

# The Effect of Ethnic and Religious Conflict on Growth

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## Abstract

This paper analyzes the role that different dimensions of ethnicity plays in the process of growth of a country. We cover essentially four issues. First, and in contrast with the ethnic characteristics considered in other studies, this paper emphasizes the importance of religious conflict in the explanation of economic growth. Second we consider an index of polarization, instead of the traditional index of fragmentation, in order to measure conflict. We provide a theoretical justification for the index based on rent-seeking models. Third, we elaborate a database on religious diversity within countries and finally we analyze the channels through which religious polarization affects growth. The main finding is that religious conflict, measured as a polarization index, is an important factor in explaining economic growth and the so called "Africa's growth tragedy". We show that, when religious polarization is included in growth regressions together with ethnolinguistic fragmentation this last one turns out to be insignificant while the former is an important determinant of economic growth and, in particular, of the poor economic performance of Africa (JEL: O11, Z12, O55).

*Keywords:* Religious polarization, Africa's growth tragedy, growth regression.

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# 1 INTRODUCTION

The study of the determinants of growth has attracted a lot of attention in recent years. The economic literature has concentrated on the effect of economic factors although since the beginning of the new surge of empirical growth some authors, for example Barro (1991), have also considered non-economic factors. One important element among those non-economic factors is the ethnic diversity of a country. Ethnic conflict is a recurrent phenomenon affecting many countries. Ethnicity is at the center of politics in divided societies while ethnic conflicts lead to problems inside countries and international tensions.

In the economic literature the study of ethnic conflict and how this phenomenon can affect economic processes has not attracted a lot of attention. Low investment, low level of education, high population growth, high levels of political instability, etc have become the major answers to explain why some economies grow slowly. However, ethnic diversity could also be a major explanation of low investment, political instability and poor economic performance.

In order to construct an indicator of potencial ethnic conflict we have to address two important questions: first it is necessary to clarify the concept of ethnicity in order to select the variables that capture ethnic diversity. Second, we need to justify the use of a particular index. Is it social fragmentation or social polarization that makes ethnic tensions stronger? To answer this question we need to study the mechanism through which ethnic groups interact and analyze in which situations tensions arise more easily.

This paper analyzes the different dimensions of the concept of ethnicity in order to provide a detailed account of the relative explanatory power of each of those dimensions. We cover essentially four issues: the importance of religion as an ethnic characteristic, the construction of a theoretically based index of religious polarization, the elaboration of data of religious diversity within countries, and the channels through which religious polarization affects growth. It is not our objetive to consider

all the possible specifications for the basic growth regression that have been proposed in the literature<sup>1</sup> but to chose one generally used and compare the performance of alternative measures of potential ethnic conflict.

First, and in contrast with the ethnic characteristic considered in many other studies, we emphasize the importance of religious polarization in the explanation of economic growth. Most of the economic literature has limited the extent of ethnicity to ethnolinguistic diversity (Mauro 1995, Easterly and Levine 1997). However, this is just one of three basic dimensions of ethnicity together with race and religion.

Second, we provide theoretical support for the construction of an index of polarization that captures the level of religious tensions. The measures frequently used in the literature to quantify ethnic diversity are fragmentation indices. This choice has very important consequences because it implies that ethnic tension increases with the number of ethnic groups. We argue that this does not have to be the case for all ethnic characteristics. We show that polarization indices are more appropriate in the case of religious diversity. We show that the effect on growth of these indices of polarization are very robust to alternative estimation procedures, the data used for its construction and different sets of explanatory variables. However, not all religions should be treated symmetrically because some, like animist cults, are very different from large religions. In this case we propose the construction of an index of animist diversity that turns out to have a large explanatory power for Africa's growth tragedy. We find that when religious diversity measures are included, the ethnolinguistic diversity measure employed by Easterly and Levine (1997) turns out to be insignificant suggesting that the former may be more important in explaining the poor economic performance of Africa.

One of the most important points of this paper is to emphasize why there is an important relation between ethnic polarization, mainly constructed using religion as the basic ethnic dimension, and economic performance. Horowitz (1985) points out

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<sup>1</sup>See Sala-i-Martin (1997) or Doppelhofer et al (2000).

that “in divided societies, ethnic conflict is at the center of politics. Ethnic divisions pose challenges to the cohesion of the states and sometimes to peaceful relations among states. Ethnic conflict strains the bonds that sustain civility and is often at the root of violence that results in looting, death, homelessness, and the flight of large numbers of people. In divided societies, ethnic affiliations are powerful, permeative, passionate, and pervasive<sup>2</sup>”. In religious divided societies, segmental cleavages are caused by religious differences. That is why religious diversity plays an important role not only as a social cleavage that derives in social tensions but also in politics. It is through these channels that the paper emphasizes the importance of religious polarization in the process of development of countries, as one of the most important social conflicts in the world.

Third, we construct a database on religious diversity within countries that tries to overcome the common criticisms to the World Christian Encyclopedia data<sup>3</sup> combining several sources of information, including national sources.

Finally this paper investigates the channels through which religious tensions affect growth to evaluate the importance of the direct effect versus the indirect effects.

This paper is divided in seven sections. The first one is this introduction. Section two presents a brief review of the literature on religion and economic development. The third section constructs an index of religious conflict using theoretical results on rent seeking models. Section four discusses the data available for constructing the index proposed in section three. The fifth section analyzes the robustness of the religious polarization index under alternative specifications, estimation procedures and data used in its construction. In this section we also consider a specification where investment, government expenditure and civil wars are treated as endogenous in order to explain the channels through which religious polarization affects growth. Another test for the robustness of the results is presented in section six where there

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<sup>2</sup>Donald Horowitz, (1985). p.14.

<sup>3</sup>This is the source of data on religion used most widely of the literature.

is a comparison of the explanatory power of religious polarization versus other ethnic characteristics. Finally, section seven concludes.

## 2 A REVIEW OF THE LITERATURE

The level of economic development of a country is affected by many factors. Economists tend to emphasize the impact of economic variables but political<sup>4</sup> and social factors can also be very important determinants of growth<sup>5</sup>. Among the social factors the ethnic characteristics of a society such as language, religion, and race have only been used in a few studies. Easterly and Levine (1997) use the index of linguistic fragmentation of Taylor and Hudson (1972) as a measure of ethnic diversity in order to explain Africa's growth tragedy. This variable measures the probability that two randomly selected individuals in a country will belong to different ethnolinguistic groups. They test the hypothesis that African nations unusually high ethnic fragmentation explains a significant part of their poor economic performance. When this ethnic variable is included in growth regressions the significance of the African dummy weakens, which they suggest is an indication that ethnic divisions have played a significant role in Africa's growth tragedy. Mauro (1995) also uses this data to examine the relation between ethnolinguistic fragmentation and long-run growth. He argues that ethnic conflict may lead to political instability and, in extreme cases, to civil war. Moreover, he also argues that ethnolinguistic fragmentation may affect investment not only by increasing corruption and political instability, but also directly because it might slow down the diffusion of ideas and technological innovations within a country.

There are very few studies in the empirical growth literature that look at the role of religion from a macroeconomic perspective. Questions like the effect of religion and religious diversity on economic prosperity and welfare have only very recently started

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<sup>4</sup>See Alesina and Rodrick (1994).

<sup>5</sup>Barro(1991,1997).

to receive a formal treatment.

This paper examines the relevance of the existence of different religious groups on the process of economic growth of a country. In the study of the relationship between social conflicts and growth one of the most important determinants is religious diversity. High religious tensions can be found in Lebanon and Israel, where there are conflicts among religious communities; in Algeria with fights against extremist Muslims groups; in Nigeria where there are conflicts among Islamic groups; in Sudan with the secession of the Christian and animist population; in Ethiopia, with tensions between government and Muslims; in Malaysia with tension between Christians and Muslims; in India, between Hindus and Muslims, and many others. The main focus of this paper is to propose an index of potential religious conflict theoretically grounded and to study the role of that index in the process of development of a country. The main conclusion is that religious conflict is highest in a situation in which there are two groups with the same relative size, and that this polarization of the religious groups, called religious conflict, is an important social factor in the explanation of growth and therefore it can be also an important explanation for Africa's growth tragedy. The results also show the importance of these variables compared with other ethnic variables used in the literature as a proxy of ethnic diversity.

### **3 AN INDEX OF RELIGIOUS CONFLICT**

The objective of this section is to construct an index that captures religious conflict using theoretical arguments. In order to do that we first justify why religion is a relevant ethnic characteristic to be focus on. Secondly we provide a theoretical justification for the use of polarization indices instead of the usual fragmentations measures.

### 3.1 Why religion?

Many conflicts related with religious differences arise every day in our world. Even though economists have not paid special attention to the issue of religion in the explanation of civil wars many researchers in political science have emphasized the importance of religious differences as cause of ethnic conflicts. These facts have also become an important focus of attention in the debate generated around the theory of Samuel Huntington (1996). The collapse of the USSR and its satellite countries dynamited the precarious international balance which appeared in the Yalta conference at the end of World War II. Huntington (1996) proposes another model to interpret the new reality of the world, based on the fact that the explanatory factors are not ideological but cultural. People identify themselves in function of their cultural identity. These new conflicts will tend to have originated in the lines of fracture between civilizations. Following Huntington, we have to grant to religions a fundamental role in world politics. The faith and the family, the blood and the beliefs are the things with which people identify themselves, for which they fight and die. Therefore in the future we may see a large conflict among civilizations<sup>6</sup>. People belonging to different religions have different visions of the relation between God and humans, between individuals and groups, between citizenship and state, between father and son, between husband and wife; moreover they have also different visions of the relative importance of their rights and responsibilities, of freedom and authority, of equality and hierarchy. These differences are the product of centuries of history, and they do not disappear easily. The differences among civilizations have been the cause of the longest and most violent conflicts in history.

One of the most important causes of the conflict among civilizations is that their characteristics and differences are less mutable than other factors. Therefore while it may be possible to reach an agreement in political or economic issues it is much more difficult, for instance, to compromise in religious matters. More than other

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<sup>6</sup>The attacks of September 11 and their aftermath seem to support this theory.

dimensions, religion discriminates and differentiates humans in a sharp and exclusive way. A person can be half French and half Saudi Arab and at the same time be a citizen of both countries. However it is difficult to be half Catholic and half Muslim. In the old Soviet Union, communists could become democrats and poor could become rich. However, it is unlikely that Muslim will become Christian or vice versa. In the class and ideological conflicts, the key question was, "which side are you fighting with?" and people can decide and can change sides. In the conflict among civilizations the question is "what are you?" and you can not change sides easily.

Horowitz (1985) points out that in plural societies in Asia, Africa and the Caribbean, parties tend to be organized along ethnic lines. In Western Europe and North America, religion, social class and language are the basic dimensions of the situation of a political party. Lijphart (1984) found, in a sample of twenty-two democratic regimes, that the two dimension that most frequently differentiate systems are the socioeconomic and the religious.

These authors, among others, claim that religious differences are more important than language differences as a social cleavage that can develop into a conflict. There are two basic reasons why religious differences can generate more violence than other social cleavages. First, there is not doubt of the exclusivity of religion. One can speak two or more languages, but you can only have one religion. Religion can be used as a sign of identity, stronger than language in the sense that you exclude absolutely the ones from other religion, while speaking two languages diffuse the division line among groups. Second, religious differences, which are the base of the differences among civilizations, imply different ways of understanding the world, social relationships...etc. Even if different groups speak different languages, they could share the same way of understanding the world and the relationships if they belong to the same civilization. However, this is more difficult for people of different religions.



## 3.2 Why polarization?

The relationship between religious diversity and social conflict is not an easy one. Initially, one could think that the increase in religious diversity increases the likelihood of social conflicts. However, this does not have to be the case. Religious differences are important social cleavage in the society. As such different groups have different preferences that can generate tensions among them. For this reason they are willing to spent resorces trying to obtain influence in political decisions. Rent-seeking models are a suitable tool to analyze this kind of situation. Conflict can be described as a situation in which asymmetric players, with an exogenous initial situation, fight to obtain a prize, in this case power, which does not increase with the resources spent. Following Baik (1992) the efforts that players spent fighting with each other in rent-seeking contests can be interpreted as a social cost. The key point is then to find which is the distribution of social groups that generates the maximum social cost, defined as the sum of the resources spent by all the social groups. Different applications of the rent-seeking model show that social cost, or social conflict, is maximum under a bimodal distribution provided that cross-groups preferences satisfy a symmetry condition<sup>7</sup>.

It is easy to justify why societies with social cleavages have a high probability of social conflicts if the underlying distribution of the groups is close to a bimodal distribution. In a country in which there's only one religion there's no religious interaction. By contrast if there are as many religions as individuals there is no gain in fighting against each other. Therefore, when the number of religions increases from the minimum religious tensions increases. However, there must be a point at which increasing the number of religions will reduce tensions. Therefore we can conjecture that there must be a point of maximum tension. In fact, in a theoretical setup, Esteban and Ray (1999) find that the extent of conflicts is closely connected with the bimodality of the underlying distribution of agent's characteristics.

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<sup>7</sup>See Esteban and Ray (1999).

There are also political economy considerations. If different religious groups have opposite interests, the government can use religion as a criteria to take decisions in order to benefit the group that represent a sufficiently high proportion of people. The government will have more incentives to behave in this way, the closer is the size of the group to majority. In a situation in which the population is characterised by two different religious collectives (50%; 50%), the government has more possibilities to obtain a strong support satisfying the interest of one of the group, compared with a situation in which there are three different religious groups (33%; 33%; 33%). It is unlikely that the government will take measures based in religious differences in order to satisfy only a third of the population because it will have 2/3 of the population against them. The closer to (50%; 50%) is the division of the population in religious collectives, the more probable is that government behave using religious differences and, therefore, more probable is that people react.

In addition each religious group sees the other religious collectives as a threat. The fact that one religious group see the others as a threat implies that it has to reaffirm its identity as a group. This implies a situation of tensions among these social groups, which generates social frictions, that can promote instability in the country. Initially, a religious group see other collectives more as a threat the larger is the size of the other group relative to its own size. For instance, in a country with two religions, each group is for the other a threat more dangerous than in a country with three religions of equal size. Therefore the closer is the country to the (50%; 50%) situation, the higher are social frictions.

Let's analyse a situation in which there exist only two religious groups. One of them includes the majority of the population. Obviously, the minority group sees the majority as a big threat. So it will tend to reaffirm its identity. In principle, for the majority group, the minority is not a threat, so it will not have the necessity to reaffirm its identity. In this context there exists what is called the minorities fear, which leads to the growth of religious nationalism, fanatical groups, and religious

”integrisme” inside the majority group. These are all reactions against the minorities that want to annihilate them and destroy all their religious signs. This fact implies the existence of social friction since the minority group is reaffirming its identity only for being a minority. Moreover, the larger is the size of the minority the more affraid is the majority group and, therefore, the stronger the reactions against minorities will be. This means that social frictions will be higher. Therefore, the closer to the (50%;50%) situation, the larger will be the reactions against the minorities, which implies a high level of social friction.

### 3.3 Towards an index of religious conflict

The main result of rent-seeking models points out that social cost is the highest, and social tensions emerge more easily, when the population is distributed in two groups of equal size. Therefore a natural way to construct an index that reflects the level of tensions and that is linked with these models, would be to construct an indicator of distance from bimodality. What we want to capture is the distance of any distribution of religious groups from the situation that leads to the maximum conflict.

In order to construct this index we follow several steps:

a) First we consider the deviations of the proportion of each religion from the maximum, 0.5. In order to weight equally positive and negative differences from 0.5 we take the square of the difference.

b) Then, we weight each of those deviations by the proportion that each religion represents, in order to give to each group a weight proportional to its size.

$$IRC1 = 1 - \sum_{i=1}^N \left( \frac{0.5 - \pi_i}{0.5} \right)^2 \pi_i \quad (1)$$

This index provides a ranking order of the different distributions of the population<sup>8</sup>.

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<sup>8</sup>The properties of the index IRC1 are similar to the measure of conflict in contest in Esteban

It is an index of polarization with the following properties:

**Property 1:** Suppose that there are two groups with size  $\pi_1$  and  $\pi_2$ . Take any one group and split it into  $m \geq 2$  groups in such a way that  $\pi_1 = \tilde{\pi}_1 \geq \tilde{\pi}_i \forall_{i=2, \dots, n+1}$ , where  $\tilde{\pi}$  is the new vector of population sizes, and clearly  $\sum_{i=2}^{n+1} \tilde{\pi}_i = \pi_2$ . Then polarization under  $\tilde{\pi}$  is smaller than under  $\pi$ .

**Proof:** We now compute

$$\begin{aligned} IRC1(N=2) - IRC1(N=n+1) &= \sum_{i=2}^{n+1} (0.5 - \tilde{\pi}_i)^2 \tilde{\pi}_i - (0.5 - (\sum_{i=2}^{n+1} \tilde{\pi}_i))^2 (\sum_{i=2}^{n+1} \tilde{\pi}_i) = \\ &= \sum_{i=2}^{n+1} \tilde{\pi}_i \left\{ (0.5 - \tilde{\pi}_i)^2 - (0.5 - (\sum_{j=2}^{n+1} \tilde{\pi}_j))^2 \right\} = \sum_{i=2}^{n+1} \tilde{\pi}_i \left\{ (0.5 - \tilde{\pi}_i)^2 - (0.5 - \pi_2)^2 \right\} \end{aligned}$$

Notice that,  $h(\pi) = (1/2 - \pi)^2$  is a convex function with  $h'(\pi) = 2\pi - 1$  and  $h''(\pi) = 2$ .

By assumption

$$\tilde{\pi}_i \leq \min\{\pi_1, \pi_2\} \leq 1/2 \quad i=2, \dots, n+1$$

Because of the symmetry of  $h$  around  $1/2$  we have that  $h(\pi_1) = h(\pi_2)$ . Since for  $\pi < 1/2$   $h$  is strictly decreasing, we have that  $h(\tilde{\pi}_i) > h(\pi_2)$ . Therefore,  $IRC1(N=2) > IRC1(N=n+1)$ . ■

Observe that (1) can be written as  $IRC1 = \sum_{i=1}^N [1/N - 4(1/2 - \pi_i)^2 \pi_i] = \sum_{i=1}^N f(\pi_i)$ .

The behaviour of the index critically depends on the properties of the  $f$  function.

By differentiation one can compute  $f'$  and  $f''$ .

$$f' = [-3\pi_i^2 + 2\pi_i - 1/4]4 \quad f'' = 6[1/3 - \pi]$$

The  $f$  function reaches a minimum for  $\pi = 1/6$  and a maximum for  $\pi = 1/2$ . It is convex for  $\pi < 1/3$  and concave for  $\pi > 1/3$ . (see figure 1).

Understanding the shape of the function it is crucial to understand the properties of the proposed polarization index. The intuition behind is clear and simple. If we transfer population from one group to another the effect on the conflict level

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and Ray (1999).

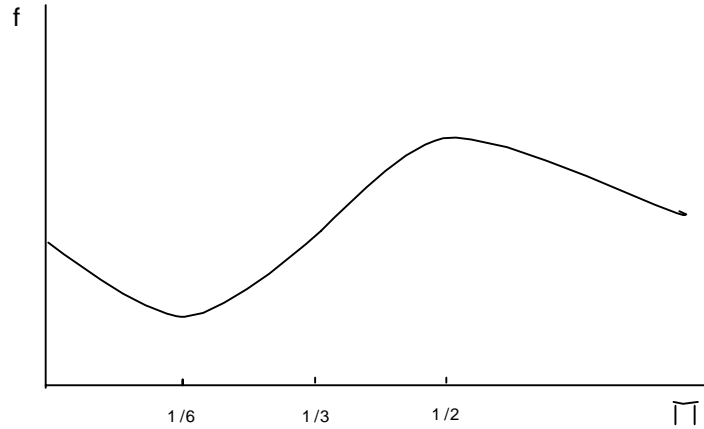


Figure 1:

is different depending on the size of the groups. Imagine a population composed by three groups distributed in the following way  $(0.5, 0.25, 0.25)$ . If we transfer population from one small group to the other, the conflict increase. We are in the concave part of the function. However if the distribution is  $(0.45, 0.45, 0.1)$ , and we transfer population from one big group to the other, the conflict decrease. This is because we are in the convex region. What is the intuition behind this result? In the first case, even that transfer implies that the distribution is more unequal in the new situation: one of the small groups is larger, respect to the big group, which means that we are closer to polarization. In the second case, the transfer implies that one of the big oppositors became smaller, and therefore the new situation is less polarized. Notice that the results implies that this index does not satisfies the properties of the Lorenz curve about concavity. In a Lorenz curve this effect of moving people between small or big groups is the same. It is important to notice another difference with the Lorenz curve dominance, which is that our measure is global and the Lorenz curve is not. While the Lorenz criteria stabilshes the impact on inequality of a local transfer

independently of the shape of the rest of the distribution, in our case the effect on polarization of the transfer population from a group to another can not be established without knowing the entire distribution<sup>9</sup>.

**Property 2:** It attains its maximum at the bipolar symmetric distribution.

**Proof:** Step 1: Suppose there are  $N$  groups of any size. Take the biggest one and separate it from the other. Then merge all the other groups into one group. By property 1 polarization increases. That is, the new distribution has more polarization than the original one. This means that, given any distribution of  $N$  groups, I can always find another distribution on two groups where polarization is larger.

Step 2: Suppose now that we only have two groups of  $\pi$  and  $(1 - \pi)$  sizes. The polarization index  $IRC1 = 1 - \sum_{i=1}^2 (0.5 - \pi_i)^2 \pi_i / 0.25 = 1 - 4\{(0.5 - \pi_1)^2 \pi_1 + (0.5 - (1 - \pi_1))^2 (1 - \pi_1)\}$

Can be readily verified that this expression is maximized at  $\pi_1 = \pi_2 = 0.5$

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**Property 3:** Suppose we start with population equally distributed over two groups. Let us transfer  $x$  from from each originary group to two newly created groups. Then the index is non-monotonic with respect to  $x$ , and, it reaches its minimum at four equally sized groups.

**Proof:** Start with two groups of size  $1/2$  each, and shift  $x$  from each group into a new group. Now the polarization index is the following:

$$IRC1 = 1 - 4\{2(0.5 - x)^2 x + 2x^2(0.5 - x)\} = 1 - 4(1/2 - x)x$$

This is minimized at  $x = 1/4$ .

Therefore, the index is non-monotonic. Reaches its minimum at 4 equally sized groups. ■

**Property 4:** Consider the population divided into  $N$  groups of size  $1/N$ . Polarization goes down with  $N$ .

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<sup>9</sup>This is a property that also has the measure of polarization proposed by Esteban and Ray (1994).

Indeed, the index  $IRC1 = 1 - \sum_{i=1}^N (0.5 - \pi_i)^2 \pi_i / 0.25 = 1 - 4N(1/2 - 1/N)^2(1/N) = 1 - 4(1/2 - 1/N)^2$

Clearly, the index is strictly decreasing in  $N$ .

**Property 5:** If we start with a uniform distribution over  $N$  groups, any merging of  $k$  adjacent groups will increase polarization. This is a direct corollary of property 4.

The index  $IRC1$  belongs to the class of polarization measures. In order to show that the results obtained in the regression analysis are robust to other polarization indices, in the empirical applications we compare the performance of the index of religious polarization measured by  $IRC1$  with the polarization measure proposed by Esteban and Ray (1994). Their original index was a measure of polarization of income distribution but it can also be the base for an index of conflict. They argue that the most polarized situation corresponds to an income distribution that is bimodal. When using Esteban and Ray's measure we denoted religious polarization by  $IRC2$ . Before applying the measure proposed by Esteban and Ray (1994) it has to be showed that the polarization of the religious distribution of the society exhibits the basic features that Esteban and Ray argue that the polarization of a distribution of individual attributes must exhibit:

FEATURE 1: There must be a high degree of homogeneity within groups.

Clearly in the religious distribution, there is homogeneity of believes, and in most cases, also homogeneity in ways of living following those believes<sup>10</sup>.

FEATURE 2: There must be a high degree of heterogeneity across groups.

In the religious distribution there is heterogeneity of believes since the individuals of different religious groups believe in a different religion.

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<sup>10</sup>However, in some large religions there may be conflict among different groups. Section 4 presents a discussion of this issue.

FEATURE 3: There must be a small number of significantly sized groups. In particular, groups of insignificant size (for instance isolated individuals) carry little weight.

The religious distribution also satisfies this feature because in the data we never observe more than twelve significantly sized groups in a country.

The polarization measure proposed by Esteban and Ray (1994) is:

$$P^*(\pi, Y) = K \sum_{i=1}^n \sum_{j=1}^n \pi_i^{1+\alpha} \pi_j |y_i - y_j|$$

for some constant  $K > 0$  and  $\alpha \in (0, \alpha^*]$  where  $\alpha^* \simeq 1.6$ ,  $y_i$  is income per capita and  $\pi_i$  is the relative size of the group.

Applying this measure to the distribution of religions, it is possible to make homogeneous the distances between religions given that there is no good measure of the distances across religions that takes into account the twelve religions used in this analysis<sup>11</sup>. Therefore, the distance across religions will be normalized to 1 and the distance within the same religion will be zero. Obviously, using different distances across religions would clearly improve the index that captures conflict across religions.

This index becomes the following:

$$P^*(\pi) = K \sum_{i=1}^n \sum_{j=1}^n \pi_i^{1+\alpha} \pi_j d = IRC2$$

where  $d = 1$  if  $i \neq j$  and  $d = 0$  if  $i = j$

For each possible  $\alpha$  there is a different polarization function. Therefore, when using the Esteban and Ray (1994) measure we have a continuous rank of possibilities depending on the chosen  $\alpha$ <sup>12</sup>.

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<sup>11</sup>Babchuk (1990) and Roof, Wade Clark, and Hadaway (1979).

<sup>12</sup>In the empirical application we will choose the  $\alpha$  that maximizes the R-squared of the growth



## 4 DATA

The main source of data for religious diversity of a country's population comes from Barret's (1982) World Christian Encyclopedia. The proportion of each religion is constructed from the answer to the question "What is your religion?" in public polls. Several papers have used this data to analyze the determinants of democracy<sup>13</sup> or the main factors behind civil wars<sup>14</sup>. Barro (1997) uses this data and distinguishes nine religious groups: Catholic, Protestants, Muslims, Hindus (includes Jains and Sikhs), Buddhists, miscellaneous eastern religions (Chinese folk religions, Confucianism and new religionists), no professed religion and other religious groups.

We decide not to use directly Barro's data because they do not represent with sufficient detail all the religions, and we have observed in the World Christian Encyclopedia that there is too much inertia in the growth rate of some religions, mainly the Catholic. We construct our data using essentially two sources of information: "L'Etat des Religions dans le monde" (ER), which takes the data from the "World Christian Encyclopedia" (WCE) and corrects them using some national sources which allows to take into account double practices; and "The Statesman Year's Book of 1987" (SY). In many cases the two basic sources coincide and we take that value to be the correct one. In some other cases the SY does not provide enough disaggregation and we use the ER. The great advantage of the SY is the extreme detail on animist religions<sup>15</sup>.

The World Christian Encyclopedia (WCE) has the advantage of being a cross section of time series, providing information for 1970, 1975 and 1980. However, as we pointed out before, this source has several shortcomings. First, and probably the 

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rate regression including the religious conflict. This value turns to be in the range of feasible values for  $\alpha$ . The fact that  $\alpha$  is not determined from the theoretical model but has to be estimated reduces the use of this second polarization index to a matter of comparison with respect to our own index.

<sup>13</sup>For instance Barro (1996).

<sup>14</sup>Collier and Hoeffler (1999) use Barro's data.

<sup>15</sup>We confronted the data with national sources in order to improve the reliability of this information.

most important, the data does not consider the possibility of double practice, very common in Sub Saharan Africa and Latin America countries. Comparing this to the other sources of information we realize that the data is biased towards the Christian religion. A clear example is the case of Zaire in which the distribution of religions is considered to be similar to Spain or Italy. The distribution of religious groups between 1970 and 1980 does not change in many countries. There are only about seventeen countries that record changes in proportions. But those changes occur in countries where there is double practice and they usually imply an increase in the percentage of Christians and a reduction in the size of animist followers. Because of these reasons we take the data coming from the WCE with a lot of caution.

We consider the following religious groups: Jews, Christians, Muslims, Buddhism, Hinduism, Taoism, Confucianism, Chinese Religion, Bahaism, Syncretic cults, animist religions, other religions and no-religion.

The animists are followers of traditional religions which practice magic and the veneration of a large number of gods and spirits. They use magic as an instrument to control the world. In some countries there exists only one particular animist cult, as Charmandism in Soviet Union or Druidism in United Kingdom. In those cases, its percentage is included in other religions. Therefore, animist religions always include more than one type of cult. Finally, other religions include small collectives as “black church” or “spiritual groups”.

## **4.1 The statistical treatment of double practice**

In some particular countries, mainly in Africa and Latin America, part of the population are apparently followers of two different religions. The combination involves one of the large religions, mainly Christian, and some animist or syncretic cults. Usually, as The World Christian Encyclopedia does, they do not consider the autochthon religion and they count these people as Christians, possibly because they have received the baptism or because they live in a region with missions. However, this treatment is

not consistent with what Wilson (1972) points out about the studies of Siegel (1940) and Bastide (1960): magical ideas persist among the country people of long-settled Christian areas. We follow these studies and we consider that people that follow traditional religions like animist and are counted as double practise are not Christians. The reason that explains the treatment of these cases is that, as defined above, the animist religion usually identifies a collectivity. In part of the literature this kind of religion is defined as the typical cult of primitive villages. Taking this definition as the point of reference, what matters is the existence of these groups, even if they are counted as followers of the rites of large religions. And this treatment is consistent with Wilson (1972).

When the double practice involves a large religion and a Syncretic cult, the treatment is the same as in the case of the animist. Moreover, a syncretic cult is the one that mixes rites and beliefs of different religions. Therefore, someone who believes in one large religion and a Syncretic cult is someone who belongs to another syncretic cult. She only increases the number of rites in his cult.

The original data are presented as the proportions of a particular religion with respect to total population. Since what we are trying to capture is religious interaction, it is reasonable not to treat the no-religion group as another religion because the only things that people in this group have in common is the fact that they do not belong to any religious groups. Therefore, there are not specific common interests that permit us to identify them as a collective or that distinguishes them from the interest of all the other groups. This means that, from a political point of view, there is no common point of reference that keeps them together. Moreover, the non-religious group does not have the necessity to reaffirm its identity because, as a group, it has no identity. Therefore, we normalize the data on religious groups dividing each percentage by the sum of all the percentages of the religious groups (the percentage of believers). Notice that, since there are only eleven countries in which the percentage of non-religion is

more than 10%, the data do not change much after the normalization<sup>16</sup>.

Many of the religious groups included in our list are large with the exception of the animist and the syncretic cults which involves a variable number of different cults but with some common elements that distinguish them from large religions. Therefore, in the treatment of the animist religions in the IRC1 indicator, we capture the friction between all these traditional collectives as a group with respect to other religions. This approach considers that the animist groups have some common characteristics that differ from the large religions and that lead to some common interests that distinguish them from other religions. On the other hand, the fact that they have traditional and original beliefs, typically from primitive collectives, makes them the perfect victim for large religions. Therefore, the people that practice these cults have the necessity to reaffirm their identity as a group. All these facts justify the treatment of all the animist religions as a group with common interests.

In some countries there may be conflict inside a religious group. We consider three cases: the animists, the Christians and the Muslim groups<sup>17</sup>. For the Muslims and the Christians we apply the same measure of polarization, IRC1. We use the proportions of different kind of Christians for the polarization measure of Christians, and data on the votes for Muslim political parties to calculate a polarization measure for the Muslim group (see Reynal 1998 for more details).

## 4.2 The treatment of animist diversity

The animist groups are different. They include a variable number of traditional religions typical of primitive societies. In this section, we analyze if there exists some religious interaction across these collectives. Each of these groups uses magic as an instrument to control the world. In these primitives societies “each adult has

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<sup>16</sup>The results do not change even if we consider the no professed religion as another group.

<sup>17</sup>We do not consider other religions because they do not have the features that make these three groups internally problematic.

some religious functions and the elders have most. There's some tendency towards religious specialization in such societies based on a variety of attributes, such as knowledge of herbal plants, the capacity to enter a state of trance or dissociation" (Turner 1972). Religion in these societies pervades all social domains. Therefore, here the argument of the interaction between religions explained before does not work. In the context of primitive societies, somehow isolated from western civilization, the existence of so many different kind of organizations based on different beliefs makes the communication across these groups more difficult. Therefore, the more animist collectives there are, the slower the diffusion of ideas and technological innovation, which may have negative implications for growth.

One problem that emerges when capturing this effect is that the degree of communication loss depends on the number of animist cults. There is no information available on this issue and therefore, we approximate this effect using the following argument: we consider that in two countries with the same number of inhabitants but with a different percentage of animist followers, the one that has a higher percentage of animists has more animist religions, given that animist groups are usually very small collectives. Therefore more diversity leads to less capacity for communication. Moreover, if there are two countries with the same percentage of animist followers but with different number of total population, the one that has more population is supposed to have more animist groups.

Using these arguments we construct an index of animist diversity, AD, as the number of followers of animist cults in each country. In order to avoid the level effect generated by this variable the regressions that include this index consider also as an explanatory variable the total population of the country.

## 5 THE EMPIRICS OF RELIGIOUS CONFLICT AND GROWTH

The recent empirical literature on the determinants of economic growth has examined the influence of many variables on the economic prosperity of the countries. These variables include the growth rate of population, the rate of investment, human capital proxies, government expenditure, corruption, ethnic diversity, etc. However, religious diversity has not usually been considered as a potential determinant of per capita income.

There are at least two reasons why religious conflict can have a direct effect on economic growth. Firstly, and following the rent seeking approach exposed in section 3, the resources spent by the religious groups in order to obtain political influence (time, labor, etc) can be considered as a social cost that has a negative effect on economic growth because it implies a non-productive usage of these inputs<sup>18</sup>. Moreover, because religious differences is an important social cleavage in the society, the rent-seeking model leads to social behaviour that generates violence. And this violence can affect negatively the growth rate increasing the instability of the country. Secondly, technological change is also affected by religious conflicts. The communication across individuals of different groups diminishes when there is conflict in polarized societies. The same effect is true when society is structured in very small collectives. In both cases the higher the level of conflict the less communication. The loss of communication slows down the diffusion of ideas and technological innovation within the country which has negative implications for growth.

This section aims to show empirical evidence on the effect of religious conflict on growth. It is divided in four parts. The first part analyzes the results for the general

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<sup>18</sup>This effect can be capture in a two sector model in which the resources can be allocated in either the high or low productivity sector. The reallocation of resources in this model is the channel through which growth is affected.

case, the second part contains a discussion of the importance of religious conflict in the explanation of Africa’s growth tragedy. The third part checks the robustness of the results using different polarization indices, data used in its construction, alternative estimation procedures and different explanatory variables. Finally the fourth part analyses the channels through which religious conflict affects economic growth to evaluate the importance of the direct effect versus the indirect effects.

## 5.1 Regression results

To analyze the effect of religious conflict on growth we adopt the general specification of the convergence literature. The general form of the specification is

$$Y_i = \alpha + \beta \log(GDP)_{i0} + \sum \gamma_j X_{ji} + \delta IRC_i + u_i \quad (2)$$

where  $Y$  is the growth rate of GDP per capita,  $GDP_0$  is gross domestic product per capita in the initial period and  $X$  refers to other variables. The set of  $X$ ’s includes the ones proposed by Barro (1991). It considers some variables like government expenditure, revolutions, coups, assassinations and inflation. Additionally, the IRC variable measures religious conflict. We use two alternative indices: the polarization index in section 3 of this paper ( $IRC1$ ) and Esteban and Ray’s (1994) polarization index ( $IRC2$ ).

For all the empirical exercises we use the Barro and Lee (1994) dataset. We consider a sample of 138 countries and data from 1960 to 1989 organized in periods of five-years<sup>19</sup>. The polarization measures are supposed to be constant across time<sup>20</sup>. We include in all the regression a dummy variable for each of the religions that participate in the construction of the polarization index in order to avoid that the significance of the index comes from the types of religions rather than from their

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<sup>19</sup>See Barro (1996) or Islam (1995).

<sup>20</sup>Next part modifies this assumption when data are available.

polarization. In this way we try to ensure that the index captures only religious conflict independently of which religions coexist in the country<sup>21</sup>.

Table 1 shows the results of the pooled estimation using the set of variables proposed by Barro (1991). In columns (1) and (2) we find that the index of religious polarization has a negative and significant effect on growth, independently of the measure of religious conflict we use, either IRC1 or IRC2. When we include Esteban and Ray's index (IRC2) the R-squared is slightly higher. However, as we have shown before, Esteban and Ray's index has a continuous rank of possibilities depending on the chosen  $\alpha$  and we estimated  $\alpha$  to reach the maximum R-squared coefficient. There is no theory that could explain this particular value of  $\alpha$ <sup>22</sup>.

In order to analyze the effect of animist fragmentation we include in (3) the results for the regression once the religious conflict variable is substituted by animist diversity (AD). This variable is not a proportion but the number of animist cults followers in each country. For this reason we add the total population to control for the level effect. We find that the index of animist diversity has a negative and significant coefficient. Finally, we include together the index of religious polarization and the index of animist diversity. The results are shown in columns (5) and (6) of Table 1<sup>23</sup>. As in the other cases there is a negative and significant relationship between these religious conflict indicators and growth<sup>24</sup>. The fact that all the indices used to capture religious conflict have a negative and significant coefficient supports the view that religious polarization is an important determinant of economic growth.

The index of religious polarization has a negative and significant effect on growth

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<sup>21</sup>Some of these dummies have a very interesting interpretation jointly with the polarization index but, as this is not the objective of the paper, we leave that discussion aside.

<sup>22</sup>The estimation of  $\alpha$  is 1.5.

<sup>23</sup>The results are essentially unchanged if we combine also the index of Muslim and Christian polarization.

<sup>24</sup>Since the proportion of religions across time is quite stable and it is not probable that bad economic results induce people to change religion the reverse causation from growth to religious polarization does not seem to be a plausible hypothesis.



no matter which measure is used. The same is true for the animist diversity index even when both are included together.

## 5.2 An explanation for Africa's growth tragedy

The indices of religious polarization and animist diversity are highly and positively correlated with the dummy variable for Sub Saharan countries of Africa, which is the usual variable included in growth regressions to capture the special case of many African countries. The extension of animist cults in Africa is the main reason for such a high correlation. In column 7 of Table 1 we have included the dummy for Sub Saharan Africa (Safrika) together with animist diversity. The set of explanatory variables corresponds to Barro (1991). The result shows that the Safrika dummy is not insignificant <sup>25</sup>. Therefore we can conclude that one possible factor explaining the role of the Sub-Saharan dummy in convergence growth regressions may be the effect of animist diversity which, in fact, is an explanation of Africa's growth tragedy versus the non-explanation involved in the use of the dummy variable.

Moreover, if we analyze the importance of the religious conflict in explaining differences on growth rates of different regions compared with OECD countries, Table 2 shows that the religious conflict indicator explains more of these differences in Sub-Saharan regions than in other regions such as Latin America or Asia. This table also compares the effect of religious polarization with the effect of ethnolinguistic fragmentation, ELF, the ethnic variable commonly used in the literature. The results show that ELF does not explain growth differences between Sub-Saharan countries and OECD countries, opposite to what happen when religious diversity is included. The poor explanatory power of the linguistic fragmentation variable in explaining

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<sup>25</sup>Barro (1997) points out that "the government consumption ratio is the only individual variable whose omission causes the dummy to become insignificant". In section 5.4 we compare the relative explanatory power of religious conflict and government expenditure in a simultaneous equations set-up.

Africa's growth tragedy is also reflected later in section 6 when we analyze the effects of the different dimensions of ethnicity on the growth rate of countries. Linguistic fragmentation and religious conflict are very common in African countries. In Table 3 we report the countries with the highest degrees of religion polarization, animist diversity, and ethnolinguistic fragmentation. The rank correlation between IRC1 and ELF is low, about 0.26, and between AD and ELF is about -0.073 . This means that religious polarization and animist diversity are not proxies for ethnolinguistic fragmentation. All these results corroborate the fact that religions, mainly animist diversity, are an important factor in the explanation of Africa's growth tragedy, and that linguistic fragmentation, even though it is also high in African countries, does not explain their poor economic performance.

### 5.3 Sensitivity analysis

In order to check the robustness of the results we have compared the effect of alternative indices of religious polarization and animist diversity. However, there are at least three additional dimensions that we could study to test the robustness of the results. The first dimension covers the possibility of alternative estimation procedures. The structure of panel data allows the estimation to be carried out using procedures appropriate for this kind of data. The second dimension is the sensibility of the polarization measure to the data used in its construction. The third dimension is the sensitivity of the results to different sets of explanatory variables. Table 4 presents the results obtained by pooling the data over the different periods, while Table 5 uses the random effects estimator. They include also a comparison of the effect of using different sets of explanatory variables, different data for religious proportions and the alternative indices of polarization and animist diversity.

Notice that the religious conflict indexes (religious polarization and animist diversity) have a significant and negative effect on economic growth, no matter which method or set of other explanatory variables is used. Only in one case, when using

the data collected directly from the World Christian Encyclopedia and Barro's set of other explanatory variable the polarization measure becomes insignificant. However animist diversity remains significant. The problems above mentioned with the data collected by the World Christian Encyclopedia could be the reason for this result. The time series of religious proportions presented in this source has several features that makes them scarcely credible in its evolution like, for instance, the frequent increase in 10 percent points for Christians in many countries every five years period. Therefore, the effect of religious conflict on growth does not seems to be the result of a particular estimation procedure, index of polarization, set of other explanatory variables or specific data set.

#### **5.4 Direct and Indirect effect of Religious Polarization**

As we argued before, religious polarization implies frictions across different religious groups that could lead to social conflicts causing, on the one hand, instability in the country and, on the other hand, loss of communication among workers/firms. This instability implies an increase in uncertainty and, therefore, could lead to a reduction of the investment rate and could even transform into a civil war. In addition the government could decide to oil those conflicts by using public expenditure as a mitigation device. The religious conflict affects indirectly economic growth through these two channels. However, we also argue that there is a direct channel that works through the loss of communication produced by conflict or diversity. This loss of communication slows down the diffusion of ideas and technological innovation within the country affecting negatively economic growth.

In order to distinguish direct and indirect effect we specified a system of equations that considers the investment rate, the government expenditure and civil wars as endogenous variables. In the three cases all the religious conflict indicators are included as explanatory variables. The forth equation is just the traditional growth

regression<sup>26</sup>.

Table 6 presents the results of the estimation of this system. First of all the index of religious polarization seems not to have a direct effect on growth. By contrast the index of animist diversity has a very important direct effect on the growth equation. However, the index of religious polarization (IRC1) has an indirect effect through the reduction of the rate of investment, the increase in government expenditure and the increase in the probability of a civil war. The index of animist diversity has also an indirect effect through the probability of civil war.

The indirect effects of religious polarization on economic growth works through the reduction of the investment rate and seems to capture, at least in part, the non-productive use of the inputs that arises because of the social cost generated from the rent-seeking behavior. In order to check the robustness of this effect we introduce more political instability variables like riots, purges, and government crises in the regressions. The results show that the indirect effect of religious polarization on economic growth through investment is maintained.

## 6 ETHNIC CONFLICT: POLARIZATION VERSUS FRAGMENTATION

Horowitz (1985) consider that ethnicity covers differences in skin color, language, religion or some other attribute of common origin.

“Taking account of the disparity between physical evidence and group conceptions requires a concept of ethnicity that is somewhat elastic. On this score, Enid Schildkrout’s does as well as any: “The minimal definition of an ethnic unit... is the idea of common provenance, recruitment primarily through kinship, and a notion of distinctiveness whether or not this consists of a unique inventory of cultural traits.” This is

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<sup>26</sup>This approach is similar to the methodology used by Tavares and Wacziarg (2001) to explain the effect of democracy on growth. See also Barro (1997).

closed to Max Weber's conception of a subjective belief in common descent . . . whether or not an objective blood relationship exists. To this I would add a minimal scale requirement, so that ethnic membership transcends the range of face-to-face interactions, as recognized kinship need not. So conceived, ethnicity easily embraces groups differentiated by colour, language, and religion; it covers tribes, races, nationalities and castes."

This implies that the basic variables that capture ethnicity are color, language and religion. Up to this point we have only analyze the religious dimension of ethnic tensions. We turn now to a comparison with some of the other dimensions of ethnicity, in particular linguistic diversity.

To construct an index of ethnic conflict we need data on the distribution of color of the population, the languages that they speak or the religions they practice. The most important issue is the appropriate procedure to summarize in an index the concept of ethnic conflict. Is it social fragmentation or social polarization that makes ethnic tensions stronger? The tensions caused by language differences and its effects on communication loss can emerge in a situation very different from the ones generated by religion or color differences. The same is true for combinations of those three characteristics (color and religion, language and color, etc). There is not much theoretical work done on this area<sup>27</sup>.

In the literature there is only one type of index that has been applied to ethnic differences which is the index of fragmentation of Taylor and Hudson (1972) referred to the linguistic dimension. In fact many authors consider this index as the only measure of ethnic diversity. Basically this indicator can be interpreted as measuring the probability that two randomly selected individuals in a country will belong to different ethnolinguistic groups. Easterly and Levine (1997) use this variable to show

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<sup>27</sup>The Minorities at Risk project is dedicated to the detailed, empirical study of ethnopolitical groups around the world.

how African nations unusually high linguistic fragmentation explains a significant part of their poor policies and slow growth. The use of ethnolinguistic fragmentation in growth regressions modestly weakens the significance of the dummy for Africa.

There are at least three important shortcomings when using ethnolinguistic fragmentation as proxy for ethnic conflict. Firstly, the ethnolinguistic origin is only one of the dimension of ethnic diversity. As we argued above, ethnic diversity involves more dimensions than just linguistic differences. Secondly, there are other alternative indices that can measure conflict in a more accurate manner. The ethnolinguistic fragmentation index,  $ELF_i$ , is defined as

$$ELF_i = 1 - \sum_{j=1}^J (n_{ij}/N_i)^2 \quad (3)$$

where  $n_{ij}$  is the number of people who profess religion  $j$  in country  $i$  and  $N_i$  is the population of country  $i$ . Therefore ELF measures diversity. Alesina, Baquir and Easterly (1997) construct a measure of ethnic divisions based on colour differences as an ethnic variable. The functional form of the index is the same as the index of ethnolinguistic fragmentation but using data on color<sup>28</sup>. Collier and Hoeffler(2000) construct an index of religious fractionalization to analyze its effect on civil war. The basic data for the construction of the index comes from Barro (1997) and the functional form is the same as the ethnolinguistic fragmentation. Their results show that this variable has no influence on the probability of civil wars. However conflict may not be an increasing monotonic function of diversity, as we have argued in previous sections of the paper. Therefore the choice of a particular indicator, a fragmentation index, is a very important decision not only from the empirical point of view but also from its theoretical implications.

Finally, from an empirical point of view it is not even clear that linguistic differences play such a significant role in explaining Africa' s growth tragedy. Easterly and

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<sup>28</sup>They argue that color fragmentation in US cities, metropolitan areas and urban counties reduces expenditure in productive public services and increases rent-seeking expenditures.

Levine (1997) show that the dummy for Africa is still very significant in the presence of the ethnolinguistic fragmentation variable, which means that part of what was not explained about Africa’s growth experience still remains to be explained.

We consider the index of religious polarization as the appropriate indicator to measure religious tensions. Our index, as the one proposed by Esteban and Ray (1994), points out that the situation that leads to the point of maximum tension is when there are two religious groups with the same size. This kind of measures differ from the index of fragmentation because the index of polarization captures how far the distribution of the groups are from a bimodal distribution while the fragmentation index increases monotonically with diversity.

It is important to notice the different way in which linguistic and religious tensions work. The effect of both types of tensions on growth are coming through the implied loss of communication. However, while in the linguistic case the communications problems derive from the potential existence of many different languages<sup>29</sup>, in the religious dimension it is essentially different, as we argued in section 3.

We are concentrated on the study of religious conflict rather than linguistic differences but we compare our results with the ones obtained using the available indices of ethnolinguistic fragmentation <sup>30</sup> in section 6.2.

The index of religious conflict was defined as

$$IRC1_i = 1 - \sum_{j=1}^J (0.5 - \pi_{ij})^2 \pi_{ij} / 0.25 \quad (4)$$

where  $\pi_{ij}$  is the proportion of population of country i that profess religion j.

In Table 7A we analyze the effects of religious fragmentation on economic growth. For this purpose we use the religious fragmentation of Collier and Hoeffler(2000),

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<sup>29</sup>Therefore, in principle, it is reasonable to think that more diversity leads to worse results.

<sup>30</sup>However it would also be interesting to know the empirical performance of an index of ethnolinguistic polarization to support the claim that the more diversity of languages the worse.

called Rf, constructed using data from Barro (1997) and with the same functional form as the ethnolinguistic fragmentation index. The explanatory variables are the ones included in Barro(1991). The first three columns analyze the explanatory power of this variable using pooled estimation, and the last three columns (4, 5 and 6) using random effects estimation. The results are very similar and they show that religious fragmentation does not seem to be a robust explanatory variable for economic growth, no matter if we include it linearly or squared, while animist diversity is still an important determinant.

Moreover, in order to analyze if there exist any indirect effect of religious fragmentation on economic growth, we perform the analysis presented in section 5.4 but using religious fragmentation instead of religious polarization. The results, presented in Table 7B, show that religious fragmentation has no direct effect on economic growth. Moreover, the only indirect effect that is significant, is the role of religious fragmentation in explaining government expenditures. However this effect disappears when we include together religious fragmentation and religious polarization as we show in Table 7C.

In that table we analyze the effect of religious fragmentation versus several alternative religious conflict indices. When Rf is included jointly with religious polarization and animist diversity its coefficient turns out to be not significant. The index of religious fragmentation has no direct or indirect effect on economic growth. However the coefficient on religious polarization and animist diversity have a negative and significant effect on economic growth.

The results in Table 7C show that religious polarization has a strong indirect effect on economic growth. Moreover, animist fragmentation has direct and indirect effect on economic growth. The results in section 5.4 are maintained even in the presence of the religious fragmentation index which turns out to be statistically insignificant in the explanation of economic growth<sup>31</sup>.

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<sup>31</sup>The results are the same if we construct the index of religious fragmentation using the same



## 6.1 Ethnic conflict and religious polarization

In this section we analyze the explanatory power of ethnic diversity in growth regressions. As we argued before ethnic diversity cannot be captured just by one of the characteristics of the definition of ethnicity reason for which we will include in our estimation indicators of the two data available dimensions already mentioned. Finally, in some experiments we also consider the effect of Christian polarization using the index developed in section 3 applied within Christian groups. Summarizing, the ethnic variables included in the regression are the following:

IRC1<sup>32</sup>=index of religious conflict

AD= animist diversity

ELF= ethnolinguistic fragmentation

The explanatory variables are again the ones included in Barro (1991)<sup>33</sup>.

In Table 8A we analyze the direct and indirect effect of linguistic fragmentation on economic growth and we find that this ethnic variable has no significant direct effect on economic growth. Moreover, as the religious fragmentation index, the only indirect effect that is significant is the role of this variables in explaining government expenditures. However this effect disappear when we include together linguistic fragmentation and religious polarization.

In Table 8B we analyze the effect of ethnolinguistic fragmentation versus several alternative indices of religious conflict. When ELF is included jointly with religious polarization and animist diversity its coefficient turns out to be not significantly different from 0. The index of ethnolinguistic fragmentation has no direct nor indirect effect on economic growth. However the coefficient on religious polarization and animist diversity variable have a negative and significant effect on economic growth.

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data that we use in the construction of the polarization index instead of Barro's data.

<sup>32</sup>The results are similar when using IRC2 index.

<sup>33</sup>We avoid the use of the dummy variable for Africa because, as we showed before, religious polarization captures better the explanatory power of that dummy.

The results in Table 8B show that religious polarization has a strong indirect effect on economic growth, no matter which polarization index is used. Moreover, animist fragmentation has also a direct and indirect effect on economic growth. Therefore the results in section 5.4 are maintained even in the presence of the linguistic fragmentation variable. The index of ethnolinguistic fragmentation turns out to be statistically insignificant in the explanation of economic growth.

## 7 CONCLUSIONS

In this paper we analyze the role that religious polarization and animist diversity play in the process of economic development. We provide theoretical justification, based on rent-seeking models, for why polarization indices should reflect religious conflict better than fragmentation measures. Using an index of religious polarization the paper reports empirical evidence that supports the relevance of religious conflicts in the explanation of growth. In addition, we found that animist diversity is an important explanation for Africa's growth tragedy. Moreover, the index of religious polarization is a better explanation for the slow growth rate record of some countries than ethnolinguistic fragmentation, which is the usual proxy for ethnic diversity used in the literature. Interestingly, when religious polarization is included together with ethnolinguistic fragmentation the latter becomes insignificant while the former is significant suggesting that religious polarization and animist diversity are important determinants of the poor economic performance of Africa.

We check the robustness of our finding by using alternative estimation procedures, different sets of explanatory variables and alternative data for the construction of the polarization indicator. We also compare the results when other measures of ethnic conflict are included in the regression and conclude that the findings are robust to changes in the specification and the estimation procedure.

In addition we study the channels that could explain the effect of religious polar-

ization and animist diversity on growth. The results show that religious polarization has no direct effect on growth but it is important in the explanation of the investment rate, government expenditure and the probability of civil wars. However, animist diversity has a direct effect on growth and it is also important in the explanation of the probability of civil war. These are the results that we would expect if the loss of communication associated with the direct effect is essentially determined by diversity while the increase in uncertainty and its effects on investment, government expenditure and civil wars is linked to conflict and polarization. Ethnolinguistic fragmentation does not seem to have any significant effect on any of the relevant variables.

Further research will consider the relevance of democracy as a factor that could modify or scale up or down the intensity of the effect of religious polarization and animist diversity on growth. In order to address this question it is necessary to develop a theory for the relationship among religion, democracy and political systems<sup>34</sup>.

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<sup>34</sup>Reynal-Querol (2002) contains some ideas in this line.

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“Elections Around the World” Wifred D.C.G.Derksen

## APPENDIX :

### DEFINITIONS OF THE MAIN EXPLANATORY VARIABLES

y: growth rate of real GDP per capita of the period(Summers and Heston)

Inv: Average of the ration of real domestic investment for the period (private plus public) to real GDP. SH

L(int.gdp): Real GDP per capita of the initial period (1985 international prices) from SH v.5.5.

Sec: Percentage of secondary school attained in the total population. Taken at the beginning of the period Source: Barro and Lee.

Pri: Percentage of “Primary school attained” in the total population. Taken at the beginning of the period. Source: Barro and Lee.

Gov: Average period of the Ratio of real government “consumption” expenditure net of spending on defense and on education to real GDP.

Rev: Number of revolutions per year, averaged over the period (Banks).

Ass:number of assassination per milion population per year, average period. Source: Banks.

Coups: number of coups per year, average period.

Pish: Price level of investment (PPP I / Xrate relative to U.S.) at the beginning of the period. (U.S=1.0). Source: SH v.5.5.

ppdev: Magnitude of the deviation of Pish560 from the sample mean.

Ppdev =  $\text{abs}(\text{Pishx} - \text{sample mean})$

Safrica: Dummy for Sub-Saharan African countries.

Laam: Dummy for Latin-American countries.

Asiae: Dummy for East-Asian countries.

gpop: average annual rate of population growth per period

lpop: log of the population al the begining of the period

hum: Average schooling years in the total population over age25 of the initial period. Source: Barro and Lee.

ex: Ratio of exports to GDP(in current international prices). Average period. Source: SH v.5.0

Ex2: square of ex.

Demo: Democracy score: general openness of the political institutions (0=loww; 10=high)Source: PolityIII data set. (<http://www.colorado.edu/IBS/GAD/spacetime/data/Polity.htm>)

civwar: Dummy variable which take value one if a civil war broke out and zero if the country did not experienec a civil war Source: Sivard (1993).

Riots: any violent demonstration or clash of more than 100 citizen. Source:Banks, Arthur S. 1994.

Purges: Purges. Source: Banks, Arthur S. 1994.

Govtcris: Major Government Crises. Source: Banks, Arthur S. 1994.

### **Ethnic variables**

IRC1: religious polarization index.

IRC2: religious polarization using the application of Esteban and Ray polarization index.

AD: Animist diversity index.

ELF: ethnolinguistic fragmentation index. Source: Easterly and Levine (1997).

rf: religiuos fragmentation index used in the paper "Justice-Seeking and Loot-Seeking in Civil War". Source: Collier and Hoeffler.

TABLE 1  
 POOLED REGRESSIONS USING BARRO (1991) SET OF EXPLANATORY VARIABLES

Dependent variable: log difference GDP per capita, five years period from 1960 to 1989.								
Model	0	1	2	3	4	5	6	7
Const	0.52 (6.77)	0.67 (7.18)	0.74 (7.41)	0.67 (7.11)	0.61 (6.89)	0.78 (7.50)	0.83 (7.71)	0.72 (6.74)
Inv	0.556 (5.35)	0.48 (4.43)	0.47 (4.30)	0.50 (4.53)	0.55 (2.28)	0.46 (4.15)	0.45 (4.02)	0.58 (5.70)
L(int.gdp)	-0.06 (-5.48)	-0.06 (-5.84)	-0.07 (-6.01)	-0.07 (-6.05)	-0.07 (-6.04)	-0.08 (-6.46)	-0.08 (-6.62)	-0.08 (-6.60)
Sec	0.13 (2.49)	0.12 (2.33)	0.13 (2.41)	0.13 (2.46)	0.14 (2.64)	0.13 (2.44)	0.13 (2.47)	0.13 (2.44)
Pri	0.05 (1.45)	0.06 (1.56)	0.06 (1.48)	-0.08 (1.83)	0.06 (1.72)	0.06 (1.46)	0.06 (1.38)	0.01 (0.21)
Gov	-0.53 (-4.66)	-0.48 (-3.86)	-0.49 (-4.03)	-0.66 (-5.39)	-0.59 (-5.14)	-0.57 (-4.54)	-0.56 (-4.52)	-0.44 (-3.83)
Rev	0.41 (3.05)	0.41 (2.99)	0.42 (3.11)	0.42 (3.11)	0.41 (3.03)	0.41 (3.01)	-0.41 (-3.04)	0.41 (3.03)
Ass	-0.61 (-3.14)	-0.60 (-3.08)	-0.62 (-3.20)	-0.63 (-3.19)	-0.61 (-3.12)	-0.61 (-3.11)	-0.62 (-3.15)	-0.62 (-3.15)
Coup	0.04 (0.56)	0.06 (0.87)	0.06 (0.87)	-0.01 (-0.9)	-0.01 (-0.97)	-0.02 (-0.99)	-0.01 (-1.05)	-0.01 (-0.90)
Pish	-0.02 (-1.00)	-0.03 (-1.54)	-0.03 (-1.47)	-0.02 (-0.96)	-0.01 (-0.78)	-0.03 (-1.40)	-0.03 (-1.45)	-0.01 (-0.33)
Ppdev	-0.05 (-2.24)	-0.03 (-1.41)	-0.03 (-1.51)	-0.00 (-0.02)	-0.01 (-0.19)	0.01 (0.42)	0.01 (0.44)	-0.01 (-0.56)
Laam	-0.45 (-2.57)	-0.04 (-1.97)	-0.04 (-2.08)	0.06 (-2.88)	-0.06 (-3.09)	-0.05 (-2.53)	-0.05 (-2.58)	-0.05 (-2.28)
Asiae	0.08 (3.27)	0.08 (2.43)	0.10 (2.94)	0.08 (2.33)	0.09 (3.37)	0.09 (2.59)	0.10 (2.86)	0.11 (3.96)
<b>safrica</b>								<b>-0.04 (-1.78)</b>
<b>IRC1</b>		<b>-0.09 (-2.89)</b>				<b>-0.07 (-2.43)</b>		
<b>IRC2</b>			<b>-0.33 (-3.43)</b>				<b>-0.16 (-2.98)</b>	
<b>AD</b>				<b>-0.17 (-3.44)</b>	<b>-0.15 (-3.23)</b>	<b>-0.16 (-3.16)</b>	<b>-0.16 (-3.15)</b>	<b>-0.15 (-2.14)</b>
Lpop				-0.00 (-0.03)	-0.00 (-0.46)	-0.00 (-0.16)	-0.00 (-0.17)	-0.00 (-0.88)
R2	0.2525	0.2741	0.2791	0.2767	0.2659	0.2853	0.2896	0.2629
N	515	515	515	511	511	511	511	511

Set of explanatory variables Barro (1991)

Dummies for each religion have been used in order to isolate the effect of polarization, except for regression 4, in which just the dummy for the animist religion has been used.

Numbers in parentheses are t-statistics.

Inv: Average of the ration of real domestic investment for the period (private plus public) to real GDP.

L(int.gdp): Real GDP per capita of the initial period (1985 international prices)

Sec: Percentage of secondary school attained in the total population. Taken at the beginning of the period

Pri: Percentage of "Primary school attained" in the total population. Taken at the beginning of the period.

Gov: Average period of the Ratio of real government "consumption"expenditure net of spending on defense and on education to real GDP.

Rev: Number of revolutions per year, averaged over the period (Banks). Ass: number of assassassination per milion population per year, average period. Coups: number of coups per year, average period.

Pish: Price level of investment (PPP I / Xrate relative to U.S.) at the beginning of the period. (U.S.=1.0).

ppdev: Magnitude of the deviation of Pish560 from the sample mean.

Laam: Dummy for Latin-American countries. Asiae: Dummy for East-Asian countries.Safrica: Dummy variable for Sub Saharan countries. lpop: log of the population al the beginning of the period

IRC1: religious polarization index

IRC2: religious polarization using the application of Esteban and Ray polarization index

AD: Animist diversity index



TABLE 2:  
DECOMPOSITION EFFECT

	OECD	SAFRICA	LAAM	ASIAE
Growthmean	0.1417	0.039	0.0622	0.1079
Diff growth	0	-0.102	-0.08	0.046
IRC1 Mean	0.0787	0.7047	0.4278	0.5064
Diff IRC1	0	0.626	0.3491	0.4278
AD Mean	0.0003	0.2198	0.0047	0.0734
Diff AD	0	0.2196	0.0044	0.0732
Elf mean	0.2187	0.6513	0.2657	0.46222
Diff Elf	0	0.4326	0.046	0.2435
<b>Effect IRC1</b>	<b>0</b>	<b>-0.05</b>	-0.028	-0.034
<b>Effect AD</b>	<b>0</b>	<b>-0.056</b>	-0.001	-0.018
Effect Inv	0	-0.0870	-0.06	-0.034
<b>Effect elf</b>	<b>0</b>	<b>-0.00865</b>	-0.00092	-0.0048

OXACA DECOMPOSITION

		OECD	SAFRICA	LAAM	ASIAE
<b>IRC1</b>	Effect1	0	<b>-0.199</b>	0.0073	0.3108
	Effect2	0	-0.0427	-0.0159	0.039
<b>AD</b>	Effect1	0	<b>-0.018</b>	-0.0033	-0.058
	Effect2	0	-0.00025	-0.00042	-0.00043
Investment	Effect1	0	-0.0957	-0.075	-0.0458
	Effect2	0	0.045	0.056	0.629
<b>ELF</b>	Effect1	0	<b>0.00978</b>	-0.0021	-0.0207
	Effect2	0	-0.0083	-0.01	0.0102

All differences respect the OECD mean, that is (mean of variable I in region j) - (mean of variable I in oecd).

The effect in the first decomposition comes from the product between the coefficient of variable I in regression in table 1, multiplied by the difference just describes above. We decompose the effect for variable IRC1, AD, investment as a matter of comparison, and ELF.

In the OXACA decomposition, we run regression for each region, obtaining a different Beta coefficient of the variable of interest in each region. Effect 1 correspond to differences in the mean weighted by the coefficient of the Variable obtained in the regressions using just the region sample. And effect two corresponds to the coefficient effect, measured as the difference in coefficients, weighted by the mean of the variable in the corresponding region.

Inv: Average of the ration of real domestic investment for the period (private plus public) to real GDP.

Safrica: Dummy for Sub-Saharan African countries.; Laam: Dummy for Latin-American countries.

Asiae: Dummy for East-Asian countries.

IRC1: religious polarization index

IRC2: religious polarization using the application of Esteban and Ray polarization index

AD: animist diversity index

ELF: ethnolinguistic fragmentation index.

TABLE 3  
RANKING OF THE MOST POLARIZED, MOST ANIMIST DIVERS, AND MOST LINGUISTICALLY FRAGMENTED COUNTRIES

MOST POLARIZED		MOST ANIMIST DIV		LEAST POLARIZED		MOST LING. FRAGMENTED	
	IRC1		AD		IRC1		ELF
Dom.repu	0.999	Zaire	0.77	Oman	0.029	Tanzania	0.93
Zaire	0.993	Nigeria	0.7615	Luxemburg	0.029	Zaire	0.9
Burundi	0.987	Kenya	0.508	Afganistan	0.027	Uganda	0.9
Madagascar	0.972	Mozambique	0.47	Iceland	0.026	Cameroon	0.89
Leshoto	0.96	Indonesia	0.46	Turkey	0.022	India	0.89
Zimbawe	0.958	Ethiopia	0.36	Sweden	0.018	South Africa	0.88
Bolivia	0.957	South Africa	0.28	Denmark	0.014	Nigeria	0.87
Fiji	0.928	Madagascar	0.249	Italy	0.009	Coted'ivoire	0.86
Sierra Leone	0.924	Tanzania	0.23	Comoros	0.008	Liberia	0.83
Taiwan	0.919	Ghana	0.214	Dominica	0.008	Chad	0.83
Burkina Faso	0.918	Cameroon	0.206	Finland	0.006	Kenya	0.83
Guinea Bissau	0.914	Sudan	0.20	Norway	0.006	Zambia	0.82
Ethiopia	0.906	Burkina Faso	0.20	Somalia	0.005	Mali	0.78
Angola	0.906	Uganda	0.19	Ireland	0.005	Angola	0.78
Cent. Afr. Rep	0.901	Cote d'Ivoire	0.167	Cape Verde	0.004	Sierra Leone	0.77

The Fifteen most polarized countries, the most animist divers, and the most linguistic fragmented following the index IRC1, AD and ELF. And the fifteen least polarized .

TABLE 4:  
ANALYSIS OF ROBUSTNESS USING DIFFERENT SET OF EXPLANATORY VARIABLES, INDEX AND DATABASE.

CONFLICT INDEX				USING ESTEBAN AND RAY INDEX				
		IRC1	AD	R2	IRC2	R2	Variables Specif.	Sample N
Pool	Data	-0.09 (-2.89)		0.2741	-0.33 (-3.43)	0.2791	Barro	Barrolee N=515
	WC	-0.4 (-1.33)		0.2639	-0.15 (-1.75)	0.2658	Barro	Barrolee N=514
	Data	-0.13 (-3.81)		0.2168	-0.42 (-4.13)	0.2210	Lev&Ren.	Barrolee N=485
	WC	-0.09 (-2.77)		0.2107	-0.22 (-2.25)	0.2063	Lev&Ren.	Barrolee N=481
Pool	Data		-0.17 (-3.44)	0.2767			Barro	Barrolee N=511
	WC		-0.21 (-3.14)	0.2728			Barro	Barrolee N=509
	Data		-0.29 (-4.03)	0.2085			Lev&Ren.	Barrolee N=481
	WC		-0.30 (-4.03)	0.2058			Lev&Ren.	Barrolee N=481

Data means that the results are obtained by using the data set proposed in this paper. An dWC means that the results are obtained using the WC Encyclopedia dataset. Barro means that the results are obtained using Barro (1991) set of explanatory variables. Lev&Ren means that the results are obtained using Levine and Renelt (1992) set of explanatory variables. Numbers in parentheses are t-statistics. IRC1: religious polarization index; IRC2: religious polarization using the application of Esteban and Ray polarization index AD: animist diversity index

TABLE 5:  
ANALYSIS OF ROBUSTNESS USING THE RANDOM EFFECTS ESTIMATION PROCEDURE

		CONFLICT INDEX		ESTEBAN AND RAY INDEX		Variables	Sample
		IRC1	AD	R2	IRC2	R2	Specif. N
RE	Data	-0.09 (-2.86)		0.2733	-0.35 (-3.39)	0.2785	Barro Barrolee N=515
	WC	-0.04 (-1.28)		0.2627	-0.16 (-1.66)	0.2646	Barro Barrolee N=514
	Data	-0.129 (-3.79)		0.2168	-0.42 (-4.13)	0.2210	Lev&Ren. Barrolee N=485
	WC	-0.09 (-2.66)		0.2080	-0.21 (-2.09)	0.2033	Lev&Ren. Barrolee N=481
RE	Data		-0.24 (-3.43)	0.2765			Barro Barrolee N=511
	WC		-0.25 (-2.93)	0.2785			Barro Barrolee N=509
	Data		-0.39 (-4.27)	0.2119			Lev&Ren. Barrolee N=481
	WC		-0.38 (-4.44)	0.2116			Lev&Ren. Barrolee N=481
RE	Data	-0.08 (-2.53)	-0.25 (-3.27)	0.2979			Barro Barrolee N=511
	Data		-0.25 (-3.37)		-0.31 (-3.15)	0.3032	Barro Barrolee N=511
	WC	-0.03 (-0.86)	-0.24 (-2.67)	0.2803			Barro Barrolee N=508
	WC		-0.25 (-2.77)		-0.15 (-1.54)	0.2832	Barro Barrolee N=508

Data means that the results are obtained by using the data set proposed in this paper. An dWC means that the results are obtained using the WC Encyclopedia dataset. Barro means that the results are obtained using Barro (1991) set of explanatory variables. Lev&Ren means that the results are obtained using Levine and Renelt (1992) set of explanatory variables. Numbers in parentheses are t-statistics.

IRC1: religious polarization index; IRC2: religious polarization using the application of Esteban and Ray polarization index

AD: animist diversity index

TABLE 6  
DIRECT AND INDIRECT EFFECTS USING 3SLS ESTIMATION

Dependent variable: log difference GDP per capita, five years period from 1960 to 1989				
Equations	GROWTH	Investment	Gov.exp	Civil war
Const	0.71 (5.62)	-0.16 (-2.86)	0.28 (5.69)	-0.54 (-2.09)
Inv	0.56 (3.97)			
Ln(Int.gdp)	-0.07 (-5.26)	0.05 (9.62)	-0.01 (-1.26)	0.04 (1.33)
Sec	0.11 (1.83)		0.03 (1.05)	
Pri	0.06 (1.26)			
Hum				-0.02 (-2.21)
Gov	-0.59 (-4.08)	0.01 (0.19)		
Rev	0.39 (2.53)	0.17 (2.42)	-0.02 (-0.28)	
Ass	-0.60 (-2.61)	-0.25 (-2.36)	0.02 (0.21)	
Coup	0.01 (0.25)	-0.02 (-2.34)	0.02 (2.01)	
Civwar	0.04 (-2.32)			
Pish	-0.03 (-1.49)			
Ppdev	-0.01 (-0.44)			
Ex				-0.68 (-1.58)
Ex2				0.91 (1.02)
Laam	-0.04 (-1.63)			
Asiae	0.13 (2.52)			
<b>IRC1</b>	<b>-0.03</b> <b>(-0.80)</b>	<b>-0.06</b> <b>(-3.27)</b>	<b>0.05</b> <b>(3.25)</b>	<b>0.16</b> <b>(2.55)</b>
<b>AD</b>	<b>-0.24</b> <b>(-2.77)</b>	<b>-0.03</b> <b>(-0.94)</b>	<b>0.03</b> <b>(0.99)</b>	<b>0.66</b> <b>(4.94)</b>
Lpop	0.00 (0.32)	0.00 (0.31)	-0.01 (-4.55)	
Demo				0.01 (1.53)
R-squared	0.3826	5453	0.3281	0.3268

Dummies for each religion have been used in order to isolate the effect of polarization,

Numbers in parentheses are Z-statistics.

Laam: Dummy for Latin-American countries.

Asiae: Dummy for East-Asian countries.

gpop: average annual rate of population growth per period

lpop: log of the population at the beginning of the period

hum: Average schooling years in the total population over age 25 of the initial period.

ex: Ratio of exports to GDP(in current international prices). Average period.

Ex2: square of ex.

Demo: Democracy score: general openness of the political institutions

civwar: Dummy variable which take value one if a civil war broke out and zero if the country did not experience a civil war.

IRC1: religious polarization index

AD: animist diversity index

TABLE 7A  
 POOLED AND RANDOM EFFECTS ESTIMATION USING THE  
 RELIGIOUS FRAGMENTATION VARIABLE , RF

Dependent variable: log difference GDP per capita, five years period from 1960 to 1989.

Model	1 Pool	2 Pool	3 Pool	4 RE	5 RE	6 RE
Const	0.58 (5.65)	0.58 (5.67)	0.65 (6.88)	0.83 (6.57)	0.84 (6.60)	0.65 (6.88)
Inv	0.42 (3.06)	0.44 (3.23)	0.48 (4.32)	0.49 (3.23)	0.50 (3.30)	0.48 (4.32)
L(int.gdp)	-0.52 (-3.83)	-0.05 (-3.99)	-0.06 (-5.37)	-0.08 (-4.85)	-0.08 (-4.96)	-0.06 (-5.37)
Sec	0.09 (1.53)	0.09 (1.54)	0.10 (1.88)	0.06 (1.03)	0.07 (1.04)	0.10 (1.88)
Pri	0.023 (0.40)	0.025 (0.55)	0.07 (1.68)	0.13 (0.24)	0.01 (0.26)	0.07 (1.68)
Gov	-0.57 (-4.12)	-0.58 (-4.19)	-0.81 (-6.10)	-0.72 (-4.35)	-0.72 (-4.37)	-0.81 (-6.10)
Rev	0.42 (3.14)	0.41 (3.10)	0.41 (3.22)	0.42 (3.06)	0.43 (3.05)	0.41 (3.22)
Ass	-0.63 (-3.24)	-0.62 (-3.21)	-0.61 (-3.32)	-0.64 (-3.14)	-0.63 (-3.14)	-0.61 (-3.32)
Coup	-0.04 (-0.50)	-0.03 (-0.46)	-0.00 (-0.29)	-0.56 (-0.72)	-0.06 (-0.72)	-0.00 (-0.29)
Pish	-0.035 (-1.42)	-0.03 (-1.38)	-0.01 (-0.11)	-0.05 (-1.64)	-0.05 (-1.62)	-0.01 (-0.11)
Ppdev	-0.02 (-0.74)	-0.02 (-0.78)	-0.01 (-0.45)	-0.02 (-0.52)	-0.02 (-0.54)	-0.01 (-0.45)
Laam	-0.06 (-2.57)	-0.06 (-2.54)	-0.07 (-3.56)	-0.07 (-2.48)	-0.07 (-2.50)	-0.07 (-3.56)
Asiae	-0.005 (-0.08)	-0.00 (-0.06)	0.08 (2.19)	-0.01 (-0.19)	-0.01 (-0.18)	0.08 (2.19)
<b>Rf</b>	<b>-0.07</b> <b>(-1.72)</b>		<b>-0.05</b> <b>(-0.62)</b>	<b>-0.05</b> <b>(-0.95)</b>		<b>-0.05</b> <b>(-0.62)</b>
<b>Rf2</b>		<b>-0.09</b> <b>(-1.67)</b>			<b>-0.08</b> <b>(-1.04)</b>	
<b>AD</b>			<b>-0.10</b> <b>(-2.20)</b>			<b>-0.10</b> <b>(-2.20)</b>
Lpop			-0.00 (-0.60)			-0.00 (-0.60)
R2	0.3426	0.3422	0.3203	0.3318	0.3315	0.3203
N	363	363	363	363	363	363

Set of explanatory variables Barro (1991)

Dummies for each religion have been used in order to isolate the effect of fragmentation.

Numbers in parentheses are t-statistics.

Inv: Average of the ration of real domestic investment for the period (private plus public) to real GDP.

L(int.gdp): Real GDP per capita of the initial period (1985 international prices)

Sec: Percentage of secondary school attained in the total population. Taken at the beginning of the period

Pri: Percentage of "Primary school attained" in the total population. Taken at the beginning of the period.

Gov: Average period of the Ratio of real government "consumption" expenditure net of spending on defense and on education the real GDP.

Rev: Number of revolutions per year, averaged over the period (Banks).

Ass: number of assassassination per milion population per year, average period.

Coups: number of coups per year, average period.

Pish: Price level of investment (PPP I / Xrate relative to U.S.) at the beginning of the period. (U.S=1.0).

ppdev: Magnitude of the deviation of Pish560 from the sample mean.

Laam: Dummy for Latin-American countries.

Asiae: Dummy for East-Asian countries.

lpop: log of the population al the beginning of the period

AD: animist diversity index

Rf: religiuos fragmentation index used in the paper "Justice-Seeking and Loot-Seeking in Civil War".

Rf2: square of religious fragmentation

TABLE 7B  
DIRECT AND INDIRECT EFFECTS USING 3SLS ESTIMATION

Dependent variable: log difference GDP per capita, five years period from 1960 to 1989				
Equations	GROWTH	Investment	Gov.exp	Civil war
Const	0.61 (5.03)	-0.28 (-6.00)	0.38 (9.62)	-0.05 (-0.16)
Inv	0.45 (2.89)			
Ln(Int.gdp)	-0.06 (-4.36)	0.06 (12.80)	-0.02 (-3.76)	-0.04 (-0.88)
Sec	0.08 (1.26)		0.02 (0.61)	
Pri	0.07 (1.30)			
Hum				-0.03 (-2.18)
Gov	-0.62 (3.75)	-0.03 (-0.46)		
Rev	0.41 (2.71)	0.13 (1.83)	-0.00 (-0.09)	
Ass	-0.62 (-2.78)	-0.17 (-1.70)	-0.00 (-0.05)	
Coup	-0.012 (-0.52)	-0.02 (-2.00)	0.03 (2.62)	
Civwar	-0.04 (-2.36)			
Pish	-0.012 (-0.48)			
Ppdev	0.01 (0.26)			
Ex				-0.65 (-1.45)
Ex2				1.15 (1.05)
Laam	-0.07 (-2.58)			-0.01 (-0.17)
Asiae	0.10 (1.86)			0.41 (3.09)
<b>rf</b>	<b>-0.05</b> <b>(-1.05)</b>	<b>-0.02</b> <b>(-1.02)</b>	<b>0.06</b> <b>(3.84)</b>	<b>-0.15</b> <b>(-1.20)</b>
<b>AD</b>	<b>-0.17</b> <b>(-2.73)</b>	<b>0.05</b> <b>(1.96)</b>	<b>-0.02</b> <b>(-1.04)</b>	<b>0.30</b> <b>(2.13)</b>
Lpop	0.06 (0.88)	0.00 (0.35)	0.01 (-4.68)	0.04 (2.55)
Demo				0.01 (1.48)
R-squared	0.3784	0.6028	0.3583	0.2184

Dummies for each religion have been used in order to isolate the effect of polarization, Numbers in parentheses are Z-statistics.

Laam: Dummy for Latin-American countries.

Asiae: Dummy for East-Asian countries.

gpov: average annual rate of population growth per period

lpop: log of the population at the beginning of the period

hum: Average schooling years in the total population over age 25 of the initial period.

ex: Ratio of exports to GDP(in current international prices). Average period.

Ex2: square of ex.

Demo: Democracy score: general openness of the political institutions

civwar: Dummy variable which take value one if a civil war broke out and zero if the country did not experience a civil war.

AD: animist diversity index

Rf: religious fragmentation index used in the paper "Justice-Seeking and Loot-Seeking in Civil War"

TABLE 7C  
DIRECT AND INDIRECT EFFECT USING 3 SLS ESTIMATION

Dependent variable: log difference GDP per capita, five years period from 1960 to 1989				
Equations	GROWTH	Investment	Gov.exp.	Civil war
Const	0.69 (5.22)	-0.11 (-1.96)	0.28 (5.68)	-0.59 (-2.00)
Inv	0.36 (2.40)			
Ln(Int.gdp)	-0.06 (-4.25)	0.05 (8.13)	-0.01 (-1.36)	0.03 (1.01)
Sec	0.06 (1.01)		0.01 (0.5)	
Pri	0.07 (1.37)			
Hum				-0.04 (-2.95)
Gov	-0.75 (-4.59)	-0.02 (-0.27)		
Rev	0.56 (3.78)	0.08 (1.20)	-0.02 (-0.31)	
Ass	-0.84 (-3.88)	-0.11 (-1.12)	0.02 (0.21)	
Coup	0.00 (0.06)	-0.02 (-1.58)	0.02 (2.42)	
Civwar	-0.07 (-2.36)			
Pish	-0.03 (-1.37)			
Ppdev	-0.01 (-0.24)			
Ex				-1.34 (-1.86)
Ex2				2.38 (1.40)
Laam	-0.07 (-2.10)			
Asiae	0.06 (1.13)			
<b>IRC1</b>	<b>-0.03</b> <b>_-(-0.55)</b>	<b>-0.08</b> <b>_-(-4.44)</b>	<b>0.03</b> <b>(2.00)</b>	<b>0.51</b> <b>(5.11)</b>
<b>AD</b>	<b>-0.29</b> <b>_-(-3.16)</b>	<b>0.05</b> <b>_(1.34)</b>	<b>0.00</b> <b>(0.1)</b>	<b>0.81</b> <b>(4.92)</b>
Lpop	0.00 (0.64)	0.00 (0.17)	-0.01 (-4.66)	0.01 (0.46)
<b>Rf</b>	<b>-0.00</b> <b>_-(-0.40)</b>	<b>0.00</b> <b>(1.36)</b>	<b>0.00</b> <b>(1.89)</b>	<b>-0.01</b> <b>_-(-1.85)</b>
Demo				-0.01 (-1.68)
R-squared	0.3963	0.6081	0.3437	0.3572

Dummies for each religion have been used in order to isolate the effect of polarization, Numbers in parentheses are Z-statistics.

Inv: Average of the ration of real domestic investment for the period (private plus public) to real GDP.

L(int.gdp): Real GDP per capita of the initial period (1985 international prices)

Sec: Percentage of secondary school attained in the total population. Taken at the beginning of the period

Pri: Percentage of "Primary school attained" in the total population. Taken at the beginning of the period.

Gov: Average period of the Ratio of real government "consumption"expenditure net of spending on defense and on education to real GDP.

Rev: Number of revolutions per year, averaged over the period (Banks). Ass=number of assassassination per milion population per year, average period. Coups: number of coups per year, average period.

Pish: Price level of investment (PPP I/ Xrate relative to U.S.) at the beginning of the period. (U.S.=1.0).

ppdev: Magnitude of the deviation of Pish560 from the sample mean.

IRC1: religious polarization index. AD: animist diversity index. Rf: religiuous fragmentation index used in the paper "Justice-Seeking and Loot-Seeking in Civil War"

TABLE 8A  
DIRECT AND INDIRECT EFFECTS USING 3SLS ESTIMATION

Dependent variable: log difference GDP per capita, five years period from 1960 to 1989				
Equations	GROWTH	Investment	Gov.exp	Civil war
Const	0.70 (5.92)	-0.23 (-4.83)	0.34 (8.13)	-0.22 (-0.76)
Inv	0.57 (3.98)			
Ln(Int.gdp)	-0.069 (-4.77)	0.06 (12.47)	-0.01 (-2.29)	-0.00 (-0.06)
Sec	0.08 (1.26)		0.01 (0.58)	
Pri	0.04 (0.78)			
Hum				-0.04 (-2.65)
Gov	-0.61 (-4.30)	-0.06 (-0.09)		
Rev	0.35 (2.26)	0.100 (1.38)	0.02 (0.34)	
Ass	-0.53 (-2.33)	-0.13 (-1.27)	-0.04 (-0.45)	
Coup	-0.00 (-0.07)	-0.02 (-2.43)	0.02 (2.58)	
Civwar	-0.05 (-2.26)			
Pish	-0.03 (-1.33)			
Ppdev	-0.01 (-0.43)			
Ex				-0.58 (-1.30)
Ex2				0.32 (1.73)
Laam	-0.07 (-2.30)			0.07 (1.40)
Asiae	0.11 (2.11)			0.35 (3.01)
<b>ELF</b>	<b>-0.05</b> <b>(-1.60)</b>	<b>-0.03</b> <b>(-1.95)</b>	<b>0.03</b> <b>(2.26)</b>	<b>0.14</b> <b>(1.88)</b>
<b>AD</b>	<b>-0.15</b> <b>(-2.50)</b>	<b>0.01</b> <b>(0.46)</b>	<b>-0.01</b> <b>(-0.26)</b>	<b>0.35</b> <b>(2.85)</b>
Lpop	-0.00 (-0.02)	-0.00 (-0.45)	-0.01 (-4.07)	0.02 (1.33)
Demo				0.01 (1.76)
<b>R-squared</b>	<b>0.3936</b>	<b>0.5531</b>	<b>0.3148</b>	<b>0.2186</b>

Dummies for each religion have been used in order to isolate the effect of polarization, Numbers in parentheses are Z-statistics.

Laam: Dummy for Latin-American countries.

Asiae: Dummy for East-Asian countries.

gpop: average annual rate of population growth per period

lpop: log of the population at the beginning of the period

hum: Average schooling years in the total population over age 25 of the initial period.

ex: Ratio of exports to GDP(in current international prices). Average period.

Ex2: square of ex.

Demo: Democracy score: general openness of the political institutions

civwar: Dummy variable which take value one if a civil war broke out and zero if the country did not experience a civil war.

AD: Animist diversity index. ELF: ethnolinguistic fragmentation index



TABLE 8B  
DIRECT AND INDIRECT EFFECT USING 3 SLS ESTIMATION

Dependent variable: log difference GDP per capita, five years period from 1960 to 1989				
Equations	GROWTH	Investment	Gov.exp.	Civil war
Const	0.72 (6.44)	-0.14 (-2.81)	0.28 (6.48)	-0.38 (-1.42)
Inv	0.58 (4.79)			
Ln(Int.gdp)	-0.07 (-5.29)	0.05 (9.41)	-0.01 (-1.86)	0.03 (0.84)
Sec	0.07 (1.22)		0.04 (1.65)	
Pri	0.006 (0.150)			
Hum				-0.02 (-1.77)
Gov	-0.65 (-4.85)	0.02 (0.43)		
Rev	0.18 (1.33)	0.15 (2.27)	0.036 (0.65)	
Ass	-0.27 (-1.41)	-0.20 (-2.19)	-0.06 (-0.78)	
Coup	-0.06 (-0.87)		-0.06 (-2.11)	
Civwar	-0.07 (-3.05)			
Pish	-0.03 (-1.31)			
Ppdev	-0.006 (-0.23)			
Ex				-0.78 (-1.76)
Ex2				1.16 (1.58)
Laam	-0.05 (-2.51)			
Asiae	0.08 (2.12)			
<b>IRC1</b>	<b>-0.004</b> <b>(-0.11)</b>	<b>-0.05</b> <b>(-2.86)</b>	<b>0.04</b> <b>(2.69)</b>	<b>0.23</b> <b>(3.01)</b>
<b>AD</b>	<b>-0.25</b> <b>(-2.86)</b>	<b>0.007</b> <b>(0.181)</b>	<b>0.04</b> <b>(1.16)</b>	<b>0.69</b> <b>(3.67)</b>
Lpop	0.004 (0.71)	-0.002 (-0.84)	-0.01 (-3.83)	0.02 (1.52)
<b>ELF</b>	<b>-0.06</b> <b>(-1.74)</b>	<b>-0.00</b> <b>(-0.06)</b>	<b>0.02</b> <b>(1.64)</b>	<b>-0.09</b> <b>(-1.25)</b>
Demo				0.007 (1.42)
R-squared	0.3883	0.4984	0.2879	0.1518

Dummies for each religion have been used in order to isolate the effect of polarization, Numbers in parentheses are Z-statistics.

Inv: Average of the ration of real domestic investment for the period (private plus public) to real GDP.

L(int.gdp): Real GDP per capita of the initial period (1985 international prices)

Sec: Percentage of secondary school attained in the total population. Taken at the beginning of the period

Pri: Percentage of "Primary school attained" in the total population. Taken at the beginning of the period.

Gov: Average period of the Ratio of real government "consumption" expenditure net of spending on defense and on education to real GDP.

Rev: Number of revolutions per year, averaged over the period (Banks).

Ass=number of assassassination per milion population per year, average period.

Coups: number of coups per year, average period.

Pish: Price level of investment (PPP I / Xrate relative to U.S.) at the beginning of the period. (U.S.=1.0).  
ppdev: Magnitude of the deviation of Pish560 from the sample mean.  
IRC1: religious polarization index  
AD: Animist diversity index  
ELF: ethnolinguistic fragmentation index