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Troubles with the Neighbours: Africa's Problem, Africa's Opportunity

William Easterly and Ross Levine[1]
World Bank and University of Virginia

There is systematic contagion across national borders. Favourable or unfavourable growth performance of one's neighbours tends to influence one's own long-run growth rate. Policy choices are also contagious across borders. While improving policies alone boosts growth substantially, the growth effects are much larger if neighbouring countries act together.

1. Introduction

Sub-Saharan Africa has been the slowest growing region in the world. On average, real per capita GDP did not grow in Africa over the 1965–90 period.[2] In contrast, Latin America grew at almost 2% per year, and East Asia enjoyed real per capita growth in excess of 5%. These growth differences helped produce a situation where Africa's GDP per capita in the 1980s was a third of Latin America's and a fifth of East Asia's.[3] These developments have justifiably produced a large literature examining the causes of Africa's growth disaster and searching for strategies that will begin sustained economic development in Sub-Saharan Africa.[4]

Cross-country regressions are at least partly successful in explaining growth experiences over the past 30 years. We reproduce in this paper what many other studies have shown, that low school attainment, political instability, poorly developed financial systems, large black

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[2] For conciseness, we use the terms 'Sub-Saharan Africa' and 'Africa' interchangeably.

[3] These data are in purchasing power parity adjusted terms.

[4] See the citations in Easterly and Levine (1997).

market exchange rate premia and large government deficits are strongly associated with slow growth. These public policy indicators account for about half of the growth rate differential between slow growing Africa and fast growing East Asia. While the growth-explanation glass is half-full, it is also half-empty. Specifically, while the public policy indicators are associated with an economically meaningful proportion of the cross-country variation in growth rates, they miss half of that variation. When a dummy variable for Africa is included in the regressions, it enters significantly with a coefficient value of -0.015, which implies that simply being in Africa lowers predicted annual growth by 1.5 percentage points. This is large if one considers that the sample mean growth rate over this period is only about 2 percentage points per year. This significant African dummy variable suggests that we are missing something important about Sub-Saharan Africa's growth rate in our cross-country regressions.

It is noteworthy that failure has been concentrated in Sub-Saharan Africa and success has been concentrated in East Asia. It is only possible to talk about 'Africa' and 'East Asia' as meaningful units in the preceding paragraph because growth success has been unusually concentrated in East Asia and growth failure has been unusually concentrated in Africa. It is also informative that large growth fluctuations have been synchronised across many of the major economies of Latin America – most of them boomed in the 1960s and 1970s and crashed in the 1980s. There may be systematic contagion across national boundaries such that favourable or unfavourable characteristics of one's neighbours may importantly influence one's own long-run growth rate, as previously suggested by Chua (1993) and Ades and Chua (1993).

Given the regional concentration of growth successes and failures, we examine growth contagion between neighbouring countries in this paper. Subject to a number of caveats discussed below, the results are very strong. We find that country B's growth rate is strongly correlated with neighbouring country A's growth rate even after controlling for other factors. Once we include this neighbour effect, the Africa dummy variable is no longer significant.

This contagion effect suggests that each individual African nation was at a significant disadvantage compared with each individual East Asian nation. The average African nation had neighbours who were growing at 0.5% per year through the 1960s, 1970s and 1980s. The

average East Asian nation had neighbours who were growing at 4.2% per year through the 1960s, 1970s and 1980s.

We also find evidence consistent with the view that national economic policies are contagious. Neighbouring countries seem to imitate each others' policies. Again, an individual African nation was at a disadvantage relative to an individual East Asian nation. An individual African nation had neighbours who on average had a black market premium of 49% and sufficiently severe financial repression that financial assets were only 24% of GDP. An individual East Asian nation had neighbours who on average had a black market premium of 19% and sufficiently little financial repression that financial assets were 63% of GDP.

Of course, the circle of imitation and contagion between neighbours is not enough by itself to explain why Africa had poor policies and poor growth while East Asia had good policies and good growth. Something has to get the spiral going in one direction or the other. In our previous work (Easterly and Levine, 1997), we argue that the political economy of ethnic conflict helps explain the choices of national economic policies that slowed growth in Africa. East Asia, in contrast, benefited from greater social consensus over growth-promoting policies.

The relationship between growth in one country and growth in neighbouring economies suggests that there may be growth contagion 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 the results on neighbours in this paper suggest that if neighbouring countries act together, the growth effects are much larger. There is a 'neighbour multiplier' when countries act together. Specifically, the coefficients suggest that a policy change by a set of neighbours will have an effect on growth that is 2.2 times larger than if a single country had acted alone. While it may not be possible to exploit this neighbour multiplier fully in practice, these results suggest that Africa's growth disasters can be powerfully reversed by a group of African neighbours acting together.

Unfortunately, the neighbour multiplier also works in reverse. Africa contains many groups of neighbours who individually are ethnically fragmented, which according to our previous paper contributes to the choice of bad policies and bad growth outcomes. The neighbour multiplier magnifies these bad growth outcomes. The direct

and indirect effects of the political economy of ethnic divisions are much larger when ethnically divided countries happen to adjoin each other geographically.

These conclusions require many caveats. The cross-country regression methodology has numerous shortcomings and should not be the only method used to study growth or draw conclusions about Africa.[5] 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 of the partial correlation between economic growth and variety of economic and political indicators. As such, cross-country regressions offer complementary information to rigorous country studies by permitting a uniform statistical assessment of growth across a wide array of countries.

Moreover, our results on neighbours create new questions even as they attempt to answer old ones. We do not have at present a convincing story for why these neighbour contagions are so strong. We made a preliminary attempt to investigate the mechanisms, which ended in failure. We present these purely empirical results on neighbour spillovers here in the hope that they will spur more investigation into the mechanisms at work.

2. Using Cross-country Regressions to Explain Growth

Since we are focusing on long-run growth, we study economic performance over decades. 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.

[5] For a discussion of the weaknesses with cross-country growth regressions, see Levine and Renelt (1992) and Levine and Zervos (1993).

2.1 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 core regression uses a 'generic' cross-country growth regression specification that is consistent with a large literature as summarised in Barro and Sala-i-Martin (1995). 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.[6]

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 assumption that, *ceteris paribus*, lower income countries will enjoy a higher marginal productivity of capital. However, Baumol *et al.* (1992), Easterly (1994) and others show that the convergence effect is generally nonlinear, first rising and then falling with per capita income. To capture the potential nonlinear 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

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

presented, we used other indicators of political instability that did not alter the results.[7]

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.[8] For many countries the ratio equals M2/GDP. King and Levine (1993a,b) show that DEPTH responds to financial sector policies in predictable ways and 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 including the central government surplus to GDP ratio, SURPLUS. A negative relationship between government deficits and growth has earlier been found by Easterly and Schmidt-Hebbel (1991), Fischer (1993), and Easterly and Rebelo (1993). 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.

2.2 *Core Regression: Results*

Table 1 presents the core regressions. All of the variables are significant at the 0.05 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 repressed 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 stronger 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

[7] 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).

[8] Liquid liabilities includes demand deposits and interest bearing liabilities of banks and non-banks. Also, for additional measures of financial development, see Levine and Zervos (1998).

Table 1: *Core Regression. Pool Data 1960–90*
(dependent variable is growth of per capita real GDP)

Variable	Coefficient
DUM60	–0.3135
	(0.1009)
DUM70	–0.3098
	(0.1009)
DUM80	–0.3258
	(0.1003)
AFRICA	–0.0145
	(0.0053)
LATINCA	–0.0158
	(0.0033)
LRGDP	0.0957
	(0.0260)
LRGDPSQ	–0.0067
	(0.0017)
Log (Schooling)	0.0112
	(0.0051)
Assassinations	–15.9596
	(6.6151)
Financial Depth	0.0205
	(0.0066)
Black Market Premium	–0.0187
	(0.0051)
Fiscal Surplus	0.1215
	(0.0428)
No. of observations	193
R^2	0.54

Note: heteroscedasticity-consistent standard errors 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.

countries with incomes of about $1,600.[9] 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 than for middle-income countries.

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 than 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 the regression coefficient R^2 is slightly more than 50% and the coefficients have the expected signs, we are unable to account adequately for the poor growth performance of Africa and Latin America.

2.3 Assessing Africa's Performance

Using the core regression results presented in Table 1, we now decompose Africa's performance and compare it with 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 that of East Asia and Pacific. Africa's black market premium is 50% 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% higher in other developing countries. Thus, poor policies and low human capital, as measured by school attainment, stymie growth in Africa.

One can formally decompose the core regression results by

[9] 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.

Table 2: *Averages: Africa vs Other Country Samples*

	Africa	Non-Africa	Non-Africa Non-OECD	East Asia and 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	–0.0492	–0.0390	–0.0416	–0.0246
No. of observations	34	159	114	23

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

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.[10] 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 each explanatory variable.

[10] 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.

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

	Africa vs:	
	Non-Africa	East Asia and 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%
assassinations	-0.1%	0.0%
financial depth (DEPTH)	0.4%	0.5%
black market premium (BLACK)	0.4%	0.6%
fiscal surplus (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 upon 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.

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. 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 fully account for

much of Africa's economic performance. In our previous paper (Easterly and Levine, 1997), we accounted for part of the bad policy choices within African countries by the political economy of ethnic conflict. In this paper, we investigate more why the Africa dummy is statistically significant even after controlling for these bad policy choices. We attempt to shed additional light on one strategy for closing the growth gap with East Asia, one that moves from focusing only on correcting the bad policies of individual countries to focusing on broader regional reforms.

3. Troubles with Neighbours

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 (Latin America's synchronised crisis in the 1980s). Recently, two insightful papers have suggested that there are general spillovers across borders from unfavourable characteristics of one's neighbours, such as 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 neighbours.

3.1 Estimating Neighbour Spillovers

This paper extends the work of these papers in two ways, in order to apply it to the Africa conundrum. First, we change the Chua (1993) definition of neighbour effects by weighting each neighbour 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 USA than by Belize, and Cameroon would be affected more by gigantic Nigeria than by tiny Equatorial Guinea.[11] Second, instead of putting the averages of

[11] We explore further different weighting schemes for spillover effects from other countries. We find that trade weights (either exports or imports) perform poorly in identifying country spillover effects, as does weighting by distance (which was also unsuccessful in an earlier paper by DeLong and Summers (1991)). We also find that neighbours' policies are correlated with each other.

the neighbours' right-hand-side variables into the growth regression, we put the average of the neighbours' 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 neighbour and your neighbour affects you back — we will instrument for the neighbours' growth rate with the neighbours' right-hand-side variables. We will then perform a test of the overidentifying restrictions that the neighbours' 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 direct growth contagion hypothesis against the indirect hypothesis that neighbours' characteristics affect your own growth.

Table 4, regression (1) shows the two-stage least squares results with the neighbours' weighted average growth rate included in the core regression that excludes the government surplus. We use the neighbours' weighted average right-hand-side variables as instruments. Each country's neighbours' growth rate has a surprisingly large and statistically significant effect on each country's own growth: one percentage point more growth by the neighbours in a given decade translates into higher own growth of 0.55 percentage points. Although the Latin America dummy variable remains significant, the Africa dummy becomes insignificant once the neighbours' growth rate is included.

There are strategic implications from the finding that including neighbour effects eliminates the significance of the Africa dummy variable. The existence of contagion between neighbours provides a mechanism that amplifies the effect of policy differences between regions. A set of neighbours that all have below-average policies will each have poor growth not only because of their own bad policies, but also because of their neighbours' bad policies. This will create a growth differential *vis-à-vis* the rest of the world that is greater than can be explained by the direct effect of a country's policies on its own growth rate. Neighbours with bad policies drag each other down.[12] This is a plausible explanation of what led to the negative

[12] In the formal econometrics, we include policy indicators designed to capture policies that distort investment and allocation decisions. There may be policies other than those formally entered into the regressions that importantly influence investment and growth with neighbour spillovers.

Table 4: *Neighbour Regressions: Two-stage Least-squares (Dependent variable is growth of per capita real GDP (GYP))*

Variable	(1)	(2)
Intercept	–0.1832	–0.3788
	(0.0845)	(0.0950)
DUM70	0.0011	0.0033
	(0.0033)	(0.0035)
DUM80	–0.0046	–0.0053
	(0.0054)	(0.0053)
AFRICA	–0.0054	–0.0094
	(0.0060)	(0.0065)
LATINCA	–0.0095	0.0142
	(0.0040)	(0.0039)
LRGDP	0.0574	0.1098
	(0.0220)	(0.0245)
LRGDPSQ	–0.0043	–0.0078
	(0.0014)	(0.0016)
Log (schooling)	0.0125	0.0163
	(0.0041)	(0.0045)
Assassinations	–17.0179	–15.0943
	(9.5227)	(8.5881)
Financial depth	0.0092	0.0136
	(0.0062)	(0.0059)
Black market premium	–0.0205	–0.0120
	(0.0042)	(0.0046)
Fiscal surplus		0.1494
		(0.0310)
Neighbours' average growth (W6GYP)	0.5543	0.3364
	(0.1914)	(0.1793)
No. of observations	234	169

Note: standard errors are in parentheses. Regression sample consists of pooled cross-sections. For 1960s, 1970s and 1980s, 'neighbours' average growth' is the growth rate of per capita real GDP averaged, using 1960 GDP weights, for the neighbours of the country for which data was available. See text for details.

AFRICA shift variable, and indeed this variable loses statistical significance once we introduce the neighbour growth spillover variable. In Africa, the whole was worse than the sum of the parts.

The results are similar for regression (2) of Table 4, which also includes the fiscal surplus variable. Including SURPLUS, however, substantially reduces the sample size from 234 to 169. The neighbour variable enters with a t-statistic of 1.92 (P-value of 0.06), and the coefficient falls to 0.34. The dummy variable for Sub-Saharan Africa is insignificant. The reduction of the sample by the inclusion of the government surplus variable eliminates much of the data from the 1960s. Since the covariation of neighbours across time helps distinguish the neighbour variable from the Africa dummy, we suspect the elimination of most of the data from the 1960s is mainly responsible for the weaker significance of the neighbour variable in this regression.

A test of the overidentifying restrictions that all of the neighbours' right-hand-side variables have zero direct effect on the country's own growth 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 4 on the set of all exogenous variables, including the neighbours' right-hand-side variables. The test statistic, which is distributed as χ^2 with 5 degrees of freedom (six excluded exogenous variables – the neighbours' right-hand-side variables – minus one included endogenous variable), has a value of 8.35 and is not significant at the 5% level in the regression excluding the government surplus. In the regression including the government surplus, the test statistic has 6 degrees of freedom and has a value of 10.65, still not significant at the 5% level. Finally, it should be emphasised that the regressions include both the African and Latin American dummy variables. Thus, the neighbour variables is not simply capturing a fixed factor associated with continent-specific characteristics.

3.2 Where Does Contagion Come From?

There is not yet a convincing theory that explains contagion between neighbours. Contagion results pop up in a bewildering variety of places in the literature. The growth literature of course features much speculation and (a little) evidence about externalities and strategic complementarities, in the form of external effects of human or physical

capital across industries (Caballero and Lyons, 1989, 1990), and within cities (Rauch, 1993). 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' neighbours in socioeconomic outcomes in American cities. Jalan and Ravallion (1995) find spatial externalities in household living standards in poor areas of southern China. Calvo and Reinhart (1995) show how there is contagion in capital flows from large Latin American countries to their small neighbours. Eichengreen *et al.* (1996) discuss contagions between foreign exchange markets across international boundaries. Frankel and Schmukler (1996) discuss contagions between equity markets across international boundaries. Quah (1997) presents suggestive evidence that 'convergence clubs' are geographically concentrated.

Here, we discuss several possible channels for the kind of growth and policy contagion across neighbours that we find.

First, policies may be copied by neighbours. 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 neighbouring countries. There may be more pressure for policy makers to attain high growth from envy of the neighbours' success.

There is ample evidence of policy imitation, at least at the casual level, from other regions. Latin American countries copied each others' import-substituting policies in the 1950s and 1960s, then copied each others' debt-led investment expansions in the 1970s and copied each others' painful macroeconomic adjustments in the 1980s. Specific policy ideas such as central bank independence spread within Latin America through imitation in the 1990s.

There may be negative policy imitation too. Governments do not necessarily maximise growth; they may maximise rent-seeking opportunities. Thus, policies that are bad for growth might be imitated by neighbours if they are demonstrated to be good for creating rent-seeking opportunities or some other non-growth objective that is desired by the policy-making elite.

Table 5 presents evidence that is consistent with these conjectures. The core regression's policy indicators and the other regressors are highly correlated across neighbours.

As a second possible channel for neighbour spillovers, direct foreign investors may find it easier to move next door once success is achieved

Table 5: *Correlations of Right-hand Side Variable for Each Country with the Average for its Neighbours*

	Correlation Coefficient	T-Statistic on Bivariate Association	No. of Observations	R^2
Initial income	0.77	22.3	333	0.60
Log (schooling)	0.70	16.0	273	0.48
Assassinations	0.41	7.9	319	0.16
Financial depth	0.55	11.3	299	0.30
Black market premium	0.24	4.3	323	0.06
Fiscal surplus	0.27	4.0	207	0.07

in a neighbouring country. There may exist an assortment of technological, institutional, and legal costs associated with adopting a technology to local conditions. If local conditions are similar among neighbours, this may lower the cost of international corporations investing in the neighbours of countries where the corporations have enjoyed success and not investing in the neighbours of countries where multinational corporate investments have been less profitable

Third, international trade may be likely between neighbours, so that positive performance in one country spills over to neighbouring countries through trade. The data do not support this hypothesis, however. 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.

There are, of course, many other possible channels. Economic hardship in one country can spill over into its neighbours by reducing opportunities for labour emigration and earnings for the neighbours, a phenomenon that is important for the neighbours of oil producers like Nigeria. Deteriorating economies accompanied by deteriorating infrastructure can make life difficult for neighbours who need to use each others' roads and railways to reach ocean ports, a factor that is important for land-locked countries like Zambia.

Still we have to admit that all of these stories are speculative and we

do not have direct evidence for any of them. Admittedly, the replacement of the Africa dummy by a growth spillover effect really only changes the source of mystery rather than removing it.[13] But it changes the mystery in a very important way, as we will see now.

3.3 Neighbour Multipliers

How do we interpret a growth contagion effect versus an Africa dummy effect? The implications are very different. The contagion effect says that Africa's lagging growth relative to policy variables will disappear if a sufficient critical mass of countries provide a demonstration effect to change a negative contagion effect to a positive one. The good news in these results was that a large policy change in unison would have a multiplier effect on the countries in the region that is even larger than the – already strong – direct effect of a country's policies on its own growth rate. The bad news in the Africa dummy effect was that it implied Africa's growth would always be worse than the rest of the world for a given set of policies.

We show in the Appendix how the simultaneity of neighbour interactions provide the multiplier effect by which the effects of either good or bad country characteristics within a set of neighbours are magnified. These magnification effects are small if a country acts alone, but are large if a set of countries act in unison. If a country acts alone, there will be a small spillover to its neighbour's growth rate, which in turn spills back over into the country's own growth rate. Given that most countries have four or more neighbours, these spillover effects are fairly small. We calculate from our estimated set of weights for Africa that the median country changing policies in isolation has a neighbour multiplier of 1.041; that is, the effect of policies taking into account neighbour feedback is only 4% larger than the direct effect of one's own policies on one's own growth.

However, if all countries act together, the neighbour multiplier is

[13] It is also possible that instead of contagion, there are simply time-varying common shocks that hit all countries in a region at the same time. While we are unable to rule out this possibility, we do not place heavy weight on it. This explanation would require region-specific shocks that are sustained for a protracted period. While certain types of climactic events may fall into this category, we could not gather adequate data and therefore leave this for future research.

much larger. This is because all of the home country's neighbours 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 neighbours, the multiplier will be $(1/(1-b)$, or 2.2 where b is the estimated coefficient on one's weighted average of neighbour growth rates, estimated by us to be 0.55. That is, a set of neighbours adopting a set of policy changes that would have raised growth by a multiple of 1.04 if they had each acted alone will see growth increase by a multiple of 2.2 if they act together. This also works in the other direction: with a set of neighbours all simultaneously adopting bad policies such as exchange rate controls leading to a high black market premium, the negative effect on all of them would be magnified. While other factors were certainly at work, the neighbour multiplier offers a plausible story for what happened to Africa beginning in the second half of the 1960s and continuing into the 1970s and 1980s.

Do our results imply that countries would be better off free-riding on their neighbours' good policies rather than making their own policy changes? No. 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 neighbour'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 neighbours have good or bad policies. These results do not suggest weak incentives to act in isolation, but they do suggest that acting in unison has magnified effects for good or evil.

3.4 Ethnic Divisions and Neighbour Spillovers

Our previous paper (Easterly and Levine, 1997) argued that the political economy of ethnic divisions in Africa led to policy choices that were adverse to growth rates in individual countries. Where there were many competing ethnically based interest groups, each interest group would act it in its own interests at the expense of other interest groups. This would lead to rent-seeking policies like artificially controlled official exchange rates and high black market premia. When polarised, interest groups were unable to agree on the kind of public

good they wanted, such as what kind of language and cultural instruction they wanted to be given in schools, they would wind up devoting less of their joint resources to the public good. We did in fact find in the earlier paper that ethnically divided countries had lower schooling, less infrastructure, higher black market premium and less financial depth, and that this accounted for part of Africa's low growth.

When our earlier results are combined with the results in this paper, we have at least a speculative – we emphasise *speculative* – explanation for why growth turned out so badly in Africa. A high geographic concentration of ethnically divided countries led to a high geographic concentration of countries with poor economic policies. Possibly because of demonstration effects, countries imitated each others' policy choices – causing policies to deteriorate further. Other direct growth contagion, such as flight of direct foreign investment from the region, deterioration of earnings of labour emigrants and regional transportation difficulties, led to a vicious circle. Poorly performing country A pulled down country B's performance, which in turn fed back onto country A. The whole was worse than the sum of the parts: poor policies and poor growth were magnified across country borders, dragging down Africa as a whole into the worst growth performance in the world over 1960–89.

4. Conclusion

This paper changes the mystery of Africa's growth tragedy and suggests a strategy – though a difficult one – for the future. The significant, negative coefficient on the dummy variable for Sub-Saharan Africa in past cross-country regressions suggested that Africa grew slowly because it was Africa. This paper suggests an alternative explanation into why Africa was special without fully resolving the mechanics. Our data and results here suggest that what was unique about Africa was a high geographic concentration of poor policies, which Easterly and Levine (1997) showed was related to the high geographic concentration of ethnically-divided countries.[14]

[14] Future work could econometrically improve this analysis by using dynamic-panel estimation procedures. This would better account for country-specific effects, further reduce endogeneity concerns, and more fully incorporate the time-dimension into the current analysis.

When a country adopts growth-retarding policies, this negatively affects its neighbours. The knife edge of these large growth spillovers cut strongly against Africa. The concentration of countries with growth-retarding policies induced a multiplier effect that severely slowed economic growth in Africa. This knife has two edges, however. If neighbours can together adopt growth-promoting policies, there will be a positive multiplier effect that will spur economic growth in Africa.

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Appendix: Calculating Policy Multipliers with Spillovers of Growth to Neighbours

Section 4 of the paper presents evidence that a country's own growth is influenced by a weighted average of its neighbours' 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:

$$G = PA + bWG \tag{A1}$$

where G is an $n \times 1$ vector of growth rates for the n countries over the given time period, P is an $n \times q$ matrix of country policies and other characteristics, A is a $q \times 1$ vector of coefficients on policies, b is a scalar measuring the degree of spillover from one's neighbours to one's own growth and W is an $n \times n$ matrix of weights on one's neighbours 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 neighbouring countries. For example, if country 1 has as neighbours 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:

$$G = (I - bW)^{-1}PA. \tag{A2}$$

The elements of the inverse matrix $(I - bW)^{-1}$ contain the multipliers and cross-effects by which neighbour 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 neighbour feedback is taken into account. This indirect effect occurs because country i's policy change raises its neighbours' 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:

(A3) $$\Delta PA = i$$

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

(A4) $$\Delta G = (I - bW)^{-1}i = (1 - b)^{-1}i.$$

We can see from A4 that the neighbour 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 (A4). Hence, the multiplier with an estimated b coefficient of 0.55 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 neighbours act together.