Does the Leader's Ethnicity Matter?
Ethnic Favoritism, Education and Health in Sub-Saharan Africa

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Abstract

This paper provides a new assessment of ethnic favoritism in Sub-Saharan Africa. Using data from 18 African countries, we study how primary education and infant mortality of ethnic groups were affected by changes in the ethnicity of the countries' leaders during the last fifty years. Our results indicate that the effects of ethnic favoritism are large and widespread, thus providing support for ethnicity-based explanations of Africa's underdevelopment. We also find that ethnic favoritism is more prevalent in countries where governments have greater fiscal resources and less prevalent in countries with one dominant religion. In contrast, countries whose ethnic groups speak structurally unrelated languages or live in more segregated areas do not display higher levels of ethnic favoritism.

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1. Introduction

In their pioneering paper, Easterly and Levine (1997) suggested that Sub-Saharan Africa's high level of ethnic diversity can explain the region's poor economic performance. They found that in a broad cross section of countries, ethnic diversity was correlated with bad economic policies, slow economic growth and low levels of per capita income. Subsequent research has confirmed these patterns, as ethnically diverse countries were found to have poor quality of government, inadequate provision of public goods and frequent civil wars (La Porta et al. 1999, Alesina et al. 2003, Montalvo and Reynal-Querol 2005). Yet, due to the well-known limitations of the cross-country studies, it remains unclear whether the adverse effects of ethnic diversity are causal and, if so, what are the main mechanisms through which they operate (Alesina and La Ferrara 2005).

A leading set of explanations for the poor economic performance of ethnically diverse countries is political. It is often argued that ethnic diversity leads to costly rent-seeking by different ethnic groups (e.g. Easterly and Levine 1997) and generates conflict over the provision of public goods (e.g. Alesina, Baqir and Easterly 1999). These arguments imply that politically dominant ethnic groups will use their power to provide economic benefits to their own members. La Porta et al. (1999, p. 231) explicitly link the costs of ethnic diversity to ethnic favoritism: "In ethnically heterogeneous societies, it has been common for the groups that come to power to fashion government policies that expropriate…the ethnic losers…, and limit the production of public goods to prevent those outside the ruling group from also benefiting and getting stronger". Easterly and Levine (1997) and Alesina et al. (2003) also use anecdotes of ethnic favoritism from several African countries to illustrate the economic costs of ethnic diversity.

Ethnic favoritism has also been a prominent theme in formal theories of ethnic politics. In the models of Fearon (1999) and Caselli and Coleman (2006), ethnicity is used as an exclusion device, and the winning ethnic groups redistribute resources toward their own members. Likewise, Padro i Miguel (2007) predicts that a change in the ethnic group in power should lead to a change in taxation and allocation of public goods across the groups. He also argues that ethnic favoritism is prevalent in Africa and can explain the low accountability of African political leaders.

In contrast to the theoretical arguments that link poor economic outcomes of African countries to ethnic favoritism, there is no systematic empirical evidence that members of African

ethnic groups actually benefit from having their leaders in power. African leaders appear to tax *more* heavily the crops grown in their own ethnic regions (Kasara 2007); and, in Guinea, the change in the president's ethnicity was found to have no effect on the relative levels of infant mortality among the country's ethnic groups (Kudamatsu 2007).

In this paper, we reassess the role of ethnic favoritism in Sub-Saharan Africa. Using the Demographic Health Surveys (DHS), we construct time-variant ethnic-level measures of education and health, and study how they are affected by changes in the ethnicity of top political leaders in 18 African countries over the last fifty years. We use the difference-in-difference methodology and estimate the average effects of ethnic favoritism in our sample of countries as well as its effects in each individual country.

In our analysis of education, we rely on the fact that most Africans attend primary school between ages 6 and 13 (World Bank 2008). This allows us to measure the ethnic groups' educational achievements in *different time periods* using the DHS data on primary education and literacy of people from *different age cohorts*. In our analysis of health, we follow Kudamatsu (2006, 2007) and measure the past levels of infant mortality using the DHS retrospective reports of African women regarding the death or survival of their children.

Intuitively, our difference-in-difference estimates answer two questions. First, do people who happened to be between 6 and 13 years old during the rule of their coethnic country leader have a higher probability of attending/completing primary school or becoming literate? Second, do children who happened to be born when their coethnic was in power have a lower probability of dying during the first year of their lives?[1]

We find that ethnic favoritism is an important determinant of education and infant mortality in Sub-Saharan Africa. We estimate that the leaders of the 18 countries in our sample have on average increased the primary school attendance, completion and literacy of their ethnic groups by about 2.5 percentage points and reduced their infant mortality by about 0.5 percentage point. These effects of ethnic favoritism are large relative to the average time trends in education and infant mortality, corresponding to between three and four years of secular improvement in these outcomes in the countries we study. They are also similar to the effects of direct policy

[1] We interpret the affirmative answers to these questions as evidence for causal effects of ethnic favoritism on education and health. In Section 5, we provide empirical support for this causal interpretation.

interventions typically found in the broader literature on education and health in developing countries (e.g. Glewwe and Kremer 2006, Jones et al. 2003).

Our analysis of individual African countries confirms the importance of the leader's ethnicity. Although the effects of ethnic favoritism vary from country to country, we find that in most countries in our sample it has a strong impact on education, infant mortality or both. Thus, in Sub-Saharan Africa ethnic favoritism is not only important on average, but is also quite widespread.

Overall, our findings are consistent with the theoretical arguments that link Africa's poor economic performance to ethnic favoritism. At the same time, they are inconsistent with the earlier empirical work that found no evidence of ethnic favoritism in Africa. In particular, even if African leaders impose higher taxes on their coethnics (Kasara 2007), they also provide them with large education and health benefits in return.

We also make an attempt to address another important question: why is ethnic favoritism more prevalent in some African countries than in others? To evaluate some of the available theoretical arguments, we run education and infant mortality regressions in which we interact our measure of leader's ethnicity with the relevant country-level variables. This analysis, which captures bivariate correlations across the 18 countries in our sample, produces several interesting results.

First, ethnic favoritism is more prevalent in countries whose governments collect more revenues and have greater resources to spend on the provision of public goods. This suggests that differences in the fiscal capacity of African governments (Herbst 2000) may be one reason for the uneven spread of ethnic favoritism on the continent. Second, the frequency of single-party elections (Geddes 2005) tends to be a good predictor of ethnic favoritism. However, other political variables (i.e. polity scores, experience with multi-party elections or frequency of coups) that could affect the incentives of the leaders to cater to their ethnic groups cannot explain the cross-country differences in ethnic favoritism. Third, countries whose ethnic groups speak more distant languages (Fearon 2003) or live in more segregated areas (Matuszeski and Schneider 2006) do *not* display higher levels of ethnic favoritism. Finally, four countries with one dominant religion (Islam) have significantly smaller effects of ethnic favoritism than the other fourteen that have much higher degree of religious fractionalization (Alesina et al. 2003).

In our view, the main contributions of this paper are as follows. To the best of our knowledge, this paper is the first to systematically study the effects of ethnic favoritism in a large number of countries.[2] In the case of education, we employ a new methodology in order to do so; in the case of infant mortality, we expand Kudamatsu's (2007) analysis of Guinea to a much larger sample of countries. Furthermore, we make an important step toward a comparative analysis of ethnic favoritism by studying its economic, political and cultural correlates across countries.

By showing the importance of ethnic favoritism in Africa, we provide new evidence in support of the ethnicity-based explanations of the continent's underdevelopment. But the costs of African ethnic diversity may be even larger than suggested by our analysis. First, some of the transfers that ethnic groups receive from their leaders may not be translated into immediate gains in their education and health. Thus, until we have better data on changes in income of different groups, we might underestimate the amount of ethnic favoritism in Africa. Second, while we estimate the benefits to the ordinary members of ethnic groups from having their coethnics in power, African leaders may deliver even larger favors to ethnic elites. Such narrower elite-based ethnic favoritism can exacerbate ethnic rent-seeking and conflict, and further hamper economic development. Finally, while we only focus on the political role of ethnicity, African ethnic diversity may have other economic costs. For example, people from different ethnic groups may be less productive working together (Lazear 1999, Habyarimana et al. 2007) or may find it hard to sanction the free-riders and solve the collective action problem in the provision of local public goods (e.g. Miguel and Gugerty 2005).

The rest of the paper is organized as follows. Section 2 provides some theoretical background for our empirical analysis. Section 3 describes our leader ethnicity data and explains the construction of our measures of education and health. Section 4 estimates the average effects of ethnic favoritism in our sample of 18 countries and its separate effects in each individual country. It also presents a case study of Congo-Brazzaville that illustrates how ethnic favoritism can operate in practice. Section 5 provides evidence in support of the causal interpretation of our regression results. Section 6 examines why ethnic favoritism is more prevalent in some African countries than in others. The last section concludes.

[2] In her important study of taxation in agriculture, Kasara (2007) also uses data from many African countries, but she does not estimate the effects of ethnic favoritism within each country.

2. Should the leader's ethnicity matter in Sub-Saharan Africa?

In this section, we provide some theoretical background for our empirical analysis. We describe three general models of ethnic politics and discuss their implications for ethnic favoritism in Africa. We show that the models produce different theoretical predictions, and conclude that it is ultimately an empirical task to demonstrate the existence of ethnic favoritism in Africa.

Borrowing from the literature on distributive politics in democracies (Cox and McCubbins 1986, Lindbeck and Weibull 1987, Dixit and Londregan 1996), we can think of three broad models describing the relationship between the political leader and the members of his ethnic group.

The first model assumes that the political leader derives direct utility from his ethnic group's higher level of well-being. For example, a Kikuyu politician may feel happier if the ordinary Kikuyu become better educated or healthier. The implication of this model is obvious: the ethnic leader will be interested in providing favors to the members of his group, regardless of their actual political behavior. We call this the "ethnic altruism" model, because the leader is essentially assumed to have altruistic preferences toward his ethnic group.

The second model assumes that the leader is an opportunistic politician who only cares about staying in power and transfers resources to different ethnic groups in order to maximize his total political support. Importantly, the model also assumes that the members of the ethnic groups receive large "psychic benefits" (Chandra 2004) from seeing their coethnics in office. For example, the ordinary Kikuyu may feel happier if a Kikuyu becomes the president of Kenya, in the same way that they feel happier if a Kikuyu wins an Olympic medal or becomes a celebrity. This "psychic benefits" model implies that the members of the ethnic groups will tend to support their political leaders unconditionally, without demanding any material benefits in return. As a result, the leaders will have little incentive to cater to their coethnics and might even prefer to spend more resources in securing the support of other ethnic groups. This argument is reminiscent of the probabilistic voting models of electoral politics (e.g. Lindbeck and Weibull 1987), in which redistributive benefits are targeted at groups of "swing voters" rather than "core supporters".

The third model maintains the assumption that the political leader is purely an office-seeker in need of political support, but drops the psychic benefits assumption of the previous model. Now, the members of the leader's ethnic group (like those of other groups) will only support him in exchange for material benefits such as schools or hospitals. In this model, there are at least two reasons why the leader may favor his ethnic group. First, it may be cheaper for the leader to buy the support of his coethnics (than the support of other groups) because he better understands their needs and can transfer to them the benefits more efficiently (Dixit and Londregan 1996). Second, it may be less risky for the risk-averse leader to trust the promises of his own group that it will support him politically in exchange for the benefits he provides (Cox and McCubbins 1986). We call this the "quid pro quo" model, because it involves a mutual exchange of support between the ethnic leader and the ordinary members of his group.

Overall, these models of ethnic politics have several implications for the study of ethnic favoritism in Africa. First, "ethnic altruism" could be one reason for ethnic favoritism in Africa. Its empirical importance would depend on the number of African leaders who directly cared about the well-being of their ethnic groups.

Second, ethnic favoritism in Africa could be also generated by the "quid pro quo" mechanisms. These mechanisms would be most relevant for African leaders who needed broad political support in order to remain in power. Thus, they were most likely to be at work during the periods of democracy, but also in African autocracies whose leaders tried to mobilize popular support by creating political parties and using them to provide benefits to the masses (Geddes 2005). Conversely, the "quid pro quo" model might be less applicable to African autocrats whose political survival depended on the loyalty of a narrow circle of close allies and military officers (Tullock 1987, Wintrobe 2000). These leaders could therefore be less likely to provide benefits to the ordinary members of their ethnic groups (Bueno de Mesquita et al. 2003).

Finally, the assumptions of the "psychic benefits" model are inconsistent with the possibility of ethnic favoritism. Thus, if many Africans provided unconditional political support to their ethnic leaders, they would be unlikely to receive material benefits from having these leaders in power.

The main conclusion we draw from this theoretical discussion is that the existence of ethnic favoritism in Africa cannot be taken for granted. Different models of ethnic politics produce conflicting predictions, and it is hard to know a priori which of the theoretical

assumptions are more realistic in the African political context. Thus, demonstrating the existence of ethnic favoritism in Africa remains an empirical task.

3. The data

To study ethnic favoritism in Africa, we need two types of data. First, for each country, we must know which ethnic group held political power at each point in time since independence. Second, we need data showing changes in economic or social well-being of every ethnic group over the same time period.

3.1. Leader ethnicity as a measure of ethnic political power

Following Kasara (2007) and Fearon et al. (2007), we use the ethnicity of the country's top political leader as an indicator of an ethnic group's control of national politics. This measure is especially relevant in Sub-Saharan Africa, where politics tends to be highly centralized around the chief executive (Jackson and Rosberg 1982, van de Walle 2003, Posner 2007), and where the ethnic group of the country's leader is usually thought to be most favored and politically dominant (Glickman 1995, Posner 2005). Furthermore, leader ethnicity varies over time for a large number of African countries, which allows us to study the effects of ethnic political control in a panel data setting.

We use Goemans et al.'s (2006) list of heads of state and collect information on the ethnicity of leaders of all the countries in Sub-Saharan Africa from their independence to 2006.[3] This information comes from several sources which include Morrison et al. (1989), Wiseman (1991) and Rake (1992, 2001) among others.[4] However, there are two problems related to the coding of leader ethnicity. First, for some leaders we must decide whether to use narrower or broader ethnic categories. For instance, Paul Biya of Cameroon was a member of the Bolou-Fang ethnic group, which is itself a part of the broader Beti-Pahouin ethnic cluster. It is therefore unclear whether he should be counted as belonging – and be expected to provide favors – to the former or to the latter. This "grouping problem" (Posner 2004) is well known in the ethnic fractionalization literature and does not have a clear solution since any ethnic partition is

[3] Most African countries became independent around 1960. For Ethiopia and Liberia, which were not colonized, we collect information on leader ethnicity starting from 1941 and 1944 respectively.

[4] Our efforts of collecting leader ethnicity data are independent of (and similar to) earlier attempts by Londregan et al. (1995) and Kasara (2007).

somewhat subjective. As a rule, we rely as much as possible on the ethnic categories offered by the influential papers of Alesina et al. (2003) and Fearon (2003).[5] Second, the ethnicity of some leaders is ambiguous because their parents belong to two different ethnic groups (Londregan et al. 1995). For example, Thomas Sankara of Burkina Faso was born to a Mossi father and a Fulani mother. In these rare cases, we code the leader as having both ethnicities, thus assuming that he may provide favors to both ethnic groups.

3.2. Measuring ethnic-level changes in education and health

To measure the impact of ethnic favoritism, we would ideally like to use economic or social variables that would have been collected for every ethnic group over the span of 30-40 years since each country became independent. However, such long ethnic-level time series are currently unavailable for most African countries. We therefore have to rely on indirect methods to construct similar time series using only recent and readily available data sources.

In this paper, we use information from the Demographic Health Surveys (DHS) to create two types of time-variant ethnic-level outcome measures. First, we use data on primary education and literacy for Africans of *different age cohorts* as proxies for their educational achievements in *different time periods*. Second, we rely on retrospective information provided by African women regarding the death or survival of the children they gave birth to in the past.[6] Before describing the construction of these education and health variables in greater detail, a few general words about the DHS surveys are in order.

The DHS surveys have been conducted by ORC Macro in a large number of developing countries since the late 1980s. They have a sizable standardized component allowing us to pool together the data for many African countries and to provide comparable estimates of ethnic favoritism for individual countries. Each DHS survey contains three types of files. The main (or "household members") files contain basic information about the entire sample of surveyed men and women of all ages. The women's and the men's files include additional data for smaller samples of women aged 15-49 and men aged 15-59 respectively. Our data on primary education come from the main files, while the information on literacy is only available for the smaller

[5] In a few cases we were also limited by the ethnic definitions of the Demographic Health Surveys, which are the source of our dependent variables as described below.

[6] Kudamatsu (2006) was the first to generate infant-mortality time series using the retrospective component of the DHS surveys.

samples of women and men. The retrospective data on child mortality are also part of the women's files.

The DHS surveys for most African countries provide information about the respondents' ethnicity.[7] As we explain in detail below, this information allows us to link the educational achievements of the respondents and the health outcomes of their children to the ethnicity of their country's leader in any given year.

3.2.1. Using the age cohorts to measure ethnic-level changes in education

Each DHS survey provides information on the educational attainment of its respondents. We use this information to construct our *Some Primary Education* variable. This dummy variable equals 0 for individuals with "no education" and equals 1 for individuals with at least an "incomplete primary education".[8] We then assume that most Africans attended primary school between the ages of 6 and 13. This important assumption allows us to construct time series of primary school attendance using the different age cohorts of the DHS respondents.

There is indeed some evidence that this assumption is realistic for the 18 African countries which we study in this paper and describe in Section 3.3. First, the ages of 6 to 13 tend to coincide with the official primary school age in these countries (World Bank 2008).[9] Second, the World Bank data for these countries suggest that, on average, about three quarters of all the students who attended primary school in a given year belonged to the official-age group.[10] Third, our own DHS data indicate that on average 82 percent of all individuals who attended primary school "during the current school year" were between 6 and 13 years old. Notice that these numbers are likely to understate the true importance of the ages 6 to 13 in determining the value of *Some Primary Education*, because even the students who attended school at an earlier or a later age were likely to receive at least some of their primary education when they were between 6 and 13.

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[7] More precisely, the ethnicity variable is included in the women's and the men's questionnaires. For the main sample we impute the ethnicity of other household members by using the ethnicity of the head of their household.

[8] Other educational categories of the DHS are complete primary, incomplete secondary, complete secondary and high education.

[9] For example, in 1991 the official primary school starting age in these countries was 6 or 7 (with the average of 6.33), and the official finishing age was between 12 and 14 (with the average of 12.58).

[10] To see this, we computed the ratio of net primary school enrollment to gross primary school enrollment in 1991 for the countries in our sample and found that it averaged 0.74.

The idea behind our use of age cohorts is simple: for each respondent we identify his/her country's leader when he/she was between 6 and 13 years old and determine whether this leader belonged to the respondent's ethnic group. More precisely, we define the *Coethnic Leader* variable in three steps: (1) we determine the calendar years when the respondent was between 6 and 13; (2) we find the number of those years in which the country's leader was of the same ethnicity as the respondent; (3) we divide the number of years found in the second step by 7, i.e., by the total years of primary school education. Therefore, the *Coethnic Leader* variable equals 1 for the respondents whose primary school age entirely coincided with the rule of a leader who shared their ethnic background, 0 for the respondents who grew up under a leader from another ethnic group, and a value strictly between 0 and 1 for the respondents whose primary school years only partly coincided with the rule of a leader who shared their ethnicity.

As an example, consider the DHS survey of Kenya which was conducted in 2003. In that country, Jomo Kenyatta, who was a member of the Kikuyu ethnic group, was the president from 1963 to 1978, when he was succeeded by Daniel Arap Moi, who was a Kalenjin, and who remained in power until 2002. Now, consider three of the survey respondents from the Kikuyu ethnic group – X, Y and Z – who were respectively 40, 20 and 35 years old at the time of the survey. X was born in 1963, and all of his primary school years (1970-1976) coincided with the Kenyatta regime. Therefore, X's *Coethnic Leader* score is 1. Y was born in 1983 and his primary school education occurred between 1990 and 1996, under the rule of Moi. Y's *Coethnic Leader* score is therefore 0. Finally, Z was born in 1968. Since he spent four of his primary education years under Kenyatta (1975-1978) and three under Moi (1979-1981), his *Coethnic Leader* score equals 4/7, i.e., 0.57.

The main advantage of the *Some Primary Education* variable is that primary school attendance is directly relatable to a particular age group, thus making it an ideal measure of education in our framework. However, it may sometimes be problematic to use this measure. Indeed, some ethnic groups in some African countries have a very large share of people with at least some primary school education, especially in recent years and/or in younger age cohorts.[11] In such circumstances, using school attendance may produce a biased estimate of ethnic favoritism because almost all of the group members already attend primary school.

[11] As an extreme example, our data suggest that about 99 (!) percent of the Boulou-Fang-Beti of Cameroon born between 1970 and 1989 have some primary education.

To address this potential "upper limit" problem, we use two additional measures of education. The *Completed Primary Education* variable is a dummy equal to 1 for the individuals who have at least a "complete primary education" and equal to 0 for the individuals who have "no education" or an "incomplete primary education". The *Literacy* variable is a dummy equal to 1 for the respondents who are able to read "a whole sentence" or "parts of a sentence" and equal to 0 for the respondents who "cannot read at all".

These two alternative measures allow us to overcome the "upper limit" problem by posing significantly higher educational thresholds. For example, in our sample of Sub-Saharan African countries shown in Table A1 and discussed in details below, about 60 percent of the men and women aged 15 to 49 have some primary education, but only 52 percent are literate and only 37 percent completed their primary education.[12] An additional advantage of using the *Literacy* variable is that it measures the quality, and not just the quantity, of education.

The disadvantage of our two alternative educational measures is that their incidence is more loosely related to a particular age cohort of respondents. These variables can only be used if it is assumed that the respondent's probability to complete primary school and to become literate was mainly determined by what happened when he or she was 6 to 13 years old. While these assumptions are not unreasonable, they are admittedly stronger than those made for the *Some Primary Education* variable.

3.2.2. The retrospective data on infant mortality

To construct the ethnic-level time-series of infant mortality, we follow the methodology developed by Kudamatsu (2006, 2007) in his important work. In each DHS survey, women aged 15 to 49 are asked to retrospectively report about all the children they gave birth to in the past. In particular, the women report their children's date of birth and date of death, if the child died before the time of the interview. Therefore, for each new-born baby, we define the *Infant Death* dummy variable as equal to 1 if he/she died during the first year of his/her life, and equal to 0 otherwise.[13]

[12] For the Boulou-Fang-Beti of Cameroon born between 1970 and 1989, the figures for the *Literacy* and *Completed Primary Education* variables are about 93 and 83 percent respectively.

[13] We drop from our analysis all the children born less than a year before the interview of their mother, because it could not yet be known whether they survived until their first birthday.

Furthermore, in order to build the *Coethnic Leader* variable in the context of infant mortality, we determine whether the country leader when the child was born and the child's mother were of the same ethnicity. As such, the *Coethnic Leader* is now a dummy variable equal to 1 for the children who were born when their mother's coethnic leader was in power, and equal to 0 for the children who were born when the country's leader belonged to another ethnic group.

3.3. The sample of countries in Sub-Saharan Africa

Having discussed the construction of our main dependent and independent variables, we now describe the sample of Sub-Saharan African countries used in our analysis. Drawing on our leader ethnicity data, we identify all the countries in Sub-Saharan Africa that had at least two leaders from different ethnic groups.[14] We then focus on the countries that in addition had at least one DHS survey with information on the respondents' ethnicity.

Our final sample consists of 18 countries in Sub-Saharan Africa. For each country, we use one survey for data on education and one, sometimes different, survey for data on infant mortality. If a country has several DHS surveys conducted in different years, we select the surveys that maximize the number of leaders and ethnic groups in power that can be used in the analysis.[15]

Table A1 shows the list of all the countries in our sample, with the DHS surveys and the time periods covered by our data. Overall, our main education sample consists of 497,784 respondents, while our analysis of infant mortality uses information on 350,768 children. Table A2 shows summary statistics for the dependent, independent and control variables used in the analysis.

In Table 1 we compare the characteristics of the 18 countries in our sample to those of Sub-Saharan Africa as a whole. Two clear patterns emerge. First, the countries in our sample are relatively large in terms of population and have a high degree of ethnic or cultural fractionalization even by African standards. They are therefore especially likely to display patterns of ethnic favoritism. Second, the countries in our sample have relatively low per capita

[14] We excluded from our analysis the leaders who stayed in power less than three years, as they were unlikely to influence the education and health outcomes in their countries.

[15] In the case of education, the most recent surveys have always been selected based on this criterion. In the case of infant mortality, it has often been more efficient to use earlier surveys because infant mortality series are shorter going back in time.

income and exhibit particularly poor educational and health outcomes. Thus, if the leaders of these countries wanted to help the ordinary members of their ethnic groups, they would be likely to do so by improving their education and health.

4. Empirical analysis

4.1. Econometric methodology

To estimate the average effect of ethnic favoritism on education in our sample of 18 African countries we run the following regression:

$$Y_{iect} = \alpha_c + \beta_t + \mu_{ct} + \delta_{ec} + \gamma * CoethnicLeader_{ect} + \theta_{ec} t + X_{iect}\eta + \varepsilon_{iect} \qquad (1)$$

Y_{iect} is the value of one of our education outcomes for individual *i* from ethnic cluster *e* in country *c* who was born in year *t*. We define an "ethnic cluster" as being equivalent to an ethnic group for all the groups that had at least one member who became a country leader; in addition, we create in each country a residual ethnic cluster comprising all the ethnic groups which were never in power. $CoethnicLeader_{ect}$ is our main independent variable: it measures for all the members of ethnic cluster *e* in country *c* born in year *t* the share of years when they were aged 6 to 13 that coincided with the rule of a leader who belonged to their ethnic cluster. α_c, β_t, μ_{ct} and δ_{ec} denote country fixed effects, year-of-birth fixed effects, country-year-of-birth fixed effects and country-ethnic-cluster fixed effects respectively. $\theta_{ec} t$ represents a linear time trend specific to ethnic cluster *e* in country *c*. We include these time trends to control for any ethnic-level changes in education that might be unrelated to ethnic favoritism. X_{iect} is a vector of individual controls that includes male and urban residence dummies. Finally, we cluster standard errors at the ethnic-cluster level.

Likewise, to estimate the average impact of ethnic favoritism on infant mortality in the sample of 18 countries we run:

$$Y_{iect} = \alpha_c + \beta_t + \mu_{ct} + \delta_{ec} + \gamma * CoethnicLeader_{ect} + \theta_{ec} t + X_{iect}\eta + \varepsilon_{iect} \qquad (2)$$

Y_{iect} is a dummy equal to 1 if baby *i* born to mother from ethnic cluster *e* in country *c* in year *t* died before reaching the age of one year. $CoethnicLeader_{ect}$ is now a dummy variable equal to 1

for the babies of ethnic cluster *e* in country *c* who were born in year *t* when their mother's coethnic was their country's leader. As before, $\alpha_c, \beta_t, \mu_{ct}, \delta_{ec}$ and $\theta_{ec}t$ denote country fixed effects, year-of-birth fixed effects, country-year-of-birth fixed effects, country-ethnic-cluster fixed effects and ethnic-cluster specific linear time trends. X_{iect} is a vector of individual controls that now includes dummies for baby girls, mother's urban residence, multiple birth and short birth spacing, as well as mother's age at birth and its square and baby's birth order and its square.[16] As before, we cluster standard errors at the ethnic-cluster level.

We are also interested in estimating the effects of ethnic favoritism in individual countries. To do so, we estimate country-specific regressions of the form:

$$Y_{iect} = \beta_t + \delta_{ec} + \gamma * CoethnicLeader_{ect} + \theta_{ec}t + X_{iect}\eta + \varepsilon_{iect} \qquad (3)$$

where all the parameters are defined as in equations (1) and (2) depending on whether we study education or infant mortality.

In all the regressions, our main parameter of interest is γ. In the regressions for individual countries, γ represents a country-specific difference-in-difference parameter that estimates the difference in the changes in education and infant mortality between the members of ethnic groups that had a fellow coethnic in power and those that did not.[17] In regressions (1) and (2), which include all the countries in our sample, γ measures the average of these country-specific difference-in-difference estimators. It can therefore be interpreted as measuring the average effect of ethnic favoritism in Africa.

To be more specific, in the education regressions, γ estimates the change in the probability that a respondent attends/completes primary school or becomes literate because his/her years of primary school education coincided with the rule of a coethnic leader. Likewise, in the infant mortality regressions, γ measures the change in the probability that a newborn dies

[16] The multiple birth dummy is equal to 1 for twins, triplets and quadruplets. The short birth spacing dummy is equal to 1 for babies born less than 24 months after the previous birth given by their mother. See Kudamatsu (2006) for a discussion of the effects that these and other individual controls may have on infant mortality and the related references.

[17] This difference in difference is measured relative to the ethnic-group specific time trends.

during the first year of his/her life because he/she was born during the rule of a leader who shared his/her mother's ethnicity.[18]

We assume that the transitions between leaders of different ethnicity in our dataset were exogenous to changes in the ethnic groups' education and health. We therefore interpret γ as measuring the causal effects of ethnic favoritism. Given the importance of the exogeneity assumption, we will examine it more closely in Section 5. In particular, we will discuss possible endogeneity concerns and will show that they are unlikely to be important for our analysis.[19]

Our methodology also assumes that ethnic favoritism starts having an impact on education and infant mortality as soon as a new leader comes to power. This is not unrealistic, as many of the policies that African leaders could use to improve the education and health of their coethnics could be implemented fairly quickly. In the case of education, African leaders could reduce school fees or even pay students to attend in the form of cash grants or subsidized meals and uniforms. They could also increase the school quality by hiring new teachers, repairing leaking roofs or providing blackboards and textbooks (Glewwe and Kremer 2006). Likewise, in the case of infant mortality, African leaders could expand the immunization coverage, increase the availability of vital drugs and raise the number of skilled birth attendants in their ethnic areas (Jones et al. 2003).

African leaders could also produce quick improvements in education and health of their coethnics by pursuing more general policies of favoritism. For example, they could give cash transfers or public-sector jobs to members of their own ethnic groups. Both policies would increase the income of parents who could then afford to send their children to school and pay for healthcare.

Still, it is possible that the effects of some policies (e.g. building new schools or improving sanitation infrastructure) related to ethnic favoritism could only be felt with a time lag. Therefore, as a robustness check, we ran education and infant mortality regressions with the

[18] In additional regressions available upon request, we show that our results are robust to using a probit model instead of a linear probability model. We choose the linear probability model as our main specification because probit regressions with fixed effects can be subject to the incidental parameters bias (Hahn and Newey 2004).

[19] Another potential concern is that our retrospective measures of education and infant mortality of African ethnic groups are subject to a measurement error due to selection effects. In particular, richer and more educated individuals (and their children) may be either overrepresented in the DHS surveys (e.g. because they were more likely to survive), or underrepresented in these surveys {e.g. because they were more likely to emigrate to another country). However, these selection effects should not bias our estimates of ethnic favoritism because they are unlikely to systematically vary across ethnic groups and be correlated with the patterns of interethnic leadership transitions.

Coethnic Leader variable lagged one, two or three years.[20] We found that the results of these regressions were similar to those of the regressions without lags, which suggests that the choice of lag structure is of little importance for our analysis. We thus focus on the regressions without lags in the rest of the paper.

4.2. The average effect of ethnic favoritism in Sub-Saharan Africa

In this section we estimate the average effect of ethnic favoritism on education and health in our sample of countries in Sub-Saharan Africa.

Table 2 shows the regression results for primary school attendance (column 1), primary school completion (column 2) and infant mortality (column 3). All the regressions include the full set of fixed effects and control for country-ethnic-cluster specific linear time trends.

We find that ethnic favoritism has a statistically significant impact on primary education and infant mortality in Sub-Saharan Africa. The respondents whose primary school years fully coincided with the rule of a coethnic leader were on average 2.47 percentage points more likely to attend primary school and 2.04 percentage points more likely to complete it than the respondents who grew up under a leader from another ethnic group. Likewise, the children born when their mother's coethnic leader was in power were 0.53 percentage points less likely to die during their first year of life than the children born when their country's leader belonged to another ethnic group.

It is important to put these results in perspective. As shown in Table A2, 59 percent of all the respondents above age 6 attended and 29 percent of them completed primary school, while the average rate of infant mortality in our sample of countries is 10 percent.[21] Thus, on average country leaders increased the primary school attendance of their ethnic groups from 59 to 61.5 percent, their primary school completion from 29 to 31 percent, and reduced their infant mortality from 10 to 9.5 percent.

[20] In the education regressions, the Coethnic Leader variable lagged one year captures the ethnicity of the country leaders who were in power when the respondent was 5 to 12 (instead of 6 to 13) years old. With two-year and three-year lags, it captures the ethnicity of the leaders who were in power when the respondent was 4 to 11, and 3 to 10, years old respectively. In the infant mortality regressions, the Coethnic Leader variable lagged one year captures the ethnicity of the leader who was in power one year before the birth of the baby.

[21] The corresponding standard deviations are 49, 45 and 30 percentage points respectively. However, since all our dependent variables are dummy variables, their standard deviations are difficult to interpret.

An intuitive way to interpret the magnitude of these effects of ethnic favoritism is to compare them to the average time trends (i.e., the average annual changes) in education and infant mortality in our data. Our estimations, whose details are available upon request, show that in our sample of countries, primary school attendance and completion rose on average by 0.87 and 0.51 percentage points per year respectively, while the average annual reduction in infant mortality amounted to 0.12 percentage points.[22] When compared to the coefficients on *Coethnic Leader* in Table 2, these estimates imply that African leaders improved education and health of their coethnics by the equivalent of three to four years of secular trend. This suggests that the effects of ethnic favoritism that we find are economically quite large.[23]

Another way to appreciate the quantitative importance of our results is by putting them in the context of the empirical literature that estimates the effects of active policy interventions on education and child mortality. Glewwe and Kremer (2006) review the literature on education. Although they report mixed evidence on the effectiveness of various programs, the effects of the programs that did work were found to be quantitatively similar to the effects of ethnic favoritism observed in our study. For example, large cash grants paid to the participants in the PROGRESA program in Mexico conditional on their children's school attendance increased primary school enrollment by 3.4 percentage points (Schultz 2004).[24]

Jones et al. (2003) estimate the effects of various medical interventions on reducing under-5 child mortality in developing countries. They calculate that universal availability of antibiotics for pneumonia or dysentery would reduce child mortality by 3 to 6 percent, and universal availability of a skilled attendant at birth would reduce it by 4 percent.[25] Again, these

[22] To compute these time trends, we regressed each dependent variable (*Some Primary Education*, *Completed Primary Education* and *Infant Mortality*) on the respondent's (in the case of education) or the baby's (in the case of infant mortality) year of birth while controlling for the country and country-ethnic-cluster fixed effects and all the individual controls from equations (1) and (2).

[23] In Table 2 the coefficients on *Coethnic Leader* may look small relative to those on *Urban* or *Male*. However, it is not appropriate to compare the cross-sectional urban-rural or gender differences in education and health, which are determined by long-term economic and social factors, with the relatively short-term time-series impact that country leaders can have on the members of their own ethnic groups.

[24] Likewise, government attempts to substantially increase the number of teachers during the "Operation Blackboard" in India raised primary school completion by 2 to 3 percentage points (Chin 2005). And a massive deworming campaign in the early-20th-century U.S. South increased school enrollment by 3 to 5 percentage points (Bleakley 2007).

[25] Other interventions were estimated to have similar effects. The effects on child mortality would be smaller if less than universal coverage was achieved, but larger if several interventions were undertaken at the same time.

estimates are quantitatively similar to the 5 percent reduction in infant mortality (0.5 percentage point down from the mean of 10) due to the presence of a coethnic country leader.[26]

To sum up, the results presented in Table 2 confirm the existence of ethnic favoritism in Sub-Saharan Africa. They also suggest that its economic effects on education and health are quite large.

In Table 3 we present a more complete picture of ethnic favoritism in education. In columns 1 and 2, we estimate the effect of ethnic favoritism on literacy, which is a direct measure of the *quality* of acquired education. These regressions complement our evidence on primary school attendance and completion, the two variables that mainly measure the *quantity* of education provided. Since the data on literacy is only available for smaller samples of women aged 15 to 49 and men aged 15 to 59, we present separate regression results for these gender groups. To better compare these results with the earlier ones on primary education, in columns 3 to 6 we rerun the original regressions for primary school attendance and completion but now splitting the sample by gender. All the regressions of Table 3 include the usual set of fixed effects and country-ethnic-cluster specific time trends.

The results in Table 3 convey two points. First, the effects of ethnic favoritism on literacy are similar to its effects on primary education, which confirms that the leader's ethnicity is a major determinant of education in Africa. In particular, women who had a coethnic leader in power during their primary school years were 3.17 percentage points more likely to become literate than those who did not. This is similar to their 3.79 percentage point higher probability of attending and 2.17 percentage point higher probability of completing primary school.

Second, the impact of ethnic favoritism on education in Africa is uneven across genders. While the regressions for women produce large and statistically significant coefficients on *Coethnic Leader* across all three measures of education, the results for men are only significant for primary school completion. Interestingly, this evidence is consistent with the broader

[26] Retrospective studies of infant mortality also produced similar results. For example, a 10 percentage point increase in the Family Health Program coverage in Brazil reduced infant mortality by 4.5 percent (Macinko et al. 2006). And during the 1960s, a 20 percentage point increase in the fraction of homes with improved sanitation infrastructure on U.S. Indian reservations reduced infant mortality by 0.1 percentage points or by 5 percent (Watson 2006).

literature on education which finds that active policy interventions in developing countries also tend to benefit girls more than boys (Glewwe and Kremer 2006, Orazem and King 2008).[27]

Overall, Tables 2 and 3 support the idea that members of the African ethnic groups benefit, in terms of their education and health, from having a coethnic politician as their country's leader. Our evidence also suggests that these benefits are economically large, although in the case of education they mostly apply to women rather than men.

Although the average effects of ethnic favoritism in Sub-Saharan Africa are quite substantial, they can mask potentially important differences between the countries in our sample. While in some African countries the leader's ethnicity may have a strong impact on the distribution of education and health, in others it may play a more limited role. In the next subsection, we disaggregate the results of Tables 2 and 3 and estimate the effects of ethnic favoritism in each country in our sample.

4.3. The effects of ethnic favoritism in Africa: a country-by-country analysis

Tables 4 and 5 present the country-by-country estimates of ethnic favoritism in education and health for all 18 countries in our sample. Table 4 shows the effects of ethnic favoritism on primary school attendance and completion for all the respondents in a country, as well as its effects on literacy for women aged 15 to 49 and men aged 15 to 59. Table 5 shows the impact of ethnic favoritism on infant mortality. All the regressions include the year-of-birth and ethnic-cluster fixed effects, as well as the ethnic-cluster specific linear time trends. We now report two types of standard errors: those clustered at the ethnic-cluster level (like in our aggregate analysis) and those clustered at the ethnic-cluster*year-of-birth level.[28]

The results in Table 4 indicate that the leaders of many African countries disproportionately improved the education of their own ethnic groups. In fact, in eight countries

[27] It would be interesting to know why ethnic favoritism has a stronger impact on women's education. Although in Sub-Saharan Africa women have lower initial rates of primary school attendance and literacy than men, it is not obvious why the marginal returns on their education would be higher when the new funds associated with ethnic favoritism arrive. More generally, Orazem and King (2008) note that the literature on education in developing countries does not provide a definitive answer as to why policy interventions usually benefit girls more than boys. We leave this question for future research and do not pursue it in the rest of the paper.

[28] The advantage of the standard errors clustered at the ethnic-cluster level is that they take account of possible serial correlation of error terms within each ethnic cluster (Bertrand, Duflo and Mullainathan 2004), and this is the reason we use them in our aggregate analysis. However, in the country-by-country analysis, it may be more appropriate to cluster standard errors at the ethnic-cluster*year-of-birth level because of the small number of ethnic clusters in each country. Since each strategy has its costs and benefits, we present both types of standard errors in Tables 4 and 5.

in our sample, the *Coethnic Leader* coefficients are positive and large on a consistent basis. In some of these countries such as Congo-Brazzaville, Ethiopia, Gabon and Kenya, the effects of ethnic favoritism on education are particularly large, exceeding 10 percentage points for some measures of education. In other countries, like Benin, Central African Republic, Ghana and Togo, these effects are more moderate but still substantial, ranging from 2 to 8 percentage points.[29]

Likewise, the results in Table 5 show that in many African countries ethnic favoritism is an important determinant of infant mortality. In ten countries in our sample, the *Coethnic Leader* coefficient is negative and large (above 0.003 in absolute value).[30] For example, in Benin, Malawi, Niger and Senegal ethnic favoritism reduced infant mortality by 0.39 to 0.85 percentage points. The effects of ethnic favoritism were even larger in Burkina Faso, Chad or Uganda, where children born when their coethnic leader was in power benefited from a 2 to 4 percentage point reduction in the probability of dying during their first year of life.

Taken together, the results in Tables 4 and 5 indicate that ethnic favoritism had a strong impact on education, infant mortality or both in a large number of African countries. They confirm the aggregate evidence presented earlier and suggest that in Sub-Saharan Africa ethnic favoritism is not only important on average but is also quite widespread.

Yet, Tables 4 and 5 also show that the effects of ethnic favoritism vary across countries. Differences in the size of the *Coethnic Leader* coefficient between countries can be quite substantial; and in a few countries (e.g. Guinea or Mali) we do not find any evidence of ethnic favoritism.[31] This heterogeneity raises an important question: why is ethnic favoritism more prevalent in some African countries than in others? We will attempt to shed light on this issue in Section 6.

But now we want to illustrate how ethnic favoritism can emerge and be implemented in Sub-Saharan Africa by providing a case study of Congo-Brazzaville, one of the countries where we find strong effects of ethnic favoritism on education.

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[29] Most of these coefficients are statistically significant, although this sometimes depends on how we cluster the standard errors.

[30] In some of these countries (e.g. Central African Republic or Togo), the *Coethnic Leader* coefficient is very large but imprecisely estimated. In others (e.g. Chad or Uganda), its statistical significance depends on how we cluster the standard errors.

[31] In his study of Guinea, Kudamatsu (2007) also found no evidence of ethnic favoritism in health. Our results for this country indicate a similar lack of ethnic favoritism in primary education and literacy.

4.4. Ethnic favoritism in practice: a case study of Congo-Brazzaville

In Congo-Brazzaville, the main ethnic division runs along regional lines. The members of the Kongo ethnic group (which constitutes about half of the country's population) live in the Southern part of the country, while the members of the Mbochi ethnic group (which constitutes about 13 percent of the population) inhabit the North.[32] Although the rivalry between the Kongo and the Mbochi goes back to the colonial period, it was exacerbated by the leaders who successively ruled the country after independence (Kitsimbou 2001). The first two leaders, Fulbert Youlou (1960-1963) and Alphonse Massamba-Debat (1963-1968), were both ethnic Kongo from the South. But the three subsequent leaders, Marien Ngouabi (1968-1977), Jacques-Joachim Yhombi-Opango (1977-1979) and Denis Sassou-Nguesso (1979-1992), were all ethnic Mbochi from the North.[33]

Historical evidence suggests that the change in the ethnicity of the Congolese leaders shifted the balance of power between the two groups. Both Youlou and Massamba-Debat had developed a system of patronage which favored their fellow Kongo, but Ngouabi replaced most of the Kongo office-holders with his own Mbochi appointees soon after his 1968 coup against Massamba-Debat. Later on, under the leadership of Yhombi-Opango and Sassou-Nguesso, the Mbochi continued to occupy a disproportionate number of political and administrative positions, and their governments were widely perceived as the rule of Northerners over the South of the country (Kitsimbou 2001).

In such a context of intense political rivalry between the Kongo and the Mbochi, it is not surprising that, in Congo-Brazzaville, ethnic favoritism had an impact on education.[34] Figures 1 to 3 illustrate this graphically by showing the time series of primary school attendance, primary

[32] The Kongo ethnic group consists of several subgroups such as the Lari, the Bakongo and the Yombe. Similarly, the Mbochi ethnic group consists of the Mbochi, Kouyou and Makoua subgroups. Following Alesina et al. (2003), we use the broad Kongo and Mbochi ethnic categories in our analysis. In addition to the Kongo and the Mbochi, other ethnic groups in Congo-Brazzaville include the Teke (17 percent of population), the Mbete (5 percent), the Punu (3 percent), the Sanga (3 percent) and many smaller groups.

[33] After 24 years, the Mbochi rule ended in 1992 when Sassou-Nguesso lost elections to Pascal Lissouba, a member of the small Bandzabi ethnic group. The Mbochi, however, came back to power in 1997 when Sassou-Nguesso defeated Lissouba in a civil war. Since most of the effects of ethnic favoritism on education that we find in Congo-Brazzaville seemed to have occurred between 1960 and 1992, we only focus on this time period in our case study.

[34] It is also possible that the 1968 change in the ethnicity of the Congolese leaders had an effect on the relative levels of infant mortality of the Kongo and the Mbochi. We cannot however assess this possibility, since our data on infant mortality in Congo-Brazzaville only start in 1968, the year when Ngouabi came to power.

school completion and female literacy for the Kongo, the Mbochi and the "Other" ethnic groups between 1960 and 1992. To construct these time series, we follow a strategy similar to the one used in our regression analysis. For each calendar year (and for each ethnic category), we consider the DHS respondents who were between 6 and 13 years old during that year and compute the percentage of those respondents who attained the corresponding level of education.

Figures 1 to 3 show that before 1968, when the Kongo leaders ruled the country, the educational achievements of the Mbochi were significantly lower than those of the Kongo. However, after Ngouabi's coup, the Mbochi quickly closed this gap and eventually achieved higher rates of primary school attendance, primary school completion and female literacy. The figures also show that the "Other" ethnic groups, whose educational outcomes were similar to those of the Mbochi before 1968, failed to improve them as rapidly afterwards and continued to lag behind the Kongo. This provides a counterfactual suggesting that the Mbochi's own improvement in education vis-à-vis the Kongo could not have been possible without their leaders coming to power.

Indeed, the fast change in the relative educational achievements of the Kongo and the Mbochi can be best explained by the policies of ethnic favoritism pursued by the successive Congolese leaders. Both Youlou and Massamba-Debat made larger educational investments in the South than in the North of the country (Kiamba 2007). They also increased the number of positions in the civil service and allocated most of them to their fellow Kongo (Mbandza 2004). This latter policy raised the income of many Kongo families and further increased their ability to send their children to school. Overall, the policies of Youlou and Massamba-Debat reinforced the Kongo's educational advantage inherited from the colonial period.[35] However, things changed when Ngouabi came to power.

Ngouabi was particularly concerned with education because of his Marxist-Leninist beliefs (Kitsimbou 2001). His government spent on education almost 6 percent of GDP in 1970 and nearly 8 percent of GDP in 1975, more than any other government in Sub-Saharan Africa (World Bank 2003). But these funds were not evenly distributed among the Congolese ethnic groups, as it was now the turn of the Mbochi to enjoy the benefits of favoritism.

[35] The French administrators and missionaries first settled in the coastal areas in the South of Congo and only later moved to the inland North. As a result, more schools were built in the South, and the Kongo were more likely to receive colonial education.

The intensive recruitment of new teachers in the Mbochi areas was a particularly important channel of ethnic favoritism, as nearly 70 percent of the country's education budget between 1970 and 1982 was spent on the teachers' salaries (Kiamba 2007).[36] Furthermore, Ngouabi and his Mbochi successors accelerated the construction of new schools in the North of the country, and distributed the lion's share of financial aid to the Mbochi students (Kiamba 2007).

In addition to pursuing these policies, which directly aimed at improving the education of the Mbochi, Ngouabi and his successors also favored their coethnics when filling the large number of newly created positions in the civil service.[37] This increased the income of many Mbochi families and further contributed to the fast rise in the rates of schooling and literacy of the Mbochi children.

Overall, the case of Congo-Brazzaville illustrates the different mechanisms through which African leaders could improve the educational achievements of their coethnics. It also shows that the policies of favoritism can quickly change the relative levels of education of a country's ethnic groups. In addition, the example of Congo-Brazzaville suggests that ethnic favoritism might be especially prevalent in African countries whose leaders have large fiscal resources that they can spend on the provision of public goods. This is one of the hypotheses that we will test in our comparative analysis of ethnic favoritism in Section 6. But beforehand, we have to confirm the causal interpretation of our regression results.

5. The effects of ethnic favoritism in Africa: evidence for causality

In the discussion of our regression results in Sections 4.2 and 4.3, we interpreted the effects of ethnic favoritism on education and infant mortality as causal. In this section, we provide some evidence in support of this causal interpretation. First, we run a falsification test and verify that our results are not driven by pre-trends in education and infant mortality. Second, we review the history of the interethnic leadership transitions in our dataset and show that only a

[36] This emphasis on the recruitment of new teachers is not surprising since in the first two decades after independence, the shortage of teachers was seen as a major obstacle to improvements in education in Congo-Brazzaville (Thompson and Adloff 1984).

[37] Mbandza (2004, p. 124) reports that in 1972, four years after Ngouabi's coup, there were 21,000 civil servants, up from 7,000 in 1963. Under Sassou-Nguesso, the public sector kept on growing: there were 45,000 civil servants in 1982 and nearly 72,000 in 1988.

small number of them could have possibly been endogenous to changes in education and health. We also show that our results are robust to the exclusion of these transitions.

5.1. Falsification test

It is possible that for reasons unrelated to ethnic favoritism, the ethnics groups in a country had different short-term trends in education and infant mortality around the time of leadership transitions. These short-term trends would not be captured by the linear long-term trends included in our regressions, and could potentially confound our difference-in-difference estimates.

To alleviate this concern, we carry out a falsification test that examines the timing of our results. In particular, we want to show that our estimates of ethnic favoritism are not driven by pre-trends, i.e. by changes in education and infant mortality that occurred before the corresponding changes in the country's leadership.

To implement the falsification test in education, we rerun regression (1) using the *Coethnic Leader* variable forwarded eight years instead of the original *Coethnic Leader* variable. This regression tests whether the respondents who were aged 14 to 21 (instead of 6 to 13) during the rule of their coethnic country leader have higher rates of primary school attendance, primary school completion and literacy. Since it is unrealistic to assume that these outcomes are determined between the ages of 14 and 21, a large and significant positive coefficient on the forwarded *Coethnic Leader* variable would point to the existence of pre-trends in education that could bias our estimates of ethnic favoritism. Conversely, a small and insignificant coefficient on the forwarded *Coethnic Leader* variable would indicate the absence of such pre-trends.

In the case of infant mortality, we run regression (2) using the *Coethnic Leader* variable forwarded two years as a substitute for the original one.[38] This regression tests whether the babies whose coethnic country leader was in power two years after their birth were less likely to die during the first year of their lives. Since it is reasonable to assume that the leaders cannot affect infant mortality before coming to power, a large and significant negative coefficient on the forwarded *Coethnic Leader* variable would point to the existence of pre-trends that could drive

[38] Since we only know the year when the child was born, but not his exact date of birth, we forward the *Coethnic Leader* variable two years to make sure that there is at least one year between the child's birth and the leader's coming to power. As a robustness check, we also ran the infant mortality regression with the *Coethnic Leader* variable forwarded only one year and obtained similar results which are available upon request.

our original infant mortality results. In contrast, a small and insignificant coefficient on the forwarded *Coethnic Leader* variable would alleviate this concern.

Table 6 presents the results of the falsification test for primary school attendance (column 1), primary school completion (column 2), female literacy (column 3) and infant mortality (column 4).[39] For easier comparison, we also reproduce the corresponding *Coethnic Leader* coefficients from our original regressions in Tables 2 and 3. All the regressions in Table 6 include the usual set of fixed effects, ethnic-cluster specific linear time trends and individual controls.

Table 6 shows that, in contrast to the *Coethnic Leader* coefficients in our original regressions, the coefficients on the forwarded *Coethnic Leader* variable in the falsification regressions are always small and statistically insignificant. This finding suggests that our original regressions capture the changes in education and infant mortality that occur after new leaders come to power, and not before. It is therefore consistent with the causal interpretation of the results in Section 4.

Yet, the absence of pre-trends does not rule out the possibility that the interethnic leadership transitions in our dataset were endogenous. We address this issue in the next subsection.

5.2. Are transitions between leaders of different ethnicity exogenous?

In Section 4, we assumed that the transitions between the leaders of different ethnicity were exogenous to the changes in education and infant mortality of their ethnic groups. Since this assumption is crucial for the causal interpretation of our difference-in-difference estimates (Besley and Case 2000), in this subsection we examine its empirical validity. We also evaluate the robustness of our results to the exclusion of transitions that could have potentially been endogenous.

In general, endogeneity can be caused by either reverse causality or an omitted variable bias (OVB). In this study, reverse causality does not seem to be a concern because short-term variations in primary education or infant mortality of ethnic groups were unlikely by themselves

[39] Since in Section 4.2 we could not find a significant average effect of ethnic favoritism on male literacy, we exclude this outcome from our robustness analysis.

to cause changes in a country's leadership.[40] However, an OVB remains a possibility in our regressions: an ethnic group can experience a positive (negative) income shock that helps its leader to come to (be removed from) power and at the same time improves (worsens) the education and health of its members.[41] In this case, our difference-in-difference regressions would overestimate the true effects of ethnic favoritism (i.e. the coefficients on *Coethnic Leader* would be biased away from zero).

In what follows, we discuss possible types of such relative income shocks and examine whether they might have influenced the interethnic leadership transitions in our dataset.

5.2.1. Relative income shocks and the possibility of omitted variable bias

Three types of income shocks may create an OVB in our regressions. First, an ethnic group may become richer because it benefits from the recent exploitation of natural resources (e.g., oil) in the region that it inhabits, or from a change in the terms of trade for these natural resources.

Second, and quite similarly, agricultural shocks may also change the relative wealth of ethnic groups in a country. These agricultural shocks may result from extreme weather conditions (e.g., drought or flood) which affect the production of regionally-grown crops (Miguel et al. 2004), or from exogenous changes in the world prices for these crops.

Third, foreign aid, from either international financial organizations or individual countries, may generate an OVB. For instance, during the Cold War the United States and the Soviet Union often provided military assistance to various governments while also supplying economic aid to their countries' populations. It is possible that such aid benefited some ethnic groups more than others. Notice, however, that there would only be an OVB if the foreign powers directly funded the schools and hospitals of the incumbent leader's ethnic group (in addition to propping him up in power). Conversely, if foreign aid was given to the leader who then allocated it to his coethnics, this would constitute a case of ethnic favoritism but not of OVB.

[40] The absence of pre-trends in education and infant mortality is consistent with this presumption.

[41] We partly alleviate the possibility of an OVB by including ethnic-group specific time trends in our regressions. This allows us to control for the situation in which a gradual change in the groups' relative incomes eventually leads to a change in the leader's ethnicity and, at the same time, generates different ethnic-specific trends in education and infant mortality. Unfortunately, the time trends cannot control for an OVB caused by a short-term change in the groups' relative incomes.

To see whether our empirical results could indeed be subject to an OVB, we studied the history of all the interethnic leadership transitions in our sample of countries.[42] We specifically examined whether the timing of any of these transitions could have been affected by recent changes in the groups' relative incomes due to shocks to the prices of natural resources, agricultural output or the amount of foreign aid. In the next subsection, we discuss the main findings of this historical review.

5.2.2. The role of relative income shocks in African leadership transitions

In our dataset, we can distinguish between four types of interethnic leadership transitions. The first type can be termed a "peaceful dictatorial transition" in which a dictator appoints his successor and for a while grooms him as his potential heir. In such a situation, an OVB is unlikely to be an issue because the actual leadership change usually results from the incumbent's death or health-related resignation, the timing of which can be reasonably viewed as exogenous (Jones and Olken 2005). For example, Kalenjin politician Daniel Arap Moi became president of Kenya in 1978, after the death of Jomo Kenyatta, a Kikuyu, whom he had served as vice-president since 1967. Of course, ethnicity could have still played a role in Kenya's transition. In fact, a group of powerful Kikuyu, called the *Kiambu Mafia*, tried to prevent Kenyatta from designating Moi as his successor. But there is no evidence that Moi eventually prevailed and came to power because the Kalenjin became richer or the Kikuyu poorer (Widner 1992).[43]

Coups make up the second type of leadership transitions in our dataset. As documented by McGowan (2008), two kinds of coups can be distinguished. The first type pertains to "palace revolutions" which are mainly motivated by personal rivalry between members of the ruling junta. An OVB is therefore unlikely to be an issue because the timing of these coups usually reflects the weakening of the incumbent leader's personal power. For instance, in the 1971 coup in Uganda, sections of the army led by then Chief of Staff Idi Amin Dada overthrew Milton

[42] An appendix listing all the historical sources that we consulted for each country is available from the authors upon request.

[43] Jones and Olken (2005) also classify the transition in Kenya as exogenous, because it resulted from the incumbent leader's death in office. Similarly, they classify as exogenous the transition in Gabon between Leon Mba (a Fang), who died in 1967, and Omar Bongo (a Teke). Other "peaceful dictatorial transitions" are also likely to have been exogenous. For instance, Cameroon's President Ahmadou Ahidjo (a Fulani) was succeeded by his Prime Minister Paul Biya (a Fang) in 1982 after the former resigned, ostensibly for health reasons. Although there are many theories surrounding Ahidjo's resignation, there is no indication that it was the result of a relative income shock that favored the Fang over the Fulani. See Barnes (1992) and Gardinier (1994) on the transition in Gabon and Takougang and Krieger (2000) on the transition in Cameroon.

Obote when he was abroad attending a Commonwealth conference. Amin clearly acted out of personal fear that Obote would sack him and bring him to trial. In fact, during the months preceding the coup, Obote leveled a series of personal accusations against Amin and reorganized the army to weaken Amin's authority (Mutibwa 1992). It is also true that the coup was facilitated by the split in the army between officers of Obote's Lango ethnic group (and of the related Acholi group) and those of Amin's Kakwa ethnic group (and of the related West Nile groups). However, there is no indication that the Kakwa's relative income increased before the coup or that such an increase contributed to the coup's success.

In contrast to the "palace revolutions", the second kind of coups is concomitant with civil unrest and/or an economic crisis. But such coups can only create an OVB if the economic turmoil hurts the incumbent's ethnic group more than the rebel leader's ethnic group. From our reading of various sources, there is very little evidence to suggest that there is such a case in our dataset. For instance, the 1966 coup in Burkina Faso, led by Lt-Col. Sangoule Lamizana against President Maurice Yameogo, occurred in the wake of a general strike and demonstrations by trade unions and radical students, who marched to government headquarters demanding action by the military. While ethnic conflicts between Mossi politicians in Yameogo's government and Lamizana, a Samo, might have contributed to the coup, it does not seem that the economic crisis hurt the Mossi more than the Samo (Englebert 1998).

The third type of transition between leaders of different ethnicity may result from civil wars. These transitions may entail an OVB if the incumbent leader lost the war because foreign powers stopped financing his military efforts and at the same time cut economic aid to his ethnic group. This could have possibly been the case in Ethiopia where Mengistu Haile Mariam lost the war to Meles Zenawi's Tigrayan People's Liberation Front in 1991 after the decline in Soviet economic and military assistance to his government (Woodward 1996). Notice that even in Ethiopia the existence of an OVB is far from certain, because it is not clear that the Soviets directly targeted their economic aid at the Amhara population (as opposed to giving money to Mengistu who then transferred it to the Amhara). Nevertheless, we will evaluate below in Section 5.2.3 the robustness of our results to the exclusion of Ethiopia from the regression analysis.

In the other instances of civil war, the existence of an OVB is less likely. For example, it is widely acknowledged that Uganda's Milton Obote was able to overthrow Idi Amin Dada in

1979 with the military support of Tanzania's Julius Nyerere (Mutibwa 1992), but it is unlikely that Tanzania also funded schools and hospitals for Obote's fellow Langi. Similarly, during the Congolese civil war, which was fought along both ethnic and ideological lines between Pascal Lissouba and Denis Sassou-Nguesso, the latter prevailed in 1997 partly because he received military aid from Angola (Clark 2008). It is however doubtful that the Angolan government provided economic assistance to Sassou-Nguesso's fellow Mbochi.

Democratic elections constitute the last type of interethnic leadership transition in our dataset.[44] Most democratic elections in Africa were held as part of the general process of democratization which took place in the 1990s, after the end of the Cold War. In this period, Western powers often pushed for democratization by reducing the amount of foreign aid to the incumbent leaders and forcing them to hold free and fair elections. Thus, France forced democratization on some of its former colonies, such as Benin, Congo-Brazzaville, Mali and Niger (Clark and Gardinier 1997). This led, for instance, to the electoral defeat of Mathieu Kerekou to Nicephore Soglo in the 1991 election in Benin, as well as to the fall of Congo's Denis Sassou-Nguesso and the election of Pascal Lissouba in 1992. Likewise, Western countries cut all but humanitarian aid to Malawi until Hastings Banda, the country's long-time ruler, organized democratic elections in 1994, when he was defeated by Bakilii Muluzi (Kees van Donge 1995; Ihonvbere 2003). Although there is no evidence that Western countries directly reduced their transfers to the incumbent leaders' ethnic groups or increased their transfers to the new leaders' ethnic groups, the use of foreign aid for political purposes probably increases the likelihood of an OVB in these democratic transitions. We therefore examine below what happens if we conservatively exclude these transitions from our regressions.

To sum up, we found no evidence in the historical literature that the interethnic leadership transitions in our dataset were caused by relative income shocks due to changes in natural resources or agricultural output. However, a small number of these transitions might have been affected by an OVB due to the changing patterns of foreign aid after the end of the Cold War. The fall of Mengistu in Ethiopia in 1991 is one transition that could have been endogenous to changes in foreign aid. The democratic transitions in Benin in 1991, Congo-Brazzaville in

[44] It is well-known that the outcome of elections usually depends on the state of the economy (see, e.g., Mueller (2003) for a survey). However, this does not imply that the incumbent leaders are more likely to lose the elections when their own ethnic groups are hit harder by an economic downturn than the ethnic groups of the challengers.

1992, Mali in 1991, Malawi in 1994 and Niger in 1993 could have also been potentially biased by the end of the Cold War.

5.2.3. Robustness to the exclusion of potentially endogenous leadership transitions

We now evaluate the robustness of our estimates of the average ethnic favoritism in Africa to the possibility of an OVB. Specifically, we rerun regressions (1) and (2), but now drop from our sample the transitions that could have potentially been endogenous. We therefore consider two alternative samples of countries. In the first sample, we exclude Ethiopia; in the second sample, where we are more conservative and view all the post-Cold War transitions as possibly endogenous, we also exclude Benin, Congo-Brazzaville (after 1992), Malawi, Mali (after 1991) and Niger.[45] In both cases, we compare the results to those obtained for the full sample of countries.

Table 7 displays the results of this robustness analysis. The regressions for primary school attendance and completion, female literacy and infant mortality are presented in columns 1 to 4 respectively. All the regressions include the usual set of fixed effects, ethnic-cluster specific linear time trends and individual controls.

Table 7 shows that our results are robust to using the alternative samples of countries. In the case of education, the coefficients on *Coethnic Leader* become somewhat smaller but remain strongly significant in almost all the regressions.[46] In the case of infant mortality, the coefficient on *Coethnic Leader* becomes even larger than in the benchmark regression, although it is imprecisely estimated (and hence only marginally significant) when all the post-Cold War transitions are excluded.

Overall, the evidence presented in this section suggests that it is not unrealistic to assume that the transitions between leaders of different ethnicity in Sub-Saharan Africa are exogenous. We have shown that only a small number of the transitions in our dataset could have possibly been endogenous, and that our estimates of the average ethnic favoritism in Africa are robust to the exclusion of these transitions. These findings confirm the existence of important causal effects of ethnic favoritism on education and health in Africa.

We now turn to the comparative analysis of ethnic favoritism across African countries.

[45] The transitions in Congo-Brazzaville before 1992 and in Mali before 1991 were unlikely to be subject to an OVB.

[46] The coefficient on *Coethnic Leader* loses its statistical significance only in the regression for primary school completion when all the post-Cold War transitions are excluded.

6. Explaining the cross-country variation in ethnic favoritism in Africa

As we saw in Tables 4 and 5, the effects of ethnic favoritism on education and infant mortality differ across African countries. In this section, we evaluate several hypotheses that can explain these differences.

6.1. Theoretical hypotheses

We examine three sets of hypotheses. First, some African leaders may have weaker *ability* to influence primary education and infant mortality of their ethnic groups, because of either geographic constraints or inadequate public finance. Second, the *incentives* of the leaders to cater to the ordinary members of their groups may be affected by the political environment in their countries. Finally, the patterns of ethnic favoritism may depend on the cultural distance between the ethnic groups living in the same country.

Ethnic favoritism may be limited if the country has a large territory or if the members of the leader's ethnic group live far away from the capital city where most government agencies are located. Under such geographic constraints, the leader may simply be unable to effectively provide benefits to his home area (Herbst 2000). We capture these constraints in two ways. First, we use the (logarithm of the) country's land area. Second, we construct the *Distance to Capital for Ethnic Groups in Power* variable by computing the average distance between the country's capital and the home areas of the ethnic groups whose leaders were in power.

The leader's inability to provide ethnic favors may also stem from the country's inadequate system of public finance. If the government has low administrative capacity to collect revenues, the leader may not have sufficient public funds to spend on education and health of his coethnics. To capture the fiscal constraints of the African leaders, we use several alternative measures of public finance, all expressed as percent of GDP: the average tax revenue in 1970-2000, the average current revenue (excluding grants) in 1970-2000, the average total public expenditure in 1970-2000 and the average public expenditure on education in 1970-2000 or health in 1990-2000. We expect poor public finance to be correlated with lower levels of ethnic favoritism.

The second set of explanations which we consider pertains to the differences in the countries' political environment. The "quid pro quo" model discussed in Section 2 suggests that

ethnic favoritism might be more prevalent in democracies than in autocracies, because democratic leaders need broader political support and may therefore have stronger incentives to cater to the members of their own ethnic group. We use two measures of democracy. First, we compute the country's average Polity2 score (Marshall and Jaggers 2004) during the period covered by our ethnic favoritism data. Second, we compute the number of years in which the country held multi-party elections as a fraction of the total number of years in the same time period.

Although there is certainly some variation in the amount of democracy experienced by the African countries in our sample, all of them were predominantly autocratic during the time period of our study. Yet, even the authoritarian regimes may differ along important political dimensions, and these differences might have implications for ethnic favoritism.

At one extreme, we find the leaders of the countries characterized by high political instability. These leaders are heavily preoccupied with their physical security and spend a large share of public funds on personal protection against the constant threats of coups. In such circumstances, the leaders may be unlikely to help the ordinary members of their ethnic groups, because their support is nearly irrelevant for the leaders' political (or even physical) survival. At the other extreme, we find the authoritarian leaders who mobilize the masses by creating political parties and organizing single-party elections (Geddes 2005). Since these leaders actively seek broader political support, they are more likely to provide benefits to their coethnics based on the logic of the "quid pro quo" model.

We account for these features of African politics by using several variables. To measure political instability, we compute the country's average number of successful or attempted (i.e. successful and unsuccessful) coups per year. To capture the leaders' efforts at mass mobilization, we compute the fraction of years in which the country held single-party elections. We also combine our measures of single-party and multi-party elections and compute the fraction of years in which the country held either type of elections.[47] We expect the coups to be associated with lower ethnic favoritism, and the single-party (or multi-party) elections to be associated with higher ethnic favoritism.

[47] The data on coups come from McGowan (2006), while the data on elections come from the African Election Database (http://africanelections.tripod.com). All the coups and the elections variables are computed over the period covered by our data on ethnic favoritism.

Finally, we examine whether the patterns of ethnic favoritism are related to cultural distance between the ethnic groups living in the same country. We consider three dimensions of ethnic distance.

First, ethnic favoritism may be more prevalent in countries whose groups speak structurally distant languages (Fearon 2003). To evaluate this hypothesis, we use two alternative measures: Fearon's index of cultural fractionalization and the difference between his ethnic and cultural fractionalization indices. The former measure captures not only the linguistic distances between the country's ethnic groups, but also the country's level of ethnic diversity, which might be less relevant for us. The latter measure, on the other hand, solely focuses on the linguistic distances and may therefore better suit our purposes. Higher cultural fractionalization or a *smaller* difference between the ethnic and cultural fractionalization indices would indicate that the country's ethnic groups speak more distant languages, potentially making ethnic favoritism more likely.[48]

Second, ethnic differences may be less important in countries with one dominant religion (Alesina et al. 2003). Four countries in our sample – Guinea, Mali, Niger and Senegal – have such a dominant religion, with at least 85 percent of the population of each of these countries being Muslim (Alesina et al. 2003). In contrast, all the other fourteen countries that we study have much higher religious fractionalization.[49] To examine whether a common religion can reduce ethnic favoritism, we compare the average levels of favoritism in the two groups of countries by using the *One Dominant Religion* dummy variable.

Third, ethnic relations may be especially tense when the groups are geographically segregated in a country's territory (Matuszeski and Schneider 2006). Segregation may reduce cultural contacts between the members of different groups and increase the salience of their ethnic differences, potentially leading to more ethnic favoritism. Segregation can also make it easier for leaders to exclude the outsiders and target the distribution of public goods to the

[48] Ethnic fractionalization in a country is measured as the probability that two individuals selected at random will be from different ethnic groups. If all the groups in the country speak completely unrelated languages, the country's cultural and ethnic fractionalization indices will be equal. However, the more similar are the languages spoken by the different groups, the lower is the cultural fractionalization vis-à-vis the ethnic fractionalization. Thus, a larger difference between the two indices would indicate greater linguistic similarity among the country's ethnic groups.

[49] Alesina et al.'s (2003) index of religious fractionalization shows sharp differences between the two groups of countries. Guinea, Mali, Niger and Senegal score between 0.15 and 0.27 in religious fractionalization, while the other fourteen countries score between 0.55 and 0.82 on that index.

members of their own ethnic groups (Bates 1983, Caselli and Coleman 2006). We use the *Ethnic Clustering* index developed by Matuszeski and Schneider (2006) as our measure of the country's ethnic segregation.

To evaluate the hypotheses presented above, we run a series of regressions in which we interact the *Coethnic Leader* variable with the corresponding country-level variables introduced one at a time. Formally, we add an interaction term to equations (1) and (2) and estimate regressions of the form:

$$Y_{iect} = \alpha_c + \beta_t + \mu_{ct} + \delta_{ec} + \gamma_1 * CL_{ect} + \gamma_2 * CL_{ect} * Z_c + \theta_{ec} t + X_{iect}\eta + \varepsilon_{iect} \qquad (4)$$

Y_{iect} is the value of one of our education or health outcomes for individual *i* from ethnic cluster *e* in country *c* who was born in year *t*. CL_{ect} is the *Coethnic Leader* variable as defined in equations (1) and (2). Z_c is one of the explanatory variables described in this section in country *c*.[50] We continue to include the usual set of fixed effects, ethnic-cluster specific linear time trends and individual controls.

Whereas γ_1 measures the main effect of ethnic favoritism, our primary goal is to estimate the interaction-term parameter γ_2 that captures the cross-country relationship between the explanatory variable of interest Z_c and the level of ethnic favoritism in education and health. In particular, a positive (negative) γ_2 in the education regressions or a negative (positive) γ_2 in the infant mortality regressions would indicate that ethnic favoritism is more prevalent in African countries with a higher (lower) level of Z_c.

6.2. Empirical results

Tables 8-10 show the results of our comparative analysis of ethnic favoritism. Table 8 evaluates the importance of geographic and fiscal constraints. Table 9 focuses on the role of political environment. Table 10 examines the role of cultural distance between the ethnic groups. Each table displays the regressions for primary school attendance and completion (columns 1 and 2), female and male literacy (columns 3 and 4) and infant mortality (column 5). Although for

[50] Table A3 shows the descriptive statistics for all the country-level variables used in the analysis.

each regression we report the estimates and the standard errors (clustered at the ethnic-cluster level) of both γ_1 and γ_2, our main focus is on γ_2 which is emphasized in bold.

The results in Table 8 show that geographic constraints are not important in explaining the differences in ethnic favoritism across African countries. Countries that have a large territory or whose leaders come from ethnic groups that live far from the capital city do not display lower levels of ethnic favoritism.[51] In contrast, the measures of public finance are important predictors of ethnic favoritism in primary education (albeit not in infant mortality). Leaders that collect more revenues and have more resources to spend on the provision of public goods appear to have greater ability to provide educational benefits to their ethnic groups. For example, a one-percentage-point increase in the country's current revenue (as percent of GDP) is associated with a 0.3 percentage-point increase in the effect of ethnic favoritism on primary school attendance, a 0.5 percentage-point increase in the effect of ethnic favoritism on female literacy and a 0.4 percentage-point increase in its effect on male literacy. Likewise, a one-percentage-point increase in the country's public expenditure on education (again as percent of GDP) is associated with approximately a 2 percentage-point increase in the effects of ethnic favoritism on primary school attendance and literacy of both men and women.[52]

In Figures 4 and 5, we illustrate the positive relationship between the strength of public finance and ethnic favoritism in education graphically. On the horizontal axis we plot the country's current revenue (in Figure 4) or public expenditure on education (in Figure 5), both as percent of GDP. On the vertical axis we plot the country-by-country estimates of the effect of *Coethnic Leader* on *Some Primary Education* and *Literacy* (Women) from Table 4. The figures show that countries like Kenya, Congo-Brazzaville, Gabon or Togo that have stronger fiscal capacity are also characterized by higher levels of ethnic favoritism.

The results in Table 9 provide mixed evidence on the role of the political environment in explaining the different levels of ethnic favoritism in Africa. First, countries that had longer experience with democracy (as measured by either the average Polity2 score or the frequency of multi-party elections) do not display more ethnic favoritism. Second, a higher frequency of

[51] If anything, larger distance between the capital and the ethnic groups in power is associated with *greater* ability of the leaders to improve the rates of primary school completion of their ethnic groups.

[52] In standard-deviation terms, a one-standard-deviation increase in these public-finance variables is associated with about a one-half-standard-deviation increase in the effects of ethnic favoritism on primary school attendance and literacy. See the descriptive statistics of the country-level variables in Table A3.

successful or attempted coups does not seem to reduce the incentives of the leaders to provide ethnic favors.[53] In contrast, single-party elections tend to be a good predictor of ethnic favoritism in primary education. When considered alone, they are associated with a larger effect of ethnic favoritism on primary school attendance and female literacy. When counted together with the multi-party elections, they are also positively correlated with the effect of ethnic favoritism on male literacy.

The results for single-party elections are consistent with the "quid pro quo" model of ethnic politics. They suggest that African dictators who attempted to mobilize popular support were more likely to provide ethnic favors. Quantitatively, the coefficients on the *CL * Single-Party Elections* interaction term indicate that one additional single-party election in 20 years (i.e., one standard deviation in our sample of countries) is associated with a 1 percentage-point increase in the effect of ethnic favoritism on primary school attendance and a 3 percentage-point increase in its effect on female literacy.

Table 10 shows that the interactions of *Coethnic Leader* with the two measures of linguistic distance based on Fearon (2003) or with the *Ethnic Clustering* index of Matuszeski and Schneider (2006) tend to produce statistically insignificant coefficients. Thus, ethnic favoritism does not appear to be more prevalent in countries whose ethnic groups speak more distant languages or live in geographically segregated areas.[54] In contrast, our evidence suggests that the existence of one dominant religion – in our case Islam – may have limited ethnic favoritism in education. In particular, we find that in Guinea, Mali, Niger and Senegal the effects of ethnic favoritism on primary school attendance and completion as well as on female literacy are about 3 percentage points smaller than the corresponding effects in the other, more religiously fragmented, countries in our sample. Thus, in the case of education, the average effects of ethnic favoritism in Sub-Saharan Africa which we found in Tables 2 and 3 are entirely driven by the

[53] If anything, a higher average Polity2 score is associated with a *smaller* effect of ethnic favoritism on female literacy, while a higher frequency of attempted coups is associated with a *larger* effect of ethnic favoritism on primary school completion. These results are not in line with the predictions of the "quid pro quo" model.

[54] The coefficient on *CL * Ethnic minus Cultural Fractionalization* is never statistically significant, while the coefficient on *CL * Cultural Fractionalization* is significant only in the female literacy regression. There is therefore no sufficient evidence to suggest that language distance leads to higher levels of ethnic favoritism.

latter group of countries, while in the former four countries the leader's ethnicity did not matter for educational outcomes.[55]

To sum up, the evidence presented in this section suggests several explanations for the differences in ethnic favoritism across African countries. First, some African leaders may have been better able to provide ethnic favors thanks to the stronger fiscal capacity of their governments. Second, ethnic divisions in Guinea, Mali, Niger and Senegal may have been attenuated by the predominance of Islam, leading to lower ethnic favoritism in these countries. Third, the existence of single-party elections may have increased the incentives of African leaders to favor their own ethnic groups in order to obtain their support. This is, however, the only political factor which is correlated with ethnic favoritism in our regressions. Finally, geographic constraints, linguistic differences or patterns of ethnic segregation are found to be poor predictors of ethnic favoritism.

7. Conclusion

In this paper we reassessed the role of ethnic favoritism in Sub-Saharan Africa. Using data on primary education and infant mortality from 18 African countries, we found that the effects of ethnic favoritism are quite large and widespread. These results provide new evidence in support of the ethnicity-based explanations of Africa's underdevelopment. Although we discussed several theories that can account for the effects of ethnic favoritism in Africa, more research is needed in order to find which of them are more important in practice. It would be especially interesting to learn more about the role of ethnic "quid pro quo" in African politics and to identify the specific mechanisms through which it operates.

We also made an important step toward a comparative analysis of ethnic favoritism by studying its economic, political and cultural correlates across African countries. Yet, the conclusions we reach in Section 6 are far from definitive. In particular, we need a better understanding of the role of political environment in shaping the leader's incentives to provide ethnic favors. Is ethnic favoritism more prevalent in democracies or autocracies? What is the role

[55] When we interact *Coethnic Leader* with the *One Dominant Religion* dummy, the main effects of *Coethnic leader* in columns 1 to 3 are large and statistically significant. This indicates that in religiously fragmented countries the effects of ethnic favoritism on education are strong. In contrast, the sum of the main and the interaction coefficients in these regressions is always very small and statistically insignificant. This latter result suggests that the countries with one dominant religion do not experience ethnic favoritism in education.

of political parties in channeling ethnic pork? What is the relationship between ethnic favoritism and political instability? We hope that future research will provide better answers to these important questions.

Finally, while our study focused on the benefits to the ordinary members of ethnic groups from having their leaders in power, African leaders may deliver even larger favors to narrower subgroups of their coethnics. Since such elite-based forms of ethnic favoritism can by itself have important political and economic consequences, we hope that their systematic study will also be the subject of future research.

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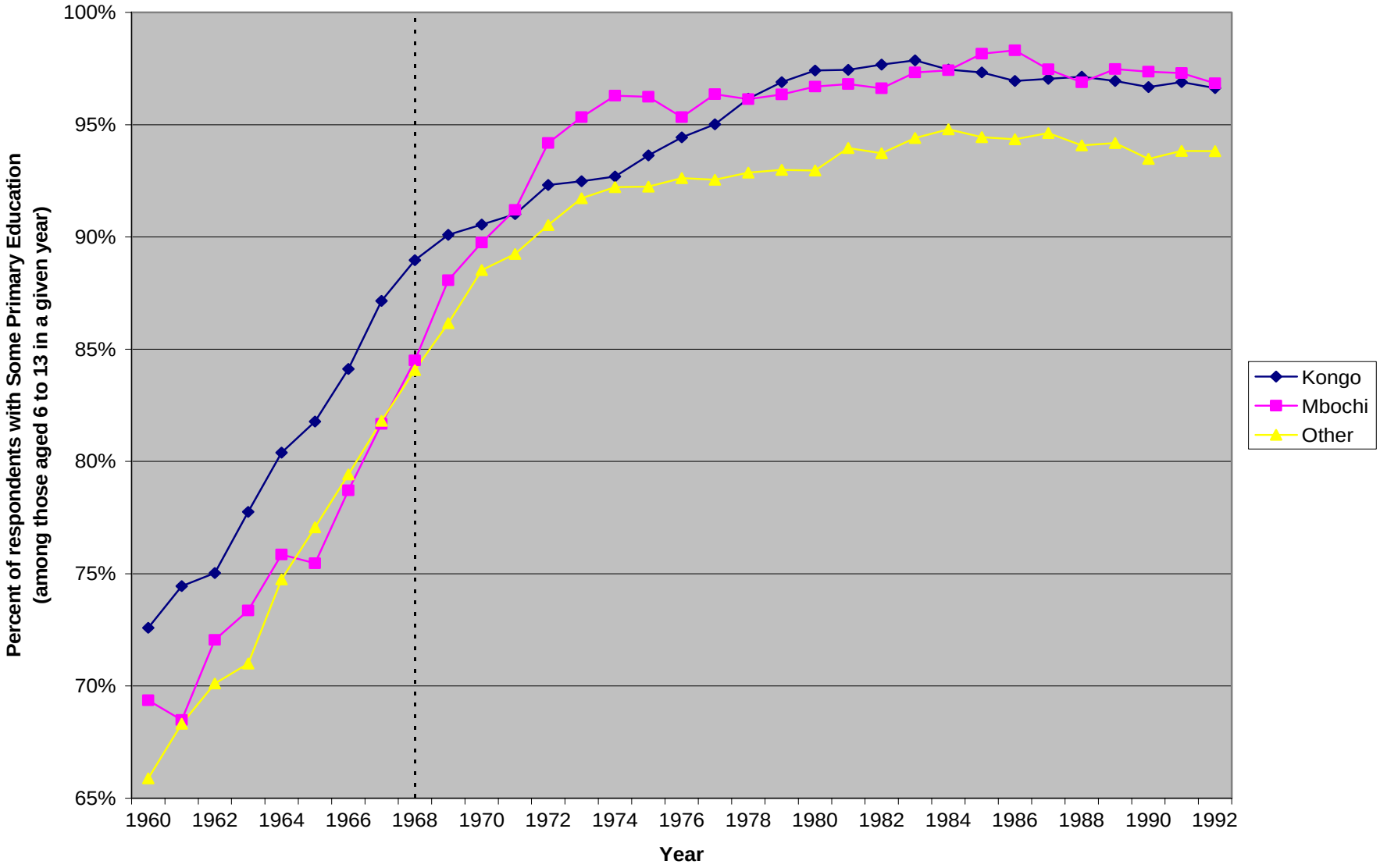


Figure 1: Rates of primary school attendance of the different ethnic groups in Congo-Brazzaville, 1960-1992.

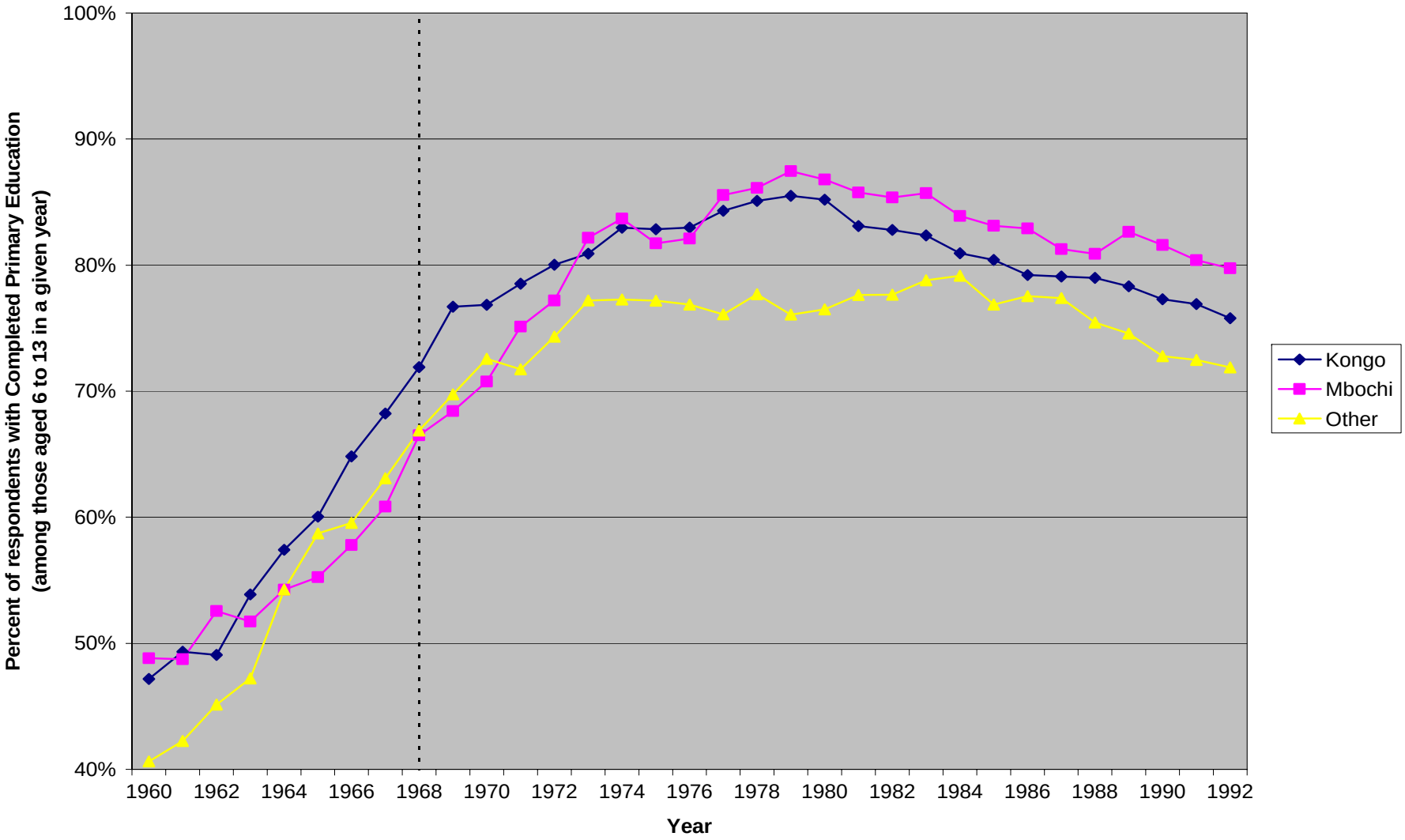


Figure 2: Rates of primary school completion of the different ethnic groups in Congo-Brazzaville, 1960-1992.

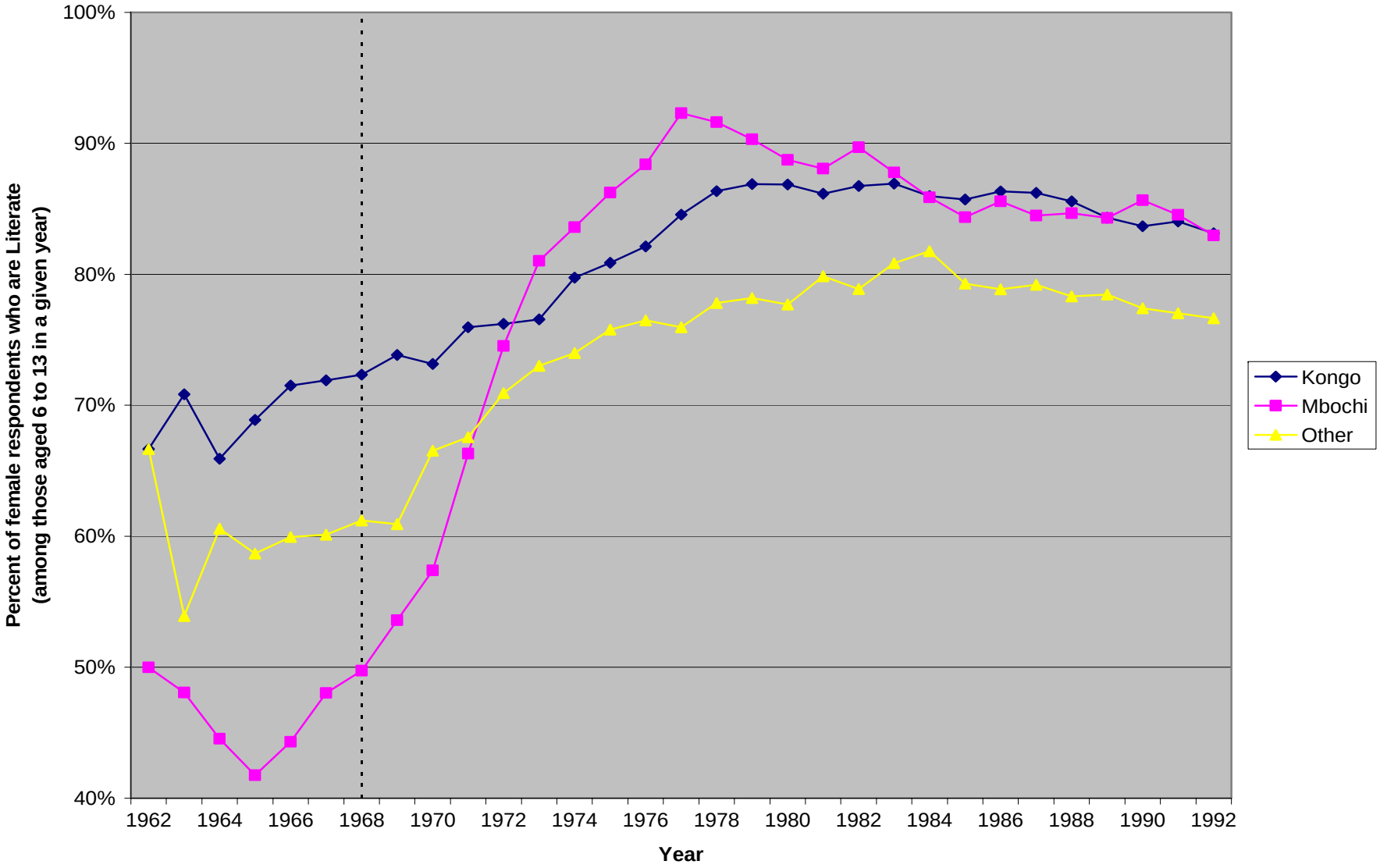
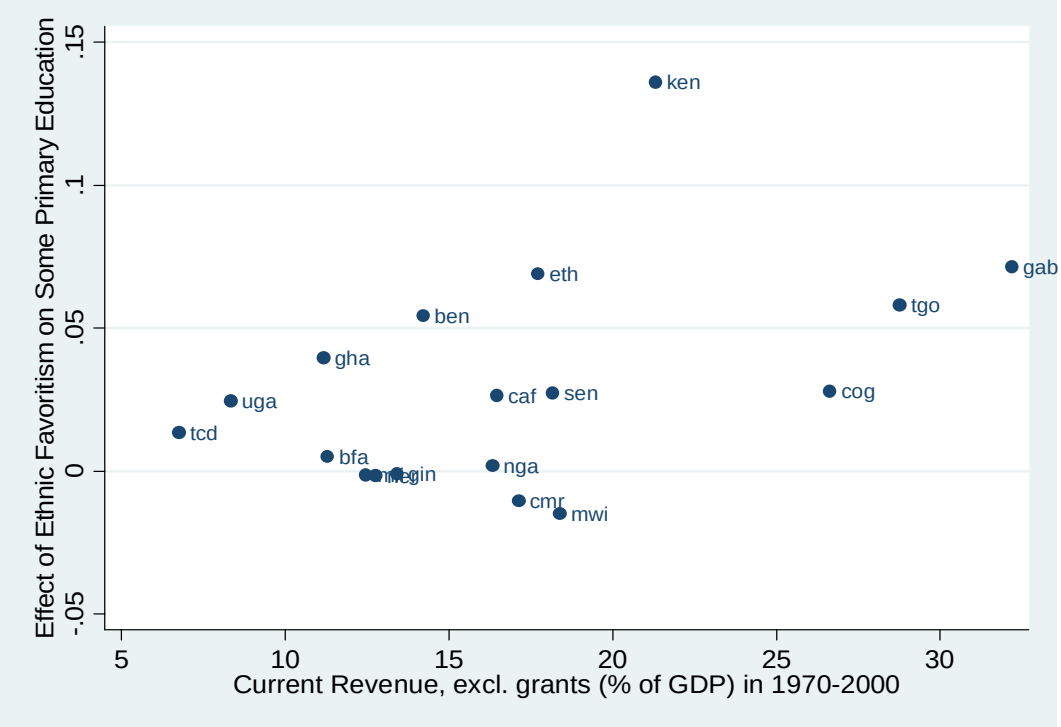


Figure 3: Rates of female literacy of the different ethnic groups in Congo-Brazzaville, 1962-1992.



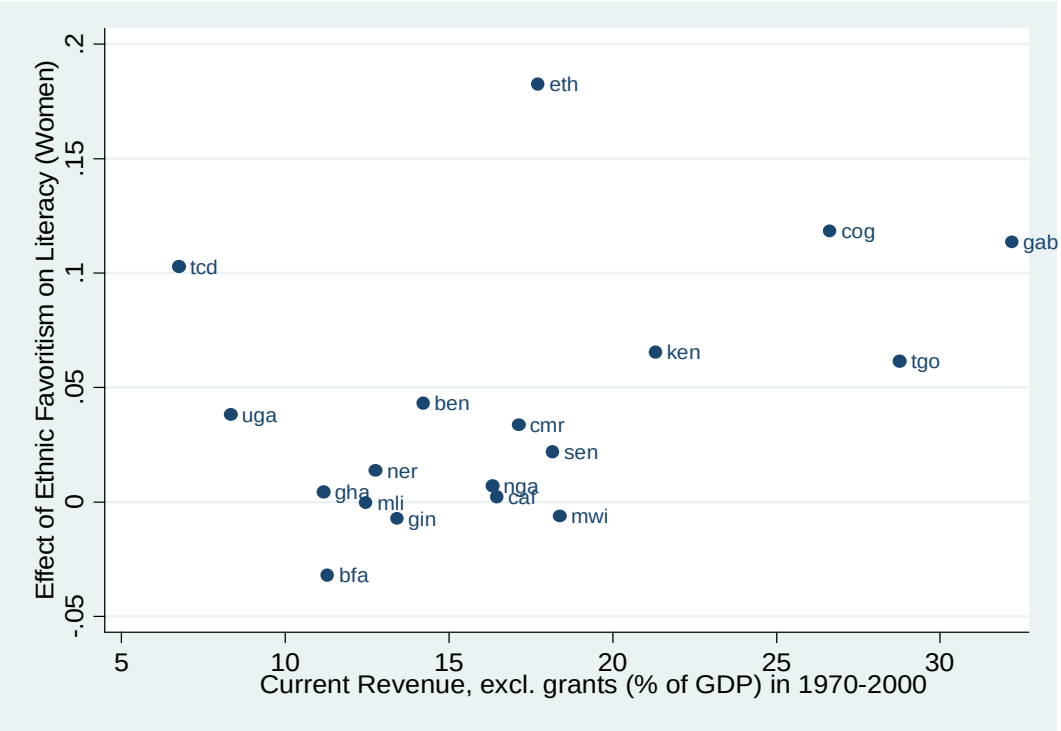
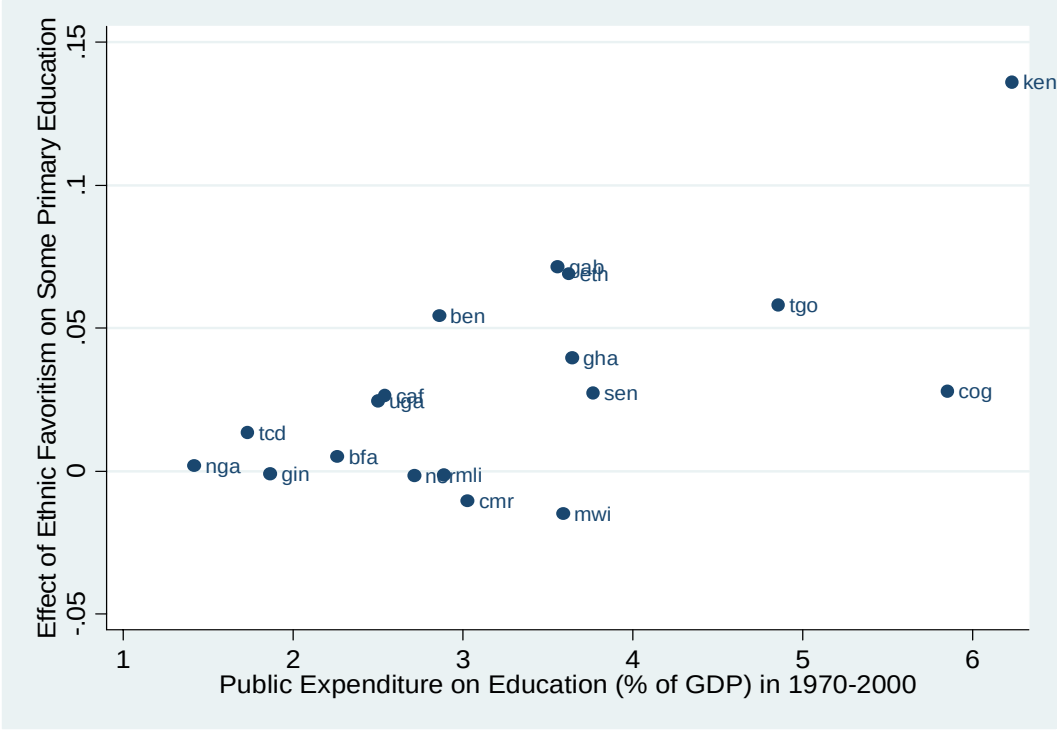


Figure 4: Current revenue and ethnic favoritism in primary education and female literacy.

Notes: Country-by-country estimates of the effects of ethnic favoritism are from Table 4



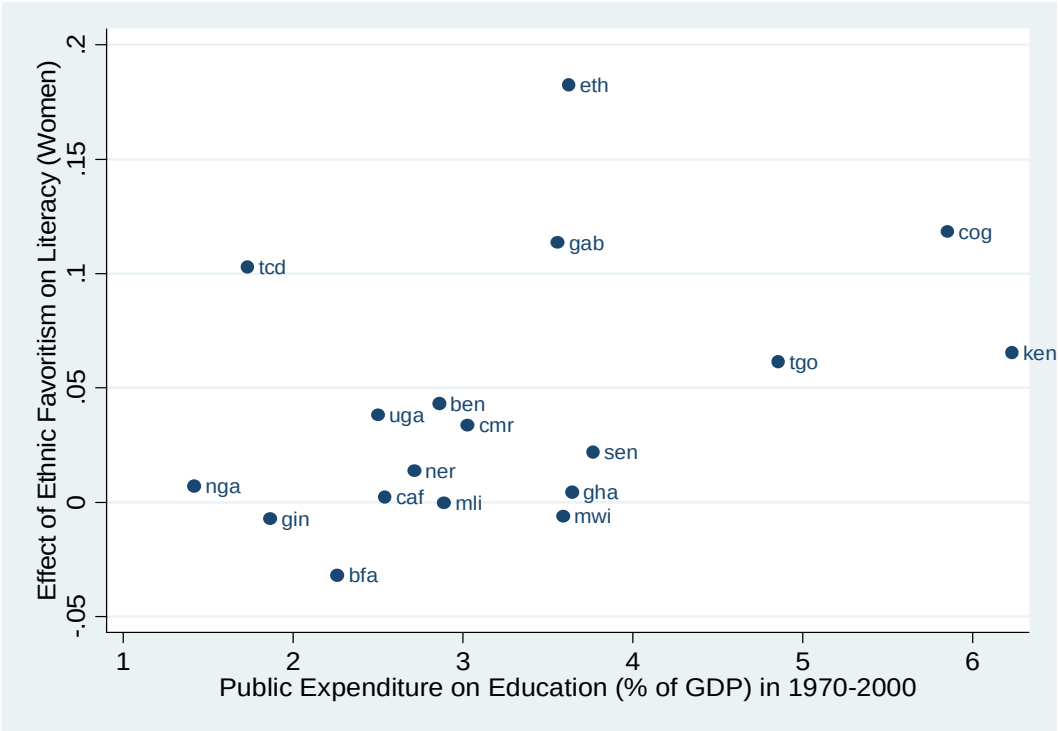


Figure 5: Public expenditure on education and ethnic favoritism in primary education and female literacy.

Notes: Country-by-country estimates of the effects of ethnic favoritism are from Table 4.

Table 1: Comparability of different groups of countries in Sub-Saharan Africa

Group of countries:	(1) Sample	(2) All
Total Population in 1985	13.40	8.85
(in millions)	[20]	[14.2]
	18	46
Ethnic Fractionalization - Alesina et al.	0.763	0.652
(0 to 1)	[0.084]	[0.233]
	18	45
Ethnic Fractionalization - Fearon	0.789	0.710
(0 to 1)	[0.090]	[0.197]
	18	41
Cultural Fractionalization - Fearon	0.528	0.432
(0 to 1)	[0.132]	[0.204]
	18	41
GDP per capita in 1985	1028.11	1136.57
(in constant 1985 int'l dollars)	[938.47]	[908.01]
	18	46
Primary School Enrollment in 1984	68.26	74.51
(% gross)	[35.94]	[32.67]
	17	41
Adult Illiteracy Rate in 1985	64.91	56.01
(%)	[17.27]	[18.87]
	16	39
Infant Mortality in 1985	116.75	110.00
(per 1000 live births)	[34.09]	[38.04]
	18	46

Sources: Alesina et al. (2003), Fearon (2003), World Bank (2003), Global Development Network Growth Database.

Notes:

(1) For each variable, the mean, the standard deviation (in brackets) and the number of countries are reported in the top, middle and bottom rows respectively.

(2) Column 1 includes the 18 countries studied in this paper; column 2 includes all the countries in Sub-Saharan Africa (excluding Eritrea and South Africa).

Table 2: Ethnic favoritism in primary education and infant mortality

Dependent Variables:	Some Primary Education	Completed Primary Education	Infant Death
	(1)	(2)	(3)
Coethnic Leader	0.0247	0.0204	-0.0053
	[0.0068]***	[0.0082]**	[0.0021]**
Urban	0.2562	0.2784	-0.0288
	[0.0218]***	[0.0136]***	[0.0028]***
Male	0.1275	0.1138	
	[0.0100]***	[0.0057]***	
Baby Girl			-0.0129
			[0.0011]***
Other Individual Controls			YES
Country FE	YES	YES	YES
Year of Birth FE	YES	YES	YES
Country-Year of Birth FE	YES	YES	YES
Country-Ethnic Cluster FE	YES	YES	YES
Country-Ethnic Cluster specific time trends	YES	YES	YES
Number of Countries	18	18	17
Number of Country-Ethnic Clusters	64	64	61
Observations	497746	410208	350768
R-squared	0.36	0.33	0.04

Notes:
(1) Other Individual Controls include: Multiple Birth, Mother's Age at Birth and its square, Birth Order and its square, Short Birth Spacing.
(2) The Number of Ethnic Clusters in a country refers to the number of ethnic groups whose members became leaders of the country, plus one cluster comprising all the other groups.
(3) Standard errors clustered at the Ethnic Cluster level are shown in brackets.
(4) *** denotes significance at the 1% level, ** at the 5% level, * at the 10% level.

Table 3: Ethnic favoritism in literacy and primary education for men and women

Dependent Variables:	Literacy		Some Primary Education		Completed Primary Education	
	(1)	(2)	(3)	(4)	(5)	(6)
Sample:	women	men	women	men	women	men
Coethnic Leader	0.0317	0.0027	0.0379	0.0077	0.0217	0.0186
	[0.0121]***	[0.0095]	[0.0110]***	[0.0070]	[0.0114]*	[0.0078]**
Urban	0.3036	0.2789	0.2658	0.2423	0.2604	0.2956
	[0.0173]***	[0.0230]***	[0.0203]***	[0.0246]***	[0.0130]***	[0.0169]***
Country FE	YES	YES	YES	YES	YES	YES
Year of Birth FE	YES	YES	YES	YES	YES	YES
Country-Year of Birth FE	YES	YES	YES	YES	YES	YES
Country-Ethnic Cluster FE	YES	YES	YES	YES	YES	YES
Country-Ethnic Cluster specific time trends	YES	YES	YES	YES	YES	YES
Number of Countries	18	18	18	18	18	18
Number of Country-Ethnic Cluster	64	64	64	64	64	64
Observations	160180	57657	264889	232857	221609	188599
R-squared	0.36	0.29	0.39	0.32	0.33	0.33

Notes:

(1) The Number of Ethnic Clusters in a country refers to the number of ethnic groups whose members became leaders of the country, plus one cluster comprising all the other groups.

(2) Standard errors clustered at the Ethnic Cluster level are shown in brackets.

(3) *** denotes significance at the 1% level, ** at the 5% level, * at the 10% level.

Table 4: Ethnic favoritism in primary education and literacy - country by country

Country	Benin	Burkina Faso	Cameroon	Centr Afr Rep	Chad	Congo-Brazz	Ethiopia	Gabon	Ghana
Number of Ethnic Clusters	3	4	3	3	3	4	3	3	5
				Dependent Variable: Some Primary Education - All					
Coethnic Leader	0.0542	0.0050	-0.0104	0.0264	0.0134	0.0279	0.0689	0.0714	0.0396
	[0.0239]	[0.0039]	[0.0011]**	[0.0443]	[0.0157]	[0.0080]**	[0.0019]***	[0.0071]***	[0.0431]
	{0.0157}***	{0.0073}	{0.0289}	{0.0345}	{0.0316}	{0.0090}***	{0.0178}***	{0.0157}***	{0.0218}*
Observations	18650	39332	33228	15311	19153	21473	47212	19091	16399
Within R-squared	0.2	0.24	0.12	0.18	0.21	0.1	0.27	0.09	0.18
				Dependent Variable: Completed Primary Education - All					
Coethnic Leader	0.0515	-0.0030	0.1052	0.0757	-0.0862	0.0225	0.0944	0.0040	0.0553
	[0.0007]***	[0.0037]	[0.0309]*	[0.0039]***	[0.0004]***	[0.0206]	[0.0163]**	[0.0527]	[0.0345]
	{0.0178}***	{0.0056}	{0.0387}***	{0.0442}*	{0.0268}***	{0.0157}	{0.0130}***	{0.0306}	{0.0253}**
Observations	14835	31750	27711	13329	15401	18416	38995	15852	15671
Within R-squared	0.16	0.23	0.22	0.19	0.21	0.26	0.34	0.22	0.24
				Dependent Variable: Literacy - Women					
Coethnic Leader	0.0433	-0.0319	0.0335	0.0023	0.1030	0.1182	0.1826	0.1135	0.0045
	[0.0109]*	[0.0112]*	[0.0043]**	[0.1066]	[0.0658]	[0.0195]***	[0.0219]**	[0.0028]***	[0.0285]
	{0.0267}	{0.0153}**	{0.0431}	{0.0573}	{0.0451}**	{0.0312}***	{0.0234}***	{0.0330}***	{0.0371}
Observations	6009	12429	10573	5690	6074	6980	13836	6111	5663
Within R-squared	0.15	0.27	0.14	0.21	0.14	0.1	0.34	0.05	0.17
				Dependent Variable: Literacy - Men					
Coethnic Leader	0.0146	0.0060	-0.0248	0.0484	-0.2352	0.0065	0.0228	0.0691	-0.0044
	[0.0253]	[0.0132]	[0.0722]	[0.1129]	[0.0552]*	[0.0071]	[0.0399]	[0.0090]**	[0.0284]
	{0.0687}	{0.0269}	{0.0562}	{0.1398}	{0.0995}**	{0.0210}	{0.0300}	{0.0483}	{0.0367}
Observations	2420	3487	5144	1496	1852	3097	5931	1867	4969
Within R-squared	0.15	0.26	0.06	0.1	0.17	0.05	0.2	0.04	0.11

Continued

Table 4: Ethnic favoritism in primary education and literacy - country by country (continued)

Country	Guinea	Kenya	Malawi	Mali	Niger	Nigeria	Senegal	Togo	Uganda
Number of Ethnic Clusters	3	3	3	4	5	5	3	3	4
				Dependent Variable: Some Primary Education - All					
Coethnic Leader	-0.0010	0.1361	-0.0150	-0.0014	-0.0016	0.0018	0.0273	0.0580	0.0246
	[0.0151]	[0.0130]***	[0.0130]	[0.0209]	[0.0229]	[0.0140]	[0.0097]	[0.0450]	[0.0117]
	{0.0154}	{0.0299}***	{0.0118}	{0.0123}	{0.0121}	{0.0154}	{0.0157}*	{0.0288}**	{0.0221}
Observations	25272	23236	34600	39213	29855	22431	45912	27128	20250
Within R-squared	0.27	0.06	0.1	0.19	0.24	0.14	0.22	0.19	0.08
				Dependent Variable: Completed Primary Education - All					
Coethnic Leader	-0.0095	-0.0252	0.0022	-0.0098	0.0142	0.0347	-0.0149	0.0348	0.0121
	[0.0011]**	[0.0721]	[0.0279]	[0.0043]	[0.0082]	[0.0137]*	[0.0129]	[0.0542]	[0.0064]
	{0.0156}	{0.0370}	{0.0123}	{0.0083}	{0.0090}	{0.0183}*	{0.0131}	{0.0230}	{0.0215}
Observations	20132	20366	28499	31396	23348	18682	38070	21517	16238
Within R-squared	0.23	0.28	0.16	0.2	0.18	0.2	0.14	0.2	0.2
				Dependent Variable: Literacy - Women					
Coethnic Leader	-0.0074	0.0654	-0.0063	-0.0004	0.0136	0.0070	0.0219	0.0615	0.0382
	[0.0077]	[0.0127]**	[0.0094]	[0.0254]	[0.0140]	[0.0350]	[0.0052]*	[0.0072]**	[0.0124]*
	{0.0184}	{0.0313}**	{0.0250}	{0.0175}	{0.0153}	{0.0275}	{0.0299}	{0.0281}**	{0.0430}
Observations	7871	8174	11678	12553	9153	7522	14490	8527	6847
Within R-squared	0.22	0.09	0.1	0.18	0.22	0.12	0.15	0.18	0.1
				Dependent Variable: Literacy - Men					
Coethnic Leader	0.0506	0.1017	-0.0176	-0.0666	-0.0299	-0.0109	0.0092	0.0359	-0.0735
	[0.0208]	[0.0076]***	[0.0155]	[0.0508]	[0.0215]	[0.0578]	[0.0315]	[0.0203]	[0.0145]**
	{0.0449}	{0.0393}**	{0.0382}	{0.0387}*	{0.0274}	{0.0427}	{0.0467}	{0.0342}	{0.0664}
Observations	3108	3508	3155	3098	3432	2166	3634	3455	1838
Within R-squared	0.3	0.04	0.03	0.21	0.22	0.1	0.16	0.15	0.05

Notes:

(1) All regressions include Ethnic Cluster FE, Year of Birth FE, Ethnic Cluster specific time trends and Urban control. Primary Education regressions also control for gender.

(2) The Number of Ethnic Clusters in a country refers to the number of ethnic groups whose members became leaders of the country, plus one cluster comprising all the other groups.

(3) Standard errors clustered at the Ethnic Cluster level are shown in square brackets. Standard errors clustered at the Ethnic Cluster * Year of Birth level are shown in curly brackets.

(4) *** denotes significance at the 1% level, ** at the 5% level, * at the 10% level.

Table 5: Ethnic favoritism in infant mortality - country by country

Country	Benin	Burkina Faso	Cameroon	Centr Afr Rep	Chad	Congo-Brazz	Ethiopia	Ghana
Number of Ethnic Clusters	3	4	3	3	3	4	3	5
				Dependent Variable: Infant Death				
Coethnic Leader	-0.0039	-0.0208	-0.0050	-0.0252	-0.0209	0.0005	0.0072	0.0230
	[0.0009]**	[0.0055]**	[0.0040]	[0.0176]	[0.0208]	[0.0009]	[0.0051]	[0.0171]
	{0.0054}	{0.0109}*	{0.0225}	{0.0205}	{0.0113}*	{0.0122}	{0.0081}	{0.0125}*
Observations	18060	19649	14372	15340	24089	15455	37293	10244
Within R-squared	0.04	0.03	0.03	0.04	0.03	0.03	0.04	0.04

Continued

Table 5: Ethnic favoritism in infant mortality - country by country (continued)

Country	Guinea	Kenya	Malawi	Mali	Niger	Nigeria	Senegal	Togo	Uganda
Number of Ethnic Clusters	3	3	3	4	5	5	3	3	4
				Dependent Variable: Infant Death					
Coethnic Leader	0.0033	-0.0006	-0.0085	0.0083	-0.0075	0.0009	-0.0054	-0.0179	-0.0404
	[0.0040]	[0.0019]	[0.0017]**	[0.0073]	[0.0041]	[0.0072]	[0.0017]*	[0.0116]	[0.0247]
	{0.0130}	{0.0074}	{0.0074}	{0.0204}	{0.0042}*	{0.0084}	{0.0077}	{0.0191}	{0.0130}***
Observations	21487	22461	33440	11180	29552	21000	25932	9998	21216
Within R-squared	0.03	0.02	0.04	0.05	0.04	0.04	0.03	0.04	0.03

Notes:

(1) All regressions include Ethnic Cluster FE, Year of Birth FE, Ethnic Cluster specific time trends and the following controls: Urban, Baby Girl, Multiple Birth, Mother's Age at Birth and its square, Birth Order and its square, Short Birth Spacing.

(2) The Number of Ethnic Clusters in a country refers to the number of ethnic groups whose members became leaders of the country, plus one cluster comprising all the other groups.

(3) Standard errors clustered at the Ethnic Cluster level are shown in square brackets. Standard errors clustered at the Ethnic Cluster * Year of Birth level are shown in curly brackets.

(4) *** denotes significance at the 1% level, ** at the 5% level, * at the 10% level.

Table 6: Ethnic favoritism in education and infant mortality - falsification test

Dependent Variables:	Some Primary Education	Completed Primary Education	Literacy (Women)	Infant Death
	(1)	(2)	(3)	(4)
		Original Regressions		
Coethnic Leader	**0.0247 [0.0068]*** **	**0.0204 [0.0082]** **	**0.0317 [0.0121]** **	**-0.0053 [0.0021]** **
Observations	497746	410208	160180	350768
R-squared	0.36	0.33	0.36	0.04
		Falsification Regressions		
Coethnic Leader (when respondent is aged 14-21)	**0.0119 [0.0079]**	**0.0068 [0.0069]**	**-0.0133 [0.0088]**	
Observations	331362	331362	159147	
R-squared	0.40	0.32	0.36	
Coethnic Leader (two years after baby's birth)				**-0.0015 [0.0028]**
Observations				335329
R-squared				0.04

Notes:

(1) All the regressions include Country FE, Year of Birth FE, Country-Year of Birth FE, Country-Ethnic Cluster FE, Country-Ethnic Cluster specific time trends and the individual controls from Tables 2 and 3.

(2) All the regressions in columns 1 to 3 use data from 18 countries and 64 country-ethnic clusters. All the regressions in column 4 use data from 17 countries and 61 country-ethnic clusters. The number of ethnic clusters in a country refers to the number of ethnic groups whose members became leaders of the country, plus one cluster comprising all the other groups.

(3) The "Original Regressions" are reported for easier comparison. They are identical to the regressions in columns 1-3 of Table 2 and column 1 of Table 3. In these regressions the *Coethnic Leader* variable is computed for the period when the respondent is aged 6-13 (in columns 1 to 3) or for the year in which the baby is born (in column 4).

(4) In the "Falsification Regressions", the original *Coethnic Leader* variable is forwarded eight years (in columns 1-3) or two years (in column 4).

(5) Standard errors clustered at the Ethnic Cluster level are shown in brackets.

(6) *** denotes significance at the 1% level, ** at the 5% level, * at the 10% level.

Table 7: Ethnic favoritism in education and infant mortality - robustness to the exclusion of potentially endogenous leadership transitions

Dependent Variables:	Some Primary Education	Completed Primary Education	Literacy (Women)	Infant Death
	(1)	(2)	(3)	(4)
		Main Sample		
Coethnic Leader	**0.0247 [0.0068]*** **	**0.0204 [0.0082]** **	**0.0317 [0.0121]** **	**-0.0053 [0.0021]** **
Number of Countries and Country-Ethnic Clusters	18, 64	18, 64	18, 64	17, 61
Observations	497746	410208	160180	350768
R-squared	0.36	0.33	0.36	0.04
		Excluding Ethiopia		
Coethnic Leader	**0.0192 [0.0064]*** **	**0.0109 [0.0056]***	**0.0172 [0.0077]** **	**-0.0062 [0.0021]*** **
Number of Countries and Country-Ethnic Clusters	17, 61	17, 61	17, 61	16, 58
Observations	450534	371213	146344	313475
R-squared	0.36	0.33	0.37	0.04
		Excluding the Post-Cold War Transitions		
Coethnic Leader	**0.0225 [0.0077]*** **	**0.0079 [0.0075]**	**0.0199 [0.0102]***	**-0.0066 [0.0040]**
Number of Countries and Country-Ethnic Clusters	12, 50	12, 50	12, 50	11, 47
Observations	333189	281165	112686	222838
R-squared	0.36	0.34	0.38	0.04

Notes:

(1) Coefficients and standard errors for the *Coethnic Leader* variable are shown in bold. Standard errors are clustered at the Ethnic Cluster level.

(2) All the regressions include Country FE, Year of Birth FE, Country-Year of Birth FE, Country-Ethnic Cluster FE, Country-Ethnic Cluster specific time trends and the individual controls from Tables 2 and 3.

(3) The Number of Ethnic Clusters in a country refers to the number of ethnic groups whose members became leaders of the country, plus one cluster comprising all the other groups.

(4) The "Main Sample" regressions are reported for easier comparison. They are identical to the regressions in columns 1-3 of Table 2 and column 1 of Table 3.

(5) The regressions excluding the post-Cold War transitions exclude Benin, Congo-Brazzaville (after 1992), Ethiopia, Malawi, Mali (after 1991) and Niger.

(6) *** denotes significance at the 1% level, ** at the 5% level, * at the 10% level.

Table 8: Explaining the cross-country variation in ethnic favoritism - the role of geographic and fiscal constraints

Dependent Variables:	Some Primary Education	Completed Primary Education	Literacy (Women)	Literacy (Men)	Infant Death
	(1)	(2)	(3)	(4)	(5)
Coethnic Leader	0.040 [0.104]	-0.069 {0.115]	-0.161 [0.147]	0.174 [0.134]	-0.023 [0.023]
CL * Log (Land Area)	**-0.001 [0.008]**	**0.007 [0.009]**	**0.015 [0.012]**	**-0.013 [0.011]**	**0.001 [0.002]**
Coethnic Leader	0.021 [0.010]**	-0.002 [0.008]	0.010 [0.015]	0.001 [0.017]	-0.008 [0.003]***
CL * Distance to Capital for Ethnic Groups in Power (in '00s km)	**0.002 [0.006]**	**0.016 [0.006]****	**0.016 [0.014]**	**0.001 [0.011]**	**0.002 [0.002]**
Coethnic Leader	-0.030 [0.020]	0.003 [0.024]	-0.026 [0.025]	-0.067 [0.027]**	-0.018 [0.012]
CL * Tax Revenue (% of GDP) in 1970-2000	**0.004 [0.002]*****	**0.001 [0.002]**	**0.004 [0.002]*****	**0.005 [0.002]*****	**0.001 [0.0008]**
Coethnic Leader	-0.023 [0.016]	-0.007 [0.019]	-0.047 [0.021]**	-0.058 [0.024]**	-0.021 [0.011]*
CL * Current Revenue, excl. grants (% of GDP) in 1970-2000	**0.003 [0.001]*****	**0.0017 [0.0013]**	**0.005 [0.001]*****	**0.004 [0.001]*****	**0.001 [0.0006]**
Coethnic Leader	-0.016 [0.016]	0.003 [0.017]	-0.055 [0.020]***	-0.036 [0.021]*	-0.016 [0.008]*
CL * Total Public Expenditure (% of GDP) in 1970-2000	**0.002 [0.001]****	**0.001 [0.001]**	**0.004 [0.001]*****	**0.0019 [0.0009]****	**0.0005 [0.0004]**
Coethnic Leader	-0.033 [0.015]**	0.003 [0.019]	-0.047 [0.020]**	-0.049 [0.027]*	
CL * Public Expenditure on Education (% of GDP) in 1970-2000	**0.018 [0.005]*****	**0.006 [0.007]**	**0.025 [0.007]*****	**0.016 [0.007]****	
Coethnic Leader					0.0009 [0.005]
CL * Public Expenditure on Health (% of GDP) in 1990-2000					**-0.0035 [0.0025]**

Notes:

(1) The table shows coefficients and standard errors for *Coethnic Leader* and its interactions with the country-level variables introduced one at a time. Standard errors are clustered at the Ethnic Cluster level.

(2) All the regressions include Country FE, Year of Birth FE, Country-Year of Birth FE, Country-Ethnic Cluster FE, Country-Ethnic Cluster specific time trends and the individual controls from Tables 2 and 3.

(3) All the regressions in columns 1 to 4 use data from 18 countries and 64 country-ethnic clusters. All the regressions in column 5 use data from 17 countries and 61 country-ethnic clusters. The number of ethnic clusters in a country refers to the number of ethnic groups whose members became leaders of the country, plus one cluster comprising all the other groups.

(4) All the regressions in columns 1 to 5 have 497746, 410208, 160180, 57657 and 350768 observations respectively.

(5) All the regressions in columns 1 to 5 have an R-squared of 0.36, 0.33, 0.36, 0.29 and 0.04 respectively.

(6) *** denotes significance at the 1% level, ** at the 5% level, * at the 10% level.

Table 9: Explaining the cross-country variation in ethnic favoritism - the role of political environment

Dependent Variables:	Some Primary Education	Completed Primary Education	Literacy (Women)	Literacy (Men)	Infant Death
	(1)	(2)	(3)	(4)	(5)
Coethnic Leader	0.006 [0.018]	-0.003 [0.020]	-0.020 [0.024]	-0.048 [0.033]	-0.005 [0.002]***
CL * Democracy (Polity2)	**-0.004 [0.004]**	**-0.005 [0.005]**	**-0.012 [0.007]***	**-0.011 [0.007]**	**-0.00004 [0.0004]**
Coethnic Leader	0.025 [0.020]	0.031 [0.025]	0.075 [0.039]*	-0.017 [0.032]	-0.004 [0.006]
CL * Multi-Party Elections	**-0.004 [0.137]**	**-0.083 [0.162]**	**-0.360 [0.254]**	**0.161 [0.225]**	**-0.011 [0.041]**
Coethnic Leader	0.006 [0.008]	0.004 [0.009]	-0.015 [0.013]	-0.011 [0.015]	-0.009 [0.006]
CL * Single-Party Elections	**0.242 [0.127]***	**0.222 [0.158]**	**0.623 [0.219]*****	**0.180 [0.194]**	**0.048 [0.053]**
Coethnic Leader	-0.039 [0.029]	-0.020 [0.029]	-0.041 [0.029]	-0.088 [0.040]**	-0.012 [0.011]
CL * Multi-Party and Single-Party Elections	**0.323 [0.147]****	**0.207 [0.150]**	**0.374 [0.122]*****	**0.464 [0.196]****	**0.033 [0.046]**
Coethnic Leader	0.027 [0.012]**	0.009 [0.012]	0.043 [0.014]***	0.007 [0.016]	-0.006 [0.002]**
CL * Successful Coups	**-0.032 [0.121]**	**0.163 [0.126]**	**-0.173 [0.163]**	**-0.066 [0.162]**	**0.002 [0.030]**
Coethnic Leader	0.018 [0.012]	0.005 [0.012]	0.029 [0.014]**	0.008 [0.019]	-0.002 [0.005]
CL * Attempted Coups	**0.058 [0.076]**	**0.128 [0.072]***	**0.024 [0.070]**	**-0.042 [0.103]**	**-0.026 [0.040]**

Notes:

(1) The table shows coefficients and standard errors for *Coethnic Leader* and its interactions with the country-level variables introduced one at a time. Standard errors are clustered at the Ethnic Cluster level.

(2) All the regressions include Country FE, Year of Birth FE, Country-Year of Birth FE, Country-Ethnic Cluster FE, Country-Ethnic Cluster specific time trends and the individual controls from Tables 2 and 3.

(3) All the regressions in columns 1 to 4 use data from 18 countries and 64 country-ethnic clusters. All the regressions in column 5 use data from 17 countries and 61 country-ethnic clusters. The number of ethnic clusters in a country refers to the number of ethnic groups whose members became leaders of the country, plus one cluster comprising all the other groups.

(4) All the regressions in columns 1 to 5 have 497746, 410208, 160180, 57657 and 350768 observations respectively.

(5) All the regressions in columns 1 to 5 have an R-squared of 0.36, 0.33, 0.36, 0.29 and 0.04 respectively.

(6) *** denotes significance at the 1% level, ** at the 5% level, * at the 10% level.

Table 10: Explaining the cross-country variation in ethnic favoritism - the role of cultural distance

Dependent Variables:	Some Primary Education	Completed Primary Education	Literacy (Women)	Literacy (Men)	Infant Death
	(1)	(2)	(3)	(4)	(5)
Coethnic Leader	0.013 [0.023]	-0.016 [0.023]	-0.050 [0.026]*	0.047 [0.034]	-0.002 [0.008]
CL * Cultural Fractionalization	**0.024 [0.048]**	**0.073 [0.051]**	**0.163 [0.064]****	**-0.089 [0.075]**	**-0.007 [0.017]**
Coethnic Leader	0.022 [0.015]	0.030 [0.016]*	0.052 [0.023]**	-0.020 [0.023]	-0.005 [0.004]
CL * Ethnic minus Cultural Fractionalization	**0.010 [0.050]**	**-0.036 [0.048]**	**-0.078 [0.056]**	**0.084 [0.067]**	**-0.001 [0.013]**
Coethnic Leader	0.032 [0.009]***	0.030 [0.011]***	0.042 [0.017]**	0.008 [0.010]	-0.006 [0.003]**
CL * One Dominant Religion	**-0.025 [0.013]***	**-0.032 [0.012]*****	**-0.033 [0.019]***	**-0.024 [0.022]**	**0.002 [0.004]**
Coethnic Leader	0.023 [0.067]	-0.018 [0.076]	-0.054 [0.097]	-0.031 [0.080]	-0.007 [0.016]
CL * Ethnic Clustering	**0.002 [0.091]**	**0.053 [0.108]**	**0.118 [0.144]**	**-0.031 [0.080]**	**0.002 [0.025]**

Notes:

(1) The table shows coefficients and standard errors for *Coethnic Leader* and its interactions with the country-level variables introduced one at a time. Standard errors are clustered at the Ethnic Cluster level.

(2) All the regressions include Country FE, Year of Birth FE, Country-Year of Birth FE, Country-Ethnic Cluster FE, Country-Ethnic Cluster specific time trends and the individual controls from Tables 2 and 3.

(3) All the regressions in columns 1 to 4 use data from 18 countries and 64 country-ethnic clusters. All the regressions in column 5 use data from 17 countries and 61 country-ethnic clusters. The number of ethnic clusters in a country refers to the number of ethnic groups whose members became leaders of the country, plus one cluster comprising all the other groups.

(4) All the regressions in columns 1 to 5 have 497746, 410208, 160180, 57657 and 350768 observations respectively.

(5) All the regressions in columns 1 to 5 have an R-squared of 0.36, 0.33, 0.36, 0.29 and 0.04 respectively.

(6) *** denotes significance at the 1% level, ** at the 5% level, * at the 10% level.

Appendix 1

Data and Sources

Analysis of education	
Dependent variables	
Some Primary Education	Dummy variable equal 1 for respondents with at least an "incomplete primary education", and 0 for those with "no education". Source: Demographic Health Surveys
Completed Primary Education	Dummy variable equal 1 for respondents with at least a "complete primary education", and 0 for those with "no education" or an "incomplete primary education". Source: Demographic Health Surveys.
Literacy	Dummy variable equal 1 for respondents who are able to read "a whole sentence" or "parts of a sentence", and 0 for those who "cannot read at all". Source: Demographic Health Surveys.
Independent variables	
Coethnic Leader	Measures the share of years in which the respondent's country leader(s) belonged to the respondent's ethnic group when the respondent was between 6 and 13 years old. This index equals 1 if the country leader(s) belonged to the respondent's ethnic group in all the years when the respondent was between 6 and 13; it equals 0 if the country leader(s) and the respondent belonged to different ethnic groups in all the years when the respondent was between 6 and 13; it equals x/7 if the country leader(s) and the respondent shared the same ethnicity in x of the seven years when the respondent was between 6 and 13. Scale 0-1. Source: Constructed by the authors using Goemans et al. (2004), Morrison et al. (1989), Wiseman (1991), Rake (1992, 2001) and Demographic Health Surveys.
Urban	Dummy variable equal 1 for respondents who reside in urban areas and 0 for those who reside in rural areas. Source: Demographic Health Surveys.
Male	Dummy variable equal 1 for male respondents and 0 for female respondents. Source: Demographic Health Surveys.
Background variables	
Age	Respondent's age (in years). Source: Demographic Health Surveys.
Year of Birth	Respondent's year of birth. Source: Demographic Health Surveys.

Data and Sources (continued)

Analysis of infant mortality	
Dependent variable	
Infant Death	Dummy variable equal 1 for children who died during the first year of their lives, and 0 otherwise. Source: Demographic Health Surveys.
Independent variables	
Coethnic Leader	Dummy variable equal 1 for children who were born when the country's leader was their mother's coethnic, and 0 for those who were born when their mother and the country's leader belonged to different ethnic groups. Sources: Constructed by the authors using Goemans et al. (2004), Morrison et al. (1989), Wiseman (1991), Rake (1992, 2001) and Demographic Health Surveys.
Urban	Dummy variable equal 1 for mothers who reside in urban areas and 0 for those who reside in rural areas. Source: Demographic Health Surveys.
Baby Girl	Dummy variable equal 1 if the new-born child was a girl and 0 if he was a boy. Source: Demographic Health Surveys.
Multiple Birth	Dummy variable equal 1 for children who were born in a multiple birth (i.e., twins, triplets etc), and 0 for those who were born in a single birth. Source: Demographic Health Surveys.
Mother's Age at Birth	Mother's age (in years) when she gave birth to the child. Source: Demographic Health Surveys.
Birth Order	Child's birth order of his/her mother. Equals 1 for the first child, 2 for the second child etc. Source: Demographic Health Surveys.
Short Birth Spacing	Dummy variable equal 1 if the child was born less than 24 months after the previous birth given by his/her mother (counting twins as one birth), and 0 otherwise. Source: Demographic Health Surveys.
Background variable	
Year of Birth	Child's year of birth. Source: Demographic Health Surveys.

Data and Sources (continued)

Country-level variables	
Log (Land Area)	Logarithm of a country's land area (in square kilometers). Land area is a country's total area excluding area under inland water bodies. In most cases the definition of inland water bodies includes major rivers and lakes. Source: Based on World Development Indicators (2003).
Distance to Capital for Ethnic Groups in Power (in '00s km)	Average distance (in hundreds kilometers) between the country's capital city and the home areas of ethnic groups whose members became the country's leaders. Source: Constructed by the authors using Goemans et al. (2004), Morrison et al. (1989), Wiseman (1991) and Rake (1992, 2001).
Tax Revenue (% of GDP) in 1970-2000	Average tax revenue (as percent of the country's GDP) for the years 1970-2000. Source: Based on World Development Indicators of the World Bank (2003).
Current Revenue, excluding grants (% of GDP) in 1970-2000	Average current revenue, excluding grants (as percent of the country's GDP) for the years 1970-2000. Source: Based on World Development Indicators of the World Bank (2003).
Total Public Expenditure (% of GDP) in 1970-2000	Average total public expenditure (as percent of the country's GDP) for the years 1970-2000. Source: Based on World Development Indicators of the World Bank (2003).
Public Expenditure on Education (% of GDP) in 1970-2000	Average public expenditure on education (as percent of the country's GDP) for the years 1970-2000. Source: Based on World Development Indicators of the World Bank (2003).
Public Expenditure on Health (% of GDP) in 1990-2000	Average public expenditure on health (as percent of the country's GDP) for the years 1990-2000. Source: Based on World Development Indicators of the World Bank (2003).
Cultural Fractionalization	An index equal to one minus the expected linguistic resemblance of the languages spoken by two individuals selected at random from a country. Linguistic resemblance between two languages is measured by Greenberg's (1956) resemblance factor. The resemblance factor is 0 when the two languages come from completely unrelated families (like Indo-European and Bantu); it is 1 when the two individuals speak exactly the same language; in between, it is an increasing function of the number of shared classifications between the two languages. The more similar are the languages spoken by the different ethnic groups in a country, the lower is the *Cultural Fractionalization* index. Source: Fearon (2003).

Data and Sources (continued)

Ethnic minus Cultural Fractionalization	A measure of linguistic distance between the ethnic groups in a country, computed as the difference between Fearon's (2003) indices of *Ethnic Fractionalization* and *Cultural Fractionalization* (see above). The *Ethnic Fractionalization* index is defined as the probability that two individuals selected at random from a country will be from different ethnic groups. When all the groups in a country speak completely unrelated languages, the country's *Cultural Fractionalization* and *Ethnic Fractionalization* indices will be equal. The more similar are the languages spoken by the different groups, the lower is the country's *Cultural Fractionalization* vis-à-vis its *Ethnic Fractionalization.* Thus, a larger difference between the two indices indicates greater linguistic similarities among the country's ethnic groups. Source: Based on Fearon (2003).
One Dominant Religion	Dummy variable equal 1 for countries where at least 85 percent of the population is of the same religion and 0 otherwise. Source: Based on Alesina et al. (2003).
Ethnic Clustering	An index of ethnic clustering. Related to the average entropy of the language shares of each area of the country, as normalized by the entropy of the language shares of the country as a whole. Higher levels are associated with higher levels of ethnic clustering (i.e., segregation). Source: Matuszeski and Schneider (2006).
Democracy (Polity2)	Average Polity2 score in the Polity IV dataset for years covered by the main education sample or the infant mortality sample. Varies between -10 (strongly autocratic) and +10 (strongly democratic). Source: Based on Marshall and Jaggers (2004).
Multi-Party Elections	Number of years with multi-party elections during the period covered by the main education sample or the infant mortality sample as a fraction of the total number of yeas in that period. Source: Based on African Election Database.
Single-Party Elections	Number of years with singe-party elections during the period covered by the main education sample or the infant mortality sample as a fraction of the total number of yeas in that period. Source: Based on African Election Database.
Multi-Party and Single-Party Elections	Number of years with multi-party or single-party elections during the period covered by the main education sample or the infant mortality sample as a fraction of the total number of yeas in that period. Source: Based on African Election Database.
Successful Coups	Average number of successful coups (per year) in years covered by the main education sample or the infant mortality sample. Source: Based on McGowan (2007).
Attempted Coups	Average number of attempted (i.e., successful and unsuccessful) coups (per year) in years covered by the main education sample or the infant mortality sample. Source: Based on McGowan (2007).

Appendix 2

Table A1: African countries and DHS surveys used in the analysis

	Main Education Sample				*Infant Mortality Sample*			
Country	Year of DHS survey	Time period covered	Leaders in power	Ethnic groups in power	Year of DHS survey	Time period covered	Leaders in power	Ethnic groups in power
Benin	2001	1960 - 2001	4	2	2001	1964 - 2000	3	2
Burkina Faso	2003	1960 - 2003	4	3	1998/99	1962 - 1998	4	3
Cameroon	2004	1960 - 2004	2	2	1998	1960 - 1997	2	2
Centr Afr Rep	1994/95	1960 - 1993	3	2	1994/95	1960 - 1993	3	2
Chad	2004	1960 - 2004	5	2	1996/97	1960 - 1996	5	2
Congo-Brazz	2005	1960 - 2005	6	3	2005	1968 - 2004	4	2
Ethiopia	2005	1941 - 2005	3	2	2005	1968 - 2004	3	2
Gabon	2000	1960 - 2000	3	2				
Ghana	2003	1952 - 2000	4	4	1993	1957 - 1993	4	4
Guinea	2005	1958 - 2005	2	2	1999	1961 - 1998	2	2
Kenya	2003	1963 - 2002	2	2	1993	1963 - 1992	2	2
Malawi	2004	1966 - 2004	2	2	2004	1967 - 2004	2	2
Mali	2001	1960 - 2001	3	3	1987	1960 - 1986	2	2
Niger	2006	1960 - 2006	5	4	2006	1969 - 2005	5	4
Nigeria	2003	1960 - 2003	7	4	2003	1965 - 2002	7	4
Senegal	2005	1960 - 2005	3	2	1997	1961 - 1996	2	2
Togo	1998	1960 - 1998	3	2	1988	1960 - 1987	3	2
Uganda	1995	1962 - 1995	4	3	1995	1962 - 1994	4	3

Notes:

(1) For the main education sample, the "time period covered" refers to the years in which at least some respondents were between 6 and 13 years old.

(2) For the infant mortality sample, the "time period covered" refers to the years in which at least some children of the interviewed mothers were born.

(3) "Leaders in power" only include the leaders who stayed in power at least three years. A new (nonconsecutive) term in office of the old leader is counted as a new "leader".

Table A2: Summary statistics

Sample: Education - Main	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Dependent variables					
Some Primary Education	497784	0.587	0.492	0	1
Completed Primary Education	410225	0.293	0.455	0	1
Independent variables					
Coethnic Leader	497784	0.216	0.396	0	1
Urban	497784	0.360	0.480	0	1
Male	497746	0.468	0.499	0	1
Background variables					
Age	497784	23.644	13.321	7	77
Year of Birth	497784	1979.078	13.479	1928	1999
Sample: Education - Women	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Dependent variable					
Literacy	160180	0.407	0.491	0	1
Independent variables					
Coethnic Leader	160180	0.212	0.384	0	1
Urban	160180	0.371	0.483	0	1
Background variables					
Age	160180	28.116	9.393	15	49
Year of Birth	160180	1974.124	9.846	1947	1991
Sample: Education - Men	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Dependent variable					
Literacy	57657	0.627	0.484	0	1
Independent variables					
Coethnic Leader	57657	0.205	0.381	0	1
Urban	57657	0.394	0.489	0	1
Background variables					
Age	57657	30.054	11.334	15	59
Year of Birth	57657	1972.432	11.498	1943	1991
Sample: Infant Mortality	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Dependent variable					
Infant Death	350768	0.098	0.297	0	1
Independent variables					
Coethnic Leader	350768	0.198	0.399	0	1
Urban	350768	0.274	0.446	0	1
Baby Girl	350768	0.491	0.500	0	1
Multiple Birth	350768	0.031	0.174	0	1
Mother's Age at Birth	350768	24.663	6.377	7.250	48.833
Mother's Age at Birth squared	350768	648.925	342.336	52.563	2384.694
Birth Order	350768	3.479	2.353	1	18
Birth Order squared	350768	17.640	23.231	1	324
Short Birth Spacing	350768	0.232	0.422	0	1
Background variable					
Year of Birth	350768	1988.260	8.812	1957	2005

Table A3: Summary statistics for the country-level variables

Explanatory variables	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Log (Land Area)	18	12.788	0.952	10.904	14.052
Distance to Capital for Ethnic Groups in Power (in '00s km)	18	1.506	1.076	0.250	4.850
Tax Revenue (% of GDP) in 1970-2000	18	13.798	4.904	6.063	24.577
Current Revenue, excl. grants (% of GDP) in 1970-2000	18	16.863	6.820	6.751	32.193
Total Public Expenditure (% of GDP) in 1970-2000	18	21.899	7.510	12.289	36.069
Public Expenditure on Education (% of GDP) in 1970-2000	18	3.273	1.311	1.418	6.230
Public Expenditure on Health (% of GDP) in 1990-2000	18	1.760	0.590	0.584	3.139
Cultural Fractionalization	18	0.789	0.090	0.622	0.930
Ethnic minus Cultural Fractionalization	18	0.261	0.137	0.037	0.535
One Dominant Religion	18	0.222	0.428	0	1
Ethnic Clustering	18	0.733	0.089	0.540	0.851
Years covered by the main education sample					
Democracy (Polity2)	18	-4.627	1.663	-7.317	-1.614
Multi-Party Elections	18	0.120	0.045	0.048	0.196
Single-Party Elections	18	0.085	0.051	0	0.178
Multi-Party and Single-Party Elections	18	0.205	0.055	0.118	0.317
Successful Coups	18	0.059	0.053	0	0.143
Attempted Coups	18	0.125	0.100	0	0.382
Years covered by the infant mortality sample					
Democracy (Polity2)	17	-4.715	2.445	-7.368	2.946
Multi-Party Elections	17	0.099	0.048	0	0.189
Single-Party Elections	17	0.088	0.058	0	0.211
Multi-Party and Single-Party Elections	17	0.187	0.054	0.121	0.316
Successful Coups	17	0.071	0.058	0	0.162
Attempted Coups	17	0.139	0.102	0	0.394

Country-by-Country Estimates of the Effect of Ethnic Favoritism on:	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Some Primary Education	18	0.029	0.038	-0.015	0.136
Completed Primary Education	18	0.020	0.046	-0.086	0.105
Literacy (Women)	18	0.042	0.056	-0.032	0.183
Literacy (Men)	18	-0.005	0.072	-0.235	0.102
Infant Death	17	-0.007	0.015	-0.040	0.023

Notes:

(1) The country-by-country estimates of the effects of ethnic favoritism are from Tables 4 and 5. These estimates are not used in any of the regressions, but their summary statistics may be helpful in interpreting the results in Tables 8-10.