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How Natural Resource Export Structures Affect  
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# **The Varieties of Resource Experience: How Natural Resource Export Structures Affect the Political Economy of Economic Growth\***

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**Abstract:** Many oil, mineral, and plantation crop-based economies experienced a substantial deceleration of growth since the commodity boom and bust of the 1970s and early 1980s. In this paper, we illustrate how 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. Controlling for a wide array of other potential determinants of governance, we use data on classifications of export structure to show that ‘point source’ and ‘coffee/cocoa’ exporting countries do relatively poorly across an array of governance indicators. This is not just a function of being a “natural resource” exporter, as countries with natural resource exports that are “diffuse” do not show the same strong differences—and have had more robust growth recoveries.

*Keywords: economic growth, institutions, natural resource endowment*

*JEL Codes: O13; O50; Z13*

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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*<sup>1</sup>

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*<sup>2</sup>

[I]t 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: The Political Economy of Development*<sup>3</sup>

## I. Introduction

Is oil wealth a blessing or curse? Norway provides a hopeful 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>4</sup>. The controversy over the construction of the pipeline in Chad

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<sup>1</sup> Cited in Ross (2001: 329, fn. 6)

<sup>2</sup> Karl (1997: 13)

<sup>3</sup> Bates (2001: 107, fn. 1)

<sup>4</sup> According to the 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).

demonstrates that even in an extraordinarily poor country, not all believe that additional wealth pouring into government coffers will lead to better times.

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 (e.g., 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 strengthened (then) Zaire’s elite, revenues from Col-tan are now strengthening the rebel Rally for Congolese Democracy<sup>5</sup>. Rebels in Sierra Leone are financed from diamond mines, and are perhaps fighting over nothing else except for control over them.

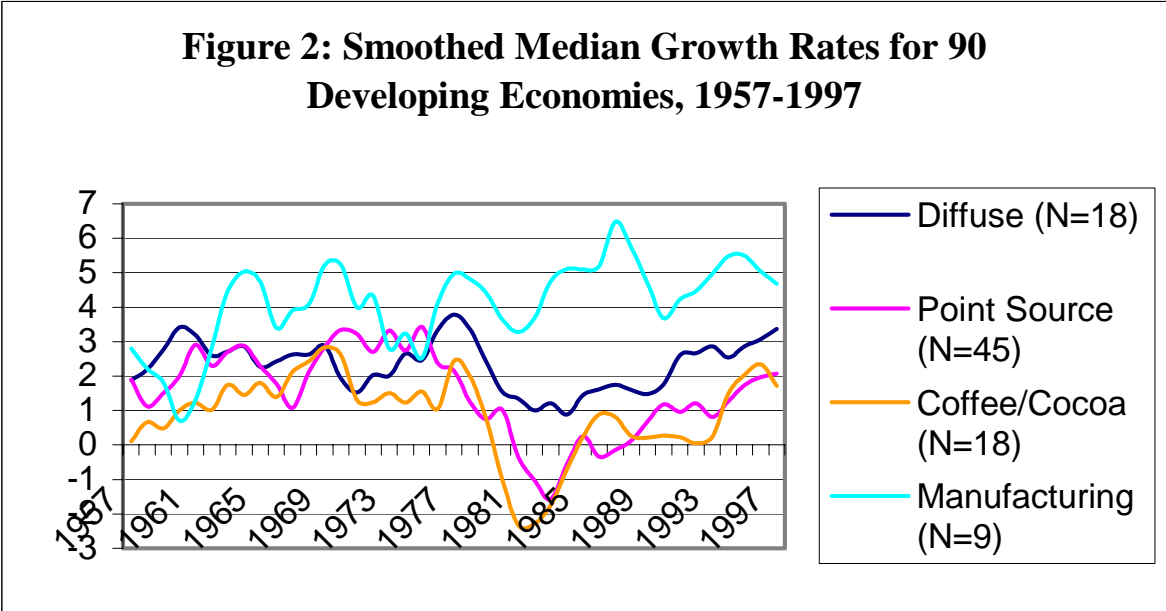
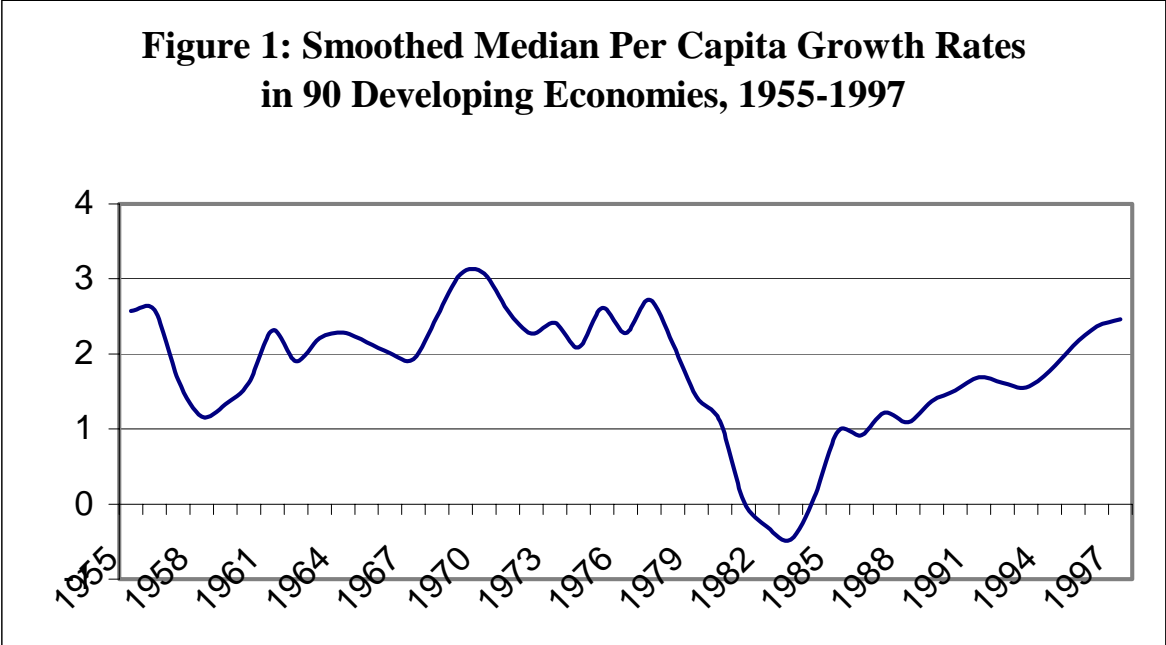
What mechanisms might explain the conditions under which resource abundance becomes a problem rather than part of a solution to development? We add to the burgeoning literature on natural resources and performance by documenting one way in which countries’ sources of export revenue affect economic growth<sup>6</sup>. We show that export concentration in what we term “point-source” natural resources—those extracted from a narrow geographic or economic base such as oil, minerals (e.g. copper, diamonds), and plantation crops (e.g. bananas)—is strongly associated with weak public institutions which are, in turn, strongly associated with slower growth. This paper presents econometric evidence to support the hypothesis that not only is institutional capacity to handle shocks a determinant of economic

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<sup>5</sup> Columbine-tantalite (Col-tan) has recently been declared ‘the wonder mineral of the moment’: when processed, it is vital for the manufacture of capacitors and other high tech products.

<sup>6</sup> The most recent literature on the effects of natural resources on growth includes Auty 1995, 2001b; Leamer et al 1999; Leite and Weidmann 1999; Ross 1999, 2001; Sachs and Warner 1995 [2000], 1999; Stijns 2001; Nugent and

growth since the “commodity shocks” of the 1970s and 1980s (Rodrik, 1999), but that institutional capacity itself varies across economies with different sources of export revenue, and that it is these export structures that influences socioeconomic and political institutions.



Robinson 2001; Gylfason and Zoega 2001, 2002; Lederman and Maloney 2002; Murshed 2003; Sala-i-Martin and Subramanian 2003.

Figures 1 and 2 (from Woolcock, Pritchett and Isham 2001) illustrate the growth performance facts we are trying to (partially) explain. Figure 1 shows the smoothed (over three years) median developing country annual growth rate of GDP per capita. From the early 1960s until the late 1970s this was consistently above 2 percent. But since 1980 the 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. Figure 2 is even more striking, as it shows that the growth performance of ninety developing economies classified by their export structure in 1985 (we turn to the exact definitions of the categories below). Countries that were exporters of manufacturers have not experienced a growth deceleration at all. All natural resource exporters suffered substantial slow-downs, but the deceleration was much more severe and lasted much longer for “point source” and “coffee/cocoa” exporters than for countries whose principal exports were what we term “diffuse.” Why?

We focus on the variety of growth experiences associated with reliance on different sources of export revenue and show that *export composition*—both between natural resources and manufactures but also amongst different types of natural resources—influences the quality of political institutions, and that these, in turn, shape growth performance. Section II 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. Section III discusses our two measures of export structure. Section IV shows the link between these and indicators of governance, and then completes the circle by showing the link between indicators of governance and economic growth since. Section V concludes, with some speculations for policy.

## II. Development of our hypothesis

Ross's (2001) excellent empirical investigation into the mechanisms by which oil undermines democracy outlines several possible channels or "effects" through which oil affects political outcomes. We draw on his analysis to discuss three such mechanisms: a *rentier effect*, a *delayed modernization effect*, and an *entrenched inequality effect*. All of these are consistent with a negative link between particular types of resources and government capacity.

*Rentier Effects.* Political scientists generally—and area specialists in particular—argue that certain natural resources undermine development through what they term "rentier effects" (Ross 2001)<sup>7</sup>. When revenues can be easily extracted from a few sources that are easily controlled 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 develop the deep "civil society" and horizontal social associations that many feel are the "preconditions" of democracy.<sup>8</sup> 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 resources to pursue direct repression and violence against dissenters.

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<sup>7</sup> Some historians of the early modern state (e.g., Chirot, 1998) 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 exogenous resources (e.g. the Spanish crown) 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, either (a) an accommodation was reached between the sovereign and other classes about their permission/assistance in taxation (classic case: England), (b) an increasingly powerful sovereign extracted resources directly (classic case: France), or (c) an inability to mobilize revenues because of conflicts between sovereign and nobles meant that eventually one got gobbled (classic cases: Poland, Hungary).

<sup>8</sup> See, among others, Lipset (1959), Moore (1966), Putnam (1993), and Inglehart (1997).

*Delayed Modernization.* For influential scholars such as Barrington Moore (1966), the story of wealth, power, and political and economic transformation begins with some smallish group of elites owning the most valuable resources (usually land); from this land they extract a surplus from the peasants in some way or another (serfdom, slavery, feudal exactions), but then economic circumstances change so that industrialization is necessary. Modernization requires that (a) some of the surpluses be transferred from existing activities to new industrial activities, (b) at least some of the labor be moved to the new activities, and (c) 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<sup>9</sup>. 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 of landed elite/rural producer and urban labor/new industrialists/urban “middle class” plays out. This process can go more or less rapidly and can lead to representative democracy, fascism, corporatism, Marxist dictatorships, or oligarchies (Moore 1966). More recently, Acemoglu, Johnson, and Robinson (2001) 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.

Moreover, states who control a “point source” resource would resist industrialization because it means creating several alternative sources of power (urban labor, urban middle class, urban industrialists) each of whom, 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

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<sup>9</sup> Acemoglu and Robinson (1999) model precisely these trade-off by the elites.



that countries that are still today dominated by “point source” products are also likely to be dominated by elite politics of one type or another. In this case we do want to bring the OECD countries in, because they are countries that successfully made the transition from agricultural production to industrialization (and beyond) and in the process created functioning democratic polities (although via very different paths—the US/UK path to democracy is very different from the French, Prussian/German, or Japanese one). Indeed, viewed over the span of the last hundred years, it is only quite recently that resource-poor countries have become systematically wealthier than resource-rich countries (see Auty 2001a: 5).

Political scientists have long argued that states dependent on natural resources tend to thwart secular modernization pressures—e.g., higher levels of urbanization, education, and occupational specialization—because their budget revenues are derived from a small work force that deploys sophisticated technical skills that can only be acquired abroad (e.g., oil is largely extracted 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 therefore less able to effectively and peacefully voice their collective interests, preferences, and grievances (even in nominally democratic countries such as Zimbabwe and Jamaica). In short, resource abundance simultaneously “strengthens states” and “weakens societies”, and thus yields—or at least perpetuates—low levels of development (cf. Migdal 1988).<sup>10</sup>

*Entrenched Inequality.* The “entrenched inequality” effect is that the export composition affects economic and political outcomes by affecting the social structure. Economic historians

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<sup>10</sup> There are many variants on the way in which resources delay modernization, which center on different connections between states and elites. The state can own the rents and a regime of rentier autocrats emerges, as with

Engerman and Sokoloff (1997, 2002; see also Sokoloff and Engerman 2000) argue that the diverging growth trajectories of South and North America over the last two hundred years can be explained by reference to the types of crops grown, the extent of property rights regimes enacted to secure their sale, and the timing and nature of colonization. In North America, crops such as wheat and corn were grown on small family farms, cultivatable land was relatively abundant, but de-colonization 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, de-colonization occurred late, and property rights were weak. Landed elites were able to amass great personal fortunes, resist more democratic reforms, and consolidated power.<sup>11</sup> During 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 generating an influence on the long-run level of development: ergo, North America’s resource base enabled it to become rich, but South America’s did not.<sup>13</sup>

The social dimension of “entrenched inequality” is that some areas of geographic space are conducive to small-holder production on individually owned plots. The interactions among

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Algeria and Nigeria; or, rentier capitalists can effectively own the state, as in Angola and El Salvador, and oligarchic regimes emerge.

<sup>11</sup> From this perspective, the warmer southern states in North America, with their plantation crops (tobacco) and enduring commitment to slavery, were a microcosm of the larger contrast between North and South America.

<sup>12</sup> 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 paper: they also note (echoing Barro 1996) that one possible explanation for the distributive struggle in many countries is the attempt to appropriate rents generated by natural resource endowments.

<sup>13</sup> For instance, one of many possible channels is that Carlos Diaz-Alejandro conjectured the at least some of the difference in political and economic evolution between Argentina and the United States can be explained by the fact that in Argentina land gets better from west (last settled) to east (first settled), while in the USA 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 up. Access to new land was only for less attractive property while redistribution would involve existing, very valuable lands. In contrast USA the western expansion moved onto

these producers tend to be horizontal relationships of equality. In other areas of geographic space, production is conducive to large-scale production (e.g. plantations of bananas). In these regions the relationships tend to bind each person to a social superior (noble, land-owner), and the horizontal relationships among producers tend to be ones of distrust. This economic structure then produces a social structure that is conducive to “bad” politics (clientelism) and to “bad” governance (since citizens cannot cooperate to demand better services from the state).

*Implications of all three stories.* We do not propose that the empirical results below are the “test” of some particular model; rather they are consistent with a variety of possible models<sup>14</sup>. The story we wish to tell contains three common (but distinctive) elements drawn from them. First, all involve some connection from the structure of economic production, and in particular the structure of exporting activity, to some measure of the capacity and quality of government. Second, it is not just exports of “natural resources” that matter, but their production characteristics. The actual geographic pattern of production is important, particularly as it affects the ease with which the state can control and extract the “rents.” In particular, while others have focused (rightly) on dimensions of natural resource exports such as lack of diversification and exposure to secular terms of trade decline (and volatility)<sup>15</sup>, we stress the effect of exports on political and social structures, and only then indirectly on economic

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superior land. This meant the system of property rights was developed as new, valuable lands, were being brought into the economy (De Soto, 2000) and redistribution of existing land was of almost no interest.

<sup>14</sup> We acknowledge that this deviates from much of existing economic practice, but we do so deliberately. That is, 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 vindicates that particular model. We feel that this is methodologically unsound. Any particular empirical test does not *vindicate* a particular model; it only *rejects* the class of models that are incapable of producing the associations in the data and therefore vindicates *all* models that are capable of generating the particular comparative static prediction. In this section, we show 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.

performance. In this sense, while it is of course possible for the state to extract rents from all forms of natural resources, we argue that ‘point source’ resources are far more susceptible to capture (whether through marketing boards, control of line ministries, or direct procurement) than ‘diffuse’ resources. Third, while many of our stories for growth involve very long run effects, there is also a connection with *changes* in growth rates through the combination of weak institutions and shocks.

### **III. Creating a measure of export structure**

Our conjecture and hence 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.* We are going to show that endowments condition export structures, export structures influence measures of political and institutional performance, and that these measures of political and institutional performance condition growth performance in the 1974-1997 period, which was a period in which there was massive deceleration in growth in developing countries. Again, this approach does not attempt to differentiate amongst the various models whereby resource endowments affect political and institutional structures or amongst the various models whereby these structures affect growth.

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<sup>15</sup> Note that our classification of “diffuse” is about the conditions of production of any given commodity, not “diversification” across different commodities.

In this paper we take the link between endowments and export structure as given—that countries with oil are more likely to export oil and that countries can only export crops like coffee and cocoa if they have appropriate climates. This link has a reasonable base in theory and evidence. Our measures of the “quality” of government are typically from the 1980s and 90s. We use export structure from prior to that period so that, at least with respect to post-1980 growth and currently assessed institutional quality, export structure is pre-determined. The weak link in determining the chain of causation is that it is possible that historical factors affect institutions and this in turn determines whether a country will develop a manufacturing capability and export manufactures, and hence the link between poor governance and exports is caused by poor governance. However, this argument is much less compelling against the arguments about the differences of types of natural resource exports.

#### *A) Data on export composition*

To test this hypothesis we create classifications of export structures according to their natural resource base using two methods.

First, we use UNCTAD’s *Handbook of International Trade and Development Statistics* (1988) for data on the leading exports of every country in 1985 that had a GNP per capita under \$10,000 and a population greater than one million. We classified countries based on their top two SITC three digit exports into four types:

- ‘Manufacturing exporters’, who relied on exports of manufactures (without regard to labor or capital intensity).
- ‘Diffuse’ economies, which have relied primarily on animals and agricultural produce grown on small family farms (e.g., rice and wheat).

- ‘Point source’ economies, which have relied primarily on fuels, minerals, and plantation crops (e.g., sugar).
- ‘Coffee and cocoa’ economies, which have relied primarily on these two commodities (classifying them as either ‘point source’ or ‘diffuse’ proved problematic since these crops can be grown either on plantations or small family farms, but since these tree crops rely on a long time scale and are immobile, they are potentially susceptible to rent extraction from small holders via marketing boards.)

We relied on judgments from country and commodity experts when there was some ambiguity about a country’s classification. The countries used in this analysis, with their classifications, are presented in Appendix Table 1, which also lists the description of the first and second most important export categories with their share in total exports<sup>16</sup>.

The second method was to compute four indices of ‘net export shares’ that mirror our four classifications of the *types* of exports: (1) manufacturing; (2) diffuse, (3) point source, and (4) coffee and cocoa. To construct these four indices, the World Trade Analyzer from 1980 was used to aggregate SITC codes at the two-digit level into our four export categories, following the approach of Leamer *et al.* (1999). To calculate the ‘net export share’ for each sub-category, net exports ( $X-M$ ) of sub-category  $i$  is divided by the sum of the absolute value of net exports across all sub-categories (following the procedure in Leamer *et al.*, 1999). The four indices are then

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<sup>16</sup> Naturally, there are borderline cases and judgments could differ. Wherever possible, we tried to err on the side that would be “against” our findings. For instance, should we consider Botswana a “point source” country because of its diamonds or a “diffuse” country because of its cattle? Robinson (2003) has argued that the social structures that emerged from cattle were an important part of the Botswana success story (and why they could resist the pressures of diamond exports). We classify Botswana as “point source”—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 they affected the results overall as they were not based on performance. For instance, although Mali and Burkina Faso both export cotton (which we regard as “point source”) and live animals (which we regard as “diffuse”) as their two major exports, we classify Mali as “diffuse” because its share of live animals is substantially higher than that of Burkina Faso. It is unlikely these few difficult cases strongly determine the results.

calculated as the sum of the net export shares for each sub-category in each of the four categories. By construction, these indices have a range of –1 to 1, with a higher number indicating a greater relative reliance on the corresponding category for export earnings.<sup>17</sup>

Reassuringly, the two methods give similar results, as shown in Table 1, which presents the means of these four indices among all countries and according to these UNCTAD-based classifications. The ‘manufactures index’ is –0.34 for all countries in our sample: it is –0.02 for the UNCTAD ‘manufacturing exporters’ compared to –0.38, –0.35, and –0.43 for 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 (in the last three rows of the table), so that moving diagonally in the lower right of the table, 0.08, 0.28, and 0.16 (in bold), respectively are higher than other row entries<sup>18</sup>.

**Table 1: Export compositions and the natural resource base of selected developing economies**

Data source	Statistics Canada World Trade Data Base (1980)			
UNCTAD-based Classification:	Manufactures index	Diffuse index	Point source index	Coffee and Cocoa index
All countries	-0.34	0.03	0.11	0.06
<i>of which:</i>				
Manufacturing exporters	<b>-0.02</b>	-0.05	-0.12	0.01
Diffuse	-0.38	<b>0.08</b>	-0.04	0.04
Point source	-0.35	0.01	<b>0.28</b>	0.04
Coffee and cocoa	-0.43	0.06	-0.02	<b>0.16</b>

Notes: means of selected export and trade related data for 90 developing economies. See text for descriptions of country classifications, data and data sources.

<sup>17</sup> For additional detail on the rationale behind the groupings, see (Leamer 1984). We thank Peter Schott for providing this information.

*B) Differences in growth and institutional quality across export categories*

We now begin to develop our argument that the nature of export composition—measured by these four indices—affects economic growth via political and social institutions. First, Table 2 shows the growth story that we introduced with Figures 1 and 2. Since 1974, growth rates have been massively different between developing countries that export manufactures and resource-exporter countries—almost 4 percentage points per annum different (4.58 versus 0.65). The difference is due in large part to the different in the *deceleration* of growth. Whereas the growth in the exporters of manufactures *increased* by one percentage point, that of the resource exporters decelerated by almost two percentage points (1.89) for a three percentage point differential (these magnitudes of growth rate differences maintained over time have enormous implications—if two countries begin with equal income today the country growth three percentage points faster would be more than *twice* as rich in only 22 years). More importantly for our hypothesis about the importance of the composition of natural resource exports, growth rates are also significantly different (using the Mann–Whitney test) between the types of resource exporters. Diffuse economies have done almost as well as their pre-oil shock performance (decelerating by “only” 0.43), while point source have decelerated by 2.57 percentage points and coffee/cocoa economies have decelerated by 1.65 percentage points.

Second, in Table 3, we also compare the averages across these exporter classifications for eleven institutional variables, which have been used as indicators of “institutional quality” in the empirical growth literature<sup>19</sup>. There is no question that the manufactures exporters appear to

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<sup>18</sup> The classification of countries also produces reasonable results when compared with standard sources like the World Development Indicators (WDI) (1999). Over the 15 year period *before* the oil shock manufactures were only 10.6 percent of exports for resource exporters versus 46.8 percent for merchandise exporters.

<sup>19</sup> These “institutional” variables have been used recently in a set of papers on the institutional determinants of economic growth (Knack and Keefer 1995; Rodrik 1999a, Kaufmann *et al.* 2000; Dollar 2000, Ritzén, Easterly and



**Table 2: GDP per capita growth rates by export composition and period.**

		Manufacturers exporters	Resource-exporter				
		All	All	Classification of resource exports:			
				Diffuse	Point source	Coffee/ cocoa	
<b>GDP per capita growth rates per annum</b>							
Period	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 5% level and ** significant at 1% level for Mann-Whitney test of similar distributions in resource-poor and resource-exporter countries.							

**Table 3: Institutional quality and export composition among ninety developing economies.**

		Exporters of manufactures	Resource-exporter				
			All RE	Type of resource exports:			
				Diffuse	Point source	Coffee/ cocoa	
Number of countries:		9	81		18	45	18
<i>Source</i>	<i>Variable</i>						
Kaufmann Kraay, Zoboda	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
ICRG	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
Freedom House	Political rights	3.98	3.28		3.50	3.26	3.12
	Civil Liberties	3.56	3.35		3.49	3.33	3.24
CPIA	Property rights and rule-based governance	3.60	3.37		3.53	3.28	3.42
Notes: The sources for these institutional variables are Kaufmann et al. (2000) (for KKZ), Easterly (2001) (for ICRG and Freedom House) and World Bank (2002) (for CPIA).							
* significant at 5% level and ** significant at 1% level for Mann-Whitney test of similar distributions in resource-poor and resource-exporter countries.							

Woolcock 2000, and Easterly 2001). Growth rate data for the period 1957-1997 was compiled from the Penn World Tables and the World Development Indicators (World Bank 1999). Measures of social and political data were adapted from Kaufmann *et al.* (2002), Easterly (2001), and World Bank (2002).

have higher institutional quality—the indicator is lower among the resource-exporter countries in all cases and for six of these this difference is statistically significant<sup>20</sup>. However, the differences among the types of resource exporters are not impressive: while diffuse exporters tend to have better institutional quality, the differences are small and not statistically significant.

#### **IV. Regressions: government quality and exports**

Using our continuous indices of export composition, we can move beyond the simple cross-tabs in two ways. We use regressions that measure the intensity of the export concentration within type, and the regressions control for the composition of all four types for each country. We estimate a two-equation system. In the first equation, institutional variables are endogenously determined by different types of natural resource intensity (point-source vs. diffuse, etc.) as well as the other correlates of institutional quality that have been proposed in the literature—e.g., a country’s share of English and European language speakers, latitude, and ‘predicted trade share’ (Hall and Jones 1999, Kaufmann, Kraay, Zoboda 2000) and ethnic fractionalization (as used in Ritzen, Easterly, and Woolcock 2000, Alesina, *et al.* 2002). In the second equation, growth is then determined by institutions (as well as initial income, investment, education and other usual suspects from the growth regression literature).

Unless otherwise noted, all of the regression results reported below are from the two stage system (equations 1 and 2) detailed here. We first estimate an equation for each of six indicators of institutional quality *measured in the 1990s* ( $I_{i,1990s}^j$  listed below) (‘rule of law’, ‘political stability and violence’, ‘government effectiveness’, ‘absence of corruption’, ‘regulatory

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<sup>20</sup> From the KKZ data, ‘rule of law’, ‘political stability’, ‘government effectiveness’, and ‘control of corruption’;

framework’, and ‘property rights and rule-based governance’) as a linear function of the four indices of net export composition *measured in 1980* ( $NR_i^k$ ), plus five other (relatively) predetermined variables: ‘English language’, ‘European language’, ‘distance from equator’, ‘predicted trade share’, ‘ethnolinguistic fractionalization’, all of the usual growth determinants ( $X_i^m$ ), (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 dummies<sup>21</sup>.

Growth over the period 1975 to 1997 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 dummies. We use three-staged least squares (3SLS) to estimate this system of equations.<sup>22</sup>

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

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

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from ICRG, ‘law and order tradition’ and ‘quality of the bureaucracy.’

<sup>21</sup> One reaction to this strategy is to wish for “instruments for our instruments.” We are using export structures as a means of identifying the impact of political and institutional quality variables on growth. But this leads to the common complaint that export structure is not exogenous, and that in particular, countries which developed good institutions, even if they were richly endowed with natural resources (e.g. Norway, Australia) ceased becoming primary goods exports and hence export structure is endogenous to institutions. Our response is that we are focused not on showing that exporters of manufactures have better institutions than primary exporters (as others have done), but rather that the composition of the types of natural resource exports have political effects over and above the “manufactures versus primary” distinction. On this point we are more comfortable 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 on the identification question.

<sup>22</sup> This follows the example of Barro (1997) and many others in the growth literature. 3SLS estimates are more efficient than IV estimates if the error terms below are correlated and the system is not exactly identified. As noted by an anonymous (and helpful) referee, some recent growth literature has used recursive SUR estimation for models that includes natural resource endowments (e.g. Gylfason and Zoega 2001), which is one approach to address the simultaneity problem that might otherwise bias such results. We re-estimated our models using recursive SUR, and found no substantial difference in the reported results.

In particular, we call attention to two of the growth determinants. First, we include in the growth regression the terms of trade, to be sure that we are not simply capturing the effect of falling terms of trade. Second, we also include the share of primary exports to GDP, which was done in a pair of influential papers by Sachs and Warner (1995 [2000], 1999), who argue that having abundant natural resources makes you less competitive in manufacturing exports, and manufacturing exports have some happy features like learning spillovers that make them “extra good” for growth. Originally we thought that the channel through institutions might be a better “explanation” of the presence of the “primary share” in a growth regression. However, including the regional variables in a sample of developing countries already makes the pure “primary exports” variable statistically insignificant. Even so, we include the share of exports that are “primary” as a growth regressor, because this means we can be sure the impacts of export structure are due to the *composition* among types of primary exports, not simply that any natural resource has the same impact.<sup>23</sup>

First, we present the results for estimating equation (1), based on a three-staged least squares (3SLS) estimation of this system of equations. These results establish whether measures of the natural resource endowment—using the four indices derived from Statistics Canada—predict the nature of socioeconomic and political institutions. Table 4 illustrates the results of equation (1) for the six chosen institutional variables.<sup>24</sup> As shown in the first two rows, neither the ‘manufactures index’ nor the ‘diffuse index’ are statistically significant predictors of any of the six institutional variables.

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<sup>23</sup> At the suggestion of an anonymous referee, we also verified that including ‘exports/GDP’ in the model has no effect on the reported results.

<sup>24</sup> 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 1.

**Table 4: The effect of the natural resource endowment on institutions**

	(1)	(2)	(3)	(4)	(5)	(6)
	Rule of law	Political stability	Government effectiveness	Absence of corruption	Regulatory framework	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)
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

Notes: test of the effect of natural resource base indicators on six institutional variables. See text for descriptions of all variables. \* significant at 5% level, \*\* significant at 1% level

By contrast, as shown in the third row, the ‘point source index’ is statistically significant in all six specifications: *ceteris paribus*, an increased dependence on point source natural resources is associated with much worse institutions. From the fourth row, the ‘coffee and cocoa index’ is significant in specifications (1) – (4).<sup>25</sup> As for the other regressors in this model, ‘European language,’ ‘Secondary school achievement,’ and ‘Europe and the Middle East’ are also statistically significant predictors of these institutional variables.<sup>26</sup>

These results also show that ‘Share of primary exports/GDP’ is a positive and significant predictor of institutions as well, which seems to raise the question of the net effect of exporting certain kinds of primary goods.<sup>27</sup> To diagnose this result, we first replaced ‘share of primary exports/GDP’ with ‘exports/GDP’ in our model. In this equation, the results using this alternative regressor were almost identical statistically. We then included both of these variables as regressors in the model. The results in this case were that neither variable was significant on its own, but they were jointly significant. These results lead us to believe that it is the presence of exporting, of any kind, which has an independent and positive effect on institutions. Higher exporters are more plugged into globalized markets: one can only be plugged into globalized markets if one respects rule of law, property right, etc.

What are the relative magnitudes of the effects of the significant regressors in this equation? Table 5 lists the equivalent of ‘beta coefficients’ from this 3SLS estimation.<sup>28</sup> The values for ‘point source index’ (from –0.38 to –0.71) are either the largest (columns 1 and 2) or second largest (columns 3 – 6) compared to the values of ‘European Language’ and the other

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<sup>25</sup> The p-values for specifications (5) and (6) are 0.07 and 0.12, respectively.

<sup>26</sup> A small note about the scale and definition of ‘Per capita GDP (1975)’ in this table: it is in US\$1000, adjusted for purchasing power parity.

<sup>27</sup> We thank an anonymous referee for drawing our attention to this.

significant variables.<sup>29</sup> The values for ‘coffee and cocoa index’ (from –0.13 to –0.37) are generally comparable to those of ‘GDP per capita.’

**Table 5: The relative magnitude of the effect of the natural resource endowment**

	(1) Rule of law	(2) Political instability	(3) Government effectiveness	(4) Control of corruption	(5) Regulatory framework	(6) 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/GDP	0.21	0.21	0.20	0.03	0.13	0.27

Note: figures are the equivalent of 'beta coefficients' from 3SLS estimation

What are the absolute magnitudes of the effects of the natural resource variables? From specification (1), a country whose ‘point source index’ fell by a standard deviations<sup>30</sup> (=0.266)—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 deviations (=0.08)—the approximate difference between Colombia (0.22) and Ecuador (0.14)—would increase ‘rule of law’ by 0.37. Since the standard deviation of ‘rule of law’ is 0.68, these represent substantial institutional improvements. To illustrate, the estimated effect of a decrease

<sup>28</sup> 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.

<sup>29</sup> We have excluded the ‘Europe and Middle East’ dummy from this comparison.

in one standard deviation of the ‘point source index’ and of the ‘coffee and cocoa index’ yields a total change of ‘rule of law’ by 0.76, based on the calculations above: this is the equivalent of the difference between Sri Lanka (-0.31) and Thailand (0.44). Given their relative and absolute magnitudes, these overall results are consistent with our first hypothesis: that both point source and coffee and cocoa dependence are critical determinants of socioeconomic institutions.

Next, in Table 6, we present the results of estimating the growth equation to show the strong impact of institutions on post-1974 growth.<sup>31</sup> Five of the six OLS models (specification 1) suggest that institutions are a positive and significant determinant of economic growth among these developing countries from 1975 to 1997. By contrast, when the four natural resource indices are used as the identifying instruments (specification 2), this generates an estimate that is significant with all six institutional variables—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 languages variables and ‘latitude’ are added to the natural resource instrument set (specification 3), this produces broadly similar results.

The presence of alternative valid instruments<sup>32</sup> for institutions allows us to test the “exclusion” restriction—that is, that export composition affects growth *only* insofar as it affects institutions (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; see Davidson and MacKinnon 1993, Hausman-Taylor 1991 and the results of using these tests in

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<sup>30</sup> Here and with the ‘beta coefficient’ calculations above, we use the standard deviations from the regression sample, as listed in Appendix Table 2.

<sup>31</sup> In Table 6, the top line is taken from Appendix Table 3 and the remaining five lines in Table 6 are taken from tables such as Appendix Table 3 (not reported) where “rule of law” was replaced first by “political stability”, then by “government effectiveness”, and so on.

<sup>32</sup> 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



Appendix Table 3). We find no evidence that export composition should be included in the growth regression.

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**Table 6: The effect of the institutions on economic growth, 1974-1997**

Estimation procedure	OLS (1)	3SLS (2)	3SLS (3)
Instrument set	-	Natural resources	Full W 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

Note: OLS and 3SLS with various instrument sets, as discussed in the text

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Jones (1990, we believe however that the clearly exogenous ‘English language’, ‘European language’, and ‘distance

The results in this section comprise the econometric punch line of this paper. First, both point source and coffee and cocoa dependence negatively affect national socioeconomic institutions. Second, institutions that are endogenously determined by the nature of natural resource dependence are significant determinants of growth.

What are the implications of this two-stage effect? In the first part of this section, we noted that a large change in the composition of a country's natural resource endowment—a one standard deviation change in point source and coffee and cocoa dependence—is associated with a relatively large improvement of our measures of socioeconomic institutions. How might such an improvement translate into a change of economic growth? Using the results from Table 4 and specification (3) in Table 6, we calculate the estimated effect of a decrease in one standard deviation of the 'point source index' and of the 'coffee and cocoa index' on economic growth, via better institutions. These calculations yield an annual increase of per capita growth from between 0.51 to 0.75. Using the median of these figures (0.68), this translates into a GDP per capita that, *ceteris paribus*, is 19 percent higher, 25 years after the oil shock, among countries with such better institutions than countries with worse institutions.

## **V. Discussion and conclusion**

At first glance, ours are stultifying results for the policymaker; like Putnam's (1993) medieval guilds and choral societies, it is hard to imagine how a policymaker interested in accelerating growth can change what we have identified as one possible underlying cause of poor performance—a country's natural resource endowment makes for poor institutions.

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from equator' are ideal instruments for our endogenous regressors of interest, the institutional variables.

Given this, what options are available to the policy maker? World Bank (1998) illustrated the power of institutions in development assistance, and what donors should (and most importantly, should not) do in the face of varied institutional performance among potential aid recipients. Our results suggest how entrenched—and ‘environmentally determined’—poor institutions can be (cf. Wade 1988, at micro level). So these results, in a certain sense, further raise cautions about casual attempts at institutional reform (Murshed 2003). Poor institutions are deeply rooted. Where others (e.g., Rodrik 1999; Pritchett 2000; Acemoglu, Johnson, and Robinson 2004) 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 back further one step further, showing that, pace Karl (1997: 13), “the revenues a state collects, how it collects them, and the uses to which it puts them” does indeed “define its nature”. Institutions surely matter a lot, but *types* of natural resource endowments and the corresponding export structures to which they give rise (rather than “geography”), 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 created ‘institutional’ conditionality regarding the use of the resources from the oil pipeline that they are helping to finance. Perhaps this will work, but as this project began, money still went, defiantly, to the purchasing of 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. He is attempting reform from within and he has decreed (Weaver 2000) that Qatar will become a democracy.

We are hopeful that in some cases, donors can—if they’re lucky—gently nudge along such reforms. At the very least, donors should not maintain (perceived) ‘lifeline’ aid that prevents the likelihood of nascent reforms from even getting started. More optimistically and constructively, we fully endorse proposals (made by, among others, *The Economist* 2003 and Sala-i-Martin and Subramanian 2003) to have all revenues and expenditures associated with natural resource rents made publicly available; 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—in both the economic and geo-political sense—natural resources such as oil and diamonds, rather than genuine partners in the development process, likely undermines such reform efforts.

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**Appendix Table 1: Details on the export classifications derived from UNCTAD data**

<i>Export classification</i>	<i>Country</i>	<i>Year</i>	<i>Description of first and second most important exports</i>	<i>SIC export code for first</i>	<i>SIC export code for second</i>	<i>Percent of total exports</i>	<i>Percent of category exports</i>	
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		Manufacturing					
	* India	1985	Pearl, clothing	667	841	11, 9	58	
	* Korea, Republic	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, Textile	841	651	16, 6	61	
	Diffuse	* Argentina	1985	Wheat, Oil seeds and nuts	041	221	13, 10	66.1
* Burma / Myanmar		1985	Rice, Wood	042	242	31, 33	56.5	
* Gambia		1985	Oil seeds, veg oils	221	421	25, 21	84	
Guinea-Bissau			Fruits					
* Honduras		1985	Fruit, coffee	051	071	38, 25	84.7	
Lesotho								
* Malaysia		1985	Crude petrol, veg oil	331	442	23, 13	31.5	
* Mali		1985	Cotton, Live animals	263	001	56, 30	58.6	
Mozambique		1984	Fish, fruit	031	051	36, 19	69	
* Pakistan		1985	Cotton, rice	652	042	12, 12	61.9	
Panama		1985	Fruit, Fish	051	031	28, 21	78	
* Philippines		1985	Special trans, Veg oil	931	422	30, 9	26.9	
* Senegal		1985	Fish, Veg oils	031	421	14, 13	38	
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, Veg	042	054	13, 9	46.2	
* Uruguay		1985	Wood, Meat	262	011	19.3, 14.1	46.1	
* Zimbabwe		1985	Tobacco, Pig Iron	121	671	23, 12	36.3	
Point source		* Algeria	1985	Petroleum products, crude petrol	332	331	36, 32	97.6
		Angola	1985	Crude petrol, petroleum products	331	332	76, 5	84.9
	* Benin	1982	Cotton, Cocoa	263	072	32, 27	46	
	* 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 petrol, petroleum products	331	332	89, 4	93.3	
	* Dominican Repub.	1985	Sugar, pig iron	061	671	28, 14	42.7	
	* Ecuador	1985	Crude petrol, coffee	331	071	64, 7	66.7	
	* Egypt	1985	Crude petrol, cotton	331	263	51, 13	68.1	
	Fiji		Sugar					
	* Gabon	1985	Crude petrol, wood	331	242	84, 6	81.2	



**Appendix Table 1 (continued)**

Point source (continued)						
	Guinea					
*	Guyana					
*	Indonesia	1985 Crude petrol, gas	331	341	48, 18	68.6
*	Iran	1987 Crude petrol, tapestry	331	657	95, 2	95.8
	Iraq	1985 Crude petrol, fruit	331	051	95, 0	98.8
*	Jamaica	1986 Inorganic elements, nonferrous metal	513	283	40, 20	51.9
*	Jordan	1985 Fertilizers (crude), Fertilizer (manu.)	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
*	Mauritania	1985 Iron, fish	281	031	44, 40	58.3
*	Mauritius	1985 Sugar, clothing	061	841	47, 29	49.8
*	Mexico	1985 Crude petrol, petroleum products	331	332	56, 5	60
*	Morocco	1985 Fertilizers, Inorganic elements	271	513	23, 16	40.5
	Namibia					
*	Niger	1981 Uranium, live animals	286	001	81, 14	80
*	Nigeria	1985 Crude petrol, 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 petrol, petroleum products	331	332	49, 19	74.1
*	Togo	1985 Fertilizers, Cocoa	271	072	49, 16	53.6
*	Trinidad & Tobago					
*	Tunisia	1985 Crude Petrol, Clothing	331	841	40, 17	44.5
*	Venezuela	1985 Crude petrol, petroleum products	331	332	46, 29	80
*	Zaire	1985 Copper, Crude petrol	682	331	45, 22	44.2
*	Zambia	1985 Copper, zinc	682	686	88, 2	93.4
Coffee/cocoa	Brazil	1985 Coffee, petroleum products	071	332	10, 7	37
*	Burundi	1985 Coffee, tea	071	074	84, 6	92.2
*	Cameroon	1986 Coffee, cocoa	071	072	28, 22	52.5
	Central African Rep	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
*	Cote d'Ivoire	1985 Cocoa, Coffee	072	071	32, 25	68
*	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 veg 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

Notes: Export classifications based on data from UNCTAD (1988)

Countries marked with \* are included in the econometric models documented in Tables 3 and 4.

See the text for a description of the classification methodology

*Appendix Table 2: Data names and sources*

<u>Variable name</u>	<u>Year(s)</u>	<u>Source</u>	<u>Entire sample</u>			<u>Regression sample</u>		
			N	Mean	STD	N	Mean	STD
<u>Dependent variable</u>								
Per capita growth rate	1975 - 1997	World Bank (2002)	90	1.05	2.39	66	0.92	2.13
<u>Natural resource variables</u>								
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
<u>Possible determinants of institutions</u>								
Ethnic fractionalization	1972	Easterly (2000)	84	48.6	29.5	66	48.2	30.7
Predicted trade share	--	Hall and Jones (1999)	89	2.73	0.64	66	2.70	0.64
Latitude	--	Hall and Jones (1999)	89	6.20	18.09	66	6.22	18.18
English language	--	Hall and Jones (1999)	88	0.04	0.16	66	0.04	0.19
European language	--	Hall and Jones (1999)	89	0.20	0.36	66	0.25	0.39
<u>Possible determinants of economic growth</u>								
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- 1990	Sachs and Warner (1995)	85	0.19	0.33	66	0.17	0.31
Change in terms of trade	1975 - 1997	World Bank (2002)	80	-0.22	0.26	66	-0.22	0.27
Share of primary exports/GDP	1971	Sachs and Warner (1995)	81	0.16	0.15	66	0.15	0.11
Sub-Saharan Africa	--	--	90	0.46	0.50	66	0.44	0.50
Europe and Middle East	--	--	90	0.12	0.33	66	0.11	0.31
Latin America	--	--	90	0.24	0.43	66	0.32	0.47
East Asia	--	--	90	0.11	0.32	66	0.08	0.27
<u>Institutions</u>								
Rule of law	2000/01	Kaufmann <i>et al.</i> (2002)	89	-0.37	0.72	66	-0.38	0.68
Political instability and violence	2000/01	Kaufmann <i>et al.</i> (2002)	87	-0.31	0.83	65	-0.32	0.78
Government effectiveness	2000/01	Kaufmann <i>et al.</i> (2002)	86	-0.33	0.78	64	-0.33	0.69
Control of corruption	2000/01	Kaufmann <i>et al.</i> (2002)	86	-0.34	0.68	64	-0.38	0.62
Voice and accountability	2000/01	Kaufmann <i>et al.</i> (2002)	90	-0.30	0.77	66	-0.21	0.77
Regulatory burden	2000/01	Kaufmann <i>et al.</i> (2002)	89	-0.11	0.78	66	-0.06	0.71
Law and Order Tradition	1984-1998	Easterly (2000)	78	2.95	0.95	59	2.90	0.81
Quality of the Bureaucracy	1984-1998	Easterly (2000)	78	2.70	0.99	59	2.72	0.92
Political rights	1972-1998	Easterly (2000)	89	4.66	1.54	65	4.53	1.51
Civil Liberties	1972-1998	Easterly (2000)	89	4.63	1.27	65	4.48	1.20
Property rights and rule-based governance	1997	World Bank (2002)	81	3.39	0.73	62	3.49	0.59

Note: last columns are sample sizes, means, and standard deviations for the entire sample and the regression sample.

**Appendix Table 3: Determinants of economic growth: 1974 - 1997**

Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation procedure	OLS	3SLS	3SLS	3SLS	3SLS	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 (0.03)	-0.04 (0.04)	-0.03 (0.03)	-0.03 (0.03)	-0.04 (0.04)	-0.03 (0.03)
Trade openness	2.15 ** (0.73)	1.79 (0.92)	2.12 ** (0.72)	2.11 ** (0.70)	1.97 * (0.85)	2.16 ** (0.70)
Change in terms of trade	-1.62 ** (0.63)	-1.64 ** (0.59)	-1.62 ** (0.57)	-1.62 ** (0.57)	-1.63 ** (0.58)	-1.62 ** (0.57)
Share of primary exports/GDP	-1.36 (1.68)	-1.63 (1.64)	-1.37 (1.55)	-1.38 (1.54)	-1.49 (1.60)	-1.34 (1.54)
Sub-Saharan Africa	-3.43 ** (0.83)	-3.43 ** (0.77)	-3.43 ** (0.76)	-3.43 ** (0.76)	-3.43 ** (0.76)	-3.43 ** (0.76)
Europe and Middle East	-2.38 * (0.94)	-2.61 ** (0.96)	-2.39 ** (0.87)	-2.40 ** (0.87)	-2.49 ** (0.93)	-2.36 ** (0.87)
Latin America	-2.89 ** (0.83)	-2.83 ** (0.78)	-2.88 ** (0.76)	-2.88 ** (0.75)	-2.86 ** (0.76)	-2.89 ** (0.75)
East Asia	-1.05 (1.04)	-1.06 (0.97)	-1.05 (0.95)	-1.05 (0.95)	-1.05 (0.95)	-1.05 (0.95)
Adjusted r-squared	0.47	0.54	0.56	0.56	0.55	0.56
Sample size	65	65	65	65	65	65
Instruments		Partial W's	NR	Partial W's and NR	Full W's	Full W's and NR
Hausman test	--	0.95	0.57	0.89	0.96	0.92
Overidentification test	--	0.97	0.30	0.72	0.90	0.76
Hausman-Taylor test	--	--	--	0.64	0.51	0.66

Notes: Dependent variable is the annual growth rate in GDP: 1975 - 1997.

\* significant at 5% level; \*\* significant at 1% level. P - values listed for the three final statistical tests.

See the text for descriptions of the variables, the econometric specifications, and the statistical tests.