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Fossil fuels abundance and institutional changes in the post-socialist countries[1]

Summary. *The aim of the research was to indicate whether fossil fuels abundance had a negative effect on political and economic changes in the post--socialist countries in the years 1991—2015. The research covered 28 countries of Central-Eastern Europe and the former Soviet Union. Data were collected from the Freedom House (FH) and the European Bank for Reconstruction and Development (EBRD) databases, as well as the BP database.*

The results of conducted study showed that the abundance of fossil fuels resources did not have a decisive influence on the process of market economy creation and democratisation of the post-socialist countries of Central-Eastern Europe and the former Soviet Union.

Keywords: post-socialist countries, institutional change, natural resource curse.

JEL: O11, P20, Q32

Almost thirty years ago, the process of a radical transformation began in the countries of Central-Eastern Europe and the Soviet Union. As described by Ratajczak (2009), the systemic transformation covers three broad areas: economic, political and social. The essence of the first one is the transition from a centrally planned economy to a market economy. The second one involves a change from an authoritarian to a democratic system. In turn, the last one refers to the reconstruction of societal attitudes influenced by forced collectivism towards a society in which the individual activity is essential.

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While at the beginning of the 1990s, post-socialist states formed quite a homogeneous group in terms of institutional development, nowadays the level of political freedom and economic performance differs substantially among these countries (Havrylyshyn, Meng & Tupy, 2018; Piątek, Szarzec & Pilc, 2013). There is an extensive literature on the issue of institutional performance determinants and factors that potentially influence the pace of institutional changes might be divided into four categories: cultural, political, economic and geographical[2].

Culture can be understood as a set of common moral values, beliefs, ideas, rules and other norms of behaviour that characterise communities and are highly persistent and pervasive (La Porta, Lopez-de-Silanes, Shleifer & Vishny, 1999). According to Pejovich (2003, p. 348), a transition process in the post-socialist countries is a cultural issue rather than a simple technical one. Cultural factors influence formal institutions, and the results of the transition depend on the interaction between new formal rules and prevailing informal ones. When common beliefs and ideas are not coordinated with implemented formal changes, the transition costs of institutional restructuring are much higher (Pejovich, 2003). In econometric analyses, a religion is often used as a proxy of unobservable cultural factors (e.g., Aslaksen, 2010; de Melo, Denizer, Gelb & Tenev, 2001; Schweickert, Melnykovska, Belke & Bordon, 2011).

The Post-socialist countries started a process of institutional changes with a ”legacy” of several decades of the centrally-planned economy that had strongly influenced social behaviours and mentality of individuals. Landes (2000) indicates that as a result of anti-market and anti-profit schooling people were afraid of market uncertainties and yearned for the safe monotony of state employment, even after the fall of the socialist regime. The societies of the countries undergoing transformation were characterised by a low level of social trust, a high level of corruption and egalitarian attitudes (Ratajczak, 2009), which had a negative impact on the pace of changes towards a market economy.

As a political factor of institutional changes, accession to international organisations is often considered (e.g., Belke, Bordon, Melnykovska & Schweickert, 2009; Di Tommaso, Raiser & Weeks, 2007; Staehr, 2011). In many post-socialist countries, joining the European Union (EU) and the World Trade Organization (WTO) was seen as a step towards democratisation and economic reforms (Michalopoulos, 1999; Staehr, 2011). A fact of leading an armed conflict (e.g., Collier & Hoeffler, 2004; Schonfelder, 2005) can be indicated as a potential obstacle for institutional changes towards democracy.

[2] La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999) indicate that the theories of determinants of institutional performance fall into three broad categories: economic, political, and cultural. Since the focus in this study is on natural resources, the author distinguishes also the geographical factors.

Collier and Hoeffler (2004) show that low-income countries are more likely to experience riots, political strikes and civil wars. They also claim that governments in poor countries are characterised by rent-seeking behaviour and cause political cycles in the economy due to increasing expenditures before the elections. Therefore, post-socialist countries with a higher income level should be characterised by a faster pace of institutional changes.

A wide discussion on the impact of natural resources on economic and political institutions was started with a seminal paper by Sachs and Warner (1995). The authors show that resource abundance is often associated with lower institutional performance and that economies with high level of natural resources tend to grow at a slower pace than resource-scarce economies. Other studies support the hypotheses on the natural resource curse by indicating that they lead to the establishment of a *predatory state* that is characterised by: lower level of democracy, slow pace of economic growth and corruption (Auty, 2001; Mikesell, 1997; Ross, 2001; Sala-i-Martin & Subramanian, 2003). Isham, Pritchett, Woolcock and Busby (2005) define *point-source* resources as those that are geographically clustered in space and are easier to be controlled by those in power. The aforementioned authors point out that resources such as oil, natural gas and minerals particularly strongly affect socio-economic institutions.

There are several theories that were proposed to explain the discussed phenomenon. While some of them place emphasis explicitly on the impact of natural resource abundance on the economy, the others address the issue of the influence on political institutions.

The first explanation of the possible negative economic impact of resource exports refers to a *Dutch Disease* thesis stating that resource exports lead to the decline in the terms of exchange between primary and manufactured goods. The reason for this results from a tendency for the excessive appreciation of the real exchange rate during positive resource shocks which leads to the decline in competitiveness of manufacturing enterprises (Sala-i-Martin & Subramanian, 2003). For the first time the *Dutch Disease* was mentioned in *The Economist* in 1977 to describe economic destabilisation and low growth rates in the Netherlands ten years after a discovery of natural gas resources in the North Sea.

Ross (2001) shows that political institutions might be undermined by certain non-renewable mineral resources through *rentier effects*. Revenues that can be easily captured from a few sources (such as *point-source* resources, Isham et al., 2003) cause that the government expresses reduced need for taxation, therefore, such shortage of pressure for taxation results in citizens lacking incentive to control those in power and to create accountability mechanisms. At the same time, the state obtains *exogenous* revenues that can be spent on patron-

age, which in turn lowers pressure for democratisation. Similarly, the government might take advantage of abundance of natural non-renewable mineral resource revenues to prevent the establishment of social groups that are independent from the state and thus, likely to demand political rights.

Natural resource abundance and authoritarianism might be also linked even when citizens of resource-rich countries want democracy as much as citizens of resource-poor states. It refers to the *repression effect* which indicates that resource wealth allows governments to spend more on internal security and therefore, to block democratisation processes (Ross, 2001).

Another explanation of the natural resource curse phenomenon is the *modernisation effect* which states that democracy is based on rising education levels, urbanisation and occupational specialisation rather than simply on growing income. Due to the fact that budgetary revenues in fossil fuels abundant countries are obtained from a small group of workers with advanced technical skills that can only be acquired abroad, the government has no incentive for modernisation and institutional reforms, which results in workers exerting less pressure for the increase of literacy and political influence (Isham et al., 2003).

Obviously, all four presented explanations (or any combination of them) of the natural resource curse phenomenon might be simultaneously valid. Considering a transition of the post-socialist countries towards a market economy, oil and natural gas abundance could have negatively impacted economic institutions due to:

- decline of competitiveness of sectors other than the ones connected with oil and natural gas and a shift of investments towards the fossil fuels sector, therefore limiting the scope of newly established privately-owned companies;
- reducing the pressure for limiting public expenditure and increasing taxation due to *exogenous* revenues from the export of oil and natural gas;
- reducing the pressure for privatisation and restructuring state-owned enterprises as well as for improving competition policy due to the strong market position of state-owned enterprises and rents from oil and natural gas sectors captured by them.

In turn, when political institutions and revenues from oil and natural gas are considered, one can refer to:

- reducing the pressure for democratisation and for limiting the scope of state involvement due to high government spending;
- less demand for accountability of the governments due to low taxation;
- limiting the scope of social groups independent from the state due to substantial government spending;
- increasing the role of internal security through revenues from the oil and natural gas sectors;

- no incentive for social modernisation in the natural resource-driven economies.

Although many studies clearly support the hypothesis of the negative impact of rich natural resources on economic and political performance, some authors indicate drawbacks of the analyses in the resource curse literature. A wide range of studies suggesting the presence of the natural resource curse (including Beck & Leaven, 2006; Sachs & Warner, 1995; Sala-i-Martin & Subramanian, 2003) use the ratio of resource exports to GDP as the proxy for resource abundance. However, it can be argued that it is a measure of resource dependence rather than abundance. As an exogenous indicator of resource abundance, Brunnschweiler and Bulte (2008) propose a variable based on the level of resource reserves and the discounted value of the future flow of resource rents. The authors argue that the level of reserves is likely to be relatively independent of economic and political performance. By employing this variable, Alexeev and Conrad (2011) as well as Brunnschweiler and Bulte (2008) show that there is no sufficient proof for the existence of the resource curse phenomenon. Another drawback of many studies in the analysed literature (including Leite & Weidmann, 1999; Ross, 2001; Sachs & Warner, 1995, 1997, 2001) is the employment of cross-country regression frameworks that make use of cross-sectional variance and ignore time-series variance. Therefore, results can suffer from omitted variable bias induced by unobserved and time-invariant heterogeneity (Haber & Menaldo, 2011, p. 3), and it cannot be indicated whether the relationship between resource abundance and poorer institutional and economic performance is causal. By employing panel data and time-series techniques, Cavalcanti, Mohaddes and Raissi (2011) as well as Haber and Menaldo (2011) obtain the results that contradict the resource curse hypothesis, while Aslaksen (2010) shows a negative impact of oil abundance on democracy.

Despite extensive literature on the issue of institutional changes determinants in the post-socialist countries (e.g., de Melo et al., 2001; Pejovich, 2003; Piątek et al., 2013; Schweickert et al., 2011), only few studies focus on the impact of natural resources on this process and their results lead to ambiguous conclusions (Alexeev & Conrad, 2011; Brunnschweiler, 2009; Horvath & Zeylanov, 2014; Kronenberg, 2004). Therefore, there is still a need for further research on the natural resource curse, especially in the post-socialist economies that have experienced *quasi-natural experiment* of radical institutional changes (Piątek, 2016). It can be assumed that whether the curse of natural resources does exist, it would be particularly pronounced in the post-socialist countries.

The aim of the econometric analysis in this research is to examine whether the fossil fuels resource abundance, represented by oil and natural gas reserves, impacted the pace of political and economic changes in 28 countries

of Central-Eastern Europe and the former Soviet Union. To indicate if this group of states experienced the natural resource curse phenomenon, panel data methods that control for unobserved heterogeneity (*fixed effects*, *random effects* and *within-between* models) and data for the years 1991—2015 are employed. Data on political and the economic institutions were collected from the Freedom House (FH) and the European Bank for Reconstruction and Development (EBRD) databases. The BP database served as a source of measures concerning oil and natural gas reserves.

This article contributes to the still scarce literature on the impact of natural resources on the pace of institutional changes in the post-socialist countries by employing resource measures that do not depend on the level of economic and political performance and by extending the analysed period to the years 1991—2015. What is more, a novel method by Bell and Jones (2015) is used and its applicability in the analysed field is discussed.

DATA

An econometric analysis was conducted for 28[3] post-socialist countries over the period 1991—2015. The Freedom in the World *(FH)* index by FH[4] and indicators by the EBRD[5] were employed as dependent variables. The first one is a widely used index of political freedom (e.g., Abadie, 2005; Chowdhury, 2004; Grier, 1989; Law, Lim & Ismail, 2013; Piątek et al., 2013; Schweickert et al., 2011; Staehr, 2011), while the second one reflects the pace of economic transition in the post-socialist countries (employed by, e.g., Belke et al., 2009; Horvath & Zeylanov, 2014; Schweickert et al., 2011; Staehr, 2011).

In tab. 1, the mean values of the Political Rights (*PR*) and Civil Liberties (*CL*) indices by FH for particular countries over the period 1991—2015 are presented. Based on FH, a country was classified as free when its indicator value was 2.5 or lower (1 for the greatest degree of freedom) and not free when 4.5 or higher (7 for the smallest degree of freedom). Among post-socialist countries, there were 10 states that could be classified as free based on the mean values of the index, the same number of countries was partly free on average and 8 post-Soviet republics were above the higher threshold of the index.

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[3] Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, the Russian Federation, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

[4] *Freedom in the World: Country Ratings 1973—2016*. Retrieved from: https://freedomhouse.org/sites/default/files/Country%20Ratings%20and%20Status%2C%201973-2016%20%28FINAL%29.xlsx.

[5] *Transition Indicators*. Retrieved from: http://www.ebrd.com/downloads/research/economics/macrodata/tis2012.xlsx.

TAB. 1. *FH*, MEAN VALUES BY COUNTRY, 1991—2015

Country	*FH*	Country	*FH*	Country	*FH*
Free		**Partly free**		**Not free**	
Slovenia	1.28	Croatia	2.85	Kyrgyzstan	4.72
Czech Republic	1.30	Macedonia	3.26	Russia	4.78
Poland	1.34	Ukraine	3.30	Kazakhstan	5.42
Lithuania	1.42	Albania	3.38	Azerbaijan	5.54
Hungary	1.44	Moldova	3.52	Belarus	5.88
Estonia	1.46	Serbia	3.58	Tajikistan	5.94
Slovakia	1.60	Montenegro	3.80	Uzbekistan	6.72
Latvia	1.82	Georgia	3.82	Turkmenistan	6.92
Bulgaria	2.02	Bosnia and Herzegovina	4.24		
Romania	2.44	Armenia	4.34		

S o u r c e: own study based on FH data.

In tab. 2, the mean values of the *EBRD* transition indicators[6] of particular countries are presented. Units were divided into 3 groups — the first one consists of countries that had the mean values of the indices higher than or equal to the sum of the group mean and one standard deviation ($\overline{EBRD}_i \geq \overline{\overline{EBRD}} + \sigma_{\overline{EBRD}}$, where i denotes a country). Five Central European countries were classified as economies with the high level of reforms. In the group with the low level of economic reforms, 11 states were included with the mean value of the indicator below or equal to the difference of the group mean and one standard deviation ($\overline{EBRD}_i \leq \overline{\overline{EBRD}} - \sigma_{\overline{EBRD}}$). The other 12 countries were included in the intermediate group ($\overline{\overline{EBRD}} + \sigma_{\overline{EBRD}} < \overline{EBRD}_i < \overline{\overline{EBRD}} - \sigma_{\overline{EBRD}}$).

TAB. 2. *EBRD*, MEAN VALUES BY COUNTRY, 1991—2014

Country	$EBRD$	Country	$EBRD$	Country	$EBRD$
High level of economic reforms		**Moderate level of economic reforms**		**Low level of economic reforms**	
Hungary	3.78	Lithuania	3.47	Moldova	2.90
Slovakia	3.74	Latvia	3.44	Kazakhstan	2.81
Poland	3.68	Croatia	3.35	Ukraine	2.76
Czech Republic	3.66	Slovenia	3.34	Azerbaijan	2.51
Estonia	3.65	Bulgaria	3.26	Tajikistan	2.46
		Macedonia	3.15	Montenegro	2.44
		Romania	3.14	Serbia	2.39
		Kyrgyzstan	3.10	Bosnia and Herzegovina	2.38
		Albania	3.03	Uzbekistan	2.19
		Georgia	3.01	Belarus	1.86
		Russia	2.99	Turkmenistan	1.49
		Armenia	2.97		

S o u r c e: own study based on EBRD data.

Data on proved oil and natural gas reserves were collected from BP (2016) that defines total proved reserves of oil and natural gas as *generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under*

[6] Small scale privatisation, Large scale privatisation, Competition Policy, Trade & Forex system, Price liberalisation, Governance and enterprise restructuring. Measured from 1 to 4.33.

existing economic and operating conditions. As such, the values of reserves are driven by new discoveries of natural non-renewable resources and technology development. The BP database, which is widely used in natural resource curse research (e.g., Aslaksen, 2010), included indicators on 8 post-socialist countries. Values of other countries were set at zero which is not supposed to bias results since each omitted country had a share of reserves in the BP database lower than 0.05%. The same approach was employed by Aslaksen (2010). To account for the population size, values of reserves *per capita* were used.

As presented in tab. 3, the most oil abundant country in the years 1991—2015 was Kazakhstan, followed by Russia and Azerbaijan. At the same time, the highest average level of natural gas reserves *per capita* was recorded for Turkmenistan, followed by Russia, Azerbaijan, Kazakhstan and Uzbekistan.

TAB. 3. OIL AND NATURAL GAS RESERVES *PER CAPITA*, MEAN VALUES BY COUNTRY, 1991—2015

Country	Mean oil reserves *per capita* in barrels	Mean natural gas reserves *per capita* in 1000 m^3
Azerbaijan	505.464	99.621
Kazakhstan	908.096	76.163
Poland	—	2.986
Romania	36.464	17.465
Russia	750.608	216.088
Turkmenistan	123.112	1433.916
Ukraine	—	14.416
Uzbekistan	20.572	43.405

S o u r c e: own study based on BP (2016).

Finding that 2 variables are correlated is usually not enough to conclude that there is a causal relationship between them, therefore the econometric analysis is needed to hold other relevant factors fixed. In this study, variables that were potential determinants of institutional changes in the post-socialist countries and that could be correlated with oil and natural gas abundance indicators need to be controlled. Therefore, based on the literature on political and economic institutions (e.g., Acemoglu & Robinson, 2016; Belke et al., 2009; de Melo et al., 2001; Di Tommaso et al., 2007; La Porta et al., 1999; Pejovich, 2003; Schweickert et al., 2011; Staehr, 2011), a set of geographical, cultural, political and economic variables was used as control variables. The first group was represented by a variable indicating the absolute latitude and a dummy variable indicating whether a particular country is landlocked. The second one included the share of Muslim population and dummy variables indicating dominant religions. In the group of political control variables, the length of the period under central planning, a dummy variable indicating a year when a country experienced an armed conflict and variables reflecting an accession to international organisations such as the EU and the WTO were included. GDP *per capita* in a given year and at the beginning of transition were chosen as economic variables.

The sources of variables and their descriptions are presented in tab. 4.

TAB. 4. VARIABLES AND THEIR SOURCES

Variable	Short description	Source	Observation
	Dependent variables		
FH	average level of *PR* and *CL* indices, measured from 7 to 1 (7 representing the smallest degree of freedom)	FH database	700
EBRD	average level of all transition indicators: Small scale privatisation, Large scale privatisation, Competition Policy, Trade & Forex system, Price liberalisation, Governance and enterprise restructuring (measured from 1 to 4.33 — 1 representing little or no change from a rigid centrally planned economy and 4.33 representing the standards of an industrialised market economy)	EBRD database	665
	Explanatory variables		
OilPC *OilPCnorm*	total proved reserves of oil *per capita* (in billion of barrels *per capita* and normalised values)	BP (2016); World Bank database	680
GasPC *GasPCnorm*	total proved reserves of natural gas *per capita* (in trillion m^3 *per capita* and normalised values)	BP (2016); World Bank database	636
	Control variables		
	Geographical factors		
Latitude	absolute latitude	Aslaksen (2010)	28
Landlocked	dummy variable indicating if a country is landlocked	Aslaksen (2010)	28
	Cultural factors		
MuslimShare	number of Muslims as a percentage of the country's population in 2005	Aslaksen (2010)	28
Catholic *Muslim* *Orthodox* *Protestant*	dummy variable indicating dominant religion	Froese (2004)	28
	Political factors		
YUCP	years under central planning	de Melo et al. (2001)	28
EUA	dummy variable representing EU accession (equals 1 starting in the year of signing Association Agreement with the EU)	European Commission website	700
WTOA	dummy variable representing the WTO accession (equals 1 starting in the year of the WTO accession)	Michalopoulos (1999); WTO website	700
WAR	dummy variable indicating the fact of an armed conflict of a country (equals 1 in years when a country experienced an armed conflict)	Center for Systemic Peace (2015)	700
	Economic factors		
GDPpc1989	GDP *per capita* in PPP in 1989 (in US$)	de Melo et al. (2001)	28
GDPpc	GDP *per capita* in PPP (in US$)	World Bank database	700
	Other control variables		
t	time dummies (equal 1 for each year in the analysed period)	—	28

S o u r c e: own study.

METHODOLOGY

The aim of the econometric analysis is to test whether fossil fuels abundance, represented by oil and natural gas reserves, impacted the pace of political and economic changes in 28 countries of Central-Eastern Europe and the former Soviet Union.

This aim allows to formulate the following research hypotheses:

- H1 — fossil fuels abundance, represented by the variables indicating oil and natural gas reserves, had a negative impact on establishing of a political system with a high level of civil liberties and political rights in the post-socialist countries;
- H2 — fossil fuels abundance, represented by the variables indicating oil and natural gas reserves, had a negative impact on the pace of economic changes towards the industrialised market economy in the post-socialist countries.

Since the analysis is conducted on data that consist of a time series for each cross-sectional object, i.e. a country, panel data methods need to be employed. The main motivation to use panel data models is to address the omitted variables problem that is caused by unobserved heterogeneity among units. Methods used in fixed effects and random effects models (Wooldrigde, 2002) are considered to be the basic solutions to the problem of unobserved heterogeneity in panel data.

The fixed effects estimator is the pooled ordinary least squares (OLS) estimator from the regression on time-demeaned data. This transformation is called *within transformation*[7] and solves the problem of unobserved heterogeneity by removing time-invariant individual effect by time-demeaning. Therefore, only time variation within each unit is used and time-invariant variables are ruled out. A panel data method that enables to include time-invariant variables is the random effects estimator that exploits the serial correlation in composite errors in a generalised least squares (GLS) framework. In the random effects analysis, orthogonality between unobserved heterogeneity and explanatory variables is assumed, which implies that unobserved component is not correlated with explanatory variables at each time period.

The choice between fixed effects and random effects models is based mainly on the results of the Hausman test that indicates possible rejection of the orthogonality assumption. However, Bell and Jones (2015) suggest that the abandonment of random effects in favour of fixed effects is usually false. They claim that this rejection most commonly arises as a result of multiple processes related to particular variables. In Bell and Jones (2015, p. 5), the authors claim that such covariates contain both the *between* and *within* effects: $x_{it} = x_i^B + x_{it}^W$. The *between effect* is the unit specific effect that does not vary across time, and the *within effect* is the effect of changes of a variable value within one unit across

[7] In the literature also called as the *fixed effects transformation*.

time. By using fixed effects estimation, the coefficients by x_i^B cannot be estimated, and therefore it is impossible to model the source of heterogeneity. At the same time, in random effects models both effects are assumed to be equal and when it is not true, β coefficients are uninterpretable weighted average of two processes. By implementing the *within-between* random effects estimator, heterogeneity bias across levels is explicitly modelled, and the effects of the time-variant variables are separated into two levels, which is relevant to the researcher. Simultaneously, the effects of the time-invariant variables are controlled by the means of the time-variant variables, and higher-level variance (between units) associated with the time-variant variables is not constrained by the within effects. As such, β coefficients by the time-variant variables obtained from this estimation will be identical to that estimated by the fixed effects estimator. Therefore, Bell and Jones (2015) claim that the fixed effects model is a constrained form of the random effects model.

Before the final model specifications are chosen, model diagnostics, which tests crucial assumptions in panel data methods and allows to establish a set of variables that will be included in the empirical analysis, needs to be conducted. In the first step, panel unit root tests of *FH* and *EBRD* variables were conducted. A regression based on non-stationary data can lead to the spurious regression problem, and in this case it is suggested to use either first-differenced variables or cointegration tests and error correction mechanism regressions when also explanatory variables are non-stationary (Wooldrigde, 2002). The choice of panel unit root tests was based on the number of N units and the number of T periods included in the analysis. Since N and T are, respectively, 28 and 25, it cannot be unambiguously indicated if either N or T should be assumed as tending to infinity. Therefore, two kinds of tests were implemented — the Harris-Tzavalis test (1999) assuming N as tending to infinity and the Levin-Lin-Chu test (2002) assuming N/T as tending to zero. To account for possible common shocks across countries, the option to subtract the cross-sectional averages from the series was chosen. The results[8] of both tests conducted on the *FH* and *EBRD* variables indicate that null hypothesis of panels containing unit roots at the 5% significance level can be rejected and therefore, the conclusion that there is no need to use models for non-stationary data can be drawn. Additionally, the Pesaran test (2007) that assumes cross-sectional dependence was used and its results[9] also suggest that the null on non-stationarity can be rejected. Nevertheless, bearing in mind that for the *FH* variable the null hypothesis of the Harris-Tzavalis test was rejected only at the 5% level (p-value $= 0.0327$) and the fact that dependent variables in this study are bounded on both extremes[10] (1—7 for

[8] Available upon request.

[9] Available upon request.

[10] This problem is discussed in Rzońca & Ciżkowicz (2003). The author of this research is grateful to an anonymous referee that indicated this substantial issue.

FH and 1—4.33 for *EBRD*), robustness of the results was checked with the analysis based on first-differenced data (Wooldrigde, 2002, pp. 279—284).

In the second step, strict exogeneity assumption on the explanatory variables in panel data was considered. It implies that explanatory variables at all periods are uncorrelated with the idiosyncratic error at each time period. As far as data presented in tab. 4 are considered, it can be argued if *EUA*, *WTOA* and *GDPpc* variables are strictly exogenous in the analysis with the *FH* and *EBRD* dependent variables. It can be the case that signing an association agreement with the EU and an accession to the WTO depend on the previous development of political and economic institutions. According to the author of this research, including *EUA* and *WTOA* variables would imply that the strict exogeneity assumption does not hold, and therefore the variables should not be included in the analysis[11].

In the literature (e.g., Acemoglu & Robinson, 2012), it is a well-established fact that the high level of institutional quality affects growth positively. In case of this analysis, there is no doubt that economic growth in transition countries depends on the pace of economic reforms. Therefore, including the *GDPpc* variable in the analysis with the *EBRD* dependent variable implies that the strict exogeneity assumption is violated. At the same time, the impact of political freedom on growth is ambiguous — most authors claim that this influence is positive (e.g., Acemoglu and Robinson, 2012), while others suggest that it is either negative (Feng, 1997) or insignificant (Wu & Davis, 1999). To avoid the possible violation of the strict exogeneity assumption, the *GDPpc* variable is not included in the analysis with the *FH* dependent variable[12]. Instead, to control income *per capita* as a proxy of standard of living, the level of GDP *per capita* in 1989 is included in the analysis (this solution was proposed in de Melo et al., 2001).

Frequently, in econometric analyses, some time periods are missing for some units in the analysed population, which makes a panel unbalanced. In order to use fixed effects or random effects models with an unbalanced panel, a distinction between randomly missing data and non-randomly missing data needs to be made. In this research, values of natural gas reserves from BP (2016) in the years 1991—1996 were missing for five countries: Azerbaijan, Kazakhstan, Turkmenistan, Ukraine and Uzbekistan. All of them are former republics of the Soviet Union. At the same time, in the database, values of natural gas reserves were collected for the Soviet Union for the period 1991—1996. Therefore, it can be concluded that a problem of missing data results from a non-random factor, which causes that the random effects and *within-between* models cannot be estimated with data for the years 1991—1996. The unbalanced panel can be employed in the fixed effects model, unless idiosyncratic errors are correlated with selection (Wooldrigde, 2002, pp. 578—581).

[11] However, the additional analysis, including both variables as exogenous, was conducted to check the robustness of results (tab. 7—10).

[12] The additional analysis, including the variable *GDPpc* as exogenous, was conducted to check the robustness of results (tab. 7 and 8).

What is more, the values of the *EBRD* variable for Czech Republic over the period 2008—2014 were missing. Due to the fact that this country did not record natural gas and oil reserves and the inclusion of this unit would have shortened the analysed period by 7 years, the decision was made not to include the Czech Republic in random effects and within-between random effects estimation with the *EBRD* dependent variable[13].

To test the research hypotheses, the following models using the *within--between* random effects framework were developed:

$$EBRD_{it} = \beta_0 + \beta_1 OilPC\ddot{n}orm_{it} + \beta_2 GasPC\ddot{n}orm_{it} + \beta_3 \overline{OilPC\ddot{n}orm_i} + \\ + \beta_4 \overline{GasPCnorm_i} + \beta_5 Latitude_i + \beta_6 Landlocked_i + \beta_7 MuslimShare_i + \\ + \beta_8 YUCP_i + \beta_9 W\ddot{A}R_{it} + \beta_{10} \overline{WAR_i} + \beta_{11} GDPpc1989_i + \gamma_t + u_i + e_{it}$$

$$FH_{it} = \beta_0 + \beta_1 OilPC\ddot{n}orm_{it} + \beta_2 GasPC\ddot{n}orm_{it} + \beta_3 \overline{OilPC\ddot{n}orm_i} + \\ + \beta_4 \overline{GasPCnorm_i} + \beta_5 Latitude_i + \beta_6 Landlocked_i + \beta_7 MuslimShare_i + \\ + \beta_8 YUCP_i + \beta_9 W\ddot{A}R_{it} + \beta_{10} \overline{WAR_i} + \beta_{11} GDPpc1989_i + \gamma_t + u_i + e_{it}$$

where:

$EBRD$ or FH — the dependent variables at t time for a i country,
β_1, β_2, β_3, and β_4 — parameters by the fossil fuels variables[14],

[13] The additional analysis with the *EBRD* dependent variable including all countries for the years 1997—2007 was conducted to check the robustness of the results. This analysis leads to the same conclusions as presented in this study. Results available upon request.

Apart from checking panel unit root tests, strict exogeneity assumption and sample selection problem, model specifications are based on the results of time-fixed effects, random effects, heteroskedasticity, serial and cross-sectional correlation tests. Their results suggest that time dummies should be included, pooled OLS is not an appropriate method to use in this analysis, clustered standard errors should be employed and there is no problem with cross-sectional dependence when time dummies are included in the analysis. Results of tests available upon request. The most common test to decide between fixed effects and random effects models is the Hausman test that checks if coefficients of both models differ significantly. However, Bell and Jones (2015, p. 138) claim that the model they propose solves the problem of heterogeneity bias and so makes the Hausman test, as a test of fixed effects against random effects model, redundant. In this research, the analysis for each specification (*within-between*, fixed effects and random effects) is conducted what makes the Hausman test unnecessary.

Variance inflation factor was calculated at each step of the analysis. In some specifications the problem of multicollinearity among the control variables was present, but as far as this thesis is focused on the impact of natural abundance on the pace of the institutional changes, we do not have to care about the amount of correlation between other variables (Wooldrigde, 2009, pp. 95—99).

[14] In order to simplify a comparison and an interpretation of the obtained results, the normalised values of proved reserves of oil and natural gas *per capita* were calculated and employed: $OilPCnorm_{it} = \frac{OilPC_{it} - OilPC_{min}}{OilPC_{max} - OilPC_{min}}$, $GasPCnorm_{it} = \frac{GasPC_{it} - GasPC_{min}}{GasPC_{max} - GasPC_{min}}$. Since the minimum values in the dataset were equal to 0, this transformation did not impact the significance levels in the econometric analysis.

$\overline{OilPCnorm_i}$ and $\overline{GasPCnorm_i}$ — mean values of, respectively, oil and natural gas reserves for a i country,
$\overline{OilPCnorm_{it}} = OilPCnorm_{it} - \overline{OilPCnorm_i}$,
$GasP\ddot{C}norm_{it} = GasPCnorm_{it} - \overline{GasPCnorm_i}$,
β_0 — the intercept term,
u_i — an unobserved individual effect assumed to be uncorrelated with explanatory variables,
e_{it} — the idiosyncratic error assumed to be uncorrelated with explanatory variables and u_i at all periods,
γ_t — are time-dummies.

Using the fixed effects framework, the models of the following form were estimated:

$$F\ddot{H}_{it} = \beta_0 + \beta_1 OilPC\ddot{n}orm_{it} + \beta_2 GasPC\ddot{n}orm_{it} + \beta_3 W\ddot{A}R_{it} + \gamma_t + \ddot{e}_{it}$$
$$E\ddot{B}RD_{it} = \beta_0 + \beta_1 OilPC\ddot{n}orm_{it} + \beta_2 GasPC\ddot{n}orm_{it} + \beta_3 W\ddot{A}R_{it} + \gamma_t + \ddot{e}_{it}$$

where:

$E\ddot{B}RD$ or $F\ddot{H}$ — the dependent variables,
β_1 and β_2 — parameters by the fossil fuels variables,
$OilPC\ddot{n}orm_{it}$ and $GasPC\ddot{n}orm_{it}$ — time-demeaned values of variables representing, respectively, oil and natural gas abundance.

Using the random effects framework, the models of the following form were developed:

$$EBRD_{it} = \beta_0 + \beta_1 OilPCnorm_{it} + \beta_2 GasPCnorm_{it} + \beta_3 Latitude_i + \\ + \beta_4 Landlocked_i + \beta_5 MuslimShare_i + \beta_6 YUCP_i + \beta_7 WAR_{it} + \beta_8 GDPpc1989_i + \\ + \gamma_t + u_i + e_{it}$$
$$FH_{it} = \beta_0 + \beta_1 OilPCnorm_{it} + \beta_2 GasPCnorm_{it} + \beta_3 Latitude_i + \beta_4 Landlocked_i + \\ + \beta_5 MuslimShare_i + \beta_6 YUCP_i + \beta_7 WAR_{it} + \beta_8 GDPpc1989_i + \gamma_t + u_i + e_{it}$$

RESULTS AND ROBUSTNESS CHECK

In tab. 5, the results of the econometric analysis for the *FH* dependent variable are presented. It is shown that effects of the variable based on the oil reserves are negative[15] but not statistically different from zero in each model. The

[15] It should be noted that the highest value for the *FH* variable represents the lowest level of political freedom. Therefore, the positive sign of the coefficient in the analysis with this dependent variable shows a negative effect on political freedom.

impact of the variable $GasP\ddot{C}norm$ is negative and significant at the 10% level in the within-between model. At the same time, the between effect of this covariate is indicated as negative and significant at the 1% level. Coefficients from the random effects model were also statistically significant. However, employing the fixed effects estimator for the years 1991—2015, the impact of natural gas abundance did not significantly differ from zero.

TAB. 5. ECONOMETRIC ANALYSIS — RESULTS, DEPENDENT VARIABLE *FH*

Specification	Results obtained with the use of models		
	within-between random effects	fixed effects	random effects
Explanatory variables			
$OilP\ddot{C}norm$	0.586	0.544	—
	(0.42)	(0.45)	
$\overline{OilP\ddot{C}norm}$	0.413	—	—
	(1.16)		
$OilP\ddot{C}norm$	—	—	0.599
			(0.41)
$GasP\ddot{C}norm$	0.230*	0.220	—
	(0.13)	(0.13)	
$\overline{GasPCnorm}$	3.646***	—	—
	(0.86)		
$GasPCnorm$	—	—	0.300**
			(0.13)
Control variables			
Time-invariant variables (*Latitude*, *Landlocked*, *MuslimShare*, *YUCP*, *GDPpc1989*	yes	no	yes
Time-variant variables) (*time dummies*, *WAR*)	yes	yes	yes
Intercept	yes	yes	yes
N	532	670	532
σ_u	0.785	1.756	0.733
σ_e	0.483	0.664	0.483
rho	0.725	0.875	0.697
R_w^2	0.149	0.218	0.149
R_o^2	0.843	0.061	0.825
R_b^2	0.893	0.046	0.874

N o t e. Standard errors are reported in parentheses. Asterisks denote significance levels: *** — 1%, ** — 5%, * — 10%. N — number of observations, σ_u — standard deviation of residuals within groups, σ_e — standard deviation of residuals (overall error term), rho — intraclass correlation that shows how much of the variance is due to differences across panels, R_w^2, R_o^2, R_b^2 — respectively, within, overall, and between R-squares.

S o u r c e: as in the tab. 4.

Table 6 presents the results for the $EBRD$ dependent variable. The within effect of the variable representing oil abundance was negative and significant at the 1% significance level in both *within-between* random effects and fixed effects models, while the between effect was not statistically different from zero. When the random effects model was used, the coefficient was negative and significant at the 1% level. The within effect of natural gas abundance was indicated as close to zero. At the same time, the between effect represented by the variable $\overline{GasPCnorm}$ was negative and significant at the 1% significance level.

TAB. 6. ECONOMETRIC ANALYSIS — RESULTS, DEPENDENT VARIABLE *EBRD*

Specification	Results obtained with the use of models		
	within-between random effects	fixed effects	random effects
Explanatory variables			
$\ddot{OilPC}norm$	–0.384***	–0.383***	—
	(0.09)	(0.09)	
$\overline{OilPCnorm}$	0.901	—	—
	(0.72)		
$OilPCnorm$	—	—	–0.369***
			(0.09)
$\ddot{GasPC}norm$	–0.066	–0.071	—
	(0.06)	(0.06)	
$\overline{GasPCnorm}$	–2.967***	—	—
	(0.55)		
$GasPCnorm$	—	—	–0.084
			(0.06)
Control variables			
Time-invariant variables (*Latitude*, *Landlocked*, *MuslimShare*, *YUCP*, *GDPpc1989*)	yes	no	yes
Time-variant variables (*time dummies*, *WAR*)	yes	yes	yes
Intercept	yes	yes	yes
N	486	635	486
σ_u	0.507	0.594	0.476
σ_e	0.164	0.238	0.164
rho	0.906	0.862	0.894
R_w^2	0.551	0.801	0.551
R_o^2	0.567	0.327	0.439
R_b^2	0.569	0.096	0.422

N o t e. *** — significance level 1%.
S o u r c e: as in the tab. 4.

As a sensitivity analysis, it was decided to control for variables that had previously been excluded due to possible violation of the strict exogeneity assumption, different proxies for cultural factors and the logarithmic transformation of variables indicating fossil fuels abundance. The variables on accession to international organisations, such as the EU and the WTO, were not included in the basic specification due to an endogeneity problem. However, some authors (e.g., Di Tommaso et al., 2007; Schweickert et al., 2011) assume integration processes as exogenous. Since this choice is ambiguous, the additional analysis including the *EUA* and *WTOA* variables was conducted and its results are presented in column (2) in tab. 7 and 10. Similarly, the current level of income *per capita* was included in the analysis with the *FH* dependent variable (column 5 in tab. 7 and 8). The variable indicating the share of Muslim population was employed in the basic specification to control for cultural factors (the same approach was used in, e.g., Aslaksen, 2010 as well as McCleary & Barro, 2006). In research on the post-socialist countries, some authors (e.g., Schweickert et al., 2011) include a dummy variable indicating the dominant religions. In this research, 7 countries can be classified as Catholic, 8 as Muslim, 2 as Protestant and 11 as

Orthodox. Results of the analysis with these variables are presented in column 3 in tab. 7—10. Due to the fact that extreme high values, as in case of natural gas reserves in Turkmenistan, can lead to bias results, it is recommended to use logarithmic transformation of data in some research. Therefore, the analysis including resource variables in natural logs[16] was conducted and its results are presented in column 4.

Tables 7—10 represent coefficients and standard errors that were obtained using different specifications of the models[17]. In tab. 7, the *FH* dependent variable and oil reserves are considered and, in each case, the impact of the variables indicating oil abundance was not statistically significant. Considering the magnitudes of obtained coefficients (from –1.608 to 2.112), an increase by one standard deviation (*SD*) of oil reserves (0.1393, normalised values) leads to an average change of the *FH* variable within the range from –0.22 to 0.29. These values for log transformed oil reserves vary from 0.0015 to 0.13[18]. Considering that the *FH* index takes values from 1 to 7, such results lead to the conclusion that the impact of oil reserves on political institutions was not only statistically but also economically not substantial, which does not support the H1 hypothesis. At the same time, it should be indicated that the coefficients by the variable representing the between effect differ significantly between specifications, suggesting a possible omitted variable problem in the *within-between* model.

TAB. 7. SUMMARY OF THE ECONOMETRIC ANALYSIS, *FH* AND OIL RESERVES

Explanatory variables (model)	Results of the analysis				
	basic	*EUA*, *WTOA*	dominant religion	natural logs	*GDPpc*
$OilPC\ddot{C}norm$	0.544	0.721	0.544	0.938	0.532
(fxed effects)	(0.45)	(0.51)	(0.45)	(0.75)	(0.43)

[16] Since for many countries values of gas and oil reserves were set to zero, the following logarithmic transformation was conducted:

$$OilPCnormLN_{it} = \ln(OilPCnorm_{it} + 1)$$
$$OilPC\ddot{n}ormLN_{it} = OilPCnormLN_{it} - \overline{OilPC\ddot{n}ormLN_i}$$

where:
i — a country,
t — a year,
$\ln(.)$ — the natural log transformation,
$OilPCnormLN_i$ — the mean value of the $OilPCnormLN$ variable for a country i.

The same transformation was used for variables indicating natural gas reserves.

[17] Detailed results of the robustness check available upon request.

[18] For log transformed oil and natural gas reserves, expected changes were calculated as an increase from the mean values (0.0426 for oil reserves and 0.0159 for natural gas reserves) to the mean value plus one standard deviation (0.0426 + 0.1393 for oil reserves and 0.0159 + 0.0906 for natural gas reserves).

TAB. 7. SUMMARY OF THE ECONOMETRIC ANALYSIS, *FH* AND OIL RESERVES (dok.)

Explanatory variables (model)	Results of the analysis				
	basic	*EUA*, *WTOA*	dominant religion	natural logs	*GDPpc*
$OilPC\ddot{C}norm$ (*within-between* random effects)	0.586 (0.42)	0.704 (0.46)	0.586 (0.42)	0.984 (0.68)	0.121 (0.26)
$\overline{OilPC\ddot{C}norm}$ (*within-between* random effects)	0.413 (1.16)	0.371 (0.93)	–1.608 (1.37)	0.384 (1.50)	2.112 (1.51)
$OilPCnorm$ (random effects)	0.599 (0.41)	0.706 (0.44)	0.520 (0.40)	0.999 (0.64)	0.206 (0.30)
$OilPCnorm$ (first-differenced)	–0.019 (0.13)	–0.016 (0.13)	–0.019 (0.13)	0.012 (0.22)	–0.015 (0.13)

N o t e. Standard errors are reported in parentheses.
S o u r c e: as in the tab. 4.

Table 8 focuses on natural gas reserves and the *FH* variable. Coefficients obtained by employing the fixed effects model and data for the years 1991—2015 suggest an insignificant within effect in the basic specification and analyses including the income level and the dominant religion. However, when the variables based on the accession to the international organisations and natural logs of the variables of interest were used, this impact was significant at the 10% level. Similarly, the negative and statistically significant within effect of natural gas abundance was shown in 4 out of 5 analysed specifications employing the within-between model. Interestingly, by using the variable based on the income level, this coefficient suggested a positive and significant impact. In the analysis with the random effects model, natural gas reserves had a negative impact that was significant at the 5% level in 4 out of 5 specifications. Analysing first-differenced data, all coefficients were close to zero. Despite the fact that the within effect and the coefficients from the random effects model were statistically substantially different from zero in most specifications, the magnitudes of these coefficients (from –0.386 to 0.432) do not allow to indicate that they had a significant impact on political changes — one *SD* increase of natural gas reserves (0.0906, normalised values) leads to expected changes of the *FH* index within the range from –0.034 to 0.039, which cannot be considered as a substantial impact. Similarly, for log transformed natural gas reserves, these values range from –0.014 to 0.042.

The between effect represented by the $\overline{GasPCnorm}$ variable was negative and highly significant in each case. Assuming an increase by one *SD* of natural gas reserves mean values, the *FH* index is expected to grow, considering different specifications, within the range from 0.28 to 0.41. It suggests a stronger negative impact of natural gas reserves than previously, however it still does not lead to

the conclusion that natural gas abundance is a decisive determinant of political changes. What is more, the analysis of the *between* effects needs to be treated with caution due to possible correlation with unobserved heterogeneity.

TAB. 8. SUMMARY OF THE ECONOMETRIC ANALYSIS, *FH* AND NATURAL GAS RESERVES

Explanatory variables (model)	Results of the analysis				
	basic	*EUA*, *WTOA*	dominant religion	natural logs	*GDPpc*
$GasP\check{C}norm$ ..... (fixed effects)	0.220 (0.13)	0.366* (0.19)	0.220 (0.13)	0.367* (0.21)	0.136 (0.31)
$GasP\check{C}norm$ (within-between random effects)	0.230* (0.13)	0.340** (0.16)	0.230* (0.13)	0.374* (0.20)	–0.386* (0.22)
$\overline{GasPCnorm}$ ..... (within-between random effects)	3.646*** (0.86)	3.085*** (0.74)	3.693*** (0.72)	4.769*** (1.08)	3.516*** (1.17)
$GasPCnorm$ ..... (random effects)	0.300** (0.13)	0.432** (0.17)	0.328** (0.13)	0.496** (0.20)	–0.154 (0.23)
$GasPCnorm$ ..... (first-differenced)	–0.102 (0.06)	–0.098 (0.06)	–0.102 (0.06)	–0.169 (0.10)	–0.101 (0.07)

N o t e. Asterisks denote significance levels: *** — 1%, ** — 5%, * — 10%.
S o u r c e: as in the tab. 4.

In conclusion, the results obtained in the analysis with the basic specification suggest that fossil fuels abundance represented by the variable indicating oil reserves did not have a significant impact on political changes in transition countries and this conclusion was robust to the different specifications. When natural gas reserves were considered, results differed between analysed models and only the negative *between* effect was statistically significant at each specification. However, the magnitudes of obtained coefficients do not indicate a substantial economic impact of this variable. Therefore, there is no sufficient proof to unequivocally support the H1 hypothesis when both oil and natural gas reserves are considered. It can be concluded that fossil fuels abundance was not a decisive determinant of political changes towards a political system that respects civil liberties and political rights in the post-socialist countries.

To test the H2 hypothesis, the effect of oil and natural gas reserves on economic reforms presented by the *EBRD* variable was checked. Table 9 summarises the analysis with the oil reserves variables. Coefficients by the $OilPCnorm$ variable were negative and statistically significant at the 1% level at each specification employing the fixed effects and *within-between* random effects models. Similar results were shown in the analysis with the random effects model. How-

ever, when the magnitudes of coefficients are taken into account, a substantial impact on the analysed process cannot be indicated — one *SD* increase of oil reserves leads to the expected changes within the range from –0.057 to –0.036 in the *EBRD* variable (that is measured from 1 to 4.33).

Coefficients from the analysis employing first-differenced data were close to zero. The between effect of oil reserves was statistically insignificant in the basic specification and when natural logs were used. However, when an accession to the international organisations and the dominant religion were considered, the between effect was indicated as statistically significant and positive (with an expected increase of the *EBRD* variable, due to one *SD* change of oil reserves, by 0.10 and 0.26 respectively). Again, such results should be treated with caution — ambiguous results of the analysis with different proxies for cultural factors may be due to a problem of omitted variables what substantially limits applicability of the method proposed by Bell and Jones (2015) in the analysed field.

TAB. 9. SUMMARY OF THE ECONOMETRIC ANALYSIS, *EBRD* AND OIL RESERVES

Explanatory variables (model)	Results of the analysis			
	basic	*EUA*, *WTOA*	dominant religion	natural logs
$OilPC\ddot{C}norm$ ..... (fixed effects)	–0.383*** (0.09)	–0.412*** (0.12)	–0.383*** (0.09)	–0.575*** (0.16)
$OilPC\ddot{C}norm$ ..... (*within-between* random effects)	–0.384*** (0.09)	–0.365*** (0.12)	–0.385*** (0.09)	–0.574*** (0.16)
$\overline{OilPCnorm}$ ..... (*within-between* random effects)	0.901 (0.72)	0.958** (0.41)	2.411*** (0.81)	1.270 (0.93)
$OilPCnorm$ ..... (random effects)	–0.369*** (0.09)	–0.339*** (0.13)	–0.348*** (0.10)	–0.547*** (0.16)
$OilPCnorm$ ..... (first-differenced)	0.008 (0.04)	0.011 (0.04)	0.008 (0.04)	0.022 (0.06)

N o t e. Significance levels: *** — 1%, ** — 5%.
S o u r c e: as in the tab. 4.

In tab. 10, the coefficients by the variables based on natural gas reserves are presented. The within effect for this variable was not statistically significant when the fixed effects and within-between random effects models were used. For the random effects model, the insignificant impact was shown in the basic specification and in the analysis employing the logarithmic transformation of the variables of interest. Coefficients from the analysis with first-differenced data were not statistically different from zero. Assuming an increase of natural gas reserves by one *SD*, only minor changes in the *EBRD* variable are expected — from –0.013 to 0.032.

The coefficients by the $\overline{GasPCnorm}$ variable suggest the negative and highly statistically significant impact of gas abundance. Expected decrease in the *EBRD* variable (due to an increase of natural gas reserves by one *SD*) varies from 0.22 to 0.33. Such an impact can be considered as rather moderate.

TAB. 10. SUMMARY OF THE ECONOMETRIC ANALYSIS, *EBRD* AND NATURAL GAS RESERVES

Explanatory variables (model)	Results of the analysis			
	basic	*EUA*, *WTOA*	dominant religion	natural logs
$GasP\check{C}norm$ ..... (fixed effects)	–0.071 (0.06)	–0.050 (0.07)	–0.071 (0.06)	–0.113 (0.09)
$GasP\check{C}norm$ ..... (*within-between* random effects)	–0.066 (0.06)	–0.084 (0.08)	–0.066 (0.06)	–0.104 (0.09)
$\overline{GasPCnorm}$ ..... (*within-between* random effects)	–2.967*** (0.55)	–2.481*** (0.30)	–2.836*** (0.46)	–3.927*** (0.69)
$GasPCnorm$ ..... (random effects)	–0.084 (0.06)	–0.143** (0.07)	–0.096* (0.06)	–0.136 (0.09)
$GasPCnorm$ ..... (first-differenced)	0.190 (0.19)	0.190 (0.19)	0.190 (0.19)	0.369 (0.29)

N o t e as in the tab. 8.
S o u r c e: as in the tab. 4.

When the economic reforms were considered, the results suggest that an increase in oil reserves had a negative impact that was statistically significant. However, the magnitudes of obtained coefficients do not allow to indicate this impact as economically significant. For the variable representing natural gas abundance, the within effect was close to zero. The *between* effect of natural gas reserves was negative and statistically significant and its economic impact was moderate. Therefore, the H2 hypothesis is not unambiguously supported and it can be concluded that fossil fuels abundance was not a crucial obstacle towards the market economy in the post-socialist countries.

Conclusions

Natural resource curse is a widely discussed phenomenon in the literature. Researchers indicate that countries with rich natural resources tend to be less politically free and their economies grow at a slower pace. However, some authors claim that many studies suggesting the negative impact of resource abundance employ endogenous proxies of natural resources and methods that suffer from omitted variable bias. To address these issues, variables based on oil and natural gas reserves as well as panel data estimators (*within-between* random

effects, fixed effects, random effects) were employed in this study. An econometric analysis was based on data from the post-socialist countries that experienced rapid institutional changes.

The results and their robustness check suggest that there was no sufficient proof to indicate the presence of the natural resource curse when political and economic institutions were considered. Therefore, it can be concluded that oil and natural gas abundance was not a decisive obstacle towards a politically free, democratic system with the market economy in the post-socialist states.

In the analysis, a novel method by Bell and Jones (2015) was employed to distinguish *within* and *between* effects of natural resource variables. However, its applicability in this field is rather limited due to the possible omitted variables problem and missing data issue that substantially restricts the number of observations within the random effects framework. What is more, considering that oil and natural gas discoveries might multiply available reserves in a short period of time, it might be impossible to distinguish between both analysed effects.

Despite the fact that results of this research contradict the hypothesis on the existence of the natural resource curse in the post-socialist countries, further research should continue the analysis in this group of states. Substantial improvements in this field might be made by employing a broader range of institutional indicators and more precise measures of resource abundance.

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Zasoby paliw kopalnych a zmiany instytucjonalne w krajach postsocjalistycznych

Streszczenie. *Celem badania jest ustalenie, czy bogactwo paliw kopalnych miało negatywny wpływ na przemiany polityczne i gospodarcze w krajach postsocjalistycznych w latach 1991—2015. Badaniem objęto 28 krajów Europy Środkowo-Wschodniej i byłego Związku Radzieckiego. Wykorzystano dane pochodzące z baz Freedom House (FH), Europejskiego Banku Odbudowy i Rozwoju (European Bank for Reconstruction and Development — EBRD) i BP. W analizie zastosowano estymatory: within-between, o efektach losowych oraz o efektach stałych. W celu uniknięcia problemu endogeniczności wskaźników zasobów naturalnych wykorzystano zmienne odnoszące się do wielkości zasobów ropy i gazu.*

Wyniki przeprowadzonego studium wykazały, że bogactwo wybranych paliw kopalnych nie miało decydującego wpływu na proces tworzenia gospodarki rynkowej oraz demokratyzacji krajów Europy Środkowo-Wschodniej i byłego Związku Radzieckiego.

Słowa kluczowe: kraje postsocjalistyczne, przemiany instytucjonalne, klątwa bogactwa.