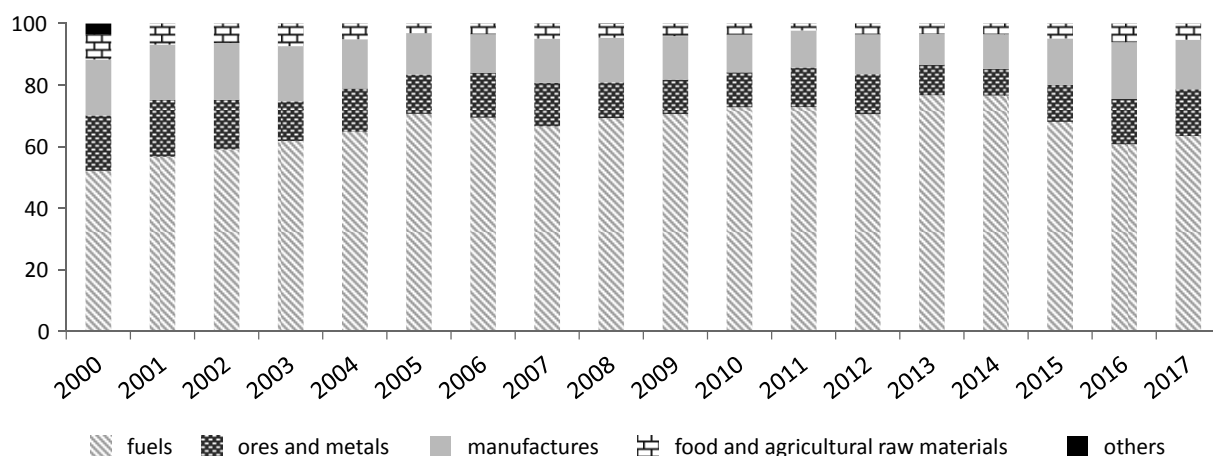

Fig. 4. Structure of merchandise export in Kazakhstan

Source: Own elaboration based on data from World Trade Organisation and World Bank.

between two or more variables requires knowledge of their joint distribution. When the joint distribution is normal the Pearson correlation coefficient is applied. However, when the joint distribution is not normal, the relationship between chosen variables is calculated based on Spearman's rank correlation coefficient. Estimation of correlation coefficients requires variables to be stationary. The augmented Dickey–Fuller (ADF) test points that the first difference of all applied data does not have the unit root. Thus, all data are expressed as a first difference of their logarithm value. The table summarizes correlation estimates between oil prices and spot nominal exchange rates (Azerbaijani manat to US dollar USD/AZM, Kazahstani tenge to US dollar USD/KZT), real effective exchange rates of Azerbaijan (AZ_REER) and Kazakhstan (KZ_REER), growth rates of GDP in Azerbaijan (AZ_GDP) and Kazakhstan (KZ_GDP), ratio of public debt to GDP in Azerbaijan (AZ_Debt to GDP) and Kazakhstan (KZ_Debt to GDP).

The normality of joint distribution of analysed variables is tested based on Shapiro–Wilk test. The table presents Shapiro–Wilk test statistics and corresponding p-values. The null hypothesis of normality is rejected for all variables apart from joint distribution of oil and AZ_GDP, oil and KZ_GDP, oil and AZ_Debt

to GDP, where estimated p-values are higher than 0.05 level of significance.

The table shows that estimated Spearman's rank correlation coefficients between oil prices and spot nominal exchange rates USD/AZM and USD/KZT are negative. It implies that Kazakhstani and Azerbaijani currencies appreciate against US dollar when oil prices increases. The correlation is strong and significant at 5% level of significance for crude oil and USD/KZT exchange rate. The estimated correlations coefficients for real effective exchange rates (REER) confirm above results. Real effective exchange rates measures the development of real value of a country's currency against the basket of the trading partners of the country. Results presented in the table suggests that when oil prices are surging, real effective exchange rates are increasing. It concerns both analyzed countries. The relationship between oil prices and exchange rates is well established by the early papers of Golub [1983] and Krugman [1983]. They find that oil exporting country may experience home currency's appreciation when oil prices increase, and depreciation when oil prices fall. Lizardo and Mollick [2010] confirm that a rise in oil prices leads to a significant appreciation of the currency of oil exporting countries such as Canada, Mexico and Russia. Turhan et al. [2014] reveal that

Table. Correlation coefficients between oil prices and selected macroeconomic indicators of Azerbaijan and Kazakhstan in the period from 2000 till 2017

Variable	Number of observations	Shapiro–Wilk test statistic results	p	Correlation coefficient	p
USD/AZM	18	0.73	< 0.001	−0.29[S]	0.246
USD/KZT	18	0.79	0.001	−0.59[S]	0.012
AZ_REER	18	0.84	0.006	0.25[S]	0.306
KZ_REER	18	0.79	0.001	0.47[S]	0.051
AZ_GDP	18	0.93	0.218	0.32[P]	0.191
KZ_GDP	18	0.95	0.358	0.54[P]	0.020
AZ_Debt to GDP	18	0.86	0.102	−0.78[P]	< 0.001
KZ_Debt to GDP	15	0.87	0.039	−0.58[S]	0.026

[P] – Pearsons's correlation coefficient, [S] – Spearman's rank correlation coefficient

Source: Own calculation based on data from World Bank and Reuters Datastream.

the link between oil prices and exchange rates has intensified in the period between 2000–2013. It is worth emphasizing that stronger home currency makes the country's export of other goods in a tradable manufacturing and agricultural sector less competitive. It hampers the overall growth of non-resource tradable sector and may lead to natural resource curse.

The table reports the estimated correlations coefficients between oil prices and growth rate of Azerbaijani and Kazakhstani GDP. Pearson correlation coefficients are positive. It implies that oil price increase is associated with higher growth rate of GDP. However, a decline in oil prices hampers economic growth. The results are significant at 0.05 significance level only for Kazakhstan. Positive relationship between oil prices and GDP growth rate is generally specific to oil-dependent economies. Mork et al. [1994] study the link between oil-price movements and GDP fluctuations. They suggest that the correlation coefficient between those two variables is positive for countries where oil-producing sector constitutes a considerable and large portion of country's income.

Moreover, the results presented in the table reveal strong, negative and significant relationship between oil prices and public debt to GDP ratios both for Azerbaijan and Kazakhstan. It may suggest that oil prices' fall leads to the increase of public debt in oil-dependent economies. However, it needs to be emphasized that during the decline of oil prices, the oil-rich country's GDP is expected to decrease, an increase of public debt to GDP ratio is, therefore, driven by both increase of public debt and decrease of GDP. Nevertheless, it altogether shows that the oil prices' decline has negative impact on economic performance of oil-dependent countries such as Azerbaijan and Kazakhstan.

SUMMARY

The paper shows that both Azerbaijan and Kazakhstan generate high oil rents to GDP ratios. The Azerbaijani ratio reached a record high level of 41.81% in 2006. The highest level of oil rents to Kazakhstani GDP was observed in 2005, when the ratio reached the maximum level of almost 26%. Moreover, the paper reveals that fuels export constitutes a huge portion of total Kazakhstani and Azerbaijani merchandise export. The average 2000–2017 fuels as a share to merchandise export ratio equals 88.85 and 66.82% in Azerbaijan and Kazakhstan respectively. It implies that majority of the countries' export revenues come from fuels extraction.

The empirical analysis of co-movements between the crude oil prices and chosen macroeconomic indicators shows that correlation between oil prices volatility and Kazakhstani and Azerbaijani public debt to GDP ratio is negative, strong and significant. Moreover, it has been shown that Kazakhstani and Azerbaijani currencies appreciate against US dollar when oil prices increases. However, the correlation is strong and significant at 5% level of significance only for Kazakhstan. In addition, the study reveals positive relationship between oil prices and GDP growth rate. The oil price increase is associated with higher growth rate of GDP. A decline in oil prices, on the other hand, hampers economic growth. The results are significant at 0.05 significance level only for Kazakhstan.

Economies highly dependent on natural resources are more sensitive to commodities' price changes and are more likely to suffer from natural resource curse. The research findings are important from the view of development of country's income sources diversification.

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UZALEŻNIENIE ROZWOJU GOSPODARCZEGO BYŁYCH REPUBLIK ZWIĄZKU RADZIECKIEGO W REGIONIE MORZA KASPIJSKIEGO OD WYDOBYCIA ROPY NAFTOWEJ NA PRZYKŁADZIE AZERBEJDŻANU I KAZACHSTANU

STRESZCZENIE

Celem artykułu jest przedstawienie uzależnienia rozwoju gospodarczego Azerbejdżanu i Kazachstanu od branży wydobywczej w latach 2000–2017. Omawiane państwa, byłe republiki Związku Radzieckiego w basenie Morza Kaspijskiego, znajdują się wśród 15 najbardziej uzależnionych od wydobycia ropy naftowej gospodarek. Wykazano, że w przypadku obu krajów zyski generowane z produkcji ropy naftowej stanowią dużą część ich produktu krajowego brutto. Dodatkowo pokazano, że całkowity eksport towarów obu państw opiera się głównie na eksporcie ropy i gazu ziemnego. W artykule zbadano zależność między ceną ropy a wybranymi wskaźnikami makroekonomicznymi Kazachstanu i Azerbejdżanu. Wykazano, że w przypadku obu krajów istnieje ujemna, silna i istotna statystycznie zależność między ceną ropy a wskaźnikiem długu publicznego względem PKB. Dodatkowo pokazano, że istnieje istotna statystycznie zależność między ceną ropy a kursem walutowym i wzrostem gospodarczym w Kazachstanie.

Słowa kluczowe: ropa naftowa, zależność państw od ropy naftowej, „klątwa surowcowa", realny efektywny kurs walutowy, wzrost gospodarczy, region Morza Kaspijskiego