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**Working Paper**

## The natural resource curse in post-soviet countries: The role of institutions and trade policies

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Arbeitsbereich Ökonomie

## **IOS Working Papers**

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### **The Natural Resource Curse in Post-Soviet Countries: The Role of Institutions and Trade Policies**

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## **Abstract**

We examine the effect of natural resource abundance on economic performance during the 1996–2011 period in the 15 independent countries that formerly comprised the Soviet Union. These countries were a largely homogeneous group with respect to institutional development, liberalization and economic performance; however, these countries began to demonstrate marked differences from one another with respect to these factors during the transition, which has resulted in unique cross-section and time variation. Using several panel regression models that address the endogeneity issues, our results suggest that natural resources crowd out manufacturing sector unless the quality of domestic institutions is sufficiently high. Conversely, trade policies do not help convert the natural resource curse into a blessing.

*JEL-Classification:* O11, O13, Q30

*Keywords:* natural resource curse, institutions, manufacturing, post-Soviet countries

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## 1 Introduction

Since Sachs and Warner (1995), many empirical studies have observed that natural resource abundance does not necessarily – lead to higher economic growth and that abundant natural resources are, in fact, often associated with lower economic performance. Several mechanisms have been proposed by the literature to illuminate the so-called natural resource curse (see van der Ploeg, 2011, and Frankel, 2012, for surveys), and it has been argued that institutions are the main driving factor at the nexus of natural resources and growth (Bulte et al., 2005; Isham et al., 2005; Brunnschweiler and Bulte, 2008). It has been also shown that manufacturing sector is typically crucial for long-term productivity growth, as it facilitates learning by doing (Matsuyama, 1992; Jones and Olken, 2008; Rodrik, 2008; Johnson et al., 2012) and that natural resource exports crowd out manufacturing sector (Sachs and Warner, 1999, and Rajan and Subramanian, 2011).

The period following the collapse of communism in the former Soviet Union provides for what is arguably the largest natural experiment on economic reforms in recent history (Campos and Horvath, 2012). A number of large-scale market-oriented reforms were implemented in the newly independent countries that formerly comprised the Soviet Union, and the once largely homogenous group in terms of institutions began to differ markedly from one another. We gather the relevant data on post-Soviet countries and examine whether the natural resource curse exists, and if so, whether institutions can cure this curse. Although the non-linear effect of natural resources on growth has been examined in several recent studies, we continue to believe that it is worthwhile to examine this issue and verify previous findings in this field especially as we specifically focus on the performance of manufacturing sector.

We believe that this is the case because we extend the previous literature in several ways. First, we focus on a relatively homogeneous group of countries, the countries that formerly comprised the Soviet Union. These countries share common history with similar social and institutional contexts. Therefore, our sample is more likely to form a homogeneous group, and imposing common parameters upon such a group might be reasonable.

Second, most of the previous research focuses on cross-sectional data. However, van der Ploeg (2011) and Rajan and Subramanian (2011) emphasize that the application of panel data is crucial because cross-sectional data suffer from omitted variable bias that arises from the correlation between initial income and the omitted initial level of productivity. We follow this and apply panel data regressions for the post-Soviet countries.

Third, our sample of post-Soviet countries offers a unique opportunity to examine the effects of institutions more fully. Institutions are typically persistent and do not change significantly over short periods of time. However, institutional frameworks have changed dramatically in several post-Soviet countries over the most recent two decades. Consider Estonia. Once part of the Soviet Union, Estonia is now fully integrated into European structures and adopted the euro in 2011. According to the widely used World Bank Governance Indicators, Estonia obtained a rule of law score close to countries such as Uruguay or Botswana at the beginning of our sample in 1996. Fifteen years later (at the end of our sample), Estonia received the same score as Spain and was not far from Japan.



Fourth, the previous literature on transition economies, including that studying post-Soviet countries, does not come to an unequivocal conclusion as to whether the natural resource curse exists. The findings of Esanov et al. (2001) and Kronenberg (2004) tend to support the existence of the natural resource curse, whereas Alexeev and Conrad (2009) suggest that the net effect of natural resources on growth is close to zero. Alternatively, Ahrend (2012) finds that natural endowments have a positive effect on economic growth in Russian regions at the outset of the transition.

Fifth, Arezki and van der Ploeg (2010) emphasize that trade policies may play the same role as institutions for the natural resource-economic growth nexus and argue that natural resources may give rise to greater pressure on government officials to protect non-resource export sectors from international competition. This argument implies that trade is less likely to be liberalized in countries with greater natural resources dependence. Arezki and van der Ploeg (2010) also find some evidence for this (rarely examined) trade channel <sup>1</sup> using a cross-sectional regression for a global sample. We test this hypothesis on panel data from the former Soviet countries. As discussed above, the transition from communist to market-oriented economy provides us with an interesting context because trade has been liberalized dramatically in some countries, whereas very little progress has been made with respect to liberalization in other countries.

Our results suggest that natural resource dependence crowds out manufacturing sector in post-Soviet countries only with sufficiently high institutional quality; in the absence of such institutional quality, these countries suffer from the natural resource curse. This result is robust to different regression specifications, different structures of instrumental variables and to different measurements of institutions from different sources. On the other hand, we find no support for the hypothesis that trade liberalization helps turn the natural resource curse into a blessing in a similar manner.

This paper is organized as follows. Section 2 discusses the related literature. Section 3 describes the data and introduces the econometric model. Section 4 presents the results. Concluding remarks are offered in section 5. An appendix with data descriptions and additional results follow.

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<sup>1</sup> In fact, it seems that only Arezki and van der Ploeg (2010) have examined this channel so far.

## **2 Literature Survey**

We provide a brief literature survey in this section and largely focus on those studies that examine how institutions shape the effect of natural resources on growth. We refer the reader to the surveys from van der Ploeg (2011) and Frankel (2012) for a more comprehensive overview of the literature on the natural resource curse.

Natural resource literature was inspired by Sachs and Warner (1995), whose empirical analysis showed that resource-scarce economies tend to exhibit higher economic performance than resource-rich economies over the long run. This finding spurred many economists to analyze its origins and test its robustness. Some studies took an additional step (e.g., Robinson et al., 2006) and suggested that institutional quality itself might be endogenous and not invariant with using natural resource in economic growth models.

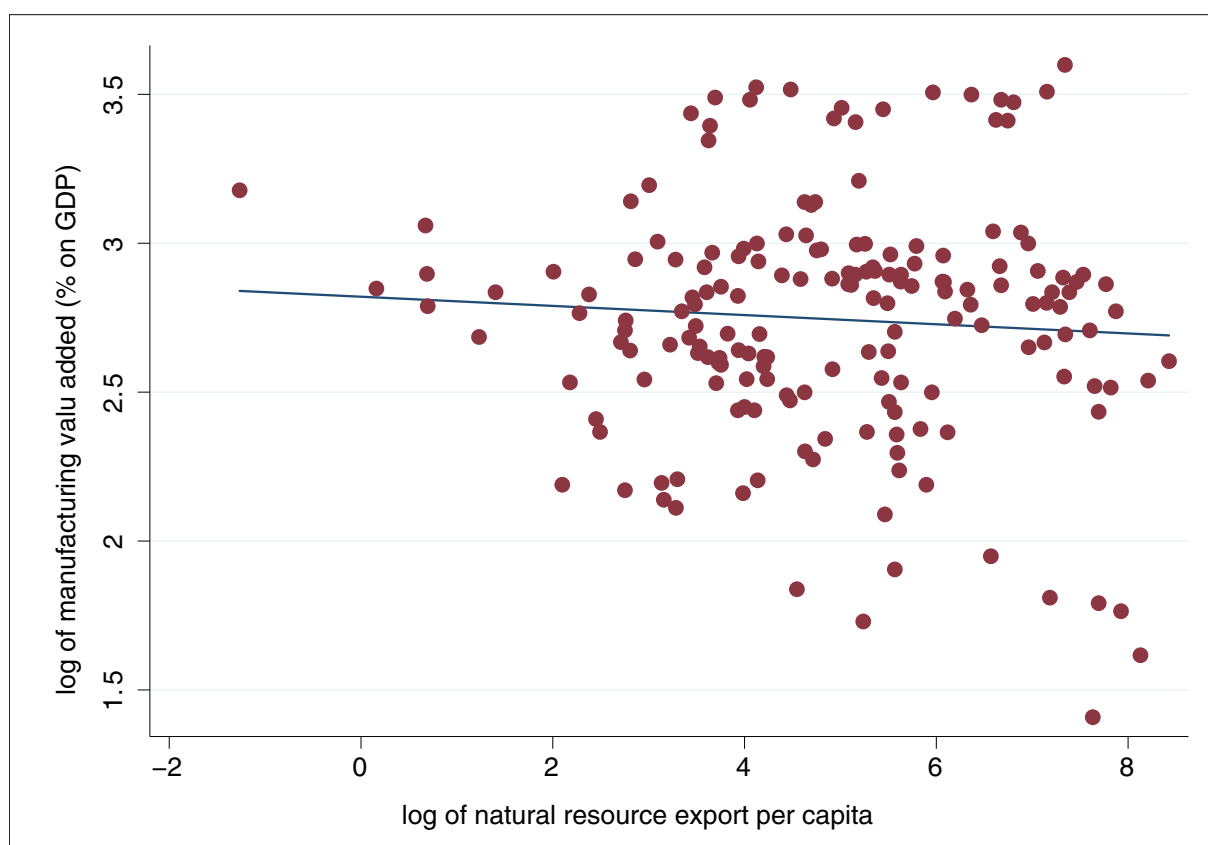
Several studies have emphasized that the effect of natural resource abundance on economic growth depends on the quality of institutions. Sala-i-Martin and Subramanian (2003) find that high levels of corruption prevented Nigeria from reaping the benefits of its natural resources and from promoting growth. Others have emphasized the negative effects of an abundance of natural resources on democracy (Ross, 2001) or found that natural resources increase the incidence of civil war (Collier and Hoeffler, 1998, or Fearon, 2005). It has been shown that the positive effects of natural resources on growth prevails only in countries with institutions of sufficient quality (Bulte et al., 2005, Mehlum et al., 2006). Botswana is frequently mentioned as the example of a developing country that managed to improve its institutional framework and generate higher growth in its diamond industry (Ilmi, 2007). Some studies emphasize that the natural resource curse is more concentrated in appropriable “point-source” resources such as oil, diamonds or minerals than in other resources (Auty, 2001, Boschini et al., 2007).

The natural resource literature has also been analyzed in transition countries, and the post-Soviet countries represent a large share of such countries. Previous studies focus on the effect of natural resources on growth but do not specifically examine how institutions influence the resource-growth nexus. Kronenberg (2004) finds that natural resources are negatively related to economic growth and argues that corruption is an obstacle for natural resources to translate into higher growth. Esanov et al. (2001) claims that the income from natural resources reduced the incentive to reform in transition countries in the 1990s. The impact of oil on economic growth in transition countries (including former Soviet countries and countries from Central and Eastern Europe) is examined by Brunnschweiler (2009), and her empirical analysis showed that oil reserves had a positive effect on economic growth over the 1996–2006 period. However, she also finds that oil reserves have a positive relationship with low democracy index scores, high levels of corruption and low human capital formation. Alexeev and Conrad (2011) analyze the relationship between “point source” natural resources and economic growth in transition countries and extend the previous literature in a number of ways in finding that, overall, natural resources do not represent an obstacle for economic growth in transition countries. Our study differs from previous studies on the role of natural resources for growth in transition countries primarily because we use panel data regressions in examining how institutions shape the effect of natural resources on growth.

### 3 Data and Empirical Methodology

We present our data and econometric framework in this section. Our dataset consists of 15 countries during the 1996–2011 period.<sup>2</sup> We refer the reader to the Appendix, which presents data definitions, sources and basic descriptive statistics (see Table A.1).

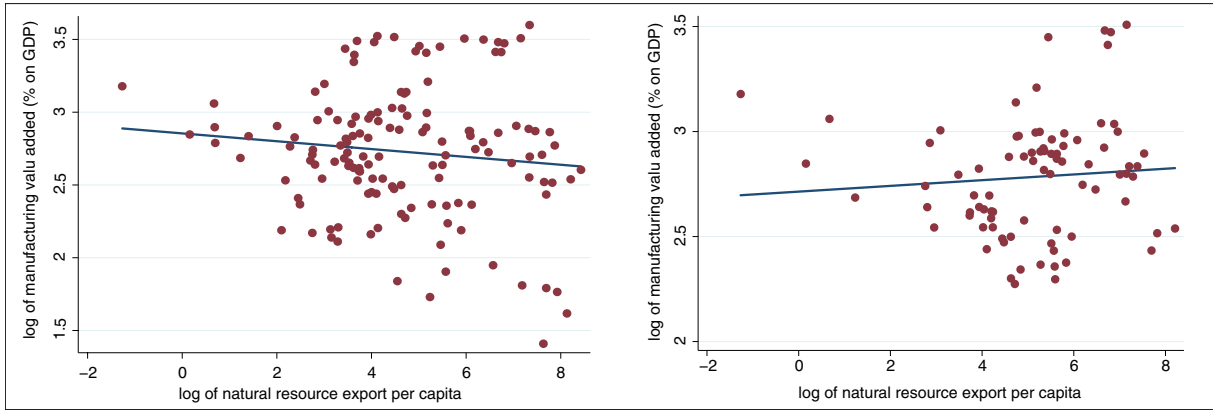
Figure 1 shows that we observe a somewhat negative relationship between the measure of natural resource dependence and manufacturing performance for the full sample, which provides some informal evidence for the natural resource curse (or some would put it as the symptoms of Dutch disease to be more specific). Next, we split our sample into two groups: countries with high quality rule of law and countries with low quality rule of law. We label the rule of law as good, if the value of the rule of law indicator is greater than the 25th percentile. Clearly, the cut-off point at the 25th percentile is somewhat arbitrary, but this measurement illustrates our point that institutions may turn a natural resource curse into a blessing. The corresponding scatter plots are available in Figure 2. After this experiment, we observe a negative relationship between natural resources and growth only for countries with bad institutional frameworks.



**Figure 1: Natural Resource Dependence and Manufacturing Performance**

<sup>2</sup>The list of countries is as follows: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, the Russian Federation, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

Our econometric framework largely follows Brunnschweiler and Bulte (2008)<sup>3</sup> and Isham et al. (2005), but we extend it for the panel setting. We examine the underlying factors that determine natural resource dependence and institutional quality with two-stage least squares (2SLS) and the determinants of economic growth with three-stage least square (3SLS). Using this framework, our ambition is to investigate the following: (1) whether an abundance of natural resources damage institutions and whether this low level of institutions in turn weakens economic performance; (2) whether institutions promote natural resource exports; (3) whether an abundance of natural resources translates into lower manufacturing share in post-Soviet countries, i.e., whether such abundance signals the natural resource curse; and (4) if the resource curse exists, whether sufficient institutional quality helps alleviate the negative effects of resources on growth.



**Figure 2: Natural Resource Dependence and Manufacturing Performance: Good and Bad Institutions**

We run three different regression equations. Following earlier studies (Isham et al., 2005, or Brunnschweiler and Bulte, 2008), we first analyze the determinants of institutional quality,  $\theta_{it}$ , using Eq. (1). As in Brunnschweiler and Bulte (2008), we use the latitude in absolute terms ( $latitude_i$ ) and natural resource abundance ( $nat_{it}$ ) as the instruments. In addition, we use the variable measuring the years under socialism ( $socialism_i$ ) to examine whether a longer socialist experience erodes institutional quality further. This instrument has been used by Beck and Laeven (2006) in their examination of the effect of institutions on economic growth in transition economies.

$$\theta_{it} = \alpha_0 + \alpha_1 latitude_i + \alpha_2 socialism_i + \alpha_3 nat_{it} + \epsilon_{it} \quad (1)$$

We expect that  $\alpha_1 > 0$  because countries farther from the equator typically have better institutions, i.e., they are more developed.  $\alpha_2$  is likely to be negative, as Beck and Laeven (2006) argue. Spending more time under socialism is likely to further erode the institutional framework of the country. The expected sign of  $\alpha_3$  is not clear *a priori*. If the income effect prevails, then  $\alpha_3 > 0$ , and if resources indeed damage institutions then  $\alpha_3 < 0$ .

<sup>3</sup> Interestingly, Brunnschweiler and Bulte (2008) exclude the post-Soviet countries due to data unavailability.

In the second step, we analyze the determinants of natural resource dependence, see Eq. (2). Following Brunnschweiler and Bulte (2008), we use terms of trade ( $tot$ ), a dummy variable for resource abundance ( $RA_i$  – dummy variable obtains the value of one if the country is resource-rich and zero otherwise) and institutional indicators. We expect that the terms of trade, resource abundance and institutional measures all exert a positive influence on natural resource exports.

$$nat_{it} = \varphi_0 + \varphi_1 tot_{it} + \varphi_2 RA_i + \varphi_3 \theta_{it} + \eta_{it} \quad (2)$$

Finally, we examine the determinants of economic growth.  $\theta$  and  $nat$  are instrumented using Eq. (1) and Eq. (2), respectively. We also include the interaction term of  $\theta$  and  $nat$  to examine the hypothesis that the natural resource curse is present only in countries that lack good institutions. In addition, we control for some standard regressors. To put additional structure into the analysis, the choice of regressors largely follows Ilmi (2007) and Brunnschweiler and Bulte (2008).

$$growth_{it} = \gamma_0 + \gamma_1 nat'_{it} + \gamma_2 \theta'_{it} + \gamma_3 nat_{it} \theta'_{it} + \gamma_4 lib_{it} + \gamma_5 open_{it} + \gamma_6 \tau_{it} + \gamma_7 ed_{it} + \gamma_8 n_{it} + \gamma_9 initialGDPpc_i + u_{it} \quad (3)$$

where  $growth_{it}$  is the natural logarithm of manufacturing value added to GDP;  $nat'_{it}$  is the instrumented natural logarithm of natural resource exports of fuel, metal and ore per capita;  $\theta'$  represents the institutional quality measure (we use six measures from the World Bank Governance Indicators because these are typically used in the previous literature);  $lib_{it}$  represents EBRD trade liberalization data;  $open_{it}$  denotes trade openness;  $\tau_{it}$  is average tax rate;  $ed_{it}$  is external debt;  $n_{it}$  represents population growth;  $initialGDPpc_i$  is the initial GDP in 1996; and  $u_{it}$  represents the error term.

The negative impact of natural resources on economic performance is typically explained using two phenomena. First, the so-called “Dutch Disease” stipulates that natural resource richness crowds out the manufacturing sector because significant natural resource exports tend to appreciate the domestic currency. Second, the natural resource curse is explained through institutions. The discovery of point-source natural resources is often claimed to promote rent seeking and corruption. In that case, natural resources have an indirect effect on economic growth through institutions (Sachs and Warner, 2001). Given the construction of our dependent variable, our results can also be interpreted as evidence for the Dutch disease (see also Rajan and Subramanian, 2011, who use the manufacturing value added to GDP as the dependent variable, Sachs and Warner (1999) and Harb (2009) use similar measures) but taking on board the effect of institutions, too.

Next, we estimate Eq. (4), which is similar to Eq. (3), but here we examine the effect of the interaction of natural resources and trade liberalization (instead of institutions).

$$growth_{it} = \gamma_0 + \gamma_1 nat'_{it} + \gamma_2 lib'_{it} + \gamma_3 nat_{it} lib'_{it} + \gamma_4 \theta_{it} + \gamma_5 open_{it} + \gamma_6 \tau_{it} + \gamma_7 ed_{it} + \gamma_8 n_{it} + \gamma_9 initialGDPpc_i + u_{it} \quad (4)$$

Estimating Eq. (4), we examine to what extent trade policies might help overcome the natural resource curse (Arezki and van der Ploeg, 2010). In addition, it is notable that Campos and Horvath (2012) emphasize that it is important to differentiate between reform inputs and reform outcomes, and claim that EBRD trade liberalization data might be plagued by including reform outcomes, to a certain extent. To alleviate this issue, we include trade openness into Eq. (4) to explicitly control for the reform outcomes.

## 4 Results

This section provides our regression results. As described in the previous section, we first present the determinants of institutional quality in post-Soviet countries and then present the regressions that examine the determinants of natural resource exports. Next, we examine the determinants of manufacturing performance in these countries and specifically analyze the significance of the interaction term between natural resource dependence and institutions to address our main hypothesis, i.e., whether the natural resource curse is limited to those countries with bad institutions.

Table 1 presents our results on the determinants of institutional quality. Similarly to the cross-sectional regressions in Brunnschweiler and Bulte (2008), we find that latitude in absolute terms is positively associated with institutional quality.<sup>4</sup> Next, our results indicate that countries that spent more years under socialism exhibit lower quality of institutions. This result supports the earlier findings of Beck and Laeven (2006). Notably, our results do not suggest that natural resource dependence damages institutions (Esanov et al., 2001 and Kronenberg, 2004).

**Table 1: The Determinants of Institutional Quality**

Measure of Institutions	CRP	LAW	EFT	REG	STB	VOI
Latitude	0.02 (0.01)	0.03** (0.01)	0.04** (0.01)	0.05** (0.02)	0.03 (0.02)	0.06*** (0.02)
Years under socialism	-0.04*** (0.01)	-0.05*** (0.01)	-0.04*** (0.01)	-0.05*** (0.02)	-0.03* (0.02)	-0.05*** (0.02)
Natural resource export	0.04*** (0.01)	0.03*** (0.01)	0.02** (0.01)	0.03*** (0.01)	0.03** (0.01)	-0.02 (0.01)
Number of observations	207	207	207	207	207	207
F/Wald test	56.53	79.31	37.45	35.77	18	37.44
R2 – overall	0.67	0.76	0.63	0.59	0.43	0.66

Notes: The model is estimated for six different measures of institutional quality, seetoprow. CRP – Control of Corruption, LAW – Rule of Law, EFT – Government Effectiveness, REG – Regulatory Quality, STB – Political Stability and Absence of Violence and VOI – Voice and Accountability. Robust standard errors are in parentheses. \*, \*\*, and \*\*\* indicate significance at 10, 5, and 1 percent levels, respectively. Constant not reported.

Table 3 presents the determinants of natural resource dependence. We find that the terms of trade shocks exert a positive influence on natural resource dependence. Clearly, resource abundance also has a positive effect on resource dependence. These results correspond with Brunnschweiler and Bulte (2008). Conversely, we fail to find that institutions affect natural resource dependence.

Next, we examine whether natural resource dependence crowds out manufacturing sector in post-Soviet countries. Natural resource dependence and institutions are instrumented, as described above. Our results are provided in Table 3. We show seven columns; the first lacks the

<sup>4</sup> Latitude is often used as the instrument in empirical growth literature, see Diamond (1997), Gallup et al. (1998) or Hall and Jones (1999).

**Table 2: The Determinants of Natural Resources Dependence**

		CRP	LAW	EFT	REG	STB	VOI
Terms of trade	0.55*	0.53**	0.41*	0.46*	0.39	0.44*	0.66**
	(0.30)	(0.29)	(0.30)	(0.31)	(0.30)	(0.30)	(0.31)
Resource abundance	2.96**	3.68***	3.46***	3.24***	3.12***	3.26***	3.23***
	(1.29)	(0.89)	(0.93)	(0.87)	(0.91)	(0.97)	(0.90)
Institution		1.65***	1.32***	1.21***	1.24***	0.89***	0.68**
		(0.33)	(0.33)	(0.32)	(0.27)	(0.26)	(0.32)
Number of obs.	240	240	240	240	240	240	240
F/Wald test	8.78	39.25	30.01	29.44	34.27	24.51	19.17
R2 – overall	0.23	0.49	0.48	0.48	0.51	0.42	0.44

Notes: The model is estimated for six different measures of institutional quality, see top row. CRP – Control of Corruption, LAW – Rule of Law, EFT – Government Effectiveness, REG – Regulatory Quality, STB – Political Stability and Absence of Violence, VOI – Voice and Accountability. The robust standard errors in parentheses. \*, \*\*, and \*\*\* indicate significance at 10, 5, and 1 percentage levels, respectively. Constant not reported.

measure of institutional quality, while the remaining six specifications contain the individual measure of institutions. Statistical tests have been undertaken to choose the proper econometric method. Our results suggest that natural resource dependence leads to shrinking of a manufacturing sector, which corresponds to the previous findings of Sachs and Warner (1999) using cross-country regressions and Rajan and Subramanian (2011) using panel regressions on the industry level. Next, we find that better institutions translate into higher manufacturing growth, which broadly corresponds to earlier findings by Beck and Laeven (2006).

The conditioning variables also offer a consistent story. Greater openness is associated with better economic performance, which is consistent with previous studies on the natural resource curse such as Sachs and Warner (1997) or Papyrakis and Gerlagh (2004), in addition to being consistent with earlier empirical growth literature (Barro, 1991, King and Levine, 1993, Mankiw et al., 1992). We also find that higher external debt results in lower performance, which broadly corresponds to the findings of Manzano and Rigobon (2001). Higher taxes are associated with lower growth (see also Padovano and Galli, 2001), whereas trade liberalization and population growth are insignificant. Our results also support the evidence for conditional convergence, i.e. poorer countries grow faster than rich countries (Barro, 1991).

Next, we present additional results regarding manufacturing performance in post-Soviet countries. The results are given in Table 4. We additionally include the interaction term between natural resource exports and institutional quality to examine the role of institutions in shaping the natural resource-growth nexus<sup>5</sup>. The effect of natural resource exports on growth remains neg-

<sup>5</sup> We also examined alternative measures of institutional quality such that “law and order” and “democratic accountability” from the International Country Risk Guide dataset. The drawback of this dataset is that it does not contain several countries in our sample limiting the number of countries in our sample to ten. The results are largely in line with the findings that we present in the paper but sometimes standard errors were larger given the low number of observations.



**Table 3: The Determinants of Manufacturing Performance in Post-Soviet Countries**

	(0)	(1)	(2)	(3)	(4)	(5)	(6)
Natural resource export	-0.11** (0.04)	-0.16*** (0.04)	-0.16*** (0.04)	-0.15*** (0.04)	-0.15*** (0.04)	-0.16* (0.09)	-0.13** (0.04)
Control of corruption		0.67*** (0.15)					
Rule of law			0.48*** (0.12)				
Gov. e ectiveness				0.50** (0.17)			
Regulatory quality					0.37*** (0.12)		
Political stability						0.84** (0.31)	
Voice and accountability							0.16 (0.16)
Trade liberalization	0.08 (0.08)	0.10 (0.09)	-0.08 (0.08)	-0.05 (0.09)	-0.05 (0.09)	-0.01 (0.11)	-0.03 (0.09)
Trade openness	0.47*** (0.09)	0.58*** (0.09)	0.55*** (0.09)	0.53*** (0.09)	0.54*** (0.09)	0.53*** (0.10)	0.48*** (0.09)
Average tax rate	-0.11** (0.04)	-0.07 (0.04)	-0.07* (0.04)	-0.08* (0.04)	-0.08* (0.04)	-0.12** (0.04)	-0.10** (0.04)
External debt	-0.06** (0.02)	-0.07*** (0.02)	-0.08*** (0.02)	-0.07*** (0.02)	-0.07*** (0.02)	-0.07*** (0.02)	-0.07*** (0.02)
Population growth	0.01 (0.03)	-0.02 (0.03)	-0.02 (0.03)	0.02 (0.03)	-0.01 (0.03)	0.03* (0.028)	-0.01 (0.03)
Initial GDP	0.01** (0.00)	0.01*** (0.00)	0.00*** (0.00)		0.00*** (0.00)		0.00*** (0.00)
Number of observations	207	207	207	207	207	207	207
Regression model	RE	RE	RE	FE	RE	FE	RE
F/Wald test	11.75	22.73	22.57	22.72	23.87	24.23	22.84
BP LM	82.79	113.31	93.85	78.74	96.39	96.29	87.56
Hausman test	16.33	23.35	26.56	1.43	107.65	5.45	17.85
R2 – overall	0.41	0.56	0.54	0.48	0.49	0.48	0.45

Notes: The F test determines the choice between the POLS model and the FEM. The LM test determines the choice between the POLS Model and the REM. The Hausman test determines the choice between the FE and the RE. Null hypothesis is REM is efficient. The regression represents estimated method of models. The robust standard errors are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at 10, 5, and 1 percentage levels, respectively. Constant not reported.

ative, whereas institutions exert a positive effect. The interaction term for institutions is positive and statistically significant, which suggests that countries with good institutions do not suffer from the natural resource curse. This result is robust to the different measures of institutions and different regression specifications and is interesting because recent empirical evidence suggests that that natural resource curse may be 'red herring' after the endogeneity of some regressors are controlled for (see Brunnschweiler and Bulte, 2008, or Arezki and van der Ploeg, 2010).

**Table 4: The Determinants of Manufacturing Performance in Post-Soviet Countries: The Interactions of Natural Resources and Institutions**

	(1)	(2)	(3)	(4)	(5)	(6)
Natural resource export (NAT)	0.82*** (0.22)	-0.85*** (0.16)	-0.98*** (0.23)	-0.77*** (0.16)	-0.797*** (0.267)	-0.70*** (0.11)
Control of Corruption (CRP)	2.15*** (0.45)					
CRP*NAT	0.42*** (0.16)					
Rule of Law (LAW)		2.06*** (0.35)				
LAW*NAT		0.47*** (0.10)				
Effectiveness (EFT)			2.02*** (0.43)			
EFT*NAT			0.47*** (0.13)			
Regulatory Quality (REG)				1.54*** (0.31)		
REG*NAT				0.36*** (0.09)		
Stability (STB)					1.66*** (0.46)	
STB*NAT					0.33** (0.13)	
Voice and Accountability (VOI)						1.54*** (0.26)
VOI*NAT						0.40*** (0.08)
Number of observations	207	207	207	207	207	207
Regression model	RE	RE	RE	RE	RE	RE
F/Wald	18.08	16.72	14.16	14.31	15.04	13.54
BP LM	358.96	362.20	141.21	163.89	119.48	154.01
Hausman test	28.53	51.53	90.86	81.15	64.99	59.71
R2 – overall	0.64	0.64	0.60	0.62	0.57	0.61

Notes: The F test determines the choice between the POLS model and the FEM. The LM test determines the choice between the POLS Model and the REM. The Hausman test determines the choice between the FE and the RE. Null hypothesis REM is efficient. The regression represents estimated method of models. The robust standard errors are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at 10, 5, and 1 percentage levels, respectively. Control variables and constant not reported.

Finally, we examine the hypothesis put forward by Arezki and van der Ploeg (2010) that the degree of natural resource curse depends on the extent that a country is open to international trade. Significant natural resource exports are likely to drive domestic currency upward, which thus puts non-resource export sectors under pressure. In such a case, government officials may protect these sectors by adopting more restrictive trade policies. Arezki and van der Ploeg (2010) find some evidence for their hypothesis; however, in some instrumental variable regressions, the interaction term between natural resource exports and their measure of trade liberalization remains positive but no longer statistically significant.

**Table 5: The Determinants of Manufacturing Performance in Post-Soviet Countries: The Interactions of Natural Resources and Institutions and Trade Liberalization**

	(1)	(2)	(3)	(4)	(5)	(6)
Natural resource exp. (NAT)	-0.17** (0.06)	-0.06 (0.08)	-0.41*** (0.07)	-0.59** (0.73)	-0.08 (0.05)	-0.11* (0.06)
Trade liberalization (LIB)	1.74 (2.57)	1.83 (3.72)	-0.31 (2.94)	3.62 (3.11)	-0.72 (2.90)	-0.14 (0.36)
NAT*LIB	-0.41 (0.73)	-0.25 (1.04)	0.33 (0.82)	-0.86 (0.89)	0.85 (0.67)	0.11 (0.08)
External debt	-0.40* (0.23)	-0.45** (0.23)	-0.48** (0.22)	-0.44* (0.23)	-0.54** (0.22)	-0.52** (0.22)
Average tax rate	-0.39*** (0.11)	-0.40*** (0.11)	-0.36*** (0.11)	-0.39*** (0.11)	-0.36*** (0.11)	-0.39*** (0.11)
Population growth	-0.00 (0.03)	0.00 (0.04)	0.01 (0.04)	0.00 (0.03)	0.04 (0.04)	0.01 (0.03)
Initial GDP	0.01* (0.00)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)	0.01 (0.06)
Number of observations	207	207	207	207	207	207
Regression model	RE	RE	RE	RE	FE	RE
F/Wald test	27.63	25.57	24.62	26.87	21.02	17,86
BP LM	76.34	54,34	65.76	84.23	87.32	65.75
Hausman test	8.43	42.21	33.32	10.01	10.81	14.5
Measure of institutions	CRP	LAW	EFT	REG	STB	VOI
R2 – overall	0.24	0.23	0.30	0.17	0.41	0.48

Notes: The F test determines the choice between the POLS model and the FEM. The LM test determines the choice between the POLS Model and the REM. The Hausman test determines the choice between the FE and the RE. Null hypothesis is REM is efficient. The regression represents estimated method of models. The robust standard errors are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at 10, 5, and 1 percentage levels, respectively. Control variables and constant not reported. Institutional quality, terms of trade and resource abundance used as the instrument to trade liberalization. CRP – Control of Corruption, LAW – Rule of Law, EFT – Government Effectiveness, REG – Regulatory Quality, STB – Political Stability and Absence of Violence, VOI – Voice and Accountability.

Table 5 presents our results. Although the effects of other regressors remain largely identical to the previous Table, we do not find the interaction term of natural resource dependence and trade liberalization statistically significant. Therefore, in our sample of post-Soviet countries, we do not find evidence that trade policy helps countries avoid shrinking of a manufacturing sector stemming from the natural resource dependence.

## **5 Concluding Remarks**

We examine how natural resource exports and the quality of institutions influence manufacturing performance with data from a panel of post-Soviet countries over the last two decades. More specifically, we investigate whether good institutions are the way to overcome the natural resource curse. Post-Soviet countries offer a unique laboratory for this exercise, as institutions in these countries were changing dramatically. Therefore, we examine the role of institutions on natural resource curse not only across countries but also over time.

Our results point to an existence of natural resource curse in post-Soviet countries. We find that natural resource exports crowds out manufacturing sector when a wide range of economic, social and political characteristics are controlled for.

Nevertheless, our results indicate that the natural resources are a curse only in countries characterized by bad institutions. Importantly, we find that this non-linear effect holds regardless of the measure of institution that we use. Therefore, the results provide a clear message to policy makers about the positive role that institutions play in economic performance. According to our results, institutions not only have a positive and direct effect on the performance of manufacturing sector, they also support growth indirectly by helping to alleviate the natural resource curse. Next, we find that more years spent under communism result in a greater detrimental effect on the quality of institutions, which suggests that the lack of democratic rules results in the deterioration of institutional quality.

Finally, we also examine whether trade policies help reduce natural resource curse. We fail to find the same non-linear effect for trade liberalization that we find for institutions. Therefore, our results indicate that good institutions rather than trade liberalization can turn natural resource curse into a blessing.

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## Appendix

### Data definitions and its sources

*growth*: the log of manufacturing value added as a percentage of GDP during the 1996–2011 period. Source: World Bank, World Development Indicators.

*nat*: the natural logarithm of natural resources per capita (fuel, metal and ore exports) during the 1996–2011 period. Source: World Development Indicators.

*Institutional quality defined and measured by Kaufmann, Kraay and Mastruzzi, on a scale of 0–5: a higher degree represents higher governance performance*. Source: World Bank, World Governance Indicators.

*control of corruption*: the term that captures the perceptions of the extent to which public power is exercised for private gain, including both small-scale and large-scale forms of corruption, in addition to the “capture” of the state by elites and private interests.

*rule of law*: the term that captures the perceptions of the extent to which agents have confidence in and abide by the rules of society, and, in particular, the quality of contract enforcement, the enforcement of property rights, confidence in the police and the courts, and the likelihood of crime and violence.

*government effectiveness*: the term that captures the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies.

*regulatory quality*: the term that captures the perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

*political stability and absence of violence*: the term that captures the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism.

*voice and accountability*: the term that measures the perceptions of the extent to which a country’s citizens are able to participate in selecting their government, including freedom of expression, freedom of association, and a free media.

#### ***Instrumental variables***

*tot*: terms of trade, which is measured as the ratio of the export price index to the import price index. Authors’ calculation. Source of price indexes: World Development Indicator.

*latitude*: the value of the latitude of a country on a scale of 0–100. Source: OpenData by Socrata.

*socialism*: information regarding years under socialism is collected by the authors for each country from different sources.



**Other explanatory variables**

*lib*: trade liberalization, which is measured on a scale from 1 to 4.3, where 1 represents little or no change from a rigid centrally planned economy and 4.3 represents the standards of an industrialized market economy. Source: EBRD, Transition Indicators.

*open*: trade openness is the sum of the percentages of merchandise export and import on GDP. Source: World Development Indicator.

$\tau$ : tax rate is measured as the percentage equal to the proportion that tax revenue is of GDP. Tax revenue refers to compulsory transfers to the central government for public purposes. Source: World Development Indicator.

*ed*: external debt, which is measured as a percentage of external debt stocks to gross national income. Total external debt is debt owed to nonresidents that is repayable in currency, goods, or services, where it represents the sum of public, publicly guaranteed, and private nonguaranteed long-term debt, use of IMF credit, and short-term debt. Source: World Development Indicator.

*n*: population growth is the exponential rate of growth of midyear population during one year, expressed as a percentage. Source: World Development Indicator.

*initial GDP* per capita of countries is based on 1996. Source: World Development Indicator.

Table A.1 shows the descriptive statistics of the main dependent, independent and instrumented variables.

**Table A.1: Descriptive Statistics**

Dependent Variable	Obs	Mean	Std.Dev.	Min	Max
Manufacturing value added	222	16.92	6.88	4.09	36.56
Explanatory Variables					
Natural resource export	240	398.67	739.15	0	4571.25
Trade liberalization	240	3.41	1.03	1	4.30
Trade openness	240	0.82	0.3	0.29	1.69
Average tax rate	238	0.10	0.03	0.01	0.18
External debt	218	55.65	34.42	2.03	162.11
Population growth	238	0.2	1.02	-2.52	2.82
Initial GDP (GDP, 1996)	240	3834.4	2543.18	860.87	8530.55
Institutional Quality Indicators					
Control of Corruption (CRP)	240	1.84	0.57	1.01	3.47
Rule of Law (LAW)	240	1.86	0.71	0.81	3.68
Regulatory Quality (REG)	240	2.12	0.96	0.32	3.94
Government Effectiveness (EFT)	240	2.02	0.67	0.82	3.72
Political Stability (STB)	240	2.16	0.73	0.26	3.51
Voice and Accountability (VOI)	240	1.90	0.91	0.37	3.60
Instrumental Variables					
Terms of trade	240	0.94	0.35	0.34	2.87
Latitude	240	47.48	7.25	37.93	59.43
Years under Socialism	240	65	9.03	50	76