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INSTITUTIONAL FACTORS OF GOVERNMENT EFFICIENCY: CROSS-COUNTRY COMPARATIVE ANALYSIS

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Government efficiency is one of many fuzzy terms in contemporary political science. Due to its multidimensionality, it is not well-defined and, therefore, hard to identify. The idea of the current research is to create an index of government efficiency using data envelopment analysis. Using a sample of 127 countries for the period of 2009-2011 we then mark out the significant institutional factors that could impact government efficiency. Moreover, this study supports the initial hypothesis about the predominance of political factors in the efficiency increase.

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Keywords: political institutions, government effectiveness, state efficiency, data envelopment analysis, cross-country analysis

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1. Introduction

The problem of effectiveness and efficiency is one of the core issues and mainstream directions in contemporary political science. The decision-making process should correspond with the initial goals and probable results of government programs. Hence, it is quite important to compare and analyze the costs and benefits of implementing policies. Such an analysis demands the understanding of effectiveness and efficiency in state policy.

Despite being one of the key concepts in economic and social policy, there is little agreement about the definition of efficiency. The absence of such a definition leads to various conceptual misunderstandings during the comparison of various research results. Therefore, I have decided to analyze the factors that may form government efficiency. At the same time, it could help to pick out which factors should be improved in order to increase efficiency.

The present study aims to find the significant institutional factors that may explain the diversity of government efficiency across various countries. I hypothesize that the political institutional factors (such as political regime, political stability and the proper implementation of the initial goals) have a greater impact on efficiency than any other factors, for instance, economic or social ones. The paper consists of two main parts – the construction of an efficiency index and measuring the possible influence of various political, economic and social factors on the level of efficiency.

Efficiency may reflect several aspects of government policy. It marks out the complexity and multidimensionality of the efficiency concept. Firstly, efficiency is used in the economic and managerial sense and explains the productivity of machines and industrial technologies. But in 1960s Lipset defined efficiency as one of the characteristics of a political system (Lipset, 1960). That led to a conceptual dichotomy – efficiency and effectiveness, where the latter means the correspondence of the results with the initial strategic goals of the program. The concept of effectiveness was used as an indicator of the quality of governance (Barnard and Andrews, 1971; Osborne and Gaebler, 1993; Rainey and Steinbauer, 1999; Rainey, 2009) and, then, was extended to the understanding of the potential of a political system (Cameron and Whetten, 1983; Selden and Sowa, 2004).

Efficiency forms an alternative approach. It was highly developed in 1950s and based on the cost-benefit analysis. Later, Farrell (Farrell, 1957) strengthened this approach suggesting data envelopment analysis (DEA). Since then DEA has become one of the widely spread non-parametric methods of measuring efficiency. DEA is basically grounded on the idea of the

production-possibility frontier and was well-known at first only in economic and industrial spheres. In the mid-1970s it was adopted by the political realm (Charnes et al., 1978). Nowadays it has become one of the exact methods for measuring efficiency and the quality of governance; thus it is used by a number of researchers (Fakin et al., 1997; Evans et al., 2000; Afonso and Aubyn, 2005 ; Andrews, 2008).

A comparative analysis of these two approaches – effectiveness and efficiency – gives birth to a wide discussion in the contemporary political science (Deva, 1985; Akhremenko, 2012). Moreover, government effectiveness is often equated with the quality of government, and therefore, is measured with Worldwide Governance Indicators (WGI (“WB,” 2014)) and with the indicators of the security property rights (Myerson and Satterthwaite, 1983), (Neeman, 1994). But in the current paper I am concentrated on the second definition and identify the efficiency of government policy as a balance between input resources and final output results. As a result, I measure efficiency using Data Envelopment Analysis (DEA) and the comparison of inputs and outputs for individual units. The final DEA results I consider as a proxy for efficiency and then use these indicators of efficiency in several multivariate regression models on the times-series cross-section data of 127 countries from 2009 to 2011.

The rest of the paper is organized as follows. Section 2 includes the theoretical grounds and describes the main concepts of the current research. Section 3 presents data and suggests the methodological basis of the paper. Section 4 outlines the empirical analysis of the current problem. Section 5 shows the discussion of the empirical results and suggests the robustness check tests in order to support the validity of the results. Section 6 concludes.

2. Effectiveness and efficiency: possible influential factors.

Efficiency serves as a basic characteristic of the authorities in power and of the current policy. It may influence the duration and survival of political elites. Thus, it is quite important to measure efficiency and to understand the possible factors that could increase its level. Moreover, the limitation on resources stimulates the formulation of efficient policy. Legitimacy and economic and political effectiveness as the quality of implementation strategy tend to be the core factors of political stability (Lipset, 1960). Moreover, in a political sense, effectiveness and efficiency can often be integrated with executive power as a realization of the number of initial requirements (Rainey, 2009). Another approach considers effectiveness and efficiency as the implementation of the original goals and functions of the system, and political system as well (Selden and Sowa, 2004). The opposite approach presents effectiveness and efficiency not as a fact of realization of some aims, but as a measure of the quality of the final results. Thus, Nord (Nord, 1983), Walker

and Boyne (Walker and Boyne, 2006), Lee and Whitford (Lee and Whitford, 2008) presume effectiveness and efficiency as an identification of the quality of governance. Andrews points out that such an approach gives an opportunity to understand the quality of the political system and to evaluate the policy of the current authorities and the quality of their decision-making process (Andrews, 2008). Moreover, Andrews marks out that efficient authorities may exist not only in well-developed and democratic states. Factors of the efficient and effective governance may sharply depend on the political regime type (Andrews, 2008). Such an idea was well developed in the concept of “good enough governance” (Grindle, 2004; Evans, 2012). Different regime types could have different cut points of “good governance” and, consequently, different definitions of effectiveness and efficiency. An efficient system may also be defined as a unit that justifies all the costs and does not lead to any economic or financial damages (Osborne and Gaebler, 1993). At the same time it is a unit where each actor or agent (individual or institutional) realizes properly all his authorities and, finally, achieves the initial goals (Rainey and Steinbauer, 1999).

In the current research I use the generalized definition that combines the two approaches – effectiveness and efficiency. Nevertheless, the conceptualization turns out to be closer to efficiency than effectiveness, because it is mainly connected with the grounds of cost-benefit analysis and with the economic sense of the quality of governance. Such an approach was used for analyzing the efficiency of public spending (Fakin et al., 1997), the efficiency of the education policy in OECD states (Clements, 2002), for the evaluation of the health policy efficiency in 191 states across the world (Evans et al., 2000) and for measuring the efficiency of education and health in OECD countries (Afonso and Aubyn, 2005). All this research points out that it is important not only to analyze the amount of input resources, but also to understand how the institutional design may transform these input resources to output results. This process is based on a comparative analysis of ex-ante and ex-post parameters (Jones et al., 2012).

Therefore, it is important to define the inputs and outputs of the system and to model the possible interactions between them. Inputs and outputs are not necessarily monetary. Nevertheless, a system is more efficient when it spends fewer input resources or receives a greater amount of final goods (Akhremenko, 2012). The parametric approach of such a system comes to the Cobb-Douglas function, whereas the non-parametric approach is based on the Data Envelopment Analysis (DEA) (Sengupta, 2000). The non-parametric method – DEA – allows estimating multi-input and multi-output models (Cook and Seiford, 2009). Multidimensionality made DEA a well-developed method in the analysis of public (efficiency of schools, colleges, hospitals or the efficiency of railway transport) and private (small business structures, commercial banks,

investment companies) sectors (Sengupta, 1999; Nakanishi and Falcocchio, 2004; Fried et al. 2008; Cooper et al., 2011).

Charnes, Cooper and Rhodes emphasized that government efficiency includes the idea of proper resource spending. Thus, it is necessary not only to count the amount of the spent resources, but also to evaluate the quality of the final goods (Charnes et al., 1978). In such a context the unit of analysis – of the efficiency evaluation process – is called a “decision-making unit” (DMU). These units could be particular states, regions, institutions or political actors. Charnes, Copper and Li chose cities as “decision-making units”. Using DEA they analyzed the efficiency of Chinese cities; therefore, they took the working force as an input resource and the amount of the gross domestic product of the city as an output indicator (Charnes et al., 1989). Afonso offered states as “decision-making units” and started analyzing government and state efficiency with Data Envelopment Analysis (Afonso and Aubyn, 2005). As a result, since the 2000s DEA has become a developed method of analysis in political studies (Clements, 2002; Afonso et al., 2003).

In the current paper I presume the existence of several institutional factors that could impact government efficiency. The efficiency means appropriate converting of the input resources to the output results. But each decision-making unit has its own institutional characteristics that may affect the efficiency. Easton’s “black box” of the political system does not identify such characteristics (Easton, 1953). I presume the necessity of exploring the “black box” and recognizing the inner institutional peculiarities that may impact efficiency. Deva points out that the quality of the bureaucracy, political stability, rule of law and level of corruption serve as possible factors of government efficiency and effectiveness. At the same time the infrastructure quality, urbanization rate, population density, decentralization leverage and the development of rural areas could also impact the efficiency (Deva, 1985). Deva and Brancati also point out that cultural factors may matter as well (Deva, 1985; Brancati, 2006). Thus, I assume that the amount of institutional factors can be classified as geographical (exogenous structural characteristics of the states), socio-economic and political.

Exogenous geographical factors create the external conditions for institutional construction (Przeworski, 2004). Institutions are endogenous and are the consequences of their own geographical area. Therefore, geographical characteristics may have an influence on the institutional rules inside the state and on the efficiency of these rules and of the decision-making process as a whole. Finally, efficiency could directly depend on the resource curse and on the amount of the exported energy resources. A resource curse increases the growth of corruption,

the development of an authoritarian regime and the realization of private elite interests (Ross and Andersen, 2012). In the current research I analyze the amount of the extracted natural resources (oil, gas and other valuable energy resources) as a geographical factor. The amount of the exported natural resources depends on the resource potential of the state, which is influenced by the country's geographical position.

Socio-economic factors may be presented by indicators of the economic growth, social and economic inequality in the state and the ease of doing business. A high level of income inequality is the evidence of the existence of strong elite groups around the leader. Budget redistribution between elites and society is biased; this leads to the growth of clientelism and corruption. In such a situation the dominating role is held by the private elite sector and does not support the development of public goods (Dixit and Londregan, 1996). As Dixit and Londregan said, the policy aims at "tactic redistribution" and at the realization of local private interests instead of the "programmic redistribution" and the implementation of the financial aid towards public sector and social transfers (Dixit and Londregan, 1996). Hence, according to my hypothesis, the utilized input resources do not lead to the planned results; and policy turns out to be ineffective and inefficient. Economic growth may serve both as a factor and as a consequence of efficient policy, but I presume that the indicator of the economic growth divides states into two groups: developing and developed. Therefore, this could be one of the probable factors of government efficiency. Economic growth could be connected with the development of private business. The strength of the small and medium-sized business indicates the capacity of the security property rights which leads to the growth of government responsiveness; and, as a result, to the political system efficiency (Neeman, 1994).

At the same time I hypothesize that socio-economic factors are not as essential for the government and state efficiency as the political ones. I suppose that Easton's "black box" does work and institutional peculiarities of the political system do matter. Political factors constitute the basis of the "black box" political system. And it seems quite logic that government efficiency depends on the political institutions. Government efficiency is often compared with the quality of government. I support the idea that quality of government is only one of the factors of efficiency. Only good governance with proper bureaucracy will implement efficient decisions (Porta et al., 1999). Stable bureaucracy leads to high quality government and it performs as a core factor of the effective executive power (Rauch and Evans, 2000; Court et al., 2000).

The quality of government is also strongly related to political regime. The latter could work as a factor of government efficiency as well. Democratic states are often more efficient than

autocratic or hybrid regimes. This may be due to better governance, higher quality of government and the existence of stronger institutions. But a number of studies claim that regime influence on government efficiency is not one-dimensional. Moreover, the high levels of effectiveness and efficiency could be achieved in autocracies (Brewer et al., 2007). Bureaucracy quality and the responsibility of the administrative sector are more significant factors: the case of Singapore, with an autocratic leader and professional “civic bureaucrats” (Dixit and Londregan, 1996), seems to be a good illustration of such a thesis. Moreover, a democratic regime does not necessarily mean high levels of efficiency (Adserà et al., 2003). Therefore, I use a regime as an additional variable that could divide the sample into two groups and give the opportunity to test the hypothesis on the subsamples.

3. Data

The current research uses a time-series cross-section sample of 127 countries for the period 2009-2011. The dependent variable is represented by the efficiency index. This index was built using Data Envelopment Analysis – the relation between input resources and output results. I presume that the effectiveness and efficiency of government depend on their ability to realize proper public goods. Therefore, I chose health and education policy as the grounds of Data Envelopment Analysis. So I picked public health expenditures (as a percent of total government expenditures by World Bank (“WB,” 2014)) and public education expenditures (as percents of the GDP by World Bank (“WB,” 2014)) as input resources (Afonso and Aubyn, 2005; Gupta and Verhoeven, 2001). Output results are measured by Infant Mortality Rate (by World Bank (“WB,” 2014)) and Human Development Index (by United Nations (“HDI,” 2014)). Multidimensional input transforms into the multidimensional output. This transformation arises inside the political system and the quality of such a transformation is evaluated via the Data Envelopment Analysis. As a result, I received a proxy for measuring government efficiency as a ratio between initial resources and the final results. Exactly this proxy is used in the further empirical analysis.

The number of independent variables (Table 1) is represented by three groups of indicators according to the three types of possible factors of government efficiency: geographical, socio-economic and political.

- Geographical factors include fuel export (% of the whole export of the state by World Bank (“WB,” 2014)), geographical latitude (by the La Porta, Lopez-de-Silanes, Shleifer

and Vishny Database (“QoG,” 2014)), and colonial origins (by Hadenius and Teorell Database (“QoG,” 2014)).

- Socio-economic block consists of the Gini index of inequality (“WB,” 2014), GDP per capita via the PPP (“WB,” 2014) and ease of doing business index (“WB,” 2014).
- Political factors cover political regime (“Polity IV,” 2014), political rights and civil liberties (“FH,” 2014), quality of governance integrated index which includes the quality of bureaucracy, corruption and rule of law (by International Country Risk Guide (“QoG,” 2014)), Worldwide Governance Indicators (Control of Corruption, Political Stability, Rule of Law, Regulatory Quality, Voice and Accountability (“WB,” 2014)) and Corruption Perception Index (“CPI,” 2014).

Table 1. Description Statistics of Independent Variables

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Fuel Export	368	16,05	24,996	0	98,617
Latitude	573	0,28	0,188	0	0,722
Colonial Origin	573	3,078	2,6888	0	10
Gini Index	49	43,486	9,181	26	63,14
GDP p/c	525	12386,83	13519,59	303,388	77987,08
Ease of Doing Business	180	93,772	53,311	1	185
Polity IV	481	3,8852	6,243	-10	10
Political Rights	573	3,393	2,148	1	7
Civil Liberties	573	3,242	1,846	1	7
ICRG Quality of Governance	414	0,533	0,202	0,083	1
Control of Corruption	567	-0,070	1,001	-1,744	2,484
Government Effectiveness	567	-0,064	0,99	-2,269	2,292
Political Stability	573	-0,072	0,988	-3,32	1,576
Rule of Law	573	-0,081	0,988	-2,494	1,97
Regulatory Quality	567	-0,075	0,984	-2,561	1,932
Voice and Accountability	573	-0,069	1,010	-2,235	1,631
Corruption Perception Index	527	3,976	2,080	0,983	9,463
Security Property Rights Index	528	43,097	23,720	0	95

Empirical analysis also includes the set of control variables (Table 2): population (by World Bank), area of the state (by World Bank), and ethno-linguistic and religious fractionalization (by Alesina et al. Database).

Table 2. Descriptive Statistics of the control variables

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Population	573	$3,58 \cdot 10^7$	$1,35 \cdot 10^8$	9806	$1,34 \cdot 10^9$
Area	382	676511.6	1852325	2	$1,64 \cdot 10^7$
Ethnic Fractionalization	555	.439	0,257	0	0,93
Religious Fractionalization	564	.435	0,233	0,002	0.86

4. Empirical Analysis

The core empirical analysis was done using a statistical analysis and, particularly, with linear regression models.

Table 3. OLS estimation results of the pooled models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates
Fuel Export	0.002** (0.001)	0.002** (0.001)	0.003*** (0.0008)	0.003*** (0.0008)	0.002*** (0.0007)	0.002** (0.0007)	0.0015** (0.0008)
Polity IV		0.004 (0.003)		-0.0013 (0.003)			
Urbanization Rate	0.003*** (0.001)	0.0036*** (0.0009)	0.001 (0.001)	0.002** (0.0009)	0.0017* (0.0009)	0.0001 (0.0009)	0.0003 (0.0009)
Latitute	0.079 (0.097)	0.118 (0.0897)	0.002 (0.085)	0.0533 (0.075)	-0.006 (0.081)		
Ethnic Fragmentation	-0.405*** (0.102)	-0.310*** (0.072)	-0.301*** (0.094)	-0.237*** (0.070)	-0.261*** (0.077)	-0.189*** (0.062)	-0.186*** (0.062)
Government Effectiveness			0.110*** (0.021)	0.100*** (0.022)			
Quality of Governance					0.487*** (0.088)	-0.077 (0.098)	0.001 (0.102)
GDP p/c						$1.24 \cdot 10^{-5}$ *** ($1.32 \cdot 10^{-6}$)	$1.24 \cdot 10^{-5}$ *** ($1.48 \cdot 10^{-6}$)
Political Rights							0.017* (0.009)
Constant	0.503*** (0.108)	0.377*** (0.068)	0.558*** (0.105)	0.460*** (0.071)	0.249*** (0.080)	0.467*** (0.075)	0.363*** (0.075)
Number of observation	211	200	211	200	182	178	178
R-squared	0.353	0.445	0.429	0.512	0.506	0.588	0.598
Standard errors in the parentheses							
*** p<0.01, ** p<0.05, * p<0.1							

According to the preliminary correlation analysis, several indicators appear to be insignificant and invalid. These were excluded from the further regression models. These predictors were the Gini index, the ease of doing business index, colonial origin and political stability indicator. Also, population and area were eliminated from the regression analysis as insignificant controls.

Table 4. OLS estimation results of the pooled models with dummies on years

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates
Fuel Export	0.0017**	0.002**	0.0027***	0.0025***	0.0024***	0.0018**	0.0015*
	(0.0007)	(0.0009)	(0.0008)	(0.0008)	(0.0007)	(0.0007)	(0.0008)
Polity IV		0.004		-0.0013			
		(0.003)		(0.0029)			
Urbanization Rate	0.003***	0.0036***	0.0009	0.002**	0.0016*	5.70×10^{-5}	0.0003
	(0.001)	(0.0009)	(0.001)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
Latitude	0.071	0.115	-0.0002	0.057	0.0038		
	(0.100)	(0.091)	(0.087)	(0.075)	(0.082)		
Ethnic Fragmentation	-0.405***	-0.310***	-0.301***	-0.237***	-0.261***	-0.192***	-0.189***
	(0.101)	(0.073)	(0.094)	(0.071)	(0.077)	(0.062)	(0.062)
Dummy for 2010	-0.039	-0.013	-0.039	-0.011	0.005	0.003	0.004
	(0.034)	(0.029)	(0.031)	(0.027)	(0.027)	(0.025)	(0.025)
Dummy for 2011	-0.032	-0.008	-0.009	0.012	0.039	0.050	0.049
	(0.046)	(0.043)	(0.044)	(0.041)	(0.044)	(0.042)	(0.041)
Government Effectiveness			0.110***	0.101***			
			(0.021)	(0.022)			
Quality of Governance					0.494***	-0.070	0.007
					(0.088)	(0.099)	(0.102)
GDP p/c						1.26×10^{-5} ***	1.25×10^{-5} ***
						(1.39×10^{-6})	(1.57×10^{-6})
Political Rights							0.016*
							(0.009)
Constant	0.528***	0.385***	0.578***	0.463***	0.235***	0.457***	0.354***
	(0.119)	(0.071)	(0.115)	(0.073)	(0.082)	(0.076)	(0.078)
Number of observations	211	200	211	200	182	178	178
R-squared	0.358	0.446	0.433	0.513	0.509	0.593	0.603
Robust standard errors in the parentheses							
*** p<0.01, ** p<0.05, * p<0.1							

The empirical analysis first estimated the pooled model with robust standard errors for the time-series cross-section data. Table 3 presents the OLS estimation of the seven various models for the pooled data. According to the R-square values, the seventh model turns out to be the most consistent and explains about 60% of the dependent variable variance. The pooled data results show that fuel export (in all models), GDP p/c (models 6 and 7), government effectiveness (models 3 and 4) and political rights (models 6 and 7) are statistically significant. But such pooled data models may include time trends. Hence, I put a dummy on years into these seven models (Table 4). Table 4 supports the absence of the impact of independent variable trends on the dependent variable dynamic. The same variables are statistically significant as in the previous models. Moreover, the dummy variables coefficients appear to be non-significant. Therefore, I conclude that there are no significant time trends in the data.

Besides the possible time influence, the dynamic of the dependent variable could be affected by individual country peculiarities. In order to consider this condition, I used panel data models with random (Table 5) and fixed effects (Table 6).

Table 5 presents eight models estimated by the OLS method. It is obvious that the corruption perception index has statistically significant positive impact on the level of efficiency (in models 4-7). Thus, I conclude that less corrupted states are more efficient. GDP per capita is also statistically significant (in models 1, 2, 8, 9, 10), therefore, I may use this indicator as a control variable. At the same time it proves the existence of positive effect of economic performance on the level of efficiency in my sample. Models with random effects do not diminish the individual country effects. Hence, I checked these results with the fixed effects models.

Table 6 presents eight models with fixed effects. These models show that the only significant predictor is political regime (models 4 and 7, where Polity IV coefficient is statistically significant). Surprisingly, that political regime had a negative impact on efficiency. It may provide evidence that democracy could stimulate the reduction of governance and bureaucracy quality. In order to prove such an idea I put the scatter-plot of the Polity IV and the indicators of government efficiency (Figure 1).

Table 5. OLS estimation panel data models with random effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Variables	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates
Fuel Export	0.003 (0.002)	0.003 (0.002)	0.005* (0.003)	0.004* (0.002)	0.004* (0.002)	0.004 (0.003)	0.005* (0.002)	0.003 (0.002)	0.003 (0.002)	0.003 (0.002)	0.003 (0.002)
GDP p/c	1.42*10 ^{-5***} (1.20*10 ⁻⁶)	1.32*10 ^{-5***} (1.45*10 ⁻⁶)						1.51*10 ^{-5***} (2.98*10 ⁻⁶)	1.50*10 ^{-5***} (4.12*10 ⁻⁶)	1.10*10 ^{-5***} (3.13*10 ⁻⁶)	1.43*10 ^{-5***} (1.50*10 ⁻⁶)
Polity IV		0.003 (0.004)	0.015*** (0.005)	0.007 (0.005)		0.005 (0.005)	0.007 (0.005)	0.004 (0.004)	0.004 (0.003)	0.002 (0.003)	0.011* (0.006)
Corruption Perception Index				0.059*** (0.009)	0.066*** (0.007)	0.045*** (0.011)	0.057*** (0.009)	-0.013 (0.015)			
Urbanization Rate						0.003 (0.002)					
Religious Fragmentation							0.121 (0.088)				
Control on corruption									-0.027 (0.048)		
Regulatory Quality										0.041 (0.040)	
Political Rights											0.027 (0.017)
Constant	0.322*** (0.028)	0.296*** (0.034)	0.391*** (0.057)	0.175*** (0.048)	0.189*** (0.044)	0.105** (0.046)	0.128** (0.059)	0.325*** (0.061)	0.275*** (0.027)	0.319*** (0.030)	0.159* (0.085)
Number of Observations	209	196	200	199	209	199	199	195	196	196	196
Number of groups	107	99	101	100	106	100	100	98	99	99	99
Robust standard errors in parentheses											
*** p<0.01, ** p<0.05, * p<0.1											

Table 6. OLS estimation panel data models with fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables	DEA- estimates	DEA- estimates	DEA- estimates	DEA- estimates	DEA- estimates	DEA- estimates	DEA- estimates	DEA- estimates	DEA- estimates	DEA- estimates
Fuel Export	0.006 (0.006)	0.007 (0.006)	0.006 (0.006)	0.006 (0.006)	0.006 (0.006)	0.007 (0.006)	0.006 (0.006)	0.007 (0.006)	0.007 (0.006)	0.007 (0.006)
GDP p/c	-6.11e*10 ⁻⁶ (8.26*10 ⁻⁶)	-8.99*10 ⁻⁶ (8.49*10 ⁻⁶)					-9.18*10 ⁻⁶ (8.64*10 ⁻⁶)	-1.01*10 ⁻⁵ (8.87*10 ⁻⁶)	-9.42*10 ⁻⁶ (8.62*10 ⁻⁶)	-8.80*10 ⁻⁶ (8.69*10 ⁻⁶)
Polity IV		-0.009 (0.006)	-0.008 (0.006)	-0.010* (0.006)		-0.007 (0.005)	-0.010* (0.006)	-0.008 (0.006)	-0.008 (0.007)	-0.008 (0.007)
Corruption Perception Index				-0.082 (0.063)	-0.081 (0.058)	-0.075 (0.056)	-0.073 (0.063)			
Urbanization Rate						-0.057 (0.043)				
Control on corruption								-0.167 (0.134)		
Regulatory Quality									0.042 (0.103)	
Political Rights										0.003 (0.008)
Constant	0.548*** (0.079)	0.621*** (0.090)	0.499*** (0.065)	0.883*** (0.274)	0.835*** (0.242)	4.165 (2.691)	0.970*** (0.355)	0.655*** (0.102)	0.614*** (0.0906)	0.604*** (0.108)
Number of Observations	209	196	200	199	209	199	195	196	196	196
Number of groups	0.147	0.244	0.224	0.254	0.246	0.305	0.267	0.256	0.245	0.244
Control on corruption	107	99	101	100	106	100	98	99	99	99
Robust standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

Figure 1 shows that there is no obvious linear interaction between political regime and government efficiency.

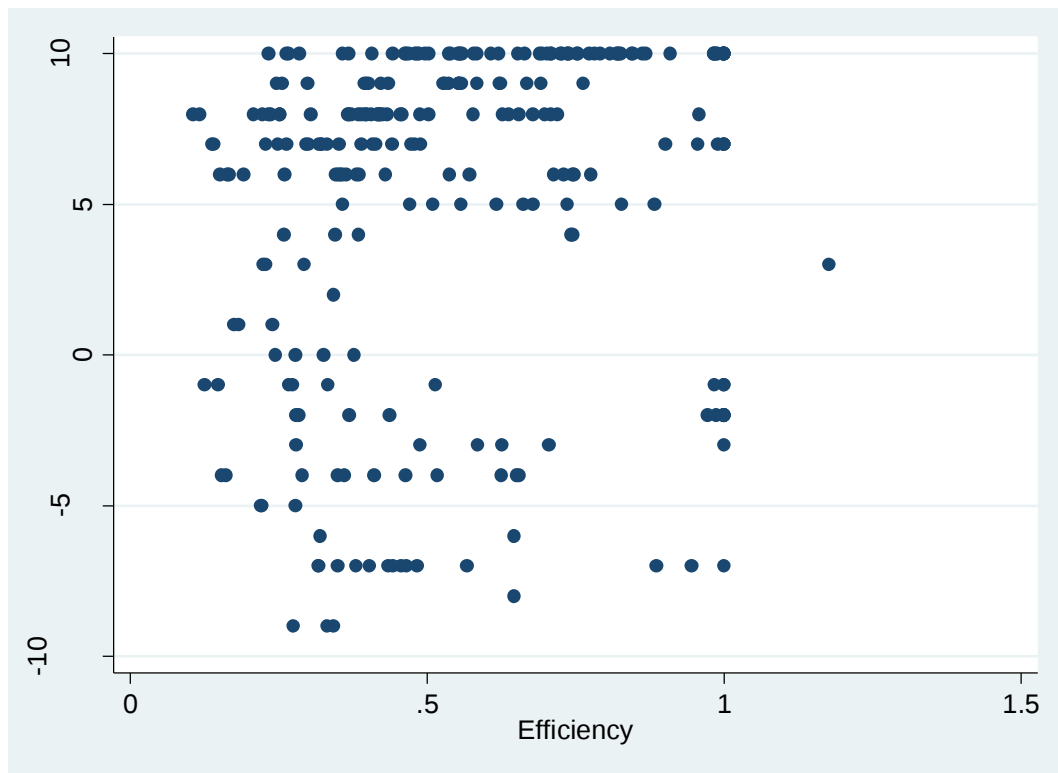


Figure 1. Scatter-plot of political regime and government efficiency

Thus, I decided to use the indicator of political regime as a control variable and, therefore, cluster the initial sample in two groups: autocracies (if the values of Polity IV were less than zero) and democracies (if values of Polity IV were greater than zero). Finally, I checked the models against Table 5 and 6 on the two new groups of countries – autocracies (Table 7) and democracies (Table 8).

Table 7 shows the results of the OLS regression with random and fixed effects for autocracies. Fuel export has a statistically significant positive effect (in all models) on government efficiency. It is a logical inference for the autocracies, where energy resources and fuel export are one of the core points in the budget income. So I conclude that the growth of resource potential may stimulate high levels of efficiency in autocratic states.

The indicator of regulatory quality also has a positive impact on the efficiency. This supports the idea of S. Deva, A. Dixit and J. Londregan about the key role of “civic bureaucracy”. For instance, Singapore stands as a proper example of an efficient and effective autocratic regime, where the high quality of governance and bureaucrats form a fair system for creating public goods.

Table 7. OLS regression results for autocracies (Polity IV less than zero)

	Models with random effects				Models with fixed effects			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates
Fuel export	0.004***	0.005***	0.005***	0.004***	0.012***	0.010***	0.012***	0.012***
	(0.0013)	(0.002)	(0.001)	(0.0013)	(0.0008)	(0.001)	(0.0009)	(0.0008)
Corruption Perception Index	0.023				-0.016			
	(0.035)				(0.025)			
GDP p/c	6.26*10 ^{-6*}	3.41*10 ⁻⁶	3.5*10 ⁻⁶	9.51*10 ^{-6***}	-9.78*10 ^{-6**}	-4.73*10 ⁻⁶	-9.82*10 ^{-6**}	-1.00*10 ^{-55*}
	(3.56e-06)	(4.8*10 ⁻⁶)	(2.71*10 ⁻⁶)	(2.54*10 ⁻⁶)	(4.27*10 ⁻⁶)	(3.49*10 ⁻⁶)	(3.66*10 ⁻⁶)	(4.96*10 ⁻⁶)
Control for Corruption		0.109				0.312		
		(0.097)				(0.195)		
Regulatory Quality			0.120*				0.232*	
			(0.069)				(0.124)	
Political Rights				0.016				-0.002
				(0.017)				(0.019)
Constant	0.193**	0.334***	0.338***	0.176*	0.294***	0.380***	0.320***	0.257*
	(0.094)	(0.078)	(0.051)	(0.098)	(0.098)	(0.092)	(0.053)	(0.141)
Number of Observations	35	36	36	36	35	36	36	36
R-squared					0.405	0.472	0.446	0.398
Number of groups	19	20	20	20	19	20	20	20
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Table 8 presents the OLS regression models for democracies. Columns 5-6 show that there are no significant factors in the models with fixed effects. GDP p/c (models 1-4) and indicators of political rights (model 4) have an influence on the efficiency in the models with random effects (models 1-4). GDP p/c has a positive effect in democracies. This supports the idea that well-developed economic systems with advanced and promoted democratic institutions contribute to the growth of efficiency. Political factors in the democratic sample do not have any significant effect on the efficiency. This finding supports the initial hypothesis about the diverse factors of government efficiency and effectiveness and various political regimes. Therefore, it could be argued that political factors matter.

The indicator of political rights in democracies has a negative impact on efficiency (model 4). This may be another support of the inverse and uncertain interaction between efficiency and political regime.

Table 8. OLS regression results for autocracies (Polity IV greater than zero)

	Models with random effects				Models with fixed effects			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates	DEA-estimates
Fuel export	0.003	0.003	0.003	0.003	0.006	0.006	0.006	0.007
	(0.00359)	(0.00339)	(0.00345)	(0.00337)	(0.00581)	(0.006)	(0.006)	(0.006)
Corruption Perception Index	0.003				-0.096			
	(0.021)				(0.086)			
GDP p/c	$1.29*10^{-5***}$	$1.23*10^{-5***}$	$1.27*10^{-5***}$	$1.78*10^{-5***}$	$-1.19*10^{-5}$	$2.13*10^{-6}$	$-1.30*10^{-5}$	$-7.99*10^{-6}$
	$(3.81*10^{-6})$	$(4.23*10^{-6})$	$(3.28*10^{-6})$	$(2.08*10^{-6})$	$(2.25*10^{-5})$	$(2.15*10^{-5})$	$(2.50*10^{-6})$	$(2.30*10^{-5})$
Control for Corruption		0.025				-0.170		
		(0.056)				(0.122)		
Regulatory Quality			0.026				0.219	
			(0.042)				(0.234)	
Political Rights				0.045**				0.080
				(0.021)				(0.057)
Constant	0.325***	0.354***	0.345***	0.171***	1.145*	0.522*	0.598*	0.442
	(0.057)	(0.053)	(0.035)	(0.061)	(0.678)	(0.306)	(0.316)	(0.338)
Number of Observations	167	171	171	171	167	171	171	171
R-squared					0.257	0.149	0.154	0.191
Number of groups	84	86	86	86	84	86	86	86
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

5. Discussion

The results of the current research support the initial hypothesis that institutional factors matter. The growth of efficiency could be stimulated by a particular set of institutional characteristics. Pooled and time-series cross-section models show that political regime serves as a diversification factor that is statistically significant and may be the basis of the sample division on autocracies and democracies. Regime transformation is quite a complicated and long-lasting process and can not be done over a three year period. Thus, I used the political regime indicator for clustering the initial sample.

In general, I have summed up set of factors that may have a real impact on the level of efficiency in various situations. The pooled model results show that the level of corruption measured with the corruption perception index has a negative effect on government efficiency and on the effectiveness of implementing government decisions. The autocratic sample show a positive

influence of energy resources export on the level of efficiency, which may be connected with the resource curse in autocratic states. At the same time the models show that for autocracies it is important not only to be a resource rich country, but also to have proper bureaucratic institutions. And this idea is supported by the significant indicator of regulatory quality that shows the positive impact of bureaucracy quality on the level of state efficiency. Moreover, perfect bureaucrats are commonly accountable and loyal to their leaders in autocratic and hybrid regimes. Thus, I presume they could be more efficient in a decision-making process than the democratic elites. The latter often consist of coalition groups based on deliberation process as a central principle of decision-making process. As a result, they are sometimes inefficient and ineffective when policy-making. All of these factors represent the third – political – dimension of possible factors of government efficiency. Another factor that has a significant influence on efficiency in the autocratic sample is GDP per capita as an indicator of economic performance of the state. Interestingly, that GDP p/c has a negative effect. I believe it is the result of the diminishing marginal utility. States could not have an infinite sharp economic growth. The achievement of the marginal utility cut point leads the economically developed states to the fixation of their economic performance. As a result, it may lead to stagnation or even a reduction of the efficiency in the sense of realizing public goods. In the democratic sample, GDP p/c as an economic institutional factor turns out to be the only element that changes government efficiency.

Finally, political regimes makes up a core dichotomy in the sample. This creates two possible strategies for increasing government efficiency. Democracies should orient to the economic factors and economic performance. Hence, the stimulation of GDP p/c may cause an increase in efficiency. In autocracies, on the contrary, economic factors are not enough. Moreover, they can reduce efficiency. So the key factors are political ones and should be connected with the quality of elite groups, bureaucracy and quality of governance. The high quality of such characteristics increases the loyalty and responsibility of the elites. Consequently, it stimulates the decrease of clientelism and corruption. As a result, the level of efficiency may be increased.

In order to support these results I conducted robustness check tests. I constructed the same models as in Table 7 and 8, but replaced the dependent variable indicators. The similarity of the results supports the validity of the current models and proves the consistence of the research results. I use two other indicators for the dependent variable – government effectiveness (by Worldwide Governance Indicators, World Bank) and the indicator of security property rights (by Heritage Foundation). Government effectiveness is a direct measure of efficiency and effectiveness by World Bank. The indicator of security property rights (by Heritage Foundation

(“QoG,” 2014)) is an indirect proxy indicator. Security property rights appear as a core economic institution that may impact the quality of governance in the sense of creating public goods (Coase, 1960; Neeman, 1994). Tables 9 and 10 present, correspondently, OLS estimation results for the models with government effectiveness and security property rights outcomes.

Table 9. OLS regression with fixed effects for the models with Government Effectiveness (WGI) as an outcome

	Pooled Data						Autocracies	Democracies
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	GE	GE	GE	GE	GE	GE	GE	GE
Fuel Export	0.001**	0.0009	0.0013**	0.0014***	0.0013**	0.0013*	0.002***	0.0007
	(0.0006)	(0.0006)	(0.0006)	(0.0005)	(0.0006)	(0.0007)	(0.0003)	(0.001)
GDP p/c	$1.14 \cdot 10^{-5}$		$1.09 \cdot 10^{-5}$	$1.13 \cdot 10^{-5}$	$1.04 \cdot 10^{-5}$	$2.50 \cdot 10^{-6}$	$-9.99 \cdot 10^{-6**}$	$1.61 \cdot 10^{-5*}$
	($1.05 \cdot 10^{-5}$)		($1.11 \cdot 10^{-5}$)	($1.13 \cdot 10^{-5}$)	($1.10 \cdot 10^{-5}$)	($8.34 \cdot 10^{-6}$)	($4.55 \cdot 10^{-6}$)	($8.74 \cdot 10^{-6}$)
Corruption Perception Index		0.041		0.058**				
		(0.026)		(0.028)				
Polity IV			0.011	0.013	0.009	0.012		
			(0.010)	(0.009)	(0.010)	(0.008)		
Political Rights					-0.012			
					(0.016)			
Regulatory Quality						0.403***	0.673***	0.274***
						(0.076)	(0.160)	(0.076)
Constant	0.037	0.017	-0.030	-0.298	0.025	-0.023	-0.105	0.008
	(0.148)	(0.116)	(0.160)	(0.209)	(0.153)	(0.119)	(0.071)	(0.131)
Number of Obs	358	357	324	321	324	324	65	286
R-squared	0.036	0.029	0.050	0.086	0.052	0.218	0.447	0.153
Number of groups	141	142	126	125	126	126	29	110
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Table 9 supports the negative influence of corruption on the pooled data (model 4), the positive impact of fuel resources on the pooled data (models 1, 3-6) and on the autocratic sample (model 7). For the autocracies regulatory quality also has a positive effect and GDP p/c has a negative impact, as in the DEA-estimates. GDP p/c has a positive influence on efficiency in the sample of democratic states also supports the empirical research results. Additionally, regulatory quality has an impact on the democratic sample as well. Therefore, Table 9 gives the evidence for the validity of the initial models as well as Table 10.

Table 10. OLS regression with fixed effects for the models with Security property rights (SPR) as an outcome

	Pooled Data						Autocracies	Democracies
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	SPR	SPR	SPR	SPR	SPR	SPR	SPR	SPR
Fuel Export	-0.026**	0.0009	-0.023**	-0.019*	-0.023**	-0.023**	-0.017*	-0.032
	(0.011)	(0.024)	(0.010)	(0.012)	(0.010)	(0.009)	(0.009)	(0.028)
GDP p/c	0.0001		0.0002	0.0002	0.0001	0.0001	1.93*10 ⁻⁵	0.0002
	(0.000247)		(0.0003)	(0.0002)	(0.0003)	(0.0002)	(5.27*10 ⁻⁵)	(0.0004)
Corruption Perception Index		1.293		1.698**				
		(0.817)		(0.767)				
Polity IV			-0.259	-0.188	-0.332	-0.255		
			(0.192)	(0.218)	(0.256)	(0.198)		
Political Rights					-0.395			
					(0.798)			
Regulatory Quality						1.706	8.589	0.272
						(3.100)	(5.419)	(3.149)
Constant	48.02***	43.06***	48.10***	40.30***	49.96***	48.12***	37.23***	50.92***
	(3.419)	(3.655)	(3.526)	(5.378)	(5.062)	(3.444)	(1.581)	(6.186)
Number of obs	353	355	323	320	323	323	64	282
R-squared	0.008	0.015	0.018	0.045	0.020	0.021	0.145	0.007
Number of groups	138	140	125	124	125	125	28	108
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

The level of corruption affects the consistence of security property rights on the pooled data (model 4) as in the DEA models. Fuel export also positively influences the efficiency on the pooled data (1, 3-6) and on the autocratic sample (model 7). It demonstrates that the security property rights indicator is connected with regime characteristics and, therefore, political factors and regime peculiarities may impact the efficiency as it is argued in the initial models with DEA estimates of the efficiency.

Thus, I believe that Tables 9 and 10 are evidence for the validity of the initial models and could work as proper robustness check tests for the main findings of the research.

6. Conclusion

The absence of a universal and accepted definition and interpretation of efficiency leads to measurement problems and causes confusion around the term. The current research solves two problems – creating government efficiency indicators and determining a set of institutional

factors that may affect these indicators. The first step of the research described the government efficiency estimation using Data Envelopment Analysis. The received data was used in the core empirical research. The empirical analysis of 127 states for the period 2009-2011 supports the initial hypothesis about the dominant impact of political factors on the government efficiency. Geographical indicators represented by the resource potential of states have an impact on the efficiency, but the peculiarities of this impact depend on the political regime and on the quality of the state's bureaucracy and elite groups. It is important that geographical and economic potential are realized properly. And it is possible only with a high quality of governance and political institutions. The high quality of governance and bureaucratic system may reduce corruption and can stimulate the realization of public goods and services instead of private ones. As a result, high levels of efficiency may be reached in autocracies as well as in the democracies. Nevertheless, it is important to pay attention to various factors: to the economic performance – for democracies and to the political and administrative ones – for the autocracies. A political regime itself works as a core factor of government efficiency stimulation as well.

Finally, I conclude that in the case of government efficiency, political institutions matter and possible further directions of the research could be connected with more detailed clustering of the initial sample and analyzing efficiency on the more homogenous set of cases.

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