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Measuring Ethnic Fractionalization in Africa

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In most studies of the impact of ethnic diversity on economic growth, diversity is hypothesized to affect growth through its effect on macroeconomic policies. This article shows that most measures of ethnic diversity (including the commonly used ELF measure) are inappropriate for testing this hypothesis. This is because they are constructed from enumerations of ethnic groups that include all of the ethnographically distinct groups in a country irrespective of whether or not they engage in the political competition whose effects on macroeconomic policymaking are being tested. I present a new index of ethnic fractionalization based on an accounting of politically relevant ethnic groups in 42 African countries. I employ this measure (called PREG, for Politically Relevant Ethnic Groups) to replicate Easterly and Levine's influential article on Africa's "growth tragedy." I find that PREG does a much better job of accounting for the policy-mediated effects of ethnic diversity on economic growth in Africa than does ELF.

In 1997, William Easterly and Ross Levine published an article titled "Africa's Growth Tragedy: Policies and Ethnic Divisions" (Easterly and Levine 1997), which found a statistically and economically important negative effect of ethnic diversity on economic growth in a cross-section of countries. Specifically, Easterly and Levine (hereafter E&L) found that moving from an ethnically homogeneous country to one with a diversity of ethnic communities corresponded with a decrease in annual economic growth rates of more than 2 percent. They then applied this finding to Africa, reasoning that, because African countries are typically ethnically diverse, the strong link between ethnic heterogeneity and slow growth was quite likely an important part of the explanation for that region's "growth tragedy."

E&L's findings have been broadly accepted. Thanks largely to their article, it is now *de rigueur* for economists to include a measure of ethnic diversity in their cross-country growth regressions (e.g., Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg 2003; Brock and Durlauf 2001; Collier and Gunning 1999; Easterly 2002; Englebert 2000; Hall and Jones 1999; and Rodrik 1999).[1] Until recently, nearly all such studies followed E&L in employing a measure of ethnic fractionalization called ELF (for Ethno-Linguistic Fractionalization). The ELF measure is available for 129 countries and reflects the likelihood that two people chosen at random will be from different ethnic groups.[2] It is calculated using a simple Herfindahl concentration index from data compiled by a team of Soviet ethnographers in the early 1960s and published in the *Atlas Narodov Mira* (1964).[3]

Three problems with the ELF measure—two with the measure itself and one with the way it is ordinarily used—call into question the findings that have been reported

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[1]Measures of ethnic diversity have also become standard variables in analyses of civil conflict (Annett 2001; Collier 1998; Elbadawi and Sambanis 2002; Reyna-Querol 2002), the quality of governance (La Porta et al. 1999), and even the origins of property rights (Keefer and Knack 2002).

[2]Newer measures of ethnic fractionalization, such as those developed by Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003), Fearon (2003), and Roeder (2001), have yet to be widely adopted. The conventional wisdom about the effects of ethnic diversity on growth is based almost entirely on studies that use the ELF measure.

[3]The Herfindahl concentration formula is: $ELF = 1 - \sum_{i=1}^{n} s_i^2$ where s_i is the share of group i ($i = 1, \ldots, n$).

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to date about the relationship between ethnic diversity and economic performance.[4] First, the underlying ethnographic data from which the ELF measure is constructed are suspect. Second, summarizing the ethnic landscape of a country with a single statistic, as all ethnic fractionalization indices (including ELF) do, obscures features of ethnic diversity that may be highly relevant to the relationship between ethnicity and economic growth. Third, and most important, there is a critical mismatch in most studies between the causal mechanism that is claimed to link ethnic diversity with slow growth and the measure of diversity that is used to test that mechanism. Contrary to the assumptions of most scholars who seek to test the effects of ethnic diversity on growth, there is no single "correct" accounting of the ethnic groups in a country, and thus no single "correct" ethnic fractionalization index value. Countries possess multiple dimensions of cultural cleavage and multiple possible accountings of the salient ethnic communities. Researchers must choose the one that provides the appropriate enumeration of ethnic groups for the specific causal mechanism that is being tested and then calculate their ethnic fractionalization value from that enumeration.

The first two of these issues have been discussed by other researchers (Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg 2003; Fearon 2003; Linzer 2003). However, the problem posed by the mismatch between measure and mechanism has yet to be remarked upon. The principal contribution of this article is to highlight this third issue and to introduce (and apply) a new measure of ethnic diversity that better captures the causal process through which diversity is usually hypothesized to affect economic performance.

The first part of the article critiques the ELF measure (and, implicitly, the growth analyses that employ it) in greater detail. The second part introduces the new measure of ethnic diversity (which I call PREG, for Politically Relevant Ethnic Groups) and compares it with ELF and other measures of social heterogeneity. The third part employs the PREG measure to replicate E&L's analysis in the African subsample. The results confirm that, at least in Africa, PREG does a better job than ELF in capturing the policy-mediated effects of ethnic diversity on growth.

[4]A fourth critique of existing analyses—particularly the E&L article—emphasizes problems of model specification and interpretation (see Arcand, Guillaumont, and Jeanneney 2000; Englebert 2000; Linzer 2003). Because the emphasis of this article is on conceptual issues regarding the measurement of ethnic diversity, these weaknesses are not treated here.

Critique of the ELF Measure

The shortcomings of the ELF measure can be divided into three categories: *specific* problems that stem from the underlying ethnographic data from which the index is calculated, *general* problems that arise from attempting to summarize a country's ethnic diversity with a single index (and that apply to all single-measure ethnic fractionalization indices, including the one introduced here), and *problems of application* that arise from the way the measure is used. I discuss each in turn.

Problems Specific to the ELF Index

A first problem with the ELF index is that the data from which it was calculated is, by now, more than 40 years out-of-date. Although ethnic group distributions are often assumed not to change much over time—indeed, their presumed exogeneity to historical events is a big part of the reason why ethnic fractionalization indices are prized (e.g., Mauro 1995)—this need not always be the case. Ethnic groups are now recognized to be social constructions with histories of expansion and contraction, amalgamation and division (Laitin and Posner 2001). If ethnic groups can grow and shrink, emerge and disappear, then the ethnic demographies they collectively define will be fluid. A measure of ethnic diversity built from data collected in the early 1960s may not accurately reflect the shape of a country's ethnic landscape several decades later.[5]

The ELF measure also suffers from a number of basic coding inaccuracies.[6] A number of these stem from what I call the "grouping problem." In the country-by-country ethnic breakdowns provided in the *Atlas*, ethnic groups are identified along with their approximate population sizes. Usually groups are listed singly, but sometimes they

[5]Some researchers defend the use of ethnic fractionalization indexes based on out-of-date ethnographic data on the grounds that it eliminates the possibility of endogeneity. Much like the practice of lagging a variable, the idea is that the diversity of the country was measured too long ago to conceivably be affected by present-day growth patterns. The problem is that, while safely exogenous to present-day growth levels, the ethnic demography being measured may bear little resemblance to the contemporary ethnic landscape whose effects on growth are being tested. The challenge is to create a measure of ethnic diversity that is both exogenous to growth and also a valid measure of our variable of interest.

[6]My treatment in this section is limited to the African portion of the data. The problems I identify among the African cases are likely indicative of problems elsewhere in the data set. For a critique of some of the values the ELF index provides for Asian countries, see Reilly (2000).

are catalogued as part of a larger umbrella category with a single population count. The "grouping problem" refers to the fact that these umbrella categories sometimes subsume groups that are clearly distinct in most ethnographic and political accounts. In Uganda, for example, the Acholi and Lango are collapsed into a single category despite a lengthy history of political rivalry between these groups (Kasfir 1976). In Tanzania, the Nyamwezi and Sukuma are similarly lumped together despite the fact that most descriptions of Tanzania's ethnic politics treat these groups not only as geographically, linguistically, and culturally distinct but also as keen political competitors. By grouping them into a single category, an important cleavage is hidden from view. The most glaring example of this kind involves the cases of Rwanda and Burundi, where the fundamental cleavage between Hutus and Tutsis is totally absent in the *Atlas* accounting. In the former, both groups are collapsed into a monolithic "Banyrwanda" category; in the latter, Hutus and Tutsis share a common designation as "Barundi."

Togo provides an example of a slightly different kind of grouping problem. Here, the Kabre are classified along with two other groups as a subgroup of the Tem. Yet, the literature on contemporary Togo identifies the Kabre, but not the Tem, as a central actor in the country's politics. Because the Kabre are grouped under the Tem umbrella, it is impossible to determine exactly how large a group they, in fact, are. As a result, their size is not (and cannot be) reflected correctly in the index. Similarly, in Mozambique, the Ndau, a group central to the RENAMO support coalition, are not even included in the *Atlas*'s listing of the country's ethnic groups. We must infer their size (or, at any rate the upper bound on their size) from the figures provided for the Mashona, of which the Ndau are a subgroup. Numerous additional examples of this sort can be identified.[7]

General Problems with Measuring Ethnic Diversity

Quite apart from the problems specific to the ELF measure, a number of difficulties hamper any attempt to summarize a country's ethnic landscape with a single index of fractionalization. First, there are reasons for questioning whether the Herfindahl concentration index provides an adequate technology for summarizing the relevant features of a country's ethnic diversity.[8] As others have pointed out (e.g., Fearon 2003), a key problem with the Herfindahl formula is that it is insensitive to a great deal of potentially relevant variation in the ethnic landscapes of the countries being compared. Take two hypothetical countries, the first with two groups of equal size and the second with three groups containing two-thirds, one-sixth, and one-sixth of the population, respectively. In both countries, the fractionalization index calculated with the standard Herfindahl formula would be 0.5. Yet the dynamics of the intergroup competition in each country would almost certainly be different. In the first case, small differences in the mobilization of either group's members would yield very large payoffs, and we would expect to find intense rivalry across group lines. In the latter case, the largest group has clear numerical superiority, and we would expect a very different, more moderate, pattern of interethnic competition. If our hypothesis regarding the effects of ethnic diversity on growth focuses on the nature of the political competition among ethnic communities, as most do, then adopting a formula that codes these countries as equivalent is problematic.

A second problem is that ethnic fractionalization indices such as ELF fail to incorporate potentially relevant information about the spatial distribution of groups around the country. A large literature suggests that social cleavages are likely to have very different effects when the groups they define are concentrated than when they are dispersed (e.g., Bush and Reinhardt 1999; Mozaffar, Scarritt, and Galaich 2003; Rogowski, Kayser, and Kotin 1999; Toft 2003). To the extent that variation across countries in the spatial distribution of groups affects the impact of ethnic diversity on policy formation and growth, this aspect of the causal process will be left out of the analysis.

A third problem with using an index of fractionalization to summarize the effects of ethnicity on growth stems from the fact that such measures convey no information about the *depth* of the divisions that separate members of one group from another. Of course, it is possible that ethnic diversity matters purely through the multiplicity

[7] In Niger, the Jerma are included within the larger Songhai group, even though it is the Jerma, and not the Songhai, that are referred to again and again in the literature as politically important. The same is true of the Ashanti, hidden under the larger Akan umbrella in Ghana; the Sara, lumped together with other groups under the broader Bagirmi category in Chad; and the Mbochi, grouped under the more encompassing Boubangui label in Congo.

[8] Although other means of calculating social fractionalization have been proposed (e.g., Esteban and Ray 1994; Garcia-Montalvo and Reynal-Querol 2002), the data requirements of these methods make them difficult to apply, and they have not been widely adopted. Other approaches—for example, recording the size of the largest ethnic group in the country or the number of languages spoken or the share of the population speaking the country's major language—may avoid some of the problems with the Herfindahl concentration index, but they each have important drawbacks of their own. For a discussion of some of these issues in the context of trying to summarize the contours of language communities, see Laitin (2000).

of interests that it brings to the table, in which case a concentration index does a reasonable job of capturing the effects of ethnicity (the previous discussion notwithstanding). But part of the reason that ethnicity diversity strikes researchers—including, no doubt, E&L—as a potentially relevant variable is because they presume that it implies something about the depth of the cleavages between groups and the unbargainability of their demands (Rabushka and Shepsle 1972), not just about the number of interests that need to be reconciled. To the extent that this is (implicitly at least) what researchers think they are bringing to the analysis by including the ethnic diversity variable, they are often misleading themselves, since the standard measures they employ convey no information about cleavage salience. To take but one particularly clear example, the ELF values for Sri Lanka and Switzerland are nearly identical, reflecting the fact that both countries have a small number of relatively large ethnic communities. But the salience of ethnicity in these two countries is very different. In Sri Lanka, the divisions between Sinhalese and Tamils have fueled a civil war that has left more than 60,000 people dead. In Switzerland, the divisions between German-speakers, French-speakers, and Italian-speakers have certainly shaped the country's politics but they have never been a source of intergroup violence. By not capturing the depth of the divisions between ethnic communities, indices of ethnic fractionalization leave out a potentially important part of the explanation for the variation we observe in economic performance.

Fearon (2003) has gone furthest in addressing this problem by creating an index of cultural diversity based on an assessment of the cultural distance between groups, as proxied by the differences in the languages they speak. Fearon's plausible assumption is that linguistic similarity is a good indicator of cultural similarity, and he uses the linguistic classifications compiled by Grimes and Grimes (1996) to weight the import of each country's ethnic diversity. By his measure, if the groups in a country speak structurally dissimilar languages, they will be coded as culturally diverse, and the cultural fractionalization value for the country will be very close to its ethnic fractionalization value. If, on the other hand, the groups in the country speak similar languages, this similarity will down-weight whatever ethnic diversity there might be, and the country will receive a cultural fractionalization value that is lower than its ethnic fractionalization value. Although questions can be raised about whether linguistic differences are always a good proxy for the depth of ethnic divisions (the example of the former Yugoslavia comes to mind), Fearon's index is nonetheless an important step forward on this problem.

A fourth difficulty with attempting to summarize the ethnic landscape of a country with a single measure is that countries contain multiple dimensions of ethnic cleavage. For example, India's population can be divided by religion, language, caste, or state. Defined in terms of religious differences, India's fractionalization index would be 0.31; defined in terms of language distinctions, it would be 0.79.[9] Both measures are "correct," in that they each reflect India's diversity on the particular ethnic cleavage dimension in question. But whereas the former value suggests a fairly homogeneous social landscape, the latter suggests a heterogeneous one.

Recognizing this issue, some scholars have developed multiple measures of ethnic diversity for each country. Scarritt and Mozaffar (1999) have compiled a data set for Africa that provides up to three different enumerations of ethnic groups: those that constitute a "national dichotomy" (for example, "North" vs. "South" in Sudan and Nigeria) those at a "middle level of aggregation," and those at a "lower level of aggregation." This technique faithfully accommodates the fact that individuals possess multiple group memberships, each implying different landscapes of group divisions. Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003) have done similarly, providing parallel measures of linguistic, religious, and "ethnic" fractionalization for 190 countries. The indices developed by Roeder (2001) also provide multiple measures of ethnic diversity, each using slightly different rules for what constitutes a group. These are all important contributions. Yet they still only get us part of the way to a solution, for they leave it up to the researcher to decide which measure she should employ, and they provide no guidance about how she should make this decision.

The Mismatch Between Measure and Mechanism

In almost every study of the relationship between ethnic diversity and economic growth, social heterogeneity is said to affect growth through its impact on macroeconomic policies. Adopting the logic of standard political economy models of the effects of interest diversity on policy outcomes (Alesina and Drazen 1991; Alesina and Rodrik 1994; Alesina, Baqir, and Easterly 1999; Weingast, Shepsle, and Johnsen 1981), ethnic diversity is taken as a proxy for interest group polarization, which is claimed to breed rent-seeking and overspending, undermine public goods provision, and "create positive incentives for growth-reducing policies, such as financial repression and

[9]These figures were calculated from data on religious group membership and language use in India reported in Hunter (1997).

overvalued exchange rates, that create rents for the groups in power at the expense of society at large" (E&L, 1206). The problem with the analyses that have been undertaken to date to test this argument is that the ELF measure that nearly all of them employ is built from an enumeration of ethnic groups that does not correspond with the groups that are involved in the political competition that is hypothesized to generate the growth-undermining policies. This disconnect between the theory and the measure severely weakens the confidence we can put in the reported findings.

The crux of the problem is that the *Atlas* data from which the ELF index was calculated enumerates dozens of groups in each country that may be culturally or linguistically distinct from their neighbors but that are irrelevant as independent political actors. In some cases, this is because these groups fold themselves into broader political coalitions, often along regional lines, when it comes to competing over resources and national-level policy outcomes. In other instances, it is because they simply do not participate in politics as distinct, recognizable groups. Whichever the reason, including them in the data from which the fractionalization index is calculated is problematic if the index is to be used to test hypotheses about the effects of interethnic competition on economic policymaking. Even the new measures of diversity developed by Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003), Fearon (2003), and Roeder (2001), which otherwise offer important improvements over ELF, do not escape this problem.[10]

To illustrate the problem, take the case of Kenya, which E&L use to illustrate the mechanism underlying their model. Although E&L describe Kenya as containing "more than 40 ethnic groups" their discussion focuses exclusively on how growth-retarding policies are generated by the competition between three broad ethnic coalitions: the Kalenjin, the Luo and the Kikuyu, each of which is described as containing "a third of Kenya's population" (1217). If, as E&L claim, it is the competition among these three groups that is affecting Kenya's economic policies (and hence its rate of economic growth), then the appropriate fractionalization index should be calculated from the population shares of these three groups (normalized to one) rather than from the relative sizes of the forty. In fact, the *Atlas* only lists 21 groups for Kenya, so the ELF index that E&L employ in their statistical analysis is actually calculated from the relative population shares of 21 groups rather than 40. Also, the population shares of the Kalenjin, Luo, and Kikuyu coalitions are closer to 10, 15, and 30%, respectively, than to the equal thirds that E&L claim. The more important point, however, is that the ELF value that E&L employ for Kenya in their cross-country regression (0.83) is quite different from the fractionalization score (0.57) that would result from plugging the population shares of the Kalenjin, Luo, and Kikuyu into the concentration formula. The latter, not the former, reflects the ethnic landscape that is relevant to the competition that their model claims is shaping the country's economic policymaking and growth outcome. Thus the latter, not the former, is the appropriate ethnic fractionalization value to use in the analysis.

Let me be clear: my assertion is not that the many ethnic groups included in the *Atlas* (and, often, in the newer measures) are unimportant *per se*. Rather, my claim is that these groups are unimportant for the explicitly political mechanism that the researchers are trying to test. To capture the contribution that a country's ethnic heterogeneity makes to its policymaking process requires an index of fractionalization that reflects the groups *that are actually doing the competing over policy*, not the ones that an ethnographer happens to identify as representing distinct cultural units. If we were just interested in looking for correlations between cultural diversity and economic growth rates, then using an index built from the *Atlas* accounting might be fine—so long as one was clear about what the index was actually measuring. But if we are interested in testing the specific proposition that ethnic diversity matters for economic growth through its effect on macroeconomic policies, then we need to select from among the multiple possible accountings of ethnic groups in each country the one that reflects the roster of actual participants in the competition over those policies. The central problem with the ELF measure is that, as the Kenya example illustrates, it quite often counts the wrong groups.

But how do we count the "right" groups? The answer depends on the particular dependent variable we happen to be interested in and on the theory we want to test. To commit oneself to trying to identify the politically relevant groups in a country naturally gives rise to the question: relevant for what? A different roster of groups might be judged to be relevant if the outcome we were interested in explaining was macroeconomic policymaking than if the outcome was voting behavior or party formation or the likelihood of secession. A clearly articulated causal

[10] In the case of the Alesina et al. data set, the problem is built right into the coding rules the authors employ. They note that "an important goal of our collection of ethnicity data was to obtain data on various ethnic groups that was *as disaggregated as we could find* . . . If sources diverged in such a way that the index of fractionalization differed to the second decimal point, we used the source where reported ethnic groups covered the greatest share of the total population. If this was 100 percent in more than one source, *we used the source with the most disaggregated data (i.e., the greatest number of ethnic groups)*" (2003, 160; italics added).

mechanism is required that links a country's diversity to the outcome in question. That mechanism can then be used to identify which groups are the salient ones for the hypothesized causal pathway.

Thus, if the mechanism to be tested is that ethnicity affects a country's economic performance via the intransigence it generates in the political bargaining over the allocation of public goods, then we would want to know whether the political coalitions doing the bargaining tend to be formed along lines of language, race, religion, region, or some other dimension of ethnic identification, and construct our fractionalization index from an enumeration of the groups on that cleavage dimension. If the hypothesized mechanism is that ethnicity affects growth by generating violent social conflict, then we would want to know the lines along which such conflict is carried out. Otherwise we risk building our measure of ethnic diversity from an enumeration of the wrong sets of actors and building an invalid measure for the purposes to which we want to put it. An important implication is that an index of "politically relevant groups" implies a subscript that specifies the mechanism for which the groups are relevant. Given the purposes for which it was created, the implicit subscript of the PREG index is "macroeconomic policy" (i.e., $\text{PREG}_{\text{macroeconomic policy}}$).[11] One could also imagine different PREG indices for other mechanisms and dependent variables built from enumerations of groups that are politically relevant for those particular hypothesized causal processes and outcomes. For example, to test the hypothesis that ethnic diversity affects growth through its effect on political stability, one could build an index of $\text{PREG}_{\text{stability}}$. Or to test the proposition that ethnic diversity affects the likelihood of civil war by affecting the feasibility of secession, one could construct an index of $\text{PREG}_{\text{secession}}$.

There is one additional complication. Even if the measure we adopt does capture the "right" (which is to say theoretically relevant) ethnic groups for the mechanism in question, it might cease to do so if a shift in political institutions, leadership, or even the policy issue that happens to be on the table results in a shift in the relevant axis of social division for that mechanism. Again, take the case of Kenya. In the 1960s and 1970s, the list of groups that were politically relevant from the standpoint of economic policymaking would certainly have included the Kikuyu and the Luo, but not the Kalenjin. It was not until after the death of Jomo Kenyatta in 1978 and his succession by Daniel arap Moi (a Kalenjin) that the Kalenjin became a major player in the country's national politics. Thus, while an accounting of the politically relevant ethnic groups before Moi's rise to power would probably not include the Kalenjin, an accounting 10 years later would have to. Because the roster of politically relevant groups changed over time, Kenya would need to have different values of ethnic fractionalization calculated (and also applied to analyses) for different periods. To accept the justification for using "politically relevant" groups is to accept the possibility that the groups that meet this criterion might change. The implication is that researchers must not just build their indices from accountings of the "right" groups, but also be prepared to update those accountings across periods to accommodate changes in the roster of groups that are (or are no longer) politically relevant.

[11] It follows that using the PREG index values provided in this article for an analysis of the effects of ethnic diversity on a different outcome (or the same outcome through a different mechanism) would be inappropriate. This may explain why Mozaffar, Scarritt, and Galaich (2003) find no effect of PREG on the number of electoral or legislative parties in Africa.

The PREG Index

In an effort to better align the measure of ethnic diversity that is used with the hypothesis it is employed to test, and to move beyond the half-way solution of providing multiple measures for each country, I have constructed a new index of ethnic fractionalization, called PREG, for 42 African countries. My first task was to conduct an exhaustive literature search for books, academic articles, and news reports that described the ethnic politics of each of the countries for which the index was to be calculated. I was particularly interested in sources that described the dynamics of competition over resources and policies, especially if the sources provided accounts of the coalition-building efforts that were part of this competition. Where descriptions of party-building, electoral campaigns and voting patterns were available, I scrutinized them for clues about interethnic alliances and rivalries. Depending on the quality of the sources available (which varied considerably), anywhere from five to 20 different sources I consulted for each country. My research assistants and I followed the practice of continuing to consult additional references until we reached a point where all the sources seemed to be mentioning—and, implicitly, excluding—the same ethnic groups as significant participants in the competition over the country's economic policies.

I used the ethnic breakdowns provided in the *Atlas* as a baseline for the construction of the PREG index. My first task was to translate the *Atlas* from Russian into English. Then, based on the information gleaned from the secondary source accounts, I either retained, eliminated, or consolidated the groups that were listed in the *Atlas*

for each country to create a new inventory of politically relevant groups, adjusting the population denominator in the weight of each group so that the total population of politically relevant groups would sum to 100%. Where the ethnic breakdowns provided in the *Atlas* were clearly problematic, as, for example, when they contained "grouping problems" such as those previously described, I consulted alternative sources to determine the approximate population shares of groups that had been excluded or improperly combined. Ethnic groups that were listed in the *Atlas* but never mentioned in any of the secondary source accounts, as well as Europeans (except in South Africa and Zimbabwe), "other Africans," and "others and unknowns" were dropped entirely. This is not to say that the individual members of these groups do not participate in the politics of their countries, only that they do not participate as members of groups with a distinct political identities. I have assumed that these individuals fold themselves into broader ethnic coalitions and do so in such a way as not to alter significantly the relative sizes of any of the remaining groups.

Quite frequently, it was possible to identify situations where two or more groups that were enumerated separately in the *Atlas* were described in the secondary source accounts as components of single, broader ethnic coalitions. This is commonly the case, for example, when all of the small ethnic groups from a particular part of the country unite politically to push for favorable policies for their region, or when all the groups that share a particular lingua franca come together in a single political party. In such instances, I pooled the population totals for these groups under a single label. These new pooled population counts, together with those of the groups that were retained without any changes from the *Atlas* listings, were then entered into the Herfindahl formula to compute the new PREG fractionalization index.

I also took steps to deal with shifts that may have occurred over time in the rosters of politically relevant ethnic groups in each country. To accommodate such changes, I calculated decade values for PREG in those countries—eight, as it turned out—where clear shifts in the constellation of politically relevant groups over time warranted doing so. These values are included in a new variable, PREGDEC, which contains separate PREG values for the 1960s through the 1990s (PREG60, PREG70, PREG80, and PREG90—see the appendix).[12]

There are at least three ways in which even the most careful application of my procedures would still leave the PREG index open to legitimate criticism. First, because the PREG index is calculated with the Herfindahl concentration formula, it suffers from the same insensitivity to potentially relevant variation in group sizes as do the ELF, Alesina et al., Fearon, and Roeder indices. Second, like the ELF index, the PREG index takes no explicit account of either the degree of concentration of the ethnic groups in the country or the depth of the divisions among them. Even with these shortcomings, however, the PREG index offers a significant improvement over previous measures for testing hypotheses about the policy-mediated effects of ethnic diversity on growth.

A final potential criticism of the PREG index is that, because of the way in which it was created, it may be endogenous to the outcome it is being used to explain. The strategy of "peeking" at the process by which ethnicity is hypothesized to affect growth to code the key causal variable may strike some readers as coming uncomfortably close to defining the independent variable in terms of the dependent variable. To understand why the methodology employed in creating the PREG index does not cross this line requires that we distinguish between a measure that is endogenous to the outcome that we are trying to explain and one that simply captures the process through which the outcome is claimed to be reached. The protocols I have adopted do not define the independent variable in terms of the *value* of the dependent variable but in terms of *the process through which the former is hypothesized to affect* the latter. So long as the reason why certain groups rather than others are participants in the policymaking process is not an outcome of the country's economic growth rate or macroeconomic policy choices, we are on sound methodological footing in "peeking" at the political process to determine which groups to include when I calculate my fractionalization index. Moreover, the alternative to doing this is to employ an index that captures a constellation of ethnic groups that is in some cases completely unrelated to the process whose effects are being investigated.

Before putting the PREG index to work in the section that follows, it will be useful to summarize some of the differences between it and other measures of ethnic fractionalization. One of the key obstacles to doing this (and

[12] The quality of the new index depends fundamentally on the quality of the (necessarily subjective) decisions that were made to consolidate or drop groups from the original *Atlas* counts. Accordingly, my research assistants and I were careful to document the rationale for each such decision in lengthy memos that were prepared for each country. When we were uncertain of a decision—as, for example, when the sources we consulted provided conflicting accounts of which groups were important or when ethnic alliances shifted over time or across issue areas—we noted this in the memo. These memos are available from the author as part of the underlying data set.

Table 1 PREG, ELF, and Other Measures of Ethnic Diversity in Africa

	PREG	ELF	ALESINA ET AL.	FEARON	ROEDER	S&M	BAH
Angola	0.65	0.78	0.79	0.76	0.79	0.73	0.74
Benin	0.3	0.62	0.79	0.62	0.62	0.42 or 0.57	0.55
Botswana	0.00	0.51	0.41	0.35	0.51	0.34	0.00
Burkina Faso	0.00	0.68	0.72	0.70	0.68	0.00	0.71
Burundi	0.26	0.04	0.30	0.33	0.28	0.30	0.00
Cameroon	0.71	0.89	0.89	0.89	0.89	0.83	0.79
CAR	0.23	0.69	0.83	0.79	0.78	0.64	0.75
Chad	0.66	0.83	0.86	0.77	0.85	0.60	0.63
Comoros			0.00		0.11	0.13	
Congo-B	0.19	0.66	0.87	0.88	0.70	0.77	0.65
Cote d'Ivoire	0.49	0.86	0.82	0.78	0.90	0.74	0.82
Djibouti			0.80	0.61	0.76	0.49	0.69
Equatorial Guinea	0.19	[0.30]	0.35		0.45	0.19 or 1.00	0.19
Ethiopia	0.57	0.69	0.72	0.76	0.69	0.73*	0.71
Gabon	0.21	0.69	0.77	0.86	0.81	0.82	0.69
Gambia	0.37	0.73	0.79	0.76	0.73	0.67	0.68
Ghana	0.44	0.71	0.67	0.85	0.87	0.63	0.69
Guinea	0.48	0.75	0.74	0.67	0.77	0.65	0.65
Guinea-Bissau	0.05	[0.80]	0.81	0.82	0.81	0.10 or 0.53	0.52
Kenya	0.57	0.83	0.86	0.85	0.88	0.83	0.73
Lesotho	0.00	0.22	0.26	0.25	0.22		0.00
Liberia	0.62	0.83	0.91	0.90	0.90	0.76	0.58
Madagascar	0.00	0.06	0.88	0.86	0.88	0.81	0.64
Malawi	0.55	0.62	0.67	0.83	0.62	0.57	0.62
Mali	0.13	0.78	0.69	0.75	0.84	0.72	0.72
Mauritania		0.33	0.62	0.62	0.34	0.26 or 0.62	0.24
Mauritius	0.60	0.58	0.46	0.63	0.48	0.45	
Mozambique	0.36	0.65	0.69	0.77	0.66	0.64	0.77
Namibia	0.55	[0.68]	0.63	0.72	0.69	0.61	0.83
Niger	0.51	0.73	0.65	0.64	0.75	0.54	0.62
Nigeria	0.66	0.87	0.85	0.80	0.87	0.50 or 0.81	0.82
Rwanda	0.26	0.14	0.32	0.18	0.28	0.18	0.00
Senegal	0.14	0.72	0.69	0.73	0.75	0.18	0.71
Seychelles	0.00	[0.33]	0.20				
Sierra Leone	0.56	0.77	0.82	0.76	0.77	0.49	0.59
Somalia	0.00	0.08	0.81	0.81	0.08	0.80	0.00
South Africa	0.49	0.88	0.75	0.88	0.88	0.39	
Sudan	0.41	0.73	0.71	0.71	0.74	0.38 or 0.60	0.70
Swaziland	0.00	[0.00]	0.06	0.28	0.39		0.00
Tanzania	0.59	0.93	0.74	0.95	0.91	0.06 or 0.86	0.87
Togo	0.49	0.71	0.71	0.88	0.74	0.45	0.68
Uganda	0.63	0.90	0.93	0.93	0.91	0.09 or 0.91	0.78
Zaire (DRC)	0.80	0.90	0.87	0.93	0.90	0.84	0.76
Zambia	0.71	0.82	0.78	0.73	0.82	0.73	0.74
Zimbabwe	0.41	0.54	0.39	0.37	0.54	0.37	0.42

PREG = static PREG value.
ELF = index of ethnolinguistic fractionalization from ANM data, 1960 (note: ELF values in braces were calculated by the author from ANM data but were not included in the data set published by Taylor and Hudson 1972).
FEARON = ethnic fractionalization index from Fearon (2003).
ALESINA ET AL. = ethnic fractionalization index from Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003).
ROEDER = ethnic fractionalization index from Roeder (2001, column 6), based on 1961 data.
S&M = ethnic fractionalization index calculated from Scarritt and Mozaffar (1999).
BAH = ethnic fractionalization index calculated from Morrison et al. (1989).
*Excluding Eritrea, which Scarritt and Mozaffar treat as a separate country.

Table 2 Pairwise Correlations of Different Measures of Ethnic Fractionalization in Africa

	PREG	ELF	Alesina et al.	Fearon
ELF	0.67			
	(37)			
Alesina et al.	0.48	0.59		
	(41)	(38)		
	0.44	0.62	0.89	
Fearon	(40)	(38)	(41)	
	0.54	0.82	0.78	0.73
Roeder	(41)	(38)	(44)	(42)

Number of observations in parentheses.

to carrying out the replications presented in the next section) is that while other indices are available for most of the countries of the world, the PREG index is only available for 42 African countries. Thus, for each correlation or sample mean that I present, I provide values from the world sample alongside a comparison of PREG and other index values for the African subsample.

The most unproblematic comparison among the various indices is presented in Table 1, which provides values for African countries for PREG, ELF, and the measures created by Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003), Fearon (2003), and Roeder (2001), as well as my calculations of ethnic fractionalization based on data from Scarritt and Mozaffar (1999) and Morrison, Mitchell, and Paden (1989). In 19 of the 37 cases for which both PREG and ELF values are available, the PREG value is more than a full standard deviation from the original ELF value, and in four cases the difference is more than two standard deviations. Table 2, which presents pairwise correlations of the various fractionalization measures for the African subsample, strongly suggests that the PREG index is measuring something different from the other measures. Whereas the correlations among the four other measures are quite high (averaging roughly 0.74), that between PREG and the four others is markedly lower (averaging roughly 0.53). Moreover, PREG is not merely a noisy proxy for the other measures. When compared with ELF, the measure with which PREG is correlated most closely, the rank orderings of most and least fractionalized countries are quite different (see Table 3).

A comparison of the means of the various indices for African countries is also revealing (see Table 4). The mean PREG (and also PREGDEC) value for Africa is 0.38, substantially lower than the mean value for Africa in all four other indices. Outside of Africa, the mean level of ethnic fractionalization ranges between 0.24 and 0.39 across

Table 3 Most and Least Fractionalized African Countries According to PREG and ELF Measures

Ten Least Fractionalized Countries				Ten Most Fractionalized Countries			
PREG		ELF		PREG		ELF	
Botswana	0.00	Burundi	0.04	Zaire (DRC)	0.80	Tanzania	0.93
Burkina Faso	0.00	Madagascar	0.06	Cameroon	0.71	Uganda	0.90
Lesotho	0.00	Somalia	0.08	Zambia	0.71	Zaire (DRC)	0.90
Madagascar	0.00	Rwanda	0.14	Chad	0.66	Cameroon	0.89
Seychelles	0.00	Lesotho	0.22	Nigeria	0.66	South Africa	0.88
Somalia	0.00	Mauritania	0.33	Angola	0.65	Nigeria	0.87
Swaziland	0.00	Botswana	0.51	Uganda	0.63	Cote d'Ivoire	0.86
Guinea-Bissau	0.05	Zimbabwe	0.54	Liberia	0.62	Chad	0.83
Mali	0.13	Mauritius	0.58	Mauritius	0.60	Kenya	0.83
Senegal	0.14	Benin	0.62	Tanzania	0.59	Liberia	0.83

Table 4 Mean Values for PREG and Other Indices for Selected Groups of Cases

	PREG	ELF	Alesina et al.	Fearon	Roeder
Sub-Saharan Africa	0.38	0.65	0.66	0.71	0.68
All Non-African Cases	n/a	0.29	0.37	0.39	0.24
All Other Developing Economies*	n/a	0.46	0.40	0.54	0.53

*Includes all non-OECD countries.

the four other measures. For all other developing countries, it ranges between 0.40 and 0.54. If we compare the PREG mean with these other figures, Africa no longer looks like the outlier it is usually assumed to be. Indeed, Africa's mean level of ethnic fractionalization (as calculated with PREG) is actually *lower* than the average level of fractionalization in other developing economies, as calculated with the four other measures. Of course, such

TABLE 5 ELF and PREG as Determinants of Macroeconomic Policy

		All Cases	Africa Only				
	C	ELF	ELF	PREG	PREGDEC	R^2	Number of Observations
Log of schooling	1.77**	−.871**				.18	265
	(.056)	(.114)					
	1.09**		−.303			.02	66
	(.205)		(.282)				
	.936**			−.100		.01	72
	(.095)			(.202)			
	.778**				.221	.02	64
	(.102)				(.216)		
Financial depth	.471**	−.290**				.10	300
	(.025)	(.050)					
	.140**		.065			.02	99
	(.032)		(.046)				
	.163**			.063		.02	98
	(.023)			(.049)			
	.159**				.069	.02	97
	(.023)				(.049)		
Black mkt premium	.110**	.240**				.01	316
	(.033)	(.064)					
	.174		.173			.06	108
	(.102)		(.147)				
	.105			.452**		.11	108
	(.067)			(.145)			
	.085				.520**	.10	103
	(.067)				(.147)		
Fiscal surplus/GDP	−.034**	−.014				.01	227
	(.050)	(.011)					
	−.012		−.040			.06	54
	(.163)		(.023)				
	−.017			−.051*		.11	57
	(.010)			(.019)			
	−.019*				−.048*	.10	56
	(0.10)				(.020)		
Log telephones per worker	−4.87**	−3.29**				.26	293
	(.167)	(.329)					
	1.26**		.821			.03	95
	(.366)		(.518)				
	2.02**			−.376		.01	96
	(.257)			(.548)			
	1.97**				−.380	.01	90
	(.253)				(.549)		

Standard errors in parentheses.
*p = .05; **p = .01.

TABLE 6 Ethnic Diversity and Long-Run Growth (Dependent Variable Is Growth Per Capita Real GDP)

	E&L Simple Regression (using SUR)	Replication of E&L, Simple Regression (using OLS)			
		All Cases	Africa Only		
	(1)	(2)	(3)	(4)	(5)
ELF	−.023**	−.022**	−.013		
	(.005)	(.004)	(.010)		
PREG				−.027**	
				(.010)	
PREGDEC					−.022*
					(.010)
Decade Dummies for the 1960s, 1970s, 1980s	yes	yes	yes	yes	yes
No. of observations	not reported	309	109	111	105
Adjusted R^2	not reported	.21	.12	.16	.13

Standard errors in parentheses.
*p = .05; **p = .01.

comparisons are highly problematic: if the same procedures that were employed to create the PREG index in Africa were applied to these other groups of countries, it would almost certainly lead to a lowering of their mean fractionalization scores. But these countries are starting, on average, from a significantly lower baseline, so the shift would probably not be as dramatic as it is for Africa.

A Replication of E&L

E&L base their conclusions about the effects of ethnic diversity on economic growth in Africa on a series of regressions run on a global cross-section of countries. Given the claims—indeed, the title—of their article, a striking aspect of E&L's findings is that they fail to hold up in the African subsample.[13] As the replications reported indicate, ethnic diversity, as measured with ELF, does not have the effect on policies or growth in Africa that E&L claim. When the PREG variable is substituted for ELF, however, the relationship between ethnic diversity and both policies and growth reemerges. PREG would seem to pick up a policy-mediated effect of ethnic diversity on economic growth in Africa that ELF does not.

Given the two-part causal mechanism that is at the heart of E&L's paper (i.e, ethnic diversity → macroeconomic policies → growth outcomes), the first step in testing the relative power of ELF and PREG is to compare the ability of the two measures to explain standard indicators of the quality of economic policymaking. Table 5 presents the results of simple bivariate regressions of the five different policy measures used by E&L on ELF, PREG, and PREGDEC. Most of the results reported are from the Africa subsample only, though I also report results with ELF from the world sample for comparison purposes. The clearest finding is that while ELF does seem to have a significant effect on public policies (except fiscal surpluses) in the world sample, its effect ceases to be significant on *any* of these measures in the African subsample. However, when we substitute the PREG (or PREGDEC) measure for ELF, a statistically significant relationship does emerge with two of the five policy measures (black market exchange-rate premiums and fiscal surpluses). These results suggest that if there is indeed an underlying relationship between ethnic diversity and poor policies in Africa then the PREG index is a better measure of ethnic diversity than the ELF index.

Next, I reproduce a simple regression of long run growth on ethnic diversity (with decade dummies), the results of which are presented in Table 6. Column 2 presents

[13]Note that this negative result is not an artifact of insufficient variation in either the independent or dependent variables in the African subsample. Although African countries are, on average, more ethnically diverse than the countries of the world, variation in ELF values within Africa (from 0.04 to 0.93, SD = 0.24) are comparable to that found in the world as a whole (from 0.02 to 0.93, SD = .29).

TABLE 7 Ethnic Diversity, Macroeconomic Policies, and Long-Run Growth (Dependent Variable Is Growth of Per Capita Real GDP)

	E&L Table IV, Equation 4 (using SUR)	Replication of Easterly and Levine, Table IV, Equation 4 (using OLS)			
		All Cases	Africa Only		
	(1)	(2)	(3)	(4)	(5)
Dummy for SSA	−.013**	−.021*			
	(.005)	(.005)			
Dummy for LA and Caribbean	−.018**	−0.18**			
	(.004)	(.004)			
Log of initial income	.086**	.101**	−.134	−.031	−.016
	(.024)	(.026)	(.111)	(.161)	(.168)
Log of initial income squared	−.007**	−.008**	.007	.001	−.000
	(.002)	(.002)	(.008)	(.012)	(.012)
Log of schooling	.009	.009	−.048	−.007	.002
	(.005)	(.005)	(.027)	(.037)	(.037)
Assassinations	−21.48**	−18.56*	−539.67*	−146.66	−120.97
	(8.77)	(9.11)	(197.1)	(263.4)	(269.9)
Financial depth	.012*	.013*	.077	.066	.072
	(.006)	(.006)	(.058)	(.088)	(.101)
Black market premium	−.019**	−0.19**	−.017	−.029	−.027
	(.004)	(.005)	(.011)	(.016)	(.017)
Fiscal surplus/GDP	.171**	.188**	.052	.086	.103
	(.035)	(.037)	(.102)	(.166)	(.180)
Log of telephones per worker	.005	.005	.019*	.012	.010
	(.003)	(.003)	(.008)	(.012)	(.014)
ELF	−.011	−.010	−.206**		
	(.007)	(.007)	(.043)		
PREG				−.047	
				(.033)	
PREGDEC					−.043
					(.044)
Decade Dummies for 1960s, 1970s, 1980s	yes	yes	yes	yes	yes
No. of observations	40; 68; 64	172	27	29	29
Adjusted R^2	0.43, 0.49, 0.61	.57	.68	.26	.22

Standard errors in parentheses.
*p = .05; **p = .01.

the replication of E&L's analysis in OLS.[14] The results confirm the strong negative relationship between ethnic diversity and economic performance in the world sample. Columns 3–5 present the results of regressions run on the African data only. Strikingly, when measured by ELF, the ethnic diversity coefficient drops precipitously and loses all statistical significance in the African subsample (column 3). However, when PREG or PREGDEC are substituted for ELF, ethnic diversity regains not only its strong significance in the equation, but also an economically large coefficient. The PREG measure would appear to be capturing an effect in the Africa subsample that the ELF measure does not. The substantive import of

[14]E&L's estimates were generated using the method of seemingly unrelated regressions (SUR) rather than with OLS, though the authors claim that their findings were substantially the same when reproduced in OLS. In Tables 6 and 7, I present the findings (generated with SUR) in column 1 that E&L report in their paper and then my own replication of their findings, using OLS, in column 2. All of the analyses reported in subsequent columns are generated using OLS, and all comparisons are against the OLS-generated baseline from column 2.

Equation 5 (which I take to be the most meaningful) is that moving from a country that is completely homogeneous on the PREG index (e.g., Botswana or Swaziland) to one that is maximally heterogeneous (Zaire/DRC comes closest at 0.80) is associated with a fall in growth of more than two full percentage points—roughly equivalent to what E&L find the effects of ELF to be in the world sample.

These results change markedly when control variables are added to the equation. Table 7 presents the results of a series of more complex equations that, following E&L, add controls for initial income, schooling, political instability, financial system development, black market exchange rate premiums, government deficits, and infrastructure development, as well as dummies for each decade, for Africa, and for Latin America and the Caribbean. Columns 1 and 2 present the results reported in E&L and my own replications using OLS for the world sample. When the growth regressions are rerun with the sample restricted to Africa, the ELF coefficient becomes much larger and highly significant.[15] The interpretation is that ELF's strongest effect on growth is not through public policies. The implication is that ethnic diversity, as measured by ELF, may matter for growth, but not through the mechanism that E&L hypothesize. ELF may capture the politically relevant groups, but not for the mechanism of macroeconomic policymaking. Meanwhile, the fact that the coefficients for both PREG and PREGDEC (columns 4 and 5) become insignificant when policy controls are added to the model confirm that PREG's effect on growth would appear to operate, as theorized, through its effect on policies.

Conclusion

The intuition that Africa's ethnic diversity might be a cause of its economic woes is well worth testing. But if the results of such tests are to generate real knowledge, then the measures that are used to capture ethnic diversity must be valid for the hypotheses they are being used to test. In this article, I have shown why the most commonly used measure of ethnic diversity, ELF, is inappropriate for testing the hypothesis that ethnic heterogeneity disrupts economic performance by perverting macroeconomic policies. I have introduced a new measure, PREG, and I have employed it to reestimate E&L's influential analysis of the effects of ethnic diversity on economic growth in Africa. I find that the PREG measure is, in fact, better suited to testing the proposition that ethnic diversity affects growth through policies.

The PREG measure does not solve all the problems that beset scholars interested in testing the effects of ethnic diversity on growth. But by providing a measure that is valid for the causal mechanism being tested, it dramatically improves the confidence we can place in our findings about the effects of ethnic heterogeneity on policies and economic performance. The empirical finding that emerges when the new measure is used is that ethnic fractionalization is, in fact, strongly negatively related to economic growth in Africa. This, of course, is also E&L's claim. But the results generated with PREG rest on a much firmer theoretical and methodological footing than do those generated with ELF. In addition, unlike analyses using ELF, the results presented here hold up in the African subsample—an important thing to do if one wants to make claims about the origins of Africa's growth tragedy.

[15]These results need to be interpreted with some caution, as the sample size for the regression results reported in columns 3 and 4 is actually even smaller than it appears. Many of the cases included in the regression are the same countries repeated with measures for different decades.

Appendix A

Decade Values for PREG

	PREG	PREG60	PREG70	PREG80	PREG90
Angola	0.65	0.65	0.65	0.65	0.65
Benin	0.30	0.30	0.30	0.30	0.30
Botswana	0.00	0.00	0.00	0.00	0.00
Burkina Faso	0.00	0.00	0.00	0.00	0.00
Burundi	0.26	0.26	0.26	0.26	0.26
Cameroon	0.71	0.71	0.71	0.71	0.71
CAR	0.23	0.23	0.23	0.23	0.23
Chad	0.66	0.66	0.66	0.66	0.66
Congo-B	0.19	0.19	0.19	0.19	0.19
Cote d'Ivoire	0.49	0.49	0.49	0.49	0.49
Equatorial Guinea	0.19	0.19	0.19	0.19	0.19
Ethiopia	0.57	0.57	0.57	0.57	0.54
Gabon	0.21	0.21	0.21	0.21	0.21
Gambia	0.37	0.37	0.37	0.37	0.48
Ghana	0.44	0.44	0.44	0.44	0.44
Guinea	0.48	0.48	0.48	0.59	0.59
Guinea-Bissau	0.05	0.05	0.05	0.05	0.05
Kenya	0.57	0.43	0.43	0.57	0.57
Lesotho	0.00	0.00	0.00	0.00	0.00
Liberia	0.62	0.01	0.01	0.62	0.62
Madagascar	0.00	0.00	0.00	0.00	0.00
Malawi	0.55	0.55	0.55	0.55	0.55
Mali	0.13	0.13	0.13	0.13	0.13
Mauritius	0.60	0.60	0.60	0.60	0.60
Mozambique	0.36	0.36	0.36	0.36	0.36
Namibia	0.55	0.55	0.55	0.55	0.55
Niger	0.51	0.51	0.51	0.51	0.51

(*continued*)

Appendix A

Decade Values for PREG (*Continued*)

	PREG	PREG60	PREG70	PREG80	PREG90
Nigeria	0.66	0.66	0.66	0.66	0.66
Rwanda	0.26	0.26	0.26	0.26	0.26
Senegal	0.14	0.14	0.14	0.33	0.33
Seychelles	0.00	0.00	0.00	0.00	0.00
Sierra Leone	0.56	0.56	0.56	0.60	0.60
Somalia	0.00	0.00	0.00	0.00	0.00
South Africa	0.49	0.49	0.49	0.49	0.64
Sudan	0.41	0.41	0.41	0.41	0.41
Swaziland	0.00	0.00	0.00	0.00	0.00
Tanzania	0.59	0.59	0.59	0.59	0.59
Togo	0.49	0.49	0.49	0.49	0.49
Uganda	0.63	0.63	0.63	0.63	0.63
Zaire (DRC)	0.80	0.80	0.80	0.80	0.80
Zambia	0.71	0.71	0.71	0.71	0.71
Zimbabwe	0.41	0.41	0.41	0.41	0.41

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