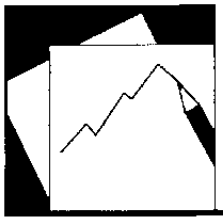
WP/03/139



IMF Working Paper

Addressing the Natural Resource Curse: An Illustration from Nigeria

Xavier Sala-i-Martin and
Arvind Subramanian

INTERNATIONAL MONETARY FUND

 WP/03/139

IMF Working Paper

Research Department

Addressing the Natural Resource Curse: An Illustration from Nigeria

Prepared by Xavier Sala-i-Martin and Arvind Subramanian[1]

Authorized for Distribution by Kenneth Rogoff

July 2003

Abstract

Some natural resources—oil and minerals in particular—exert a negative and nonlinear impact on growth via their deleterious impact on institutional quality. We show this result to be very robust. The Nigerian experience provides telling confirmation of this aspect of natural resources. Waste and poor institutional quality stemming from oil appear to have been primarily responsible for Nigeria's poor long-run economic performance. We propose a solution for addressing this resource curse which involves directly distributing the oil revenues to the public. Even with all the difficulties that will no doubt plague its actual implementation, our proposal will, at the least, be vastly superior to the status quo. At best, however, it could fundamentally improve the quality of public institutions and, as a result, durably raise long-run growth performance.

JEL Classification Numbers: O1, O4, O5, O55, O57, Q0

Keywords: natural resources, oil, Nigeria, institutions, growth

Authors' E-Mail Addresses: xs23@columbia.edu; asubramanian@imf.org

---

[1] The authors are respectively, Professor of Economics at Columbia University, and Advisor, Research Department, International Monetary Fund. We are very grateful to Francesco Trebbi for his valuable research assistance. Thanks are due to Doug Addison, Peter Clark, James Daniel, José Fajgenbaum, Chris Lane, and Dani Rodrik for helpful comments. Any errors are our own.

Contents Page

I. INTRODUCTION

On just about every conceivable metric, Nigeria's performance since independence in 1960 has been poor. In PPP terms, Nigeria's per capita GDP was US$1,113 in 1970 and is estimated to have been only US$1,084 in 2000. The latter figure places Nigeria among the 15 poorest nations in the world for which such data are available.

Nigeria, unfortunately, fares much worse on measures of poverty and income distribution. Between 1970 and 2000, the poverty rate, measured as the share of the population subsisting on less than $1 per day, increased from close to 36 percent to just under 70 percent (Figure 1A). This translates into an increase in the number of poor from about 19 million in 1970 to a staggering 90 million in 2000 (Figure 1B).[2]

Similarly, the income distribution also deteriorated very sharply. Figure 2 plots the distribution of income for four years: 1970, 1980, 1990, and 2000. It is striking that over time the two tails of the distribution have become fatter, signifying that more and more people have been pushed toward poverty (the left hand side of the distribution) and towards extreme wealth (the right hand side). To illustrate: whereas in 1970 the top 2 percent and the bottom 17 percent of the population earned the same total amount of income, in 2000 the top 2 percent had the same income as the bottom 55 percent.

Table 1 reports the growth rate of GDP and its volatility for Nigeria. In terms of growth since 1960, Nigeria fared worse than the average country but better than oil-producing countries. It is also noteworthy that Nigeria's economy was substantially more unstable—reflected in the standard deviation and coefficient of variation of growth rates—than other countries, including other oil-producing countries.

These developments, of course, coincided with the discovery of oil in Nigeria. Figure 3 depicts the revenues that Nigeria has obtained from oil since 1965. Over a 35-year period, Nigeria's cumulative revenues from oil (after deducting the payments to the foreign oil companies) have amounted to about US$350 billion at 1995 prices. In 1965, when oil revenues per capita were about US$33, per capita GDP was US$245. In 2000, when oil revenues were US$325 per capita, per capita GDP remained at the 1965 level. In other words, all the oil revenues—US$350 billion in total—did not seem to add to the standard of living at all. Worse, however, it could actually have contributed to a decline in the standard of living.

This paper has three objectives developed in the next three sections. First, in Section II, we use cross-section empirical analysis to demonstrate that stunted institutional development—a catch-all term for a range of related pathologies, including corruption, weak

---

[2] These calculations are based on Sala-i-Martin (2003). We use the original definition of poverty line of the World Bank, which is US$1 a day in 1985 prices.

governance, rent seeking, plunder, etc.—is a problem intrinsic to most countries that own certain natural resources such as oil or minerals. The resulting drag on long-run growth from having resources can be substantial. Second, in Section III, we establish that Nigeria's poor economic performance stems largely from having wasted its resource income. Then, in Section IV, we propose a solution for Nigeria to accelerate institutional change, which would involve distributing the bulk of the oil revenues directly to the people. This could fundamentally improve Nigeria's long-run growth prospects. The final section concludes.

II. The Natural Resource Curse: Revisiting The Empirical Literature

Is the detrimental impact of oil on development unique to Nigeria or is it—the oft-cited "natural resource curse"—a more general phenomenon? From a policy perspective, while it is important to know if a curse exists, it is perhaps more important to know the mechanism by which it casts its spell. Identifying the mechanism allows a better stab to be made at prescription.

In the theoretical economics literature, three channels of causation from natural resource abundance to lower growth have been identified.[3] First, natural resources generate rents which leads to rapacious rent-seeking (the voracity effect), whose adverse manifestation is felt through political economy effects as in Tornell and Lane (1999) and to increased corruption (Mauro, 1995; and Leite and Weidmann, 1999) which adversely affects long-run growth. We shall refer to this effect more broadly as the institutional impact of natural resources.

Second, natural resource ownership exposes countries to volatility, particularly in commodity prices, which could have an adverse impact on growth. Finally, natural resource ownership makes countries susceptible to Dutch Disease—the tendency for the real exchange rate to become overly appreciated in response to positive price shocks—which leads to a contraction of the tradable sector. This outcome, combined with the (largely unproven) proposition that tradable (usually manufacturing) sectors are "superior" because of learning-by-doing and other positive externalities, leads to the conclusion that natural resource ownership exerts a drag on long-run growth.

---

[3] Isham et. al. (2003) provide an excellent summary of the mechanisms of causation identified in the economics as well as in the political science literature. In the latter, emphasis is placed on the "rentier" effects, whereby large revenues from natural resources allow governments to mollify dissent and avoid accountability, insulating governments from pressures for institutional reform; and "anti-modernization" effects, whereby governments successfully thwart pressures for modernization and institutional reform because their "budgetary revenues are derived from a small workforce that deploys sophisticated technical skills that can only be acquired abroad."

Hausman and Rigobon (2002) state our understanding of the impact of natural resources as follows: "The concern that natural resource wealth may somehow be immiserating is a recurring theme in both policy discussions and in empirical analysis. The empirical regularity seems to be in the data but understanding its causes has been a much harder task." This supposed empirical regularity derives originally from the work of Sachs and Warner (1995), who showed, based on standard cross-section growth regressions, that the curse of natural resource-ownership is substantial, manifested in such countries growing slower, on average, by about 1 percent per year during the period 1970–89. Variations of this basic results can be found in Leite and Weidmann (1999) and Bravo-Ortega and De Gregorio (2001).

In their empirical work, Sachs and Warner (1995), and Leite and Weidemann (1999) attempt to unravel the potential channel of causation, but without great success. Given the Nigerian experience, we are particularly interested in exploring the channel that operates through corruption and institutional quality. The recent work (Hall and Jones, 1999, and Acemoglu et. al., 2001) on institutions provides another reason to revisit the natural resource literature. Our key results, are in sharp contrast to the commonly-held view about the impact of natural resources (especially Sachs and Warner, 1995), validating this revisiting of the empirical literature.

More recently, Collier and Hoffler (2002) have shown that natural resources considerably increase the chances of civil conflict in a country. According to their estimates, the effect of natural resources on conflict is strong and non-linear. A country that has no natural resources faces a probability of civil conflict of 0.5 percent, whereas a country with natural resources-to-GDP share of 26 percent faces a probability of 23 percent. Civil conflict, of course, is an extreme manifestation of institutional collapse and the work of Collier and Hoffler (2002) is therefore suggestive of a role for natural resources in affecting institutional quality more generally.

A recent paper by Isham et al. (2003) tests the proposition that natural resources affect economic growth through its adverse effect on economic institutions. Although our paper focuses on Nigeria, we do test a similar proposition in Section II. Our Section II differs from the Isham et al. (2003) paper in some respects. First, we employ a different basis for measuring natural resources, which also allows us to test for nonlinear effects. Second, in order to deal with the usual problem of what additional explanatory variables to include, we use the robust variables identified by Sala-i-Martin, Doppelhoffer, and Miller (2003). Third, and perhaps more importantly, our core results are subject to a greater degree of robustness checks than in the paper by Isham et al. (2003).

A. Econometric Specification

As discussed earlier, three channels of influence from natural resources to growth have been identified in the literature: the impact through terms of trade volatility, overvaluation of the real exchange rate, and institutional quality. Our empirical specification is simple and general enough to capture these three effects:

$$growth_{1970\text{-}98} = \mu + \beta \text{Conditioning Variables}_i + \phi \text{Volatility of Prices}_i + \delta \text{Overvaluation of Exchange Rate}_i + \gamma \text{Institutional Quality}_i + \lambda \text{Natural Resources}_i + \varepsilon_i \quad (1)$$

where ε_i is the random error term. If all the channels of causation from natural resources to growth are captured in equation (1) and if all the variables are correctly measured, there should be no need for the natural resources term. In practice, however, neither of these can be assumed, hence the inclusion of this term.

A number of specification issues arise. First, institutional quality will in general be endogenous and also subject to measurement error. Simple OLS estimation will therefore be incorrect. Accordingly, and in line with recent developments (Hall and Jones, 1998, and Acemoglu et al., 2001), we will adopt an instrumental variable (IV) estimation strategy, using the instruments recently identified in the literature. Two sets of instruments are available—mortality rates of colonial settlers (due to Acemoglu et al., 2001) and fraction of the population speaking English and European languages (due to Hall and Jones, 1998). In much of this paper we will rely on the latter set because they are available for a much larger group of countries, although we will also test whether our results are robust to the former set of instruments.

A second issue relates to the choice of conditioning variables and the problem of endogeneity related to them. In regard to the former, the strategy we deploy is to identify those variables that have been statistically proven to be the most robust determinants of growth. Sala-i-Martin, Doppelhofer, and Miller (2003) have shown that out of a universe of about 70 variables that can plausibly affect growth, about 17 variables are statistically robust to deserve inclusion. In other words, for 17 of the 70 variables analyzed the probability of inclusion increased after observing the data (so that the posterior was larger than the prior probability of inclusion). Sala-i-Martin et al. (2003) also show that the sign certainty probability for all these "robust" variables is well over 95 percent. We narrowed this further to 5 variables, which appear to be robust in the growth equations even after the inclusion of a measure for institutions (appropriately instrumented). Thus, we chose initial period value of income (lnRGDP70), primary school enrolment (p60), the relative price of investment goods (iprice1), prevalence of malaria (MALFAL66), coastal population (within 100 kms of coastline) over coastal area (DENS65C) as the set of covariates that feature in all the regressions. But to ensure that our choice is not selective or biased, we check the robustness of our results to inclusion of all of the other 12 covariates identified by Sala-i-Martin et. al. (2003).

Clearly, many of these covariates—indicators of health and education—are endogenous in general. This is why we take the initial period values of these variables. Hence, the only variable we instrument for is institutions. This specification and estimation strategy yields implicitly a second equation that we estimate which will be very important for our analysis. This equation is the first-stage for the institution equation. Thus,

$$\text{Institutional Quality}_i = \eta + \nu\text{Conditioning Variables}_i + \theta\text{Volatility of Prices}_i + \rho\text{Overvaluation of Exchange Rate}_i + \tau\text{Instruments for Institutional Quality}_i + \tau\text{Natural Resources}_i + \upsilon_i \quad (2)$$

This equation will allow us to test whether natural resources have an indirect effect on growth (in addition to any possible direct effect captured in equation (1)) via their impact on institutional quality.[4] This equation represents one of the key innovations of this part of the paper, allowing us to test for one of the channels of causation from natural resources to growth.

In this part of the paper, we will therefore be interested in the sign, size, and significance of the direct impacts of natural resources on growth and hence the coefficients β, ϕ, δ, and γ in equation (1), and also of the indirect impacts via institutional quality and hence the coefficients θ, ρ, and τ.

B. Data Description and Sources

The data and sources are described in detail in the appendix. Here we highlight some key issues. Growth rates of per capita PPP GDP are from the World Bank's World Development Indicators. Following Rodrik, Subramanian, and Trebbi (2002) and Easterly and Levine (2003), the institutional quality measure we use is due to Kaufmann, Kraay, and Zoido-Lobaton (2002). This is a composite indicator of a number of elements that capture the protection afforded to property rights as well as the strength of the rule of law. We also check for robustness to the other measures of institution quality compiled by Kaufmann et. al., (2002).

We measure natural resource endowments in different ways to ensure that our results are robust. Sachs and Warner's preferred measure was the share of exports of natural resources in GDP in 1970. We enlarge this to include (i) the share of the exports of four types of natural resources—fuel, ores and metals, agricultural raw materials, and food—in GDP and total exports; (ii) the share of the exports of all natural resources in total exports; and (iii) a dummy for oil producing countries. The question arises whether some of these variables could be endogenous—after all countries could have high share of natural resources in economic activity because of slow growth. To address this concern, we use initial period values of the natural resource variables for the estimations, with 1970 and 1980 serving as alternative initial periods.

---

[4] The implied exclusion restriction is that the instrument INSTR_i does not appear in equation (1).

C. Results

The results for the growth and institution equations are presented in Tables 2–9. All the tables, except Tables 4 and 8, contain two panels—Panel A presents the estimation results for the second-stage equation for growth, and Panel B to the corresponding first-stage regressions for institutional quality.

Table 2 presents the basic specification with natural resources treated as an aggregate and expressed in terms of their share in GDP (SHARENATRSGDP) or in total exports (SHARENATREEXP) for the two periods 1970 and 1980. All the equations include the five basic conditioning variables, all of which, in the growth equation, are significant and correctly signed with coefficient estimates that are close to those found in previous studies. In particular, it is worth noting that the convergence coefficient is between -1.6 percent and -1.9 percent, which is consistent with the magnitude obtained in growth regressions (Barro and Sala-i-Martin, 1995). The significance of the institutional quality terms is also consistent with the recent work of Acemoglu et al (2002). The coefficient on the instability term (measured as the standard deviation of the terms of trade between 1970 and 1998 multiplied by the share of resource exports in GDP) is significant, although not consistently, and the overvaluation term is never significant and is hence dropped from all the equations.[5]

As Panel A of the Table shows, the different measures of natural resources are insignificant and change signs between 1970 and 1980, suggesting the lack of any direct impact from natural resources to growth. This is in contrast with the findings of Sachs and Warner (1995) who found a significant negative impact.

The institution regressions, in Panel B, however, present a different story. In four of the five cases, natural resources are significant (at the 1 or 5 percent levels) and negatively signed, implying that natural resources are detrimental to institutional quality. The overall picture that appears to emerge is that natural resources have a negative impact on growth via their effect on institutions and that once institutions are controlled for they have no further impact on growth.

To gauge the quantitative significance of this indirect effect, consider the equations with natural resources expressed as a share of total exports. Note that the standard deviation for the share of natural resources in total exports is about 29 percentage points (mean of 66 percent) in 1980 and the standard deviation for institutional quality is about 1.03. A unit standard deviation increase in the share of natural resources in total exports will lead to a deterioration in institutional quality of 0.259 (28.8*.009, where the latter is the coefficient of

---

[5] The overvaluation term measures the degree to which the exchange rate is overvalued on average (see Easterly and Levine, 2002 for details) and insignificant in nearly all specifications when included on its own and also when were interacted with the various natural resource variables.

natural resources in the institution equation). This represents a 0.259 standard deviation change in institutional quality which in turn results in a 0.36 percent decline (0.259*1.43, where the latter is the coefficient on institutional quality in the growth equation) in the annual average rate of growth. Thus, a one standard deviation increase in the share of natural resources in exports is associated with a reduction in annual per capita GDP growth of about 0.36 percent.[6]

Table 3 analyzes whether it is appropriate to treat all natural resources alike. Theoretical models would suggest that while they should exert similar effects in terms of their instability and overvaluation effects, the impact of different natural resources on institutional quality could be very different. In particular, oil and minerals give rise to massive rents in a way that food or agricultural resources do not. Isham et. al (2003) refer to them as "point-source" natural resources. It is the lobbying for and allocation of the rents associated with such resources which is detrimental to economic and political institutions (as in Tornell and Lane, 1999). In Table 3, the four natural resources are combined into two—one for fuel and ores (fuelandmineralshare) and one for food and agricultural raw materials (foodandagrishare)[7] (measured in terms of their share in total GDP and exports)—and entered instead of the aggregate share.

The aggregate results in Table 2 appear to be an average of diverging effects at the level of individual resources. The coefficients on growth of the two natural resource terms are insignificant. But in the institution regressions, the coefficients of the fuel and mineral variable is consistently negative and significant, usually at the 1 percent level, while the other natural resource term switches signs and is generally not significant, a pattern that will be evident in virtually all of the regressions. This strongly confirms our priors that fuel and minerals have different impacts on institutional quality compared with other natural resources, a finding confirmed by Isham et. al. (2003).

The quantitative impact of the individual resources is broadly similar and potentially large. Taking column 4 as the core specification yields the result that a one-standard deviation in the endowment of minerals and ores is associated with *slower growth* of about 0.37 percent per annum. Finally, column (6) in Table 3 introduces an oil dummy, which yields the interesting result that oil creates a beneficial effect on growth, once institutions are controlled for. But the impact on institutions of oil is significantly negative.[8]

---

[6] Note that the equation with the share of natural resources in GDP in 1980 yields the same quantitative impact (standard deviation of SHARENATRSGDP80 in the sample is 0.115 and the coefficient is -2.29, yielding a growth impact of 0.37 percent).

[7] Respectively fuels, ores and metals, agricultural raw materials, and food.

[8] In column (5) of Table (3), we enter the four different natural resource variables individually. In the institution equation, the fuel and minerals variables behave quite similarly, although they do appear to have different direct effects on growth.

Table 4 explores whether the effect of natural resources is linear. This is done by successively introducing dummies for shares in total exports exceeding 20, 30, 40, 50 60, 70, and 80 percent, respectively. The interesting results relate to the institution equation (and hence the growth equations are not reported). The noteworthy regularity is the monotonic increase in the (absolute value of the) size of the coefficient and the precision of the estimates. For example, the coefficient on the dummy for fuel and mineral shares exceeding 80 percent is -0.97, nearly three times that of the dummy for fuel share exceeding 20 percent. Formally, these results suggest that the impact of natural resources is nonlinear; that is, the marginal (negative) impact of natural resources on institutions depends positively on the level of natural resources itself. Evidently, oil corrupts and excess oil corrupts more than excessively.

Table 5 checks whether the results are sensitive to the list of the conditioning variables. As discussed earlier, Sala-i-Martin et. al. (2003) identified 17 variables that are potentially worthy of inclusion. Our core specification contains 5 of these. We successively introduced in this core each of the other 12 variables, and Table 5 reports the results of introducing 5 of them—proportion of land area within tropics (TROPICAR), life expectancy at birth in 1960 (LIFE060), the number of years a country is open (YRSOPEN), ethnolinguistic fractionalization (AVELF), and a variable measuring the fraction of population that is Confucian (CONFU). The core result relating to the detrimental impact of fuel and minerals on institutions remains robust—even the magnitude of the coefficients is stable.[9]

In the last column of Table 5, we undertake a slightly different kind of robustness check relating to the institution equation. The finding that resources have a negative effect on institutional quality controlling for the level of real income may not be terribly interesting or surprising. If natural resource income is indeed manna from heaven with no effect at all on institutions, then we would expect a negative correlation between natural resources and institutions conditional on total (resource and non-resource) income.[10] Hence, a test for whether natural resources have a negative effect on institutions should be conditioned not on total income but on non-resource income. To do this, we replaced the 1970 level of GDP in the institutions equation with that in 1960. Since many of the oil discoveries were made after 1960, one can expect that the 1960 level of income is relatively, albeit incompletely, uncontaminated by income from natural resources. The results, presented in column (6), suggest that the core result relating to the negative impact of natural resources remains robust.

---

[9] The results when the other covariates are introduced are exactly the same and are not reported for efficiency. The only variable that changes the results is the Latin American dummy (see below).

[10] We are grateful to Dani Rodrik for this point.

Table 6 checks whether the results are robust to alternative measures of institutional quality. We replaced the rule of law variable successively by four other measures of institutional quality (from Kaufmann et. al., 2002) that capture respectively voice and accountability (VOICE), the effectiveness of government (GOVEFF), the control over corruption (CONCORR) and political stability (POLSTAB). The impact of natural resources on each of these measures is strong and statistically significant.

Table 7 undertakes other robustness checks.[11] In column 1, we use the Belsey-Kuh-Welsch (1980) test to check whether individual observations exert unusual leverage on the coefficient estimates, discarding those which do so. Two observations—Egypt and Malaysia—are influential. Even with these observations dropped, the coefficient estimates in the growth and institution regressions remain statistically unaffected. In column 2, regional dummies are introduced. While the dummies for east Asia and sub-Saharan Africa are themselves significant in the growth regression, the results on the natural resource variables remain broadly unaffected.[12] Fuel and minerals continue to exert a strong negative impact on growth (significant again at the 1 percent level) via their adverse effect on institutional quality. That the results on the fuel and minerals variable survive the inclusion of the regional dummies is remarkable.

In column (3), we narrow the sample to developing countries. The results on fuel and minerals remain broadly unchanged. The coefficient on the fuel and minerals variable drops in the institution equation drops to -1.9, but the overall impact remains broadly unchanged because the coefficient of the institution variable in the growth equation goes up from 1.2 to 1.57. In column (4), we replace the Hall and Jones instrument for institutions with the Acemoglu et. al. (2001) settler mortality. The negative effect of fuel and minerals on institutions remains robust and significant at the 1 percent level. Interestingly, the settler mortality instrument sharply increases the convergence coefficient from less than -2 percent to -2.9 percent, which is on the high side, suggesting that this specification might be more fragile.

In the preceding tables, we held the sample size constant to facilitate comparison across specifications. In Table 8, we re-estimate the preferred specifications for larger

---

[11] In the rest of the equations, column (4) in Table 3 is treated as the core specification. But virtually all the results obtain whether the individual natural resource variables are expressed in terms of export shares in 1970,1980, or for the period 1960–2000, or as a share of GDP in 1970, or whether the fuel variable is replaced by an oil dummy. Using the average for the entire period is more prone to the endogeneity problem noted above.

[12] The dummy for Latin America is insignificant and its introduction renders the regression estimate very imprecise, yielding implausible coefficient values, and hence is dropped from the analysis.

samples. In view of the fact that the binding constraint on sample size is the growth variable and that we are particularly interested in the impact of natural resources on institutional quality, we report only the first-stage equations for institutions. In column 1, the basic specification using the individual natural resources is estimated with a sample size of 82 rather than 71 (see Table 3). In column 2, the sample is restricted to developing countries. In both cases, the negative impact of fuels on institutions and the insignificant impact of the other natural resources holds robustly. In columns (3) and (4) the same exercise is repeated replacing the natural resource variables with the oil dummy and the results remain unchanged.

The results can be summarized as follows:

- First, in aggregate, some natural resources appear to have a strong, robust, and negative effect on growth by impairing institutional quality. Once institutions are controlled for, there is either very little effect of natural resources on growth or even a positive effect. In other words, owning natural resources on balance may still be a blessing rather than a curse in contrast to the findings of Sachs and Warner (1995) and Isham et. al. (2003). But there is a channel through which the curse operates, addressing which could make natural resources more of a blessing or less of a curse.
- Second, this aggregate picture, however, obscures diverging patterns between the different natural resources in one important respect. In particular, it is fuel and minerals—that typically generate rents that are easily appropriable ("point-source" natural resources)—that have a systematic and robust negative impact on growth via their detrimental effect on institutional quality. This effect is quantitatively significant, amounting to lower growth of about 0.36 percent per year. Other resources do not seem to adversely affect institutional quality. This differential impact is significant in itself but is also consistent with the different attributes of natural resources.
- Third, the impact of natural resources is nonlinear. In particular, the negative marginal impact of resources on institutional quality depends on and increases with their level.

III. THE NIGERIAN EXPERIENCE

Two broad themes pervade any macroeconomic account of Nigeria's post-independence development experience: Waste and Dutch disease. We provide evidence that suggests that Dutch disease may not be an adequate explanation for Nigeria's growth performance. The waste explanation, on the other hand, appears to be overwhelming, with oil a key factor causing a whole series of pathologies that have led to the waste.

A. The Evidence on Waste

Figure 4 provides a growth decomposition of Nigeria's performance since 1965. The two notable features are the rapid accumulation of physical capital, averaging 6.7 percent per

year; and *negative* TFP growth, averaging 1.2 percent per year. That oil was responsible for the physical capital accumulation is suggested by the timing of the surge in investment: between 1973 and 1980, the years of the two major oil price shocks, the capital stock grew at an average rate of 14 percent per year, which represented a threefold increase in the country's capital stock in 8 years. A substantial part of the increase was accounted for by public capital spending financed by the surging oil revenues. Public investment as a share of GDP rose by over 7 percentage points during the period of the oil shocks. Between the 1960s and the end of the second oil shock the share of the public sector in capital formation increased from 20 percent to 55 percent.

Another telling piece of evidence about the quality of investment comes from capacity utilization in manufacturing, a substantial portion of which is government-owned. Capacity utilization, which averaged about 77 percent in 1975, started declining very quickly, to about 50 percent in 1983 (Figure 5). Since the mid-1980s, capacity utilization has never exceeded 40 percent, and has languished at around 35 percent. In other words, two-thirds of the investment in manufacturing by the government is consistently wasted.

The overall picture that emerges is that Nigeria has over-invested in physical capital and has suffered from poor productivity. Quality has suffered at the expense of quantity. Bevan et al (1998) describe this accurately:

"This conjunction of a powerful political impetus to public investment and a lack of civil service skill is what makes Nigeria's economic history in this period so spectacular: almost the entire windfall was invested, and yet ... there was nothing to show for it." (p.67).

But how did oil make its impact felt in a way that affected Nigeria's economic fortunes and contributed to the large inefficiency reflected in negative rates of TFP growth and substantial waste of the capital stock that had been built up based on oil revenues? Anecdotal evidence for this is abundant.

In fundamental ways, the politics of Nigeria has been shaped by getting access to the revenues from oil. The Biafran war of the late 1960s was in part an attempt by the eastern, predominantly Ibo region, to gain control over oil reserves. Successive military dictatorships have plundered oil wealth, the most notable being General Abacha, and stories of transfers of large amounts of undisclosed wealth abroad are legion in Nigeria. The rise in government, following the surge in oil revenues, reflected an attempt by the North to appropriate oil revenues, and was manifested in the large share of the civil service being accounted for by Northerners. Oil revenues financed the building of the famous Ajakouta steel complex in the 1970s, which until today has not produced a commercial ton of steel. Moreover, as Bevan et. al. (1998) note the oil windfall enabled the government to increase its expenditures and thus provide increased opportunity for kickbacks.

Thus, it would seem plausible that not only has oil wealth been squandered but it has fundamentally altered governance in Nigeria. More formal evidence for this is provided in Table 9, which examines whether Nigeria is an unusual performer either in terms of growth

or of institutional development. This is done by introducing a Nigeria dummy in the core specifications. In column (1), the Nigeria dummy is significant: evidently, Nigeria fared significantly worse in terms of institutions but apparently significantly better in terms of growth. But when the natural resource variables are included (column (2)), Nigeria continues to be a positive outlier in the growth equation, although it is no longer an outlier in the institution equation. In other words, Nigeria, like other oil and mineral producing countries, has suffered from poor institutional quality stemming from these resources. Based on the estimates in column (1), poor institutional quality in Nigeria has contributed to lower long-run growth of 0.5 percent per year. This, in many ways, is the real legacy of oil in Nigeria.

B. Relative Prices and Role of Dutch Disease

In most accounts of Nigerian economic history, the impact of the oil windfall on the economy via its effect in raising the relative prices of nontradables to tradables occupies a central role in explaining poor economic performance. In this section, we explore this in further detail. We consider in turn what happened to relative prices and then to relative quantities.

In Figures 6A and 6B, we plot four indicators for the relative price of tradables to non-tradables: the first two might be called the external relative price and the latter two the internal relative price.

- the real effective exchange rate using the official rate;
- the real effective exchange rate using the parallel rate;[13]
- the relative prices of tradable to nontradables in the GDP deflator;
- the relative prices of tradables to nontradables in the CPI.

Since the early 1980s, all four indicators have moved in broadly the same direction: a substantial favoring of tradables in the 1980s and the first half of the 1990s which has been reversed since. For the 1970s, however, the indicators diverge. Specifically, the two internal price indicators suggest that, in fact, relative prices started moving in favor of tradables from 1970 onwards. The real effective exchange rate indicators, on the other hand, point to unfavorable tradable price movements for all of the 1970s, with the unfavorable trend being more pronounced for the official exchange rate indicator. A major reason for the diverging trends in these indicators is the behavior of food prices in the aftermath of the first oil price shock. As Bevan et al. (1998) explain, the expansion in the size of government led to a large

[13] Evidence in favor of Nigerian Dutch disease involves real effective exchange rate calculations using the official rate (see Pinto, 2002). It is not at all obvious why this is appropriate. As Reinhart and Rogoff (2002) remind us in their revision of post-World War II exchange rate history, parallel rates are the mechanism by which fixed exchange rate regimes become de facto floating ones. The more liberal the parallel market and the more the transactions carried out in it, the more appropriate it is to measure relative price movements based on the parallel rate.

influx of labor away from the rural toward the urban areas where job opportunities were growing. The resulting reduction in the size of the rural labor force led to a sharp decline in agricultural production and a rise in food prices.

Regardless of how the relative prices are measured, it seems that oil prices cannot account for their movements. For example, the correlation between oil prices and the two real exchange rate indices between 1968 and 2000 is -0.05 and -0.11, respectively: correctly signed but very weakly related (indeed statistically insignificant). The correlation between oil prices and the two internal price indicators is 0.39 and 0.26, respectively: statistically significant but incorrectly signed! It could be argued that it is oil revenues rather than oil prices that drive Dutch disease. When the correlations are re-computed between revenues and measures of the real exchange rate, they are always incorrectly signed and in 2 cases (the internal price indicators) are significant.

C. Relative Quantity Movements

The prime exhibit for the Dutch-disease explanation of Nigerian economic decline are Figures 7A and 7B, which show a decline in the share of agriculture in GDP from 68 percent in 1965 to 35 percent in 1981. The decline was especially pronounced for the cash crops—cocoa, oil palm and rubber, which saw a decline in output of about 75 percent between 1970 and 1981. Many commentators have argued that the big difference between the Indonesian and Nigerian response to oil windfalls was the ability of the Indonesian government to keep the exchange rate competitive and ensure the health of the agricultural sector through investments in technology, access to inputs, and provision of extension services (see Gelb et. al, 1988).

The counterpart of the decline in agricultural sector was the rapid growth in the size of services (especially government services) and manufacturing, in which the government decided to invest heavily. The share of services and manufacturing, over this same period grew by 16 and 8 percentage points respectively. This suggests that the real problem may well have been not that the agriculture sector declined but that the size of *government* in economic activity increased, with seriously detrimental effects in the long run.

Furthermore, it should be noted that this re-allocation of resources had probably very little to do with relative price movements: they were simply the result of the government's decision on how to utilize the oil windfalls. In fact, if resources had moved in response to relative prices, manufacturing should not have seen the expansion that it did because if anything relative prices were moving against it. In the period of the windfalls, public absorption increased sharply while private absorption declined: changes in the share of agriculture (private sector) and services and manufacturing (public sector) thus were the counterparts in the production side of the national income accounts of the changes in absorption.

A final problem with the Dutch disease explanation for Nigeria is that even if its detrimental effects in the 1970s were real, it is hard to explain why a reversal of the Dutch disease, indeed a sustained and prolonged real depreciation for nearly 15 years failed to offset or mitigate the previous problem. Looking at Figures 7A and 7B, it is remarkable how constant the shares of the various sectors in GDP have been since 1980 despite some pronounced changes in relative prices. Agriculture witnessed a brief boom in the mid-1980s, but manufacturing has been in secular decline since the 1980s despite favorable relative price movements.

To summarize, the Dutch disease explanation for Nigerian economic performance is not entirely satisfactory because:

- it is not clear that relative price movements did in fact consistently disfavor the tradable sector even in the immediate aftermath of the oil windfalls;
- relative price movements were not correlated with oil prices so that how oil windfalls were used rather than oil prices per se were more important in determining relative prices; in fact, decisions to keep the official exchange rate appreciated, were to a great extent related to the need to create rents (via the black market premium) at a time when oil revenues were in decline.[14] Thus exchange rate policy was itself endogenous and driven by rent and fiscal imperatives (see Gelb et al., 1988).
- the sustained movement of relative prices in favor of tradables in the 1980s and early 1990s did not reverse Nigeria's economic prospects;
- although the role of the agricultural sector declined, it was offset by an increase in the size of the government sector in economic activity, and the poor performance of the latter may well be the most important for Nigeria's long term economic decline.

If the investments in services and manufacturing that Nigeria made in the aftermath of the oil windfalls had been efficient, yielding the returns that say they did in East Asia, we would now be celebrating successful diversification *away* from agriculture by the Tiger on the Niger rather than bemoaning the victimhood of agriculture.

IV. Nigeria: From Analysis to Prescription

If natural resources do indeed lead and are intrinsic to a decline in institutional quality, what can be done to mitigate or offset this impact? Natural resources are an endowment, an unalterable geographical feature of the economic landscape. It would seem, therefore, that countries that have them are destined to institutional decline and poor growth.

---

[14] In fact, the weak correlation between oil prices and the real exchange rate reported earlier may have been stemmed precisely from the tendency of the government to keep the exchange rate appreciated during periods of low oil prices.

But can there be a way out? One answer would be to increase transparency and accountability in the management of oil revenues. But who will exercise these functions? In the past, this proved impossible. With the ongoing consolidation of democracy in Nigeria, a positive response to this question is conceivable. But even the most optimistic observer would acknowledge that, given the inheritance weak public institutions bequeathed by 4 decades of military dictatorships, strengthening them would take a long time. In the case of Nigeria, this skepticism is warranted precisely because of the influence of oil revenues that we have documented in Sections II and III.

In the previous sections we showed that the main problem affecting the Nigerian economy was the fact that the oil revenues that the government gets are regarded as manna from heaven which tends to undermine the quality of institutions and lower long-term growth prospects. Starting from this premise, the logical conclusion is that the best way to deal with the problem is to transform Nigeria into a "non-oil" economy. One way to do this is to prevent government officials from appropriating the oil resources directly. These resources should be distributed directly to the Nigerian citizens, ultimately their true and legitimate owners. This would replicate or simulate a situation in which the government has no easy access to natural resource revenue, just as governments in countries without natural resources. If this "easy revenue" (and the incentives for rent-seeking that it generates) is eliminated, it is possible that much of the problem could disappear. One of the direct benefits of this would be that Nigerians would have an initial endowment superior to that of other nations.

Of course one implication of our proposal would be that the government would lose revenue. In fact, if our proposal were to be implemented, the government would lose all the revenue that it now collects directly from the sales of oil. Although this would seem tragic to some, this is indeed what happens to most governments in the world. And, if the Nigerian authorities want to raise resources for necessary public expenditures, they would have to raise them by taxing the Nigerian citizens and companies as other governments typically do. Our reading of the evidence is that it would be much more difficult to mismanage or appropriate the resources that come from taxes than rents. This would therefore create the right incentives for governance and would contribute to mitigating the debilitating influences on the quality of institutions in Nigeria.

For reasons explained below, it would be desirable to implement our proposal as a justifiable right of each Nigerian to have access to an equal share of oil proceeds. This would take the rents out of public officials, thereby undermining the corroding process engendered by the rents, which have detrimental economic consequences. Of course, this is a radical proposal, and a number of issues arise in relation to it. We analyze each of them, but we would underscore that assessing the costs and benefits of our proposal as well as converting it into a concrete plan for implementation should be the task of Nigerians.

This solution is rendered more urgent by the prospects of the future exploitation of Nigeria's vast reserves of natural gas. Nigerians celebrate the discovery of these reserves. Sadly, we fear that natural gas may only aggravate and prolong the "curse."

Our estimates are that the likely magnitude of payments to individual households under our proposal would be large. We estimate them under two different scenarios: under current and future production levels. Under current production levels, each household would get about $140 which would amount to $425 in per capita PPP terms (roughly $760 per adult), representing about 43 percent of current per capita PPP GDP. With full exploitation of gas, these amounts could increase to upwards of $750 per capita ($1330 per adult) in PPP terms.[15] Clearly these sums are non-negligible from the point of view of individual households. If debt relief were to result from our proposal, as we argue that it will, then the total income to households would be higher still, amounting to an additional $100 per capita in PPP terms.

A. Creating a Fund or Distributing Current Revenues

One possible response to managing revenue volatility is to create a fund.[16] The best-known examples are Norway and Kuwait, although there are many others (see Davis et. al. 2001). Based on an analysis of a number of countries Davis et al. (2001) conclude that, funds "are, however, not an easy—nor necessarily an appropriate—solution to the fiscal policy problems faced by these countries." The underlying reasoning is that the conditions that generally thwart sound fiscal policy are likely to undermine the effectiveness of funds.[17] Particularly, where institutional capacity—to monitor and exercise accountability—is weak, there is a very serious risk that Funds will be "raided." This temptation is likely to be greater the larger the size of the Fund. Hence, calling for the creation of a Fund in Nigeria with stringent mechanisms to "ensure accountability and prevent the misuse of resources" begs the question of how these mechanisms can be created given the presence of oil. In this context, it is particularly inappropriate to invoke Norway as a model for Nigeria because Norway's oil discovery was made when its institutions were already highly developed.

For these reasons, the creation of a fund in the spirit of the Alaska Fund, whereby what is distributed to the public is not the oil revenue directly but the income from the Fund is not something that we would recommend. Moreover, if savings were an important issue, that could be addressed at the level of deciding how much oil to extract rather than "over-

---

[15] Considerable uncertainty surrounds the estimates of the future revenue flows from natural gas relating to the arrangements for their marketing and the terms offered to companies for its exploitation. But what is indisputable is the vast amount of reserves and its potential for exploitation.

[16] Theoretically, a Fund could be created for two reasons: to manage volatility (stabilization funds) and/or to save for future generations (savings funds).

[17] In principle, this could also apply to the proposal made in this paper.

extracting" and saving the proceeds, which has the pitfall noted earlier. Leaving oil in the ground, unextracted, is a form of saving.[18]

B. Who Should Receive the Revenues?

An important question is who should receive the oil revenues. Of course, the natural answer would be: *all* Nigerian citizens! But this raises some questions. For example, if all citizens, young and adult, are entitled to a lump-sum transfer, incentives to increase fertility (and therefore population growth) are introduced into the system. We do not think that distorting family incentives and introducing fiscally-induced fertility might be appropriate for Nigeria today. On the other hand, if only adults were entitled to the lump-sum transfer, the incentive to have more children would be reduced since the revenue associated with extra children would only become available eighteen or so years later.

It could also be argued that revenues should be distributed among adult women only. A number of studies have shown that development outcomes are strongly correlated with the degree of empowerment of women within a household (Sen, 1999). Whether this would be acceptable in Nigeria remains to be seen.

C. Fiscal Issues

Another question is whether all the revenues should be distributed or whether a certain share should be retained because of the government having to provide certain essential services (public goods). As mentioned earlier, our proposal is based on the conceptual principle of trying to convert an economy into one that notionally did not have oil. One way to achieve or simulate this would be to distribute *all* the revenues to the people and require the government to rely on normal fiscal principles to determine appropriate levels of taxation and expenditure.

This would create the right incentives for governance. Currently, oil accounts for a substantial share of total government revenues. As such, the government may have little incentive to provide services efficiently because the discipline exerted by the need to tax the public is largely absent: oil revenues are manna from heaven and keep flowing regardless of what the public sector delivers. Thus even though some would argue that the point of distributing the money and getting it back would essentially constitute an administrative waste, we believe that this waste would be justified by the radically altered incentives for governance.

---

[18] This paper does not take a view on the interesting question of whether the private sector should also decide on the rate of extraction of oil and hence address the associated intergenerational questions. What we are suggesting is that once decisions on savings are taken, savings be left in the ground rather than outside in a fund which carries the risk of the savings being consumed.

Of course, given that government cannot be starved of the revenue to provide essential services, there could be a transition period during which the share of overall revenues that is paid out progressively increases, culminating in a 100 percent distribution, say at the end of a finite period.

The notion that fiscal issues, including those relating to fiscal federalism, should be addressed "as if" Nigeria were a normal non-oil economy would argue in favor of making households or individuals rather than states as the beneficiary of the revenues. One natural question that arises is whether regions or households in regions that are the victims of the environmental degradation caused by oil should be compensated in the form of greater revenues to reflect the marginal environmental cost. After all, the derivation principle in Nigeria, whereby oil producing regions receive a higher share of revenues is in part a response to these environmental costs. While this might be seen as politically desirable, we would argue that issues related to environmental compensation and/or other political considerations should be dealt with through normal tax/expenditure principles. The distribution of revenues is purely related to the initial allocation of endowments following which normal fiscal principles would take over. The endowment instrument should not be burdened with having to address other objectives. Moreover, given that not all the oil causes environmental degradation (a point that will become even more important as natural gas exploitation starts acquiring importance), it would seem more practicable and simple to treat all sources of revenues similarly. Indeed, Ahmed and Singh (2003) argue for oil production excises to address externalities.

Our proposal could have a radical impact on fiscal federalism discussions. Above all, it could create strong pressures for decentralization because the tax base would shift down toward the states and local governments, allowing social service expenditures, which are, and arguably should be, delivered at the regional levels, to come closer to the unit of taxation.[19] Thus, expenditure and tax decision-making would be aligned closer, improving fiscal management. Currently, there are significant vertical imbalances in Nigeria with revenues of sub-federal entities financing between 20 and 40 percent of their current revenues, with the rest made up of transfers of oil revenues from the federal level. Ahmed and Singh (2003) argue that the current revenue sharing system is a key factor in predisposing the Nigerian intergovernmental arrangement to instability and inefficiency. In their view, a separation of revenues bases, with more stable revenue sources for the regions would be desirable for countries such as Nigeria and Indonesia. They envisage the central government taking on the stabilization function. Our proposal would be in line with their proposals for a larger and more stable base for sub-federal levels, while at the same time obviating the need for the federal government to provide the stabilization function. As we argue below, this stabilization function is better provided by the private sector than by the government.

---

[19] Of course, it is possible that consumers would rather not have the government provide some services; our proposal would allow consumers to decide on the scope of government itself, which might well lead to a reduction in the size of government.

While there would still be a need to determine what goods should be provided at the federal levels, how they should be financed etc., there would be an improvement over the status quo which is focused on sharing the rents rather than on conducting discussions within the context of a normal fiscal framework. Our proposal could also create additional pressures to improve tax administration and collection.

D. Implementation Issues

Implementing a system of transfer would no doubt raise huge administrative problems. The problems are very real and would have to be addressed. We would suggest that the transfers be made on a six-monthly or annual basis to minimize the administrative costs. Preferably, the payments should be made based on actual data made public by the government and the oil companies as to how much revenues were paid by the companies to the government.

Citizenship or residence could be a condition for receiving these payments. Nigeria could take advantage of the fact that it has just implemented a voter ID system and issued cards to all eligible voters. It would therefore seem practical to link payments to voter identification and hence make payments to adults or adult women. Given Nigeria's short four-year election cycle, the voter ID would be periodically updated, facilitating the making of the oil payments. An unintended consequence of our scheme, and one that would facilitate participation in elections, would be the incentive to obtain voter registration.

Implementation would be facilitated if all eligible Nigerians had a bank account so that revenues could simply be transferred from government accounts to individual ones. Indeed, requiring a bank account as a precondition for receiving revenues could encourage financial intermediation. Alternatively, and as an interim arrangement, the government could post checks to individual households as is done in the United States for tax refunds.

Waste and leakage in the process of distributing revenues could be considerable. Creative arrangements to minimize these would need to be devised. But we would argue that there is an important ex post check on the abuse that can result. Abuse will inevitably mean that some eligible households will not receive their rightful share of the oil proceeds. They would then have the right to seek redress through the judicial system. In essence, the defaults between the current system and the one we are proposing would change: under the former, citizens rely on public officials and institutions for receiving the oil money indirectly through public services; under our proposal they would have an automatic—*and justiciable*—right to receive the proceeds directly.

E. Debt Relief

Our proposal also offers a way out of the ongoing and sterile debate between international donors and Nigeria on the issue of debt relief. Nigerian officials and the public rightly wish to see the burden of external debt lifted, especially since a sizable part of the

debt was "odious" (contracted by dictators) and in which there was a large degree of creditor complicity. But donors, even those who accept the economic and moral arguments, are wary about providing debt relief. They fear that any savings from relief may well be misused as other public resources have been in the past, making them reticent about providing it despite the enormous pressure from within Nigeria and international civil society. Under our proposal, the "savings" from debt relief would also be distributed directly to the private sector, alleviating donor's legitimate concerns and making them more amenable to granting debt relief.

F. Need for Cooperation by Foreign Oil Companies

Implementing our proposal and minimizing the corruption and waste would require the cooperation of the foreign oil companies in a number of important respects. To prevent the government from under-stating the revenues it has available for distribution, oil companies could independently report the exact amounts they have paid to the government, which could be verified by independent audit. Information on their levels of production and the prices received would help in corroborating government figures.

G. Political Economy

Our proposal is open to one fundamental criticism. If vested interests have been responsible for the squandering of oil revenues in the past, why would they allow our proposal, which would denude them of all money and power, acquiesce to it?

Our response is that in some ways radical change of the sort we are proposing might be easier to accomplish than incremental change. Waste and corruption are issues that resonate deeply with every Nigerian: one could even hazard that the average Nigerian considers this to be the fundamental problem in Nigeria. As such, it might be easier to rally popular opinion in favor of such a proposal in a way that the vested interests might find difficult to resist. And especially if the push for change can be codified as a justiciable right for every citizen, the consequences could be enormous. As argued above, this right can provide some scope for redress against inevitable abuse.

H. Macroeconomic Consequences

How would the distribution of oil directly to the people affect the ability of the economy to weather shocks, particularly those relating to oil prices? In term of macro consequences, the proposal would essentially convert public windfall gains and losses from price volatility to private gains and losses. And this could have potential macroeconomic consequences.

Collier and Gunning (1996) provide an excellent analysis of the management of public and private windfalls, arguing that "...usually governments have proved themselves to be rather bad at coping with the revenue volatility that such a policy (custodial fiscal policy)

entailed. By contrast, private agents respond much more appropriately than the argument for a custodial role presumed."

The case for public management of shocks relies on government's being more able to distinguish temporary from permanent shocks and being more far-sighted in responding to them. Ideally, intertemporal consumption smoothing would require that a large portion of windfall gains be saved and that these savings be efficiently used. On the first, the evidence is that the private sector does no worse: Collier and Gunning (1996) report that savings from windfall gains were about the same whether the recipient agent was public or private.

As importantly, savings are much more efficiently used by the private than the public sector. This is, of course, the crux of our cross-section work, which shows that resources like oil are typically owned by the public sector corrode institutions because of the lobbying for rents. And there can be no stronger support for this than Nigeria, where, as our analysis showed, the returns on investment have been abysmally low. Collier and Bevan (1996) also provide evidence that the quality of investment deteriorates during windfalls. Tanzania re-introduced its "basic industries" investment program during the coffee boom having previously abandoned it. Nigeria embarked on the famous or infamous Ajakouta steel complex during the oil price boom.

In fact, Collier and Bevan (1996) discuss whether public windfalls should be transferred to the private sector through taxation or through the banking system but stop short, more on grounds of feasibility than of principle. Our proposal would just be a logical culmination of their analysis, albeit with other important justifications.

A related argument for custodial fiscal policy is the fear of a real appreciation and consequent Dutch disease when there is an unexpected positive shock. But if the private sector responds no worse or better than the public sector in terms of its savings behavior, there should be no difference in terms of the impact on currency movements. In theory, it could be argued that the private sector would in fact (i) be better able to distinguish shocks and hence be better at smoothing intertemporal consumption and (ii) spend the windfalls more efficiently than the private sector. In this case, the Dutch disease impact will be more muted.

V. Concluding Remarks

Natural resources such as oil and minerals may or may not be a curse on balance. But our work shows that they certainly have a seriously detrimental impact on the quality of domestic institutions and, through this channel, on long-run growth. Evidence from a cross section of countries shows that this impact is very robust. We also find that the relation is nonlinear.

The Nigerian experience provides telling confirmation of this aspect of natural resources. Waste and poor institutional quality stemming from oil rather than the Dutch

disease has been primarily responsible for its poor long-run economic performance. To address this, we would propose that oil revenues be distributed directly to the people, with each Nigerian or adult Nigerian having a right to an equal share of the proceeds.

We are under no illusions about the practical difficulties of implementing the proposal. Even with all the difficulties and waste that would no doubt plague its actual implementation, our proposal would, at the least, be vastly superior to the status quo. After all, the current situation is the result of waste and weak institutions over the last forty years. At best, however, our proposal could fundamentally improve the quality of public institutions and, as a result, transform the economic landscape in Nigeria for decades to come.

Further, we would argue that we may have understated the likelihood of our proposal being superior to the status quo. Our analysis was predominantly focused on average performance (economic growth), where Nigerian performance has been poor. If proper account is taken of Nigerian performance on poverty and income distribution, which has been significantly worse and which is intimately related to weak governance stemming from oil, it would be difficult to imagine that the status quo could not be improved upon.

Finally, the proposal presented in this paper for Nigeria could apply to other countries that are dependent on oil and minerals and that have been afflicted by the consequential curse of weak institutional quality. In some ways, countries such as Venezuela and Iraq may be even better candidates for considering the proposal made in this paper because the costs of administering it may be lower than in Nigeria.

Table 1: Comparative Indicators

	Nigeria	*Oil producing countries*	*Developing countries*	*All countries*
Per capita GDP, PPP, 1998	955	3,579	2,076	3,029
Growth rate of per capita GDP, 1960-98	1.336	1.105	1.520	1.739
Standard deviation of growth of per capita GDP	0.1465	0.111	0.078	0.0703
Coefficient of variation	0.110	0.101	0.051	0.040

Source: World Bank, *World Development Indicators*.

Table 2· Growth, Institutions, and Natural Resources in Aggregate

	Panel A. Second stage: dependent variable is real per capita GDP growth, 1970-98					*Panel B. First stage: Dependent variable is rule of law*				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Rule of Law	1.483	1.228	1.156	1.43	1.157					
	[0.666]	[0.785]	[0.514]	[0.789]	[0.550]					
lnRGDP70	-1.918	-1.678	-1.609	-1.738	-1.626	0.69	0.498	0.646	0.582	0.619
	[0.659]	[0.627]	[0.537]	[0.664]	[0.556]	[0.141]	[0.162]	[0.131]	[0.152]	[0.148]
P60	2.737	2.635	2.545	2.806	2.576	0.254	0.303	0.41	0.037	0.568
	[0.873]	[0.832]	[0.808]	[0.925]	[0.828]	[0.428]	[0.414]	[0.406]	[0.415]	[0.446]
IPRICE1	-0.009	-0.01	-0.009	-0.009	-0.009	-0.002	-0.002	-0.003	-0.002	-0.003
	[0.002]	[0.003]	[0.003]	[0.002]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
MALFAL66	-1.048	-1.033	-1.079	-1.059	-1.141	-0.111	-0.108	-0.077	-0.062	-0.071
	[0.580]	[0.545]	[0.495]	[0.530]	[0.523]	[0.291]	[0.287]	[0.249]	[0.281]	[0.256]
DENS65C	0.001	0.001	0.001	0.001	0.001	0	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
TOTvolatility7098	-0.014	-0.049	-0.073	-0.054	-0.065	-0.018	-0.008	0.003	-0.01	-0.006
	[0.053]	[0.029]	[0.020]	[0.027]	[0.025]	[0.021]	[0.013]	[0.008]	[0.011]	[0.011]
Overvaluation7098					-0.002					0.004
					[0.005]					[0.003]
EURFRAC						-0.569	-0.394	-0.661	-0.415	-0.622
						[0.241]	[0.220]	[0.232]	[0.217]	[0.228]
ENGFRAC						0.476	0.507	0.643	0.496	0.647
						[0.340]	[0.351]	[0.319]	[0.342]	[0.321]
naturalresourcesharegdp70	-2.427					-0.151				
	[3.025]					[0.973]				
naturalresourceshareexp70		0.001					-0.009			
		[0.010]					[0.004]			
naturalresourcesharegdp80			2.238		2.418			-2.29		-2.415
			[1.546]		[1.681]			[0.524]		[0.595]
naturalresourceshareexp80				0.009					-0.009	
				[0.010]					[0.004]	
Observations	71	71	71	71	69	71	71	71	71	69
Adjusted R-squared	0.57	0.6	0.63	0.59	0.62	0.64	0.68	0.69	0.68	0.69

Robust standard errors in brackets

Table 3: Growth, Institutions, and Individual Natural Resources

	Panel A. Second stage: Dependent variable is real per capita GDP growth, 1970-98						*Panel B. First-stage: Dependent variable is rule of law*					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Rule of Law	1.237	1.295	1.53	1.218	1.05	1.274						
	[0.745]	[0.568]	[0.682]	[0.495]	[0.478]	[0.578]						
lnRGDP70	-1.69	-1.728	-1.989	-1.743	-1.651	-1.754	0.528	0.66	0.746	0.726	0.705	0.7
	[0.624]	[0.551]	[0.692]	[0.541]	[0.494]	[0.576]	[0.150]	[0.136]	[0.133]	[0.126]	[0.133]	[0.127]
P60	2.651	2.911	2.89	2.864	2.324	2.608	0.257	0.026	0.039	0.172	0.271	0.289
	[0.864]	[0.925]	[1.002]	[0.837]	[0.703]	[0.764]	[0.439]	[0.396]	[0.512]	[0.427]	[0.474]	[0.398]
IPRICH1	-0.01	-0.01	-0.009	-0.01	-0.01	-0.01	-0.001	-0.001	-0.002	-0.002	-0.002	-0.002
	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.001]	[0.002]	[0.001]	[0.002]	[0.002]	[0.002]
MALFAL66	-0.991	-0.739	-0.92	-0.928	-1.407	-1.101	-0.261	-0.329	-0.282	-0.188	-0.158	-0.069
	[0.630]	[0.539]	[0.695]	[0.481]	[0.389]	[0.473]	[0.316]	[0.288]	[0.358]	[0.260]	[0.274]	[0.237]
DENS65C	0.001	0.001	0	0.001	0.001	0.001	0	0	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
totshkwtd7098	-0.053	-0.079	-0.029	-0.083	-0.011	-0.069	0.006	0.007	0.003	0.011	0.006	-0.007
	[0.035]	[0.025]	[0.062]	[0.021]	[0.015]	[0.013]	[0.015]	[0.009]	[0.029]	[0.008]	[0.010]	[0.007]
EURFRAC							-0.426	-0.588	-0.562	-0.679	-0.643	-0.579
							[0.234]	[0.226]	[0.240]	[0.232]	[0.233]	[0.213]
ENGFRAC							0.528	0.505	0.432	0.568	0.571	0.557
							[0.331]	[0.297]	[0.316]	[0.295]	[0.303]	[0.298]
fuelandmineralsgareexp70	0.002						-0.012					
	[0.012]						[0.005]					
foodandagrishareexp70	0						-0.007					
	[0.009]						[0.004]					
fuelandmineralsgarcexp80		0.011						-0.011				
		[0.009]						[0.003]				
foodandagrishareexp80		-0.001						-0.001				
		[0.008]						[0.004]				
fuelandmineralsgaregdp70			-1.474						-1.457			
			[3.544]						[1.554]			
foodandagrisharegdp70			-3.519						1.365			
			[3.865]						[1.311]			
fuelandmineralsgaregdp80				2.787						-2.587		
				[1.691]						[0.484]		
foodandagrisharegdp80				-1.434						0.542		
				[3.170]						[1.195]		
fuelsharegdp80					2.549						-2.798	
					[1.537]						[0.530]	
mineralsharegdp80					-7.148						-1.497	
					[2.074]						[1.197]	
foodsharegdp80					-4.826						-0.354	
					[3.637]						[1.530]	
agrisharegdp80					7.446						3.095	
					[6.906]						[1.904]	
OIL dummy						1.559						-0.932
						[0.613]						[0.175]
Observations	71	71	71	71	71	71	71	71	71	71	71	71
Adjusted R-squared	0.59	0.63	0.56	0.64	0.73	0.67	0.68	0.71	0.65	0.71	0.71	0.71

Robust standard errors in brackets

Table 4: Institutions and Natural Resources: Monotonic or Nonmonotonic Effects?

	First stage: Dependent variable is rule of law						
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
lnRGDP70	0.733	0.654	0.596	0.634	0.666	0.748	0.794
	[0.120]	[0.147]	[0.152]	[0.141]	[0.126]	[0.114]	[0.120]
P60	0.175	0.222	0.101	0.07	-0.001	-0.17	-0.316
	[0.410]	[0.427]	[0.408]	[0.403]	[0.408]	[0.422]	[0.473]
IPRICE1	-0.001	-0.002	-0.001	-0.001	-0.002	-0.002	-0.002
	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]	[0.001]	[0.002]
MALFAL66	-0.352	-0.267	-0.335	-0.327	-0.366	-0.407	-0.294
	[0.270]	[0.307]	[0.327]	[0.293]	[0.296]	[0.234]	[0.260]
DENS65C	0	0	0	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
totshkwtd7098	0.002	-0.005	-0.002	0.003	0.007	0.013	0.014
	[0.013]	[0.014]	[0.014]	[0.012]	[0.010]	[0.010]	[0.009]
EURFRAC	-0.721	-0.641	-0.499	-0.466	-0.503	-0.594	-0.564
	[0.231]	[0.247]	[0.254]	[0.278]	[0.239]	[0.217]	[0.217]
ENGFRAC	0.524	0.438	0.393	0.348	0.395	0.447	0.48
	[0.274]	[0.314]	[0.322]	[0.310]	[0.303]	[0.291]	[0.294]
fuelplusmineralshareexp>20	-0.387						
	[0.131]						
foodplusagrishareexp>20	0.394						
	[0.158]						
fuelplusmineralshareexp>30		-0.416					
		[0.186]					
foodplusagrishareexp>30		0.045					
		[0.178]					
fuelplusmineralshareexp>40			-0.605				
			[0.263]				
foodplusagrishareexp>40			-0.235				
			[0.238]				
fuelplusmineralshareexp>50				-0.655			
				[0.236]			
foodplusagrishareexp>50				-0.16			
				[0.234]			
fuelplusmineralshareexp>60					-0.671		
					[0.220]		
foodplusagrishareexp>60					0.038		
					[0.207]		
fuelplusmineralshareexp>70						-0.878	
						[0.181]	
foodplusagrishareexp>70						0.254	
						[0.201]	
fuelplusmineralshareexp>80							-0.965
							[0.195]
foodplusagrishareexp>80							0.143
							[0.217]
No. of countries for which fuel and mineral dummy =1	34	26	22	20	17	12	10
Observations	71	71	71	71	71	71	71
Adjusted R-squared	0.71	0.67	0.68	0.69	0.7	0.74	0.72

Robust standard errors in brackets

Table 5: Growth, Institutions, and Natural Resources: Robustness to Covariates

	Panel A. Second stage: Dependent variable is real per capita GDP growth, 1970-98					*Panel B. First stage: Dependent variable is rule of law*					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Rule of Law	0.035	1.154	1.072	1.408	0.992						
	[0.971]	[0.586]	[0.557]	[0.497]	[0.440]						
lnRGDP70 1/	-1.239	-2.023	-1.716	-1.91	-1.41	0.521	0.385	0.638	0.719	0.73	0.664
	[0.664]	[0.476]	[0.532]	[0.527]	[0.459]	[0.120]	[0.221]	[0.132]	[0.129]	[0.138]	[0.128]
P60	2.956	2.437	2.753	2.66	2.42	0.131	-0.334	0.066	0.116	0.159	0.578
	[0.775]	[1.147]	[0.843]	[0.850]	[0.762]	[0.357]	[0.434]	[0.437]	[0.400]	[0.459]	[0.375]
IPRICE1	-0.013	-0.01	-0.01	-0.01	-0.01	-0.002	-0.002	-0.001	-0.002	-0.002	-0.002
	[0.004]	[0.003]	[0.003]	[0.002]	[0.003]	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
MALFAL66	-0.112	-0.996	-0.914	-0.557	-0.859	0.29	-0.248	-0.149	-0.084	-0.185	-0.279
	[0.654]	[0.496]	[0.490]	[0.501]	[0.483]	[0.261]	[0.258]	[0.272]	[0.260]	[0.266]	[0.265]
DENS65C	0.002	0.001	0.001	0.001	0.001	0.001	0	0	0	0	0
	[0.001]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
totshkwtd7098	-0.085	-0.083	-0.079	-0.088	-0.082	0.005	0.011	0.014	0.01	0.011	0.007
	[0.016]	[0.021]	[0.020]	[0.020]	[0.021]	[0.010]	[0.008]	[0.008]	[0.009]	[0.008]	[0.010]
EURFRAC						-0.239	-0.603	-0.6	-0.719	-0.675	-0.764
						[0.210]	[0.218]	[0.231]	[0.237]	[0.241]	[0.230]
ENGFRAC						0.487	0.434	0.576	0.588	0.565	0.568
						[0.221]	[0.288]	[0.297]	[0.307]	[0.302]	[0.304]
fuelmineralsharegdp80	2.556	3.127	2.539	3.674	2.59	-1.347	-2.004	-2.494	-2.461	-2.577	-2.53
	[1.468]	[1.644]	[1.631]	[1.708]	[1.665]	[0.577]	[0.478]	[0.510]	[0.544]	[0.501]	[0.537]
foodagrisharegdp80	3.434	-1.364	-1.476	-1.202	-0.162	2.195	0.667	0.344	0.66	0.573	-0.038
	[4.274]	[3.220]	[2.905]	[3.187]	[2.809]	[0.945]	[1.136]	[1.237]	[1.206]	[1.267]	[1.193]
TROPICAR	-1.998					-0.901					
	[1.065]					[0.270]					
LIFE060		0.036					0.039				
		[0.048]					[0.018]				
YRSOPEN			0.538					0.51			
			[0.648]					[0.256]			
AVELF				-1.009					-0.313		
				[0.509]					[0.325]		
CONFUC					4.547					0.127	
					[0.681]					[0.398]	
Observations	71	71	71	71	71	71	71	71	71	71	71
Adjusted R-squared	0.67	0.64	0.64	0.63	0.68	0.76	0.73	0.72	0.71	0.71	0.74

Robust standard errors in brackets

1/ In column 6, the intitial level of income refers to the year 1960 instead of 1970

Table 6: Growth, Institutions, and Natural Resources: Robustness to Alternative Measures of Institutions

	Panel A. Dependent variable is rate of growth of per capita GDP, 1970-98				*Panel B. Dependent variable is institutional quality*			
Institutional variable	*Voice and accountability*	*Government effectiveness*	*Control of corruption*	*Political Stability*	*Voice and accountability*	*Government effectiveness*	*Control of corruption*	*Political Stability*
Institutions	1.424	1.546	1.416	3.424				
	[1.440]	[0.694]	[0.648]	[3.666]				
lnRGDP70	-1.687	-1.946	-2.007	-2.557	0.554	0.706	0.817	0.495
	[1.039]	[0.664]	[0.724]	[1.983]	[0.100]	[0.121]	[0.126]	[0.118]
P60	2.263	2.841	2.708	1.544	0.426	0.083	0.237	0.411
	[1.017]	[0.883]	[0.920]	[1.606]	[0.418]	[0.357]	[0.379]	[0.423]
IPRICE1	-0.008	-0.012	-0.012	-0.004	-0.003	-0.001	0	-0.002
	[0.005]	[0.003]	[0.003]	[0.010]	[0.001]	[0.001]	[0.001]	[0.002]
MALFAL66	-1.274	-0.808	-0.856	-0.298	0.11	-0.168	-0.18	-0.223
	[0.721]	[0.483]	[0.571]	[1.116]	[0.194]	[0.229]	[0.222]	[0.242]
DENS65C	0.002	0	0.001	0	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.000]	[0.000]
totshkwtd7098	-0.079	-0.073	-0.073	-0.109	0.005	0.002	0.002	0.011
	[0.031]	[0.023]	[0.022]	[0.059]	[0.011]	[0.009]	[0.008]	[0.010]
fuelmingdp80	3.766	3.354	2.041	8.248	-2.793	-2.496	-1.77	-2.553
	[4.106]	[2.003]	[1.632]	[9.585]	[0.592]	[0.550]	[0.583]	[0.489]
foodaggdp80	-1.209	-1.793	-2.917	-6.711	0.212	0.669	1.647	1.728
	[4.350]	[2.931]	[4.070]	[9.114]	[1.160]	[1.185]	[1.197]	[1.014]
					-0.261	-0.493	-0.598	-0.208
					[0.188]	[0.200]	[0.231]	[0.249]
					0.47	0.491	0.487	0.227
					[0.191]	[0.286]	[0.268]	[0.202]
Observations	71	70	69	70	71	70	69	70
Adjusted R-squared	0.3	0.63	0.51	..	0.67	0.73	0.74	0.66

Robust standard errors in brackets

Table 7. Growth, Institutions, and Natural Resources: Robustness to Influential Observations, Regional Dummies, Sample, and Instrument for Institutions

	Panel A. Second stage: Dependent variable is real per capita GDP growth, 1970-98				*Panel B. First stage: Dependent variable is rule of of law*			
	(1)	*(2)*	*(3)*	*(4)*	*(1)*	*(2)*	*(3)*	*(4)*
Rule of Law	1.027	1.128	1.564	3.408				
	[0.479]	[0.420]	[0.974]	[1.135]				
lnRGDP70	-1.533	-1.419	-1.645	-2.913	0.759	0.709	0.346	0.482
	[0.557]	[0.420]	[0.483]	[0.848]	[0.129]	[0.140]	[0.169]	[0.185]
P60	2.596	1.286	2.524	3.258	0.128	0.266	0.465	-0.151
	[0.847]	[0.728]	[0.928]	[1.332]	[0.424]	[0.561]	[0.428]	[0.483]
IPRICE1	-0.012	-0.008	-0.01	-0.008	-0.003	-0.002	-0.002	-0.001
	[0.002]	[0.002]	[0.003]	[0.004]	[0.001]	[0.002]	[0.002]	[0.002]
MALFAL66	-0.771	-0.044	-0.685		-0.044	-0.211	-0.38	
	[0.452]	[0.399]	[0.647]		[0.275]	[0.321]	[0.250]	
DENS65C	0.001	0.001	0.001		0	0	0	
	[0.000]	[0.000]	[0.001]		[0.000]	[0.000]	[0.000]	
totshkwtd7098	-0.079	-0.07	-0.087		0.009	0.01	0.011	
	[0.023]	[0.021]	[0.026]		[0.007]	[0.008]	[0.008]	
EURFRAC					-0.652	-0.699	-0.665	
					[0.234]	[0.266]	[0.288]	
ENGFRAC					0.572	0.573	0.387	
					[0.290]	[0.307]	[0.540]	
fuelmineralsharegdp80	1.591	2.367	3.164	5.561	-2.639	-2.571	-1.92	-1.599
	[1.582]	[1.555]	[2.186]	[2.685]	[0.507]	[0.480]	[0.487]	[0.529]
foodagrisharegdp80	-3.836	-0.762	-1.504	-3.586	0.337	0.534	0.671	0.796
	[2.821]	[2.165]	[4.056]	[3.498]	[1.338]	[1.245]	[1.390]	[1.427]
East Asia dummy		1.005				-0.103		
		[0.663]				[0.228]		
Sub-saharan Africa dummy		-1.498				0.042		
		[0.368]				[0.392]		
Log settler mortality								-0.217
								[0.109]
Observations	69 (influential observations: Egypt and Malaysia)	71	51 (sample = developing counries)	53	69	71	51	53
Adjusted R-squared	0.68	0.71	0.56	-0.04	0.72	0.7	0.42	0.52

Robust standard errors in brackets

Table 8. Growth, Institutions, and Natural Resources: Maximizing Sample Size

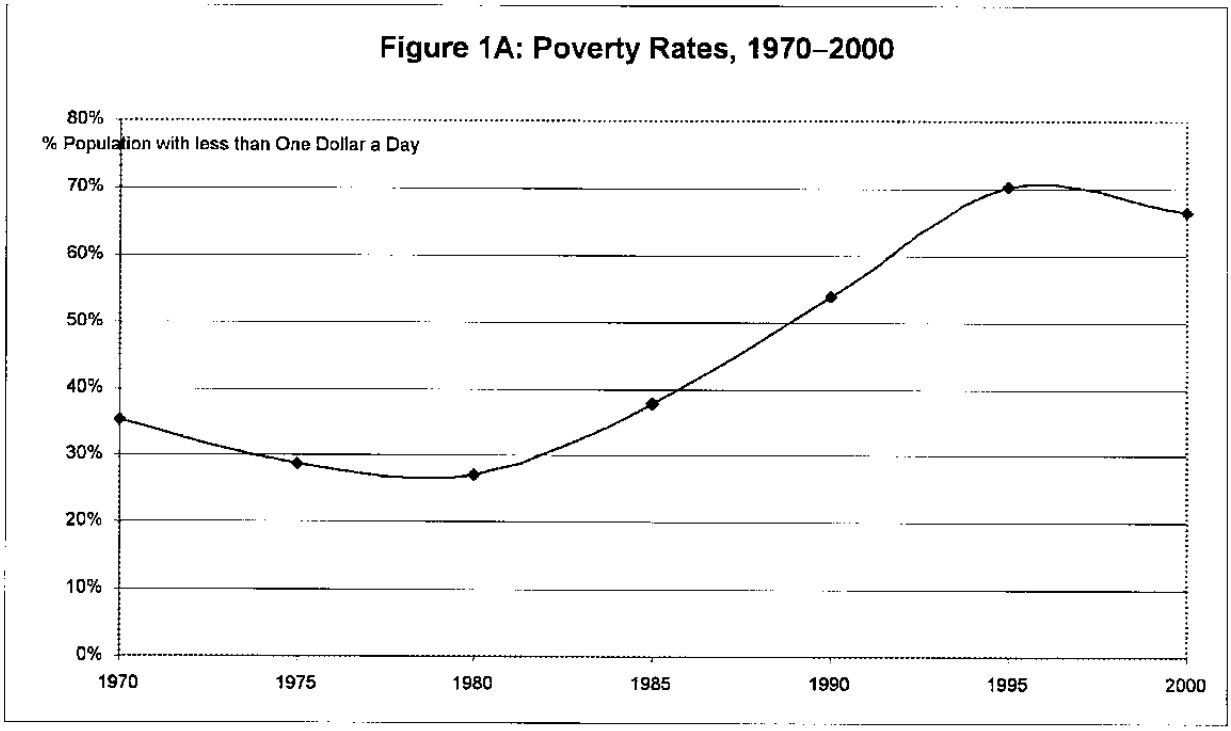
	First stage: Dependent variable is rule of law			
	(1)	*(2)*	*(3)*	*(4)*
lnRGDP70	0.683	0.242	0.77	0.365
	[0.131]	[0.156]	[0.111]	[0.123]
P60	0.396	0.601	0.089	0.282
	[0.397]	[0.356]	[0.349]	[0.327]
IPRICE1	-0.001	-0.002	-0.001	-0.001
	[0.002]	[0.002]	[0.002]	[0.002]
MALFAL66	-0.15	-0.359	-0.042	-0.259
	[0.238]	[0.232]	[0.229]	[0.227]
DENS65C	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]
totshkwtd7098	0.007	0.009	-0.004	0.001
	[0.011]	[0.009]	[0.008]	[0.008]
EURFRAC	-0.645	-0.546	-0.566	-0.53
	[0.212]	[0.257]	[0.196]	[0.241]
ENGFRAC	0.652	0.393	0.591	0.378
	[0.287]	[0.506]	[0.276]	[0.496]
fuelmineralsharegdp80	-2.388	-1.644		
	[0.478]	[0.494]		
foodagrisharegdp80	-0.335	-0.547		
	[1.060]	[1.247]		
OIL			-0.965	-0.659
			[0.175]	[0.136]
Observations	82	62 (sample = developing countries)	87	67 (sample = developing countries)
Adjusted R-squared	0.68	0.42	0.67	0.39

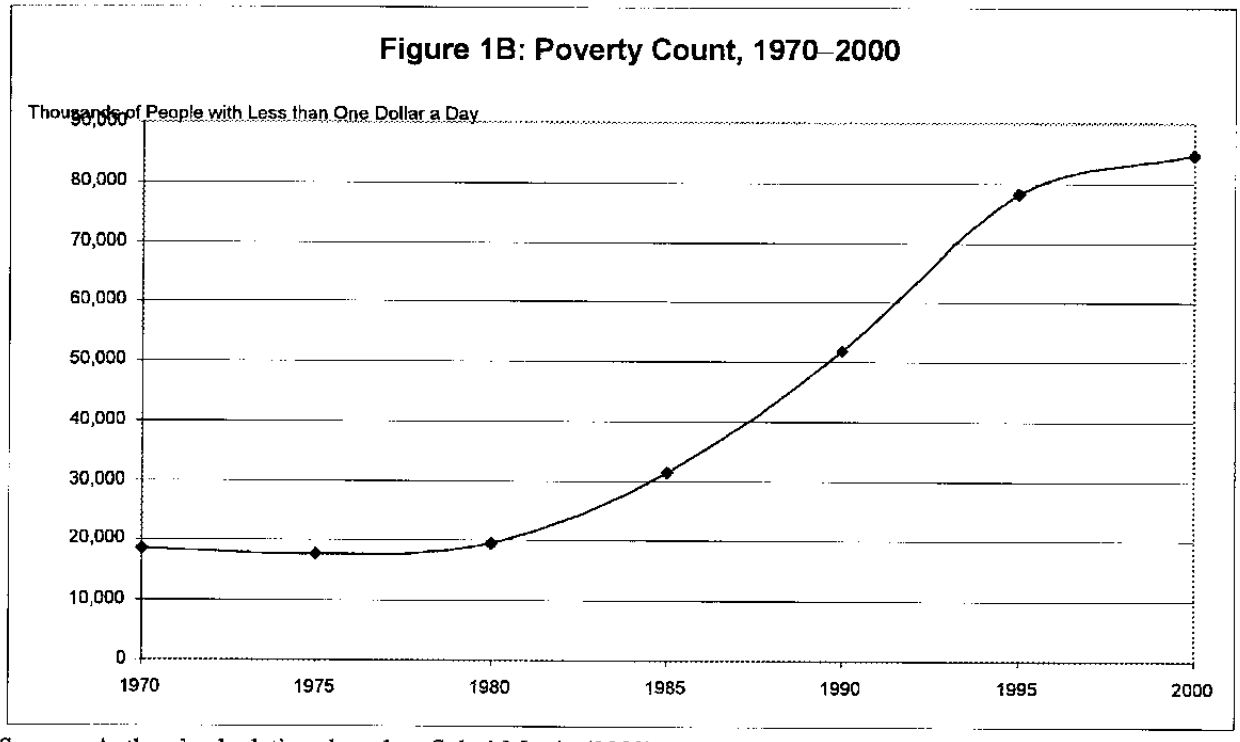
Robust standard errors in brackets

Table 9: Growth, Institutions, and Natural Resources: Is Nigeria Unusual?

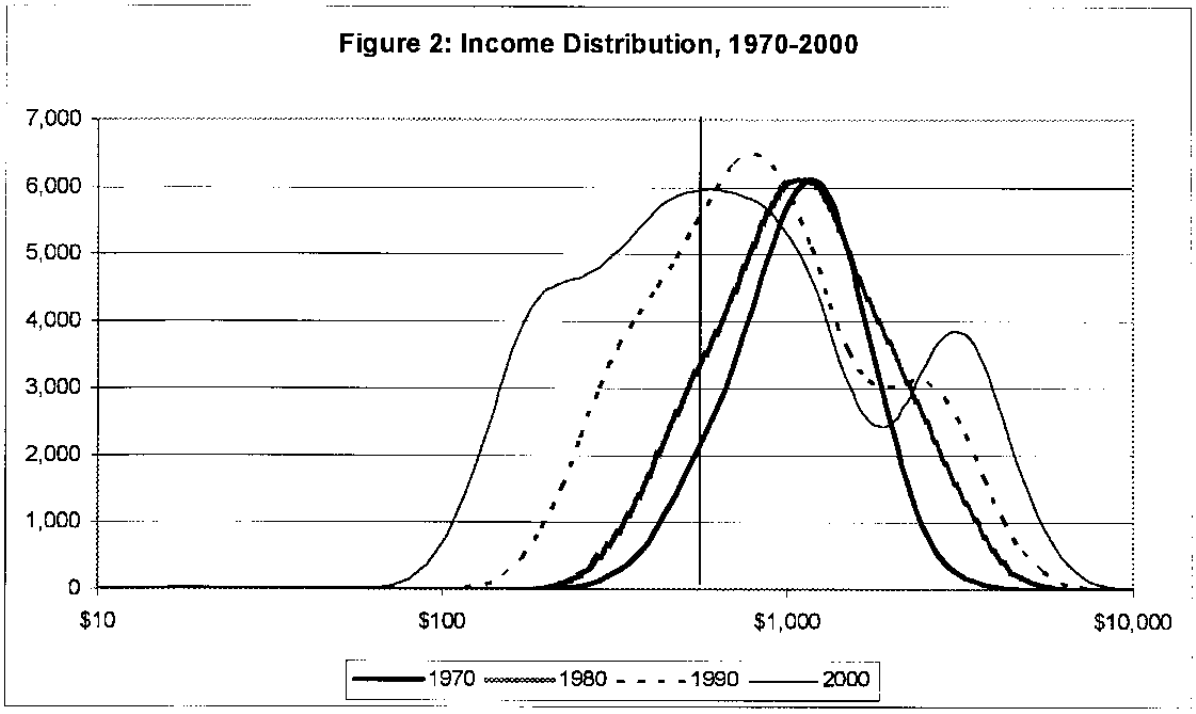
	Panel A. Second stage: Dependent variable is real per capita GDP growth, 1970-98		*First stage: Dependent variable is rule of law*	
	(1)	*(2)*	*(1)*	*(2)*
Rule of Law	1.431	1.23		
	[0.661]	[0.502]		
lnRGDP70	-1.857	-1.758	0.698	0.726
	[0.652]	[0.548]	[0.139]	[0.127]
P60	2.722	2.877	0.236	0.172
	[0.874]	[0.842]	[0.428]	[0.431]
IPRICE1	-0.009	-0.01	-0.002	-0.002
	[0.002]	[0.002]	[0.002]	[0.002]
MALFAL66	-1.109	-1.006	-0.092	-0.189
	[0.563]	[0.486]	[0.292]	[0.266]
DENS65C	0.001	0.001	0	0
	[0.000]	[0.000]	[0.000]	[0.000]
totshkwtd7098	-0.051	-0.085	-0.018	0.011
	[0.030]	[0.019]	[0.016]	[0.008]
EURFRAC			-0.567	-0.679
			[0.238]	[0.234]
ENGFRAC			0.472	0.568
			[0.337]	[0.297]
naturalresourcesharegdp80				
fuelmineralsharegdp80		2.643		-2.59
		[1.722]		[0.494]
foodagrisharegdp80		-1.101		0.546
		[3.208]		[1.224]
Nigeria dummy	1.784	1.308	-0.349	0.017
	[0.355]	[0.317]	[0.174]	[0.143]
Observations	71	71	71	71
Adjusted R-squared	0.59	0.64	0.64	0.71

Robust standard errors in brackets

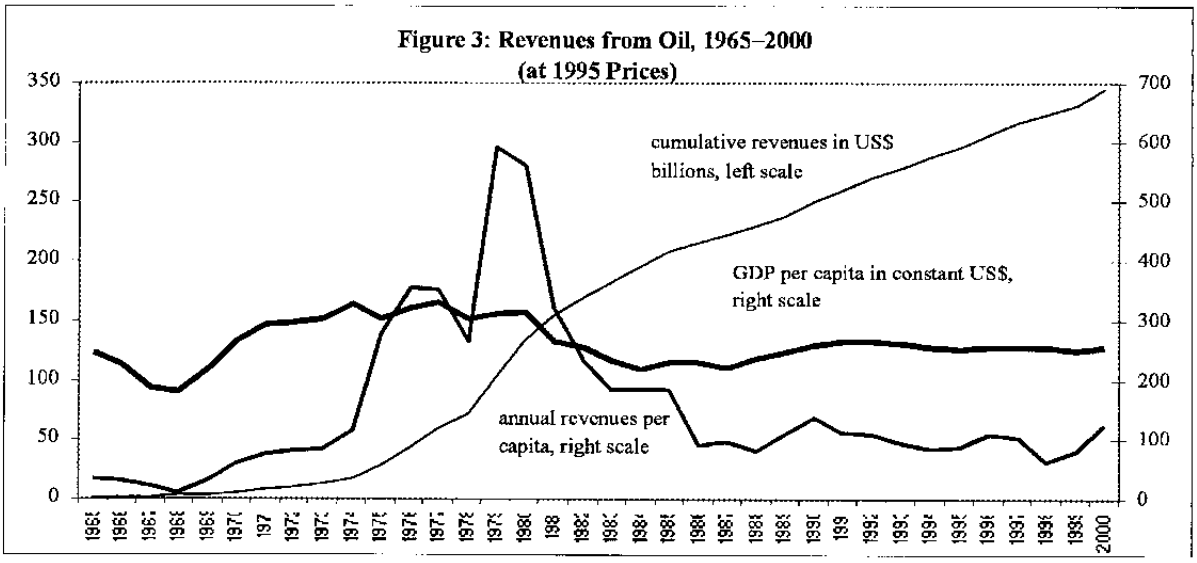




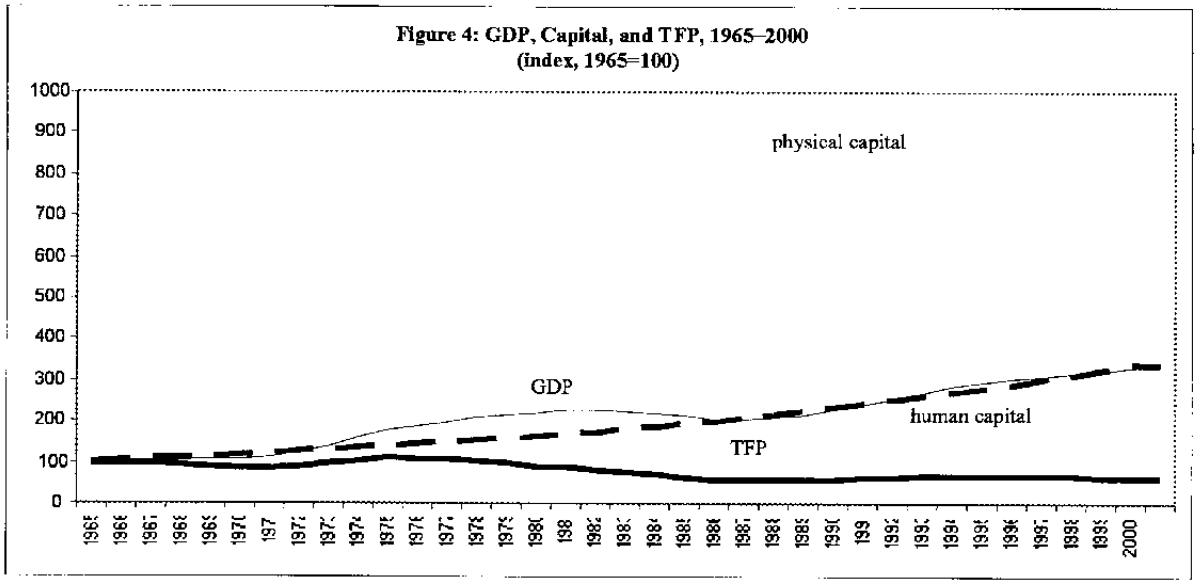
Source: Authors' calculations based on Sala-i-Martin (2003)



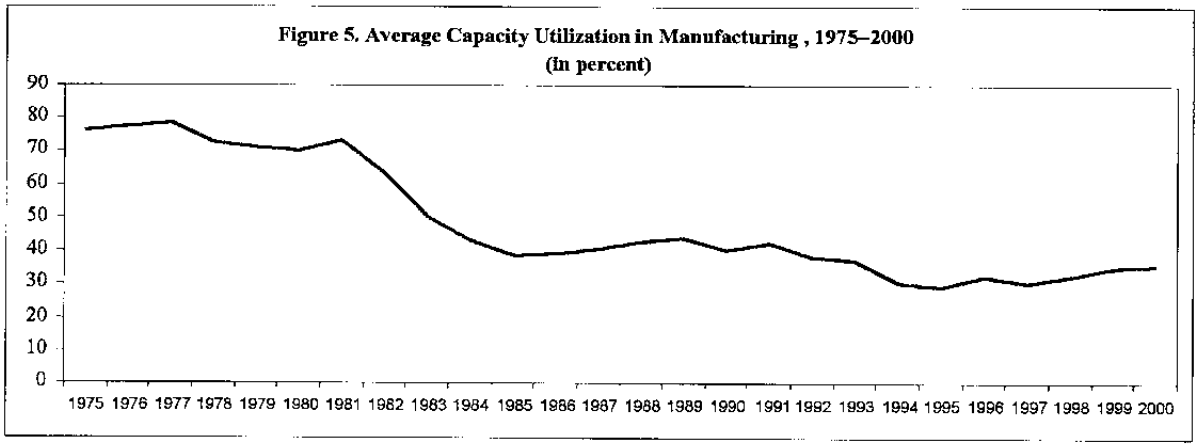
Source: Authors' calculations based on Sala-i-Martin (2003)



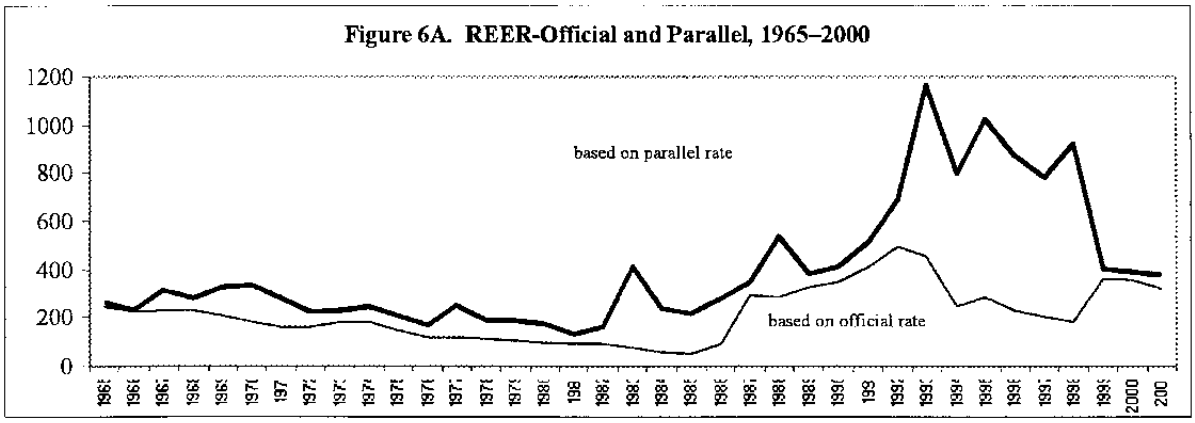
Source: BP Global, Statistical Review of World Energy, June 2001

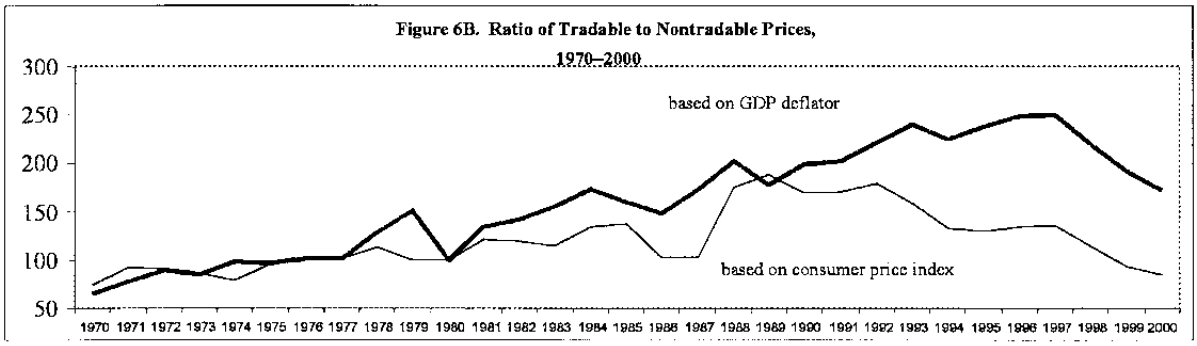


Source: Authors' calculations based on World Bank Data

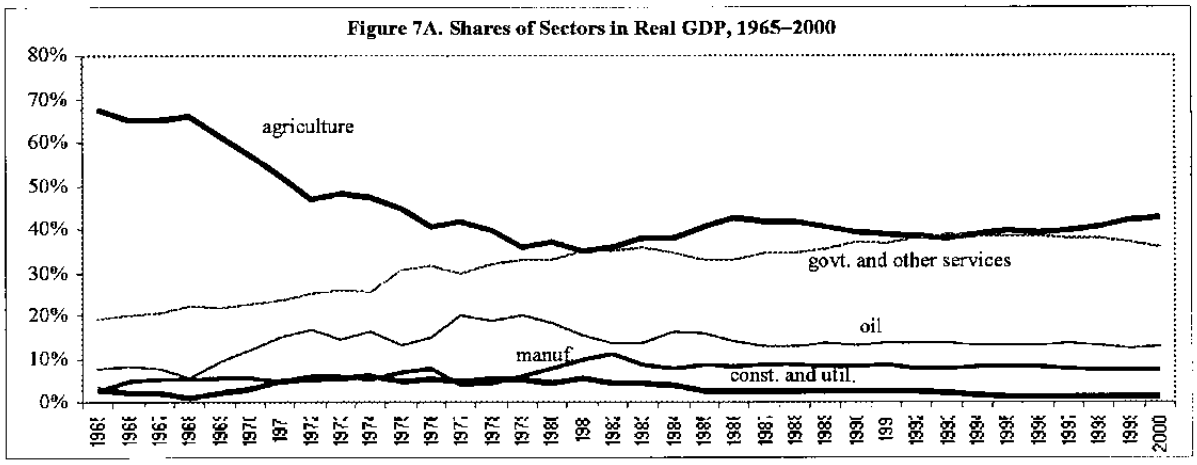


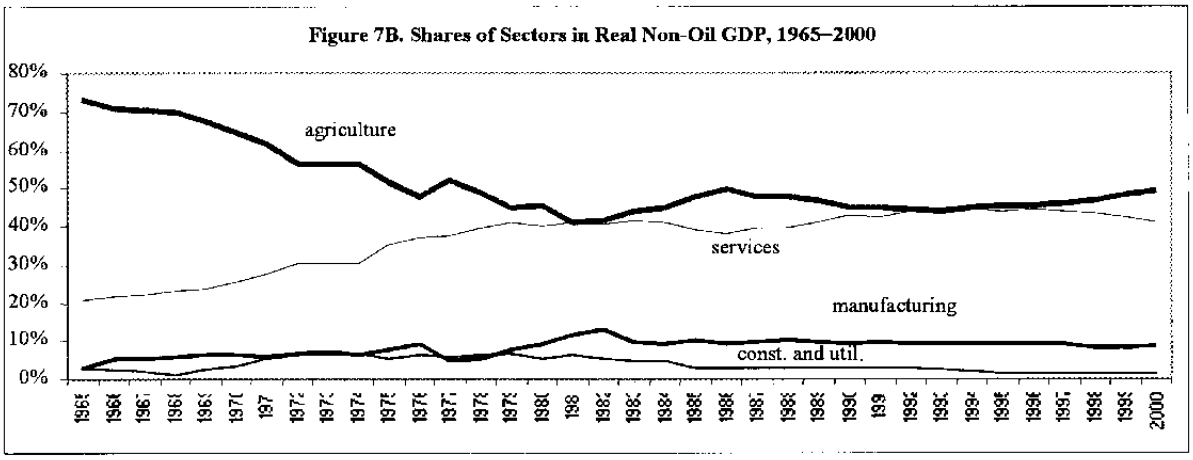
Source: Central Bank of Nigeria





Source: Authors' calculations based on World Bank data





Source: Authors' calculations based on World Bank data

Appendix: Data and Sources

ABSLAT = Distance from Equator of capital city measured as abs(Latitude)/90. Source: Rodrik et. al. (2002).

AGRIshareEXP = Share of exports of agricultural raw materials in total merchandise exports. Source: World Bank's World Development Indicators.

AGRIshareGDP = Share of exports of agricultural raw materials in GDP. Source:World Bank's World Development Indicators.

AVELF = Average of five different indices of ethnolinguistic fractionalization which is the probability of two random people in a country not speaking the same language. Source: Sala-i-Martin et. al. (2003).

CONCORR = Index of control over corruption. Source: Kaufmann, Kraay, and Zoido-Lobaton (2002).

CONFUC = Fraction of population Confucian. Source: Sala-i-Martin et. al. (2003).

DENS65C = Coastal (within 100km of coastline) population per coastal area in 1965. Source: Sala-i-Martin et. al. (2003).

East = Dummy variable taking value 1 if a country belongs to Asia, 0 otherwise.

ENGFRAC = Fraction of the population speaking English. Source: Hall and Jones (1999).

EURFRAC = Fraction of the population speaking one of the major languages of Western Europe: English, French, German, Portuguese, or Spanish. Source: Hall and Jones (1999).

FoodandagrishareEXP = Share of exports of food and agricultural raw materials in total merchandise exports. Source: World Bank's World Development Indicators.

FoodandagrishareGDP = Share of exports of food and agricultural raw materials in total GDP Source: World Bank's World Development Indicators.

FoodshareEXP = Share of food exports in total merchandise exports. Source: World Bank's World Development Indicators.

FoodshareGDP = Share of food exports in GDP. Source: World Bank's World Development Indicators.

FuelandmineralshareEXP = Share of exports fuel and natural gas and ores and minerals in total merchandise exports. Source: World Bank's World Development Indicators.

Fueland mineralshareGDP = Share of exports fuel and natural gas and ores and minerals in total GDP. Source: World Bank's World Development Indicators.

FuelshareEXP = Share of fuel and natural gas exports in total merchandise exports. Source: World Bank's World Development Indicators.

FuelshareGDP = Share of fuel and natural gas exports in GDP. Source: World Bank's World Development Indicators.

GOVEFF = Index of effectiveness of government. Source: Kaufmann, Kraay, and Zoido-Lobaton (2002).

IPRICE1 = Average investment price level between 1960 and 1964 on purchasing power parity basis. Source: Sala-i-Martin et. al. (2003).

LAAM = Dummy variable taking value 1 if a country belongs to Latin America or the Caribbean, 0 otherwise.

LCOPEN = Natural logarithm of openness. Openness is given by the ratio of (nominal) imports plus exports to GDP (in nominal US dollars). Source: Rodrik et. al. (2002).

LIFE060 = Life expectancy in 1960. Source: Sala-i-Martin et. al. (2003).

LNRDGP70 = Natural logarithm of per capita PPP GDP in 1970. Source: Sala-i-Martin et. al. (2003).

LOGEM4 = Natural logarithm of estimated European settlers' mortality rate. Source: Acemoglu, Johnson, and Robinson (2001)

LOGFRANKROM = Natural logarithm of predicted trade shares computed following Frankel and Romer (1999) from a bilateral trade equation with "pure geography" variables. Source:Rodrik et. al. (2002).

MALFAL66 = Index of malaria prevalence in 1996. Source: Gallup and Sachs (1998).

MEANTEMP = Average temperature (Celsius). Source: Sala-i-Martin et. al. (2003).

MineralshareEXP = Share of exports of ores and minerals in total merchandise exports. Source: World Bank's World Development Indicators.

MineralshareGDP = Share of exports of ores and minerals in GDP. Source: World Bank's World Development Indicators.

NaturalresourceshareEXP = Share of natural resources in total exports (calculated as the sum of the shares of individual resources). Source: World Bank's World Development Indicators.

NaturalresourceshareGDP = Share of natural resources in GDP. Source: Sachs and Warner (1995).

NGA = Dummy variable taking value 1 for Nigeria, 0 otherwise.

OIL = Dummy variable taking value 1 for a country being major oil exporter, 0 otherwise.

OVERvaluation7098 = measure of exchange rate overvaluation. Source: Easterly and Levine (2002).

P60 = Enrollment rate in primary education in 1960. Source: Sala-i-Martin et. al. (2003).

POLSTAB = Index of political stability. Source: Kaufmann, Kraay, and Zoido-Lobaton (2002).

RULE = Rule of Law index. Refers to 2001 and approximates for 1990's institutions. Source: Kaufmann, Kraay, and Zoido-Lobaton (2002).

SAFRICA = Dummy variable taking value 1 if a country belongs to Sub-Saharan Africa, 0 otherwise.

TOTshkwtd7098 = Volatility in the terms of trade between 1970 and 1998 weighted by share of natural resource exports in GDP in 1970. Source: World Bank, World Development Indicators.

TROPICAR = Percentage of tropical land area. Source: Sala-i-Martin et. al. (2003).

VOICE = Index of voice and accountability. Source: Kaufmann, Kraay, and Zoido-Lobaton (2002).

YRSOPEN = Number of years economy has been open between 1950 and 1994. Source: Sala-i-Martin et. al. (2003).

REFERENCES

Acemoglu, Daron, Simon Johnson, and James A. Robinson, 2001, "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review*, 91, 5, pp. 1369–1401.

_____, S. Johnson, J. Robinson, and Y. Thaicaroen, 2002, Institutional Causes, Macroeconomic Symptoms: Volatility, Crises and Growth, forthcoming Journal of Monetary Economics, Carnegie-Rochester Conference Series.

Ahmad, E., and R. Singh, "Political Economy of Oil-Revenue Sharing in a Developing Country: Illustrations from Nigeria," International Monetary Fund Working Paper, WP/03/16, Washington D.C.

Barro, R., and X. Sala-i-Martin, 1995, *Economic Growth*, MIT Press.

Belsey, D.A., E. Kuh, and R.E. Welsch, 1980, *Regression Diagnostics*. New York: John Wiley and Sons.

Bevan, D., P. Collier, J. W. Gunning, 1999, *The Political Economy of Poverty, Equity, and Growth: Nigeria and Indonesia*, Oxford University Press.

Bravo-Ortega, C., and J. De Gregorio, 2001, "The Relative Richness of the Poor? Natural Resources, Human Capital, and Economic Growth," mimeo, University of California, Berkeley.

Collier, P. and J. Gunning, 1996, "Policy Towards Commodity Shocks in Developing Countries," IMF Working paper WP/96/84, Washington D.C.

Collier, P. and A. Hoffler, 2002, "Greed and Grievance in African Civil Wars," mimeo, World Bank.

Davis, J., R. Ossowski, J. Daniel, and S. Barnett, 2001, "Stabilization and Savings Funds for Nonrenewable Resources," International Monetary Fund Occasional Paper No. 205, Washington D.C.

Easterly, W., and R. Levine, 2002, "Tropics, Germs, and Crops: How Endowments Influence Economic Development," mimeo, Center for Global Development and Institute for International Economics.

Engerman, Stanley L., and Kenneth L. Sokoloff, 1994, "Factor Endowments, Institutions, and Differential Paths of Growth Among New World Economies: A View from Economic Historians of the United States," National Bureau of Economic Research Working Paper No. H0066.

Gelb, A. and Associates, 1988, *Oil Windfalls: Blessing or Curse*?, World Bank: Oxford University Press.

Hall, Robert, and Chad I. Jones, 1998, "Why Do Some Countries Produce So Much More Output per Worker than Others?" *Quarterly Journal of Economics*, 114, 1, pp. 83–116.

Hausman, R., and R. Rigobon, 2002, "An Alternative Interpretation of the Resource Curse: Theory and Implications for Stabilization, Saving, and Beyond," Paper prepared for the Conference on Fiscal Policy Formulation and Implementation in Oil Producing Countries, International Monetary Fund Washington D.C.

Isham, J., L. Pritchett, M. Woolcock, and G. Busby, 2003, "The Varieties of the Resource Experience: How Natural Resource Export Structures Affect the Political Economy of Economic Growth," mimeo, World Bank, Washington D.C.

Kaufmann, D., A. Kraay, and P. Zoido-Lobatón, 2002, "Governance Matters II—Updated Indicators for 2000/01," World Bank Policy Research Department Working Paper No. 2772, Washington D.C.

Leite, C. and M. Weidmann, 1999, "Does Mother Nature Corrupt? Natural Resources, Corruption and Economic Growth," IMF Working paper WP/99/85, Washington D.C.

Mauro, P., 1995, "Corruption and Growth," *Quarterly Journal of Economics*, Vol. 90, pp. 681–712.

Pinto. B., 1987, "Nigeria During and After the Oil Boom: A Policy Comparison with Indonesia," *The World Bank Economic Review*, Vol. 1, No. 3, pp. 419–445

Reinhart, C. M., and K. Rogoff, 2002, "The Modern History of Exchange Rate Arrangements: A Reinterpretation," National Bureau of Economic Research Working Paper No. 8963.

Rodrik, D. A. Subramanian, and F. Trebbi, 2002, "Institutions Rule: The Primacy of Institutions Over Integration and Geography in Development," National Bureau of Economic Research Working Paper No. 9305.

Sachs, J., and A. Warner, 1995, "Natural Resource Abundance and Economic Growth," in G. Meier and J. Rauch (eds.), *Leading Issues in Economic Development*, New York: Oxford University Press.

Sala-i-Martin, Xavier, 2003, "Estimating Poverty from the World Distribution of Consumption", mimeo, Columbia University.

Sala-i-Martin, Xavier, Gernot Doppelhofer and Ronald Miller (2003), "Determinants of Long-Term Growth: a Bayesian Averaging of Classical Estimates (BACE) Approach", forthcoming *American Economic Review*.

Sen, A., 1999, *Development as Freedom*, New York: Norton.

Tornell, A., and P. Lane, 1999, "Voracity and Growth," *American Economic Review*, Vol. 89, pp. 22–46.