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DO SUFFICIENT INSTITUTIONS ALTER THE RELATIONSHIP BETWEEN NATURAL RESOURCES AND ECONOMIC GROWTH?

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Abstract

The purpose of this paper is to test whether institutional governance and its performance is a main driving force to achieve a positive relationship between natural resources and economic growth in the long run. The main objective is to ascertain what kind of institutional governance would be needed to distribute natural resource wealth in such a way so as to achieve economic stability, and what specific policies are needed to avoid the curse in resource-rich developing countries. The research makes an attempt to interpret the role of institutional governance, as reflected by the indicators, in the context of resource-rich, post-Soviet countries. The main finding is that an abundance of natural resources does not guarantee economic growth, where sustainable economic growth can be guaranteed, only if the resource-rich country has good institutional governance.

JEL Classification: O11, O43, O53, Q32

Keywords: economic growth, natural resources, institutional governance, post-Soviet countries

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I. Introduction

Theoretically, an abundance of natural resources tends to stimulate economic growth and to move the economy to a steady state. In contrast, though, there are many empirical surveys which show and emphasize a negative relationship between natural resource abundance and economic growth (e.g., Sachs & Warner, 1995). These empirical studies show that resource-scarce economies tend to exhibit higher economic performance than resource-rich economies in the long run. Thus, managing natural-resource income is a more important issue for resource-rich countries so as to avoid the impact of the so-called natural resource curse (Eifert, Gelb, & Borje, 2002). These considerations include how much natural resource wealth to leave to the next generation, how to attain stability with uncertain and widely fluctuating natural-resource incomes such as for oil, and how to determine an efficient strategy for spending natural-resource income.

For Ilmi (2007), natural resource management issues are connected both directly and indirectly to governance indicators which seem to play a crucial role in the natural resource curse in resource-rich developing countries. In spite of their natural resource abundance, Nigeria, Venezuela, Angola, and Ecuador, for example, have shown low economic performance over the last decades. However, countries in South East Asia have achieved supercharged economic growth without having any kind of natural resources. Ilmi (2007) argues that some reasons for failed economic growth may be attributed to Dutch disease, insufficient diversification, rent seeking and conflict, overconfidence and loose economic policies, and debt overhang. Thus, for management success, the performance of economic development, a sufficient economic policy, and strong fiscal discipline are, according to Ilmi, the most important for natural resource management in a resource-rich state.

The purpose of this paper is to test whether institutional governance and its performance is a main driving force to achieve a positive relationship between natural resources and economic growth in the long run. The main objective is to ascertain what kind of institutional governance would be needed to distribute natural resource wealth in such a way so as to achieve economic stability, and what specific policies are needed to avoid the curse in resource-rich, developing countries. The study here makes an attempt to interpret the role of governance, as reflected by the indicators, in the context of resource-rich, post-Soviet countries. As the historical, social, and institutional context is relatively homogeneous among post-Soviet countries, and as they continue to engage in cross-border transactions, they constitute a more useful set of countries to

compare than, for example, countries that do not share such features, such as Nigeria and Norway.

The impact of four governance indicators - the multi-optional export system, fiscal discipline, sufficient institutions, and external debt - on long-run economic development will be tested using natural-resource income. Doing so should help determine whether these four indicators are the essential attributes needed by government to create sustained economic growth in resource-rich, post-Soviet countries.

Having regained their independence at the beginning of the 1990s, resource-rich, post-Soviet countries are still young and blessed with a large reserve of oil and natural gas resources. However, it is questionable whether these countries should be considered successful in translating their oil income into the sustainable development of the country. There is a lack of empirical research addressing the relationship between natural resource richness and economic growth in the case of resource-rich, post-Soviet states, and this proposed study would, it is hoped, go some way towards filling this gap.

II. Developments in Natural Resources and Governance in Post-Soviet Countries

a. Natural Resources

The importance of natural resource abundance for long-run economic growth and how to explain the impact of four governance indicators on the economic growth of resource-rich, post-Soviet countries is the main purpose of this study. One pioneering study highlighting the importance of the negative relationship between natural resource abundance and economic growth in the long run is Sachs and Warner (1995). The authors show that resource-rich, developing countries are likely to grow slower and gain insignificant economic development than resource-poor ones. Papyrakis and Gerlagh (2004) revisit this negative relationship by questioning the transforming of natural resources to long-run economic development through which the kind of natural resources would hinder economic growth in resource-rich developing countries. Authors found that trade openness and educational investment have a direct and positive effect on natural-resource income and economic growth, and their transmission channels. Leite and Weidmann (1999) also analyze the existence of the “resource curse” hypothesis where the authors highlight that natural resource based industries hamper economic

development through corruption and conflict in resource-rich developing countries. Therefore, the impact of natural resource abundance on sustainable economic growth plays important and various roles in explaining the economic development of resource-rich developing countries.

It might be shown that resource-rich countries grow slower than resource-scarce countries, but not all of them. For instance, Ilmi (2007) points out that Botswana, a Central African country with no access to the sea (natural resources are usually exported by sea), had experienced sufficient economic development in the last decades. Acemoglu, Johnson, and Robinson (2001) emphasize that Botswana's good governance institutions were motivation for its remarkable long-run economic development. Another example is studied by Rahim and Liwan (2012), where it is empirically shown that Malaysia seems to have succeeded in establishing sustainable economic development by managing its natural resource through good governance indicators.

It seems that the negative effect of natural resources on economic development cannot be generalized for all developing countries. Thus, in the case of resource-rich, post-Soviet countries, it is questionable whether they have lower economic growth than resource-poor ones. It is also questionable whether these resource-rich countries could gain sustainable development without natural resource abundances. Thus, the possible explanations for these issues make this study interesting in that it would explore the transmission channel of natural-resource incomes into economic growth in resource-rich, post-Soviet countries.

First, the existence of a multi-optional export system is important in explaining the transformation of natural-resource income into significant economic growth in resource-rich, post-Soviet countries. In these countries, sectors other than natural resources (typically manufacturing) are likely to suffer from a real appreciation of the national currency (Corden & Neary, 1982). The percentages of fuel, ores, and metal exports on total merchandise export are very high in resource-exporting, post-Soviet countries (Appendix A, Figure A1). The incomes from natural resources exporting are likely absorbed by the domestic nontradables sector, where it is an obstacle to long-run, sustainable economic development in resource-rich, post-Soviet countries.

Second, natural resource abundance may also infuse government with overconfidence in their macroeconomic and fiscal policy decisions (Ilmi, 2007). Devarajan and Swarrop (1998) emphasize that natural-resource income may cause reduced pressure on tax collection, where it

may cause lower fiscal discipline. Oil-producing, post-Soviet countries are likely to charge lower domestic gasoline prices, implying that natural resource rents obtained from upstream royalties are subsidizing domestic downstream consumption. Reduced gasoline prices for citizens and compensation for this deficit with a subsidy from natural-resource income tends to weaker fiscal discipline (Kronenberg, 2004).

Third, one of the important issues for resource-rich developing countries is debt overhang, where natural-resource income tends to depend on exogenous foreign shocks, which negatively affect stable economic growth and create difficulties for debt management (de Ferranti, Lederman, Maloney, & Guillermo, 2001). However, resource-rich, post-Soviet countries have less external debt when compared to resource-scarce ones (Appendix A, Figure A2). So, it seems that debt overhang does not play an important role in explaining the negative impact of natural-resource income on economic growth in resource-rich, post-Soviet countries.

Finally, it is still debatable whether resource-rich, post-Soviet countries have failed to transform their natural-resource income into sustainable economic development. These three possible reasons do not give a clear explanation of whether the "resource curse" exists in these countries. Therefore, in doing empirical study, a clearer explanation on the negative relationship between natural resource abundance and economic growth in these countries could be demonstarted.

b. Governance

It is also major importance for natural resource management whether institutions are the main reason for natural-resource incomes to transform into sustainable economic development in resource-rich, post-Soviet countries. Ilmi (2007) argues that good institutions mean a sufficient economic policy and strong fiscal discipline, where it is a main factor for an effectiveness and efficiency in natural resource management and in the performance of economic development in resource–rich developing countries. Acemoglu, Johnson, and Robinson (2005) argue that good institutions are the key factor of growth in the long-run. If governance is poor, natural resources can be wasted quickly in less developed countries. It seems that sufficient institutional governance could change the negative effect of natural resource abundance on transforming these incomes into long-run economic development. This paper attempt to show whether

sufficient institutions are the main driving force to alter the negative relationship between natural richness and economic development in resource-rich, post-Soviet countries.

The properties of sufficient institutions developed by Kaufmann, Kraay, and Mastruzzi (2003) cover six dimensions of governance as "voice and accountability", "political stability", "government effectiveness", "regulatory quality", "rule of law", and "control of corruption". These indicators play an important role in seeing how good governance indicators can influence the transformation of natural-resource income into sustainable economic development in resource-rich countries. In general, post-Soviet countries have a lower transparent political process, more restrictions on civil liberties, lower public service quality, and higher corruption when comparing the average institutional indicators to the rest of the world. It is also easy to see that the average institutional indicators are lower in resource-rich, post-Soviet countries than in the resource-poor ones (see Appendix B, Figure B1-B6). Therefore, these countries do not seem to have succeeded in establishing sufficient institutions nor good governance, where it might be main reason for the negative relationship between natural resources and economic development.

Finally, although initial conditions were similar across post-Soviet countries, their economic growth performance has diverged in the last two decades. It might be true that these differences on economic development could be explained by natural resource richness and good governance indicators, because natural resource abundance and governance indicators are the main differences between these countries. This paper analyzes the relationship between natural resource richness and economic growth using institutional governance indicators in resource-rich, post-Soviet countries.

III. Research Methodology

a. Regression Model

This paper examines the impact of governance performance on economic development in resource-rich, post-Soviet countries. The study reassesses the impact of natural resources on economic growth using panel data. Using the panel data approach for post-Soviet countries in the range 1996-2010, allows us to see the importance of sufficient institutions to explain the relationship between natural resources and economic growth. An analysis would show us which institutions have a significant positive impact on economic growth with the condition of having

an abundance of natural resources. The main expectation is better institutions can avoid the negative impact of natural resources on long-run economic growth in resource-rich, post-Soviet countries.

The methodology for analyzing the relationship between natural resources and economic growth is by following the standard economic literature (e.g. Sala-i-Martin & Subramanian, 2003; Ilmi, 2007). The empirical growth model used in this study is:

$$\boldsymbol{growth_{it}} = \boldsymbol{\beta_o} + \boldsymbol{\beta_1 nat_{it}} + \boldsymbol{\beta_2 \theta'_{it}} + \boldsymbol{\beta_3 \theta'_{it}} * \boldsymbol{nat_{it}} + \boldsymbol{\beta_4 ed_{it}} + \boldsymbol{\beta_5 \tau_{it}} + \boldsymbol{\beta_6 n_{it}} + \boldsymbol{\beta_7 growth_{it-1}} + \boldsymbol{X'_{it}\,\delta} + \boldsymbol{\epsilon_{it}}, \qquad (1)$$

where $\boldsymbol{i}$ refers to countries, $\boldsymbol{t}$ to time. The $\boldsymbol{growth}$ is the manufacturing growth, which is estimated as an annual growth rate of manufacturing value added. It is estimated as a real non-oil GDP growth. The $\boldsymbol{nat}$ represents a proxy variable for a natural resource, which is estimated as a net fuel, ores, and metal exports of countries; $\boldsymbol{\theta}$ shows 6 different institutional indicators, which are estimated in the same way used by Kaufmann, et al. (2003), $\boldsymbol{n}$ is population growth, $\boldsymbol{\tau}$ is the average tax rate, $\boldsymbol{ed}$ represents the percentage of external debt on GNI, and $\boldsymbol{X}$ includes exogenous variables for the empirical growth model. The interaction term allows us to address how natural resource abundance and good institutional governance influence manufacturing growth together.

b. Econometrics Issue

The empirical research estimates a panel data model, where this study would utilize a panel data of 11 post-Soviet countries over the period 1996-2010. Several limitations exist: reverse causality (a bidirectional effect between economic growth and institutions); the problem of an omitted variable bias (a country-specific, unobservable effect); and a measurement of manufacturing which is likely to exhibit measurement errors.

In this analysis, economic growth is affected by natural resource exports and institutional governance; at the same time, natural resource exports and institutions are likely to be influenced by the particular stage of economic development. Consequently, the explanatory variables may be correlated with an error term. To solve this problem, the analysis uses lags of $\boldsymbol{nat}$ as an instrument of the variable in order to avoid endogeneity problems. To deal with unobservable

heterogeneity, the panel data estimation requires several assumptions. Denoting growth equation (1) in panel formulation with the constant term $\boldsymbol{\alpha_o}$:

$$\boldsymbol{growth_{it}} = \boldsymbol{\alpha_o} + \boldsymbol{\beta_1 nat_{it}} + \boldsymbol{\beta_2 \theta'_{it}} + \boldsymbol{\beta_3 \theta'_{it}} * \boldsymbol{nat_{it}} + \boldsymbol{\beta_4 ed_{it}} + \boldsymbol{\beta_5 \tau_{it}} + \boldsymbol{\beta_6 n_{it}} + \boldsymbol{\beta_7 growth_{it-1}} + \boldsymbol{X'_{it}\,\delta} + \boldsymbol{u_{it}}\,. \qquad \text{(a)}$$

And in the case of the *pooled* OLS, and the random effects (RE) model with time and country effects, where $\boldsymbol{u_{it} = c_i + d_t + \varphi_{it}}$ ($\boldsymbol{c_i}$ is country-specific effect, $\boldsymbol{d_t}$ the time effect, and $\boldsymbol{\varphi_{it}}$ a white noise) is:

$$\boldsymbol{growth_{it}} = \boldsymbol{\rho_{it}} + \boldsymbol{\beta_1 nat_{it}} + \boldsymbol{\beta_2 \theta'_{it}} + \boldsymbol{\beta_3 \theta'_{it}} * \boldsymbol{nat_{it}} + \boldsymbol{\beta_4 ed_{it}} + \boldsymbol{\beta_5 \tau_{it}} + \boldsymbol{\beta_6 n_{it}} + \boldsymbol{\beta_7 growth_{it-1}} + \boldsymbol{X'_{it}\,\delta} + \boldsymbol{\varphi_{it}} \qquad \text{(b)}$$

where for the fixed effects (FE) model with time and country effects, $\boldsymbol{\rho_{it} = \alpha_o + c_i + d_t}$. The *pooled* OLS model assumes that the effect of explanatory variables and intercepts are the same for all countries. The RE model analyzes the error variance structure $\boldsymbol{u_{it} = c_i + d_t + \varphi_{it}}$ affected by the country/time specific effect, while the FE model asks how the country/time specific effect affects the intercept (Park, 2005).

Therefore, the empirical research uses 3 different types of estimation method, where the main hypothesis is that a negative association between mineral natural-resource income and manufacturing growth exists in resource-rich, post-Soviet countries, and good institutional governance can alter these negative effects.

IV. Empirical Results

In this section, the most relevant results concerning panel data analysis in the case of resource-rich, post-Soviet countries are discussed. Six different instrumental variable regressions are performed with data that analyze the association between natural resource richness and economic growth in post-Soviet countries. These instrumental variables are not easy to define and measure, where this paper used institutional governance indicators by Kaufmann, et al. (2003). Each institutional governance index is normalized between zero and one hundred, where

one hundred represents sufficient and zero represents insufficient institutions. The appendix describes the sample tables for most relevant results.

The regressions are estimated with and without institutional variables, where the first regression represents results without the institutional variable, and the other six regressions are estimated by six different institutional governance indicators. The dependent variable is taken as a manufacturing value added (% of GDP), and various relevant macro variables are instrumented by their lagged values (see Appendix A, Figure A3&A4).

An empirical analysis is based on a *pooled* OLS model that assumes all post-Soviet countries would react in the same way to changes in economic growth, and that intercepts are the same for all post-Soviet countries. The results are statistically significant and support the resource curse hypothesis in resource-rich, post-Soviet countries (see Appendix B, Table B1). If we cannot assume that the reaction to change in economic growth is the same for all post-Soviet countries, then it is adequate to estimate with either FE or RE models. The results analyzed with the F-test, where it determines the choice between the *pooled* OLS model and the FE model, and the LM-test allows us to choose between the *pooled* OLS model and the RE model. In the end, the Hausman test determines the choice of either the FE model or the RE model, where it allows us to know whether the RE model is efficient or not. Test statistics show that the FE model estimation method is adequate in several models (see Appendix B, Table B2).

There are several different findings in the empirical results:

In analyzing whether natural resource richness has a negative effect on sustainable economic development, this paper estimated the regression models with and without the interaction term to confirm whether the natural resource curse exists in resource-rich, post-Soviet countries. The coefficients of natural resources tend to be a negative when we add the interaction term of natural resource richness. These coefficients are statistically significant for all models with 3 different estimation methods. These findings support the natural resource curse hypothesis found in resource-rich, post-Soviet countries. Therefore, resource-poor, post-Soviet countries are likely to grow faster than resource-rich ones.

In analyzing whether sufficient institutions alter the relationship between natural resources and economic growth, the paper employs six different institutional indicators. The effects of institutional governance are not statistically significant in several models. It means that changes in economic growth cannot be explained with institutional governance over a very short

horizon of a few years in the case of post-Soviet countries. Although institutional indicators are not significant, the interaction terms of resource abundance and institutional governance have significant positive effect on economic growth, meaning that if the country has good governance, natural resource abundance is conducive to economic growth in resource-rich, post-Soviet countries. Because the results are statistically robust, it can be concluded that natural resource richness does not guarantee sustainable economic development, but with sufficient governance management, long-term economic development can be generated from natural resource richness in resource-rich, post-Soviet countries.

As for other explanatory variables, the coefficients of trade openness are significant, and they support that trade liberalization has a positive and strong effect on economic growth. Average tax has a positive impact on economic growth; it supports argument promoting strong fiscal discipline. The relationship between external debt and economic growth is negative, where it shows that external debt is an obstacle to economic growth in the case of resource-rich countries.

The empirical results support the existence of the natural resource curse in resource-rich, post-Soviet countries. On the one hand, natural resources have a negative effect on economic growth; on the other hand, the interaction term has a positive effect on economic growth. Therefore, good governance can avoid the negative effect of natural resources on economic growth.

Robustness

It is possible that institutional indicators could be endogenous, where economic growth has a causal effect on institutions. Note that if institutions are endogenous, then the interaction term between mineral export and institutions are also endogenous. To check the endogeneity of natural resources, this research used the Hausman test, and the results still support the existence of the natural resource curse in resource-rich, post-Soviet countries.

This research used a robust variance matrix estimator and robust test statistics to deal with serial correlation in the pooled OLS model. However, it is possible that unobservable effects might affect economic growth in the case of post-Soviet countries. To deal with unobservable heterogeneity, the study estimated the relationship between natural resource richness and economic growth with FE and RE models, where the statistical test shows that the

results are statistically significant, and the FE model is an appropriate estimation method for the panel data model in the case of resource-rich, post-Soviet countries.

V. Concluding Remarks

This paper has examined the accepted notion of a natural resource curse, where, for example, resource-rich, post-Soviet countries grow more slowly than resource-scarce ones. The main finding is institutional governance and its performance is a main driving force to alter a negative relationship between natural resources and economic growth in these countries.

As for transforming natural-resource income into sustainable economic development, the abundance of natural resources does not guarantee economic growth. Sustainable economic development can be guaranteed, only if the resource-rich country has good institutional governance. Good institutional governance - specifically, a strong public voice with accountability, strong political stability, good regulations, and powerful anticorruption policies tends to conduce a positive relationship between natural resource richness and economic development. Consequently, resource-rich, post-Soviet countries can take advantage of their natural resource abundance, establish good governance such as strong fiscal discipline and sufficient institutions to transform natural-resource incomes into consistent and sustained economic development.

It is important to introduce explicit fiscal rules for the treatment of mineral revenues in resource-rich, post-Soviet countries. One policy implication might be to increase transparency in natural resource management with external international audits, where it would increase efficiency in transforming natural-resource income into sustainable economic development. Second, one might consider an industrial policy that targets especially the export-oriented manufacturing sector. Because of slower manufacturing growth in resource-rich, post-Soviet countries when compared to resource-poor ones, resource-rich countries might concentrate on the manufacturing industry, where this industry could strongly guarantee sustainable economic development.

This study has several weaknesses, where the panel data used data from only 11 post-Soviet countries. The sample was from 1996 to 2010, which is not enough to explain transforming natural-resource income into sustainable economic development in the long run. It might be exists that the impact of natural resources is meaningful to economic growth only after

a certain threshold point of institutional quality or a certain threshold point of natural-resource incomes. Further research, however, can take into account the non-linear effect to explain the link between natural resource richness and economic development in the case of resource-rich, post-Soviet countries.

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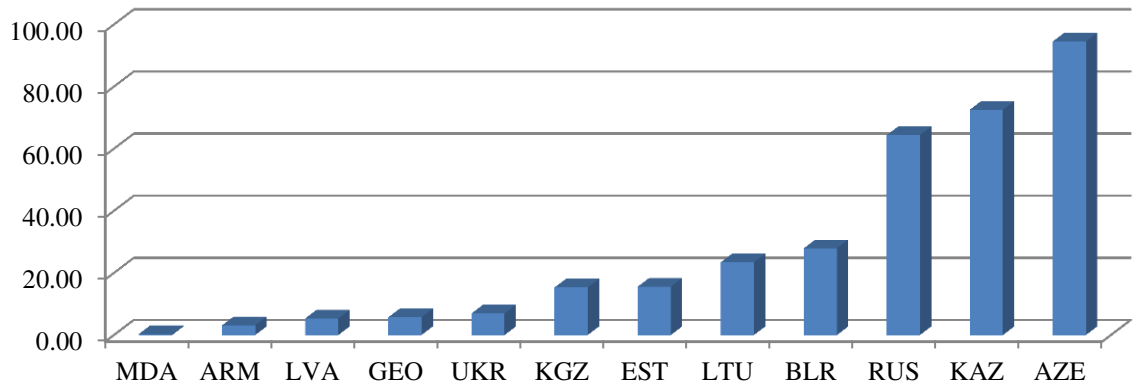
Appendix A

Table A1. List of Sample Countries					
	Country name	**Country code**		**Country name**	**Country code**
1	Armenia	ARM	9	Lithuania	LTU
2	Azerbaijan	AZE	10	Moldova	MOL
3	Belarus	BEL	11	Russian Federation	RUS
4	Estonia	EST	12	Ukraine	UKR
5	Georgia	GEO	13	Uzbekistan	UZB
6	Kazakhstan	KAZ	14	Tajikistan	TJK
7	Kyrgyz Republic	KGZ	15	Turkmenistan	TRK
8	Latvia	LVA			

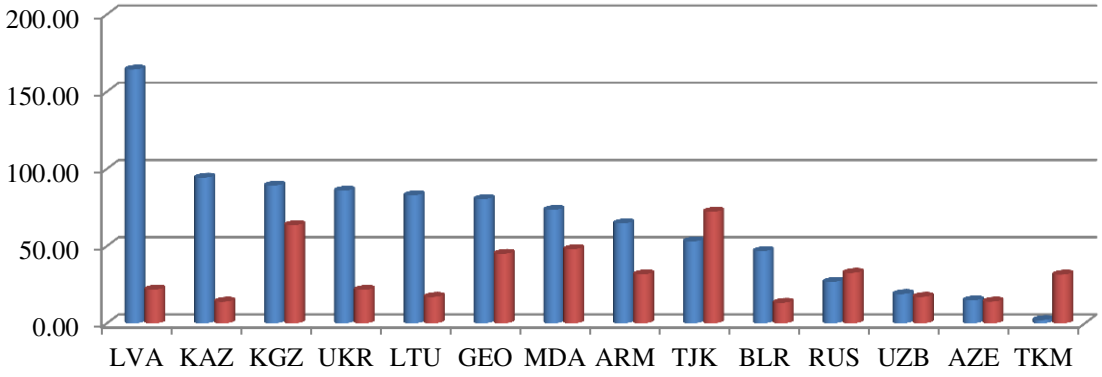
Table A2. Descriptive Statistics					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
GDP growth	180.00	5.59	6.47	-17.95	34.50
Manufacturing growth	158.00	5.05	10.97	-42.13	59.45
Manufacturing value added	158.00	16.84	7.01	4.09	34.84
External debt stocks	165.00	55.34	32.93	10.40	164.32
Net taxes	180.00	21.11	1.71	18.29	26.23
Population growth	180.00	-0.12	0.82	-2.58	2.64
Initial GDP	180.00	1393.30	980.16	394.86	3339.86
Governance Indicators					
Control of Corruption	180.00	32.85	21.49	4.88	80.98
Rule of Law	180.00	35.35	21.75	5.21	86.06
Regulatory Quality	180.00	47.34	24.60	3.92	91.87
Government Effectiveness	180.00	40.89	21.00	10.24	85.17
Political Stability	180.00	40.62	20.24	6.25	83.65
Voice and Accountability	180.00	39.28	23.09	3.37	84.62

Figure A1. Fuel Exports (% of Merchandise Exports, 2010) by Country



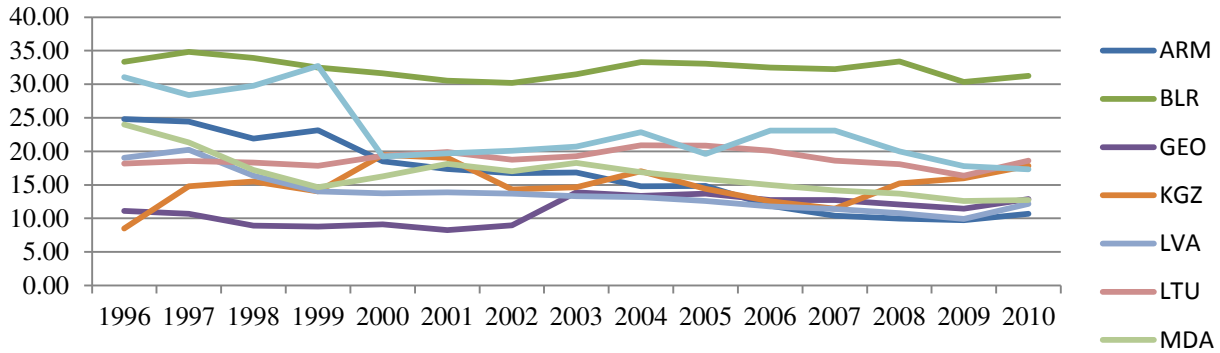
Source: World Development Indicator, WB Database, 2012

Figure A2. External Debt Stocks (% of GNI, 2010 and 1996) by Country



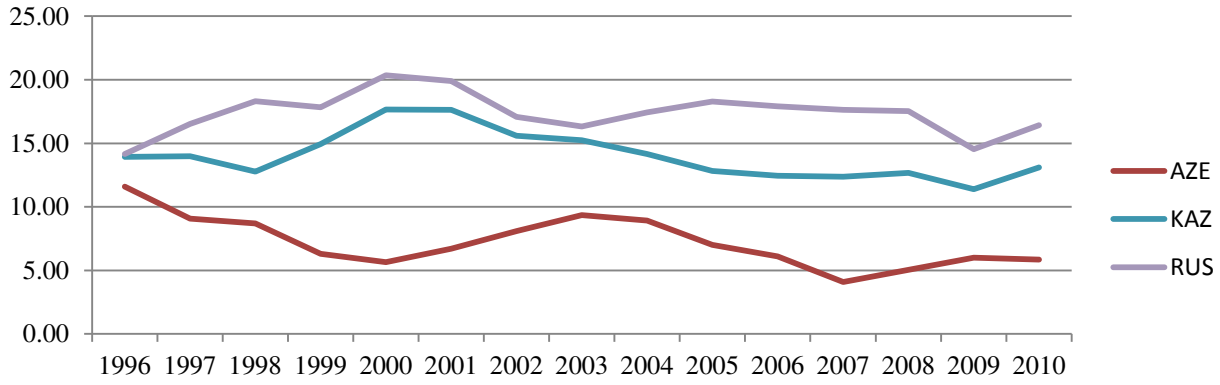
Source: World Development Indicator, WB Database, 2012

Figure A3. Manufacturing, Value Added (% of GDP), Resource-Poor, Post-Soviet Countries, 1996-2010



Source: World Development Indicator, WB Dtabase, 2012

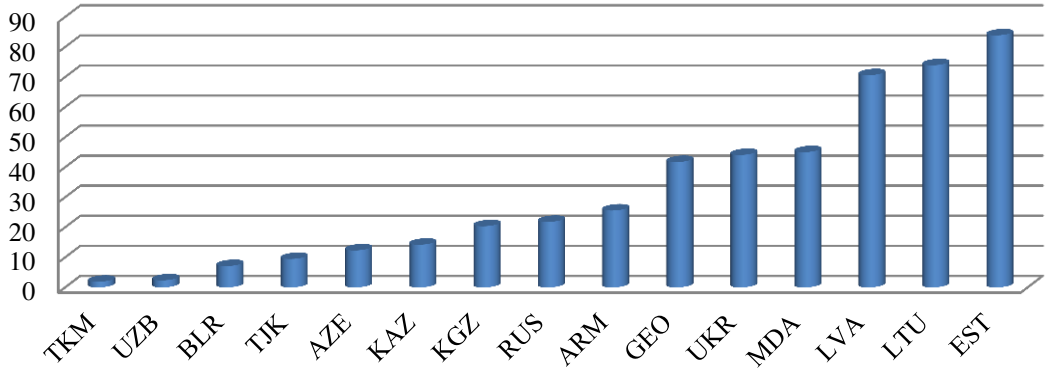
Figure A4. Manufacturing, Value Added (% of GDP), Resource-Rich, Post-Soviet Countries, 1996-2010



Source: World Development Indicator, WB Database, 2012

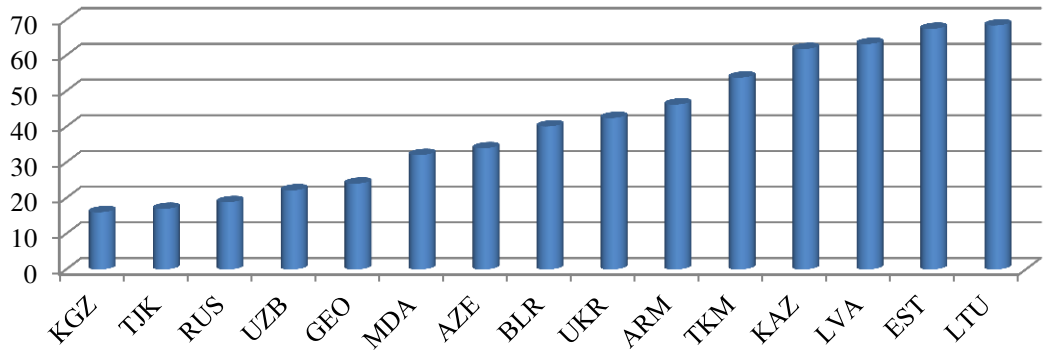
Appendix B

Figure B1. Voice and Accountability (2010) by Country



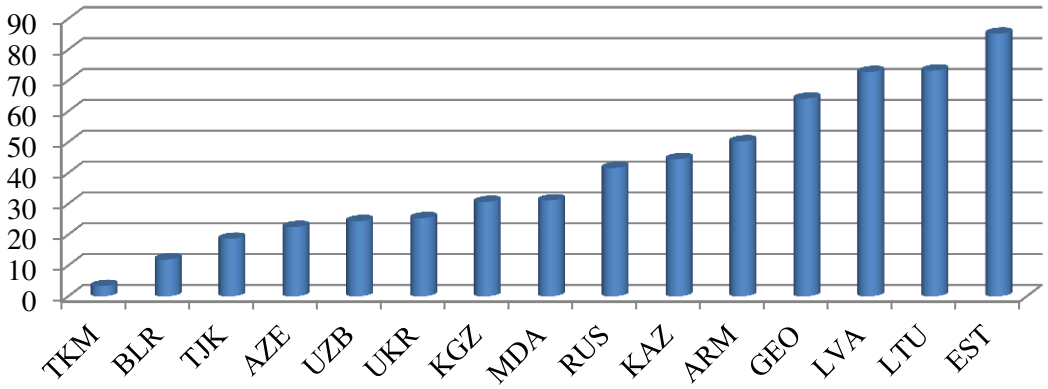
Source: The Worldwide Governance Indicators, 2012

Figure B2. Political Stability and Absence of Violence (2010) by Country



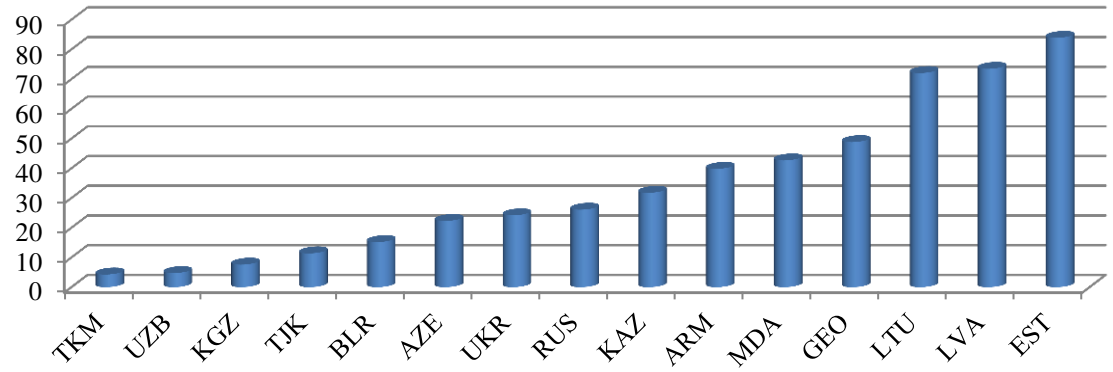
Source: The Worldwide Governance Indicators, 2012

Figure B3. Government Effectiveness (2010) by Country



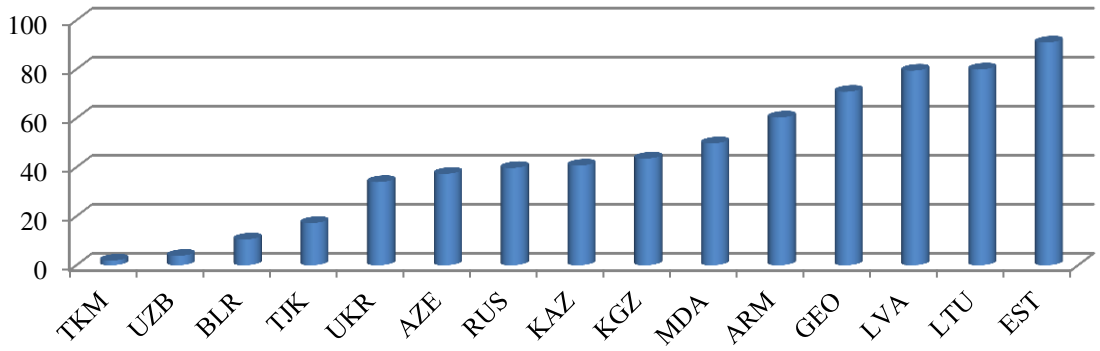
Source: The Worldwide Governance Indicators, 2012

Figure B4. Rule of Law (2010) by Country



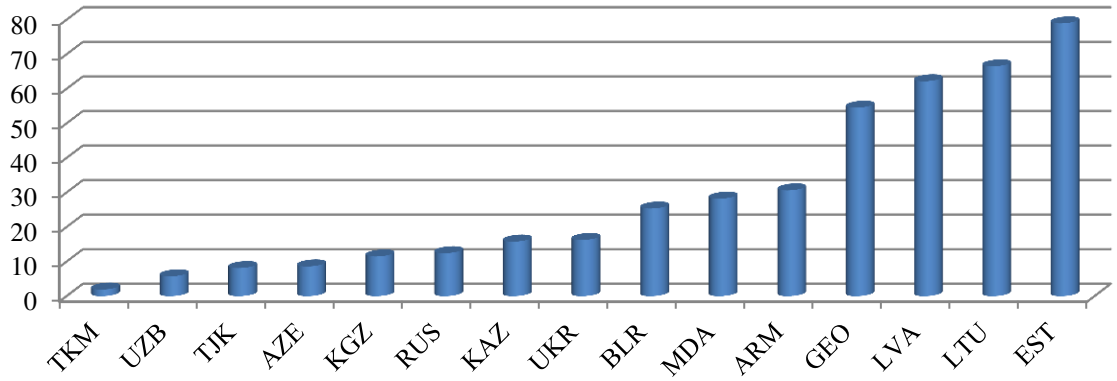
Source: The Worldwide Governance Indicators, 2012

Figure B5. Regulatory Quality (2010) by Country



Source: The Worldwide Governance Indicators, 2012

Figure B6. Control of Corruption (2010) by Country



Source: The Worldwide Governance Indicators, 2012

Appendix C

Table C1. Estimation Results with *pooled OLS*

Regression	0	1	2	3	4	5	6
F test	10.71	8.02	12.78	14.82	10.06	10.47	19.66
Mineral Export (MIN)	-0.069***	-0.135***	-0.108***	-0.122***	-0.106***	-0.171***	-0.180***
	(-0.023)	(0.041)	(0.046)	(0.044)	(0.043)	(0.048)	(0.039)
Control of Corruption (CORR)		-0.0387*					
		(0.0184)					
MIN*CORR		0.0018*					
		(0.0009)					
Rule of Law (LAW)			-0.0030				
			(0.0205)				
MIN*LAW			0.0024*				
			(0.0010)				
Regulatory Quality (REG)				0.0228			
				(0.0177)			
MIN*REG				0.0015*			
				(0.0008)			
Government Effectiveness (GOV)					-0.0044		
					(0.0196)		
MIN*GOV					-0.0002		
					(0.0009)		
Political Stability (POL)						0.0433**	
						(0.0173)	
MIN*POL						0.0023***	
						(0.0008)	
Voice and Accountability (VOI)							0.0810***
							(0.0148)
MIN*VOI							0.0033***
							(0.0007)
Population growth	-0.160***	-0.138***	-0.132***	-0.114***	-0.110**	-0.147***	-0.146***
	(0.046)	(0.046)	(0.041)	(0.042)	(0.047)	(0.041)	(0.043)
External debt	-0.097**	-0.099**	-0.072*	-0.007	-0.046	-0.154***	-0.121***
	(0.054)	(0.053)	(0.042)	(0.045)	(0.046)	(0.052)	(0.042)
Average tax rate	0.209***	0.230***	0.200***	0.138***	0.181***	0.297***	0.213***
	(0.057)	(0.059)	(0.052)	(0.052)	(0.054)	(0.064)	(0.049)
Trade openness	0.151**	0.123*	0.138**	0.133***	0.142**	0.145**	0.147**
	(0.06)	(0.072)	(0.062)	(0.055)	(0.072)	(0.068)	(0.074)
Initial GDP	0.022**	0.019**	0.021*	0.028**	0.019	-0.029	0.032**
	(0.010)	(0.009)	(0.016)	(0.011)	(0.012)	(0.051)	(0.015)
Constant	1.929***	2.896***	2.430***	1.194**	2.241**	3.298***	5.085***
	(0.498)	(0.693)	(0.735)	(0.890)	(0.923)	(0.690)	(0.666)
Number of observation	158	158	158	158	158	158	158
Number of county	11	11	11	11	11	11	11
R^2	0.35	0.38	0.37	0.43	0.37	0.41	0.48
Adjusted R^2	0.33	0.35	0.34	0.40	0.34	0.38	0.46

Source: Author's estimates.

Note:

The Model (0) estimated without institutional variable, (1)-(6) estimated with 6 different institutional indicators. The dependent variable is manufacturing value added (% of GDP) and various relevant macro variables are instrumented by their lagged values.

The White-heteroscedasticity-consistent standard errors are shown in parentheses.

* , **, and *** indicate significance at the 10, 5, and 1 percent levels, respectively.

Table C2. Estimation Results with FE/RE Models							
Regression	0	1	2	3	4	5	6
Model[a]	FEM	FEM	FEM	REM	FEM	REM	FEM
F test[b]	11.64	7.91	13.77	10.36	7.69	8.27	7.71
LM[c]	40.85	41.47	54.14	52.48	45.92	48.37	43.45
Hausman[d]	3.94	6.65	3.56	13.99	8.15	21.90	5.13
Mineral Export (MIN)	-0.064**	-0.070**	-0.057**	-0.022	-0.059*	-0.103***	-0.053**
	(0.033)	(0.038)	(0.028)	(0.033)	(0.042)	(0.038)	(0.014)
Control of Corruption (CORR)		-0.0021					
		(0.035)					
MIN*CORR		0.0012**					
		(0.0007)					
Rule of Law (LAW)			-0.0339				
			(0.0357)				
MIN*LAW			0.0014**				
			(0.0007)				
Regulatory Quality (REG)				-0.0013			
				(0.0016)			
MIN*REG				0.0262**			
				(0.0123)			
Government Effectiveness (GOV)					0.0043		
					(0.0147)		
MIN*GOV					-0.0002		
					(0.0007)		
Political Stability (POL)						0.0198*	
						(0.0124)	
MIN*POL						0.0011*	
						(0.0006)	
Voice and Accountability (VOI)							0.0157*
							(0.0135)
MIN*VOI							0.0032***
							(0.0006)
Population growth	0.014	0.010	-0.142***	-0.114***	-0.075*	-0.069**	0.081**
	(0.031)	(0.033)	(0.032)	(0.031)	(0.063)	(0.034)	(0.033)
External debt	-0.070**	-0.075**	-0.048*	-0.045*	-0.068*	-0.104*	-0.069*
	(0.036)	(0.038)	(0.025)	(0.027)	(0.039)	(0.040)	(0.039)
Average tax rate	0.022***	0.024***	-0.004	0.025	0.040	0.077*	0.059*
	(0.004)	(0.004)	(0.043)	(0.044)	(0.043)	(0.044)	(0.043)
Trade openness	0.016**	0.143*	0.098**	0.124*	0.122**	0.136**	0.137**
	(0.009)	(0.112)	(0.042)	(0.095)	(0.072)	(0.079)	(0.073)
Initial GDP				0.003**		0.003**	
				(0.002)		(0.001)	
Constant	5.158***	5.297***	4.192***	3.307***	4.631***	5.538***	4.919***
	(0.510)	(0.706)	(0.708)	(0.798)	(0.796)	(0.764)	(0.755)
Number of observation	158	158	158	158	158	158	158
Number of county	11	11	11	11	11	11	11
R^2	0.34	0.35	0.38	0.38	0.34	0.36	0.35

Source: Author's estimates.

Notes:

[a] The Model (0) estimated without institutional variable, (1)-(6) estimated with 6 different institutional indicators. The dependent variable is manufacturing value added (% of GDP) and various relevant macro variables are instrumented by their lagged values.

[b] The F test determines the choice between the *pooled* OLS Model and the FEM.

[c] The LM test determines the choice between the *pooled* OLS Model and the REM.

[d] The Hausman test determines the choice between the FEM and the REM. Null hypothesis is RE is efficient.

The White-heteroscedasticity-consistent standard errors are shown in parentheses.

* , **, and *** indicate significance at the 10, 5, and 1 percent levels, respectively.