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# The Resource Curse, Corruption, Rule of Law

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## Abstract

The purpose of this article is to identify a possible causal channel through which resource abundance might affect economic growth. By using a different proxy for natural resource abundance, we find that, although the level of corruption increases in resource abundance in most countries, its deleterious effect is mediated, or even reversed, when the quality of the rule of law is sufficiently high. Our result, therefore, explains that, with successful legal reforms reducing corruption, resource-rich countries may promote economic growth, countering the conventional resource curse hypothesis that an abundance of natural resources unconditionally slows economic growth.

Key Words : Resource Curse; Corruption, Rule of Law JEL Code : F1, Q4

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## 1. Introduction

A common sense dictates that a resourceful country should have an edge in economic development over a resource-poor country. Ironically, though, an abundance of natural resources has been blamed for sluggish economic growth. Juan Pablo Perez Alfonzo, a former Venezuelan minister and a co-founder of the Organization of Petroleum Exporting Countries (OPEC), refers to oil as the devil's excrement. It is widely known as the resource curse. Sachs and Warner (1995) in their influential paper argue that resource-rich countries tend to grow more slowly than resource-poor countries. In addition to its effect on growth, natural resource abundance has been found to be negatively associated with governance and institutions. Leite and Weidmann (1999) found in their cross section study that natural resource abundance creates opportunity for rent-seeking behavior and thus increases a country's level of corruption. Similarly, Ross (2001a) shows that oil hinders democracy. Ross (2001b) also finds the breakdown of forest institutions in South-East Asia consistent with the resource curse.

Nonetheless, not all resource-rich countries have suffered corruption and slow economic growth. The successful industrialization of the United States in 19<sup>th</sup> century can be attributed to the availability of numerous resources needed for the industrialization of the newly emerging country (David and Wright 1997). Norway and the United Kingdom still remain among the richest and the least corrupt countries despite the discovery of oil in the North Sea. Anecdotal examples are

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not limited to the richest continents of Europe and North America. Botswana, despite being rich in natural resources, has been one of the fastest growing economies in the world for the last two decades. What separates Botswana from other resource-rich growth-losers in the continent? Acemoglu *et al.*(2002) attributes the success of Botswana to its sound institutions.

Empirical evidence for this institutional hypothesis has also been reported in the literature. Mehlum *et al.*(2006) finds that the effect of natural resource abundance on economic growth depends on the institutional arrangement. They interact natural resource abundance with the institutional quality, and find that the quality of institutions is the difference maker in the growth-effect of natural resource abundance.

This paper shifts the focus from economic growth to the level of corruption. Following the spirit of Mehlum *et al.*(2006), we hypothesize that the effect of an abundance of natural resources on a country's level of corruption depends on the quality of its legal institutions. The effect of resource abundance on corruption can be either positive or negative since, although it is true that resource abundance increases rents available in the system, those increased rents may not lead to an increase in the level of corruption if strong legal institutions are present to allocate the rents with transparency. Therefore, what really matters is the quality of institutions within which rents can be allocated with transparency rather than the mere size of an increase in rents due to resource abundance.

It is intuitive to believe that rents generated by resource abundance increase the level of corruption in a country with poor institutions, but the opposite may not be so. Resource abundance may contribute to a fall in a country's level of corruption as there is less incentive to accumulate wealth via illegal means and

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more incentive to keep a job for bureaucrats. A greater amount of resources in a transparent government may mean higher salaries for public servants and thus greater loss if caught and fired for taking bribes. This is consistent with our observations of countries previously discussed – the United States, Norway, the United Kingdom, and Canada. In all these countries, the establishment of strong institutions predates recent discovery of natural resources. We hypothesize that, although resource abundance increases the level of corruption in many countries, it reduces corruption in countries where the quality of legal institutions is sufficiently high.

We empirically test this hypothesis, and make contributions to the resource curse literature in two ways. First, it identifies corruption as a possible causal channel through which resource abundance may influence economic growth.<sup>1</sup>) Second, it uses a different measure of natural resource abundance. A conventional proxy that has been used in the resource curse literature is resource-export shares of GDP. The present paper uses the mining FDI as a share of GDP.<sup>2</sup>) It may be a better proxy in the sense that it controls for heterogeneity among natural resources. The use of the natural resource share of GDP has been criticized because it includes agricultural resources that are labor-intensive as opposed to capital-intensive mineral resources that generate large rent-seeking opportunity. Mining FDI used in this study does not include agricultural resources.

<sup>1)</sup> It is widely accepted since the pioneering work of Mauro (1995) that corruption slows economic growth by reducing investment.

Mining FDI is measured by the stock values of inward foreign direct investment into industries related to mineral resource exploration and extraction.

The rest of this paper is organized as follows: section 2 discusses econometric issues in estimation; section 3 reports data and test results; and the final section concludes.

# 2. Econometric Issues

In testing the hypothesis discussed, the first decision a researcher should make is the type of data to be used, panel or cross-country data. A panel data analysis certainly has an advantage over cross-country models in sample size. However, time-series analysis may not be the best choice since there are no good time-sensitive measures of corruption available. There are three indices of corruption available that report on a yearly or monthly basis -the Corruption Perceptions Index of Transparency International (yearly), the Control of Corruption index of the World Bank (yearly), and corruption ratings of the International Country Risk Guide (monthly). All three indices are not suitable for time-series analysis. Transparency International and the World Bank have not used the same sets of surveysin constructing the ratings every year. Thus, it is not clear whether a change in the indices from one year to another reflects a true reduction or increase in the level of corruption or the use of different surveys or respondents. Likewise, the PoliticalRisk Services (PRS), publisher of the International Country Risk Guide (ICRG) indices, seems to have recalibrated its ratings several times causing unexplained jumps in country ratings (Treisman 2007 p12). As a result, the country ratings are not always consistent with reality.<sup>3)</sup>

<sup>3)</sup> Refer to Treisman (2007 p12) for more detailed discussion.

A cross-country analysis of corruption is hardly without problems. Previous studies find that time-invariant country-specific effects are important in the study of corruption. These include ethnolinguistic factionalism (Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg. 2003), as well as colonial legacy and legal origin (La Porta, Lopez-de-Silanes, Shleifer, and Vishny 1999; Sandholtz and Koetzle 2000; Treisman 2000). As opposed to pooled regressions where time-invariant factors can be controlled in a fixed-effects model, a cross-country regression should include them in the control variables in order to avoid omitted variable bias. A problem is that many of these variables are correlated with each other. In an attempt to reduce this multicollinearity, we do not include a variable whose correlation is greater with other explanatory variables than with the dependent variable. In addition, we monitor the extent of multicollinearity by the variance inflation factor for each regression. In addition, endogeneity between the dependent and independent variables should be addressed. The level of corruption may influence many of the explanatory variables. In the absence of good instruments that may be the best way to deal with endogeneity, we attempt to mitigate this endogeneity by lagging all explanatory variables by, at least, three years.

# 3. Data and Test Results

## 3.1.Data

The variable *WB05* is the Control of Corruption in the World Bank governance index database, measured in 2005. We also use the Corruption

Perception Index of Transparency International in sensitivity tests for the same year. The variable *Mining*represents the stock positions of inward foreign direct investment in industries related to mineral resource exploration andextraction as shares of GDP. The FDI data is collected from the OECD and UNCTAD. They are measured in 2002; but for some countries that have no value for that year, an observation is taken from previous years (1997~2001) that is closest to 2002. The variable *Law*, used to check the importance of rule of law for changing the relation between Corruption and Mining FDI across countries, is obtained from the World Bank governance indices, measured in 2000. Sources and definitions of all variables are reported in Appendix.<sup>4</sup>)

Table 1 provides summary statistics. All the corruption indices are re-scaled so that a high value indicates more corruption while a low value less shows corruption. Summary statistics shows that a number of countries, particularly developing ones,

Variable	Observation	Mean	Std. Dev.	Min	Max
wb05	59	-0.35	1.07	-2.49	1.19
ti05	59	-4.90	2.37	-9.70	-2.10
mining	59	0.07	0.14	0	0.62
lawdum	59	0.39	0.49	0	1.00
presid	59	1.00	0.98	0	2.00
war	59	0.26	0.49	0	2.50
yearopen	57	82	16	50	100
regulate	47	3.5	1.0	0.7	5.0
woman	59	16	10	1	43
urban	59	66	17	12	97

Table 1. Summary Statistics

<sup>4)</sup> The time for the data is basically the year of 2005. But, we face no data on Law and FDI for 2005 and follow tha advice from a World Bank analyst participated in the Claremont semimar that Law measured in 2000 and FDI in 2002 are best matchable with the corruption WB05 data.

are highly dependent on foreign direct investments in the mining sector, indicating why understanding the impact of mining FDI is important. The maximum value of *Mining* is 0.62. A dummy for the rule of law is created – *lawdum*. *Lawdum* takes 1 for countries ranked in the highest 25% on the rule of law index.

Table 2 lists data series of the main variables of this study - WB05, Law, and Mining. Countries are sorted from highest to lowest in WB05. A careful examination of Table 2 reveals the relationship between mining FDI and corruption depends on the quality of the rule of law in host countries. Chile and Venezuelaprovide a real world example suggestive of the role that the rule of law can play on the effect of resource abundance on corruption. Both countries are former Spanish colonies located in South America. And they are both blessed with abundant natural resources and harbor large foreign investments in mining -Chile (22% as a share of GDP) and Venezuela (14%). Despite all these similarities, the countries are moving in the opposite directions in many ways. The level of corruption is no exception; Venezuela is the 3<sup>rd</sup> most corrupt country and Chile the 45<sup>th</sup> out of 59 countries in our data set. We suspect that the rule of law may be the difference maker; Chile possesses the 16<sup>th</sup> strongest legal institutions, while Venezuela is the 55th out of 59 countries. The critical role of the rule of law in the effect of mining FDI on corruption is illustrated in Figure 1. A sample of countries in the bottom 75% of rule of law ratings clearly exhibits an upward-sloping line by estimating parameters with 95% significance level, indicating that an increase in the economy's dependency on mining FDI increases the host country's level of corruption. However, this relationship is reversed in the sample of countries in the top 25% of the rule of law ratings also by estimating parameters with 95% significance level.

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Figure 1. Corruption, Rule of Law and Resource Abundance



Strong and weak rule of law indicates groups of countries ranked at top 25% and bottom 75% on the rule of law index, respectively.

Resource abundance is measured by the stock position of foreign direct investment into industries related to mineral resource exploration and extraction.

country	wb05	Law*	mining
paraguay	1.19	-0.93	0.000
azerbaijan	1.01	-1.09	0.621
venezuela	1.00	-0.93	0.139
kazakhstan	0.94	-0.89	0.425
uganda	0.87	-0.62	0.008
bolivia	0.81	-0.58	0.390
ecuador	0.81	-0.74	0.253
ethiopia	0.79	-0.47	0.026
russia	0.74	-0.99	0.009
tanzania	0.73	-0.26	0.100
mozambique	0.68	-0.71	0.000
honduras	0.67	-0.98	0.022
dominican republic	0.66	-0.27	0.001
armenia	0.64	-0.60	0.020
nicaragua	0.62	-1.01	0.037
guyana	0.58	-0.23	0.401
mongolia	0.55	0.12	0.163
jamaica	0.50	-0.25	0.023
macedonia	0.50	-0.40	0.047
peru	0.49	-0.60	0.032
argentina	0.44	0.07	0.118
mexico	0.41	-0.45	0.002
el salvador	0.39	-0.59	0.000
brazil	0.28	-0.21	0.009
colombia	0.22	-0.73	0.032
morocco	0.09	0.18	0.019
bulgaria	0.05	-0.22	0.003
trinidad & tobago	-0.01	0.38	0.516
turkey	-0.08	-0.07	0.001
tunisia	-0.13	0.30	0.172
poland	-0.19	0.54	0.001
lithuania	-0.26	0.18	0.002
latvia	-0.33	0.09	0.002
greece	-0.40	0.66	0.000
italy	-0.41	0.88	0.003
czech republic	-0.42	0.51	0.008

Table 2. Corruption, Rule of Law and FDI

country	wb05	Law*	mining
slovak republic	-0.43	0.23	0.003
korea	-0.47	0.52	0.000
hungary	-0.63	0.77	0.002
slovenia	-0.88	0.81	0.000
estonia	-0.88	0.63	0.002
botswana	-1.10	0.56	0.278
portugal	-1.13	1.07	0.001
spain	-1.34	1.29	0.004
chile	-1.34	1.23	0.215
france	-1.40	1.36	0.000
belgium	-1.45	1.53	0.000
united states	-1.56	1.79	0.003
ireland	-1.70	1.71	0.000
canada	-1.92	1.87	0.069
germany	-1.92	1.84	0.000
united kingdom	-1.94	1.80	0.042
australia	-1.95	1.89	0.050
austria	-1.99	1.94	0.002
netherlands	-1.99	1.89	0.009
norway	-2.04	1.90	0.063
sweden	-2.10	1.87	0.002
denmark	-2.23	1.87	0.013
iceland	-2.49	1.95	0.000

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\*Law is from the World Bank governance index for the year 2000

We summarize the correlation matrix among variables in Table 3 before the regression analysis is made with the variables. *Mining* positively correlated to corruption. Other control variables used in the regression are highly correlated with the level of corruption. High correlations are also spotted among some independent variables; for example, that of *yearopen* and *lawdum* (-0.82). But, they are still less than the correlation with the dependent variable; for example, the correlation between *yearopen* and *WB05* is 0.85.

	wb05	mining	lawdum	lawdum	presid	war	Year	regulate	woman
				*mining			open		
mining	0.31								
lawdum	-0.88	-0.24							
lawdum *mining	-0.29	0.21	0.35						
presid	0.67	0.20	-0.64	-0.12					
war	0.06	-0.20	-0.04	-0.03	-0.11				
Year open	0.85	0.29	-0.82	-0.19	0.52	0.01			
regulate	0.61	0.08	-0.49	-0.34	0.34	-0.13	0.56		
woman	-0.57	-0.10	0.46	0.07	-0.34	-0.11	-0.43	-0.22	
urban	-0.55	-0.14	0.40	0.10	-0.18	-0.27	-0.45	-0.33	0.33

Table 3. Correlation Matrix

### 3.2. stimation Results

The previous correlation analysis solidifies our suspicion that the effect of an abundance of natural resources may vary depending on the rule of law. Now we perform regression analyses to see how this preliminary evidence holds up after other influential variables are controlled for. The regression outcomes are reported in Table 4. Regression result of mining FDI is consistent with the previous findings in Figure 1. *Mining* has positive coefficients while *Law\*Mining* has negative coefficients in all specifications, indicating that mining FDI increases corruption for the bottom-75% countries in the rule of law index whereas it decreases corruption for countries ranked in the top 25% in the index.<sup>5</sup>) Controlling for other explanatory variables does not make much difference to the previous findings that reforming legal institutions may even contribute to reducing corruption via mining FDI. In a good government, greater resources may mean higher salaries for public servants, which represent greater loss if caught and fired for taking

<sup>5)</sup> The sum of the two coefficients is negative in all but the first equation.

bribes. It supports our hypothesis that mining FDI increases the host country's level of corruption where adequate legal institutions are absent. Further, it may reduce the level of corruption when the quality of legal institutions is sufficiently high. The joint hypothesis test that the host country's level of corruption is a function of mining FDI is significant at 1% in all but the first equation.<sup>6</sup>)

Commution	OLS	OLS	OLS	OLS
Corruption	WB05	WB05	WB05	WB05
Mining	0.85	1.60***	1.59***	1.82***
	0.44	0.33	0.40	0.44
Lawdum*Mining	-0.49	-4.10***	-3.78***	-4.62***
	1.17	0.98	1.05	0.95
Lawdum	-1.84***	-0.55*	-0.54*	-0.52**
	0.17	0.23	0.24	0.22
presid		0.20*	0.19**	0.08
		0.09	0.08	0.06
war		0.27*	0.20*	0.14
		0.12	0.10	0.12
yearopen		0.02***	0.02*	0.03**
		0.00	0.01	0.01
regulate		0.19***	0.17**	0.24**
		0.07	0.06	0.10
woman			-0.01	-0.02*
			0.01	0.01
urban			-0.01	0.00
			0.00	0.00
constant	0.31	-3.01	-2.01	-2.86
	0.09	0.45	0.85	0.96

Table 4. The effect of FDI on Corruption: OLS estimation

<sup>6)</sup> We retest for resource-export shares of GDP, instead of mining FDI, whether the result is consistent or not. As easily expected, most of results for resource-export shares of GDP are statistically insignificant since the variable of 'resource-export shares of GDP' incorporates the labor-intensive agricultural resource.

Commution	OLS	OLS	OLS	OLS
Corruption	WB05	WB05	WB05	WB05
Historical Controls	No	No	No	Yes
Number of obs	59	46	46	41
R-squared	0.78	0.89	0.90	0.96

Reported within parentheses are heteroskedasticity-consistent standard errors.

\*indicates significant at 10%; \*\*at 5%; \*\*\*at 1%.

Historical controls include percent Protestant 1980, percent Catholic 1980, percent Muslim 1980, British law, French law, German law, Scandinavian law, former British colony, former French colony, and former colony of other power except Spain or Portugal.

Control variables are found highly significant as in other studies. A presidential system tends to be more corrupt; governments that are involved in armed conflicts, internal or external, are associated with higher corruption; countries that opened its economy to international trade late tend to be more corrupt; greater government regulation of business means more power for corrupt bureaucrats to extract rents; and females tend to be less prone to corruption. Urbanization is not found significant.

# 3.3. Sensitivity Tests

The findings of our analysis are found to be robust to the following sensitivity tests. First, we use the Corruption Perception Index of Transparency International, instead of the Control of Corruption Index of the World Bank. As reported in Table 5, the test results are very similar.<sup>7</sup>) The interaction term is

<sup>7)</sup> The coefficients estimated with the Corruption Perception Index of Transparency International are larger. But it is due to the difference in the range of the two indices; *T105* ranges from -9.70 to -1.70 while *WB05* from -2.49 to 1.79.

negative in all but one specification, signifying that the role of rule of law in mediating the effects. *Mining* has positive signs regardless of specifications.

Commution	OLS	OLS	OLS	OLS	
Corruption	TI05	TI05	TI05	TI05	
Mining	1.52**	2.41***	2.42**	2.40**	
	0.71	0.77	0.91	0.94	
Lawdum*Mining	0.10	-7.67**	-7.39**	-8.95**	
	3.39	2.58	2.21	2.88	
Lawdum	-4.13***	-1.60**	-1.52**	-1.54*	
	0.40	0.45	0.45	0.71	
presid		0.25*	0.22*	0.15	
		0.14	0.12	0.12	
war		0.63**	0.42*	0.15	
		0.22	0.21	0.30	
yearopen		0.05***	0.04***	0.04*	
		0.01	0.01	0.02	
regulate		0.54***	0.48***	0.53**	
		0.16	0.12	0.24	
woman			-0.04*	-0.04*	
			0.02	0.02	
urban			-0.01	-0.01	
			0.01	0.01	
constant	-3.40	-10.43	-7.91	-7.88	
	0.16	1.13	1.83	2.68	
Historical Controls	No	No	No	Yes	
Number of obs	59	46	46	41	
R-squared	0.78	0.87	0.91	0.95	

 Table 5. The Effect of FDI on Corruption: CPI from Transparency International as

 a Measure of Corruption

Reported within parentheses are heteroskedasticity-consistent standard errors.

\*indicates significant at 10%; \*\*at 5%; \*\*\*at 1%.

Historical controls include percent Protestant 1980, percent Catholic 1980, percent Muslim 1980, British law, French law, German law, Scandinavian law, former British colony, former French colony, and former colony of other power except Spain or Portugal.

Secondly, we used weighted least squares instead of ordinary least squares in estimation. Following Treisman (2000), we attempt to control for the fact that corruption ratings for some countries are likely to be more precise than those of other countries. The Control of Corruption index of the World Bank is the average of multiple surveys and ratings from risk rating agencies. A large variance for a country's averaged rating indicates that the observation is likely to be less precise. Thus, we weigh by the variance to place more weight on more precise observations. The test result is almost identical to the OLS outcome, as reported in Table 6.

<b>a</b>	WLS	WLS	WLS	WLS
Corruption	WB05	WB05	WB05	WB05
Mining	1.00**	1.64***	1.63***	1.84***
	0.43	0.34	0.41	0.43
Lawdum*Mining	-0.90	-4.23***	-3.93***	-4.73***
	1.21	0.92	1.01	0.91
Lawdum	-1.76***	-0.51**	-0.51**	-0.49**
	0.18	0.21	0.22	0.21
presid		0.21***	0.20***	0.08
-		0.08	0.08	0.06
war		0.27*	0.21*	0.14
		0.11	0.10	0.12
yearopen		0.02**	0.02*	0.03**
		0.00	0.01	0.01
regulate		0.19***	0.17**	0.24**
		0.07	0.06	0.10
woman			-0.01	-0.02*
			0.01	0.01
urban			-0.01*	0.00
			0.00	0.00
constant	0.27	-3.05	-2.10	-2.94

Table 6. The Effect of FDI on Corruption: Weighted Least Squares Estimation

Corruption	WLS	WLS	WLS	WLS
	WB05	WB05	WB05	WB05
	0.10	0.41	0.82	0.94
Historical Controls	No	No	No	Yes
Number of obs	59	46	46	41
R-squared	0.77	0.89	0.90	0.96

Reported within parentheses are heterosked asticity-consistent standard errors.

\*indicates significant at 10%; \*\*at 5%; \*\*\*at 1%.

Historical controls include percent Protestant 1980, percent Catholic 1980, percent Muslim 1980, British law, French law, German law, Scandinavian law, former British colony, former French colony, and former colony of other power except Spain or Portugal.

Thirdly, we examine income-per-capita as a proxy for the rule of law. One might suggest that an objective measure, such as the level of development, may be a better proxy for the rule of law. After the use of the log of GDP per capita in place of the rule of law, the interaction effect becomes insignificant in three out of four specifications. Table 7 reports this test result. It is possibly a result of multicollinearity. As shown in Table 10, high correlations are spotted among explanatory variables. It is particularly acute between the income variables (*gdpdum* and *gdpdum\*mining*) and some of the control variables. It is also possible that income-per-capita is not as good a proxy for the quality of the rule of law as the perception index constructed by the World Bank; it may measure the level of institutions in general rather than just the rule of law.

Table 7. 1	The Effect of	FDI on Cor	ruption: GDP	in pla	ce of Rule	e of Law

Corruption	OLS WB05	OLS WB05	OLS WB05	OLS WB05
Mining	0.34	1.04	0.97	1.35*
	0.58	0.60	0.58	0.64
GDPdum*Mining	-11.78***	-2.64	0.37	-0.23

0	OLS	OLS	OLS	OLS	
Corruption	WB05	WB05	WB05	WB05	
	3.29	5.01	3.90	5.13	
GDPdum	-1.61***	-0.26	-0.29	-0.10	
	0.20	0.32	0.32	0.44	
presid		0.21*	0.21*	0.11	
		0.11	0.10	0.08	
war		0.30**	0.20	0.22	
		0.13	0.11	0.13	
yearopen		0.03**	0.03**	0.04***	
		0.01	0.01	0.01	
regulate		0.22**	0.22***	0.35**	
		0.08	0.07	0.16	
woman			-0.01	-0.02*	
			0.01	0.01	
urban			-0.01*	0.00	
			0.00	0.00	
constant	0.28	-3.84	-2.73	-4.59	
	0.10	0.87	1.07	1.72	
Historical Controls	No	No	No	Yes	
Number of obs	59	46	46	41	
R-squared	0.69	0.85	0.87	0.93	

Reported within parentheses are heteroskedasticity-consistent standard errors.

\*indicates significant at 10%; \*\*at 5%; \*\*\*at 1%.

Historical controls include percent Protestant 1980, percent Catholic 1980, percent Muslim 1980, British law, French law, German law, Scandinavian law, former British colony, former French colony, and former colony of other power except Spain or Portugal.

Fourthly, one might argue that the effect of FDI on the host country's level of corruption may depend on the country's level of corruption itself rather than the rule of law; the effect of FDI may be less desirable in a more corrupt country, and vice versa. So, we create a dummy for *WB00* (the World Bank's Control of Corruption measured in 2000), and interact it with *mining* instead of *lawdum*. In Table 8, the test result does not present strong evidence for this argument. *Mining*and the interaction variable both have positive signs in most

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specifications as expected, but they are insignificant. It suggests that the effect of mining FDI on the host country's level of corruption depends on the quality of the rule of law, rather than the contemporary level of corruption itself.

Constant of the second	OLS	OLS	OLS	OLS	
Corruption	WB05	WB05	WB05	WB05	
Mining	2.18***	0.72	0.91	0.73	
	0.87	1.22	1.12	1.36	
WB00dum*Mining	-1.88*	0.21	0.09	1.95	
	0.90	1.33	1.27	1.88	
WB00dum	1.48***	0.24	0.13	-0.23	
	0.18	0.16	0.15	0.24	
presid		0.26**	0.25***	0.12	
		0.08	0.08	0.09	
war		0.26*	0.20*	0.30	
		0.11	0.10	0.16	
yearopen		0.03***	0.03**	0.04***	
		0.01	0.01	0.01	
regulate		0.25**	0.22**	0.38*	
		0.07	0.07	0.18	
woman			-0.01	-0.02*	
			0.01	0.01	
urban			-0.01*	0.00	
			0.00	0.01	
_cons	-0.69	-4.41	-3.40	-5.05	
	0.16	0.34	0.66	1.06	
Historical Controls	No	No	No	Yes	
Number of obs	59	46	46	41	
R-squared	0.27	0.85	0.87	0.93	

Table 8. The Effect of FDI on Corruption: Corruption in place of Rule of Law

Reported within parentheses are heteroskedasticity-consistent standard errors.

\*indicates significant at 10%; \*\*at 5%; \*\*\*at 1%.

Historical controls include percent Protestant 1980, percent Catholic 1980, percent Muslim 1980, British law, French law, German law, Scandinavian law, former British colony, former French colony, and former colony of other power except Spain or Portugal.

Lastly, we address a possible multicollinearity among explanatory variables, particularly the correlation between level and interaction variables. Instead of using interaction variables, therefore, we divide the sample into two different groups – strong and weak legal institution group. Table 9 reports the test result. *Mining* takes positive signs for the top-25% group in the law index, while negative signs for the low-75% group. They are both highly significant, which is impressive for the small sample size. After a possible multicollinearity is addressed in this regression, the coefficients remain highly significant, enhancing our argument for the role of the rule of law in mitigating the adverse effect of mining FDI.

	OLS	OLS	OLS All	
WB05	Strong	Weak		
	Rule of Law	Rule of Law		
Mining	-2.26*	1.53***	1.08	
	1.06	0.45	0.59	
presid	0.23**	0.21*	0.26**	
	0.08	0.10	0.08	
war	0.76	0.20	0.32**	
	0.54	0.12	0.12	
yearopen	0.02*	0.03***	0.04***	
	0.01	0.00	0.01	
regulate	0.26**	0.02	0.24***	
	0.09	0.14	0.07	
constant	-3.89***	-2.95***	-4.53***	
	0.57	0.70	0.33	
Number of obs	20	26	46	
R-squared	0.51	0.62	0.85	

Table 9. The effect of FDI on Corruption: OLS estimation

Reported within parentheses are heteroskedasticity-consistent standard errors.

\*indicates significant at 10%; \*\*at 5%; \*\*\*at 1%.

Strong and weak rule of law indicates groups of countries ranked at top 25% (50%) and bottom 75% (50%) in the rule of law index, respectively.

In sum, the sensitivity tests bring more confidence to our conviction that the quality of legal institutions does play a critical role in the effect of FDI on corruption. The interaction terms consistently show negative signs and survive most robustness checks. The sign of *Mining* positive and highly consistent throughout, suggesting that mining FDI increases the level of corruption in countries that are ranked at the bottom 75% in the ratings of rule of law. The corruption-increasing effect of mining FDI can be reversed if the quality of legal institutions improves sufficiently high.

	wb05	mining	gdpdum *mining	gdpdum	presid	war	year open	regulate	woman
mining	0.31								
gdpdum *mining	-0.47	-0.06							
gdpdum	-0.82	-0.34	0.42						
presid	0.67	0.20	-0.32	-0.65					
war	0.06	-0.20	0.10	-0.02	-0.11				
year open	0.85	0.29	-0.46	-0.85	0.52	0.01			
regulate	0.61	0.08	-0.67	-0.46	0.34	-0.13	0.56		
woman	-0.57	-0.10	0.32	0.43	-0.34	-0.11	-0.43	-0.22	
urban	-0.55	-0.14	0.30	0.43	-0.18	-0.27	-0.45	-0.33	0.33

Table 10. Correlation Matrix

## 4. Conclusion, Limits, and Further Study

We reexamined the resource curse hypothesis using a different proxy for resource abundance - the county's stock position of foreign direct investment in industries related to exploring and extracting mineral resources as shares of GDP. Unlike other studies in

the literature, the current paper focuses on how resource abundance influences the country's level of corruption rather than economic growth. We find strong evidence that not all resource-rich countries are cursed. The test result suggests that, although the host country's level of corruption increases in mining FDI, its corruption-increasing effect maybe weakened or even be reversed as the quality of the rule of law sufficiently improves. It counters the resource curse hypothesis that the abundance of natural resource unconditionally hinders economic development. Growth-losers are not cursed by the natural resource *per se*, but rather by poor institutions.

Such empirical finding is consistent with the advocates of neo-institutional economics which put a light on the role of institutions in all types of economic developments. This paper eventually contributes to two academic fields, neo-institutional economics and energy economics, since the empirical results surely support for the significant role of institutions in the energy-abundant countries with resource curse faced.

Even though this paper yieldsrobust evidence on the role of rule of law in the impact of FDI on corruption, it still has some research limits. The obvious room for improvement is, in particular, in panel data analysis, which needs to be strongly considered over the cross-section dataset. Evolving the influencing pattern on the relation between level of corruptionand economic growth provides significant changes on the time-fixing results from the cross-country analysis. Also, when detecting difference in resource types across countries, it is possible to find the different effect of sound institution on economic development by the main resource type a county holds.

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Variable	Definition and Source
Mining	The FDI variable represents the stock positions of foreign direct investment in the
	industries related to exploring and extracting mineral resources as shares of the
	GDP. For some countries where the data is only available in flow values, we
	constructed the stock data by accumulating flow values following Velde and
	Morrissey (2004). FDI data is collected from the OECD and UNCTAD
	(http://www.unctad.org/Templates/Page.asp?intItemID=3198⟨=1). The variables
	are measured in 2002; for some countries with missing values for the year, an
	observation is taken from previous years (1997-2001) that is closest to 2002.
Ti05	Transparency International Corruption Perceptions Index score from year 2005,
	downloaded 14 Oct 06 from www.ICGG.ORG
Wb05	World Bank control of corruption index from year 2005, from Aggregate
	Governance Indicators 1996-2005, downloaded 13 Oct, 06
law	World Bank rule of law index from year 2000, from Aggregate Governance
	Indicators 1996-2005, downloaded 14 May, 07
gdp	GDP per capita, PPP (current international \$) from World Bank's World
	Development Indicators
war	Number of armed conflicts, external and internal, in which the government was
	involved, average of years 1995-2000, as classified by Uppsala Conflict Data
	Program, data downloaded from Quality of Government Database, at Quality of
	Government Institute, Goteborg University.
presid	Ratings are: Parliamentary (0), Assembly-elected President (1), Presidential
	(2)System classification of Beck et al. (2001): for year 2000, from Thorsten Beck,
	George Clarke, Alberto Groff, Philip Keefer, and Patrick Walsh, 2001. "New tools
	in comparative political economy: The Database of Political Institutions." 15:1,
	165-176 (September), World Bank Economic Review.
yearopen	Year country opened to trade, according to Sachs and Warner (Sachs, Jeffrey D.,
	and Andrew M. Warner, 1995, "Economic Reform and the Process of Global
	Integration," Brooking Papers on Economics Activity, Vol. 1, pp. 1-118). If not
	open as of 1994, coded as 100. If open as of 1950, coded as 1950.
regulate	Natural logarithm of the number of days required to obtain legal status to operate

# Appendix Definitions and Sources of Variables

Variable	Definition and Source					
	a firm in 1999. Source: Djankov, S, La Porta, R, Lopez-de-Silanes, F, and					
	Shleifer, A. 2002. The Regulation of Entry. Quart. J. Ecs. 117(1): 1-37., from					
	"The Regulation of Labor" dataset.					
woman	Percentage women in lower house of parliament, 2000 (Interparliamentary Union,					
	Women in Parliament, 2000), downloaded from STM103 Global Indicators Shared					
	Dataset, Updated Fall 2005, from http://ksghome.harvard.edu/~pnorris/Data/Data.htm					
urban	Urban population (% of total) 2002 (UNDP, Human Development Report, 2004),					
	downloaded from STM103 Global Indicators Shared Dataset, Updated Fall 2005,					
	from http://ksghome.harvard.edu/~pnorris/Data/Data.htm					

\* Data on control variables are directly obtained from Treisman's webpage, http://www.polisci.ucla.edu/faculty/treisman/ The Resource Curse, Corruption, Rule of Law

### 요약

# 자원의 저주, 부패, 법치 수준

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본 연구의 목적은 풍부한 자원이 경제발전에 미치는 파급효과가 제도의 수준 에 따라 다를 수 있음을 살펴본다. 자원 풍부성을 측정하기 위한 다양한 대리 변수를 가지고 59개 국가를 대상으로 실증 분석한 결과는 다음과 같다. 첫째, 부패수준이 높아질수록 자원의 저주(풍부한 자원이 오히려 경제발전에 부정적 인 파급효과를 미치는 현상)는 더욱 심각해짐을 발견하였다. 둘째, 법치 수준이 상승할수록 자원의 저주는 약화됨을 발견하였다. 따라서 자원이 풍부한 국가들 이 성공적인 경제발전을 이룩하기 위해서 우선적으로 마련해야 할 조건은 부패 를 줄일 수 있는 법 제도 개선임을 본 논문은 주장한다. 즉, 자원의 저주는 자 원의 풍부함에서 발생하는 것이 아니라 부패를 만연케 하는 후진적인 법 제도 가 보다 근본적인 배경이라 판단된다.

주요 단어 : 자원의 저주, 부패, 법치, 제도 경제학문헌목록 주제분류 : F1, Q4

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