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ECONOMIC GROWTH AND NONRENEWABLE RESOURCES: AN EMPIRICAL INVESTIGATION

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Abstract

In this paper, we revisit the resource curse hypothesis by focusing on the period after 1990. The study uses both cross-sectional and panel data techniques on a sample of 103 countries for the period 1995–2010. We find no strong evidence of the resource curse, after controlling for other important determinants of economic growth. The results show that nonrenewable resources are positively associated with economic growth for the period under study. Additionally, we find that public institutions measured using an index of government effectiveness are of paramount importance to economic growth. This suggests that if a resource-rich economy needs a greater contribution from its resources, it should improve the quality of institutions.

Keywords: Growth, primary product exports, nonrenewable resources, institutions

1. INTRODUCTION

When discussing the resource curse, most economists tend to cite African and Latin American countries as examples, such as, among others, Nigeria, Angola, the Congo, Venezuela and Bolivia. The resource curse refers to the negative effects of resource dependence on economic growth. The work of Sachs and Warner (1995, 1997) made this phenomenon popular among resource economists. From 1970–1989, countries rich in natural resources tended to grow more slowly than countries without natural resources.

Sachs and Warner (1995, 1997) and their followers measure resource dependence as the share of primary product exports in gross domestic product (GDP). However, the measure of primary product exports excludes nonrenewable resources such as gold and diamonds, which are a significant omission for resource-rich countries; indeed, these precious stones represent the main exports of most Sub-Saharan African countries. Hence, in this study, we simultaneously use both measures (primary product exports and nonrenewable resource exports) to test the resource curse hypothesis.

As well as addressing the measurement issue, most researchers have extended the work of Sachs and Warner (1995, 1997) by either including more control variables or extending the sample period to earlier years. Our emphasis is on the economic structure of most countries after the 1990s.

The resource curse literature is based on the concept of the Dutch disease, which refers to a situation in which a discovery of natural resources shrinks the economy's manufacturing sector and lowers its international competitiveness by raising the real exchange rate (Corden & Neary, 1982). The former is referred to as the resource movement effect that pulls resources from other sectors of the economy to the natural resource sector. This effect may not be prominent in developing countries because they have a shortage of all capital forms, both human and physical. If they want to extract their resources,

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They need to import capital from abroad. Since the 1990s, most developing countries have reformed their economies, particularly the extractive sector, with the help of the World Bank (Onorato *et al.* 1998; World Bank, 1992,1996). This led to a flow of foreign investment in the extractive and other sectors of the economy (see Figures 1–4). For the period under study, the discovery of natural resources in developing countries was heavily associated with the flow of foreign capital rather than pulling capital from other sectors.

Apart from the Dutch disease channel, some literature associates slow growth in resource-rich countries with rent-seeking behavior (Leite & Weidmann, 1999; Mehlum *et al.*, 2006). An economy where extraction is carried out by state-owned enterprises may suffer from rent-seeking behavior, while the introduction of private capital into the extractive sector may reduce or eliminate inefficiencies associated with rent-seeking. In fact, since the 1990s, multinational corporations have become key players in the extraction of developing countries' natural resources. We consider that mining-sector reforms and the introduction of foreign capital make it worthwhile to revisit the resource curse phenomenon by focusing on the period after 1990.

In this paper, we first show that the share of nonrenewable resource exports in GDP have a positive and statistically significant effect on economic growth for the period after the 1990s, in sharp contrast to the literature analyzing the period before the 1990s. Second, we estimate the impact of institution quality on economic growth, distinguishing public institutions from private ones. We find public rather than private institutions to be of paramount importance to economic growth, unlike Kolstad (2009), who emphasizes the importance of the latter.

The rest of the paper is organized as follows. In Section 2, we review the literature. In Section 3, we explain the empirical approach and describe the data. In Section 4, we present and discuss the results. Section 5 presents a robustness check, and section 6 concludes the paper.

2. LITERATURE REVIEW

Sachs and Warner (1995, 1997) develop a useful empirical approach to address the impact of resource dependence on economic growth. Building on the Dutch disease literature, they devise the notion of the resource curse and conduct a cross-sectional empirical study for the period 1970–1989. Their findings show that resource-rich economies tend to grow more slowly than resource-poor economies.

How to measure resource dependence has been a controversial issue. Sachs and Warner (1995, 1997) use the share of primary-product exports in the GDP of 1971. Sachs and Warner (2001) also find that including or excluding agriculture in primary-product exports does not affect the results. Boschini *et al.* (2007), whose analysis covers the period 1975–1998, use various measures such as the share of mineral production in 1971 GNP, the value of gold, silver, and diamond production as a share of GDP, and the value of ore, metal and fuel exports as a share of 1975 GDP, to obtain results similar to Sachs and Warner's (1995, 1997). However, none of their measures comprise all nonrenewable resources of fuels, ores, metals, precious stones and nonmonetary gold.

Another important issue is the role played by institutions. Apart from the Dutch disease, institutional quality emerges as a main reason for natural resources' negative effect on economic growth. Since Sachs and Warner (1995, 1997), empirical and theoretical studies have been conducted to explain the role of institutions. For instance, Robinson *et al.* (2006) and Mehlum *et al.* (2006) develop theoretical models to explain why institutions may be the cause of the resource curse. They argue that the resource curse is dominant in countries with weak institutions.

However, they emphasize different types of institutions. Robinson *et al.* (2006) emphasize public accountability and argue that the resource curse results from politicians' choices. In their model, where the resource is publicly owned and the government decides how to use the resource rent, an incumbent politician seeking re-election uses his or her access to the resource rent to secure

employment for supporters. This leads to misallocation of the resource rent, which adversely affects economic growth.

Mehlum *et al.* (2006), however, emphasize the role of private institutions because they protect the economy's entrepreneurs. They argue that the rule of law shapes the behavior of entrepreneurs in a resource-rich economy. In their model, entrepreneurs choose to become either rent-seekers ("grabbers," to use their term) or productive entrepreneurs. Weak institutions yield grabbers, whereas strong institutions foster productive entrepreneurs. They conclude that improving the quality of private institutions can eliminate the resource curse. Mehlum *et al.* (2006) also conduct an empirical study by extending Sachs and Warner's (1997) dataset to 1965–1990. They show that resource-rich countries can grow faster in the presence of good private institutions.

Most of the resource-rich developing countries, especially since the 1990s, have adopted policies intending to attract multinational corporations to the extractive sector and the general economy. Owing to such policy reforms, rent-seeking behavior seems to have gradually disappeared from these economies, improving the efficiency of resource use. Boschini *et al.* (2007) argue that institutions and the type of natural resources a country possesses are key determinants of whether it has a resource curse and show that exhaustible resources such as gold, diamonds and oil are likely to have a negative effect on economic growth in countries with weak institutions. Kolstad (2009), using Sachs and Warner's (1997) dataset, shows that only private institutions matter. In fact, most developing countries have been working to improve the quality of the rule of law, such as law enforcement and protection of private property rights, with the help of donors and international organizations since the 1990s. The initiatives aim to encourage private sector participation in the economy.[1]

3. EMPIRICAL APPROACH

3.1. Model

Following Sachs and Warner (1995, 1997), who develop the work of Barro and Sala-i-Martin (1995), we assume that the growth of economy j between periods $t = 0$and $t = T$ (1995 and 2010, respectively) is a function of its initial income Y_0^j and a vector of other factors, as follows:

$$\frac{1}{T} Log\left[Y_T^j \Big/ Y_0^j\right] = \beta_0 + \beta_1 Log Y_0^j + \beta' X^j + u_t,$$

where T is a time period, Y_T^j is income at period T, X^j is a vector of other factors affecting growth in economy j, and u_t is an idiosyncratic error term.

We investigate whether resource dependence has a significantly negative effect on economic growth for the period after the 1990s. We use two measures of resource dependence: the ratio of primary-product exports to 1996 GDP (prim96) and the ratio of nonrenewable resource exports to 1996 GDP (nonrenew96). The former follows the measure used by Sachs and Warner (1995, 1997). Primary product exports exclude exports of precious stones, nonmonetary gold, other metals and ore as reported by the United Nations Conference on Trade and Development (UNCTAD) (1997). Because many economies export precious stones such as diamonds, we use both measures simultaneously to determine the effect of resources on economic growth.

We are also interested in which type of institution has mattered most, private or public, since the 1990s. We use indicators of private and public institutions as regressors in the above regression equation.

[1] For more discussion of the importance of good quality institutions, see, for example, Kolstad and Soreide (2009),Arezki and Van der Ploeg (2007), Petermann *et al.* (2007), and Sala-i-Martin and Subramanian (2003).

3.2. Data

We have obtained a range of data for many economies from different sources. Data on the values of primary product exports and nonrenewable exports were obtained from the UNCTAD under the merchandise trade matrix category. The categories are detailed in Table 1.

Many organizations have developed indicators of countries' institutional qualities. We use those reported by Kaufmann *et al.* (2009). Their advantages are twofold; they cover as many economies as we need, and they examine many factors, having developed several indicators of governance and institutional quality. Following previous researchers, we use the rule of law and government effectiveness as indicators of quality in private and public institutions, respectively. In Kaufmann *et al.* (2009), the rule of law is defined as "capturing 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, property rights, the police, and the courts, as well as the likelihood of crime and violence." Government effectiveness is defined as "capturing 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."[2]

The choice of other control variables is based on the literature on economic growth, notably the work of Sala-i-Martin *et al.* (2004). They conduct a regression containing 67 variables to identify the determinants of long-run economic growth. Of these 67 variables, 18 have a strong effect on economic growth, with initial income and primary school enrollment being among the strongest. We use the initial values of most control variables in the sample period to eliminate or reduce the risk of reverse causality.

4. RESULTS AND DISCUSSION

We start our estimation using ordinary least squares (OLS) and following Sachs and Warner (1995). The results are reported in Table 2.

In Table 2, regressions 1 to 3 use the share of primary product exports in 1996 GDP as a measure of resource abundance. Holding all other variables constant, its increase is associated with a statistically insignificant decrease in growth. Indeed, as shown in regression 2, the coefficient is even more insignificant when we control for government effectiveness. Furthermore, regression 3, which controls for both institutional measures, the rule of law and government effectiveness, shows that only the latter is statistically significant. This suggests that having better public institutions (government effectiveness) was important for economic growth in 1995–2010.

Regarding the effects of institutions, our finding contrasts with that of Kolstad (2009), who finds that only private institutions (the rule of law) matter based on the sample period of 1970–1989. We like to argue as follows. In this period, many countries were closed and dominated by state enterprises, whereas in 1995–2010, more countries were open market economies, and most resource-rich countries negotiated contracts with foreign investors to provide assurance against government expropriation in the mining sectors. Such contract-based agreement with governments is a substitute for good quality in the rule of law. Following this thought, regression 3 shows that government effectiveness is of paramount importance to economic growth once the economy overcomes the negative effect of poor quality in the rule of law by enforceable agreement between governments and foreign investors.

Regressions 4 to 6 in Table 2 show the results obtained by changing the measure of resource dependence from primary product to nonrenewable resource exports. Similar to the previous results, government effectiveness has, on average, a positive effect on economic growth, even after controlling for the rule of law. More interesting is the effect of the share of nonrenewable resource

[2]For discussion of private and public institutions, see Mehlum *et al.* (2006) and Robinson *et al.* (2006).

exports in GDP. The results show that a greater share of nonrenewable resource exports is associated with a statistically significant increase in economic growth; that is, for the period 1995–2010, countries with a higher export of nonrenewable resources grew faster.

Of course, these results may not be free of criticism because the institutional variables are prone to the endogeneity problem. It is necessary to reconsider our OLS estimates by conducting IV estimation.Finding a desirable instrumental variable is always a challenge. Notably, Brunnschweiler and Bulte (2008) borrow latitude from La Porta *et al*. (1999) as an instrument for the institutions. Here, we use a similar variable because the dataset covers all countries in our sample[3]. The results, reported in Table 3, show that the IV estimation does not qualitatively change the results of the OLS estimation. That is, for the period under study, a higher share of nonrenewable resource exports in a country is associated with higher growth.

Our finding shows that the resource curse vanished after the 1990s, when most resource-rich developing countries implemented market-oriented economic reforms. The economic reforms are an important reason for the resource blessing observed here. The World Bank pioneered the economic reforms through its five specialized multilateral agencies, i.e. the International Center for the Settlement of Investment Disputes (ICSID), the Multilateral Investment Guarantee Agency (MIGA), the International Financial Corporation (IFC), the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA). Each of these organizations played a significant role in supporting market-oriented reforms and their implementation.

Of interest is the role played by the IFC, MIGA and ICSID in supporting private capital, especially investors in the mineral sector. According to Onorato *et al*. (1998), the IFC "is a substantial financier of minerals projects in developing countries and acts as a catalyst for investment". This implies that for the period under study, developing countries were able to solve the shortage of capital needed for extraction of their mineral resources. The authors note (p. 8) that "MIGA supports investment in mining and other projects by providing (a) guarantees (e.g., insurance) against the political (non-commercial) risks of transfer restriction, expropriation, breach of contract and war and civil disturbance; and (b) technical assistance to developing member countries to improve their ability to attract foreign investment". In addition (p.7), the authors state, "ICSID provides facilities for the conciliation and arbitration of investment disputes between states who are parties to the Convention on Investment Disputes and nationals of other states". This implies that the MIGA complements poor quality in the rule of law and that the ICSID acts as a tool to enforce contracts or agreements signed by government and foreign investors in the mining sector. Through this practice, developing economies were able to attract foreign capital to their extractive sector, which in turn facilitated the extraction of their mineral resources.

Another important reason is the economic development of China, which has stabilized the price of the main commodities, exported by resource-rich countries and increased the demand for those goods, as reported by Garnaut (2012) and Gonzalez-Vicente (2011), among others.

We also find that public institutions, measured by the index of government effectiveness, are of paramount importance to economic growth. The results in Table 2, regression 7, include an interaction term between nonrenewable resources and public institutions, which shows that the effect of public institutions does not depend on resource abundance. However, in Figure 5, we observe a negative relationship between the index of government effectiveness and the measure of resource dependence, and one can also notice that most resource-rich countries have poor quality public institutions.

[3] Other potential instruments such as the fraction of the population speaking a Western language and settler mortality do not cover the whole sample.

In light of the estimation results and observations, we can argue that resource-rich developing counties have much room to improve their public institutions, especially in relation to the mining contracts with multinational corporations. As discussed in the South African Resources Watch (2009), Gajigo *et al*. (2012), and Ibrahim-Shwilima and Konishi (2014), the tax concessions provided to firms in mining sectors have been too generous to allow the governments in resource-rich developing countries a fair share of the rents corporations capture and repatriate abroad. The resulting loss in tax revenue seems to cause a shortage in public funds for further economic growth in those countries.

4.1. Robustness check

Whereas the IV estimation results are reported in Tables 3 and 5, we conducted the *Hausmantest* to test the endogeneity of institutions because the resource curse literature always treats institutions as endogenous variables. The null hypothesis is that institutions are exogenous. The result shows that we cannot reject the null hypothesis, as it is standard in the resource curse literature. For example, Boschini *et al.* (2007) conduct a similar test and fail to reject the null hypothesis, though they report their IV results in addition.

We also check the robustness of our results using an alternative measure of natural resources and a different estimation technique. As an alternative measure of natural resource abundance, we use the natural logarithm of total natural capital and subsoil assets in US$ per capita. The natural resource capital combines the estimates of subsoil assets, cropland, pastureland, timber, non-timber forest and protected areas, whereas the subsoil assets consist of the estimates of a country's fuel and non-fuel mineral stocks (World Bank, 2006).

We use both OLS and IV estimations to reexamine our previous findings. Table 4 reports the OLS results, in which regressions 1 to 3 control the natural capital, and regressions 4 and 5 control the subsoil assets. Table 5 reports the IV estimation results, where we use latitude as an instrument for the institutions as in the previous IV estimation. In the first-stage regressions, both natural capital and subsoil assets have a significantly negative effect on the institutions. Of interest are the second-stage regressions; we find that the IV estimates strengthen our OLS estimates. In Table 5, we observe that the coefficient of subsoil asset is positive and statistically significant. This finding suggests that countries with high resource stocks of subsoil assets experienced a higher economic growth for the period under study.

We also check the robustness of our results, following the estimation technique used by Boschini *et al*. (2012). They use the pooled OLS with time effects on panel data, which includes the lagged variables of dependent and independent variables. We choose to use a similar estimation technique with panel-corrected standard errors (Beck & Katz, 1995). As Boschini *et al.* (2012) mention, the use of pooled OLS addresses some important problems such as endogeneity and omitted variables. The inclusion of lagged dependent variables partially reduces the endogeneity problem, while the use of lagged values of growth accounts for the autoregressive property of growth, and time effects partially solve the problem of omitted variables.

The pooled OLS estimator with panel-corrected standard errors uses variations over both time and cross-sectional entities to estimate coefficients, permitting the error term in the model to be correlated (Cameron & Trivedi, 2010). Now, the regression equation makes growth in period *t* depend on the same variables as above in *t–1*, includinglagged growth and time effects as additional independent variables, that is,

$$Growth_{jt} = \beta_1 LogY^{j}_{0,t-1} + \beta' X^{j}{}_{t-1} + u_t.$$

We run this regression for a 4-year averaged panel and report the results in Table 6. As we can see, they do not support the resource curse phenomenon. The coefficients of both primary product and nonrenewable resource exports are positive and statistically insignificant. Thus, no evidence for the resource curse is found. Although the coefficients of the institutions are not statistically significant,

this may be due to the lack of enough variations both within and between countries because few countries had good institutions turn bad in the period under study.

5. CONCLUSION

The prevailing economic structures of most resource-rich countries since the 1990s differ from those of the 1960s, 1970s and 1980s. We find that the share of nonrenewable resource exports was associated with positive economic growth for the period 1995–2010, in contrast to the existing empirical studies on the resource curse pioneered by Sachs and Warner (1995). We also find that public institutions—measured by an index of government effectiveness—were important for economic growth in this period, rather than private institutions, as emphasized in Kolstad (2009). Key factors underlying these differences are the market-oriented economic reforms in the 1990s and enforceable mining agreements between governments and multinational corporations in resource-rich developing countries. More studies covering the 1990s and later periods should be performed to provide sound and timely policy recommendations to policymakers.

Table 1: Data and sources

Variable	Description and source	Mean	Standard deviation
lgdpp95	Natural logarithm of real GDP per capita in 1995 (in 2005 constant prices), from UNCTAD database.	7.932	1.735
lgdpp10	Same variable for 2010	8.229	1.702
gr9510	Average annual growth rate of real GPD per capita for 1995-201: growth9510=[lgdpp10–lgdpp95] *100/16.	1.853	1.653
prim96	Share of primary product exports in 1996 GDP. Both denominator and numerator are measured in nominal dollars. Primary product exports are the sum of nonfuel and fuels products. These are reported as SITC 0,1,2,3,4 and 68 by the UNCTAD.	0.122	0.114
nonrenew96	Share of nonrenewable resource exports in 1996 GDP. Both numerator and denominator are measured in nominal dollars. Nonrenewable resources include fuels and ores, minerals and precious stones and non-monetary gold. These are reported as fuels (SITC 3), and ores, minerals and precious stone (SITC 27+28+68+667+971) by the UNCTAD database.	0.082	0.143
lnatcapital	Natural logarithm of natural capital in US$ per capita refer to 2005 and approximate stocks for the period of study, from the World Bank.	8.783	1.133
lsubsoil	Natural logarithm of subsoil assets in US$ per capita refer to 2005 and approximate stock for the period under study, from the World Bank.	6.679	2.562
apys95	Average years of primary schooling in the total population over age 25, from Barro and Lee (2013).	3.815	1.667
rule05	Rule of law index refers to 2005 and approximates current institutional quality, from Kaufmann *et al.* (2009).	-0.011	1.067
goef05	Government effectiveness index relates to 2005 and approximates 1990s improvement in government institutions, from Kaufmann *et al.* (2009).	0.073	1.095
logainv	Natural logarithm of average investment shares of real GDP per capita, 1995–2010, from Heston *et al.* (2012) Penn World table version 7.1.	3.053	0.357
revcoup	Number of revolutions and coups per year, averaged over the period 1970–1985, from Sachs and Warner	0.189	0.240

	(1997).		
lif95	Life expectancy at birth in 1995 from the World Development Indicator.	65.539	11.157
tropicar	Percentage of land area in geographical tropics from Gallup *et al*. (2001).	0.517	0.474
latitude	Absolute value of latitude of a country on a scale of 0–1. From La Porta *et al*. (1999).	0.385	0.267

Table 2: OLS regressions for growth in real income per capita for the period 1995–2010

	1	2	3	4	5	6	7
lrgdpp95	–1.224 (6.05)***	–1.365 (6.53)***	–1.365 (6.52)***	–1.457 (7.74)***	–1.588 (8.55)***	–1.576 (8.48)***	–1.438 (6.92)***
prim96	–1.499 (1.17)	–0.704 (0.53)	–0.553 (0.42)				
nonrenew96				1.746 (1.90)*	2.128 (2.37)**	2.146 (2.40)**	0.669 (0.54)
logainv	1.267 (2.93)***	1.202 (2.85)***	1.240 (2.92)***	1.077 (2.54)**	1.036 (2.55)**	1.092 (2.67)***	1.274 (3.02)***
apys95	0.386 (3.39)***	0.355 (3.15)***	0.346 (3.06)***	0.412 (3.68)***	0.363 (3.31)***	0.35 (3.18)***	0.338 (3.08)***
revcoup	0.941 (1.58)	1.032 (1.77)*	0.994 (1.70)*	0.944 (1.59)	1.025 (1.80)*	0.968 (1.70)*	1.046 (1.82)*
lif95	0.058 (2.42)**	0.060 (2.56)**	0.057 (2.43)**	0.073 (3.09)***	0.732 (3.22)***	0.069 (3.04)***	0.059 (2.55)**
tropicar	–0.726 (1.91)*	–0.764 (2.76)**	–0.843 (2.24)**	–0.971 (2.58)***	–0.969 (2.74)***	–1.058 (2.92)***	–0.999 (2.74)***
rule05	0.497 (1.93)*		–0.467 (0.90)	0.709 (2.88)***		–0.554 –1.11	–0.288 (0.43)
goef05		0.761 (2.76)***	1.204 (2.14)**		0.996 (4.00)***	1.506 (2.89)***	1.231 (1.67)*
goef05*nonrenew							0.705 (0.14)
rule05*nonrenew							–2.327 (0.49)
Constant	2.772 (1.62)	3.949 (2.23)**	4.026 (2.27)**	3.933 (2.38)**	5.18 (3.14)***	5.206 (3.16)***	4.282 (2.47)**
Obs.	103	103	103	102	102	102	102
R-squared	0.48	0.50	0.50	0.50	0.53	0.54	0.55
Absolute *t* statistics in parentheses							

*** Significant at 1 percent, ** significant at 5 percent, * significant at 10 percent

Table 3: IV Regressions for growth in real income per capita over the period 1995–2010

	Second-stage regressions: independent variable is growth9510				First-stage regressions: independent variable is an institutional index			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
lrgdpp95	–1.395	–1.414	–1.626	–1.626	0.367	0.390	0.321	0.331
	(0.339)***	(0.337)***	(0.315)***	(0.295)***	(0.065)***	(0.054)***	(0.078)***	(0.079)***
prim96	–0.851	–0.486			–1.387	–1.819		
	(1.403)	(1.469)			(0.402)***	(0.352)***		
nonrenew96			2.129	2.222			–0.657	–0.764
			(1.173)*	(1.071)**			(0.558)	(0.672)
logainv	1.111	1.167	0.913	1.007	0.550	0.489	0.535	0.466
	(0.464)**	(0.441)***	(0.405)**	(0.371)***	(0.135)***	(0.116)***	(0.161)***	(0.155)***
apys95	0.368	0.348	0.386	0.354	0.039	0.063	0.052	0.083
	(0.112)***	(0.113)***	(0.111)***	(0.111)***	(0.038)	(0.033)*	(0.039)	(0.363)**
revcoup	1.130	1.077	1.156	1.065	–0.526	–0.467	–0.531	–0.464
	(0.679)*	(0.605)*	(0.684)*	(0.577)*	(0.227)**	(0.212)**	(0.237)**	(0.236)**
lif95	0.065	0.062	0.081	0.074	–0.018	–0.013	–0.015	–0.010
	(0.030)**	(0.029)**	(0.030)***	(0.028)***	(0.008)*	(0.008)	(0.009)	(0.010)
tropicar	–0.607	–0.748	–0.780	–0.940	0.430	0.596	0.351	0.509
	(0.409)	(0.382)**	(0.448)*	(0.413)**	(0.204)**	(0.180)***	(0.208)*	(196)***
rule05	0.865		1.119					
	(0.437)**		(0.425)***					
goef05		0.861		1.085				
		(0.426)**		(0.394)***				
latitude					1.937	1.947	2.025	2.089
					(0.327)***	(0.340)***	(0.365)***	(0.397)***
constant	4.036	4.326	5.247	5.494	–4.298	–4.658	–4.167	–4.526
	(2.192)*	(2.210)**	(1.963)**	(1.883)***	(0.492)***	(0.483)***	(0.583)***	(0.596)***
Obs	103	103	102	102	103	103	102	102
R–squared	0.47	0.50	0.48	0.53	0.84	0.88	0.83	0.86
Hausman	0.43	0.82	0.36	0.82				

Robust standard error in parentheses

***Significant at 1 percent, **significant at 5 percent, *significant at 10 percent

Note: The *Hausman* reports the *p–values* of the regression-based Hausman test

Table 4: OLS Regression for growth in real income per capita over the period 1995-2010, resource measured by per capita natural capital and subsoil assets

	1	**2**	**3**	**4**	**5**
lrgdpp95	–1.536	–1.681	–1.671	–1.486	–1.563
	(7.06)***	(7.81)***	(7.73)***	(6.26)***	(6.99)***
lnatcapital	0.246	0.314	0.315		
	(1.54)	(2.01)**	(2.01)**		
lsubsoil				0.085	0.102
				(1.34)	(1.66)
logainv	1.007	1.005	1.042	1.474	1.452
	(2.37)**	(2.47)**	(2.54)**	(3.16)***	(3.27)***
apys95	0.457	0.404	0.394	0.425	0.362
	(3.97)***	(3.58)***	(3.47)***	(3.47)***	(2.99)***
revcoup	0.567	0.615	0.589	0.338	0.452
	(0.94)	(1.06)	(1.01)	(0.54)	(0.74)
lif95	0.059	0.056	0.054	0.065	0.058
	(2.50)**	(2.45)**	(2.35)**	(2.04)**	(1.93)*
tropicar	–0.793	–0.819	–0.881	–0.900	–0.928
	(2.05)**	(2.25)**	(2.35)**	(2.01)**	(2.28)**

rule05	0.817 (3.17)***		–0.371 (0.74)	0.682 (2.29)**	
goef05		1.086 (4.20)***	1.421 (2.71)***		0.91 (3.26)***
constant	3.444 (2.05)**	4.357 (2.63)***	4.331 (2.61)**	3.115 (1.55)	4.234 (2.14)**
Obs.	98	98	98	75	75
R-squared	0.48	0.52	0.52	0.54	0.58
Absolute *t* statistics in parentheses					

***Significant at 1 percent, **significant at 5 percent, *significant at 10 percent

Table 5: IV Regressions for growth in real income per capita over the period 1995–2010

	Second-stage regression: the independent variable is growth9510				**First-stage regression: the independent variable is an institutional index**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
lrgdpp95	–1.650 (0.354)***	–1.663 (0.340)***	–1.930 (0.400)***	–1.839 (0.355)***	0.331 (0.067)***	0.348 (0.060)***	0.354 (0.764)***	0.323 (0.070)***
logncapital	0.288 (0.175)*	0.307 (0.172)*			–0.098 (0.053)*	–0.118 (0.053)**		
logsubsoil			0.159 (0.073)**	0.151 (0.067)**			–0.051 (0.020)**	–0.049 (0.020)**
Logainv	0.927 (0.422)**	1.014 (0.399)***	1.072 (0.456)**	1.237 (0.384)***	0.487 (0.152)***	0.413 (0.141)***	0.551 (0.139)***	0.487 (0.145)***
apys95	0.443 (0.113)***	0.406 (0.114)***	0.345 (0.143)**	0.277 (0.147)*	0.040 (0.040)	0.075 (0.039)*	0.035 (0.042)	0.081 (0.046)*
revcoup	0.652 (0.700)	0.603 (0.600)	0.505 (0.697)	0.618 (0.540)	–0.365 (0.207)*	–0.325 (0.225)	–0.217 (0.247)	–0.304 (0.271)
lif95	0.061 (0.026)**	0.055 (0.024)**	0.076 (0.032)**	0.059 (0.027)**	–0.007 (0.008)	–0.002 (0.009)	–0.010 (0.010)	–0.002 (0.014)
tropicar	–0.680 0.404)*	–0.831 (0.378)**	–0.202 (0.594)	–0.604 (0.512)	0.351 (0.202)*	0.500 (0.193)***	0.131 (0.213)	0.394 0.229)*
rule05	1.067 (1.89)*		1.701 (0.583)***					
goef05		1.048 (0.411)***		1.583 (0.521)***				
latitude					2.055 (0.336)***	2.090 (0.368)***	1.930 (0.373)***	2.074 (0.465)***
constant	4.090 (2.031)**	4.253 (1.970)**	6.626 (2.615)***	6.799 (2.400)***	–3.854 (0.580)***	–4.075 (0.609)***	–4.400 (0.572)	–4.838 (0.628)***
Obs	98	98	75	75	98	98	75	75
R–squared	0.48	0.52	0.46	0.54	0.84	0.86	0.85	0.85
Hausman	0.57	0.92	0.05	0.13				
Robust standard error in parentheses								

***Significant at 1 percent, **significant at 5 percent, *significant at 10 percent

Note: Except for regression 3, others fail to reject the null hypothesis that institutions are exogenous

Table 6: Pooled OLS: Dependent variable is annual average growth rate per capita 1995–2010

	1	2	3	4
Lrgdpp	–0.700 (0.146)***	–0.702 (0.179)***	–0.794 (0.160)***	–0.795 (0.196)***
primary product	0.051 (2.135)	0.078 (2.195)		
nonrenewable			0.989 (1.925)	1.109 (2.034)
Loginv	1.143 (0.528)**	1.148 (0.503)**	1.061 (0.557)*	1.068 (0.532)**
Apys	0.310 (0.082)***	0.307 (0.082)***	0.329 (0.079)***	0.327 (0.079)***
life expectancy	0.067 (0.027)**	0.067 (0.027)**	0.070 (0.021)**	0.069 (0.029)**
rule of law	0.148 (0.348)		0.278 (0.347)	
gov effectiveness		0.167 (0.198)		0.300 (0.219)
constant	–1.537 (1.768)	–1.495 (1.656)	–0.872 (0.655)	–0.856 (1.522)
Obs.	412	412	412	412
R -squared	0.26	0.26	0.26	0.27
Robust standard errors in parentheses				

***Significant at 1 percent, **significant at 5 percent, *significant at 10 percent

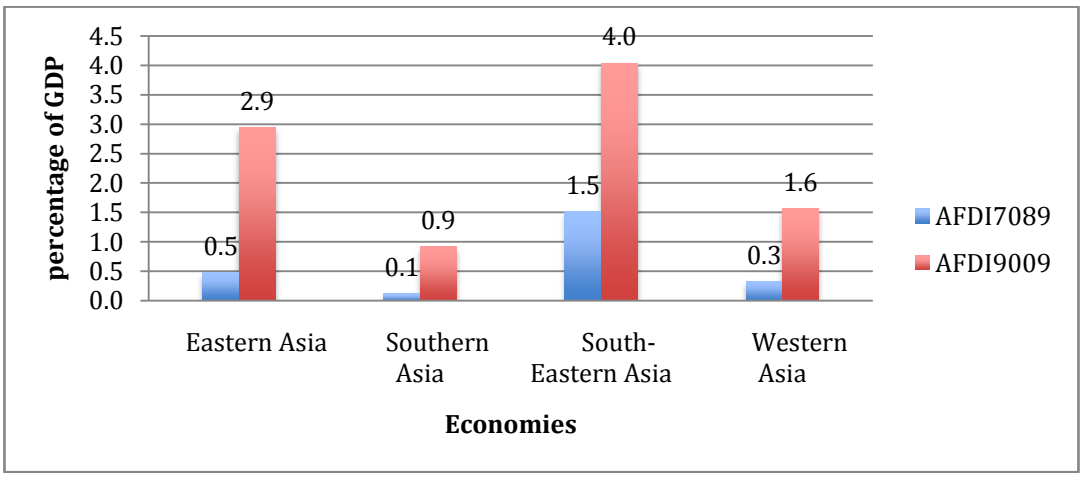

Figure 1: Asian Economies

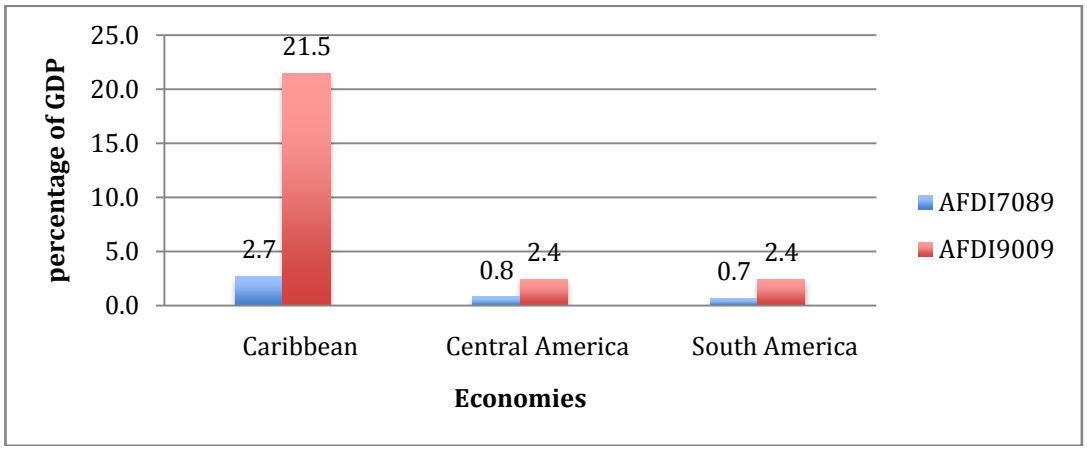

Figure 2: Latin-American Economies

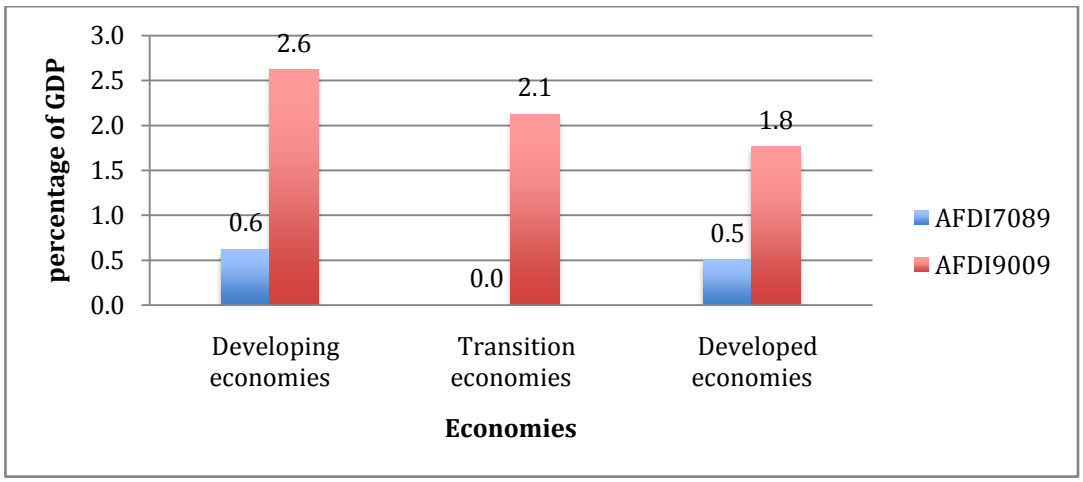

Figure 3: All Economies

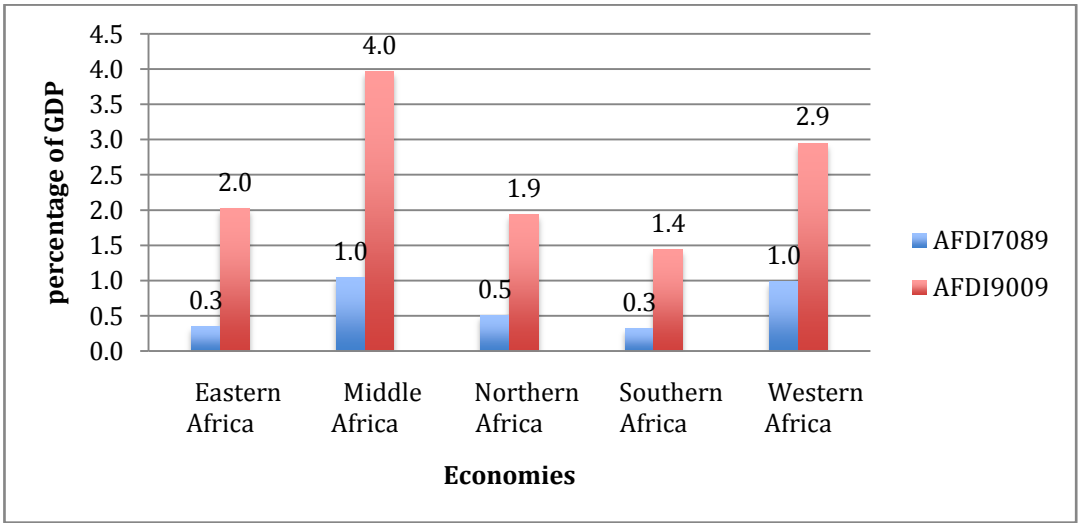

Figure 4: African Economies

Source: UNCTAD
Note: AFDI7089 and AFDI9009 are average flows of inward FDI as a percentage of GDP for the periods 1970–1989 and 1990–2009, respectively.

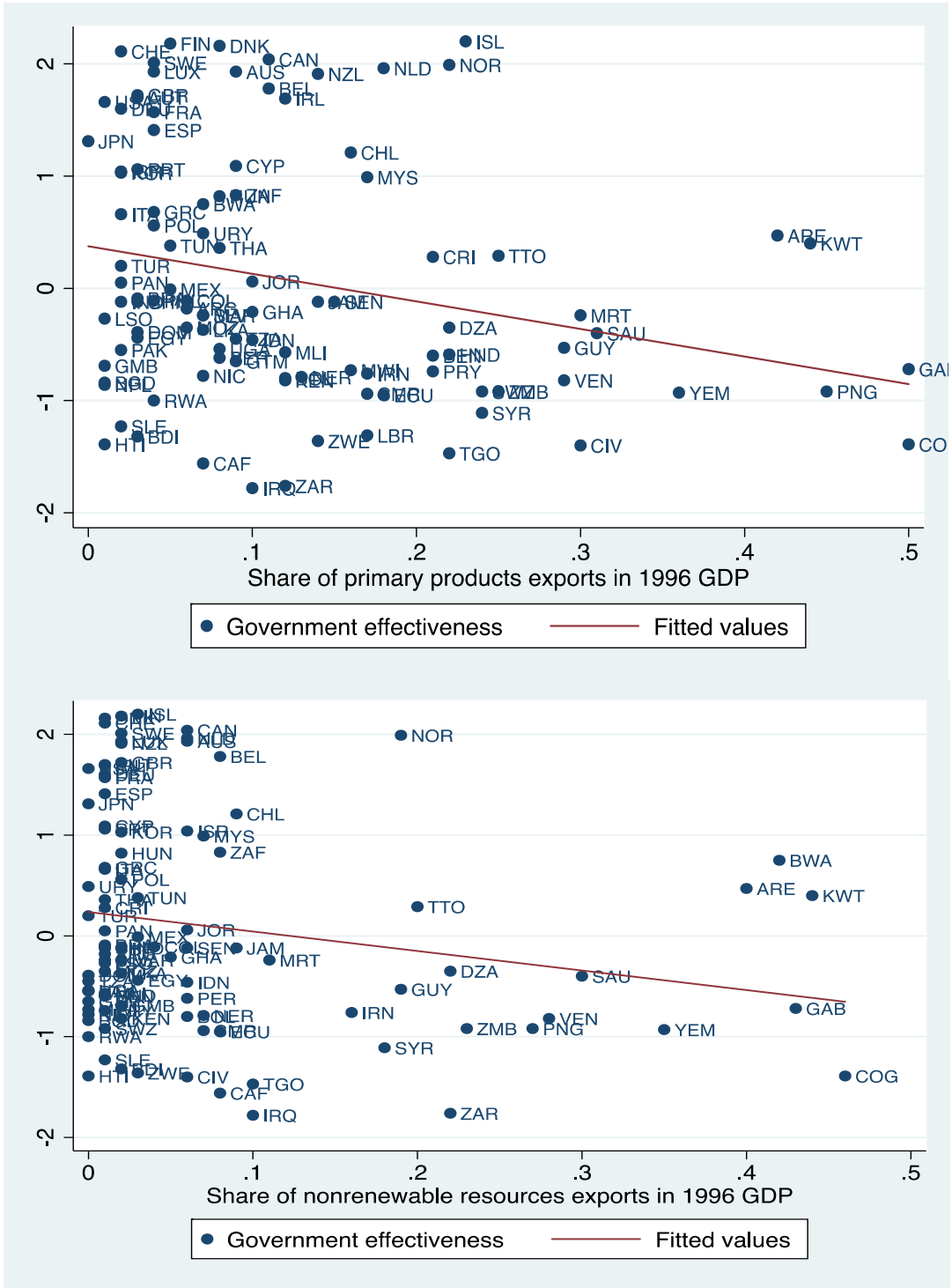

Figure 5: Government effectiveness and measures of resource dependence. (a) Government effectiveness and the share of primary product exports. (b) Government effectiveness and the share of nonrenewable resource exports. Both measures are negatively correlated with government effectiveness. (c) OLS regression for the primary product yields $\hat{y} = 0.37 - 2.45 \times spp96$, with t-

value= –2.66, and Adj. R^2 = 0.07, and for the nonrenewable resources. $\hat{y} = 0.24 - 1.94 \times nonrenew96$, with *t-value*=–1.98, and Adj. R^2 =0.04.

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Appendix 1: Countries in our sample

Algeria	Mexico	Finland
Benin	Nicaragua	France
Botswana	Panama	Germany
Burundi	Trinidad and Tobago	Greece
Cameroon	US	Hungary
Central Afr. Re	Argentina	Iceland
Congo	Bolivia	Ireland
Egypt	Brazil	Italy
Gabon	Chile	Luxembourg
Gambia	Colombia	Netherland
Ghana	Ecuador	Norway
Cote d'Ivoire	Guyana	Poland
Kenya	Paraguay	Portugal
Lesotho	Peru	Spain
Liberia	Uruguay	Sweden
Malawi	Venezuela	Switzerland
Mali	Bangladesh	Turkey
Mauritania	China	UK
Morocco	India	Australia
Mozambique	Indonesia	New Zealand
Niger	Iran	Papua N. Guinea
Rwanda	Iraq	
Senegal	Israel	
Sierra Leone	Japan	
South Africa	Jordan	
Swaziland	Korea, Rep.	
Tanzania	Kuwait	
Togo	Malaysia	
Tunisia	Nepal	
Uganda	Pakistan	
Zaire	Philippines	
Zambia	Saudi Arabia	
Zimbabwe	Sri-Lanka	
Canada	Syria	
Costa Rica	Thailand	
Dominican Republic	United Arab Emirates	
El Salvador	Yemen	
Guatemala	Austria	
Haiti	Belgium	
Honduras	Cyprus	
Jamaica	Denmark	