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Resource Curse: New Evidence on the Role of Institutions

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ABSTRACT

This paper attempts to provide a probable answer to a longstanding resource curse puzzle i.e. why resource rich nations grow at a slower rate compare to the less fortunate one. Using an innovative threshold estimation technique, the empirical results reveal that there is a threshold effect in the natural resources – economic growth relationship. We find that the impact of natural resources are meaningful to economic growth only after a certain threshold point of institutional quality has been attained. The results also shed light on the fact that the nations that have low institutional quality depend much on natural resources while countries with high quality institution are relatively less dependent to natural resources to generate growth.

Keywords: Natural resource curse, institutions and non-linear.

INTRODUCTION

Natural resource-rich countries suppose to enjoy better economic growth compare to those countries that are less fortunate. Surprisingly, everyday experiences and empirical studies show the reversal (Frankel 2010). It seems that abundance of natural resources is detrimental to economic growth. This puzzling phenomenon is known as Natural Resource Curse Hypothesis (NRC), and in literature there are at least three theories explaining the NCR: Dutch disease models, rent seeking models and institutional explanation (Sachs and Warner, 1995 and 2001). Empirical evidence from last two decades consistently shows the prevalence of the NRC (Leite and Weidmann (1999), Gylfason (2001), Gylfason and Zoega (2002), among others).

However, recent research, for instance, Brunnschweiler (2008), Brunnschweiler and Bulte (2009), and Boyce and Emery (2010) find new and contradicting empirical evidence to the existing NRC literature. Abundance natural resources evidently have positive relationship with economic growth as well as economic welfare. Isham et al (2003) and Frankel (2010) argues that the probable reason that causes inconsistency in the empirical findings by previous researches could be due to different type of resources either point or diffuse and different economics backgrounds in the area of level of human capital, level of debt overhang and export diversification. Brunnschweiler (2008) postulates the inconsistencies in the empirical finding are originated from the inappropriateness of resource abundance measurement to proxy natural resources in the empirical estimation. Using two new variables from World Bank database namely total natural capital and subsoil wealth, Brunnschweiler (2008) finds a positive and robust relationship between natural resource abundance and economic growth for more than 90 economies.

More interestingly, these two outwardly contradicting groups who investigate the NRC hypothesis are unanimously agreed on the importance of good institutions. It is found that economy with abundance natural resources and at the same time have better institutional quality and governance such as strong democratic accountability, high law and order, lower corruption, or higher integration among government institutions are evident to have better economic growth and higher human welfare (Damania and Bulte, 2003 and Mehlum et al. 2006). It is because superior institutional quality could be very effective to nullify the bad spell of the curse through avoidance of rent seeking behavior (Auty 2001), reducing corruption (Ishan et al. 2005 and Robinson et al. 2006), lowering risk of violent civil conflict (Collier and Hoeffler, 2005) and acceleration of efficient resource allocation (Atkinson and Hamilton, 2003).

However, previous studies that delve with the institutional quality and resource curse hypothesis have imposed an important a priori restriction in their analysis i.e. the impact of natural resource and institutional quality variables are set to be linear and monotonic to economic growth. It may be the case that the relationship might be non-linear and only after certain level of institution quality or any of its interaction terms that natural resources can be effectively contributed to the economic growth. In other words, it might be a point where only after certain threshold point of institutional quality that the natural resources could have meaningful contribution to the economic growth. Therefore this research is affirmative to offer a possible answer to the NRC hypothesis puzzle. If natural resources abundance is indeed detrimental to economic growth, it might be true only at low quality of institution. As the institutional quality improves, the impact of natural resources on economic growth may momentous. If it is true then, the policy makers should struggle to archive high level of institutional quality. However, another question arises, how high should quality of institution be or should it be how many percent high so that the natural resources to have favorable effect on economic growth? Or at what level of institutional quality does the curse is annulled.

The purpose of this paper is to examine the relationship between natural resource and economic growth by considering threshold level of institutional quality using Brunnweiller (2008) dataset. Particularly, the questions that are addressed in this paper are: (1) why the empirical finding on the issues of NRC hypothesis is far from conclusive. This research offers an analysis that favors to the importance of high institutional quality and good governance that could be an answer to the NRC puzzle. (2) If different level of institutional quality inherent in the economy is one of the reasons, then this study try to answer this second question by offering a threshold level at which the effect of natural resources on economic growth is positive or otherwise. In other words, is there any threshold level of institutional quality above which natural resource affects economic growth rate differently? This paper employs relatively new econometric methods for threshold estimation and inference, as proposed by Hansen (1996 and 2000).

The remainder of the paper organizes as follows. In section 2, we briefly discuss the theory and recent evidence of the NCR hypothesis and institutions. Section 3 describes the dataset used in the empirical analysis and the layout of the econometric procedures. Section 4 discusses the estimation results. Finally, section 5 offers some concluding remarks.

INSTITUTIONS AND NATURAL RESOURCE CURSE HYPOTHESIS

Economists generally agree that poor or good result of any growth policies is largely dependent on the level of institutional quality inherent in the economy and not natural resource abundance (Barro 1991 and North 1994). No matter how good the policy is or how much resource they have, but if the institutions either public or private are not accommodating then the desired results from such good resource policy will shatter. Nelson and Sampat (2001) technically define institutions as ‘social technologies’ that positively related to economic performance. They postulate that when institutions are of low quality, due to frequent changes of rules, high levels of corruption, widespread nepotism and weak law enforcement, the markets will not be functioning well and may lead to high market volatility and then the efficient allocation of resources may be severely affected. In contrary, high-quality market characteristics play an important role in promoting an efficient and low-risk investment opportunity that could be vital to provide better environment for sustainable economic growth.

Rodrik et al. (2004) argues that low quality institution through which natural resources is channeled to an economic activity could aggravate information asymmetries and adversely affect resource allocation efficiency if it is used by the perverse politician. Then the decision made by the authority might be politically rational but economically inefficient. On the other hand good institutions could be an efficient mean for channeling information about market conditions and participants by facilitating mutual co-operation between market actors that eventually could reduce transaction costs and increase efficiency. Therefore, institutions could act as a tool that reverses the negative association between natural resource wealth and poor outcomes. Good institutional arrangement is also crucial to the management of optimal and efficient resources.[1]

Mehlum, Moene and Torvik (2006) explain that good quality institution is the one who producer friendly and not a grabber. In a similar argument they have divided institution into two categories. First is institution that grabber friendly and second producer friendly. They conjecture that

[1] Leite and Weidmann (2002) explain that the negative associations between institutions, resource abundance, and economic growth are insufficient in establishing the direction of causality. What is the cause and what is the effect question is still remain unresolved. However, they are in the position to argue that poor institutions are a result of resource abundance rather than the cause.

the curse is only effective under a grabber friendly institution and not for the later. If the institution is producer friendly, then resource rich countries is hypothesized to attract more producers to involve in production and then eventually increase growth and it is not the case under grabber friendly institution. Empirically testing the hypothesis for 87 countries, the result is in favor to the idea that producer friendly institution could reduce significantly the effect of resource curse. They find that countries like the US, Canada, Norway and Australia are curse-free and enjoy high economic growth due to their producer friendly institutions with exceptionally high quality (Larsen 2005). However, their study does not clearly differentiate between good qualities that associated with the producer friendly institutions in-contrast to the grabber friendly.

EMPIRICAL MODEL

The empirical model is based on Brunnschweiler (2008), where the empirical linkages between natural resources and growth using the following linear cross-country growth equation:

$$RGDPC_i = \alpha_0 + \alpha_1 R_i + \alpha_2 INS + \alpha_3 X_i + \varepsilon_i \tag{1}$$

where $RGDPC_i$ is the real GDP per capita in country *i*, R_i is the country's natural resource abundance, *INS* is institutional quality, *X* is a vector of controls (initial income per capita, latitude), and ε_i is a noise term. Since we use logs, the effect of natural resources on real GDP per capita is expressed as elasticity.

To test the hypothesis outlined in the previous section, we argue that the following Equation (2) is particularly well suited to capture the presence of contingency effects and to offer a rich way of modeling the influence of institutional quality on the impact of natural resources in economic growth. The model, based on threshold regression, takes the following form:

$$RGDPC_i = \begin{cases} \beta_0^1 + \beta_1^1 R_i + \beta_2^1 INS_i + \beta_3^1 X_i + e_i, & \text{INS} \le \lambda \\ \beta_0^2 + \beta_1^2 R_i + \beta_2^2 INS_i + \beta_3^2 X_i + e_i, & \text{INS} > \lambda \end{cases} \tag{2}$$

where INS (i.e., level of institutional development) is the threshold variable used to split the sample into regimes or groups and λ is the unknown threshold parameter. This type of modeling strategy allows the role of natural resources to differ depending on whether institutions are below or above some unknown level of λ. In this equation, institutions act as sample-splitting (or threshold) variables. The impact of natural resources on real GDP per capita will be β_1^1 and β_1^2 for countries with a low or high regime, respectively. It is obvious that under the hypothesis $\beta^1 = \beta^2$, the model becomes linear and reduces to (1).

The first step of our estimation is to test the null hypothesis of linearity $H_0 : \beta^1 = \beta^2$ against the threshold model in Equation (2). We follow Hansen (1996, 2000) who suggests a heteroskedasticity consistent Lagrange Multiplier (LM) bootstrap procedure to test the null hypothesis of a linear formulation against a threshold regression alternative. Since the threshold parameter λ is not identified under the null hypothesis of the no-threshold effect, the *p* values are computed by a fixed bootstrap method. Hansen (2000) shows that this procedure yields asymptotically correct *p* values. It is important to note that if the hypothesis of $\beta^1 = \beta^2$ is rejected and a threshold level is identified, we should test again the threshold regression model against a linear specification after dividing the original sample according to the threshold thus identified. This procedure is carried out until the null of $\beta^1 = \beta^2$ can no longer be rejected.

Even though natural resources may have positive effect on growth, the results may have been driven by resource-rich countries with high institutional quality. In order to examine this possibility, Equation (2) is extended to include an interaction term between institutions and natural resources:

$$RGDPC_i = \alpha_0 + \alpha_1 R_i + \alpha_2 INS + \alpha_3 (R \text{ x } INS)_{\text{i}} + \alpha_4 X_i + \varepsilon_i \tag{3}$$

If α_3 is negative and statistically significant, this implies that the negative growth effect increase as institutional quality improves. On the other hand, if α_3 is positive and significant, this indicates that negative growth effect diminishes as institutional quality improves. Equation (3) is estimated using the threshold regression technique.

THE DATA

This study employs the cross-country estimations in order to estimate Equation (2). The number of countries is 90 and the sample period is covering from 1984 to 2005.

Following Brunnschweiler (2008), three natural resources indicators are employed in the analysis, namely (i) primary exports over GDP (*sxp*); (ii) Average total natural capital (*natcap*), the measure includes subsoil assets, timber resources, nontimber forest recourses, protected areas, cropland and pastureland; and (iii) average subsoil assets (*subsoil*), the measure includes energy resources and other mineral resources. The *sxp* dataset is obtained from Sachs and Warner (1995), whereas the *natcap* and *subsoil* dataset are gathered from World Bank.

The institutions dataset employed is from the International Country Risk Guide (ICRG) – a monthly publication of Political Risk Services (PRS). In this study, four PRS indicators were used to measure the overall institutional environment: (i) *corruption*, which measures excessive patronage, nepotism, job reservation, 'favour-for-favours', secret party funding, and suspicious ties between politics and business. It is hypothesised that a high level of corruption distorts the economic and financial environment and reduces the efficiency of the government and businesses by enabling people to assume positions of power through patronage rather than ability. The index ranges between zero and six with the higher the corruption, the lower the index. (ii) *rule of law*, which reveals the degree to which citizens are willing to accept established institutions to make and implement laws and to adjudicate disputes, (iii) *bureaucratic quality*, which represents autonomy from political pressure, strength, and expertise to govern without drastic changes in policy or interruptions in government services, as well as the existence of an established mechanism for recruitment and training of bureaucrats, and (iv) *government effectiveness*, which measure 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. These four variables were scaled from 0 to 6, where higher values implied better institutional quality and vice versa.

The real GDP per capita (US$ 2000 constant prices) and latitude is the location of the country. All dataset are obtained from World Development Indicators.

RESULTS

Equation (2) has been estimated using four different models depending on the institution indicator used (**Model *A***: Rule of Law; **Model *B***: Government Effect; **Model C**: Corruption; and **Model D**: Buraucratic Quality). Employing Hansen (1996 and 2000) splitting sample threshold method to investigate the NRC hypothesis with three different measures of natural resources namely share of resources export to GDP (*sxp*) as in Sachs and Warner (1995), total natural capital (*natcap*) and subsoil wealth (*subsoil*) as used by Brunnschweiler (2008). The results of each model are presented in Table 1*a*, 1*b*, 1*c*, 2*a*, 2*b* and 2*c*. The alphabet *a*, *b* and *c* after number 1 or 2 refer to an estimation using share of natural resource export to GDP (*sxp*), total natural capital (*natcap*) and subsoil wealth (*subsoil*), respectively. The number 2 refers to estimation of Equation (3) with an interaction of natural resources and institutional quality while number 1 without an interaction term.

This study has revealed several interesting results. First, the result shows (as shown in Table 1a, 1b, and 1c or 2a, 2b, and 2c) that the *p*-value of the hypothesis of no threshold effect as computed by a bootstrap method with 1,000 replications and 15% trimming percentage are rejected at a very high significant level with and without the interaction term irrespective of the models. The finding clearly indicates that the relationship between economic growth and natural resources are non-linear and therefore the imposition of priori monotonic restriction on the relationship also can be very misleading. The finding is a better explanation for dynamic rich relationship between natural resources and economic growth. Natural resources can be effectively contributed to the economic growth only after certain level of institution quality or any of its interaction terms.

Second, the presence of threshold level also indicates that the sample can be split into two different groups depending on the level of institutional quality. Any country that have institutional quality less than the threshold level are considered as low-quality institution group while the one with greater than the threshold values are classified into high-quality institution group. The behavior of the relationships between natural resources and economic growth are different for low and high quality institutions. For instance Table 1c depicts that the hypothesis of NRC is rejected at lower level of institutional quality for Model A, B, C and D. The coefficients of subsoil variable for these models are 0.532, 0.505, 0.520 and 0.549, respectively and at least significant at 5 percent level. However, as institutions getting better (after the threshold level) the contribution of natural resources is negligible. Another example is from Table 2a where at lower level of government effect (< 0.47) the coefficient of β_1^1 is -34.1 while at higher level (>0.47) of government integrity the results dramatically change to only -9.47

In addition, the regression's result of Equation 3 has provided new insight to the understanding of the resource curse. For instance, Table 2a Model B shows that the global as well as the threshold regression coefficient for natural resource is negative to confirm the present of NRC hypothesis. However, interestingly the interaction term between natural resources and institutional quality from the regression is positive and significant. The negative coefficient of natural resource and then followed by positive coefficient of interaction term is a sign of the NRC is getting weaker as the government effect is getting stronger. If the government effect could reach 1.342 level than it will cancel-out the effect of the resource curse. Out of 90 countries, our sample shows that 64 countries have the sufficient institutional quality to insulate the economy from the resource curse.

CONCLUSION

In this paper, we re-examine the well-known empirical puzzle of resource curse hypothesis using a threshold regression with reference to different institutional quality. In particular, we endogenously determine the threshold level of institutional quality and then used this threshold point to test the different effect of natural resources at low-institutional quality in comparison to natural resources in high-institutional quality countries on economic growth.

There are several major finding of this paper. First, priori monotonic restriction on the study of NRC could lead to a premature conclusion. In this study, we consistently fail to reject the presence of threshold effect in the estimation irrespective of models. Further the study highlight the importance of good quality of institution to neutralize the effect of the natural resource curse. Resource policy will be effective only under a good institution. Abundance resource countries but with weak institutional quality will not be better off in economic growth if compared to the poor resource economies. Further, this study also shows that high quality institution nation is less dependent on the natural resources to generate economic growth.

In summary, for a nation to fully benefit from natural resources should not neglect the important role of good institution and with good institution, the NCR puzzle can also be challenged. Therefore it is very important for a nation to have good quality institution for a sustainable economic growth.

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TABLE 1a: Threshold Estimates of Equation $RGDPC_i = \begin{cases} \beta_0^1 + \beta_1^1 R_i + \beta_2^1 INS_i + \beta_3^1 X_i + e_i, & \text{INS} \le \lambda \\ \beta_0^2 + \beta_1^2 R_i + \beta_2^2 INS_i + \beta_3^2 X_i + e_i, & \text{INS} > \lambda \end{cases}$ using share of resources export to GDP (*sxp*)

	Model A Institutions: Rule of Law			**Model B Institutions: Government Effect**			**Model C Institutions: Corruption**			**Model D Institutions: Bureaucratic Quality**		
	Linear	<0.54	>0.54	Linear	<0.17	>0.17	Linear	<3.28	>3.28	Linear	<0.69	>0.69
Constant	11.389** (2.037)	8.955** (2.128)	26.8** (2.78)	10.42** (2.00)	6.118** (2.46)	18.9** (1.83)	5.221** (1.766)	4.617* (2.02)	-2.37 (7.234)	9.573** (0.767)	4.431** (1.138)	5.673** (1.439)
$RGDP_{1970}$	-0.764 (0.295)	-0.339 (0.302)	-2.85 (0.402)	-0.651** (0.292)	0.010 (0.344)	-1.77 (0.27)	0.048 (0.282)	0.086 (0.311)	1.309 (1.040)	-0.241 (0.099)	-0.266 (0.101)	0.143 (0.159)
Sxp	-5.637 (2.403)	-8.951 (2.083)	-2.73 (1.42)	5.178* (2.386)	-7.92 (2.279)	-0.811 (1.780)	-6.113 (3.07)	-9.223 (2.541)	3.008 (5.120)	-0.871 (0.094)	-0.555 (0.116)	-1.206 (0.248)
Rule of Law	1.442 (1.275)	1.735** (0.452)	1.42** (0.368)									
Government Effectiveness				1.297** (0.311)	1.204 (0.646)	1.220** (0.266)						
Corruption							0.110 (0.223)	0.257 (0.221)	-0.337 (0.656)			
Bureaucratic Quality										-0.810 (0.115)	7.498** (1.609)	-0.086 (0.129)
Latitude	-0.829 (1.275)	0.557 (2.006)	0.97 (0.996)	-0.347 (1.205)	1.265 (1.948)	0.260 (0.874)	1.586 (1.845)	3.875* (1.687)	-1.209 (3.814)	-0.445 (0.103)	0.223 (0.128)	-0.667 (0.097)
Boot (p-value)	0.000			0.000			0.483			0.000		
R-sq	0.367	0.396	0.638	0.343			0.196	0.348	0.080	0.572	0.868	0.748
Het(p-value)	0.089			0.035			0.015			0.011		
No. Obs	90	60	30	90	52		90	60	30	90	39	51

Notes: The standard errors are reported in parentheses (White corrected for heteroskedasticity). Results correspond to trimming percentage of 15%. *** and ** indicate significance at 1% and 5% levels, respectively.

TABLE 1b: Threshold Regression Estimates of Equation $RGDPC_i = \begin{cases} \beta_0^1 + \beta_1^1 R_i + \beta_2^1 INS_i + \beta_3^1 X_i + e_i, & \text{INS} \le \lambda \\ \beta_0^2 + \beta_1^2 R_i + \beta_2^2 INS_i + \beta_3^2 X_i + e_i, & \text{INS} > \lambda \end{cases}$ using total natural resource (*natcap*)

	Model A Institutions: Rule of Law			Model B Institutions: Government Effect			Model C Institutions: Corruption			Model D Institutions: Bureaucratic Quality		
	Linear	<0.45	>0.45	Linear	<0.48	>0.48	Linear	<1.6	>1.6	Linear	<1.95	>1.95
Constant	10.89** (2.45)	5.929** (1.920)	24.69** (3.37)	10.513** (2.567)	6.064** (2.23)	20.524** (3.465)	3.596 (1.899)	-5.772 (5.453)	3.833* (1.926)	6.761** (1.204)	7.352** (1.23)	-50.622 (9.31)
$RGDP_{1970}$	-1.314 (0.383)	-1.656 (0.471)	-2.327 (0.468)	-1.216 (0.395)	-1.585 (0.451)	-1.714 (0.469)	-0.342 (0.425)	4.080** (0.812)	-0.403 (0.379)	0.327** (0.089)	0.298** (0.091)	0.591** (0.222)
Natcap	0.383 (0.243)	1.267** (0.344)	-0.243 (0.130)	0.337 (0.254)	1.146** (0.335)	-0.159 (0.146)	0.424 (0.255)	-1.612 (0.654)	0.445 (0.237)	-0.646 (0.086)	-0.670 (0.090)	-0.559 (0.117)
Rule of Law	1.562** (0.372)	2.446** (0.458)	0.932** (0.342)									
Government Effectiveness				1.521** (0.423)	2.304** (0.626)	0.351 (0.397						
Corruption							-0.208 (0.274)	4.078** (0.858)	-0.254 (0.311)			
Bureaucratic Quality										0.067 (0.278)	0.272 (0.345)	25.40** (4.69)
Latitude	0.370 (1.638)	2.004 (2.165)	2.37 (1.451)	0.522 (1.575)	2.91 (2.016)	1.287 (1.130)	5.058** (1.701)	-18.853 (4.652)	5.541** (1.873)	-0.115 (0.120)	-0.173 (0.125)	0.603** (0.238)
Boot (p-value)	0.000			0.000			0.070			0.606		
R-sq	0.315	0.398	0.614	0.301	0.361	0.615	0.170	0.819	0.212	0.453	0.457	0.880
Het(p-value)	0.395			0.381			0.280			0.001		
No. Obs	77	51	26	77	51	26	77	9	68	77	68	9

Notes: The standard errors are reported in parentheses (White corrected for heteroskedasticity). Results correspond to trimming percentage of 15%. *** and ** indicate significance at 1% and 5% levels, respectively.

TABLE 1c: Threshold Estimates of Equation $RGDPC_i = \begin{cases} \beta_0^1 + \beta_1^1 R_i + \beta_2^1 INS_i + \beta_3^1 X_i + e_i, & \text{INS} \le \lambda \\ \beta_0^2 + \beta_1^2 R_i + \beta_2^2 INS_i + \beta_3^2 X_i + e_i, & \text{INS} > \lambda \end{cases}$ using subsoil wealth (*subsoil*)

	Model A Institutions: Rule of Law			**Model B Institutions: Government Effect**			**Model C Institutions: Corruption**			**Model D Institutions: Bureaucratic Quality**		
	Linear	<0.45	>0.45	Linear	<0.4	>0.4	Linear	<4.1	>4.1	Linear	<2.69	>2.69
Constant	16.4** (2.206)	16.6** (2.12)	23.6** (2.63)	13.509** (2.198)	17.586** (2.035)	19.07** (3.34)	11.055** (1.951)	13.342** (2.099)	18.756** (2.39)	11.76** (1.58)	11.36** (2.28)	10.26** (1.89)
$RGDP_{1970}$	-1.97 (0.324)	-2.185 (0.316)	-2.31 (0.37)	-1.981 (0.327)	-2.286 (0.261)	-1.64 (0.469)	-1.422 (0.374)	-2.053 (0.374)	-1.402 (0.343)	-1.58 (0.303)	-1.707 (0.401)	-0.596 (0.300)
Subsoil	0.363** (0.072)	0.532** (0.083)	0.023 (0.046)	0.341** (0.068)	0.505** (0.075)	-0.004 (0.051)	0.375** (0.090)	0.520** (0.094)	0.115 (0.146)	0.358** (0.077)	0.549** (0.072)	0.091 (0.065)
Rule of Law	1.58** (0.331)	1.417** (0.452)	0.461 (0.362)									
Government Effectiveness				1.703** (0.378)	2.020** (0.579)	0.106 (0.298)						
Corruption							0.262 (0.243)	0.561* (0.245)	-0.562 (0.275)			
Bureaucratic Quality										0.653* (0.284)	0.258 (0.379)	-0.247 (0.325)
Latitude	1.771 (1.337)	2.273 (1.763)	1.422 (0.961)	1.685 (1.263)	1.772 (1.832)	1.141 (1.022)	5.619** (1.545)	7.178** (1.703)	2.233* (1.020)	5.023** (1.409)	8.61** (2.13)	2.402* (1.080)
Boot (p-value)	0.000			0.000			0.001			0.004		
R-sq	0.497	0.578	0.792	0.524	0.634	0.663	0.366	0.481	0.645	0.423	0.519	0.188
Het(p-value)	0.887			0.817			0.676			0.557		
No. Obs	60	39	21	60	37	23	60	44	16	60	37	23

Notes: The standard errors are reported in parentheses (White corrected for heteroskedasticity). Results correspond to trimming percentage of 15%. *** and ** indicate significance at 1% and 5% levels, respectively.

Table 2a: OLS and Threshold Regression Estimates of Equation $RGDPC_i = \alpha_0 + \alpha_1 R_i + \alpha_2 INS + \alpha_3 (R \text{ x } INS)_i + \alpha_4 X_i + \varepsilon_i$ using share of resources to export (sxp)

	Model A Institutions: Rule of Law			**Model B Institutions: Government Effect**			**Model C Institutions: Corruption**			**Model D Institutions: Bureaucratic Quality**		
	Linear	<0.09	>0.09	Linear	<0.47	>0.47	Linear	<3.29	>3.29	Linear	<2.08	>2.08
Constant	10.77** (2.00)	9.74** (2.83)	16.4** (2.06)	9.71** (2.02)	5.75 (3.84)	13.9** (2.27)	5.46** (1.819)	3.899* (1.936)	-4.300 (7.65)	0.699 (0.587)	0.757 (1.065)	-2.02 (1.29)
$RGDP_{1970}$	-0.630 (0.289)	-0.396 (0.379)	-1.434 (0.293)	-0.504 (0.296)	0.006 (0.57)	-1.001 (0.307)	0.139 (0.305)	-0.053 (0.320)	1.34 (0.99)	0.695** (0.054)	0.670** (0.175)	0.672 (0.805)
sxp	-6.454 (1.943)	-16.72 (3.438)	-0.972 (4.130)	-5.895 (1.725)	-34.1 (17.86)	-9.479 (2.355)	-13.25 (6.29)	6.809 (13.69)	16.806 (18.51)	-0.001 (0.037)	-2.334 (1.404)	-0.026 (0.106)
Rule of Law	0.964** (0.347)	3.506** (1.031)	1.277** (0.298)									
Government Effectiveness				0.786* (0.350)	2.40 (2.97)	0.613* (0.274)						
Corruption							-0.135 (0.27)	0.886 (0.638)	-0.009 (0.549)			
Bureaucratic Quality										-0.023 (0.067)	0.524 (0.560)	-0.154 (0.283)
Latitude	-1.331 (1.298)	2.650 (2.484)	-1.004 (1.130)	-0.815 (1.235)	3.46 (2.88)	-1.164 (1.097)	1.301 (1.914)	4.013** (1.588)	-0.834 (4.098)	-0.119 (0.090)	-0.126 (0.092)	-1.719 (2.418)
Interaction	4.511* (1.993)	-17.78 (2.484)	0.652 (3.010)	4.685** (1.825)	-41.92 (26.80)	7.062** (1.882)	2.284 (1.761)	-6.289 (5.149)	-3.14 (3.62)	-0.178 (0.080)	-0.091 (0.171)	-0.264 (0.030)
Boot (p-value)	0.018			0.017			0.395			0.198		
R-sq	0.403	0.329	0.462	0.382	0.317	0.403	0.208	0.368	0.102	0.865	0.808	0.961
Het(p-value)	0.018			0.093			0.052			0.193		
No. Obs	90	46	44	90	26	64	90	60	30	90	35	55

Notes: The standard errors are reported in parentheses (White corrected for heteroskedasticity). Results correspond to trimming percentage of 15%. *** and ** indicate significance at 1% and 5% levels, respectively.

Table 2b: OLS and Threshold Regression Estimates of Equation $RGDPC_i = \alpha_0 + \alpha_1 R_i + \alpha_2 INS + \alpha_3 (R \text{ x } INS)_i + \alpha_4 X_i + \varepsilon_i$ using total natural resource (*natcap*).

	Model A Institutions: Rule of Law			Model B Institutions: Government Effect			Model C Institutions: Corruption			Model D Institutions: Bureaucratic Quality		
	Linear	<0.75	>0.75	Linear	<0.47	>0.47	Linear	<1.6	>1.6	Linear	<0.75	>0.75
Constant	9.39** (1.91)	62.3 (51.0)	7.85** (1.87)	9.179** (2.05)	52.15** (10.62)	7.038* (3.26)	-0.665 (4.25)	-9.92 (6.57)	-5.17 (4.39)	9.391** (1.913)	62.35 (51.01)	4.008 (42.32)
$RGDP_{1970}$	-1.75 (0.401)	-2.59 (0.51)	-1.601 (0.410)	-1.568 (0.383)	-1.071 (0.771)	-1.671 (0.331)	-0.351 (0.449)	4.564** (1.043)	-0.59 (0.441)	-1.75 (0.401)	-2.592 (0.513)	-2.96** (-0.735)
natcap	0.923** (0.282)	-3.92 (5.81)	0.959** (0.284)	0.784** (0.264)	-5.212 (1.374)	1.151** (0.393)	0.946 (0.688)	-1.411 (0.644)	1.609* (0.699)	0.923** (0.282)	-3.937 (5.819)	-2.896 (1.701)
Rule of Law	8.361** (1.55)	60.2 (48.1)	7.929** (1.668)									
Government Effectiveness				7.875** (1.541)	59.52** (12.96)	7.869** (1.891)						
Corruption							1.014 (1.362)	10.82 (9.06)	2.514 (1.48)			
Bureaucratic Quality										8.361** (1.550)	60.266 (48.101)	-12.67 (11.89)
Latitude	1.145 (1.508)	-21.7 (3.84)	2.599 (1.449)	1.318 (1.493)	0.091 (3.422)	2.977 (1.438)	5.611** (1.772)	-21.513 (6.33)	6.153** (1.857)	1.145 (1.508)	-21.74 (3.84)	-0.63 (5.508)
Interaction	-0.758 (0.162)	-6.32 (5.66)	-0.759 (0.169)	-0.711 (0.157)	-7.392 (1.574)	-0.797 (0.219)	-0.149 (0.145)	-8.801 (1.086)	-0.309 (0.150)	-0.758 (0.162)	-6.324 (5.662)	-1.167 (1.507)
Boot (p-value)	0.150			0.045			0.102			0.138		
R-sq	0.437	0.895	0.411	0.400	0.389	0.392	0.182	0.826	0.241	0.437	0.895	0.411
Het(p-value)	0.576			0.523			0.28			0.576		
No. Obs	77	10	67	77	21	56	77	9	68	77	10	67

Notes: The standard errors are reported in parentheses (White corrected for heteroskedasticity). Results correspond to trimming percentage of 15%. *** and ** indicate significance at 1% and 5% levels, respectively.

Table 2c: OLS and Threshold Regression Estimates of Equation $RGDPC_i = \alpha_0 + \alpha_1 R_i + \alpha_2 INS + \alpha_3 (R \text{ x } INS)_i + \alpha_4 X_i + \varepsilon_i$ using subsoil wealth (*subsoil*)

	Model A Institutions: Rule of Law			**Model B Institutions: Government Effect**			**Model C Institutions: Corruption**			**Model D Institutions: Bureaucratic Quality**		
	Linear	<0.45	>0.45	Linear	<0.42	>0.42	Linear	<3.08	>3.08	Linear	<0.97	>0.97
Constant	16.905** (2.04)	16.67** (2.02)	26.49** (1.905)	17.17** (2.03)	17.5** (1.96)	24.4** (2.14)	9.659** (1.99)	14.59** (2.58)	-1.257 (3.198)	9.927** (1.706)	15.5** (4.84)	8.59** (2.17)
$RGDP_{1970}$	-2.012 (0.289)	-2.355 (0.356)	-2.323 (0.307)	-2.051 (0.282)	-2.35 (0.274)	-1.819 (0.344)	-1.424 (0.347)	-2.231 (0.435)	-0.402 (0.380)	-1.505 (0.294)	-2.664 (0.862)	-1.171 (0.322)
subsoil	0.357** (0.069)	0.705** (0.126)	-0.423 (0.135)	0.340** (0.064)	0.600** (0.09)	-0.671 (0.201)	0.630** (0.112)	0.517** (0.111)	2.017** (0.569)	0.622** (0.112)	1.953** (0.534)	0.681* (0.300)
Rule of Law	2.899** (0.438)	-0.092 (1.133)	-0.909 (0.456)									
Government Effectiveness				3.153** (0.504)	1.193 (0.885)	-1.947 (0.674)						
Corruption							0.746** (0.292)	0.596 (0.357)	1.272 (0.660)			
Bureaucratic Quality										1.232** (0.312)	5.219 (2.746)	0.948 (0.854)
Latitude	1.515 (1.17)	2.337 (1.669)	0.575 (0.971)	1.431 (1.218)	1.619 (1.720)	0.076 (0.948)	6.04** (1.61)	6.65** (2.214)	5.93** (1.38)	5.404** (1.396)	2.968 (3.443)	5.362** (1.374)
Interaction	-0.194 (0.050)	0.256 (0.164)	0.252** (0.074)	-0.208 (0.047)	0.148 (0.112)	0.392** (0.108)	-0.088 (0.033)	-0.012 (0.062)	-0.359 (0.104)	-0.119 (0.042)	-2.366 (0.850)	-0.148 (0.094)
Boot (p-value)	0.050			0.017			0.003			0.039		
R-sq	0.569	0.594	0.829	0.601	0.652	0.755	0.397	0.454	0.610	0.453	0.72	0.336
Het(p-value)	0.725			0.529			0.860			0.59		
No. Obs	60	39	21	60	38	22	60	36	24	60	10	50

Notes: The standard errors are reported in parentheses (White corrected for heteroskedasticity). Results correspond to trimming percentage of 15%. *** and ** indicate significance at 1% and 5% levels, respectively.