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**Ethnicity, Communication and Growth: The
Tragedy of Africa Revisited**

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ETHNICITY, COMMUNICATION AND GROWTH : THE TRAGEDY OF AFRICA REVISITED[†]

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Abstract

Easterly and Levine (1997) have recently provided a provocative, as well as pessimistic, explanation for the poor growth performance of sub-Saharan Africa based on that region's high degree of ethnic fragmentation, arguing, on the basis of cross-sectional evidence that ethnic fragmentation leads to poor policies which in turn lead to low rates of growth. In this paper, we show that : (i) while their evidence on the deleterious impact on growth of ethnic fragmentation is compelling in the full sample, it is even stronger in the extremely limited African subsample; moreover, Chow tests detect strong evidence of parameter instability between the African and non-African subsamples ; (ii) the evidence regarding the harmful impact of ethnic fragmentation on policy choices is not at all compelling in the African subsample; (iii) polarization may be more harmful to growth than ethnic fragmentation *per se*, leading us to posit a non-linear relationship between growth and ethnic diversity; (iv) the impact of ethnic fragmentation on growth may be a function of the ability of individuals within a nationstate to communicate with each other, leading us to construct a two-regime model of the impact of ethnic fragmentation on growth, where the choice between regimes is a function of illiteracy and population density; (v) the differential impact of ethnic diversity on growth by regime does not stem from a differential impact by regime of ethnic diversity on policy choices; rather, the impact of ethnic diversity on the growth rate of GDP per capita appears to be a direct one.

Keywords : economic growth, Africa, ethnic fragmentation, empirical methods

I. INTRODUCTION

There is no doubt that African growth has been slow relative to the rest of the world, and in a recent paper, Easterly and Levine (1997) provide a provocative explanation based on the deleterious impact of ethnic fragmentation. In Easterly and Levine's explanation, economic policies are important determinants of growth performance, be it in Africa or in the rest of the world. In turn, the greater the degree of ethnic fragmentation, the poorer the policies. Since ethnic fragmentation is (according to their measure) greater in Africa, a significant portion (one third) of the difference between the average rate of growth in sub-Saharan Africa, relative to East Asia, is readily accounted for.

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This explanation is generally in accordance with one's *a priori* views on the bitter inheritance stemming from the carve-up of the continent by the colonial powers during the mid- to late-nineteenth century. It also squares with the view that policies matter for growth, and that policies have tended to be extremely poor in Africa. It is also, however, an explanation that leaves little scope for improvement, in that it is hard to see how a practical solution to ethnic fragmentation can be found. In other words, if ethnic fragmentation lies at the heart of Africa's growth tragedy, there is very little, if anything, that can be done about it. The tragedy is no longer merely a tragedy, it is the fate of Africa.

The structure of the paper is as follows. In part II, we question Easterly and Levine's results using their own methodology, while focusing on (i) the subsample of observations for which the policy variables are available, and (ii) the subsample constituted by African countries south of the Sahara. Within this framework, we consider both the growth regressions *per se* and the correlation that supposedly exists between ethnic diversity and the policy variables. We show that the relationship between growth and ethnic diversity is different for Africa than it is for the rest of the world, and that ethnicity does not affect growth through policies, this last point being particularly true for African countries.

In part III, we delve further into the instability of the relationship between ethnic diversity and growth yet further, by formulating and testing two hypotheses. First, we posit that it is polarization, rather than ethnic diversity *per se*, that may be the principal fetter on growth. By polarization, we mean a situation in which a country's population is divided into two groups of roughly equal size. Moreover we hypothesise that the impact of ethnic diversity on the growth rate of GDP per capita varies according to whether a country is "highly integrated" or "weakly integrated". By "highly integrated" we mean that communication costs are low. Second, since it appears that ethnic diversity does not affect the growth rate through its impact on policies, we investigate the transmission mechanism through which ethnic diversity affects the growth rate. We show that ethnic diversity affects the growth rate directly, particularly for countries in which communication costs are high, through its impact on the productivity of factor inputs. Our hypotheses are tested within the context of a switching regression framework with unknown sample separation in which the selection equation is a function of our proxies for communication costs.

II. EASTERLY AND LEVINE REVISITED

In this section, we examine the robustness of Easterly and Levine's results using the same dataset as in their paper. Our comments may be divided into two categories. First, we consider the coherence of their explanation, which runs from ethnic fragmentation, through poor policies, to low rates of growth. Second, we consider whether their results, which are based on a sample in which African countries play an extremely limited role, constitute a solid basis on which to construct an explanation for the poor growth performance of African countries.

Ethnic fragmentation and economic policies

The crux of Easterly and Levine's argument is that ethnic fragmentation is an empirically important determinant of economic policies and that poor economic policies, caused by a high degree of ethnic fragmentation in Africa, are the root cause of Africa's poor growth performance. If this argument is correct, then one would expect, when economic policy variables are included, that the effect of ethnic fragmentation on the growth rate of per capita GDP would disappear, or at least be significantly reduced. In Easterly and Levine's results, moving from column 2 of their Table IV, in which the policy variables are excluded, to column 3 of their Table IV, in which they are included, there is almost no change in the point estimate of the coefficient on ethnic fragmentation (the coefficient is equal to -0.017 in column 2, while it is -0.016 in column (3)), and the difference is not statistically significant. This comparison is not altogether fair in that the number of observations (country-decades) included in column (2) is significantly greater than in column (3) owing to missing variables for the indicators of economic policy. We therefore re-estimated the regressions corresponding to columns (2) and (3) using the more limited sample of column (3).

Our Table A provides the results of these estimations, as well as the two baseline cases in which economic policy variables are excluded. Note that, when the policy variables are added in column (3), the coefficient on ethnic fragmentation, which was equal to -0.019, is now equal to -0.017, a difference in magnitude which is in no way statistically significant. It is only when the logarithm of the number of telephones per worker is introduced into the specification that the coefficient on ethnic fragmentation falls

somewhat, to -0.012. Thus, whether one considers the broadest sample that data availability allows or whether one focuses on the most restrictive sample to permit meaningful comparisons, the decrease in the coefficient on ethnic fragmentation that one would expect were Easterly and Levine's line of reasoning correct does not obtain.

It may be that omitted variables are responsible for bias in the regressions. Partial support for this argument is provided by the results of Sachs and Warner (1997, Appendix Table A1, p. 366). When they include measures of economic policy such as openness to international trade, as well as variables such as an index of institutional quality, the investment ratio, and the ratio of natural resource exports to GDP in their estimations, the impact of ethnic diversity becomes statistically insignificant. It also becomes insignificant in growth regressions that include other structural factors (such as the trend and the instability of the terms of trade) as in Guillaumont, Guillaumont-Jeanneney, and Brun (1997).

Moreover, it is worth noting that Easterly and Levine test the assumption of a direct effect of ethnic fragmentation on economic policies by examining the simple correlation between ethnicity and the various indicators of economic policy. This seems tenuous, at best. It is one thing for a public policy indicator to be correlated with ethnic fragmentation. It is another for this correlation to hold up once one has controlled for other, more traditional explanations for the indicator in question. Note that in the correlations between the three policy variables and ethnic diversity presented by Easterly and Levine, only the fiscal surplus does not appear to support their assertion¹.

Finally, there is the question of the sub-Saharan Africa dummy variable. If ethnic diversity is a significant determinant of growth, and if this variable is significantly larger for sub-Saharan Africa than for the rest of the sample, then one would expect that its inclusion in the regression would eliminate, or at least significantly reduce, the magnitude of the Africa dummy. As can be seen from Easterly and Levine's results (comparing their Table I, where ethnic diversity is excluded, with their Table IV, where the same regressions are estimated with ethnic diversity included), there is no significant change in the magnitude of the coefficient on the Africa dummy variable. For example, in column 1 of their Table I the coefficient on the Africa dummy is equal to -0.014 ($t = -3.24$), while in column 1 of their

¹ Besides, and we do not wish to belabor this point : if ethnic diversity determines the policy variables, then one should be using instrumental variable techniques in which ethnic diversity would be one of several instruments used to identify the effects of the policy variables on economic growth. This would appear to be particularly true for the fiscal surplus, which should be a function, among other things, of the growth rate of GDP per capita. If this is the case, then the results will be subject to simultaneity bias.

Table IV (which is the same regression, but with ethnic diversity added) the corresponding coefficient is equal to -0.013 ($t = - 2.82$). The expected reduction in the magnitude of the coefficient on the Africa dummy does therefore not obtain. The same holds for the other results presented in their Tables I and IV.

The African subsample

It is essential to note that the focal point of Easterly and Levine's argument regarding Africa is based on regression results carried out on a sample of 172 observations corresponding to three decades (Table IV, column 4). It is equally important to bear in mind that this is the most restrictive sample that is dealt with by Easterly and Levine: it includes the greatest number of explanatory variables, thus maximizing the probability of there being missing variables which lead one to drop a given observation. Upon inspection of the Easterly and Levine dataset, it turns out that 27 observations correspond to sub-Saharan Africa. There are, to be precise, 13 observations for the 1970s, 13 observations for the 1980s and a single observation for the 1960s which may be termed African.²

While the limited sample size is conditioned by data availability, particularly with respect to the economic policy variables, it does suggest that caution should be exercised in interpreting the results. In particular, generalizing the results to the whole of Africa south of the Sahara may be stretching the limits of statistical inference too far if the African countries excluded from the sample display behavior which is significantly different from that of those that are included. This issue has been carefully examined by Sachs and Warner (1997), who conclude, based on a wider subsample of African countries than that used by Easterly and Levine, that such bias is not significant.

It may also be the case that the African subsample, in and of itself, constitutes a special case. This issue lies at the heart of a long-standing debate as to whether one can explain differences in growth performance on the basis of (i) a general, worldwide model of growth in which different groups of countries differ in terms of the level of their variables, but in which the regression coefficients linking the variables in question to the growth rate are constant, or (ii) a specific model in which the coefficients and structure of the model

² The country-decades are as follows: Botswana (70, 80), Ghana (60, 70, 80), Kenya (70, 80), Liberia (70), Mauritius (70, 80), Malawi (70, 80), Senegal (70, 80), Sierra Leone (70, 80), Sudan (70), Tanzania (70, 80), Togo (80), Uganda (70, 80), Zaire (70, 80), Zambia (70, 80), Zimbabwe (80).

linking the explanatory variables to the growth rate are specific to a given region (Guillaumont, Guillaumont- Jeanneney and Brun 1997). In econometric terms, the issue boils down to the stability of the regression coefficients over different subsamples of countries. Obviously, the criteria by which one assigns a particular country to a given subsample are not restricted solely to geographical considerations.

While Easterly and Levine do note that their results remain approximately the same when they focus on the "out of Africa" subsample, they do not present, or mention, results corresponding to their limited African subsample. Moreover, they do not perform the usual Chow tests in order to verify that their estimated coefficients remain stable across African and non-African subsamples.

A series of Chow tests on the stability of the regression coefficients between the African and out of Africa subsamples, presented in the last line of Table A, reject the null hypothesis that the coefficients are equal across subsamples. The p-values of these Chow tests are all extremely small. Given the instability of the regression coefficients, we now turn to regression results based on the African subsample itself.

In Table B, our purpose is to re-estimate the Easterly and Levine regressions with the largest African subsample possible (the regressors are as in Easterly and Levine's Tables I and IV). This implies, as we add explanatory variables, that sample size (for the three decades) decreases rapidly, going from 68 observations when only the basic determinants of per capita GDP growth are included, to only 27 when economic policy variables and ethnic fragmentation are present. Note that we estimated by pooling data over the three decades, since the limited sample size when policy variables are included rendered a system of seemingly unrelated decade-specific equations with cross-equation restrictions on the coefficients infeasible. Standard errors were computed using White's heteroskedasticity-consistent method.

Four results in Table B are worth highlighting. First, the point estimate of the coefficient on the ethnic fragmentation variable is much larger (between 3 and 19 times bigger, depending upon the regression) in the results based on the African subsample than in the full sample. At the very least, this confirms that ethnic fragmentation, as suggested by Easterly and Levine, is an important determinant of economic growth in Africa. Indeed, it suggests that its importance in the African context may be underestimated by the Easterly and Levine results, or perhaps that its impact is overestimated or misspecified in some manner in the out of Africa subsample. Second, the log of initial income and the log of

initial income, squared, as well as the log of schooling, are much less important determinants of growth performance in the African subsample than in the full sample. Third, the economic policy variables have much less explanatory power than in the full sample: the fiscal surplus to GDP ratio and the black market premium, which were highly significant in all equations in which they appeared in the full sample are now significant only when the log of telephones per worker is *excluded*. Financial depth, which was statistically significant in all equations in which it was included in the Easterly and Levine full sample, is now only significant in the equation presented in column (7).

We also examined whether Easterly and Levine's argument, according to which ethnic fragmentation causes poor economic policies (which in turn cause poor growth performance) was verified for the African subsample. As in the previous argument based on the full sample, we therefore re-estimated all of our equations on the basis of an African subsample that will remain unchanged across regressions. This "unchanging" subsample corresponds to those observations for which data are available both on economic policy variables and ethnic fragmentation. This allows one to ascertain whether, for the same group of observations, inclusion of the policy variables leads to a reduction in the magnitude of the coefficient on ethnic fragmentation, as Easterly and Levine's argument would have it. These results are presented in Table C. As with (i) the full sample, (ii) the full sample restricted to the set of observations for which the policy variables and ethnic fragmentation are available, and (iii) the African subsample that maximizes sample size, the *fall* in the coefficient associated with the ethnic fragmentation variable when the policy variables are introduced is statistically indistinguishable from zero. There is thus no reasonable sample of observations for which the introduction of the policy variables leads to the reduction in the magnitude of the coefficient on the ethnic fragmentation variable which one would expect in light of Easterly and Levine's argument. Moreover, of the six possible coefficients associated with the three policy variables in the two regressions in which they are included, only one (financial depth when the log of telephones per worker is excluded) is statistically significant. This is in sharp contrast with the results in the full sample presented by Easterly and Levine, and highlights that the link between policy and the growth rate of per capita GDP is not as strong in the admittedly limited African subsample as it appears to be in the full sample.

Finally, a direct test of whether the first part of Easterly and Levine's hypothesis is consistent with the African data is to examine the correlation that exists between the

economic policy indicators and ethnic fragmentation for the African subsample. The results of these estimations are presented in Table D. Here, the results correspond to the African subsample that is chosen. If we seek to maximize sample size, the black market premium and the fiscal surplus are correlated positively and negatively, respectively, with ethnic diversity, as Easterly and Levine's argument would have it. Financial depth, on the other hand, is *positively* affected by ethnic diversity, contrary to the hypothesis advanced by Easterly and Levine. If, instead, we stick to the African subsample that appears in the growth regressions on which Easterly and Levine implicitly base their conclusions regarding the impact of ethnic diversity on policies in Africa (i.e., the subsample of 27 observations for which all of the policy variables exist), then the black market premium is correlated positively with ethnic diversity, but ethnic diversity has no significant impact on the fiscal surplus or on financial depth. These results highlight the fragility of the line of reasoning advanced by Easterly and Levine, at least with respect to the African subsample that is the implicit focus of their work.

An assessment

The upshot so far is that Easterly and Levine's point that ethnic diversity is a significant determinant of growth is well taken. Moreover, ethnic diversity is a particularly important determinant of growth for the African subsample. On the other hand, the mechanism through which ethnic diversity affects the growth rate, namely by leading to poor policies, is manifestly not the one posited by Easterly and Levine, at least not for Africa.

The purpose of part III is to examine whether an alternative specification can be found that squares better with the data. First, is the relationship between ethnic diversity and the growth rate of per capita GDP an unambiguously negative one? Or might it be that it is only for a certain group of countries, to which Africa belongs, that the relationship between ethnic diversity and growth is monotonically negative. Second, is the "geographical focus" of the argument appropriate (i.e., splitting the world up into African and non African subsamples), or could some other variables, apart from geography, condition the response of the growth rate of GDP per capita to ethnic diversity? Third, can a coherent theoretical basis be given for differing responses to ethnic diversity?

III. ALTERNATIVE SPECIFICATIONS

In Easterly and Levine's analysis, the unambiguously negative relationship between ethnic fragmentation and economic growth is justified on the basis of two hypotheses. The first hypothesis is that ethnic diversity affects the growth rate of GDP per capita through its impact on the pursuit of policies conducive to growth. The second hypothesis is that ethnic diversity has a direct effect on growth, through its impact on the productivity of factor inputs. In what follows we shall refer to the first hypothesis as the "indirect effect" while the second hypothesis will be termed the "direct effect". Note that Easterly and Levine's emphasis falls largely on the indirect effect.

Ethnicity, policies, and the efficiency of resource allocation

Easterly and Levine highlight two mechanisms through which the indirect effect might operate. The first mechanism through which the indirect effect of ethnic diversity makes itself felt is that it encourages the adoption of policies associated with rent-seeking activities (Mauro, 1995). Since these rent-seeking activities result in distortions with respect to the first-best optimum, economic growth is thereby deleteriously affected. Examples include foreign currency regulations that lead to the establishment of a parallel market (and thus dual exchange rates), interest rate ceilings that lead to negative real rates of interest, preferential credit policies that target specific sectors or economic agents. The pursuit of exchange rate unification, currency convertibility, or financial liberalization must be preceded by the establishment of a policy consensus. And such a consensus may only be reached once there is common knowledge of the concessions that each ethnic group is willing to make (Alesina and Drazen, 1991). Indeed, each ethnic group will usually be the beneficiary of a specific form of economic rent, and will fail to internalize the costs that this rent imposes on the other ethnic groups (Shleifer and Vishny, 1993). Policy reform is thus slowed, if not paralyzed, by informational costs. This informational effect associated with ethnic fragmentation and policy reform might be labeled as the "rent-keeping", "rent rigidity" or "rent rivalry and reform attrition" effect.

The second mechanism, advanced by Easterly and Levine, and through which the indirect effect impacts the growth rate, is linked to the hindrance imposed by ethnic

diversity on consensus-building related to public expenditure. Such lack of consensus may be particularly important when it comes to the provision of those public goods that promote economic growth. The classic example would be the efficiency of the educational system, which is likely to be severely impaired when there is no consensus as to the language of instruction, the content of the curriculum, or the geographical location of facilities. The same might be said of infrastructure construction, which will be a function of the geography of the underlying ethnic groups and will not necessarily be based upon productivity-enhancing concerns. This effect associated with ethnic fragmentation might be labeled as the "public good provision" effect.

The second hypothesis advanced by Easterly and Levine is that ethnic diversity may also play a direct role in the determination of the growth rate of GDP per capita through its impact on (the growth rate of) total factor productivity, or in general, the efficiency of the allocation of resources within the economy. There are several mechanisms through which this direct effect may operate. Discrimination in hiring practices based on ethnic concerns rather than competence may, for instance, result in an inefficient allocation of human capital. Similarly, the allocation of investment projects on the basis of ethnically-derived formulae that are often divorced from rate of return considerations will tend to move the economy away from the efficient frontier. Both cases illustrate that ethnolinguistic fragmentation may lead to market segmentation. Ethnic diversity can also result in political instability and violence that reduce productive private investment (Collier and Hoeffler, 1998). As suggested by our results in part II, we shall go on to show in the remainder of this paper that it appears to be the direct effect that dominates, contrary to Easterly and Levine's emphasis.

The question we pose in the following section is whether Easterly and Levine's indicator of ethnolinguistic diversity (Atlas Narodov Mira, 1964) is indeed an appropriate measure to be used in order to assess the impact that the ethnic composition of the population can have on the pursuit of the proper economic policies or on the efficiency of the allocation of resources. We do so in large part because of the results of our Chow tests in part II that indicated a differential impact of ethnic diversity in the African *versus* the non-African subsamples.

Questioning the ethnicity indicator : fragmentation versus polarization

The point we wish to raise concerns the distinction between ethnic *diversity* and ethnic *polarization*, two concepts that are often equated but that are in fact quite distinct. Consider the measure of ethnic diversity used by Easterly and Levine (also see Mauro, 1995). Let the population be divided into n ethnic groups, indexed by $i = 1, \dots, n$, where x_i denotes the number of individuals belonging to ethnic group i . Let \bar{x} denote the mean size of the ethnic groups, and let σ^2 denote the variance of the size of the ethnic groups. Then it can be shown that the probability of two randomly chosen individuals in the population *not* belonging to the same ethnic group may be expressed as :

$$\Pi(n, \sigma^2, \bar{x}^2) = 1 - \left(\frac{\sigma^2 + \bar{x}^2}{n\bar{x}^2} \right) = 1 - n^{-1}(1 + c^2),$$

where $c = \sigma / \bar{x}$ is the coefficient of variation. Five comments are in order regarding this measure. First, it is immediate that, for a homogeneous population made up of a single ethnic group, we will have $n = 1$, $\sigma^2 = 0$ and thus $\Pi(1, 0, \bar{x}^2) = 0$. Second, for a population made up of n ethnic groups of identical size, we will have $\sigma^2 = 0$ and $\Pi(n, 0, \bar{x}^2) = 1 - n^{-1}$. Third, notice that when one moves from a situation with a single ethnic group to a situation with two ethnic groups of equal size, the measure of ethnic diversity goes from 0 to 0.5. Fourth, consider the two following hypothetical distributions of ethnic groups : one group makes up one half of the population and five other equally-sized groups constitute the rest. The corresponding value of the measure of ethnic diversity is $\Pi = 0.67$. Fifth, the same value is obtained with three ethnic groups of equal size.

It is important to note that the third case —two ethnic groups of equal size— corresponds to what one might term extreme "polarization", and polarization is not necessarily more favorable, in our view, to the pursuit of appropriate economic policies or to moving the economy towards the efficient frontier than is the situation described in the fourth or the fifth case, despite the fact that the indicator of ethnic fragmentation is larger in the fourth or fifth case (0.67) than in the polarized case (0.5).

An operational definition of polarization, given that one does not possess information on the "distance" separating the desired policies of different ethnic groups that would allow one to use standard measures based on transformations of the probability density of ethnic groups, would be that it corresponds to a situation where the probability of confrontation between ethnic groups is high. This is manifestly the case when there are two ethnic groups of equal size. But it is also the case when there is one dominant group and several smaller groups likely to form a coalition that is capable of opposing the dominant group.

It is intuitively appealing that the maximum level of ethnic polarization is reached when there are two ethnic groups of equal size. In this case, the index of ethnic diversity used by Easterly and Levine is equal to one half. It is also intuitively appealing to assume that any measure of ethnic polarization will be smaller than the previously defined maximum for any other configuration of ethnic groups, and thus, at least locally, for any value of ethnic diversity that is different from one half. Rather than assuming a particular form for what would be a necessarily arbitrary definition of polarization, we prefer to characterize ethnic polarization in the following manner :

Definition. Any workable definition of ethnic polarization, $P \in [0,1]$, must satisfy the following condition, as a function of ethnic diversity Π :

$$(i) \text{ For } P = P(\Pi), \Pi \in [0,1], P \in [0,1]: \arg \max_{(\Pi)} P(\Pi) = \frac{1}{2};$$

or, equivalently

$$(ii) P(\Pi) < 1 \forall \Pi \in [0,1], \Pi \neq \frac{1}{2}.$$

By the usual argument in terms of a second-order Taylor expansion, such a function may be locally approximated (around 0.5) by a quadratic.³ This implies that, if one plots ethnic polarization on the vertical axis *versus* ethnic fragmentation on the horizontal axis, the result is an inverted U-shaped curve.

³ An example of such a function would be $P = 2n^{-1}(1 - c^4)$.