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Africa's Growth Tragedy

A Retrospective, 1960–89

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Problems associated with Sub-Saharan Africa's slow growth are low school attainment, political instability, poorly developed financial systems, large black-market exchange-rate premia, large government deficits, and inadequate infrastructure. Improving policies alone boosts growth substantially. But if neighboring countries adopt a policy change together, the effects on growth are more than double what they would have been if one country had acted alone.

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Summary findings

Africa's economic history since 1960 fits the classical definition of tragedy: potential unfulfilled, with disastrous consequences.

Easterly and Levine use one methodology — cross-country regressions — to account for Sub-Saharan Africa's growth performance over the past 30 years and to suggest policies to promote growth over the next 30 years.

They statistically quantify the relationship between long-run growth and a wider array of factors than any previous study. They consider such standard variables as initial income to capture convergence effects, schooling, political stability, and indicators of monetary, fiscal, trade, exchange rate, and financial sector policies. They also consider such new measures as infrastructure development, cultural diversity, and economic spillovers from neighbors' growth. Their analysis:

- Improves substantially on past attempts to account for the growth experience of Sub-Saharan African countries.
- Shows that low school attainment, political instability, poorly developed financial systems, large black-market exchange-rate premia, large government deficits, and inadequate infrastructure are associated with slow growth.
- Finds that Africa's ethnic diversity tends to slow growth and reduce the likelihood of adopting good policies.
- Identifies spillovers of growth performance between neighboring countries.

The spillover effects of growth have implications for policy strategy. Improving policies alone boosts growth substantially, but if neighboring countries act together, the effects on growth are much greater. Specifically, the results suggest that the effect of neighbors' adopting a policy change is 2.2 times greater than if a single country acted alone.

This paper — a joint product of the Macroeconomics and Growth Division and the Finance and Private Sector Development Division, Policy Research Department — is part of a larger effort in the department to understand the link between policies and growth. The study was funded by the Bank's Research Support Budget under the research project "Patterns of Growth" (RPO 678-26). Copies of this paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Rebecca Martin, room N11-059, telephone 202-473-9120, fax 202-522-3518, Internet address growth@worldbank.org. August 1995. (39 pages)

AFRICA'S GROWTH TRAGEDY: A RETROSPECTIVE 1960-89

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World Bank

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I. Introduction

Africa's economic history since 1960 fits the classical definition of tragedy: potential unfulfilled, with disastrous consequences. In the 1960s, a leading development textbook ranked Africa's growth potential ahead of East Asia's, and the World Bank's chief economist listed seven African countries that "clearly have the potential to reach or surpass" a 7 percent growth rate.[1] Yet, these hopes went awry. Much of Africa has suffered negative per capita growth since 1960, and the seven promising countries identified by the World Bank's chief economist were among those with negative growth.

This failure has indeed had dreadful consequences. In terms of GDP per capita, Sub-Saharan Africa averaged about $1,132 during the 1980s, while GDP per capita averaged $3,356 in Latin America and $5,048 in East Asia.[2] Out of the 20 poorest countries in the world, 16 are in Sub-Saharan Africa. Africa's growth tragedy is also reflected in painful human scars. The typical African mother has only a 30 percent chance of having all of her children survive to age 5, average life expectancy for a person born in 1980 in Sub-Saharan Africa is only 48 years compared with 65 in Latin America, and daily calorie intake is only 70 percent of Latin America's and East Asia's.

Not only is Sub-Saharan Africa poor, growth has been the slowest of any region of the world. On average, real per capita GDP did not grow in Africa over the 1965-1990 period, while, in East Asia and the Pacific, per capita GDP growth was over five percent and Latin America grew at almost two percent per year. Figure 1's map of the world illustrates this distressing point. Shaded countries suffered negative real per capita GDP growth over the 1960-88 period. Almost all of these countries fall in Sub-Saharan Africa.

This tragedy has drawn considerable attention. In addition to numerous journal articles,[3] a stroll through the Africa section of the library reveals an abundance of books with titles such as

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1 References are to Enke (1963) and Kamarck (1967), respectively.

2 These figures are in Purchasing Power Parity adjusted terms.

3 See World Bank (1981, 1989, 1994a), Bevan, Collier, and Gunning (1993), Collier and Gunning (1992), Soludo (1993), Husain and Faruquee (1994), Pack (1993), Lewis (1986), Wheeler (1984), Ndulu (1991), Elbadawi (1992), Elbadawi and Ndulu (1994), Helleiner (1986), Fosu (1992a,b,c), Gyimah-Brempong (1991), Killick (1991), Berg (1993), Pickett (1990), Hadjimichael et al. (1994), and Rimmer (1991). Chhibber and Fischer (1992) edited a book

Economic Crisis in Africa, The Destruction of a Continent, The Crisis and Challenge of African Development, Africa in Economic Crisis, Africa: Dimensions of the Economic Crisis, and *Africa: What Can Be Done?*[4] Furthermore, the World Bank recently produced two studies, *Adjustment in Africa: Reforms, Results, and the Road Ahead* (World Bank, 1994a) and *Adjustment in Africa: Lessons from Country Cases* (Husain and Faruquee, 1994), that examine the linkages between policy reforms and economic performance over the past decade.[5] These rigorous country-studies identify a diverse set of potential causes of Sub-Saharan Africa's ills ranging from bad policies, to poor education, to political instability, to inadequate infrastructure, to ethnic strife, etc. Clearly, if economists are to claim any success in explaining why some countries are rich and others poor, Africa's tragedy must be part of the explanation. Similarly, a great challenge for policy analysts is to derive policy recommendations and strategies that will ignite sustained development in Africa.

This paper uses one methodology - cross-country regressions - to examine cross-country growth experiences, with special attention to Sub-Saharan Africa, over the last 30 years. We contribute to the literature by statistically quantifying the empirical association relationship between economic growth and a wider array of factors than any existing study. In addition to standard variables such as initial income to capture convergence effects, schooling, political stability, and indicators of monetary, fiscal, trade, exchange rate, and financial sector policies, we consider new measures of infrastructure development, cultural diversity, and economic spillovers from neighbors' growth. The analysis:

(1) improves substantially upon past attempts to account for the growth experiences of Sub-Saharan African countries,

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on economic reform in Sub-Saharan Africa which discusses changes in exchange rate, fiscal, financial sector, trade, educational, and regional integration policies that could potentially stimulate sustained growth in Africa.

[4] The authors of these books are, in order: Blomstrom and Lundahl (1993), Borgin and Corbett (1982), Glickman (1988), Ravenhill (1986), Sadip Ali and Gupta (1987), Turok (1987).

[5] The former has recently been updated in Bouton, Jones, and Kiguel (1994).

(2) affirms that low school attainment, political instability, poorly developed financial systems, large black market exchange rate premia, large government deficits, and inadequate infrastructure are associated with slow growth,

(3) finds that Africa's ethnic diversity tends to slow growth and reduce the likelihood of adopting good policies, and

(4) identifies a strong web of geographic connections: many policies in country A are closely associated with growth in country A; policies in neighboring country B are correlated with policies in country A; and country A's growth rate is strongly correlated with neighboring country B's growth rate, even after controlling for policies in country A.

The relationship between particular policy indicators in one country and growth in its neighbors' economy suggests that there may be growth spillovers with strategic policy implications. While requiring much additional work to establish causal relationships, this paper's results are consistent with the view that improving policies alone boosts growth substantially, but if neighboring countries act together, the growth effects are much larger. Specifically, the coefficients suggest that a policy change by a set of neighbors will have an effect on growth that is 2.2 times larger than if a single country had acted alone.

The cross-country regression methodology has numerous shortcomings and should not be the only method used to study growth or draw conclusions about Africa.[6] Cross-country regressions do not establish the direction of causality between growth and the policy and political indicators that we study. We do not estimate structural models and the coefficients should not be interpreted as elasticities. Although we sometimes use the coefficient estimates to exemplify the strength of the association between growth and policy indicators, these examples should be interpreted as suggestive illustrations, not as exploitable elasticities. We view the cross-country regressions as examining the strength

[6] For a discussion of the weaknesses with cross-country growth regressions, see Levine and Renelt (1991) and Levine and Zervos (1993).

of the partial correlation between economic growth and a variety of economic and political indicators. As such, cross-country regressions offer complementary information to the rigorous country studies mentioned above by permitting a uniform statistical assessment of growth across a wide array of countries.

II. Using Cross-Country Regressions to Explain Growth

Since we are focusing on long-run growth, we attempt to abstract from business cycle fluctuations and study economic performance over decades. Specifically, the explanatory variable in our regressions is the average annual growth rate of GDP per capita in the 1960s, 1970s, and 1980s for all countries with data (excluding Gulf Oil States). Thus, each country has three observations, data permitting. We typically have 193 observations.

A. Core Regression: Description

To explain long-run growth, we begin with a "core" regression that includes a fairly standard set of right-hand-side variables and then expand this set in subsequent sections. This subsection describes why we include each "core" variable. In addition to different intercept terms for each decade, we include dummy variables for Sub-Saharan Africa and Latin America and the Caribbean called AFRICA and LATINCA respectively. Barro (1991) found significant, negative coefficients on both AFRICA and LATINCA in cross-country regressions. These dummy variables reflect the inability to explain the poor performance of Africa and Latin America with variables designed to control for political, economic, and other measurable characteristics.[7]

Further, we include two variables to control for initial income (at the start of each decade) and thereby capture the convergence effect highlighted by Barro and Sala-i-Martin (1992). The economic reasons underlying this convergence effect are based on the

[7] The Africa dummy variable is "robust" as defined by Levine and Renelt (1992).

assumption that - all else equal - lower income countries will enjoy a higher marginal productivity of capital. This should stimulate domestic investment by residents and foreigners that will raise the capital/labor ratio and generate output growth and higher wages. However, Baumol et al. (1992), Easterly (1994), and others show that this convergence result is generally non-linear, first rising and then falling with per capita income. To capture the potential non-linear relationship between initial income and future growth, we include two terms: the logarithm of GDP per capita at the start of the decade (INCOME) and the square of the logarithm of initial income at the start of each decade (INCOMESQ).

The core regression also includes a measure of human capital. We use the logarithm of the average educational attainment variable constructed by Barro and Lee (1993a), and call this variable SCHOOL. Countries with better educated workers should have greater growth opportunities than countries with citizens with less education. Also, we attempt to control political instability by including a measure of political assassinations, ASSASS, which Barro (1991) found to be negatively associated with growth. Although not presented, we used other indicators of political instability that did not alter the results.[8]

Finally, we include three policy indicators in the core regression. We include a measure of financial development, DEPTH, which equals liquid liabilities of the financial system divided by GDP.[9] For many countries the ratio equals M2/GDP. King and Levine (1993b) show that DEPTH responds to financial sector policies in predictable ways, and King and Levine (1993a,b) show that DEPTH is closely associated with long-run growth. Also, given the findings by numerous authors, we include a measure of the black market exchange rate premium, BLACK. Finally, we measure the fiscal stance of the country by

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[8] For example, we used measures of civil liberties, the number of revolutions and coups, and the number of casualties by war. Also, see Barro (1994).

[9] Liquid liabilities includes demand deposits and interest bearing liabilities of banks and nonbanks. On finance and economic development also see Collier and Mayer (1989).

including the central government surplus to GDP ratio, SURPLUS.[10] We experimented with including a measure of inflation and with including the ratio of exports plus imports to GDP. Inflation and trade indicators, however, typically did not enter significantly, nor did they alter the following results.[11]

B. Core Regression: Results

Table 1 presents the core regressions. All of the variables are significant at the 0.05 significance level and of the anticipated sign. Countries with greater financial development, larger fiscal surpluses, and lower black market exchange rate premia grew significantly faster than countries with more shallow financial systems, large fiscal deficits, and sizable black market premia. The regression also indicates that political assassinations are negatively correlated with long-run growth, while educational attainment is positively linked to growth.

The coefficients on the catch-up variables, 0.096 on INCOME and -0.007 on INCOMESQ, imply that the catch-up effect will be weaker for very poor countries and strongest for middle-income countries. Specifically, the catch-up effect is a concave function of initial income. For the given parameter values, the catch-up effect is strongest for countries with incomes of about $1,600.[12] Africa's average initial per capita income is below $1,600. Thus, the regression indicates that Africa should enjoy a catch-up effect, but this effect will, on average be less pronounced for Africa because of the non-linear association between initial income and growth whereby very poor countries enjoy less of a catch-up effect than countries with incomes of around $1,600.

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[10] A negative relationship between government deficits and growth has earlier been found by Easterly and Schmidt-Hebbel (1995), Fischer (1993), and Easterly and Rebelo (1993).

[11] Trade or export shares are generally not significant as explanatory variables in cross-country growth studies. Helleiner (1986) has previously pointed out the lack of explanatory power of export shares for Africa specifically. A long-standing strand of the literature argues that *export growth* is significant (e.g. Lussier, 1993, recently), but using export growth as a variable raises severe causality questions.

[12] To compute this, take the derivative of the core regression with respect to INCOME and set this to zero: 0 = 0.0957 - (0.0067)(2)(INCOME). Thus, INCOME = 7.36, and initial real per capita GDP with the maximum catch-up effect is exp{7.36} = 1,574.

The dummy variables for both Sub-Saharan African countries and Latin America and Caribbean countries are significant and negative. These two regions of the world grow significantly more slowly that predicted by the cross-country growth regressions. However, when we do a Chow test to see whether the coefficients of the core regression are significantly different for only the sample of Sub-Saharan African countries, we cannot reject the hypothesis that there are no differences. This implies that the difficulty in accounting for the tragedy of Africa does not lie in different sensitivities to policy variables. Nonetheless, although regression's R^2 is a bit over 50 percent and the coefficients have the expected signs, we are unable to account adequately for the poor growth performance of Africa and Latin America.

C. Assessing Africa's Performance

Using the core regression results presented in Table 1, we now decompose Africa's performance and compare it to other regions of the world (following a similar exercise by Barro and Lee (1993b), which was also emulated for Africa by Elbadawi and Ndulu (1994)). Table 2 gives average values of the variables in the core regression for different groups of countries. Africa had worse policy indicators than other regions of the world. For example, financial depth in Africa is less than half of financial depth in East Asia and Pacific. Africa's black market premium is 50 percent larger than the black market premium in the rest of the developing country world, and, on average, Africa has larger government deficits than non-African countries. Furthermore, average school attainment is about 50 percent higher in other developing countries. Thus, poor policy indicators and low human capital, as measured by school attainment, link closely with growth in Africa.

One can formally decompose the core regression results by computing that part of the growth difference between Africa and other countries accounted for by each of the right-hand-side variables of the core regression. For example, consider Africa versus non-African countries. Subtracting Africa's growth rate from non-African country growth

rates the difference in growth rates is 2.3 percentage points.[13] By subtracting Africa's value for each explanatory variable from non-African country values and multiplying this difference by the regression coefficient, we can compute that part of the difference in growth rates between non-African countries and African countries associated with by each explanatory variable.

The decomposition results are presented in Table 3. The core regression attributes 1.5 of the 2.3 percentage point difference in growth rates between non-African and African countries to the Africa dummy variable. All of three policy indicators (black market premium, financial depth, budget surplus) combined account for about 0.9 percentage points of the 2.3 percentage point difference. Table 3 provides comparisons between Africa and non-Africa, non-Africa developing countries, and East Asian and Pacific countries. The most remarkable feature of Table 3 is how much of the difference is associated with the Africa dummy variable. Since the Africa dummy variable really just measures our ignorance - our inability to explain Africa's growth - this decomposition highlights that the variables commonly used in cross-country regressions do not account for much of Africa's economic performance.

Figure 2 provides an illustrative decomposition and comparison of the growth performance of Africa versus East Asia, where policy differences are greater. In 1960, Africa's GDP per capita was about $800 while East Asia's was about $1500. By 1989, Africa's GDP per capita was still only about $900, while East Asia's had grown to about $5,000. Figure 2 uses the core regression to decompose the difference in GDP per capita between these two regions in 1989. About $850 of the $4,100 gap is due to the original

[13] Since the core regression includes three decade dummy variables and a Latin American dummy variable in addition to the policy indicators and the Sub-Saharan Africa dummy variable, we adjust the growth difference to account for the decade and Latin American dummy variables to focus on that part of the growth difference not explained by decade dummy variables and the Latin American dummy variable. Specifically, the difference between African and non-African real per capita GDP growth is 1.81 percentage points. We then adjust this figure to take account of the decade and Latin American dummy variables and arrive at a difference of 2.3% that must be accounted for by policy, political, and other explanatory variables.

percentage gap in GDP per capita. Policies (financial depth, black market premium, and the government surplus) account for $1750 of the large gap that emerged over the 1960-89 period. Initial income and schooling in each decade are associated with $450 of the gap (the disadvantage of lower African schooling more than offsets the advantage of lower initial income in Africa). About $1,050 of the $4,100 gap between East Asia and Africa remains unexplained. It is to this gap that we now turn. We attempt to reduce the size of this unexplained gap by introducing non-traditional explanatory variables into the core regression.

III. Two Other Explanations For African Growth

In this section, we attempt to account more fully for Africa's poor performance. Although we examined the effects of institutions[14], wars,[15] terms of trade,[16] infrastructure, and ethnic conflict, we concentrate on the links between growth and both infrastructure and ethnic conflict due to data availability. Furthermore, since data are scarce and the SURPLUS variable reduces the sample considerably, we consider the effects of incorporating indicators for infrastructure and ethnic conflict with and without the government SURPLUS variable in the core regression.

A. Infrastructure

[14] Many studies of Africa cite the hostile institutional environment for private business as a factor in the growth outcome (see references in World Bank, 1994a). Mauro (1993) and Knack and Keefer (1994) present cross-country evidence that institutional factors affect economic growth using data from country risk services for international investors. The country risk indices measure the degree of corruption in business dealings with the government, the prevalence of bureaucratic delays, the risk of nationalization, the degree to which contracts are enforced, and the general integrity of the legal system. The data on the few African countries show that African countries are in the lower half of the sample in terms of institutional development. Zaire, Liberia, and Kenya are apparent examples of institutionally-hampered growth.

[15] Over the past 3 decades, 13 of the 20 worst military conflicts have been in Africa. However, this variable is not significant in the pooled growth regressions. This may be because the most disruptive wars interrupt data collection. We do not have complete data on 10 of the 20 worst war experiencing countries.

[16] Bevan, Collier, and Gunning (1989, 1993) discuss the crucial role of response to terms of trade shocks in macroeconomic outcomes. However, Africa's terms of trade shocks were no worse than other LDC's (World Bank, 1994a), which we confirmed in our data.

Many studies of Africa cite the poor state of infrastructure. Infrastructure variables have the same rationale for inclusion in the growth regression as human capital variables: they raise the marginal product of private investment in physical capital, and thus the growth potential. An influential study by Aschauer (1988) claimed that infrastructure had large effects on US productivity growth; Canning and Fay (1993) and Easterly and Rebelo (1993) have similar findings for the cross-country sample.[17] Easterly and Rebelo used consolidated public sector investment in transport and communications; these data are available for too few African countries to be of use here.

Canning and Fay (1993) present data on physical measures of infrastructure, such as kilometers of roads and railways per worker, electricity-generating capacity per worker, and telephones per worker. Table 4 shows the averages of the 1960, 1970, and 1980 values of these infrastructure variables for Africa and the rest of the sample. We insert the Canning and Fay variables into our core regression and the results are presented in Table 5. The initial stock of roads/railways and initial electricity generation are not significantly correlated with future economic growth.[18]

We do, however, find a strong link between growth and telephones per worker as shown in regressions (2) and (5) in table 5. The coefficient on telephones per worker indicates that it is associated with perhaps 1 percentage point of Africa's 2.3 percentage point lower growth relative to the rest of the sample. We are dubious that the direct effect of phones is really this large, but it may be a good indicator of the poor state of infrastructure in general. To use the East Asia benchmark once again, Hong Kong had more telephones in 1960 than Nigeria, even though Nigeria's population was 17 times larger. By 1980, Hong Kong had more telephones than all of Sub-Saharan Africa.

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[17] An earlier cross-section study by Khan and Reinhart (1990) did not find strong growth effects of infrastructure, but this study used only an indirect measure of infrastructure investment.

[18] Canning and Fay (1993) also found no direct effect of these two variables in their OLS panel regressions for growth with 5-year averages. They did find strong effects of roads and railways on growth in a fixed effects regression, however. Fixed effects seem inappropriate here, since this paper is trying to explain the Africa fixed effect.

The data shown here may even understate the extent of the infrastructure gap between Africa and the rest of the world, as they do not correct for quality of infrastructure. For example, Chad is shown as having 15 thousand telephones, but 91 percent of all local phones calls are unsuccessful. Uganda has two thousand kilometers of paved roads, but only 10 percent of them are in good condition.[19]

Although infrastructure seems to matter, the Africa dummy remains significant in the regression including telephones. Africa grows more slowly than accounted for by the right-hand-side variables.

B. Ethnic Diversity

Wars, institutional weakness, and even bad policies may reflect a more fundamental characteristic of African societies, great ethnic diversity. High ethnic diversity may lead to increased civil strife, political instability, and destructive competitions for rents by ethnic factions. Shleifer and Vishny (1993) shows how corruption is most damaging when different groups are competing for payoffs. It may be more difficult to achieve a consensus for good policies in a polarized environment as indicated by Alesina and Drazen (1991), Alesina and Rodrik (1994), Alesina and Tabellini (1989), and Alesina and Perotti (1994). We suspect that ethnically fragmented societies are prone to competitive rent-seeking by the different ethnic groups and have difficulty agreeing on public goods like infrastructure, education, and good policies. Furthermore, ethnic diversity may favor policies destructive to long-run growth like financial repression and overvalued exchange rates if such policies create rents for the group in power at the expense of other groups.

To examine the effects of ethnic diversity, we use a variable constructed by Mauro (1993) based on data originally collected by an institute in the Soviet Union in the 1960s.

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[19] Source: World Bank (1994b), *World Development Indicators*, Table 32. These data are not available for earlier years, so we cannot insert them into the regression.

The variable, ETHNIC, measures the probability that two randomly selected individuals in a country will belong to different ethnolinguistic groups. ETHNIC will increase with the number of ethnolinguistic groups and will increase the more equal is the size of the groups. Canning and Fay (1993) use a related measure based on the same original data: the proportion of the population belonging to the largest ethnolinguistic group and find that growth is positively related to size of the largest ethnic group.

Table 6 shows the most and the least ethnically diverse societies in the world in 1960 in Mauro's data. Fourteen out of the fifteen most ethnically diverse societies in the world are in Africa; three of the East Asian fast growers are among the most ethnically homogeneous.

Table 5 regressions (3),(4), (6), and (7) present evidence on the empirical association between ethnic diversity and economic growth. ETHNIC is significantly correlated with growth, controlling for other factors. The coefficient on the ethnic diversity variable implies that it accounts for 0.8 percentage points of the 2.3 percentage point gap between Africa's growth and the rest of the sample, i.e., Africa's greater than average ethnic diversity accounts for about 35% of its growth differential with the rest of the world. While ethnic diversity is negatively associated with growth and Sub-Saharan Africa has great ethnic diversity, the Sub-Saharan Africa dummy variable tends to remain significant in the Table 5 regressions that include the ethnic diversity variable. We still cannot account for Sub-Saharan Africa's slow growth.

Importantly, the ethnic diversity variable has a high correlation with the other right-hand-side variables. Table 7 shows that ethnic diversity is negatively correlated with schooling attainment, with financial depth, and with all three infrastructure indicators: roads, telephones, and electricity. It is positively correlated with the black market premium. Quantitatively, the data imply, as noted above, that ethnic diversity independently accounts for about 35% of Africa's growth differential with the rest of the world, but when the effects of ethnic diversity on policies is also considered this figure

rises to 45% of Africa's growth differential. Thus, ethnic diversity slows growth directly and retards growth indirectly by making the adoption of good policies more difficult.

IV. Troubles with the Neighbors

The frequent use in the literature of a dummy variable for Africa indicates that the poor growth performance of Africa is usually thought to be a fixed effect (e.g. Barro, 1991). What is striking in the data is the regional concentration of both failure (in Africa) and success (in East Asia), as well as the variation across decades (Africa had done bettter in the 1960s; Latin America had a synchronized crisis in the 1980s).[20] Recently, an insightful pair of papers has suggested that there are general spillovers across borders from unfavorable characteristics of one's neighbors, like low investment or high political instability, to one's own growth performance (Chua, 1993, Ades and Chua, 1993). These authors report that the Africa dummy variable becomes statistically insignificant when controlling for spillovers from one's neighbors.

A. Estimating Neighbor Spillovers

This paper extends the work of these papers in two ways. First, we change the Chua (1993) definition of neighbor effects by weighing each neighbor by the size of its total GDP, as opposed to Chua's equal weights. It seems plausible that Mexico would be affected more by the US than by Belize, and Cameroon would be affected more by gigantic Nigeria than by tiny Equatorial Guinea.[21] Second, instead of putting the averages of the neighbors' right-hand side variables into the growth regression, we put the average

[20] It is easy to forget that a number of African countries were considered success stories well into the 1970s (Cote d'Ivoire and Kenya, for example). In fact, in every decade, there were some African countries with respectable per capita growth rates -- even in the disastrous 1980s, 3 African countries grew in excess of 3 percent per capita. But few African countries sustained healthy growth over time, hence the low average growth for the continent.

[21] We explore further different weighting schemes for spillover effects from other countries. We find that weighting by distance (which was unsuccessful in an earlier paper by De Long and Summers, 1992) performs poorly in identifying country spillover effects.

of the neighbors' growth rate itself into the regression. This allows us to test for direct contagion effects of growth successes and failures. Because there is simultaneity in this case -- you affect your neighbor and your neighbor affects you back -- we instrument for the neighbors' growth rate with the neighbors' regressors from the core regression. We will then perform a test of the overidentifying restrictions that the neighbors' right-hand-side variables have no direct effect on growth (i.e. other than through the growth contagion channel), which will allow us to test our contagion hypothesis against the policy spillovers hypothesis.

Table 8 shows two-stage least squares with the neighbors' weighted average growth rate included in the core regression that excludes the government surplus. We use the neighbors' weighted average right-hand side variables as instruments. Each country's neighbors' growth rate has a surprisingly large and statistically significant effect on each country's own growth: one percentage point more growth by the neighbors in a given decade translates into higher own growth of .55 percentage points. While the Latin America dummy variable remains uncomfortably significant, the Africa dummy becomes insignificant once the neighbors' growth rate is included.[22]

We also test whether a country A's neighbors policies, educational attainment, initial income, and political stability independently affect A's growth after controlling for its neighbors growth rates. A test of the overidentifying restrictions that all of the neighbors' right-hand side variables have zero direct effect on the country's own growth rate once its neighbors' growth is considered fails to reject this set of restrictions. The test statistic is TR^2 where T is the number of observations and the R^2 is from the regression of the residuals in the regression shown in Table 8 on the set of all exogenous variables,

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[22] With SURPLUS and the neighbor's growth rate both included in the core regression, the Africa dummy remains insignificant, but P-value on the neighbors' growth rate falls to 0.06 and the coefficient is reduced to 0.34. Including SURPLUS eliminates much of the data from the 1960s. Since the covariation of neighbors across time helps distinguish the neighbor variable from the Africa dummy, we suspect that elimination of the 1960s is responsible for the weaker significance of the neighbor variable in this regression.

including the neighbors' right-hand side variables. The test statistic, which is distributed as χ^2 with 5 degrees of freedom (six excluded exogenous variables -- the neighbors' right-hand-side variables -- minus one included endogenous variable), has a value of 8.35 and is not significant at the 5 percent level in the regression excluding the government surplus. In the regression including SURPLUS, the test statistic has 6 degrees of freedom and has a value of 10.65, still not significant at the 5 percent level. Thus, the data do not reject our econometric specification of using two-stage least squares with the neighbors weighted average growth rate.

B. Where Do Neighbor Spillovers Come From?

Unfortunately, we can only speculate about where neighbor spillovers come from. For example, if adapting a technology to a local environment is risky and involves fixed costs, then a direct foreign investor who has had success in one country may find it easier and more attractive to move next door to a neighboring country. Thus, success in one country could spillover to neighboring countries. In addition to potentially lowering the risk and cost of foreign investment, neighbor success may have demonstration effects. Governments that attain high growth with a given set of policies provide a valuable model of the efficacy of such policies to the government and citizenry of neighboring countries.[23]

We have empirically examined one channel. International trade does not appear to be a very plausible mechanism for spillovers. African countries do not trade much with each other. Moreover, when we construct a spillover variable using trade weights, the international trade spillover variable performs very poorly.

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[23] The growth literature of course features much speculation and (a little) evidence about externalities and strategic complementarities, which finds external effects of human or physical capital across industries (Caballero and Lyons, 1989, 1990), and within cities (Rauch, 1992). Strategic complementarities have also been suggested as a factor that explains booms and busts in business cycles (see Hall, 1991, and the survey by Cooper and Haltiwanger, 1993). Borjas (1994) and Case and Katz (1991) find contagion from individuals' neighbors in socioeconomic outcomes in American cities. Calvo and Reinhart (1995) show how there is contagion in capital flows from large Latin American countries to their small neighbors.

What about the transmission of growth failures across borders? Governments do not necessarily maximize growth; they may maximize rent-seeking opportunities. Even policies that are bad for growth could be imitated by neighbors if they are demonstrated to be good for creating rent-seeking opportunities or some other non-growth objective that is desired by policy-making elites.

We find that our observable policy indicators and the other right-hand side variables from Table 8 are indeed highly correlated across neighbors (Table 9). This gives a hint that unobservable government or private sector behavior contained in the residual may be correlated as well.

We acknowledge that the replacement of the Africa dummy by a growth spillover effect really only changes the kind of mystery. More research is needed to go inside the black box. Our results suggest that research on growth *interactions* between countries would be another fruitful area to add to the study of countries' individual characteristics.

C. Neighbor Multipliers

The implications of a growth contagion effect are very different from an Africa dummy effect. If we presume a particular causal direction for illustrative purposes, the contagion effect says that Africa's lagging growth relative to policy variables will disappear if a critical mass of countries improve their policies. The Africa dummy effect said that Africa's growth would always be worse for a given set of policies. The good news about the contagion effect - if one assumes that causality runs from policies to growth - is that the negative contagion effect of the last 30 years could be changed to a positive contagion effect in the next 30 years: a large policy change in unison would have a multiplier effect on the countries in the region that is even larger than the strong, direct effect of a country's policies on its own growth rate.

If a country reforms alone, there will be a small spillover to its neighbor's growth rate, which in turn spills back over into the country's own growth rate. Given that most

countries have 4 or more neighbors, these spillover effects are fairly small as shown in the Appendix. From our estimates, the median country changing policies in isolation has a neighbor multiplier of 1.041; that is, the total effect of one's policies on one's own growth rate taking into account neighbor feedback is only 4 percent larger than the direct effect of one's own policies on one's own growth.

However, if all countries act together, the neighbor multiplier is much larger. This is because all of the home country's neighbors are acting together to increase their own growth, which increases the home country's growth by a large amount in addition to the direct effect of the home country's policy change. If we suppose that policy changes are identical for a closed set of neighbors, the multiplier will be [1/(1-b)], or 2.2 where b is the estimated coefficient on one's weighted average of neighbor growth rates, estimated by us at .55. That is, a set of neighbors adopting a set of policy changes that would have raised growth by 1.04 percentage points if they had each acted alone will see growth increase by 2.2 percentage points if they act together. This also works in the other direction: with a set of neighbors all simultaneously adopting bad policies like exchange rate controls leading to a high black market premium, the negative effect on all of them would be magnified.

It is important to emphasize that our results do not imply that countries would be better off free-riding on their neighbors' good policies rather than making their own policy changes. The typical free rider problem arises because one's own actions have only a negligible effect on the benefit one obtains; here, one's own policies still have a stronger effect on one's own growth than they do on the neighbor's growth. Nor is there any incentive to wait for the other country to move first, since with our additive specification the marginal growth benefit of changes in one's own policies is the same regardless of whether the neighbors have good or bad policies. These results do suggest that acting in unison has magnified effects for good or evil.

V. Conclusions

This paper sheds additional light on accounting for long-run growth across all countries with a particular emphasis on understanding Africa's growth tragedy. In short, we find that poor growth is strongly associated with (1) low schooling, (2) political instability, (3) under-developed financial systems, (4) distorted foreign exchange market, as measured by the black market premium, (5) high government deficits, (6) low infrastructure, (7) ethnic fractionalization, (8) spillovers from neighbors that magnify (1) - (7).

The two most novel features of our results are our findings on ethnic diversity and contagion. Both findings require further investigation into the mechanisms at work. What are the mechanisms by which ethnic diversity results in high black market premia and low spending on public goods? What other mechanisms explain the link from ethnic diversity to growth? What causes neighboring countries to imitate each others' policies? Why is there a spillover to your growth from your neighbor's growth? The findings on the role of ethnic diversity and contagion in Africa point towards interesting directions in further research on both the fundamental determinants of bad policies and the interactions between neighboring country policies and growth performance.

Appendix: Calculating policy multipliers with spillovers of growth to neighbors

Section IV of the paper presents evidence that a country's own growth is influenced by a weighted average of its neighbors' growth rates. We present in this appendix the algebraic implications of these spillovers for magnifying the effects of policy changes.

For a given time period, we can write the system of equations determining cross-country growth rates for n countries as follows:

(A.1) $G = PA + bWG$

where G is an n x 1 vector of growth rates for the n countries over the given time period, P is an n x q matrix of country policies and other characteristics, A is a q x 1 vector of coefficients on policies, b is a scalar measuring the degree of spillover from one's neighbors to one's own growth, W is an n x n matrix of weights on one's neighbors to calculate the weighted average of their growth rates. The rows of W sum to unity; the diagonal elements of W are zero. Recall that the weights in W were calculated using the total GDP of neighboring countries. For example, if country 1 has as neighbors countries 2, 3, and 4 with GDPs respectively of 100, 100, and 200, the first row of W will be [0 .25 .25 .5 0 0 0 0 ..... 0].

We can then solve for the growth rate vector G as:

(A.2) $G= (I-bW)^{-1} PA$

The elements of the inverse matrix $(I-bW)^{-1}$ contain the multipliers and cross effects by which neighbor spillovers increase the effect of policy changes in the system. The element m_{ij} of the matrix has the following interpretation: a set of policy changes by country j increasing country j's growth rate by 1 percentage point will raise country i's growth rate by m_{ij}.

The diagonal elements of $(I-bW)^{-1}$ are the multipliers by which the effect on the country's own growth of the country's own policy changes are magnified through spillovers. Hence, a policy change by country i that would have directly raised country i's

own growth rate by 1 percentage point (according to the A coefficients) will raise it by m_{ii} percentage points once the indirect effect of the neighbor feedback is taken into account. This indirect effect occurs because country i's policy change raises its neighbors' growth, which in turn feeds back on country i's own growth. We have calculated these diagonal elements with the estimated b coefficient and the GDP weights, and find them to be only modestly above unity for most countries.

What is the multiplier if all countries change their policies in unison? Let us think of a set of policy changes in unison that would have the direct effect of raising each country's own growth rate by 1 percentage point. Such as a set of policies would satisfy the following equation:

(A.3) $P A = i$

where P is an n x q matrix with identical rows, made up of changes in the q types of policies, A is the same n x 1 vector of coefficients on policies as before, and i is the n x 1 unit vector. Then the change in growth rates (given as the n x 1 vector G) as a result of the policy changes in unison is given by:

(A.4) $G = (I-bW)^{-1}i = (1-b)^{-1}i$

We can see from A.4 that the neighbor multiplier for a policy change in unison is given simply by taking the row totals of the $(I-bW)^{-1}$ matrix. Given that the row totals of W are all equal to one, it is easy to show that the row totals of $(I-bW)^{-1}$ are all equal to $1/(1-b)$, which is the second equality in (A.4). Hence, the multiplier with an estimated b coefficient of .55 is 2.2. In other words, a policy change in unison that would have had the direct effect of raising growth in each country by 1 percentage point will raise it by more than twice that much when all neighbors act together.

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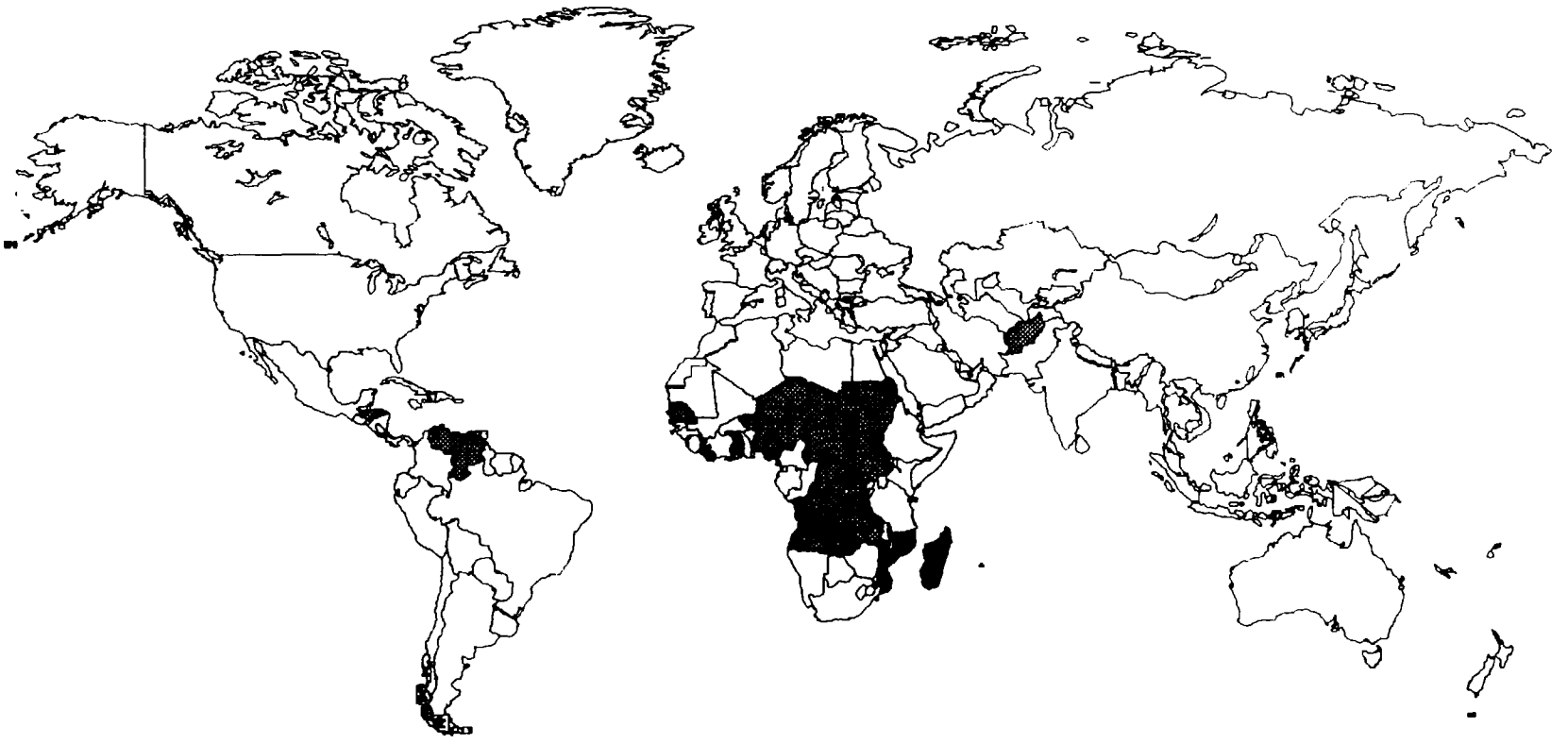
Figure 1: Regional distribution of negative growth.



Countries that had negative per capita growth 1960-88 are shaded grey

Figure 2: Decomposing the growth gap between East Asia and Africa

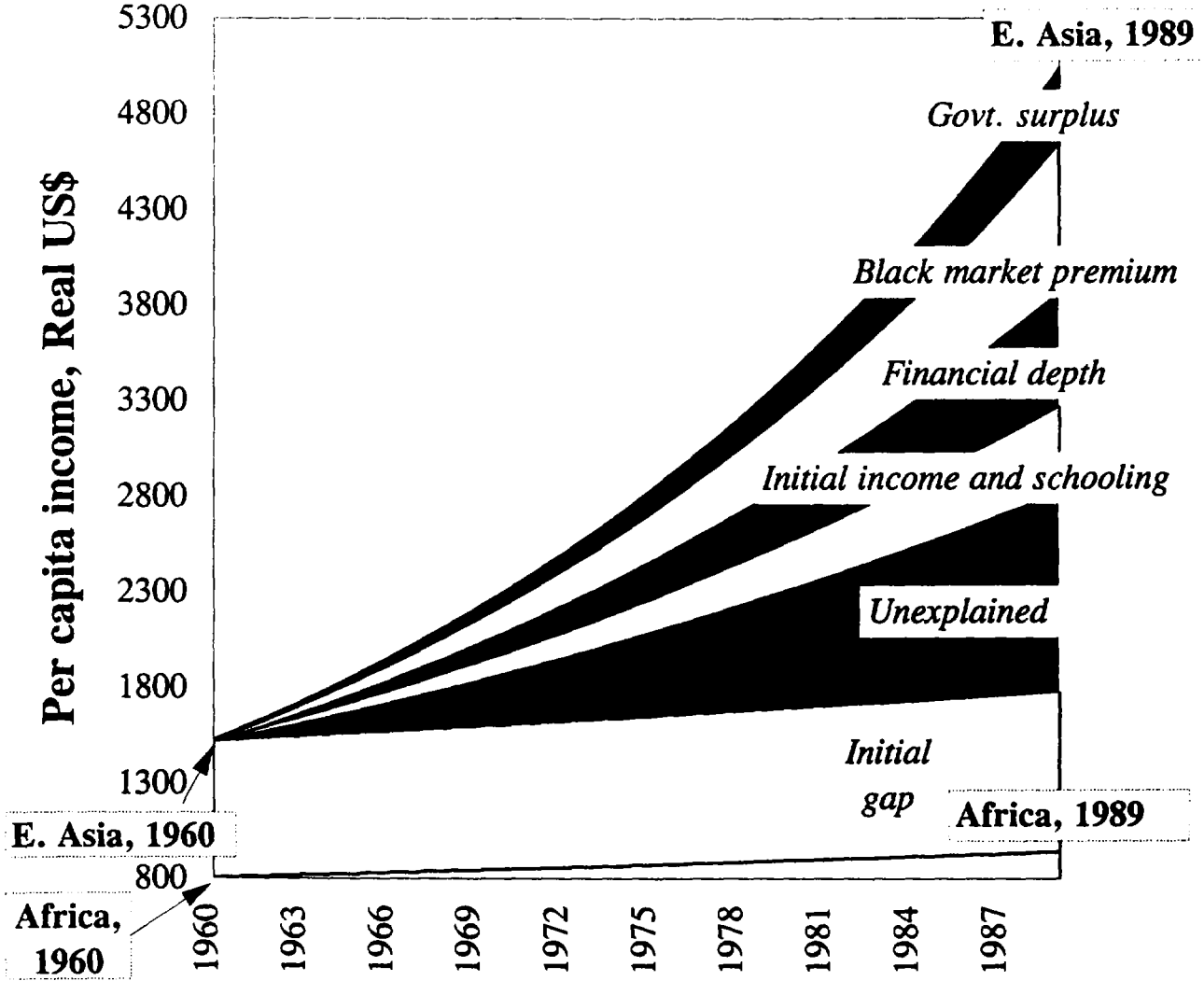


Table 1: Core Regression.

Dependent variable is growth of per capita real GDP

Variable	Coefficient
DUM60	-0.3135
	(3.11)
DUM70	-0.3098
	(3.07)
DUM80	-0.3258
	(3.25)
AFRICA	-0.0145
	(2.74)
LATINCA	-0.0158
	(4.77)
INCOME	0.0957
	(3.68)
INCOMESQ	-0.0067
	(3.95)
Log (Schooling)	0.0112
	(2.18)
Assassinations	-15.9596
	(2.41)
Financial Depth	0.0205
	(3.12)
Black Market Premium	-0.0187
	(3.69)
Fiscal Surplus	0.1215
	(2.48)
No. of observations	193
R-squared	0.54

Note: Heteroskedasticity-consistent t-statistics are reported in parenthesis. LRGDP is Log (Initial real per capita GDP) and LRGDPSQ is the same variable squared, Schooling is 1 + Average years of school attainment of the working age population, as calculated by Barro and Lee (1993), Depth is ratio of liquid liabilities of the financial sector to GDP. Regressions sample is pooled cross-section, decade averages.

Table 2: Averages: Africa vs. Other Country Samples

	Africa	Non-Africa	Non-Africa Non-OECD	East Asia & Pacific
Growth of per capita real GDP	0.0059	0.0240	0.0210	0.0417
Income	6.8375	7.9999	7.6660	7.7545
School	1.0041	1.6007	1.4152	1.5741
Assassinations	1.08E-05	4.95E-05	6.78E-05	3.44E-06
Financial Depth	0.2198	0.4237	0.3524	0.4736
Black Market Premium	0.3963	0.1896	0.2611	0.0536
Fiscal Surplus	-0.0492	-0.0390	-0.0416	-0.0246
No. of obs.	34	159	114	23

Note: See variable definitions and sources in Appendix, Table A1.

Table 3: Decomposing Per Capita Growth: Africa vs. Other Country Samples

	Africa vs.:	
	Non-Africa	East Asia & Pacific
Growth difference to be explained: *(Sample growth - Africa growth)*	2.3%	3.3%
Of which explained by:		
AFRICA dummy	1.5%	1.5%
Initial Income	-0.7%	-0.3%
Log (Schooling)	0.7%	0.6%
ASSASS	-0.1%	0.0%
DEPTH	0.4%	0.5%
BLACK	0.4%	0.6%
SURPLUS	0.1%	0.3%
Policy variables: (DEPTH, BLACK, SURPLUS)	0.9%	1.5%

Note: The underlying regression used for the above decomposition includes three decade dummies. The Initial Income term shows the net effect of the variables Initial per capita GDP and Initial per capita GDP squared. The regression is based on pooled cross-sections for 1960s, 1970s, and 1980s. The growth difference to be explained is adjusted for decade composition and the effect of the separate Latin America dummy is removed from the difference with the non-Africa sample.

Table 4: Averages of Infrastructure Indicators, 1960-1980

	Sub-Saharan Africa	Other Developing Countries	Industrial Countries
Telephones per 1000 workers	14	70	485
Kilowatts of electricity generating capacity per 1000 workers	118	277	1936
Kilometers of roads and railways per 1000 workers	1	3	16

Source: Canning and Fay (1993)

Table 5: Pooled Decade Growth Regressions with Non-traditional Variables.
Dependent Variable is Growth of Per Capita Real GDP.

	Core Regression excluding Fiscal Surplus				Core Regression including Fiscal Surplus		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
AFRICA	-0.0165	-0.0194	-0.0143	-0.0154	-0.0167	-0.0112	-0.0124
	(4.04)	(4.25)	(2.87)	(2.84)	(3.13)	(1.87)	(1.93)
LATINCA	-0.0150	-0.0162	-0.0188	-0.0183	-0.0174	-0.0191	-0.0193
	(4.65)	(4.95)	(5.84)	(5.59)	(5.36)	(5.84)	(6.15)
INCOME	0.0667	0.0660	0.0562	0.0616	0.1072	0.0869	0.1049
	(3.03)	(3.07)	(2.60)	(2.85)	(4.39)	(3.49)	(4.18)
INCOMESQ	-0.0049	-0.0056	-0.0044	-0.0053	-0.0082	-0.0063	-0.0080
	(3.39)	(3.92)	(3.08)	(3.67)	(5.21)	(3.89)	(4.89)
Log (Schooling)	0.0115	0.0057	0.0119	0.0080	0.0087	0.0117	0.0105
	(2.83)	(1.27)	(3.03)	(1.78)	(1.73)	(2.47)	(2.13)
Assassinations	-17.6182	-16.7398	-14.4453	-14.5338	-20.1476	-12.7993	-18.5198
	(2.75)	(2.51)	(2.08)	(1.96)	(3.17)	(1.59)	(2.56)
Financial Depth	0.0180	0.0120	0.0135	0.0107	0.0137	0.0162	0.0124
	(2.88)	(1.80)	(2.16)	(1.62)	(2.15)	(2.47)	(1.97)
Black Market	-0.0237	-0.0245	-0.0230	-0.0249	-0.0176	-0.0188	-0.0189
Premium	(6.02)	(5.45)	(6.10)	(5.62)	(2.97)	(3.79)	(3.08)
Fiscal Surplus					0.1985	0.1211	0.1946
					(4.61)	(2.74)	(4.57)
Log (Telephones		0.0076		0.0059	0.0074		0.0051
per worker)		(3.47)		(2.55)	(3.13)		(2.03)
ETHNIC60			-0.0164	-0.0134		-0.0170	-0.0122
			(2.96)	(2.22)		(2.78)	(1.86)
No. of observations	244	222	236	219	178	188	175
R-squared	0.50	0.52	0.52	0.54	0.59	0.57	0.61

Note: Heteroskedasticity consistent t-statistics are in paranthesis. Regression includes seperate decade dummies not reported above. ETHNIC60 is index of ethnolinguistic fractionalization. See text for further details.

Table 6: Ethnolinguistic Fractionalization Index (ETHNIC)

66 Countries, 1960

Country	ETHNIC	Country	ETHNIC
15 Most Fractionalized:		*15 Least Fractionalized:*	
Tanzania	93	Korea	0
Uganda	90	Haiti	1
Zaire	90	Japan	1
Cameroon	89	Portugal	1
India	89	Hong Kong	2
South Africa	88	Yemen	2
Nigeria	87	Germany	3
Ivory Coast	86	Burundi	4
CAR	83	Dominican Rep.	4
Kenya	83	Egypt	4
Liberia	83	Ireland	4
Zambia	82	Italy	4
Angola	78	Norway	4
Mali	78	Jamaica	5
Sierra Leone	77	Jordan	5

Note: ETHNIC measures probability that two randomly selected persons from a given country will not belong to the same ethnolinguistic group. The more groups there are, higher the ETHNIC. The more equally distributed the groups, the higher ETHNIC.

Source: Taylor and Hudson, *World Handbook of Political and Social Indicators* (1972).

Table 7: Correlations of Ethnolinguistic Fractionalization and Policy Indicators

Indicator	*Correlation with ETHNIC, 1960*
Log of School Years	-0.43 *
Financial Depth	-0.32 *
Black Market Premium	0.21 *
Government Surplus / GDP	-0.09
Log of Telephones per Worker	-0.50 *
Log of Kilometers of Roads & Railways per Worker	-0.31 *
Log of Electricity Generating Capacity per Worker	-0.45 *

*Note: * indicates correlation is significant at the 0.01 level.*

Table 8: Neighbor Regressions: Two-stage least-squares
Dependent variable is growth of per capita real GDP (GYP

Variable	(1)	(2)
Intercept	-0.1832	-0.3788
	(2.18)	(3.84)
DUM70	0.0011	0.0033
	(0.31)	(0.99)
DUM80	-0.0046	-0.0053
	(0.77)	(0.99)
AFRICA	-0.0054	-0.0094
	(0.69)	(1.38)
LATINCA	-0.0095	-0.0142
	(2.17)	(3.52)
INCOME	0.0574	0.1098
	(2.68)	(4.31)
INCOMESQ	-0.0043	-0.0078
	(3.06)	(4.65)
Log (Schooling)	0.0125	0.0163
	(3.01)	(3.40)
Assassinations	-17.0179	-15.0943
	(2.52)	(2.37)
Financial Depth	0.0092	0.0136
	(1.27)	(1.90)
Black Market Premium	-0.0205	-0.0120
	(5.00)	(2.62)
Fiscal Surplus		0.1494
		(3.57)
Neighbors' Average Growth	0.5543	0.3364
	(2.47)	(1.92)
No. of observations	234	169

Note: Heteroskedastic-consistent t-statistics in parentheses. Sample is pooled 1960 70s, and 80s data. "Neighbors's Average Growth" is per capita real GDP growth using 1960 GDP weights for the neighbors of each country.

Table 9: Correlations of right-hand side variables for each country with the average for its neighbors

	correlation coefficient	t-statistic on bivariate association	# observations
Initial income	0.77	22.3	333
Log (Schooling)	0.70	16.0	273
Assassinations	0.41	7.9	319
Financial Depth	0.55	11.3	299
Black market Premium	0.24	4.3	323
Fiscal Surplus	0.27	4.0	207

Note: Sample is pooled 1960s, 1970s, 1980s data. Neighbors' averages are immediate neighbors weighted by their respective 1960 GDP's.

Appendix: Table A1 : Variable Description

Variable	Description
DUM60	Dummy variable for 1960s
DUM70	Dummy variable for 1970s
DUM80	Dummy variable for 1980s
AFRICA	Dummy variable for Sub-Saharan African countries.
LATINCA	Dummy variable for Latin Amercia and the Carribean.
INCOME	Log (Initial real per capita GDP). Source: Summers & Heston, PWT 5.0 (1991)
INCOMESQ	INCOME squared
SCHOOL	Log (1 + average years of school attainment, decade average. Source: Barro & Lee (1993a))
Assassinations (ASSASS)	Number of assassinations per million population, decade average. Source: Barro (1991).
Financial Depth (DEPTH)	Ratio of liquid liabilities of the financial system to GDP, decade average. Source: World Bank.
Black Market Premium (BLACK)	Log (1 + Black Market Premium on the exchange rate), decade average. Source: World Bank.
Fiscal Surplus (SURPLUS)	Decade average of ratio of central government surplus (+) to GDP, both in local currency, current prices. Source: IMF International Financial Statistics.
ETHNIC	Index of ethnolinguistic fractionalization, 1960. Measures probability that two randomly selected people from a given country will not belong to the same ethnolinguistic group. Source: Taylor & Hudson (World Handbook of Political and Social Indicators)
NEIGHBOR	Weighted average for the growth of per capita real GDP of the neighbors of the country. Weights used are GDP in 1960.

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