The Institutional Basis of Efficiency in Resource-Rich Countries

ABSTRACT

The "resource curse" is a familiar and recurring theme in development economics. But does resource abundance also lead to resource inefficiency? And if so, what can contribute to better usage of a country's resources for development? This paper examines 130 countries from 1970-2011, both resource-abundant and resource-scarce, and concludes that on average, resource-abundant countries utilize resources less efficiently. Examining the institutional factors that may explain this disparity in usage, we find that several key institutions are necessary for increasing resource-use efficiency, with private property showing the largest economic and statistical significance. By improving basic institutions, resource-rich countries can thus see more environmentally-sustainable growth.

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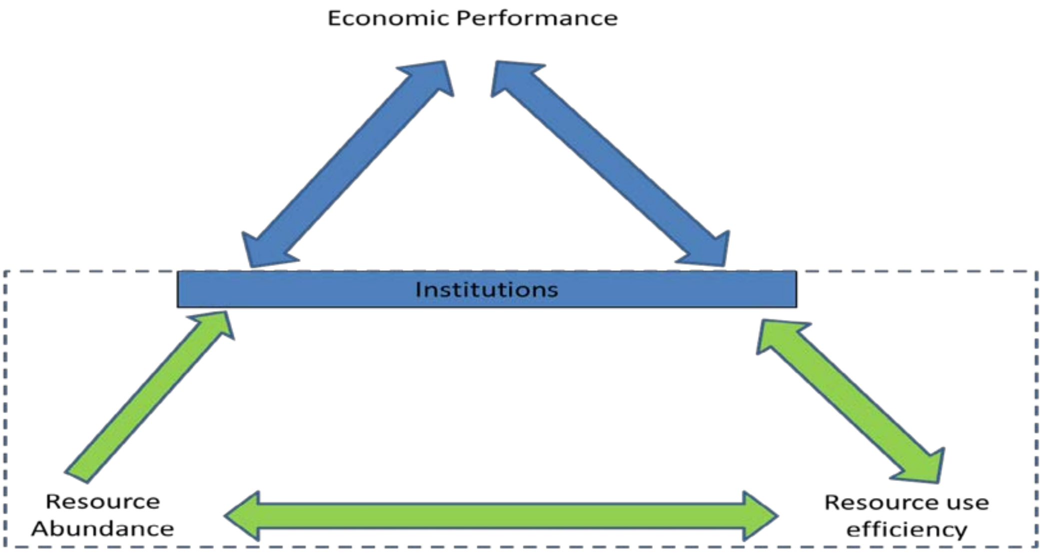
Introduction

Research has demonstrated that resource-abundant countries tend to have lower growth rates, on average, than countries that are resource-scarce (Sachs and Warner 1995, 2001 and Arezki and van der Ploeg 2007, among many others). A large literature on this phenomenon has sketched the channels in which resource abundance would cause economic stagnation, including: reducing human capital (Gylfason 2001); retarding development of economic institutions (Mehlum *et. al* 2006); altering the development of political institutions and in particular fostering rent-seeking (Alkhater 2012); fostering conflict (Collier and Hoeffler 2005); skewing incentives for prudent policies via an increased sense of security (Gylfason 2001); and increasing economic fragility (Rodrik 1999).

But while resource abundance may lead to economic stagnation via these several different intermediate effects, a less-explored theme in the literature is the direct effect of the abundance of resources on resource *usage*. As shown in Figure 1, the linkages between natural resource abundance and growth are second-order, in that they affect human capital, institutional development, and other components of the economy. Moreover, prior scholarship has already established linkages between growth and resource abundance and between resource efficiency (Coursey and Hartwell 2000) and growth. However, there should be a *direct* linkage between the abundance of resources and their usage; the question then becomes, how does resource abundance affect resource efficiency? And are there institutions that can contribute to better usage of a country's resources for development?

Figure 1 – Resources, Abundance, and Growth



To examine this question, this paper examines 130 countries over various time frames from 1970-2011, both resource-abundant and resource-scarce, to ascertain if resource-abundant countries utilize resources less efficiently than countries with a scarcity of resources. More importantly, this paper will break new ground in the literature through examining the institutional factors that may explain this disparity in usage, and ascertaining how key institutions may increase resource-use efficiency.

Theory: Does Abundance Lead to Waste?

Economics is simply the science (or art) of scarcity, and how individuals, firms, and economies deal with the absence of infinity. But what happens in an environment when it appears that the laws of scarcity do not hold (at least in the short- or medium-term)? Luckily, these effects have been observed for decades in reference to the "soft budget constraint" (Kornai 1986), a situation where laws of scarcity are superseded by a greater force (normally a paternalistic government). The consequence of this, as noted by Robinson and Torvik (2009: 787), is such that "enterprises or agencies have incentives to act in inefficient or profligate ways knowing that they will be bailed out if things go wrong." These "inefficient ways" pervade the firm at every level, including in production methods and use of inputs: "if the budget constraint is hard, the firm has no other option but to adjust… by improving quality, cutting costs, introducing new products or new processes… if, however, the budget constraint is soft such productive efforts are no longer imperative" (Kornai 1986: 10). The results of this were all-too-apparent apparent in the Soviet Union and its associated satellite states, where not only did firms survive long beyond their sell-by date (Kornai, Maskin, and Roland 2003), but incentives for quality and cost minimization were absent due to social ownership, leading to inefficiently produced and unwanted products.[1]

Relevant for this paper, and as noted by Kornai, Maskin, and Roland (2003), soft budget constraints do not only pertain to government or financial institution bailouts, but can occur in a variety of situations. Indeed, natural resource abundance could provide a similar soft budget constraint in the short- and medium-term. Generally, resource abundance (and in particular, sudden resource abundance or discoveries) alter the effect of prices on the decision-making of the firm in regards to its inputs, shifting a firm's demand curve closer to vertical (as Kornai (1986) notes). Indeed, given rapid advances in technology or resource discoveries, the soft budget constraint could occur overnight: until the advent of internal combustion, oil was fairly

[1] In the words of American humorist P.J. O'Rourke, "A huge totalitarian system has been brought to its knees because nobody wants to wear Bulgarian shoes. "

underutilized. This transformative effect of technology coupled with resource abundance (Smulders 2005) could lead to the constraints on an economy becoming quickly relaxed, and perhaps to natural resource waste and inefficiency *vis a vis* countries that have fewer natural resources.

This hypothesis follows on from the effects of natural resource abundance that have already been observed empirically. The biggest effect, as Auty and Gelb (2001:2) note, is that "natural resource-abundance tends to undermine investment efficiency whereas a resource-poor endowment places a premium on efficiency." Given that investment is but a second-order effect of a resource boom, it would make sense that the actual *first-order* effect of a resource boom, i.e. the usage of resources, would also have its efficiency undermined. This effect has also been observed in relationship to the effect that resources has on prudent macroeconomic management; in the words of Gylfason (2001:848), "incentives to create wealth tend to become too blunted by the ability to extract wealth from the soil or the sea." Thus, we would expect to see the same effect that relaxes constraints on prudent policies to also lead to a relaxation of efficiency: if everything is availability at all times, and scarcity is no longer a very real threat, there is less of an incentive to economize.

Institutional Factors Encouraging Efficiency

There has been much recent scholarship on the relationship between institutional factors and the "resource curse," focusing on political institutional quality (Bulte, Damania, and Deacon 2005; Sachs and Warner 2001; Torvik 2002; Wick and Bulte 2006, Cabrales and Hauk 2010) and the interplay of resource abundance and institutions. This work, however, has almost exclusively focused on two separate issues: the impact of the resource curse on the quality of institutions, and the impact of institutions on "escaping the curse" via growth. But are there institutional factors that can push back against the “sloth” of Sachs and Warner (1995), the reality that resource abundance can encourage resource use inefficiency?

Institutions *can* indeed matter for resource efficiency, and for the same reasons that “appropriate” institutions may temper the resource curse and lead to growth: by more closely aligning incentives for resource use efficiency with market costs, encouraging conservation of materials and moving firms towards a more efficient production frontier. However, to date, there has been comparatively little to no examination of institutions on resource usage, apart from Deacon and Mueller (2006) and empirical work done by Coursey and Hartwell (2000) and Hartwell and Coursey (2015), which found that economic freedom in a broad sense correlated with better environmental and public health indicators, including resource usage, over the period 1960-1992.

In order to delve into the question of the relationship between resource usage and institutions in a resource-abundant country, we thus need to examine the types of institutions in an economy that might have the greatest influence on resource usage. At a theoretical level, which institutions could tame the resource beast and encourage efficiency, even in a land of plenty? Following from the taxonomy of institutions in Hartwell (2013), this paper focuses on both *political* institutions (which, as in Acemoglu *et. al* 2005, are concerned explicitly with power distribution in a society) and *economic* institutions (which are “designed or arise explicitly to facilitate or hinder economic outcomes” (Hartwell 2013: 20)); this taxonomy is similar to Kolstad’s (2010) examination of the institutions that matter for the resource curse, but is more in line with tenets of the new institutionalist economics literature.

Most of the focus in the extant literature has been on the mediating effect of *political* institutions in the presence of resource abundance (see, for example, Cabrales and Hauk 2010) and the feedback effects that resources have on institutional development. Resource abundance has been linked to many negative attributes of government, including larger public sectors (Robinson *et. al* 2006), overextended public finances (Auty and Gelb 2001), and, as noted above, increased levels of corruption in the government (Alkhater 2012). Additionally, as mentioned earlier, there is a greater incentive for government to intervene in investment decisions in a resource-abundant environment, using "resource rents to relax market discipline" (Auty and Gelb: 135), which then results in inefficient investment. Given this tendency, it is perhaps too much to look for effective political institutions that can lead to resource efficiency, if they cannot even utilize the resources that are given for growth.

However, the resource curse literature has also identified the existence of political institutions that are correlated overcoming the paradox of plenty. The most important paper in this vein comes from Andersen and Aslaksen (2008), who find that parliamentary systems help to insulate against the negative effects of resource abundance. The factor that may be driving this result is the concept of political (and especially executive) constraints, which a parliamentary system has built into its very make-up and that a presidential system lacks: mechanisms, such as votes of confidence and regular elections, that constrain the government from engaging in too much intervention in the marketplace, thus distorting market prices and causing misallocation of resources. As Torvik (2009:247) notes, "while presidentialism may be more of a 'one man show' that can be captured by special interests, parliamentary regimes… may be suited to putting proceeds from resources into productive use."

The extension from this empirical reality in regards to growth to the realm of resource efficiency is thus not a far stretch. Indirectly, a more restrained government correlates with higher growth (see Hartwell 2013), which is also correlated with better resource usage (Coursey and Hartwell 2000). But more directly, if an unconstrained government encourages soft budget constraints and investment inefficiency, it is most likely also encouraging production that is less efficient than would be under proper market signals. As Auty and Gelb (2001: 133) note, time horizons for governments are compressed due to resource abundance, with “projects undertaken by resource-rich government…value[d] for their immediate income-generating effects rather than their growth-enhancing potential.” The presence of soft budget constraints and push from government to show immediate impact means a correspondingly lower emphasis on materials-use efficiency.

Under such a plausible (and indeed realistic and all-too-frequent) scenario, a more-restrained government, one that is less focused on rent-extraction, redistribution of resources, or buying off special interests through political investment, would also be less distorting when it comes to resource usage. This point is made by Alkhater (2012:41) about democracy more generally, where he notes that a “government [which] is presumably held directly accountable for its actions by the electorate… restrains abusive resource exploitation and expropriation by the state.” This point holds for constraints on the government in general, as fewer distortions of market signals should lead to more incentives for resource efficiency. Finally, as Hartwell and Coursey (2000) note, the constraints on governments derive from the governed, and a more constrained executive is likely to be held accountable if the polity demands better environmental outcomes.

Just as political institutions may operate to hinder or encourage resource efficiency, it is equally if not more plausible that there may be *economic* institutions that are more important in the determination of resource usage. Economic institutions, more concerned with economic incentives, can have a direct impact upon firm-level decisions for use of inputs, altering the calculations made by managers and businesses on efficiency (especially in an environment of abundance) and lengthening time horizons. This would provide a more direct channel for firms and, by extension, economies than government policies, which can take a longer time to work their way through the economy. There is already some evidence for this supposition in regards to the resource curse, as Kolstad (2010) finds that private sector institutions are relatively more important than public ones for ameliorating the effects of resource abundance.

If economic institutions can exert more of an influence on materials use efficiency than political ones, then theoretically, the most important economic institution would appear to be *property rights*, as their existence or lack would exert an influence on both sustainable extraction and utilization. In the first instance, clear property rights would create a secure claim of the individual to a resource stock, stabilizing the economic relations between resource owners and consumers of the resource (Knoepfel *et al.* 2007). Through this establishment of ownership of a resource, property rights would thus avoid the "tragedy of the commons" as formulated by Hardin (1968), where resources are "unowned or politically controlled," a situation that frequently leads to such resourcing being "more apt to be inadequately managed" (Adler 2000:668). Indeed, such a lack of ownership (i.e. property rights) would tend to encourage waste, as timing of extraction and use becomes more crucial than efficiency, in order to obtain the resource before someone else does. As Kronenberg (2008:787) notes, "under uncertain property rights, the resource owner will have an incentive to extract the resource more quickly than the social optimum would require;" Deacon and Mueller (2006:123) second this point, stating that "[if] the individual's claim to a resource stock's future can be rendered insecure… this reduces the payoff to natural resource conservation, leading to more rapid depletion of resource stocks." Thus, in a Coasean (1960) framework, the existence of extensive property rights may encourage the better usage of natural resources through alignment of incentives and costs (also noted by de Soto 2000), increasing payoffs to conservation and channeling resources to more efficient usage.

Moreover, property rights may not only be thought of as a defense against encroachment on resources, but also as an enabler of production and innovation. With government expropriation held at bay and property rights secure, private business may flourish and grow (Demsetz 1982, Djankov *et al.* 2002), creating a competitive market for goods and services (Hartwell and Coursey 2015). In such an environment, resource efficiency will be crucial as a way to reduce production costs and increase profits, creating an incentive for firms to innovate and dematerialize rather than lose customers and money to competitors. Finally, secure property rights may also allow for critically reducing the demand for particular resources, as exploration and innovation can generate substitutes for inputs; in the excellent phrasing of Perraton (2006:644), "changes in technology and patterns of demand make previously essential resources obsolete, whereas others assume center stage: the Stone Age didn't end from a shortage of stones, and before the 20th century there were few uses for oil."

Data and Methodology

To test the hypothesis regarding political and economic institutions improving resource usage, I have amassed a database that builds on the one created in Coursey and Hartwell (2000). That earlier database went only from 1960-1992 and suffered from the omission of many of the (now- and then-) transitioning economies, including Russia. The database for this paper rectifies this omission and covers commodity and energy production and consumption, relevant macroeconomic variables, and, most importantly, institutional variables for up to 130 countries from 1970-2011 (data availability by resource shifting the number of observations and cross-sections across models).

The basic econometric model, building on the hypotheses noted above, postulates energy efficiency as a function of resource abundance, macroeconomic and structural variables, and institutional factors, as noted in the previous section:

$$(1)\ Y_{it} = \gamma Abundance_{it} + \beta StructureMacro_{it} + \alpha Institutions_{it-1} + \varepsilon_i$$

The energy efficiency variables represented by Y in Equation 1 above include consumption of electricity, oil, natural gas, and paper (described in Table 1). To capture this resource use-intensity variable, two different methods are utilized: where direct consumption data is available, it is divided by GDP to get a measure of unit consumption per unit of GDP (direct consumption data is available for oil, gas, and electricity) Alternately, where direct consumption data is not available (as with paper), I use Malenbaum's (1978) "apparent consumption" measure, defined as the total production of raw material Y minus total exports plus total imports, divided by GDP. Given the scale of these numbers, they are log-transformed here.

TABLE 1 – Dependent Variables and Sources

Indicator	**Definition**	**Source**
Intensity Indicators		
Electricity Usage	Electricity consumption (billion Kilowatthours) divided by GDP	CEIC
Natural Gas Usage	Gas consumption (billions of cubic feet) divided by GDP	CEIC
Oil Usage	Oil consumption (thousands of barrels per day) divided by GDP	CEIC
Paper Usage	"Apparent Consumption" of Paper, defined as production of paper and imports of paper, less exports (all in tonnes), divided by GDP	FAOStat, World Bank WDI

On the right hand side of Equation 1, defining resource abundance remains a subject of controversy in the literature. Sachs and Warner (1995 and 2001) were the first to define resource abundance as the resource intensity of exports, calculated as the value of exports of a resource in country *i* divided by GDP, a metric which has been used in countless other papers since (see, for example, Mehlum *et al.* 2006, and James and Aadland 2011).[2] However, Brunnschweiler and Bulte (2008) have noted, this formulation is problematic for several reasons. In the first instance, export intensity may not capture resource *abundance* per se, but more likely captures resource *dependence*, an endogenous measure that "is not independent of economic policies and the

[2] The working paper version of this article also utilized this measure as a gauge of resource abundance.

institutions that produce them" (Brunnschweiler and Bulte 2008:249).[3] Brunnschweiler and Bulte's (2009) develop this argument further to show that resource dependence is endogenous with conflict, a major consideration given the relationship between resources and civil strife. Van der Ploeg (2011) also highlights the endogeneity issue from a growth perspective, noting that the export-based measure of abundance has unclear causality, in that low incomes may cause more reliance on resources (rather than the other way around).[4] But even from a purely trade-oriented standpoint, resources may also be an intermediate good (processed, then exported) that may skew the sense of a country's "abundance" if one relies solely on export-intensity. As Manzano and Rigobon (2006) note, resource dependence may also be driven by other, unobservable, issues related to trade and trade policy.

To guard against these issues, our empirical specification thus utilizes an alternate measure for resource abundance, that of resource production (on the theory that what does not exist cannot be mined or utilized). While using annual production data would be subjected to technology and other commodity price shocks, I instead utilize the initial level of the log of production of each resource for each country as the measure of resource abundance, as used in *inter alia* Papyrakis and Gerlagh (2004), Stijns (2005), and Brunnschweiler (2008).[5] The use of initial indicators as a consistent measure of abundance is in line with Gylfason (2001) and Brunnschweiler and Bulte (2008), who show that cumulative resource extraction over a twenty- or thirty-year period (i.e. between 1970 and 2000) does not alter the relative resource abundance of a country. Indeed, Brunnschweiler (2008) shows that the countries with the highest production of a resource in the early 1970s still had the highest stock of that same resource by the late 1990s.

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[3] Participants in a seminar at the Bank of Estonia, as well as an anonymous referee, also made this point regarding abundance versus dependence.

[4] It should be noted that this empirical specification would suffer less from reverse causality than a growth regression, as it is more theoretically plausible that resource abundance would have effects on resource efficiency than efficiency would have on resource abundance or dependence.

[5] In theory, this should be in 1970, but where data is missing for a specific country, the earliest year with production data is used.

While the purpose of this paper is to measure if specific abundance (i.e. in one resource) leads to inefficiency in that same resource, there may be some merit, as in Atkinson and Hamilton (2003), to examining the effects of overall abundance. To this end, we include as a check on the production data the percentage of GDP derived from natural resource rents; theoretically, it is possible to envision a scenario where all-around largess, as a source of income, then makes inefficiency the norm across all resources.

In regards to the macroeconomic and structural controls, there is a long list of plausible variables that may be linked to institutional development, growth, and, most importantly, materials use or dematerialization. Gassebner *et al.* (2011) offer a tour of some of the most prominent drivers of environmental outcomes writ large, many of which would also apply to dematerialization. However, as our variable of interest is environmental efficiency, the extant literature on the resource curse offers little assistance to the most important controls, focused as it is on the institutional and resource drivers of growth. For this, we must turn to the environmental economics literature for clues as to the drivers of materials usage. In the first instance, it has been proven empirically that environmental cleanliness is correlated with higher levels of economic progress (Lopez 1994, Canas 2003, Narayan and Narayan 2010); to capture this effect, we include the (log) level of current GDP per capita as a proxy for development and technology effects. However, a Kuznets Curve relationship between environmental indicators and income has also been amply demonstrated in the prior literature, where environmental degradation increases at lower levels of growth and tapers off once a certain income threshold is attained (see Grossman and Krueger 1995, Dasgupta et al. 2002, Carson 2010, or Pao and Tsai 2010). In order to capture these effects, the empirical specification utilized here will include the square of GDP per capita as an additional control.[6]

[6] Thanks are due to an anonymous referee for suggesting this point.

[Table 2 here]

Beyond growth levels, there are many other plausible country-specific drivers of materials use intensity, especially if we conceptualize these drivers “as those factors that exert influence on human activities to use resources” (Steger and Bleischwitz 2011:816). A complete list of control variables is shown in Table 2, but some prominent covariates should be highlighted. In particular, trade is often conjectured to have an ambiguous effect on environmental outcomes, as it may increase resource allocation but at the same time cause “dirtier” industries to move to countries with lax environmental standards (Birdsall and Wheeler 1993). In regards to dematerialization, empirical evidence has shown that trade has a positive effect, as specialization in exports from developing to advanced economies is characterized by much lower “environmental consumption” (Rice 2007); similarly, trade and dematerialization may have some feedback effects, as dematerialization in one country can lessen demand for resources and resource-intensive goods from trading partners, spurring on dematerialization elsewhere (Muradian and Martinez-Alier 2001). As in many other papers (Yanikkaya 2003 gives an excellent overview), trade openness is proxied here as the (log) sum of exports and imports of goods and services as a share of GDP.[7]

Given that global financial flows may also have a similar impact as trade in goods on dematerialization (i.e. providing discipline on resource use and encouraging efficiency), we include net foreign direct investment (FDI) inflows as a control (as in Antweiler *et al.* 2001 and Gassebner *et al.* 2011). Domestic investment has also been found in the growth literature to be a deterrent of the “resource curse” (Papyrakis and Gerlagh 2004, Mehlum *et. al* 2006) in environments with good institutions (Atkinson and Hamilton 2003). We would expect domestic

[7] There is also empirical evidence that increased trade in services correlates with resource-use efficiency (Taskin and Zaim 2001). While I do not differentiate here, this is an interesting avenue for future research.

investment to have the same disciplining effect as FDI, and be positively correlated with dematerialization, and thus the investment share of GDP is included.

Several other structural issues in the economy may also play a role in the determination of material use efficiency, and additional controls may be relevant for different resources (Table 2). Given this large set of plausible controls and the reality of model uncertainty, I will utilize Bayesian Model Averaging (BMA) techniques, as introduced by Fernandez *et al.* (2001), to help reduce the set of controls to only the most promising relationships. To my knowledge, the only study that has used such an approach in regards to environmental outcomes is Begun and Eicher (2008), who examine the determinants of SO2 emissions. By introducing BMA analysis to the examination of materials use efficiency, this paper will break new econometric ground and allow for a more parsimonious model of drivers of dematerialization in the presence of abundance.[8]

Finally, the institutional indicators utilized here include, as noted above, property rights and political constraints, which will be measured in a variety of ways. Property rights have been touched upon empirically in the resource literature (see Baggio and Papyrakis 2010 for a recent example), but have not been extensively tested as a determinant of resource *efficiency* apart from their inclusion in general economic freedom (see Coursey and Hartwell 2000) or in relation to broader environmental outcomes (Hartwell and Coursey 2015). This paper breaks new ground by including property rights via the International Country Risk Guide (ICRG) “Investment Profile” indicator, a summation of three sub-components (Contract Viability/Expropriation, Profits Repatriation, and Payment Delays) coded from 0 to 12, with higher values signifying greater protection of private property.

[8] The BMA model utilized in this paper is based upon the priors and sampling mechanism of Magnus *et. al* (2010), assuming a base form of $y = W\beta + Z\delta + v$. This specification thus incorporates a linear classical Gaussian model, non-informative priors for the β coefficient (as well as in the error variance *v*), and a multivariate Gaussian prior for δ (as described in Dardanoni *et. al* 2012).

As noted above, given the governmental issues that come with resource abundance, *checks and balances* could act as a deterrent to waste and encourage more judicious use of resources in natural resource-rich countries. Here I will use two separate indicators to recognize political constraints or the lack of them:

- The simplest proxy for ascertaining political influence in a country is the size of government as a percentage of GDP, used here as an objective measure for (lack of) political constraints. The same logic we apply to the resource abundance/usage nexus should also hold for government: a bigger government means more chance for rent-seeking, more access points for political interests in the policy process, or simply a bigger tax bill that requires rents from natural resources.
- On the other hand, a more-constrained government may mean less ability for the government to introduce distortions. Political constraints more broadly will be taken from Henisz's (2000) "political constraint" database, and "estimates the feasibility of policy change (the extent to which a change in the preferences of any one actor may lead to a change in government policy)." The POLCONV indicator includes data on the veto power of the legislature, the executive, the judiciary, and sub-federal entities, and is coded from 0 to 1 (with higher numbers meaning more constraint).

In addition to these institutional variables, it is plausible that it is not just the level of political constraints, but the instability of institutions that makes a difference in the consumption of resources.[9] To factor in this reality, I also utilize two variables for political stability as a robustness check; the first is the Polity IV "durable" indicator, which shows how long it has been

[9] Many thanks to Olavi Miller of the Bank of Estonia for suggesting the inclusion of political instability.

(in years) since a regime change in a particular country, while the second is the 5-year rolling standard deviation of the political constraints indicator utilized above.[10]

However, it is the relationship between institutions and resource abundance that is our question of interest (as in Mehlum *et al.* 2006). Does the presence of “good” institutions in a country blessed with resource abundance mitigate the usage of resources and make them more efficient? To test this question, I will also use interaction terms between each of the institutional terms with each separate measure of resource abundance (also as in Torvik 2009). Finally, given that institutional factors may take some time to work their way through the economy and impact on resource usage, institutions are lagged one year in Equation 1 to capture this reality.[11]

In regards to the choice of estimator, as many others have explored (Mehlum *et. al* 2006) and as we show in Figure 1, the presence of resources can distort institutional development at the same time that institutions are influencing environmental outcomes. This issue of simultaneity has been addressed to this point in the literature using the seemingly unrelated estimator (SUR) of Zellner (1962), to account for the contemporaneous influence of institutions and resource usage on each other (see especially Gylfason and Zoega 2006). Indeed, our examination here is actually a system of equations formulated as the legs of the triangle in Figure 1, where:

- Resource Abundance → Development of Institutions;
- Resource Abundance → Economic Performance; and finally,
- Institutions, Economic Performance, Resource Abundance → Resource Use Efficiency[12]

[10] The durable indicator makes no judgment on the type of regime, merely on its stability; the judgment on the type of regime is provided by the other indicators noted above. Additionally, a BMA analysis is run on these two additional regressors but not reported here – the results are reflected in the controls utilized in the regressions below.

[11] Additional lags are also tested, see the results section below.

[12] This approach also incorporates Van der Ploeg and Poelhekke’s (2010) critique of Brunnschweiler and Bulte (2008) by fashioning a standard growth regression using openness, human capital, and other covariates found to be important for growth.

However, the SUR method assumes that the right-hand side regressors are exogenous, a fact that is unlikely in the case of institutional development (Eicher and Leukert 2009; Hartwell 2013), but also in regards to the resource dependence of an economy: Brunnschweiler and Bulte (2009) have credibly argued that resource dependence itself is endogenous to the underlying factors of an economy.[13] An obvious way to account for this endogeneity would thus be to use three-stage least squares (3SLS), which will be used below as the estimator of the relationships between institutions and resource usage (as in Brunnschweiler and Bulte 2009). In this examination, I treat resource abundance (dependence), the institutional variables, and the macroeconomic controls as endogenous, instrumenting them with lagged levels of institutions, initial levels of GDP, and the country- and time- specific attributes (which are entirely exogenous over this time frame, see Becker *et. al* 1994 for an early use of these attributes as instruments).

While 3SLS may account for endogeneity effects, the estimator assumes homoscedasticity in the error terms of each constituent equation. In a large panel dataset such as the one assembled for this paper, heteroskedasticity is likely present. In order to correct for this reality, I utilize pair bootstrapped standard errors stratified by country, a technique which generates standard errors robust to both heteroskedasticity and autocorrelation (and which are similar to clustering on the country variable, see Ando and Hodoshima 2007).[14] This formulation, utilization of 3SLS with bootstrapped errors, has become standard in recent literature on natural resources, as seen in He (2006), Rausser *et al.* (2009), Liverpool-Tasie and Winter-Nelson (2011), and Panzone (2013).[15] The bootstrap approach also corrects for Van der Ploeg and Poelhekke's (2010) critique of Brunnschweiler and Bulte (2008), which assumed homoscedasticity.

[13] Earlier versions of this paper confirmed that the SUR method of accounting for the three equations did indeed suffer from endogeneity issues.

[14] The earlier working paper version of this paper utilized IV-GMM methods as a check against the 3SLS formulation specifically to deal with heteroskedasticity. However, with the advances in bootstrap theory and programming shown in papers such as Iglesias and Phillips (2012), a conscious decision was made in this version to retain the 3SLS framework for reasons of efficiency and consistency.

[15] In order to ensure small bias in our estimates, and given the large number of observations in most of our equations, the bootstrap for each equation has been set to between 1,000 and 2,500 repetitions, to correspond with the data size. This is keeping in line with the suggestion of Efron and Tibshirani (1994).

Finally, given the vast dispersion in resource abundance among countries, and in order to correct for outliers with substantial resource endowments, the 3SLS method will itself be checked by a quantile regression in the manner of Koenker and Bassett (1978). The quantile regression will enable us to discern the different rates of change that institutional quality would have at the upper and lower bounds of the conditional distribution. In order to deal with the issues of heteroskedasticity and autocorrelation, robust standard errors are utilized.

Results

The results of the econometric modeling are presented in Tables 3 through 9 below. In the first series of regressions, we seek to merely confirm the hypothesis that resource abundance does indeed lead to resource use inefficiency. To do this, I test a simple fixed-effects GLS specification that models resource intensity as a function of resource abundance and the initial level of GDP in 1970. The results of this exercise (Table 3) show that intensity indicators behave according to our theory across all of our resource indicators, with resource use per unit of GDP increasing in the presence of abundance. Indeed, using this simple regression tool, we see there is a relationship between having more of these natural resources and the use of that resource, with the strongest relationship for electricity and paper, and a smaller (although still significant) correlation for gas and oil.

[Table 3 here]

Having established that there appears to be a relationship between abundance and use, we turn now to the more interesting system of equations, relating institutional factors to resource usage. As promised above, a BMA analysis is utilized in order to narrow down the set of control variables from the large number of plausible indicators shown in Table 2. The results of this analysis are shown in Tables 4a and 4b and Tables 5a and 5b for the top-level equation of interest, relating environmental efficiency to abundance and institutions (Tables 4a and 4b shows the first measure of abundance, initial production, related to the two political variables, and Tables 5a and 5b shows the percentage of resource rents in GDP to the same variables). The criterion used here, to determine robust correlation with the outcome variable for the auxiliary regressors, was suggested by De Luca and Magnus (2011), and involves retaining auxiliary variables which have an absolute value of the *t*-ratio over 1 (a fact that also satisfies the criteria that the two standard-error confidence intervals for a given variable does not include zero). The retained variables satisfying this criterion are shown in Tables 4 and 5; the practical result of this exercise means that a different control set will be applied in each resource regression.

Tables 6 and 7 shows the results for the top-level 3SLS equations across all four resources, with Table 6 using initial level of production as the measure of resource abundance and Table 7 instead using resource rents. While there are some outliers related to shifting sample sizes, the results are generally in line with the theory elucidated above, but mainly in regards to property rights. The results for political institutions are highly dependent upon the particular resource, with size of government being associated with less efficient usage in every resource but paper (perhaps larger governments are better at creating efficient demand for paper that they use so much of). When interacted with resource abundance, however, size of government leads to *more* efficiency in gas and oil, but less in paper in electricity; this could be due to the fact that oil and gas are often state-owned, and thus larger governments are able to invest more in such operations.

Other political metrics also show some intriguing results, with political constraints showing the “correct” sign in regards to materials usage across all four resources, but only statistically significant in the case of paper and oil. The size of abundance mitigation in each instance is dwarfed, however, by the scale of inefficiency that accompanies a lessening of political constraints, in some instances up to eight times larger than the effect of political constraints in the face of abundance (i.e. as seen in the paper intensity regression). Conversely, political durability appears to contribute to less efficiency in the face of resource abundance, even as more durable governments may mean stability and higher efficiency *ceteris paribus*. This theory is given some credibility by the behavior of the political volatility indicator, which shows that volatility in a resource abundant environment leads to more inefficiency, sometimes much more; for example, a one standard-deviation increase in political volatility over a 5-year window can increase inefficiency in gas usage by as much as 80 percent.

While political institutions give conflicting results, on the other hand, across all resources shown in Table 6, higher (lagged) levels of property rights in the presence of resource abundance (captured in the interaction term) uniformly show a more efficient usage of that particular resource.[16] Moreover, this result is consistent in terms of its statistical and economic significance across specifications; as an example, in regards to oil usage, property rights by itself is associated with better efficiency, with a one unit increase in the property rights index leading to an average six percent decrease in oil intensity (oil use per unit of GDP). But when interacted with resource abundance, better property rights also result in an additional improvement in efficiency of one percent, meaning that property rights do in fact have a moderating influence on the resource curse. Against some resource, property rights by themselves may encourage slightly less efficient usage (as is the case for natural gas), but across resources, the interaction of property rights and abundance has a consistent efficiency-improving effect.

[16] Additional lags of the institutional variables, not reported here for reasons of space, found similar results in regards to both scale and statistical significance. Lags of up to ten years were used as a robustness check, and the results did not alter in any form, with the effect on usage across all resources halving from year 5 to year 10 for both institutions but remaining statistically significant. This also points to the reality that institutional changes have a bigger impact on resource usage in the years immediately preceding the change.

These results for both institutions show little change in Table 7, where an alternate indicator for resource abundance (resource rents to GDP) is utilized. Of political institutions, volatility ceases to be important for gas and electricity, while it paradoxically increases efficiency in oil and paper; this beneficial effect may be due to the fact that volatility in a generally resource-dependent state may make a rapacious government less likely to arise (or, more accurately, less able to extract rents). Similarly, constrained governments in resource-dependent states show less efficiency across all resources, perhaps due to a similar effect, i.e. government control in resource-dependent states may force efficiency that would not occur in a government monopoly on its own. Property rights retain their importance in mitigating resource usage, with only the electricity regressions showing lower (or no) significance. On the whole, however, the influence of property rights is generally in favor of better resource usage, an effect that increases when resource abundance is taken into account.

As a final check on these exhaustive results, Tables 8 and 9 shows the results of quartile regressions, robust to heteroskedasticity, for each of the full commodity models (using initial production), in order to isolate the effects of outliers (Table 8 use government share of the economy as the political institutional indicator, while Table 9 uses political constraints). While the issue of endogeneity may still be present here,[17] these regressions allow another approach to examining the impact of institutions on the entire distribution of materials usage. The results obtained in the 3SLS regressions still hold, with property rights effects getting stronger the closer one gets to the upper bounds no matter which political institution is utilized. Conversely, political institutions appear to have a more powerful effect at lower quantiles, with significance decreasing as one moves closer to the upper bounds; as an example, a country in the 25th percentile would see a one percent change in the size of its government to GDP result in

[17] Although econometric advances in modeling quantile regressions with endogeneity have made some strides recently (see Chernozhukov and Hansen 2008 or Powell 2013, who includes two-step GMM estimators), estimation of more than two endogenous treatment variables is still in its infancy. Thus, these results are included for illustrative robustness, although the exact precision of the estimates may be biased.

inefficiency increasing 3 percent, while a country in the 75th percentile would see a change of only 0.2 percent (and this effect is statistically insignificant). One the other hand, a one point change in property rights in the presence of resource abundance would lead to a 0.4 percent improvement in oil efficiency at the 25th percentile, but a 1 percentage point improvement at the 75th percentile. This tale, of increasing important of property rights and lessening importance of political institutions, also appears to confirm the median results analysis shown in Tables 6 and 7.

Conclusions

This paper has examined the materials intensity of resource-abundant countries and the institutional factors that can encourage greater efficiency. Utilizing a 3SLS estimator and incorporating Bayesian techniques, a consistent theme on the importance of specific institutions emerged. In particular, the examination of institutional variables suggested that property rights can mitigate the usage of nearly all resources in an atmosphere of resource abundance, while certain political institutions are more resource- and situation-specific in encouraging efficiency. For resource-abundance countries, however, the results are clear that the improvement of property rights will lead to more environmentally-sustainable usage in specific resources.

These results are only a first attempt to relate institutional quality and resource usage, rather than the other two legs of the triangle in Figure 1. A possible agenda for future research is thus closely aligned with the agenda of many an institutional economist, and that is to devise and test better quantitative measures for institutions that can be introduced. In particular, we may need a better measure of property rights, as the ICRG investor measure might be better understood as a measure of business activity instead of purely property rights; perhaps the objective indicator of "contract-intensive money," used by Clague *et. al* (1997) and Hartwell (2013), measuring the amount of money held outside of the formal banking sector, could be an effective proxy (constituent parts of this indicator were unfortunately severely limited given the long time-frame and broad sweep of countries examined in this paper). Other metrics for political constraints and/or bureaucratic governance quality would also be welcome, as perhaps there are specific political institutions that have a greater impact on specific resources (the distinction of point source and diffuse resources, as noted by Isham *et. al* 2005). As a first attempt, however, this paper has demonstrated a clear link between resource use intensity and institutions, a result that can be built on in the future.

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Table 2 – List of Institutional, Macroeconomic, and Structural Controls

Indicator	Definition	Proxy for	Source
Institutional Indicators			
Government share	All government current expenditures for purchases of goods and services (including compensation of employees), as a percentage of GDP	Government intervention in markets/lack of executive constraints	World Bank WDI
Political Constraints	The extent to which a change in the preferences of any one actor (including legislative, executive, judiciary, or sub-federal actors) may lead to a change in government policy	Constrained government	Henisz (2000)
Investor Protection	An assessment of the factors creating risk to investment, covering three subcomponents: Contract Viability/Expropriation, Profits Repatriation, and Payment Delays	Property Rights	ICRG
Abundance Variables			
Initial level of Production	The level of production of the particular resource in the first available year of the data	Resource abundance	UNCTAD for oil, gas, electricity; FAOStat for paper
Resource Rents	Resource rents, computed as the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents, as a percentage of GDP	Resource abundance	World Bank WDI
Macroeconomic and Structural Controls			
GDP	(log) GDP in current dollars	Development and technology effects	World Bank WDI
GDP^2	Square of (log) GDP	Kuznets curve effects	Author's calculation
GDP 1970	(log) GDP in 1970 in then-current dollars	Convergence effects/initial technology	World Bank WDI
Openness	(log) Exports + Imports (current US$)/GDP (current US$)	Trade	CEIC
FDI net	Net inflows of foreign direct investment, as a percentage of GDP	Foreign investment	World Bank WDI
Investment	Share of investment in GDP, %	Domestic production	Penn World Tables
Secondary enrollment	Total enrollment in secondary education, regardless of age, expressed as a percentage of the population of official secondary education age	Human capital	World Bank WDI

Indicator	Definition	Proxy for	Source
Urban population	Percentage of a country's total population living in urban areas	Aggolmeration effects; infrastructure	World Bank WDI
Population growth	Percentage growth in total population, year on year	Increased demand for materials	World Bank WDI
Population density	Mid-year population divided by land area in square kilometer	Spatial effects in materials usage	World Bank WDI
Industrial share	Percentage of industry value added in GDP	Industrial use of materials	World Bank WDI
Agricultural share	Percentage of agriculture value added in GDP	Agricultural use of materials	World Bank WDI

TABLE 3 – Simple FE-GLS Model, Resource Use v. Resource Intensity

	Gas	**Electricity**	**Paper**	**Oil**
	1	**2**	**3**	**4**
Resource Abundance (initial level of production)	0.11	0.31	0.96	0.05
	*1.85**	*3.43***	*6.31***	*1.72**
Log GDP 1970	1.79	-2.88	-0.33	-0.16
	*12.90***	*7.64***	*2.59***	*3.33***
n	2143	4291	1854	2344
R-squared	0.91	0.80	0.78	0.83
country dummies?	yes	yes	yes	yes
time dummies?	yes	yes	yes	yes

*Note: absolute values of t-stats are under the coefficients, with * signifying significance at the 10% level and ** at the 1% level.*

Table 4a – BMA Results, Resource Abundance expressed as Initial Level of Production, Government Share of GDP

Gas			Electricity			Paper			Oil			
Variable	**t**	**pip**	**Variable**	**t**	**pip**	**Variable**	**t**	**pip**	**Variable**	**t**	**pip**	
Constant	-3.04	1.00	Constant	-15.73	1.00	Constant	-3.03	1.00	Constant	-3.52	1.00	Focus variables
Investor Protection	5.32	1.00	Investor Protection	1.37	1.00	Investor Protection	-0.25	1.00	Investor Protection	-1.96	1.00	
Government share	3.37	1.00	Government share	2.82	1.00	Government share	-3.52	1.00	Government share	9.68	1.00	
Property rights*Abundance	-7.30	1.00	Property rights*Abundance	-5.52	1.00	Property rights*Abundance	-0.91	1.00	Property rights*Abundance	-4.77	1.00	
Government Share*Abundance	-4.62	1.00	Government Share*Abundance	4.52	1.00	Government Share*Abundance	4.27	1.00	Government Share*Abundance	-7.86	1.00	
Abundance	11.64	1.00	Abundance	18.79	1.00	Abundance	1.55	1.00	Abundance	11.76	1.00	
GDP	1.84	1.00	GDP	-0.09	1.00	GDP	0.11	1.00	GDP	1.15	1.00	
GDP^2	-0.22	1.00	GDP^2	-3.14	1.00	GDP^2	1.25	1.00	GDP^2	-1.14	1.00	
GDP 1970	-0.62	0.33	GDP 1970	-13.62	1.00	GDP 1970	-7.48	1.00	GDP 1970	-2.67	0.94	Auxiliary variables
Openness	0.81	0.45	Openness	9.79	1.00	Openness	6.80	1.00	Openness	6.18	1.00	
FDI net	0.16	0.05	FDI net	-6.09	1.00	FDI net	-2.87	0.96	FDI net	-2.73	0.95	
Investment	-2.54	0.93	Investment	-0.29	0.10	Investment	0.20	0.07	Investment	1.37	0.73	
Secondary enrollment	1.17	0.65	Secondary enrollment	1.13	0.63	Secondary enrollment	-3.1	0.98	Secondary enrollment	-0.11	0.04	
Urban population	0.26	0.10	Urban population	1.32	0.71	Urban population	0.25	0.09	Urban population	-0.01	0.03	
Population growth	0.18	0.06	Population growth	0.13	0.04	Population growth	0.07	0.04	Population growth	-0.03	0.03	
Population density	6.65	1.00	Population density	-0.11	0.03	Population density	-0.65	0.35	Population density	0.03	0.04	
Industrial share	6.39	1.00	Industrial share	2.23	0.90	Industrial share	0.20	0.07	Industrial share	0.30	0.12	
Agricultural share	0.18	0.06	Agricultural share	4.20	1.00	Agricultural share	-0.25	0.09	Agricultural share	10.50	1.00	

Shaded boxes indicate variable is above threshold.

Table 4b – BMA Results, Resource Abundance expressed as Initial Level of Production, Political Constraints

Gas			Electricity			Paper			Oil			
Variable	**t**	**pip**	**Variable**	**t**	**pip**	**Variable**	**t**	**pip**	**Variable**	**t**	**pip**	
Constant	-1.62	1.00	Constant	-13.72	1.00	Constant	-1.11	1.00	Constant	-3.46	1.00	Focus variables
Investor Protection	3.23	1.00	Investor Protection	1.42	1.00	Investor Protection	-0.97	1.00	Investor Protection	-0.25	1.00	
Political Constraints	3.59	1.00	Political Constraints	-0.15	1.00	Political Constraints	7.83	1.00	Political Constraints	-0.93	1.00	
Property rights*Abundance	-4.92	1.00	Property rights*Abundance	-5.66	1.00	Property rights*Abundance	-0.14	1.00	Property rights*Abundance	-0.73	1.00	
Political Constraints*Abundance	-3.34	1.00	Political Constraints*Abundance	-1.69	1.00	Political Constraints*Abundance	-8.49	1.00	Political Constraints*Abundance	1.54	1.00	
Abundance	12.74	1.00	Abundance	32.03	1.00	Abundance	6.03	1.00	Abundance	4.40	1.00	
GDP	0.96	1.00	GDP	-0.17	1.00	GDP	-0.75	1.00	GDP	3.06	1.00	
GDP^2	1.00	1.00	GDP^2	-3.17	1.00	GDP^2	1.21	1.00	GDP^2	-2.30	1.00	
GDP 1970	-2.13	0.89	GDP 1970	-12.42	1.00	GDP 1970	-5.83	1.00	GDP 1970	-0.05	0.04	Auxiliary variables
Openness	0.41	0.18	Openness	10.88	1.00	Openness	7.52	1.00	Openness	0.59	0.31	
FDI net	0.08	0.04	FDI net	-5.85	1.00	FDI net	-4.05	1.00	FDI net	0.05	0.03	
Investment	-2.13	0.89	Investment	-0.89	0.50	Investment	-0.10	0.04	Investment	-0.04	0.03	
Secondary enrollment	0.77	0.42	Secondary enrollment	1.79	0.83	Secondary enrollment	-0.24	0.08	Secondary enrollment	0.13	0.05	
Urban population	1.10	0.60	Urban population	0.63	0.33	Urban population	-0.14	0.05	Urban population	0.07	0.04	
Population growth	0.57	0.29	Population growth	0.05	0.03	Population growth	-0.14	0.04	Population growth	-0.23	0.08	
Population density	6.02	1.00	Population density	-0.15	0.04	Population density	-0.36	0.15	Population density	10.34	1.00	
Industrial share	5.19	1.00	Industrial share	1.16	0.64	Industrial share	-0.27	0.10	Industrial share	1.64	0.80	
Agricultural share	-0.25	0.09	Agricultural share	3.59	0.99	Agricultural share	0.09	0.04	Agricultural share	-4.13	0.99	

Shaded boxes indicate variable is above threshold.

Table 5a – BMA Results, Resource Abundance expressed as Resource Rents to GDP, Government Share of GDP

Gas			Electricity			Paper			Oil			
Variable	**t**	**pip**	**Variable**	**t**	**pip**	**Variable**	**t**	**pip**	**Variable**	**t**	**pip**	
Constant	-5.36	1.00	Constant	-17.55	1.00	Constant	-4.38	1.00	Constant	-12.37	1.00	Focus variables
Investor Protection	-0.30	1.00	Investor Protection	-4.42	1.00	Investor Protection	-3.13	1.00	Investor Protection	-10.89	1.00	
Government share	2.17	1.00	Government share	5.95	1.00	Government share	4.76	1.00	Government share	5.95	1.00	
Property rights*Resource Rents	-4.07	1.00	Property rights*Resource Rents	-1.44	1.00	Property rights*Resource Rents	-2.76	1.00	Property rights*Resource Rents	-2.39	1.00	
Government Share*Resource Rents	-6.46	1.00	Government Share*Resource Rents	-5.43	1.00	Government Share*Resource Rents	-3.08	1.00	Government Share*Resource Rents	-4.78	1.00	
Resource Rents	9.01	1.00	Resource Rents	2.45	1.00	Resource Rents	-0.91	1.00	Resource Rents	4.91	1.00	
GDP	3.07	1.00	GDP	6.86	1.00	GDP	1.1	1.00	GDP	6.80	1.00	
GDP^2	0.04	1.00	GDP^2	-6.82	1.00	GDP^2	-0.44	1.00	GDP^2	-7.03	1.00	
GDP 1970	0.26	0.09	GDP 1970	0.06	0.03	GDP 1970	-3.86	0.99	GDP 1970	-0.48	0.23	Auxiliary variables
Openness	0.14	0.05	Openness	7.27	1.00	Openness	4.59	1.00	Openness	5.68	1.00	
FDI net	0.73	0.40	FDI net	-5.05	1.00	FDI net	-2.37	0.92	FDI net	-1.80	0.84	
Investment	0.06	0.03	Investment	0.03	0.03	Investment	-0.28	0.10	Investment	3.42	0.98	
Secondary enrollment	0.34	0.14	Secondary enrollment	4.70	1.00	Secondary enrollment	-0.27	0.10	Secondary enrollment	-0.29	0.11	
Urban population	0.05	0.04	Urban population	0.85	0.48	Urban population	-0.1	0.05	Urban population	0.58	0.30	
Population growth	-0.20	0.06	Population growth	-4.82	1.00	Population growth	0.06	0.03	Population growth	-0.10	0.03	
Population density	8.64	1.00	Population density	-0.63	0.33	Population density	-1.04	0.59	Population density	-0.15	0.04	
Industrial share	3.34	0.98	Industrial share	6.61	1.00	Industrial share	10.80	1.00	Industrial share	-0.04	0.03	
Agricultural share	-0.38	0.16	Agricultural share	6.34	1.00	Agricultural share	2.72	0.95	Agricultural share	0.62	0.34	

Shaded boxes indicate variable is above threshold.

Table 5b – BMA Results, Resource Abundance expressed as Resource Rents to GDP, Political Constraints

Gas			Electricity			Paper			Oil			
Variable	**t**	**pip**	**Variable**	**t**	**pip**	**Variable**	**t**	**pip**	**Variable**	**t**	**pip**	
Constant	-4.51	1.00	Constant	-16.41	1.00	Constant	-6.07	1.00	Constant	-10.72	1.00	Focus variables
Investor Protection	-1.62	1.00	Investor Protection	-6.06	1.00	Investor Protection	-4.45	1.00	Investor Protection	-10.88	1.00	
Political Constraints	-3.68	1.00	Political Constraints	-0.46	1.00	Political Constraints	-3.91	1.00	Political Constraints	-7.51	1.00	
Property rights*Resource Rents	-1.33	1.00	Property rights*Resource Rents	1.20	1.00	Property rights*Resource Rents	-1.33	1.00	Property rights*Resource Rents	-1.01	1.00	
Political Constraints*Resource Rents	4.24	1.00	Political Constraints*Resource Rents	4.97	1.00	Political Constraints*Resource Rents	2.10	1.00	Political Constraints*Resource Rents	4.86	1.00	
Resource Rents	3.95	1.00	Resource Rents	-3.69	1.00	Resource Rents	-5.47	1.00	Resource Rents	-0.42	1.00	
GDP	2.75	1.00	GDP	6.07	1.00	GDP	1.04	1.00	GDP	5.30	1.00	
GDP^2	-0.10	1.00	GDP^2	-6.07	1.00	GDP^2	-0.12	1.00	GDP^2	-5.53	1.00	
GDP 1970	-0.03	0.03	GDP 1970	-0.17	0.05	GDP 1970	-2.10	0.90	GDP 1970	-0.34	0.34	Auxiliary variables
Openness	0.31	0.12	Openness	7.90	1.00	Openness	5.20	1.00	Openness	7.96	1.00	
FDI net	0.19	0.06	FDI net	-5.64	1.00	FDI net	-2.25	0.91	FDI net	-2.99	0.96	
Investment	0.11	0.04	Investment	-0.19	0.06	Investment	-0.14	0.05	Investment	4.48	1.00	
Secondary enrollment	2.04	0.86	Secondary enrollment	4.50	1.00	Secondary enrollment	-0.10	0.04	Secondary enrollment	0.03	0.03	
Urban population	0.08	0.04	Urban population	1.59	0.79	Urban population	-0.20	0.08	Urban population	2.47	0.96	
Population growth	-0.25	0.09	Population growth	-3.67	0.99	Population growth	0.02	0.03	Population growth	-0.21	0.06	
Population density	8.37	1.00	Population density	-0.53	0.26	Population density	-1.92	0.86	Population density	-0.22	0.07	
Industrial share	0.94	0.53	Industrial share	5.88	1.00	Industrial share	10.04	1.00	Industrial share	-0.19	0.06	
Agricultural share	-0.56	0.29	Agricultural share	6.26	1.00	Agricultural share	1.30	0.71	Agricultural share	0.75	0.41	

Shaded boxes indicate variable is above threshold.

Table 6 – 3SLS Regressions Including Institutional Interaction Terms, Resource Use v. Resource Abundance (Initial Production)

	Gas				Electricity			
	1	2	3	4	5	6	7	8
INSTITUTIONAL Variables								
Political								
Government Share	0.05				0.004			
	*6.10***				*3.15***			
Government Share*Resource Abundance	-0.01				0.004			
	*8.37***				*5.86***			
Political Constraints		0.72				-0.14		
		*2.41**				*2.67***		
Political Constraints*Resource Abundance		-0.08				-0.02		
		1.59				*1.50*		
Political Durability			0.01				-0.003	
			*4.33***				*4.75***	
Political Durability*Resource Abundance			-0.001				0.001	
			*3.06***				*5.74***	
5-year Political Volatility				-2.22				0.27
				*1.65**				*1.35*
Volatility*Resource Abundance				0.80				0.23
				*3.35***				*3.27***
Economic								
Property Rights	0.18	0.15	0.17	0.12	-0.001	0.0060	-0.001	0.005
	*4.45***	*4.42***	*4.92***	*2.91***	*0.22*	*0.69*	*0.08*	*0.65*
Property Rights*Resource Abundance	-0.04	-0.04	-0.04	-0.03	-0.01	-0.01	-0.01	-0.01
	*7.11***	*6.88***	*6.12***	*4.61***	*6.04***	*6.20***	*6.54***	*6.22***
RESOURCE Variables								
Resource Abundance (log of initial production)	1.00	0.76	0.75	0.58	0.57	0.70	0.67	0.67
	*12.75***	*15.96***	*17.10***	*9.58***	*21.66***	*31.21***	*33.69***	*33.57***
MACRO Variables								
GDP	3.00	2.25	1.24	1.16	-0.10	-0.11	0.24	-0.10
	*10.64***	*10.63***	*3.99***	*4.59***	*0.91*	*1.00*	*2.02**	*0.97*
GDP^2	-0.04	-0.03	-0.01	-0.01	-0.002	-0.003	-0.01	-0.003
	*8.25***	*6.62***	*1.96**	*2.32**	*1.21*	*1.42*	*4.14***	*1.41*
GDP 1970		-0.20	-0.06		-0.33	-0.32	-0.34	-0.33
		*4.43***	*1.42*		*19.48***	*17.79***	*19.79***	*17.69***
Openness					0.24	0.29	0.29	0.27
					*11.33***	*12.41***	*12.58***	*12.93***
FDI net					-0.01	-0.01	-0.01	-0.01
					*7.07***	*6.44***	*6.37***	*6.60***
Investment	-0.02	-0.01	-0.008					
	*7.04***	*3.50***	*2.95***					
Secondary enrollment	0.004			0.005	0.003	0.003	0.003	0.003

	Gas				Electricity			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	*4.54***			*5.75***	*6.73***	*6.57***	*5.48***	*6.18***
Urban population		0.003						
		*3.57***						
Population density	0.002	0.002	0.002	0.002				
	*19.71***	*23.69***	*20.43***	*17.41***				
Industrial share	0.04	0.03	0.03	0.03	0.005	0.003	0.004	0.004
	*14.50***	*12.33***	*15.33***	*12.53***	*4.67***	*2.79***	*3.38***	*3.61***
Agricultural share					0.008	0.009	0.008	0.009
					*6.91***	*6.95***	*6.66***	*7.33***
C	-47.12	-33.17	-21.30	-20.96	-11.54	-11.06	-15.01	-11.18
	*12.82***	*11.48***	*5.15***	*6.54***	*8.75***	*8.01***	*9.78***	*8.15***
n	917	1141	1119	916	1412	1411	1371	1405
Partial R-squared	0.73	0.73	0.74	0.73	0.65	0.65	0.65	0.65
instruments	Lag of All Institutional Variables, Initial Level of GDP, Country, Year							

*Note: absolute values of t-stats are under the coefficients, with * signifying significance at the 10% level and ** at the 1% level. Results obtained via reg3 in Stata with 3sls.*

Table 6 – 3SLS Regressions Including Institutional Interaction Terms, Resource Use v. Resource Abundance (Initial Production) continued

	Paper				Oil			
	9	10	11	12	13	14	15	16
INSTITUTIONAL Variables								
Political								
Government Share	-0.03				0.04			
	*2.47**				*7.52***			
Government Share*Resource Abundance	0.004				-0.007			
	*2.93***				*6.31***			
Political Constraints		0.49				0.58		
		*3.24***				*3.39***		
Political Constraints*Resource Abundance		-0.06				-0.10		
		*5.19***				*3.53***		
Political Durability			-0.001				-0.006	
			0.59				*15.26***	
Political Durability*Resource Abundance			0.0001				0.0008	
			0.59				*9.76***	
5-year Political Volatility				0.44				1.28
				1.60				*3.27***
Volatility*Resource Abundance				0.01				-0.06
				0.63				*0.80*
Economic								
Property Rights	-0.04	-0.04	-0.03	-0.03	-0.05	-0.06	-0.07	-0.05
	*2.12**	*2.02**	*1.74**	*1.39*	*3.72***	*4.31***	*5.33***	*3.50***
Property Rights*Resource Abundance	-0.002	-0.003	-0.003	-0.003	-0.009	-0.001	-0.01	-0.01
	*1.74**	*2.37**	*2.37**	*2.46**	*4.59***	*0.50*	*5.86***	*3.78***
RESOURCE Variables								
Resource Abundance (log of initial production)	0.07	0.17	0.14	0.15	0.27	0.12	0.13	0.13
	*2.56***	*11.10***	*10.20***	*12.13***	*10.40***	*5.95***	*7.81***	*7.49***
MACRO Variables								
GDP	-0.55	-0.60	-0.16	-0.28	0.71	-0.04	0.61	0.15
	*1.81**	*2.78***	*0.59*	*1.31*	*5.18***	*0.22*	*3.80***	*1.17*
GDP^2	0.02	0.02	0.008	0.01	-0.01	-0.002	-0.01	-0.004
	*2.71***	*4.17***	*1.54*	*2.56**	*5.41***	*0.68*	*3.58***	*1.60*
GDP 1970	-0.33	-0.33	-0.35	-0.35	-0.07		-0.15	
	*11.21***	*10.71***	*11.85***	*11.76***	*2.79***		*6.67***	
Openness	0.31	0.32	0.32	0.32	0.24		0.21	0.31
	*12.37***	*11.96***	*13.37***	*13.30***	*5.55***		*6.18***	*10.69***
FDI net	-0.01	-0.01	-0.01	-0.01	-0.01		-0.01	-0.01
	*3.65***	*3.48***	*3.31***	*3.49***	*2.71***		*2.82***	*3.44***
Investment					0.004			
					*2.79***			

	Paper				Oil			
	9	10	11	12	13	14	15	16
Secondary enrollment	-0.003		-0.003	-0.003				
	*4.39***		*5.58***	*5.41***				
Population density						-0.0002	-0.0004	-0.0004
						*3.00***	*8.00***	*8.02***
Industrial share						0.005	-0.007	
						*2.16**	*4.17***	
Agricultural share					0.02	0.02		0.02
					*11.16***	*12.62***		*15.05***
C	0.51	0.12	-4.84	3.52	-20.71	-10.89	-16.28	-13.90
	0.12	*2.79***	*1.38*	*1.25*	*12.02***	*5.00***	*7.90***	*8.32***
n	1028	1025	1028	1021	1031	953	988	1023
Partial R-squared	0.21	0.20	0.19	0.20	0.56	0.50	0.55	0.54
instruments	Lag of All Institutional Variables, Initial Level of GDP, Country, Year							

*Note: absolute values of t-stats are under the coefficients, with * signifying significance at the 10% level and ** at the 1% level. Results obtained via reg3 in Stata with 3sls.*

TABLE 7 – 3SLS Regressions Including Institutional Interaction Terms, Resource Use v. Resource Rents

	Gas				Electricity			
	1	2	3	4	5	6	7	8
INSTITUTIONAL Variables								
Political								
Government Share	0.01				0.02			
	*2.10**				*7.18***			
Government Share*Resource Rents	-0.002				-0.0009			
	*7.28***				*5.60***			
Political Constraints		-1.62				-0.06		
		*6.79***				*0.85*		
Political Constraints*Resource Rents		0.08				0.03		
		*8.11***				*5.04***		
Political Durability			-0.003				-0.0001	
			*5.42***				*0.27*	
Political Durability*Resource Rents			0.001				0.0002	
			*9.09***				*4.99***	
5-year Political Volatility				0.33				0.85
				0.33				*2.60***
Volatility*Resource Rents				-0.02				-0.01
				0.47				*0.82*
Economic								
Property Rights	0.020	0.04	0.003	0.002	-0.04	-0.06	-0.07	-0.05
	0.53	*1.42*	*0.14*	*0.06*	*3.82***	*4.64***	*6.49***	*4.30***
Property Rights*Resource Rents	-0.004	-0.001	-0.005	-0.002	-0.001	0.0006	-0.0003	-0.0004
	*4.68***	*1.14*	*4.34***	*2.18**	*2.41**	*1.23*	*0.46*	*0.83*
RESOURCE Variables								
Resource Rents	0.08	0.04	0.05	0.04	0.02	-0.02	-0.008	-0.002
	*8.56***	*3.97***	*6.80***	*4.68***	*4.04***	*3.99***	*2.01**	*0.57*
MACRO Variables								
GDP	0.90	-0.59	1.52	1.32	0.90	0.81	0.68	0.77
	*3.57***	*2.33**	*7.38***	*5.44***	*9.37***	*7.39***	*6.85***	*7.85***
GDP^2	0.001	0.03	-0.01	-0.008	-0.02	-0.02	-0.01	-0.02
	0.13	*6.36***	*2.62***	*1.60*	*9.53***	*7.55***	*6.98***	*8.03***
GDP 1970								
Openness					0.26	0.29	0.28	0.28
					*7.65***	*9.24***	*8.76***	*8.99***
FDI net					-0.02	-0.02	-0.01	-0.02
					*5.02***	*6.17***	*4.94***	*5.13***
Investment								
Secondary enrollment		0.01			0.006	0.005	0.005	0.007
		*6.73***			*9.62***	*8.01***	*6.84***	*10.30***

	Gas				Electricity			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Urban population						0.003		
						*4.27***		
Population density	0.003		0.002	0.002				-0.0002
	*32.40***		*28.20***	*30.86***				*5.82***
Population Growth					-0.10	-0.08	-0.10	-0.08
					*6.49***	*5.28***	*5.86***	*5.35***
Industrial share	0.05		0.03	0.04	0.02	0.01	0.01	0.01
	*8.97***		*6.15***	*8.60***	*7.95***	*7.09***	*6.69***	*7.59***
Agricultural share					0.02	0.02	0.01	0.02
					*8.99***	*9.19***	*8.16***	*9.66***
C	-20.44	-0.88	-28.34	-25.46	-33.60	-32.02	-30.10	-31.51
	*6.38***	*0.26*	*10.81***	*8.30*	*26.20***	*21.95***	*23.28***	*24.82***
n	1209	1156	1486	1232	1411	1409	1606	1401
Partial R-squared	0.57	0.54	0.58	0.56	0.23	0.23	0.20	0.22
instruments	Second Lag of All Institutional Variables, Initial Level of GDP, Country, Year							

*Note: absolute values of t-stats are under the coefficients, with * signifying significance at the 10% level and ** at the 1% level.*

TABLE 7 – 3SLS Regressions Including Institutional Interaction Terms, Resource Use v. Resource Rents (continued)

	Paper				Oil			
	9	10	11	12	13	14	15	16
INSTITUTIONAL Variables								
Political								
Government Share	0.01				0.01			
	*4.41***				*7.60***			
Government Share*Resource Rents	-0.0004				-0.0003			
	1.06				*3.79***			
Political Constraints		-0.53				-0.72		
		*7.15***				*11.67***		
Political Constraints*Resource Rents		0.01				0.02		
		*2.28**				*6.32***		
Political Durability			0.0003				-0.005	
			1.12				*19.84***	
Political Durability*Resource Rents			0.0003				0.001	
			*5.28***				*13.70***	
5-year Political Volatility				1.46				1.40
				*4.89***				*5.61***
Volatility*Resource Rents				-0.05				-0.04
				*3.04***				*3.30***
Economic								
Property Rights	-0.06	-0.06	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
	*4.73***	*5.82***	*10.40***	*8.88***	*12.55***	*11.47***	*11.71***	*10.93***
Property Rights*Resource Rents	-0.003	-0.003	-0.003	-0.001	-0.001	-0.001	-0.002	-0.001
	*4.68***	*3.61***	*4.64***	*1.59*	*1.45*	*1.31*	*4.23***	*2.30**
RESOURCE Variables								
Resource Rents	-0.01	-0.03	-0.02	0.01	0.02	-0.001	0.01	0.02
	1.15	*4.43***	*3.75***	*2.33**	*4.33***	*0.27*	*2.48**	*4.25***
MACRO Variables								
GDP	0.69	0.61	0.57	0.54	0.60	0.40	0.23	0.52
	*4.17***	*3.45***	*3.35***	*6.89***	*9.04***	*5.69***	*3.44***	*7.42***
GDP^2	-0.01	-0.008	-0.007	-0.01	-0.01	-0.01	-0.005	-0.01
	*2.91***	*2.44**	*2.11**	*7.11***	*9.41***	*5.88***	*3.51***	*7.90***
GDP 1970	-0.18	-0.12	-0.21	-0.02				
	*6.09***	*4.09***	*10.00***	*1.16*				
Openness	0.33	0.38	0.26	0.28	0.21	0.26	0.26	0.21
	*11.53***	*13.56***	*9.26***	*11.35***	*8.22***	*10.58***	*10.30***	*8.63***
FDI net	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.006	-0.01
	*3.63***	*3.45***	*3.68***	*2.75***	*3.38***	*3.70***	*2.40**	*3.50***
Investment	-0.002				0.005	0.007	0.005	0.006
	1.17				*6.23***	*7.82***	*5.68***	*6.68***
Urban population						0.003		
						*7.60***		

	Paper				Oil			
	9	10	11	12	13	14	15	16
Population density	-0.0004	-0.0005		-0.0003			-0.0005	
	*7.19***	*9.02***		*8.93***			*13.10***	
Industrial share	0.03	0.02	0.03	0.0001				
	*9.23***	*8.00***	*9.61***	*0.03*				
Agricultural share	0.007	0.003		0.001				
	*2.34**	*1.19*		*0.93*				
C	-18.93	-18.27	-16.07	-17.89	-19.08	-16.49	-14.39	-17.97
	*9.10***	*8.24***	*7.53***	*18.29***	*22.78***	*18.52***	*17.14***	*20.46***
n	1102	1099	1462	1831	2218	2216	2169	2208
Partial R-squared	0.39	0.39	0.40	0.27	0.27	0.29	0.33	0.28
instruments	Second Lag of All Institutional Variables, Initial Level of GDP, Country, Year							

*Note: absolute values of t-stats are under the coefficients, with * signifying significance at the 10% level and ** at the 1% level.*

Table 8 – Quantile Regressions, Government Share of the Economy v. Initial Level of Production

	Gas			Electricity			Paper			Oil		
	0.25	**Median**	**0.75**	**0.25**	**Median**	**0.75**	**0.25**	**Median**	**0.75**	**0.25**	**Median**	**0.75**
INSTITUTIONAL Variables												
Political												
Government Share	0.03	-0.02	0.002	0.001	0.003	0.01	-0.02	-0.03	-0.03	0.03	0.02	0.02
	*2.82***	*2.19**	*0.16*	*0.60*	*2.23**	*4.16***	*2.65***	*2.39**	*3.01***	*7.32***	*7.35***	*5.87***
Government Share*Resource Abundance	-0.01	-0.001	-0.01	0.005	0.002	0.001	0.003	0.002	0.003	-0.004	-0.003	-0.002
	*3.66***	*0.40*	*2.45**	*5.64***	*3.99***	*1.45*	*3.83***	*2.82***	*3.68***	*4.64***	*4.59***	*2.51**
Economic												
Property Rights	0.08	0.05	0.07	0.01	-0.005	-0.005	-0.03	-0.07	-0.02	-0.04	-0.03	-0.01
	*2.27**	*2.01**	*3.05***	*1.69**	*0.75*	*0.63*	*1.84**	*4.47***	*2.31**	*4.57***	*3.33***	*1.18*
Property Rights*Resource Abundance	-0.02	-0.02	-0.03	-0.008	-0.006	-0.01	-0.001	0.0002	-0.002	-0.01	-0.01	-0.01
	*3.97***	*4.17***	*7.11***	*3.67***	*3.47***	*4.43***	*0.42*	*0.21*	*2.15**	*5.37***	*6.12***	*4.82***
RESOURCE Variables												
Resource Abundance	0.72	0.51	0.62	0.56	0.67	0.70	0.05	0.09	0.09	0.23	0.23	0.22
	*8.56***	*7.28***	*10.64***	*16.37***	*26.59***	*20.70***	*2.00**	*3.39***	*4.17***	*10.53***	*12.47***	*9.70***
MACRO Variables												
GDP	2.71	2.74	1.27	0.45	0.09	-0.24	-0.31	-0.56	-1.24	1.36	0.78	0.35
	*3.43***	*5.27***	*2.45**	*2.65***	*0.85*	*1.01*	*1.13*	*1.87**	*4.19***	*8.03***	*3.81***	*1.54*
GDP^2	-0.04	-0.05	-0.01	-0.01	-0.006	0.0005	0.01	0.02	0.03	-0.03	-0.02	-0.007
	*2.58***	*4.31***	*1.47*	*3.67***	*2.71***	*0.1*	*1.80**	*2.69***	*4.75***	*7.90***	*4.03***	*1.58*
GDP 1970				-0.39	-0.46	-0.41	-0.24	-0.36	-0.31	-0.11	-0.03	-0.10
				*14.89***	*20.85***	*15.62***	*6.08***	*9.11***	*8.85***	*3.39***	*0.85*	*2.34**
Openness				0.16	0.15	0.24	0.28	0.34	0.31	0.23	0.21	0.27
				*5.59***	*6.30***	*8.59***	*7.58***	*9.07***	*10.25***	6.38**	6.22**	7.58**
FDI net				-0.02	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.02
				*6.34***	*4.27***	*3.07***	*2.11**	*2.06**	*1.90**	*3.97***	*2.86***	*4.01***
Investment	-0.02	-0.003	-0.005							0.007	0.004	0.0007

	Gas			Electricity			Paper			Oil		
	0.25	Median	0.75	0.25	Median	0.75	0.25	Median	0.75	0.25	Median	0.75
	2.09*	0.77	2.01*							4.18**	2.88**	0.24
Secondary Enrollment	0.004	0.004	0.01	0.001	0.002	0.003	-0.002	-0.003	-0.005			
	1.35	2.12*	6.52**	2.32*	4.18**	4.16**	2.74**	3.64**	10.73**			
Urban population												
Population density	0.002	0.001	0.0005									
	7.87**	8.50**	2.78**									
Industrial share	0.02	0.02	0.01	0.007	0.008	0.007						
	4.49**	4.61**	2.88**	5.37**	6.29**	4.27**						
Agricultural share	-0.003	-0.004	0.02	0.008	0.006	0.009				0.02	0.02	0.02
	0.25	0.46	3.32**	3.79**	4.11**	4.19**				8.65**	8.25**	7.66
C	-42.08	-39.01	-19.85	-17.60	-11.24	-7.97	-4.33	1.40	10.19	-28.87	-21.91	-14.77
	4.13**	5.67**	2.96**	7.85**	8.22**	2.70**	1.13	0.35	2.61**	13.31**	8.32**	4.76**
n	965	965	965	1466	1466	1466	1062	1062	1062	1343	1343	1343
Partial R-squared	0.50	0.48	0.47	0.38	0.42	0.44	0.09	0.13	0.18	0.31	0.31	0.29

*Note: absolute values of t-stats are under the coefficients, with * signifying significance at the 10% level and ** at the 1% level. Results obtained via qreg in Stata*

Table 9 – Quantile Regressions, Political Constraints v. Initial Level of Production

	Gas			Electricity			Paper			Oil		
	0.25	**Median**	**0.75**	**0.25**	**Median**	**0.75**	**0.25**	**Median**	**0.75**	**0.25**	**Median**	**0.75**
INSTITUTIONAL Variables												
Political												
Political Constraints	1.94	0.73	0.64	0.15	0.05	-0.09	0.31	0.42	0.45	0.91	0.56	0.30
	*7.47***	*2.90***	*1.91**	*2.39**	*1.03*	*1.42*	*1.84**	*3.25***	*2.97***	*7.18***	*4.74***	*2.38**
Political Constraints*Resource Abundance	-0.31	-0.14	-0.12	-0.11	-0.04	0.04	-0.02	-0.05	-0.06	-0.19	-0.12	-0.12
	*6.20***	*3.16***	*2.17**	*5.19***	*2.64***	*2.06**	*1.88**	*4.97***	*5.20***	*8.40***	*6.18***	*5.96***
Economic												
Property Rights	0.04	0.07	0.06	0.001	-0.009	-0.01	-0.10	-0.10	-0.03	-0.07	-0.07	-0.06
	*1.71**	*3.09***	*2.62***	*0.17*	*1.36*	*1.35*	*5.59***	*7.19***	*2.21**	*6.34***	*8.16***	*5.32***
Property Rights*Resource Abundance	-0.02	-0.02	-0.02	0.009	-0.008	-0.02	0.0004	0.001	-0.003	-0.004	-0.003	-0.01
	*3.57***	*5.76***	*3.66***	*3.66***	*3.66***	*4.93***	*0.32*	*0.54*	*3.46***	*1.80**	*1.54*	*2.22**
RESOURCE Variables												
Resource Abundance	0.75	0.61	0.51	0.71	0.75	0.76	0.13	0.15	0.16	0.21	0.17	0.17
	*14.09***	*13.66***	*9.89***	*32.68***	*39.08*	*27.91***	*4.99***	*9.71***	*8.75***	*11.24***	*8.91***	8.33**
MACRO Variables												
GDP	1.25	2.96	1.17	0.25	-0.13	-0.27	0.03	-0.63	-1.18	1.18	0.99	0.08
	*3.47***	*7.40***	*1.67**	*1.56*	*1.06*	*1.89**	*0.15*	*3.37***	*5.56***	*6.46***	*4.28***	*0.22*
GDP^2	-0.01	-0.04	-0.009	-0.009	-0.002	0.0004	0.004	0.01	0.02	-0.03	-0.02	-0.004
	*1.70**	*4.71***	*0.66*	*2.94***	*0.93*	*0.17*	*1.03*	*4.12***	*6.07***	*6.98***	*4.78***	*0.54*
GDP 1970	-0.17	-0.51	-0.21	-0.37	-0.43	-0.41	-0.35	-0.25	-0.23			
	1.42	*8.20***	*2.55**	*14.53***	*21.76***	*15.05***	*6.97***	*7.93***	*7.11***			
Openness				0.17	0.16	0.25	0.26	0.30	0.32			
				*5.18***	*7.02***	*8.10***	*6.25***	*10.40***	9.58**			
FDI net				-0.009	-0.01	-0.007	-0.02	-0.01	-0.01			
				*2.52**	*4.51***	*2.68***	*6.23***	*3.85***	*6.63***			
Investment	0.003	0.006	-0.006									
	0.66	*1.38*	*1.32*									

	Gas			Electricity			Paper			Oil		
	0.25	**Median**	**0.75**	**0.25**	**Median**	**0.75**	**0.25**	**Median**	**0.75**	**0.25**	**Median**	**0.75**
Secondary Enrollment				0.0004	0.002	0.002						
				0.57	*3.34***	*3.24***						
Urban population	0.006	0.01	-0.003									
	*1.70**	*2.95***	*0.99*									
Population density	0.002	0.002	0.001							0.0003	0.0003	0.0002
	*18.95***	*16.74***	*3.78***							*17.72***	*18.48***	*14.47***
Industrial share	0.01	0.02	0.02	0.003	0.007	0.007				-0.001	0.004	0.009
	*2.63***	*4.34***	*4.16***	*1.97**	*5.52***	*4.71***				*0.42*	*1.75**	*3.82***
Agricultural share	-0.001	0.01	-0.01	0.004	0.005	0.007				0.01	0.02	0.02
	0.13	*1.16*	*1.05*	*2.66***	*3.57***	*3.04***				*4.77***	*7.56***	*6.65***
C	-19.73	-37.33	-15.42	-15.04	-8.48	-7.02	-7.67	0.24	7.14	-27.37	-24.35	-15.53
	*4.68***	*6.74***	*1.67**	*7.81***	*5.49***	*4.30***	*2.54**	*0.10*	*2.50**	*12.00***	*8.29***	*2.65***
n	1126	1126	1126	1712	1712	1712	1538	1538	1538	1639	1639	1639
Partial R-squared	0.53	0.50	0.45	0.36	0.40	0.42	0.10	0.11	0.14	0.26	0.27	0.27

*Note: absolute values of t-stats are under the coefficients, with * signifying significance at the 10% level and ** at the 1% level. Results obtained via qreg in Stata*