

# The Varieties of Resource Experience: Natural Resource Export Structures and the Political Economy of Economic Growth

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Many oil, mineral, and plantation crop-based economies experienced a substantial deceleration in growth following the commodity boom and bust of the 1970s and early 1980s. This article illustrates how countries dependent on point source natural resources (those extracted from a narrow geographic or economic base, such as oil and minerals) and plantation crops are predisposed to heightened economic and social divisions and weakened institutional capacity. This in turn impedes their ability to respond effectively to shocks, which previous studies have shown to be essential for sustaining rising levels of prosperity. Analysis of data on classifications of export structure, controlling for a wide array of other potential determinants of governance, shows that point source- and coffee and cocoa-exporting countries do relatively poorly across an array of governance indicators. These governance effects are not associated simply with being a natural resource exporter. Countries with natural resource exports that are diffuse—relying primarily on livestock and agricultural produce from small family farms—do not show the same strong effects—and have had more robust growth recoveries.

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The rentier state is a state of parasitic, decaying capitalism, and this circumstance cannot fail to influence all the socio-political conditions of the countries concerned.

—Vladimir Lenin, *Imperialism, the Highest Stage of Capitalism*

It matters whether a state relies on taxes from extractive industries, agricultural production, foreign aid, remittances, or international borrowing because these different sources of revenues, whatever their relative economic merits or social import, have powerful (and quite different) impact on the state's institutional development and its abilities to employ personnel, subsidize social and economic programs, create new organizations, and direct the activities of private interests. Simply stated, the revenues a state collects, how it collects them, and the uses to which it puts them define its nature.

—Terry Karl, *The Paradox of Plenty*

It is useful to contrast the conduct of governments in resource-rich nations with that of governments in nations less favorably endowed. In both, governments search for revenues; but they do so in different ways. Those in resource-rich economies tend to secure revenues by extracting them; those in resource-poor nations, by promoting the creation of wealth. Differences in natural endowments thus appear to shape the behavior of governments.

—Robert Bates, *Prosperity and Violence*

Is oil wealth a blessing or a curse? Norway provides an encouraging example, but Azerbaijanis are rightly concerned whether their country can handle the potential bonanza from newly discovered oil fields. While government officials have promised that oil revenues will go to schools, hospitals, and roads, no formal plans are in the offing; meanwhile, neighboring Caspian Sea nations are despotically ruled, ethnically divided, and weakened by corruption—problems some fear will be made worse by oil.<sup>1</sup> The controversy over construction of the oil pipeline in Chad demonstrates that even in an extraordinarily poor country, not all believe that additional wealth pouring into government coffers will lead to better times. Similarly, after the recent discovery of oil reserves off the coast of São Tomé and Príncipe, the leader of a short-lived coup demanded that the oil revenues be used to benefit the nation's entire population. After the government was restored, Prime Minister Maria das Neves stated: "Oil could be our heaven, purgatory or hell; it all depends on how São Tomé faces up to this challenge" (Agence France Press 2004).

Both resource scarcity and abundance have been cited as a primary cause of civil war. Some have argued that land scarcity is behind the Rwandan conflicts (Diamond 2005; Klare 2001), but resource-rich countries have not escaped civil strife. Countries such as Angola have been embroiled in conflict since the mid-1970s, and the problem there is not scarce land but rather abundant sources of oil and some of the world's best diamonds (Campbell 2002). Just as revenues from diamonds, timber, coffee, and gold in the eastern half of the country strengthened (then) Zaire's elite, revenues from coltan (columbite-tantalite) are now strengthening the rebel Rally for Congolese Democracy.<sup>2</sup> Rebels in

1. According to the former chief UN representative in Azerbaijan, "This wealth... will create a lot of problems. It will increase the already substantial gap between the rich and poor, and eventually it will affect political stability" (Kinzer 1999).

2. Coltan has recently been declared the "wonder mineral of the moment" (Vick 2001, p. A1). When processed, it is vital for the manufacture of capacitors and other high-tech products.

Sierra Leone are financed by revenues from diamond mines and may be fighting over nothing else but control over the mines.

What mechanisms might explain the conditions under which resource abundance becomes a problem rather than part of a solution to development? This article adds to the burgeoning literature on natural resources and performance by documenting one way in which countries' sources of export revenue affect economic growth.<sup>3</sup> The novelty in this article is to show that export concentration in what is here called point source natural resources—those extracted from a narrow geographic or economic base, such as oil, minerals (such as copper and diamonds), and plantation crops (such as sugar and bananas)—is strongly associated with weak public institutions, which are, in turn, strongly associated with slower growth.<sup>4</sup> This article presents econometric evidence to support the hypothesis not only that institutional capacity to handle shocks is a determinant of economic growth since the commodity shocks of the 1970s and 1980s (Rodrik 1999) but also that institutional capacity itself varies and that export structures influence socioeconomic and political institutions.

The growth performance facts that the analysis is trying to (partially) explain are shown in figures 1 and 2. Smoothed over three years, the median annual growth rate of GDP per capita for 90 developing economies from the early 1960s to the late 1970s was consistently above 2 percent (figure 1). But since 1980, developing economies have endured a growth collapse of Grand Canyon proportions, with growth well below 1 percent for the early 1980s and remaining below 2 percent until the mid-1990s.

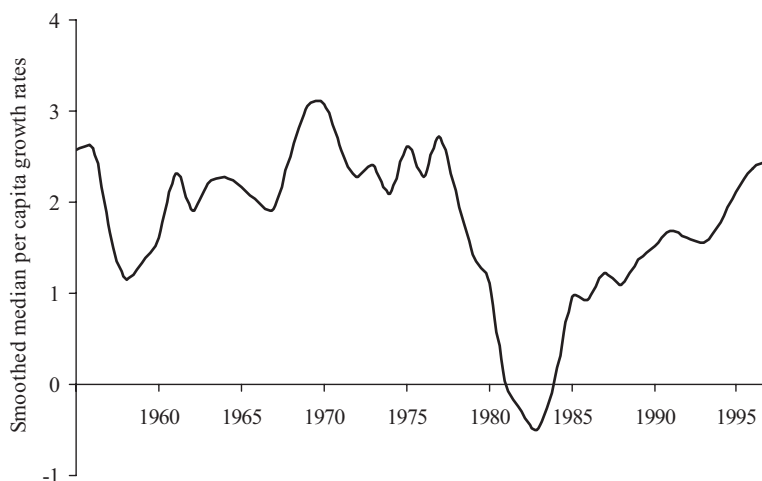
The collapse is even more striking when the growth performance is shown for the 90 developing economies classified by their export structure (defined shortly) in 1985 (figure 2). Countries that were exporters of manufacturers have experienced no growth deceleration. All natural resource exporters suffered substantial slowdowns, but the deceleration was much more severe and lasted much longer for point source and coffee or cocoa exporters than for countries whose principal exports were diffuse. Why?

This article focuses on the variety of growth experiences associated with reliance on different sources of export revenue. It shows that the composition of natural resource exports influences the quality of political institutions and that these in turn shape growth performance. Given the distinguished roster of theoretical and econometric publications that have addressed connections among natural resources, institutions, and economic performance, four caveats apply to this article's place in the literature. First, the article makes no claim that

3. The most recent literature on the effects of natural resources on growth includes Auty (1995, 2001b); Leamer and others (1999); Leite and Weidmann (1999); Ross (1999, 2001); Sachs and Warner (1995, 1999); Stijns (2001); Nugent and Robinson (2001); Gylfason (2001); Gylfason and Zoega (2001, 2002); Lederman and Maloney (2002); Easterly and Levine (2002); Murshed (2003); Sala-i-Martin and Subramanian (2003); Neumayer (2004); and Papyrakis and Gerlagh (2004).

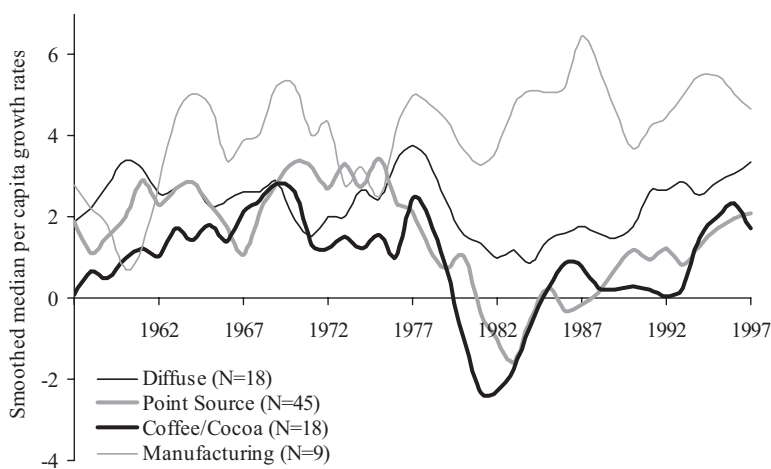
4. Rodrik and others (2004) and Rigobon and Rodrik (2004) are the latest in a decade-long set of publications to establish, with cross-sectional data, the connection between institutions and economic performance.

FIGURE 1. Smoothed Median per Capita Growth Rates in 90 Developing Economies, 1955–97



Source: Woolcock and others (2001).

FIGURE 2. Smoothed Median Growth Rates for 90 Developing Economies, 1957–97



Source: Woolcock and others (2001).

natural resources affect growth solely though institutions: Dutch disease has been convincingly documented since at least Corden and Neary (1982). Second, the article does not offer any novel claims about the relative importance of institutions for economic performance: for at least a decade a range of econometric studies have fruitfully explored this link (from Knack and Keefer 1995

through Rigobon and Rodrik 2004). Third, the article does not suggest that the empirical results reported herein are the test of some particular model; rather, they are consistent with a variety of possible models.<sup>5</sup> Finally, the results focus on modern economic history, rather than seeking to explain longer term growth trajectories (though, as will be shown, the arguments are broadly consistent with those presented in studies that do undertake such a challenge).

The article next discusses the literature on natural resources and growth, in particular the range of hypotheses that are consistent with a link between resource composition and governance. It then discusses the two measures of export structure and shows the link between these and indicators of governance, completing the circle by showing the link between indicators of governance and economic growth. The final section offers some speculations for policy.

### I. DEVELOPMENT OF THE HYPOTHESIS

Over the past decade, a distinguished body of empirical literature has emerged in support of arguments that development trajectories are shaped by institutions and that institutional form and quality, in turn, are deeply embedded in history and geography.<sup>6</sup> This work suggests that combinations of climate (disease vectors, rainfall levels, temperature), topography (soil and mineral quality, access to ports), and labor (degrees of scarcity and compliance) in the early colonial period interacted in different places with the profitability of natural resources to make it more or less necessary (or feasible) to build governance institutions geared toward the subjugation and control of a domestic population by an expatriate minority. In Latin America and Africa, this process led to the construction of highly concentrated and authoritarian political structures (“extraction colonies”), whereas in North America (except Mexico), Australia, and New Zealand it gave rise to more open and dispersed political structures that concomitantly accorded greater civic freedoms and stronger property rights (“settler colonies”).<sup>7</sup> Where extractive institutions were initially laid down, they

5. Admittedly, this deviates from much of existing economic practice, but it does so deliberately. A common approach for journal articles is to write down one particular structural model that highlights one particular way in which resources affect politics, work out the comparative statics of that model only, and then test whether the comparative static predictions of that model are consistent with the data. If they are, a claim is then made that this validates that particular model. This is methodologically flawed. Any particular empirical test does not *validate* a particular model; it only *rejects* the class of models that are incapable of producing the associations in the data and therefore validates all models that are capable of generating the particular comparative static prediction. The following section shows that a large class of models predicts that economic structure conditions political structure, with subsequent feedbacks from the resulting political and institutional structures onto economic performance.

6. See, for example, Sachs and Warner (1999); Engerman and Sokoloff (1997); Acemoglu and others (2001, 2002, 2003); and Easterly and Levine (2002). This paragraph summarizes the general line of argument emerging from this work.

7. The concepts of extraction and settler colonies come from Acemoglu, Johnson, and Robinson (2001).

soon consolidated themselves in ways that reduced the likelihood that over time they would have an interest in generating—or in being subjected to counter-vailing pressures to generate—either more diverse revenue (export) streams or more open political structures.

If this is so, one could plausibly argue that attempts to measure export structures and institutional quality in the late twentieth century—as is done here—are merely capturing paths of development laid down many decades before: endowments (broadly defined) may have had an important initial role, but in the intervening centuries it is the prevailing political institutions that have determined the export structures, not the other way around. For some, this leads to an interpretation that contemporary Russia and Mexico export oil not only because that consolidates the political power of prevailing elites but also because the associated long-standing fragility of their institutions (of all kinds) precludes the possibility of generating wealth from more technologically sophisticated (or diverse) sources.

This account is fine insofar as it provides some novel and revisionist (because earlier generations of development economists confidently believed abundant natural resources to be a solid basis of prosperity) stylized facts of modern economic history, but it is less well positioned to explain variations in the development trajectories of countries with ostensibly similar “initial conditions.” India, for example, was quintessentially an extraction colony, yet it now has a vibrant economy dominated by manufacturing and services. Argentina and Venezuela at the turn of the twentieth century—long after colonization ended—were among the richest countries in the world, yet they are now ranked below the top 60. Bangladesh has always been poor, but textiles provide its largest source of export revenue. This account is also singularly unhelpful in the realm of offering contemporary policy advice. (What can a low-income country do to avoid the “resource curse” if it happens to discover a large oil field?)<sup>8</sup>

More important, the emerging long-run storyline connecting institutional history to resource endowments is not inconsistent with several alternative (and more focused) explanations for the role of natural resource endowments in shaping growth trajectories. Ross’s (2001) excellent empirical investigation into the mechanisms by which oil undermines democracy, for example, outlines several possible channels, or effects, through which oil influences political outcomes. Three such mechanisms drawn from his analysis are discussed here—a rentier effect, a delayed modernization effect, and an entrenched inequality effect—all consistent with a negative link between particular types of natural resources and government capacity.

8. From a strictly econometric point of view, it should also be noted that instruments (such as settler mortality) used to control for the initial quality of colonial institutions have recently been called into question.

### *Rentier Effects*

Political scientists generally—area specialists in particular—argue that certain natural resources undermine development through what they call rentier effects (Ross 2001).<sup>9</sup> When revenues can be easily extracted from a few easily controlled sources, there are three consequences. First, for any given revenue target the state has less need for taxation of the population, and without the pressure for taxation the state has less need to develop mechanisms of deep control of the citizenry. By the same token, citizens have less incentive to create mechanisms of accountability and to develop the deep civil society and horizontal social associations that many feel are the preconditions of democracy (see, among others, Inglehart 1997; Lipset 1959; Moore 1966; Putnam 1993). Second, with the “exogenous” revenues the government can mollify dissent through a variety of mechanisms (buying off critics, providing the population with benefits, infrastructure projects, patronage, or outright graft). Third, the state has the resources to pursue direct repression and violence against dissenters.

### *Delayed Modernization*

For influential scholars such as Moore (1966), the story of wealth, power, and political and economic transformation begins with some small group of elites owning the most valuable resources (usually land), from which they extract a surplus from the peasants (through serfdom, slavery, or feudal exactions). But then economic circumstances change so that industrialization becomes necessary. Modernization requires that some of the surpluses be transferred from existing activities to new industrial activities, that at least some of the labor be moved to the new activities, and that a more sophisticated system be put in place to manage the political pressures generated by urbanization and the demands of new semi-professional urban dwellers and business groups. This combination of economic transformations sets off a series of shifts in political power that can lead in various directions, depending on how the coalitions play out—between landed elite and rural producer and among urban labor, new industrialists, and the urban middle class. This process can move rapidly or more slowly and can lead to representative democracy, fascism, corporatism, Marxist dictatorship, or oligarchy (Moore 1966).

9. Some historians of the early modern state (such as Tilly 1992) argue that the increasing cost of modern armies led to greater demands on the state's ability to raise revenues, which led to one of several outcomes. States with access to foreign resources (the Spanish Crown, for example) did not have to extract resources from the domestic population and so did not develop any of the forms of the modern state. In other cases an accommodation was reached between the sovereign and other classes granting permission or assistance in taxation (England is the classic case), an increasingly powerful sovereign extracted resources directly (France is the classic case), or an inability to mobilize revenues because of conflicts between sovereign and nobles meant that eventually one got subsumed (Hungary and Poland are the classic cases).

More recently, Acemoglu and others (2001, 2002) have used similar arguments in which the mortality of settlers plays a crucial role in determining the structure of economic production and hence institutions. In high-mortality environments, settlers concentrated only on rent extraction from high value-added products and hence did not “invest” in developing high-quality government institutions.

States controlling a point source resource would resist industrialization because it means creating alternative sources of power (urban labor, urban middle class, urban industrialists), which, as their power grows, will want to tax away (or just confiscate) the quasi-rents from the natural resources. In the cross-section of levels, this implies that countries that today are still dominated by point source products are also likely to be dominated by elite politics of one type or another. In this case the high-income countries of the Organisation for Economic Co-operation and Development would be included in the analysis, because they have successfully made the transition from agricultural production to industrialization (and beyond) and in the process have created functioning democratic polities (although along very different paths—the U.K.–U.S. path to democracy is very different from the French, Prussian-German, or Japanese paths). Indeed, viewed over the span of the past hundred years, it is only quite recently that resource-poor countries have become systematically wealthier than resource-rich countries (see Auty 2001a, p. 5).

Political scientists have long argued that natural resource-dependent states tend to thwart secular modernization pressures—higher levels of urbanization, education, and occupational specialization—because their budget revenues are derived from a small workforce that deploys sophisticated technical skills that can be acquired only abroad (oil, for example, is extracted largely by foreign, not domestic, firms). As a result, neither economic imperatives nor workers themselves generate pressures for increased literacy, labor organizations, and political influence. Concomitantly, citizens are less able to effectively and peacefully voice their collective interests, preferences, and grievances (even in nominally democratic countries, such as Jamaica and Zimbabwe). In short, resource abundance simultaneously strengthens states and weakens societies and thus yields—or at least perpetuates—low levels of development (see also Migdal 1988).<sup>10</sup>

### *Entrenched Inequality*

The entrenched inequality effect refers to the ways in which export composition influences economic and political outcomes by affecting the social structure. Economic historians Engerman and Sokoloff (1997; see also Sokoloff and Engerman 2000, 2002) argue that the diverging growth trajectories of South

10. There are many variations in the way resources delay modernization, all relating to different connections between states and elites. The state can own the rents and a regime of rentier autocrats emerges, as with Algeria and Nigeria. Or rentier capitalists can effectively own the state, as in Angola and El Salvador, and oligarchic regimes emerge.



and North America over the past 200 years can be explained in part by the types of crops grown, the property rights regimes enacted to secure their sale, and the timing and nature of decolonization.<sup>11</sup> In North America, crops such as wheat and corn were grown on small family farms, cultivatable land was relatively abundant, decolonization occurred early, and innovative property rights ensured that land (and assets more generally) could be sold on an open market. In South America, by contrast, crops such as sugar, coffee, and cocoa were grown on large plantations, cultivatable land was relatively scarce, decolonization occurred late, and property rights were weak. Landed elites were able to amass great personal fortunes, resist more democratic reforms, and consolidate power. During economic downswings, vested interests thus resist reforms that would diversify the economy because this would create rivals competing for labor and government influence.<sup>12</sup>

Certain types of natural resources are thus predisposed to influence the long-run level of development. North America's resource base enabled it to become rich, but South America's did not.<sup>13</sup> As Frieden (1999, p. 22) writes in his account of economic growth in modern Latin America: "Economic characteristics of assets determine the policy preferences of their owners. . . . The incentive to lobby increases with the specificity of the asset."

Entrenched inequality has social dimensions as well. Some areas of geographic space are conducive to large-scale production (plantation agriculture). In these regions relationships tend to bind producers to a social superior (noble, landowner), and the horizontal relationships among producers tend to be ones of distrust, producing a social structure that is conducive to "bad" politics (clientelism) and to "bad" governance (because citizens cannot cooperate to demand better services from the state). This pattern is in contrast to other areas of geographic space, which are conducive to smallholder production on individually owned plots and in which horizontal interactions among producers tend to be relationships of equality.

11. The Engerman-Sokoloff account of continental divergence is one based on factor endowments broadly defined and implicates primarily the role of labor scarcity (Hoff 2003).

12. See Tornell and Lane (1999) for a model of how special interests can dampen economic growth. On the institutional side, their argument is very much in the spirit of this article. They also note (echoing Barro 1997) that one possible explanation for the distributive struggle in many countries is the attempt to appropriate rents generated by natural resource endowments.

13. For instance, one of several possible channels is that proposed by the late Carlos Diaz-Alejandro, who is said to have conjectured informally to his students that at least some of the difference in political and economic evolution between Argentina and the United States could be explained by the fact that in Argentina land gets better from west (last settled) to east (first settled), whereas in the United States land gets better from east (first settled) to west (last settled). Hence in Argentina, population growth led to larger and larger rents on the good land that was already divided. Access to new land was available only for less attractive property, and redistribution would involve existing, very valuable lands. In the United States, by contrast, the western expansion moved people onto superior land. This meant that the system of property rights was developed as new and valuable lands were being brought into the economy (De Soto 2000); redistribution or taxation of the rents on of existing land was thus of almost no interest.

*Implications of All Three Stories*

The links between particular types of natural resources and government capacity exhibit three common (but distinctive) elements. First, all involve some connection from the structure of economic production, particularly the structure of exporting activity, to some measure of the capacity and quality of government. Second, natural resource production characteristics matter, not just natural resource exports. The geographic pattern of production is important, particularly as it affects the ease with which the state can control and extract rents. Whereas others have focused (rightly) on dimensions of natural resource exports such as lack of diversification and exposure to secular declines in terms of trade (and volatility),<sup>14</sup> this article stresses the effect of exports on political and social structures and only then indirectly on economic performance. Thus, as others have shown, although it is possible for the state to extract rents from all forms of natural resources (through bottlenecks along the transport chain, for example), point source resources are far more susceptible to capture (whether through marketing boards, control of line ministries, or direct procurement) than diffuse resources, as the opening country vignettes demonstrate. Third, though many of the growth stories involve very long-run effects, there is also a connection with *changes* in growth rates through the combination of weak institutions and shocks.

## II. CREATING A MEASURE OF EXPORT STRUCTURE

The hypothesis and the related empirical strategy can therefore be stated as follows. Different types of natural resource endowments matter for economic growth. In particular, countries dependent on point source natural resources and plantation crops are predisposed to heightened social divisions and weakened institutional capacity. This in turn impedes their ability to respond effectively to shocks, which previous studies have shown to be essential for sustaining rising levels of prosperity. Export structures influence various measures of political and institutional performance, and these measures of political and institutional performance condition growth performance during 1974–97, a period of massive deceleration in growth in developing economies. Again, this approach does not attempt to differentiate among the various models whereby resource endowments affect political and institutional structures or among the various models whereby these structures affect growth.

The link between endowments and export structure is taken as given—countries with oil are more likely to export oil, and countries can only export crops such as coffee and cocoa if they have appropriate climates. This link has a

14. Note that the classification “diffuse” exporter as used in the analysis here concerns the conditions of production of any given commodity, not diversification across different commodities.

reasonable base in theory and evidence. The measures of the quality of government that are used in the analysis are typically from the 1980s and 1990s. Export structure is from prior to that period so that at least with respect to post-1980 growth and currently assessed institutional quality, export structure is predetermined.

The weak link in determining the chain of causation is that it is possible that historical factors affect institutions (as already discussed) and that this in turn determines whether a country will develop a capacity to produce and export manufactures, and hence the link between poor governance and exports is caused by poor governance. However, this argument is much less compelling than the argument based on different types of natural resource exports. Moreover, given that the geopolitical and economic importance of certain types of natural resources is relatively new (the surging global demand for oil, and the debilitating economic “shocks” to which that has given rise, are largely coincident with the postcolonial era) and that geology largely determines natural resource location (but not demand), it seems reasonable to regard the link between endowments and export structures as largely exogenous.

#### *Data on Export Composition*

To test this hypothesis, export structures were classified according to their natural resource base using two methods. First, data on the leading exports of every country in 1985 with a GNP per capita of less than \$10,000 and a population greater than 1 million were taken from the *Handbook of International Trade and Development Statistics* (UNCTAD 1988). Countries were classified into four types on the basis of their top two exports at the Standard International Trade Classification (SITC) three-digit level:

- *Manufacturing exporters*, which have relied on exports of manufactures (without regard to labor or capital intensity).
- *Diffuse exporters*, which have relied primarily on livestock and agricultural produce grown on small family farms (rice and wheat, for example).
- *Point source exporters*, which have relied primarily on fuels, minerals, and plantation crops (such as sugar).
- *Coffee and cocoa exporters*, which have relied primarily on these two commodities. (Classifying them as either point source or diffuse proved problematic because these crops can be grown on either plantations or small family farms, but because these tree crops take many years to reach maturity and are immobile, they are potentially susceptible to rent extraction from smallholders through marketing boards.)

Judgments by country and commodity experts were used when there was some ambiguity about a country’s classification. The countries used in this analysis and their classifications are presented in appendix table A.1, along

with their first and second most important exports and each export's share in total exports.<sup>15</sup>

The second method was to compute four indices of net export shares that mirror the four categories of exports by type: manufacturing, diffuse, point source, and coffee and cocoa. In constructing these four indices, the World Trade Analyzer (Statistics Canada 2002) from 1980 was used to aggregate SITC codes at the two-digit level for subcategories of exports into the four export categories, following the approach of Leamer and others (1999). The net export share for each subcategory is calculated as net exports (exports minus imports) of subcategory *i* divided by the sum of the absolute value of net exports across all subcategories (following the procedure in Leamer and others 1999). The four indices are then calculated as the sum of the net export shares for each subcategory in each of the four categories. By construction, these indices have a range of  $-1$  to  $1$ , with a higher number indicating a greater reliance on that category for export earnings.<sup>16</sup>

Reassuringly, the two methods give similar results, as shown by the means of these four indices across all countries and according to the UNCTAD-based classifications (table 1). The manufactures index is much higher for the UNCTAD-based manufacturing exporters, compared with the three resource exporters (moving down the first column of the table). The diffuse, point source, and coffee and cocoa indices are highest for each of the corresponding set of UNCTAD-based classifications (the bold numbers in the last three rows of the table) and higher than the other row entries in the same category.<sup>17</sup>

### *Differences in Growth and Institutional Quality across Export Categories*

A return to the growth story introduced in figures 1 and 2 shows that since 1974, growth rates in developing economies have been massively different

15. There are several borderline cases on which reasonable judgments could differ. Wherever possible, such borderline cases were classified to err on the side that would be "against" the hypothesis. For instance, should Botswana be considered a point source exporter because of its diamonds or a diffuse exporter because of its cattle? Acemoglu and others (2003) have argued that the social structures that emerged from cattle raising were an important part of the Botswana success story (and why it was able to resist the pressures of diamond exports). For this study Botswana is classified as a point source exporter—which weakens a case that this is adverse for institutional quality and growth. In other cases, subtle judgments had to be made, and it is unlikely that they affected the overall results because they were not based on performance. For instance, although Burkina Faso and Mali both export cotton (regarded as a point source export) and live animals (regarded as diffuse) as their two major exports, Burkina Faso is classified as a point source exporter and Mali is classified as a diffuse exporter because its share of live animals is substantially higher than that of Burkina Faso.

16. For additional detail on the rationale behind the groupings, see Leamer (1984). The authors thank Peter Schott for providing this information.

17. The classification of countries also produces reasonable results when compared with standard sources such as *World Development Indicators* (World Bank 1999). Over the 15-year period before the oil shock, manufactures were only 10.6 percent of exports for resource exporters compared with 46.8 percent for merchandise exporters.

TABLE 1. Mean of the Indices of Net Export Shares by Export Composition and Natural Resource Base of Selected Developing Economies

UNCTAD-Based Classification	Statistics Canada–Based Trade Data for 1980			
	Manufactures Index	Diffuse Index	Point Source Index	Coffee and Cocoa Index
All countries	−0.34	0.03	0.11	0.06
Manufacturing exporters	−0.02	−0.05	−0.12	0.01
Diffuse exporters	−0.38	<b>0.08</b>	−0.04	0.04
Point source exporters	−0.35	0.01	<b>0.28</b>	0.04
Coffee and cocoa exporters	−0.43	0.06	−0.02	<b>0.16</b>

*Note:* Means of selected export- and trade-related data for 90 developing economies.  
*Source:* Authors' calculations based on UNCTAD (1988 ) and Statistics Canada (2002) data.

TABLE 2. Average Annual GDP per Capita Growth Rates by Export Composition and Period

Period	Resource Exporters				
	Manufactures Exporters	All	Diffuse	Point Source	Coffee and Cocoa
1957–97	4.16	1.43**	1.74	1.57	0.76
1957–74	3.56	2.54	2.03	3.08	1.73
1975–97	4.58	0.65**	1.60	0.51	0.08
Difference, 1975–97 less 1957–74	1.02	−1.89	−0.43	−2.57	−1.65

\*\*Significant at the 1 percent level for Mann-Whitney test of similar distributions in resource-poor and resource-exporter countries.

*Source:* Authors' estimations based on data indicated in appendix table A.2.

between manufactures exporters (4.58 percent) and natural resource exporters (0.65 percent)—differing by almost 4 percentage points annually (table 2). Whereas growth among manufactures exporters increased by 1 percentage point between 1957–74 and 1975–97, growth among resource exporters decelerated by almost 2 percentage points (1.89), together accounting for 3 percentage points of the difference (growth rate differences of this magnitude maintained over time have enormous implications—if two countries begin with equal income today, the country that grows 3 percentage points faster would be more than twice as rich in only 22 years). More important to the hypothesis that the type of exports—measured by the four indices—affects economic growth through political and social institutions, growth rates are also significantly different (using the Mann-Whitney test) among types of resource exporters. Diffuse exporters did almost as well as before the oil shock, with growth decelerating by only 0.43 percentage point, whereas growth decelerated by 1.65 percentage points for coffee and cocoa exporters and by 2.57 percentage points for point source exporters.

TABLE 3. Institutional Quality and Export Composition among 90 Developing Economies

Variable	Resource Exporters				
	Manufactures Exporters ( <i>n</i> = 9)	All ( <i>n</i> = 81)	Diffuse ( <i>n</i> = 18)	Point Source ( <i>n</i> = 45)	Coffee and Cocoa ( <i>n</i> = 18)
Rule of law	0.33	-0.45**	-0.40	-0.40	-0.66
Political stability and violence	0.28	-0.38*	-0.27	-0.40	-0.43
Government effectiveness	0.32	-0.41*	-0.45	-0.35	-0.51
Absence of corruption	0.23	-0.41*	-0.37	-0.36	-0.57
Voice and accountability	0.04	-0.34	-0.24	-0.36	-0.39
Regulatory burden	0.40	-0.17	-0.14	-0.19	-0.11
Law and order tradition	3.81	2.85*	2.80	2.89	2.81
Quality of the bureaucracy	3.71	2.59**	2.52	2.63	2.55
Political rights	3.98	3.28	3.50	3.26	3.12
Civil liberties	3.56	3.35	3.49	3.33	3.24
Property rights and rule-based governance	3.60	3.37	3.53	3.28	3.42

\*Significant at the 5 percent level for Mann-Whitney test of similar distributions in resource-poor and resource-exporter countries.

\*\*Significant at the 1 percent level for Mann-Whitney test of similar distributions in resource-poor and resource-exporter countries.

Source: Authors' estimations based on data indicated in appendix table A.2.

Averages were also compared across these exporter classifications for 11 institutional variables that have been used as indicators of "institutional quality" in the empirical growth literature (table 3).<sup>18</sup> By these variables institutional quality is unquestionably higher among manufactures exporters. The indicator is lower among the resource exporters in all cases, and for six of the variables the difference is statistically significant. However, the differences across types of resource exporters are not impressive: although diffuse exporters tend to have better institutional quality, the differences are small and not statistically significant.

### III. REGRESSIONS: GOVERNMENT QUALITY AND EXPORTS

The analysis now moves beyond the simple cross-tabulations, and the continuous indices of export composition are used to estimate a two-equation system. In the first equation, institutional variables are endogenously determined by different types of natural resource intensity (point source, diffuse, coffee and cocoa.) and

18. These institutional variables were recently used in a set of papers on the institutional determinants of economic growth; see, among others, Knack and Keefer (1995); Rodrik (1999); Kaufmann and others (2000); Dollar and Kraay (2003); Ritzen and others (2000); and Easterly (2001). Growth rate data for 1957-97 were compiled from the Penn World Table version 6.1 (Heston and others 2002) and the *World Development Indicators* (World Bank 1999). Measures of social and political data were adapted from Kaufmann and others (2002), Easterly (2001), and World Bank (2002).

by other correlates of institutional quality that have been proposed in the literature (table 4). In the second equation, growth is then determined by institutions (as well as initial income, education, and the other usual suspects from the growth regression literature). Unless otherwise noted, all of the regression results reported are from the two-stage system detailed here.

First, an equation is estimated for each of six indicators of institutional quality measured in the 1990s,  $I'_{i,1990s}$  (rule of law, political stability and violence, government effectiveness, absence of corruption, regulatory framework, and property rights and rule-based governance) as a linear function of the four indices of net export composition measured in 1980,  $NR^k_i$ , plus five other relatively predetermined variables (English language, European language, distance from equator, predicted trade share, and ethnolinguistic fractionalization); all of the usual growth determinants,  $X^m_i$  (lagged GDP per capita, lagged secondary school achievement, the Sachs-Warner indicator of trade openness, changes in the terms of trade, and the share of primary exports to GDP); and a set of regional dummy variables:<sup>19</sup>

$$(1) \quad I'_{i,1990s} = \beta_0 + \sum_{k=1}^4 \beta_{NR}^k * NR_i^k + \sum_{l=1}^5 \beta_W^l * W_i^l + \sum_{m=1}^5 \beta_X^m * X_i^m + \text{Region dummy variables} + \varepsilon_i^j, j = 1, \dots, 6$$

Growth over the period 1975–97 is then estimated as a linear function of an endogenously determined indicator of institutional quality (included one at a time), the same usual growth determinants, and the set of regional dummy variables. Three-stage least squares (3SLS) is used to estimate this system of equations:<sup>20</sup>

19. One reaction to this strategy is to wish for instruments for the instruments—see, for example, Rigobon and Rodrik (2004), who exploit the structural variance in two country subsamples to account for possible endogeneity. Using export structures to identify the impact of political and institutional quality variables on growth, as here, leads to the complaint that export structure is not exogenous and, in particular, that countries that developed good institutions, even if they were richly endowed with natural resources (such as Australia and Norway), ceased being primary goods exporters and hence export structure is endogenous to institutions. The point is not, however, that exporters of manufactures have better institutions than primary exporters do (as others have tried to show), but rather that the composition of the types of natural resource exports has political effects over and above the manufactures versus primary goods distinction. On this point there can be more confidence that the variation across exports is exogenous and endowment driven and that as such, using the substantially lagged export structures on institutional performance goes some way toward resolving the identification question.

20. This follows the example of Barro (1997) and many others in the growth literature. 3SLS estimates are more efficient than instrumental variable estimates if the error terms are correlated and the system is not exactly identified. As noted by an anonymous referee, some of the recent growth literature has used recursive seemingly unrelated regression (SUR) estimation for models that include natural resource endowments (for example, Gylfason and Zoega 2001), which is one approach to addressing the simultaneity problem that might otherwise bias such results. There were no substantial differences in the reported results when the model was reestimated using recursive SUR.

TABLE 4. The Effect of Natural Resource Endowment on Six Institutional Variables

	(1) Rule of Law	(2) Political Stability	(3) Government Effectiveness	(4) Absence of Corruption	(5) Regulatory Framework	(6) Property Rights and Rule-Based Governance
Manufactures index	-0.02 (0.23)	0.05 (0.29)	-0.48 (0.26)	0.02 (0.24)	-0.49 (0.30)	-0.27 (0.24)
Diffuse index	-0.08 (0.34)	-0.27 (0.45)	-0.39 (0.40)	-0.21 (0.36)	0.05 (0.45)	-0.29 (0.35)
Point source index	-1.48** (0.26)	-2.09** (0.33)	-1.47** (0.30)	-0.95** (0.26)	-1.09** (0.34)	-1.22** (0.27)
Coffee and cocoa index	-2.05** (0.69)	-3.26** (0.87)	-1.64* (0.82)	-1.41* (0.71)	-1.60 (0.89)	-1.07 (0.69)
Ethnic fractionalization	0.0027 (0.0023)	0.0018 (0.0029)	0.0027 (0.0027)	0.0004 (0.0023)	0.0022 (0.0029)	0.0059* (0.0023)
Predicted trade share	0.06 (0.10)	0.06 (0.13)	-0.09 (0.12)	0.12 (0.11)	0.04 (0.13)	-0.13 (0.11)
Latitude	-0.0058 (0.0044)	-0.0005 (0.0057)	-0.0007 (0.0051)	-0.0047 (0.0045)	0.0007 (0.0056)	-0.0010 (0.0042)
English language	0.10 (0.29)	-0.44 (0.36)	0.04 (0.33)	0.09 (0.29)	-0.08 (0.37)	-0.25 (0.28)
European language	0.92** (0.32)	1.18** (0.40)	1.11** (0.37)	0.96** (0.32)	0.99* (0.42)	1.10** (0.32)
GDP per capita	0.127** (0.046)	0.195** (0.059)	0.150** (0.053)	0.060 (0.047)	0.058 (0.061)	0.071 (0.051)
Secondary school achievement	0.024* (0.010)	0.001 (0.012)	0.029** (0.011)	0.034** (0.010)	0.029* (0.013)	0.034** (0.009)
Trade openness	0.55** (0.20)	0.31 (0.25)	0.34 (0.23)	0.17 (0.20)	0.43 (0.27)	-0.01 (0.19)

(Continued)



TABLE 4. Continued

	(1) Rule of Law	(2) Political Stability	(3) Government Effectiveness	(4) Absence of Corruption	(5) Regulatory Framework	(6) Property Rights and Rule-Based Governance
Change in terms of trade	-0.01 (0.18)	-0.09 (0.23)	-0.14 (0.23)	-0.60** (0.18)	-0.37 (0.24)	-0.45* (0.20)
Share of primary exports/ GDP	1.27* (0.53)	1.46* (0.68)	1.23* (0.61)	0.15 (0.55)	0.89 (0.71)	1.77** (0.52)
Sub-Saharan Africa	0.18 (0.28)	0.60 (0.36)	0.44 (0.33)	0.28 (0.29)	0.25 (0.37)	0.15 (0.31)
Europe and Middle East	0.87** (0.29)	0.95* (0.37)	0.95** (0.34)	0.78** (0.30)	0.58 (0.39)	0.79* (0.33)
Latin America	-0.49 (0.33)	0.21 (0.42)	-0.37 (0.38)	-0.36 (0.34)	0.03 (0.43)	-0.22 (0.36)
East Asia	0.16 (0.29)	0.43 (0.38)	0.51 (0.34)	0.08 (0.30)	0.41 (0.40)	0.23 (0.31)
Adjusted R-squared	0.71	0.65	0.63	0.63	0.51	0.64
Sample size	66	65	64	64	66	62

\*Significant at the 5 percent level.

\*\*Significant at the 1 percent level.

Note: GDP per capita (1975) was adjusted for purchasing power parity. Numbers in parentheses are standard errors.

Source: Authors' estimations based on data indicated in appendix table A.2.

$$(2) \quad \text{Growth}_i = \alpha_0 + \alpha_1 * I_{ij} + \alpha_2 * X_i + \eta_i$$

Two of the growth determinants deserve particular attention: the terms of trade, to be sure that the regression is not simply capturing the effect of falling terms of trade, and the share of primary exports in GDP, as was done in a pair of influential papers by Sachs and Warner (1995, 1999). They argue that having abundant natural resources makes a country less competitive in manufacturing exports and that manufacturing exports have some features, such as learning spillovers, that make them “extra good” for growth. Originally, the thought was that the channel through institutions might better explain the presence of the “primary share” in a growth regression. However, including the regional dummy variables in a sample of developing economies already makes the pure primary exports variable statistically insignificant. Even so, the share of primary exports to GDP is included as a growth regressor, because this ensures that the impacts of export structure are due to the *composition* of primary export types and not simply to the fact that any natural resource has the same impact.<sup>21</sup>

Estimation of equation 1, to establish whether measures of the natural resource endowment (using the four indices derived from Statistics Canada 2002 data) predict the nature of socioeconomic and political institutions,<sup>22</sup> show that neither the manufactures index nor the diffuse index are statistically significant predictors of any of the six institutional variables (see table 4). In contrast, the point source index is statistically significant in all six specifications: all else being equal, an increased dependence on point source natural resources is associated with much worse institutions. The coffee and cocoa index is significant in specifications 1–4.<sup>23</sup> As for the other regressors in this model, European language, secondary school achievement, and Europe and the Middle East are also robust statistically significant predictors of this set of institutional variables.

The share of primary exports in GDP is a positive and significant predictor of institutions as well, which seems to raise questions about the net effect of exporting certain kinds of primary goods.<sup>24</sup> To diagnose this result, the share of primary exports in GDP in the model was replaced with the share of exports in GDP. The results were almost identical statistically. Next, both of these variables were included as regressors in the model. Neither variable was significant on its

21. An anonymous referee suggested verifying that the inclusion of exports as a share of GDP in the model has no effect on the reported results; that was found to be the case. Likewise, investment is not a significant determinant of growth (as found by Gylfason 2001) in models in which the regional dummy variables are included.

22. From 62 to 66 of the 90 countries that are used to derive tables 1 and 2 have the required data to estimate these models. The countries included in these estimations are noted with an asterisk in the second column of appendix table A.1.

23. The *p*-values for specifications 5 and 6 are 0.07 and 0.12, respectively.

24. The authors thank an anonymous referee for drawing their attention to this point.

TABLE 5. The Relative Magnitude of the Effect of the Natural Resource Endowment Variables on Institutions

	(1)	(2)	(3)	(4)	(5)	(6)
	Rule of Law	Political Instability	Government Effectiveness	Control of Corruption	Regulatory Framework	Property Rights and Rule-Based Governance
Point source index	-0.58	-0.71	-0.57	-0.41	-0.38	-0.46
Coffee and cocoa index	-0.27	-0.37	-0.21	-0.20	-0.18	-0.13
European language	0.53	0.59	0.63	0.61	0.50	0.60
GDP per capita	0.32	0.44	0.38	0.17	0.13	0.17
Secondary school achievement	0.26	0.01	0.31	0.40	0.28	0.35
Trade openness	0.25	0.12	0.15	0.08	0.17	0.00
Share of primary exports in GDP	0.21	0.21	0.20	0.03	0.13	0.27

*Note:* Figures are the equivalent of beta coefficients from three-stage least squares estimation.

*Source:* Authors' estimations based on data indicated in appendix table A.2.

own, but they were jointly significant. These results suggest that it is the presence of exporting of any kind that has an independent and positive effect on institutions. Higher exporters are more plugged into globalized markets, and countries can only be plugged into globalized markets if they respect rule of law, property rights, and other institutional indicators of good governance.

What are the relative magnitudes of the effects of the significant regressors in this equation? Table 5 lists the 3SLS equivalent of standardized beta coefficients.<sup>25</sup> The values for the point source index (from -0.38 to -0.71) are either the largest (columns 1 and 2) or second largest (columns 3–6) compared with the values for European language and the other significant variables.<sup>26</sup> The values for the coffee and cocoa index (from -0.13 to -0.37) are generally comparable to those of GDP per capita.

What are the absolute magnitudes of the effects of the natural resource variables? A country whose point source index fell by a standard deviation ( $= 0.266$ )<sup>27</sup>—the approximate difference between Angola (0.70) and Cameroon (0.42)—would increase rule of law by 0.39; a country whose coffee and cocoa index fell by a standard deviation ( $= 0.088$ )—the approximate difference between Colombia (0.22) and Ecuador (0.14)—would increase rule of law by 0.18. Because the standard deviation of rule of law is 0.68, these represent substantial institutional improvements. To illustrate, the estimated effect of a

25. Figures are calculated as the product of the coefficient and the standard deviation (from the regression sample) of the listed variable, divided by the standard deviation of the dependent variable.

26. The Europe and Middle East dummy variable was excluded from this comparison.

27. Here and with the beta coefficient calculations above, the standard deviations from the regression sample are used, as listed in appendix table A.2.

decrease in 1 standard deviation in the point source index and in the coffee and cocoa index yields a total change of rule of law of 0.57, based on the calculations already done. This is equivalent to the difference between Saudi Arabia (0.19) and Taiwan, China (0.75). These overall results, in both relative and absolute magnitudes, are consistent with the first hypothesis that both point source and coffee and cocoa dependence are critical determinants of socio-economic institutions.

Table 6 presents the results of estimating the growth equation to show the strong impact of institutions on post-1974 growth.<sup>28</sup> Five of the six ordinary least squares (OLS) models (specification 1) suggest that institutions are a positive and significant determinant of economic growth among these developing economies from 1975 to 1997. By contrast, when the four natural resource indices are used as the identifying instruments (specification 2), the estimation results for all six institutional variables are significant—and the point estimate is also greater than the OLS point estimate (which is consistent with the presence of a plausible degree of measurement error in the indicators of institutional quality). When the five other relatively predetermined variables (English language, European language, distance from equator, predicted trade share, and ethnolinguistic fractionalization) are added to the natural resource instrument set (specification 3), the results are broadly similar.

The presence of alternative valid instruments for institutions allows the testing of the “exclusion” restriction—that export composition affects growth *only* insofar as it affects institutions.<sup>29</sup> Intuitively, the test is an *F*-test of the inclusion of the four export composition indices in the growth regression with a consistent estimate for the effect of institutions (Davidson and MacKinnon 1993; Hausman and Taylor 1981). The tests show no evidence that export composition should be included in the growth regression (appendix table A.3).

The results reported in this section constitute the econometric punch line of this article. First, it is not just natural resource exports that lead to lower quality institutions but a particular type of natural resource exports. Both point source export dependence and coffee and cocoa export dependence are negatively associated with national socioeconomic institutions. This is consistent with the long-run stories of institutional determination.<sup>30</sup> Second, the results using this

28. In table 6, the top line is taken from appendix table A.3 and the remaining five lines are taken from tables similar to appendix table A.3 where rule of law was replaced first by political stability, then by government effectiveness, and so on.

29. It is usually difficult, if not impossible, to find instruments that are correlated with the regressors but not with economic growth, due to the inherent endogeneity of macroeconomic variables (Temple 1999). Following Hall and Jones (1990), however, the clearly exogenous English language, European language, and distance from equator instruments are ideal for the endogenous regressors of interest, the institutional variables.

30. This is of course also consistent with the possibility that long-run institutions affect export composition in the 1980s, and certainly being a manufactures exporter rather than being a natural resource-dependent exporter in the 1980s is strongly dependent on long-run trajectories. The innovation in this article is distinguishing among types of exports.

TABLE 6. The Effect of the Institutions on Economic Growth, 1974–97

Estimation procedure and instrument set	(1) OLS	(2) 3SLS Natural Resources	(3) 3SLS Language Variables, Equator Distance, Trade Share, Fractionalization, and Natural Resources
Rule of law	1.33** (0.33) 66	1.36** (0.50) 66	1.30** (0.44) 66
Political instability	0.68* (0.27) 65	0.79* (0.37) 65	0.79* (0.35) 65
Government effectiveness	1.14** (0.32) 64	1.56** (0.56) 64	1.35** (0.46) 64
Control of corruption	0.79 (0.40) 64	1.59* (0.81) 64	1.35* (0.64) 64
Regulatory framework	1.00** (0.30) 66	1.85** (0.70) 66	1.55** (0.57) 66
Property rights and rule-based governance	1.51** (0.38) 62	2.50** (0.82) 62	1.66** (0.54) 62

\*Significant at the 5 percent level.

\*\*Significant at the 1 percent level.

Note: Numbers in parentheses are SEs. Each reported set of results is the result of including just one of the indicators of institutional quality in the growth regression in equation 2.

Source: Authors' estimations based on data indicated in appendix table A.2.

method reconfirm what others have found: institutions, which are endogenously determined by the nature of natural resource dependence, are significant determinants of growth. Third, and a bit more speculatively, the hypothesis cannot be rejected that the *only* impact of export structure on growth is through institutions.

What are the implications of this two-stage effect? It was reported above that a large change in the composition of a country's natural resource endowment—a 1 standard deviation change in point source dependence and coffee and cocoa dependence—is associated with a relatively large improvement in the measures of socioeconomic institutions. How might such an improvement translate into a change in economic growth? The estimated effect on economic growth of a 1 standard deviation decrease in the point source index and of the coffee and cocoa index, through better institutions, was calculated using the results from table 4 and specification 3 in table 6. These calculations yield an annual increase in per capita growth of between 0.51 percentage point and 0.75 percentage point. Using the median of these figures (0.68 percentage points), this translates,

all else being equal, into a GDP per capita that is 19 percent higher 25 years later among countries with better institutions than among countries with worse institutions.

#### IV. DISCUSSION AND CONCLUSION

At first glance these are stultifying results for the policymaker. Like Putnam's (1993) results on medieval guilds and choral societies, it is hard to imagine how a policymaker interested in accelerating growth can change what is here identified as one possible underlying cause of poor performance—that a country's natural resource endowment makes for poor institutions.<sup>31</sup>

What options are available to the policymaker? The World Bank (1998) illustrates the power of institutions in development assistance and identifies what donors should (and, more important, should not) do in the face of varied institutional performance among potential aid recipients. The results here suggest how entrenched—and environmentally determined—poor institutions can be (compare with Wade 1988, at the micro level). So these results raise further cautions about casual attempts at institutional reform (Murshed 2003). Poor institutions are deeply rooted. Where others (such as Acemoglu and others 2004; Pritchett 2000; Rodrik 1999) have shown how important institutional quality and social inclusion are to managing long-run growth generally and growth volatility in particular, these results push the chain of causation one step further back, showing that, as asserted by Karl (1997, p. 13) in the opening quotation, “the revenues a state collects, how it collects them, and the uses to which it puts them” do indeed “define its nature.” Institutions surely matter a lot, but the results here are consistent with models in which types of natural resource endowments and the export structures to which they give rise (rather than “geography”),<sup>32</sup> play a large role in shaping what kinds of institutional forms exist and persist.

There are possibilities for structuring the influences once they are identified, but even this is not obvious. In Chad, for instance, outside factors (notably the World Bank) have placed institutional conditions on the use of resources from the oil pipeline that they are helping finance. Perhaps this will work, but as this project began, money was still going, defiantly, to purchase arms (Thurow 2003). In contrast, in Qatar the head of state recognizes that natural resource-based revenues—and the institutions that they have sustained—are likely to weaken in the near future. Accordingly, he is attempting reform from within and has decreed that Qatar will become a democracy (Weaver 2000).

31. Similarly, in their recent article on the primacy of institutions over geography for economic growth, Rodrik and others (2004, p. 157) observe that “the operational guidance that our central result on the primacy of institutional quality yields is extremely meager.”

32. On the relatively small (and insignificant) direct effects of geography compared with institutions, see Rodrik and others (2004).

In some cases, donors can—if they are lucky—gently nudge along such reforms. At the very least, donors should not maintain (perceived) “lifeline” aid that prevents nascent reforms from even getting started. More optimistic and constructive are proposals, such as those made by *The Economist* (2003) and Sala-i-Martin and Subramanian (2003), among others, to make publicly available all revenues and expenditures associated with natural resource rents. Greater transparency and citizen accountability, as in other realms of public management reform, are key. Regarding client countries as mere repositories for the steady flow of highly valued—economically and geopolitically—natural resources such as oil and diamonds, rather than as genuine partners in the development process, likely undermines such reform efforts.

TABLE A-1. Details on the Export Classifications Derived from UNCTAD Data

Export Classification	Economy	Year	First and Second Most Important Exports	SITC Export Code for First	SITC Export Code for Second	Share of Total Exports (%)	Share of Category Exports (%)
Manufacturing	Bangladesh	1985	Woven textiles, textile	653	656	20, 19	65.8
	China	1985	Vehicles parts, knitwear	784	845	6, 5	35.9
	* Hong Kong, China		Manufacturing				
	* India	1985	Pearls, clothing	667	841	11, 9	58.0
	* Korea, Rep. of	1985	Ships, clothing	735	841	16, 14	91.3
	Nepal	1985	Floor cover, clothing	657	841	15, 12	59.1
	Singapore		Manufacturing				
	Taiwan, China						
	Turkey	1985	Clothing, textiles	841	651	16, 6	61.0
	* Argentina	1985	Wheat, oilseeds, and nuts	041	221	13, 10	66.1
Diffuse	* Myanmar	1985	Rice, wood	042	242	31, 33	56.5
	* Gambia	1985	Oil seeds, vegetable oils	221	421	2.5, 21	84.0
	Guinea-Bissau		Fruit				
	* Honduras	1985	Fruit, coffee	051	071	38, 25	84.7
	Lesotho						
	* Malaysia	1985	Crude petroleum, vegetable oil	331	442	2.3, 13	31.5
	* Mali	1985	Cotton, live animals	263	001	56, 30	58.6
	Mozambique	1984	Fish, fruit	031	051	36, 19	69.0
	* Pakistan	1985	Cotton, rice	652	042	12, 12	61.9
	Panama	1985	Fruit, fish	051	031	28, 21	78.0
	* Philippines	1985	Special transactions and commodities, vegetable oil	931	422	30, 9	26.9
	* Senegal	1985	Fish, vegetable oils	031	421	14, 13	38.0
	Somalia	1985	Live animals, fruit	001	057	79, 18	85.6
	* Sri Lanka	1985	Tea, clothing	074	841	39, 22	47.4
	* Thailand	1985	Rice, vegetables	042	054	13, 9	46.2
	* Uruguay	1985	Wood, meat	262	011	19.3, 14.8	46.1
	* Zimbabwe	1985	Tobacco, pig iron	121	671	2.3, 12	36.3

(Continued)



TABLE A-1. Continued

Export Classification	Economy	Year	First and Second Most Important Exports	SITC Export Code for First	SITC Export Code for Second	Share of Total Exports (%)	Share of Category Exports (%)
Point source							
	* Algeria	1985	Petroleum products, crude petroleum	332	331	36, 32	97.6
	Angola	1985	Crude petroleum, petroleum products	331	332	76, 5	84.9
	* Benin	1982	Cotton, cocoa	263	072	32, 27	46.0
	* Bolivia	1985	Tin, gas	687	341	23, 52	55.7
	Botswana		Diamonds				
	* Burkina Faso	1985	Cotton, live animals	263	001	47, 13	56.8
	* Chad	1980	Cotton, live animals	263	001	61, 18	79.8
	* Chile	1985	Copper, nonferrous ore	682	283	33, 10	58.3
	* Congo	1985	Crude petroleum, petroleum products	331	332	89, 4	93.3
	* Dominican Repub.	1985	Sugar, pig iron	061	671	28, 14	42.7
	* Ecuador	1985	Crude petroleum, coffee	331	071	64, 7	66.7
	* Egypt	1985	Crude petroleum, cotton	331	263	51, 13	68.1
	Fiji		Sugar				
	* Gabon	1985	Crude petroleum, wood	331	242	84, 6	81.2
	Guinea						
	* Guyana						
	* Indonesia	1985	Crude petroleum, gas	331	341	48, 18	68.6
	* Iran	1987	Crude petroleum, tapestry	331	657	95, 2	95.8
	Iraq	1985	Crude petroleum, fruit	331	051	95, 0	98.8
	* Jamaica	1986	Inorganic elements, nonferrous metals	513	283	40, 20	51.9
	* Jordan	1985	Fertilizers (crude), fertilizer (manufactured)	271	561	35, 14	43.3
	Liberia	1985	Iron, rubber	281	231	63, 19	62.9
	* Malawi	1983	Tobacco, tea	121	074	48, 24	96.0
	* Mauritania	1985	Iron, fish	281	031	44, 40	58.3
	* Mauritius	1985	Sugar, clothing	061	841	47, 29	49.8

(Continued)

TABLE A-1. Continued

Export Classification	Economy	Year	First and Second Most Important Exports	SITC Export Code for First	SITC Export Code for Second	Share of Total Exports (%)	Share of Category Exports (%)
	* Mexico	1985	Crude petroleum, petroleum products	331	332	56, 5	60.0
	* Morocco	1985	Fertilizers, Inorganic elements	271	513	23, 16	40.5
	Namibia						
	* Niger	1981	Uranium, live animals	286	001	81, 14	80.0
	* Nigeria	1985	Crude petroleum, cocoa	331	072	90, 2	96.7
	Oman						
	Papua New Guinea	1985	Nonferrous metal, coffee	283	071	35, 14	45.1
	* Paraguay	1985	Cotton, oil	263	221	43, 33	49.5
	* Peru	1985	Petrol, nonferrous metal	332	283	16, 14	40.8
	Saudi Arabia						
	* Sierra Leone	1985	Pearl, nonferrous metal	667	283	36, 26	34.8
	* South Africa	1985	Special, coal	931	321	54, 6	34.2
	Sudan	1985	Cotton, oil seeds	263	221	48, 15	71.3
	* Syria	1985	Crude petroleum, petroleum products	331	332	49, 19	74.1
	* Togo	1985	Fertilizers, cocoa	271	072	49, 16	53.6
	* Trinidad & Tobago						
	* Tunisia	1985	Crude petroleum, clothing	331	841	40, 17	44.5
	* Venezuela	1985	Crude petroleum, petroleum products	331	332	46, 29	80.0
	* Zaire	1985	Copper, crude petroleum	682	331	45, 22	44.2
	* Zambia	1985	Copper, zinc	682	686	88, 2	93.4
Coffee and cocoa	* Brazil	1985	Coffee, petroleum products	071	332	10, 7	37.0
	* Burundi	1985	Coffee, tea	071	074	84, 6	92.2
	* Cameroun	1986	Coffee, cocoa	071	072	28, 22	52.5

(Continued)

TABLE A-1. Continued

Export Classification	Economy	Year	First and Second Most Important Exports	SITC Export Code for First	SITC Export Code for Second	Share of Total Exports (%)	Share of Category Exports (%)
	Central African Repub.	1985	Coffee, Wood	071	242	35, 24	41.6
	* Colombia	1985	Coffee, petroleum products	071	332	51, 13	59.3
	* Costa Rica	1985	Coffee, fruit	071	051	30, 24	60.5
	* Côte d'Ivoire	1985	Cocoa, coffee	072	071	32, 25	68.0
	* El Salvador	1985	Coffee, Sugar	071	061	63, 4	51.3
	* Ethiopia	1985	Coffee, hides	071	211	63, 13	71.2
	* Ghana	1985	Cocoa, Aluminum	072	684	66, 6	69.3
	* Guatemala	1985	Coffee, crude vegetable materials	071	292	35, 8	58.1
	* Haiti	1985	Coffee, clothing	071	841	27, 16	74.2
	* Kenya	1985	Coffee, tea	071	074	27, 25	63.6
	* Madagascar	1985	Coffee, spices	071	075	39, 29	79.2
	* Nicaragua	1985	Coffee, cotton	071	263	38, 33	58.2
	* Rwanda	1985	Coffee, tin	071	687	43, 9	76.4
	* Tanzania	1985	Coffee, cotton	071	263	39, 11	68.1
	* Uganda	1985	Coffee, hides	071	211	71.3, 6.9	90.0

\*Countries with required data to estimate the regression models.

Note: See the text for a description of the classification methodology.

Source: Authors' calculations based on export classification data from UNCTAD (1988).

TABLE A-2. Data Names and Sources

Dependent Variable	Year or Years	Source	Entire Sample			Regression Sample		
			Sample Size	Mean	SD	Sample Size	Mean	SD
Per Capita Growth Rate	1975-97	World Bank 1999, Heston and others 2002	90	1.05	2.39	66	0.92	2.13
<i>Natural resource variables</i>								
Manufactures index	1980	Statistics Canada 2002	88	-0.339	0.267	66	-0.333	0.248
Diffuse index	1980	Statistics Canada 2002	88	0.025	0.178	66	0.044	0.185
Point source index	1980	Statistics Canada 2002	88	0.115	0.275	66	0.116	0.266
Coffee and cocoa index	1980	Statistics Canada 2002	88	0.059	0.082	66	0.066	0.088
<i>Possible determinants of institutions</i>								
Ethnic fractionalization	1972	Easterly 2001	84	48.6	29.5	66	48.2	30.7
Predicted trade share	NA	Hall and Jones 1999	89	2.73	0.64	66	2.70	0.64
Latitude	NA	Hall and Jones 1999	89	6.20	18.09	66	6.22	18.18
English language	NA	Hall and Jones 1999	88	0.04	0.16	66	0.04	0.19
European language	NA	Hall and Jones 1999	89	0.20	0.36	66	0.25	0.39
<i>Possible determinants of economic growth</i>								
GDP per capita	1975	World Bank 2002	90	2.21	2.03	66	2.13	1.74
Secondary school achievement	1975	Barro and Lee 1995	90	8.80	7.09	66	9.40	7.36
Trade openness	1965-90	Sachs and Warner 1995	85	0.19	0.33	66	0.17	0.31
Change in terms of trade	1975-97	World Bank 2002	80	-0.22	0.26	66	-0.22	0.27

(Continued)

TABLE A-2. Continued

Dependent Variable	Year or Years	Source	Entire Sample			Regression Sample		
			Sample Size	Mean	SD	Sample Size	Mean	SD
Share of primary exports/GDP	1971	Sachs and Warner 1995	81	0.16	0.15	66	0.15	0.11
Sub-Saharan Africa	NA	World Bank 2002	90	0.46	0.50	66	0.44	0.50
Europe and Middle East	NA	World Bank 2002	90	0.12	0.33	66	0.11	0.31
Latin America	NA	World Bank 2002	90	0.24	0.43	66	0.32	0.47
East Asia	NA	World Bank 2002	90	0.11	0.32	66	0.08	0.27
<i>Institutions</i>								
Rule of law	2000/01	Kaufmann and others 2002	89	-0.37	0.72	66	-0.38	0.68
Political instability and violence	2000/01	Kaufmann and others 2002	87	-0.31	0.83	65	-0.32	0.78
Government effectiveness	2000/01	Kaufmann and others 2002	86	-0.33	0.78	64	-0.33	0.69
Control of corruption	2000/01	Kaufmann and others 2002	86	-0.34	0.68	64	-0.38	0.62
Voice and accountability	2000/01	Kaufmann and others 2002	90	-0.30	0.77	66	-0.21	0.77
Regulatory burden	2000/01	Kaufmann and others 2002	89	-0.11	0.78	66	-0.06	0.71
Law and Order Tradition <sup>a</sup>	1984-98	Easterly 2001	78	2.95	0.95	59	2.90	0.81
Quality of the Bureaucracy <sup>a</sup>	1984-98	Easterly 2001	78	2.70	0.99	59	2.72	0.92
Political rights <sup>b</sup>	1972-98	Easterly 2001	89	4.66	1.54	65	4.53	1.51
Civil liberties <sup>b</sup>	1972-98	Easterly 2001	89	4.63	1.27	65	4.48	1.20
Property rights and rule-based governance <sup>c</sup>	1997	World Bank 2002	81	3.39	0.73	62	3.49	0.59

<sup>a</sup>Based on International Country Risk Guide data.

<sup>b</sup>Based on Freedom House data.

<sup>c</sup>Based on World Bank Country Policy and Institutional Assessment. NA, not applicable.

TABLE A-3. Determinants of Economic Growth, 1974-97

Variable	(1) OLS	(2) 3SLS	(3) 3SLS	(4) 3SLS	(5) 3SLS	(6) 3SLS
Constant	4.15** (0.86)	4.71** (1.26)	4.19** (0.89)	4.21** (0.86)	4.42** (1.14)	4.12** (0.85)
Rule of law	1.33** (0.33)	1.86 (0.97)	1.36** (0.50)	1.38** (0.45)	1.58 (0.84)	1.30** (0.44)
GDP per capita	-0.11 (0.13)	-0.15 (0.14)	-0.11 (0.12)	-0.11 (0.12)	-0.13 (0.13)	-0.10 (0.12)
Secondary school achievement	-0.03	-0.04	-0.03	-0.03	-0.04	-0.03
Trade openness	(0.03)	(0.04)	(0.03)	(0.03)	(0.04)	(0.03)
Change in terms of trade	2.15** (0.73)	1.79 (0.92)	2.12** (0.72)	2.11** (0.70)	1.97* (0.85)	2.16** (0.70)
Share of primary exports in GDP	-1.62** (0.63)	-1.64** (0.59)	-1.62** (0.57)	-1.62** (0.57)	-1.63** (0.58)	-1.62** (0.57)
Sub-Saharan Africa	-1.36	-1.63	-1.37	-1.38	-1.49	-1.34
Europe and Middle East	(1.68)	(1.64)	(1.55)	(1.54)	(1.60)	(1.54)
Latin America	-3.43** (0.83)	-3.43** (0.77)	-3.43** (0.76)	-3.43** (0.76)	-3.43** (0.76)	-3.43** (0.76)
East Asia	-2.38* (0.94)	-2.61** (0.96)	-2.39** (0.87)	-2.40** (0.87)	-2.49** (0.93)	-2.36** (0.87)
Adjusted R-squared	-2.89** (0.83)	-2.83** (0.78)	-2.88** (0.76)	-2.88** (0.75)	-2.86** (0.76)	-2.89** (0.75)
Sample size	-1.05 (1.04)	-1.06 (0.97)	-1.05 (0.95)	-1.05 (0.95)	-1.05 (0.95)	-1.05 (0.95)
	0.47	0.54	0.56	0.56	0.55	0.56
	65	65	65	65	65	65

(Continued)

TABLE A-3. Continued

Variable	(1) OLS	(2) 3SLS Language variables and equator distance	(3) 3SLS Natural resources	(4) 3SLS Language variables, equator distance, and natural resources	(5) 3SLS Language variables, equator distance, trade share, and fractionalization	(6) 3SLS Language variables, equator distance, trade share, fractionalization and natural resources
Hausman test (p-value)		0.95	0.57	0.89	0.96	0.92
Overidentification test (p-value)	-	0.97	0.30	0.72	0.90	0.76
Hausman-Taylor test (p-value)				0.64	0.51	0.66

\*Significant at the 5 percent level.

\*\*Significant at the 1 percent level.

Note: Dependent variable is the annual growth rate of GDP, 1975–97.

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