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A B S T R A C T

This paper analyzes the role of religious conflict in the process of development of a country. We construct an index of religious polarization using data on the proportions of each religion in a country. The index of polarization is an alternative to the usual fragmentation index. We argue that for the case of religious conflict the fragmentation index is less appropriate than the polarization measure. We include the religious polarization index in a growth regression specification to determine the effect of religious conflicts on growth. The main finding is that religious conflict is an important factor in explaining economic growth and it is also an important explanation for the so called "Africa's growth tragedy". Moreover, religious polarization has a larger explanatory power on growth than ethnolinguistic and religious fragmentation.

Keywords: index of religious polarization, fragmentation index, economic growth.

R E S U M E N

Este trabajo analiza el papel de los conflictos religiosos en el desarrollo de un país. Hemos construido un índice de polarización religiosa utilizando los datos de proporción de cada religión en un país. El índice de polarización es una alternativa al habitual índice de fragmentación. Sostenemos que para el caso de conflictos religiosos, el índice de fragmentación es menos apropiado que el de polarización. Incluimos el índice de polarización religiosa en una regresión de crecimiento para determinar el efecto de los conflictos religiosos sobre el crecimiento. El resultado principal es que el conflicto religioso es un factor importante al explicar el crecimiento económico y también al explicar la llamada "tragedia del crecimiento de África". Además, la polarización religiosa tiene mayor poder explicativo sobre el crecimiento que la fragmentación etnolingüística y religiosa.

Palabras clave: índice de polarización religiosa, índice de fragmentación, crecimiento económico.

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. This paper analyzes the different dimensions of the concept of ethnicity in order to provide a detail 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 an index of religious diversity, the elaboration of a time series of religious diversity within countries and the channels through which religious polarization affects growth.

First, and in contrast with the ethnic characteristic consider in many other studies, this paper emphasizes 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 the three basic dimension of ethnicity together with race and religion.

Second we construct an index of polarization that captures the strength of religious tensions. The measures used regularly in the literature to quantify ethnic characteristic 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 the ethnic characteristics We show that polarization indices are more appropriate in the case of religious diversity. We show that these indices of polarization are very robust to alternative estimations procedures, data used for its construction and different sets of other explanatory variables. However, not all the 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.

Third we construct a time series database on religious diversity within countries that tries to overcome the common criticisms to the World Christian Encyclopedia data[1] 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 eight sections. The first one is this introduction. The

[1]This is the source of religion data used by most of the literature.

second section presents a brief review of the literature on religion and economic development. The third section constructs the index of religious conflict. Section 4 presents a discussion of 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. Another test for the robustness of the results is presented in section 6 that compares the explanatory power of religious polarization versus other ethnic characteristics. Section 7 treats investment rate, government expenditure and civil wars as endogenous in order to explain the channels through which religious polarization affects growth. Finally, section 8 contains the conclusions.

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[2] and social factors can also be very important determinant of growth[3]. Moreover, these social elements have also influence on the economic and political structure. The economic growth literature has not paid enough attention to these sociopolitical factors.

Ethnic characteristics of a society as language, religion and race have only been use 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 the ethnic variable is included in growth regressions the significance of the African dummy weakens, what they suggest as an indication that ethnic divisions have played a significant role in Africa's growth tragedy. Mauro (1995) also uses these 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 via a direct channel. For example, it might slow down the diffusion of ideas and technological innovations within the country.

On the other hand there are very few studies on the economics growth research agenda that look at the role of religion from a macroeconomic perspective, even thought there are more at the micro level. In the economics and religious literature,

[2]See Alesina and Rodrick (1994).

[3]Barro(1991,1996).

questions like the effect of religion and religious diversity on economic prosperity and welfare have started to receive a formal treatment only very recently.

Hutcheson and Taylor (1973), indicate that other environmental characteristics, especially cultural factors, along with economic characteristics, although in some cases independent of them, are important antecedents of state political system characteristics and policy outputs. They concentrate their analysis in one important cultural variable: the religious group identification. The argument comes from the evidence that religious group identification has been shown to be related with voting behavior and, therefore, is a cultural factor that may have important effects on state political system characteristics and policy outputs.

Glahe and Vorhies (1989) show a positive interrelation between the Judeo-Christian values, political economic liberty and economic development. The argument that explains this is based on the fact that nations with Judeo-Christian values are more likely to have political democracies that are conductive to economic development. Their results suggest that social values should be consider important factors for economic development[4]. They use an index of economic development based on the work of Morris (1979). To capture not only the quality of development but also the quantity of development Glahe and Vorhies (1989) construct a index by equally weighting the levels of life expectancy, adult literacy, infant survival and per capita income. Heath, Waters, and Watson (1995) use macroeconomic data in order to measure the influence of religion, as transmitted through private and public institutions, on economic performance. Their findings show that religion influences significantly economic performance, and per capita income.

This paper examine the relevance of the existence of different religious groups on the process of economic growth of a country. Many conflicts related with religious differences arise every day in our world[5]. These facts have also become an important focus of attention in the debate generated around the theory of Samuel Huntington (199) about the cultural fragmentation of the world. In the study on the relation between social conflicts and growth one of the most important determinants is religious diversity. The most important religious tensions in the world 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 religious tensions and to study the role of that index in the process of development of a country. The

[4]The effect of democracy on economic growth is still an issue subject to debate (Barro 1996).

[5]A recent example of these conflicts can be found in Bosnia

main conclusion is that the polarization of the religious groups, called religious conflict, is an important social factor in the explanation of growth, and that this can be an important explanation for the tragedy of Africa's growth. Moreover, the results also show the importance of these variables compared with other ethnic variables used in 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. The relationship between religious diversity and social conflict is not an easy one. Initially, one could think that the more religious diversity the worst is the social situation of a the country in terms of social conflict. However, this does not have to be the case. We based the construction of the index in the the theoretical assumption that the situation of maximum tension is the one when there are two groups of equal size. For the moment, we support this assumption by the theoretical explanartions that Esteban and Ray (1994) provide for the construction of a index of polarization of income distribution that reflects the social tensions derivated of the income distribution. Later in this section we show how this index can also be apply to the religious diversity case.

The assumption that the situation of maximum tension is the one when there are two religions of equal size is the key point to construct the index. 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) Firstly we want to take into account the deviations of the proportion of each religion from the maximum point, 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.

$$IRC1 = 1 - \sum_{i=1}^{I} (0.5 - \pi_i)^2 \pi_i / 0.25 \qquad (1)$$

This index takes value one if there exists only one religion and value zero at the point of maximum interaction, which is consistent with the theory exposed before.

The closer is the distribution of religious groups in a country of the situation of maximum tension the higher is the value of the index. Therefore a country with

three religious groups distributed with percentages, 0.45, 0.45, 0.1, the index predicts a higher tension that if they are distributed in percentages 0.33, 0.33, 0.33. or o.85, 0.15, 0.

The index constructed above is a measure of polarization. In order to show that the results obtained in the regression analysis are robust to other polarization measures, we compare the index $IRC1$ with an application to religions of an existing measure proposed by Esteban and Ray (1994). The original index was a measure of polarization of income distribution but it can be the base for an index of conflict. They argue that the most polarized situation, the one in which the social tensions are higher, is the one in which the income has a distribution that is bimodal.

Before applying the measure proposed by Esteban an 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 believers[6].

FEATURE 2: There must be a high degree of heterogeneity across groups.
In the religious distribution there are heterogeneity of believes since the individuals of different religious groups believe in a different religion.

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 since the significant size groups are never more than twelve.

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 π_i is the relative size of the group.

Applying this measure to the distribution of religions, it is possible to make ho-

[6]However, in some large religions there may be conflict among different groups. See section 4 for a discussion of this issue.

mogeneous 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[7]. 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:

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

$$IRC2 = (P^*(\pi))^2$$

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

For each possible α 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 α. In practice we will choose the α that maximizes the R-squared of the growth rate regression including the religious conflict[8]. The fact that α is not determined from the theoretical model but has to be estimated and the possible violation of the first feature makes the use of this second polarization index just a matter of comparison with respect to our own index.

4 DATA

The main source of data for religious diversity of a country's population Comes form Barret's (Ed.)(1982) World Christian Encyclopedia. The proportion of each religion is constructed from the answer to the question "What is your religion?" in public polls. As this question is not multiple answer every individual is supposed to have only one possible religious tendency. Several papers have used this data to analyze the determinants of democracy[9] or the main factors behind civil wars[10].

Barro (1996) distinguish 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[11].

[7] Babchuk (1990) and Roof, Wade Clark, and Hadaway (1979).

[8] This value turns to be in the range of feasible values for α

[9] For instance Barro (1996).

[10] Collier and Hoeffer (1999).

[11] Collier and Hoeffer (1999) use Barro's data.

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 the information contained in "L'Etat des Religions dans le monde" (ER), which takes the data from the "World Christian Encyclopedia" (WCE) 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 desaggregation and we use the ER. The great advantage of the SY is the extreme detail on animist religions[12].

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.

a) Jews, Christians, Muslims, Buddhism, Hinduism, Taoism and Confucionists are represented in many countries.
b)Chinese religions: Their adepts are normally of a Chinese origin. This religion comprises Taoist and Buddhist rites with Confucianism thinking.
c) Bahaism: An important type of syncretic cult.
d) Syncretic cults: Sometimes the percentage represent only one kind of cult, but in some cases the percentage includes more than one type. When it is the case that involves more than one cult, this means that is capturing small groups that practices rites using instruments as magic.
e) Animist religion: The animists are the adepts to traditional religions practice magic and the veneration of a large number of gods an spirits. They use magic for cult, as an instrument to control the world with the help of the inhabitants beyond the grave. In some countries there exist only one particular animist cult, as Charmandism in Soviet Union or Druduism in United Kingdom. In those cases, its percentage is included in other religions. Therefore, animist religions always include more than one type of cult.
f) Other religion includes small collectives as "black church" or "spiritual groups".
g) No professed religion.

In some particular countries, mainly in Latin America, it is the case that some part of the population practices two different cults. The combination is always between one of the large religion, mainly Christian, and some animist or syncretic cults.In those cases, we consider that if someone practices an animist cult and she is also counted as Christian, what matters is that she belongs to the animist group. Therefore, we

[12]We confronted the data with national sources in order to improve the reliability of this information.

consider Christians those people that are only Christians. Moreover, in the animist group, since there are so many different types of cults, what matters is the existence of the collective that beliefs in those practices even though they could also participate in Christian rites. The reason that explains the treatment of these cases is that, as it is 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 practice also the rites of large religions. This is 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.

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 no more than someone who belongs to another syncretic cult. He 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 other religions because the only things that people in this group have in common is the fact they do not belong to any religious group. Therefore, there are not specific common interests that permit to identify them as a collective and that distinguish 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. This means that social friction caused by religious differences with other groups will not be present. 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[13].

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 numbers 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 differs from the large religions and that lead to some common

[13]The results do not change even if we consider the no professed religion as another group.

interests that distinguish them from other religions. On the other hand, the fact that there are traditional and original beliefs, typical from primitive collectives, makes them the perfect victim for large religions. Therefore, all of them 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 the treatment of the syncretic cults, we also consider them as a group with some common interests for different reasons. First of all, in most cases it represent only one syncretic cult. Moreover, when there are more than one cult represented in the percentage of syncretic cults, they have the common characteristic of using magic and being small groups.

In some countries there may be conflict inside one religious group. We consider three cases: the animists, the Cristians and the Muslim groups[14]. For the Muslims and 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).

The animist groups are different. They include a variable number of traditional religions typical of primitive societies. We consider as a primitive societies collectives or ethnic groups that do not belong to the occidental industrial civilization. In this section, we analyze if there exists some religious interaction across these collectives. Each of these groups uses the magic as an instrument to control the world. In these primitives societies "each adult has 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. This means that each animist religion uses its different beliefs to try to control the world. Therefore, this implies differences in how the world has to be controlled. It is not only a question of beliefs. The center of each of these societies is religion. 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 more difficult the communication across these groups and, therefore, as more animist collectives are, the diffusion of ideas and technological innovation may slow down the country.

One problem that emerge when capturing this effect is that the degree of communication loss depends on the number of animist cults. There is no information

[14]We do not consider other religions because they do not have the features that make this three groups internally problematic.

available on this issue and therefore, we approximate this effect using the following reasoning: 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 animist has more animist religions, given that animist groups are usually very small collectives. Therefore more diversity leads to less capacity of 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 alternative index of animist diverstity, 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.

For the sake of comparison we also collected data directly from the World Christian Enciclopedia (WCE) using its division of groups. This data set has the advantage of being a time series, providing information for 1970, 1975 and 1980. However, as we pointed out before, this source has several shortcomings. First, and probably the most important, the data does not consider the possibility of double practice, very common in Sub Saharan Africa and Latin America countries. Comparing to the other source of information we realize the data is biased towards Christian religion. A clear example is the case of Kenya 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 present change 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.

5 THE EMPIRICS OF RELIGIOUS CONFLICT AND GROWTH

The recent empirical literature on the determinants of economic growth has examine 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, potential religious conflicts have not been considered an Important variable explaining economic growth.

There are at least two reasons why religious conflict can have a direct effect on the economic growth. Firstly,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 as it implies non-productive uses for those inputs. [15] Secondly, technology is also affected by religious conflict in the following way: when there is conflict the communication across individuals of different groups diminishes. This is because the society is polarized, which implies that social friction does not allow good communication across groups. The same effect is true when society is structured in very small and different collectives. In both cases the higher is the level of conflict the less communication. The loss of communication slows down the diffusion of ideas and technological innovation within the country.

This section aims to show the empirical evidence of the direct effect of religious conflict on growth. It is divided in two parts. The first part analyzes the results for the general case while the second part contains a discussion of the importance of religious conflict in the explanation of Africa´s growth tragedy.

5.1 Regression results

To analyze the effect of religious conflict on growth we adopt the general specification of the convergence literature using two alternative sets of explanatory variables in order to show the generality of our finding. The general form of the specification is

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

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 first set of X's includes the ones proposed by Levine and Renelt (1992) as basic variables in their study on the robustness of the explanatory variables included in growth regressions. The second set of variables is larger and comes from Barro (1991). It considers some variables like government expenditure, revolutions, coups, assassinations and inflation that are not part of the basic X's in Levine and Renelt (1992). Additionally, the IRC variable measures religious conflict. We use two alternative indices: the one proposed in section 3 of this paper (IRC1) and Esteban and Ray's (1994) polarization index (IRC2).

For all the empirical exercises we use Barro and Lee (1994) dataset. We consider a sample of 138 countries and data from 1960 to 1989 organized in periods of five-years[16]. The polarization measures are supposed to be constant across time [17] We include in all the regression a dummy variable for each of the religions that participate

[15] This effect can be capture in a two sector model, in which the resources can be allocated in two sectors one with high productivity and the other with low productivity. The reallocation of resources in this model is the channel through which growth is affected.

[16] See Barro (1996) or Islam (1995).

[17] Next section modifies this assumption when data are available.

in the construction of the polarization index in order to avoid that the significance of the index comes from the types of religions rather that from their polarization. In this way we try that the index captures only religious conflict independently of which religions exist in the country[18].

Insert table 1

Table 1 shows the results of the pool estimation using the set of variables proposed by Levine and Renelt (1992). 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 α and we estimated α to reach the maximum R-squared coefficient. There is no theory that could explain this particular value of α.

In order to analyze the effect of animist fragmentation we include in (3) the results for the regression once the religious conflict variable is substitute 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 in (4) the total population to control for the level effect. In both cases we find that the index of animist diversity has a negative and significant coefficient. Finally, we combine the index of religious polarization and the index of animist diversty into two mixing indices [19]: the MIX1, that uses IRC1 as the polarization measure, and the MIX2, that takes IRC2. The results are shown in columns (5) and (6) of Table 1. As in the other cases there is a negative and significant relationship between these religious conflict indicators and growth [20]. The fact that all the indices used to capture religious conflict have a negative coefficient supports the view that religious polarization is important in order to explain economic growth.

Insert table 2

Similar results are obtained when using Barro's (1991) set of explanatory variables, as Table 2 shows. The index of religious polarization has a negative and significant effect on growth no matter which measure is used. The same is true for the animist diversity index and the mixing indices. These results strengthen the findings shown in Table 1 not only because they coincide in showing the negative effect of religious

[18]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.

[19]The results are essentially unchanged if we combine also the index of Muslim and Christian polarization.

[20]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 inverse causation from growth to religious polarization does not seem to be a plausible hypothesis.

TABLE 1
Set of explanatory variables in Levine and Renelt (1992)

Dep var Growth	(1)	(2)	(3)	(4)	(5)	(6)	(7)
No.obs	485	485	481	481	481	481	481
Const	0.64 (6.22)	0.71 (6.49)	0.51 (5.36)	0.46 (5.03)	0.67 (6.37)	0.70 (6.70)	0.71 (6.91)
Inv	0.66 (6.15)	0.63 (5.92)	0.63 (5.87)	0.63 (6.30)	0.60 (5.62)	0.62 (5.79)	0.58 (5.39)
L(Int.gdp)	-0.07 (-5.78)	-0.07 (-5.85)	-0.06 (-5.32)	-0.06 (-5.38)	-0.07 (-6.08)	-0.07 (-6.01)	-0.07 (-6.15)
Sec	0.11 (1.89)	0.11 (1.94)	0.12 (1.98)	0.12 (2.03)	0.11 (1.88)	0.12 (1.86)	0.11 (1.93)
Gpop	-1.69 (-1.82)	-1.89 (-2.08)	-1.90 (-2.05)	-1.46 (-1.71)	-1.24 (-1.32)	-1.30 (-1.39)	-1.40 (-1.52)
Laam	0.01 (0.33)	0.01 (0.29)	-0.01 (-0.49)	-0.02 (-1.15)	-0.015 (-0.71)	-0.01 (-0.35)	-0.02 (-0.88)
Asiae	0.12 (3.49)	0.149 (4.13)	0.10 (3.00)	0.12 (4.54)	0.12 (3.35)	0.12 (3.52)	0.13 (3.86)
IRC1	**-0.13 (-3.81)**				**-0.11 (-3.40)**		
IRC2		**-0.42 (-4.13)**					
AD			**-0.31 (-3.91)**	**-0.29 (-4.03)**	**-0.27 (-3.40)**		
Lpop			0.005 (0.95)	0.002 (0.53)	0.003 (0.55)	-0.00 (-0.13)	
MIX1						**-0.14 (-4.91)**	
MIX2							**0.32 (-5.48)**
R2	0.2168	0.2210	0.2207	0.2085	0.2397	0.2348	0.2440

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.
The AD variable is calculated using the pop values for each perid

TABLE 2
Set of explanatory variables Barro (1991)

Dep var Growth	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
No obs	429	429	429	423	423	423	423	423	423
Const	0.56 (6.42)	0.69 (6.65)	0.76 (6.87)	0.73 (7.01)	0.66 (6.77)	0.82 (7.35)	0.89 (7.93)	0.81 (7.27)	0.88 (7.48)
Inv	0.57 (4.85)	0.52 (4.11)	0.49 (3.93)	0.52 (4.13)	0.57 (0.86)	0.49 (3.91)	0.47 (3.74)	0.49 (3.92)	0.47 (3.74)
L(int.gdp)	-0.06 (-4.83)	-0.07 (-5.13)	-0.07 (-5.28)	-0.07 (-5.67)	-0.07 (-5.55)	-0.07 (-5.42)	-0.083 (-6.04)	0.081 (-5.89)	-0.08 (-6.03)
Sec	0.13 (2.22)	0.13 (2.12)	0.13 (2.17)	0.12 (2.09)	0.13 (2.21)	0.12 (2.03)	0.12 (2.07)	0.12 (2.03)	0.12 (2.07)
Pri	0.02 (0.44)	0.04 (0.91)	0.04 (0.87)	0.04 (0.98)	0.27 (0.65)	0.02 (0.47)	0.03 (0.66)	0.03 (0.74)	0.03 (0.68)
Gov	-0.58 (-4.58)	-0.53 (-3.77)	-0.53 (-3.87)	-0.69 (-5.13)	-0.63 (-4.95)	-0.54 (-3.95)	-0.59 (-4.47)	-0.61 (-4.38)	-0.61 (-4.44)
Rev	0.41 (2.88)	0.41 (2.84)	0.42 (2.95)	0.43 (2.99)	0.41 (2.87)	0.38 (2.67)	0.42 (2.97)	0.41 (2.88))	0.42 (2.98)
Ass	-0.62 (-2.98)	-0.61 (-2.94)	-0.63 (-3.04)	-0.64 (-3.09)	-0.61 (-2.98)	-0.57 (-2.78)	-0.63 (-3.08)	-0.61 (-2.99)	-0.63 (2.98)
Coup	-0.01 (-0.23)	-0.00 (-0.07)	-0.00 (-0.05)	-0.05 (-0.79)	-0.04 (-0.60)	-0.01 (-0.13)	-0.03 (-0.45)	-0.04 (-0.52)	-0.03 (-0.49)
Pish	-0.02 (-1.11)	-0.04 (-1.59)	-0.04 (-1.60)	-0.02 (-1.01)	-0.02 (-0.84)	-0.05 (-2.18)	-0.04 (-1.61)	-0.035 (-1.44)	-0.036 (-1.49)
Ppdev	-0.05 (-1.87)	-0.03 (-1.04)	-0.03 (0.29)	-0.02 (-0.61)	-0.02 (-0.77)	0.00 (0.19)	-0.00 (-0.00)	-0.00 (-0.08)	-0.00 (-0.04)
Laam	-0.04 (-1.94)	-0.03 (-1.18)	-0.03 (-1.32)	-0.05 (-2.42)	-0.053 (-2.66)	-0.04 (-1.83)	-0.05 (-2.42)	-0.053 (-2.32)	-0.05 (-2.44)
Asiae	0.08 (0.03)	0.083 (2.13)	0.10 (2.57)	0.08 (2.14)	0.09 (3.21)	0.08 (2.22)	0.10 (2.69)	0.08 (2.23)	0.102 (2.62)
IRC1		**-0.09 (-2.51)**						**-0.07 (-1.99)**	
IRC2			**-0.33 (-3.06)**						**-0.28 (-2.68)**
AD				**-0.37 (-4.36)**	**-0.32 (-4.19)**			**-0.33 (-3.84)**	**-0.33 (-3.86)**
Pop				0.00 (0.47)	-0.00 (-0.23)	-0.00 (-0.98)	0.00 (0.04)	0.00 (0.14)	0.00 (0.14)
MIX1						**-0.12 (-4.03)**			
MIX2							**-0.31 (-5.15)**		
R2	0.2606	0.2875	0.2928	0.3159	0.2992	0.3114	0.3279	0.3227	0.3281

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.

conflict on growth but also because they clarify that the effect of religious polarization is strong even in the presence of other variables of social instability like assassinations, coups or revolutions.

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 that high correlation. In Table 3 we have included the dummy for Sub Saharan Africa, Safrica, together with animist diversity measure used in Tables 1 and 2. The set of explanatory variables corresponds to Barro (1991). Columns 1 show how the Safrica dummy variable results insignificant, [21]. Therefore we can conclude that one possible factor explanining 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.

INSERT Table 3

5.3 Sensibility analysis

In order to check the robustness of the results we have presented tables that compare the effect of different sets of explanatory varibles and alternative indices of religious polarization and diversity. However, there are at least two additional dimensions that we could analyze as another check for 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 using procedures like random effects or fixed effects. The second dimension is the sensibility of the polarization measure to the data used in its construction.

Table 4 and 5 summarize the results presents the results obtained by pooling the data form the different periods, table 4, and using the random effects estimator, table 5. 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 diversity.

[21] Barro (1996) points out that "the government consumption ratio is the only individual variable whose omission causes the dummy to become insignificant" In section 6 we compare the relative explanatory power of religious conflict and government expenditure in a simultaneous equations set-up.

TABLE 3
Set of explanatori varibales in Barro (1991)

Dep var Growth	(1)	(2)	(3)	(4)
No obs	385	385	385	385
Const	0.86 (7.86)	0.73 (7.94)	0.72 (7.91)	0.64 (7.12)
Inv	0.63 (5.61)	0.79 (7.47)	0.79 (7.48)	0.78 (7.22)
L(int.gdp)	-0.08 (-5.68)	-0.08 (-6.32)	-0.08 (-6.27)	-0.07 (-5.66)
Sec	0.10 (1.78)	0.11 (1.87)	0.11 (1.92)	0.09 (1.59)
Pri	-0.01 (-0.32)	-0.06 (-1.52)	-0.06 (-1.45)	-0.05 (-1.32)
Gov	-0.52 (-3.94)	-0.55 (-4.46)	-0.57 (-4.72)	-0.48 (-3.851)
Rev	0.41 (3.09)	0.39 (2.91)	0.39 (2.91)	0.42 (3.063)
Ass	-0.62 (-3.20)	-0.59 (-3.04)	-0.59 (-3.05)	-0.63 (-3.12)
Coup	-0.08 (-1.09)	-0.11 (-1.53)	-0.10 (-1.45)	-0.09 (-1.35)
Pish	-0.02 (-1.02)	-0.01 (-0.49)	-0.01 (-0.62)	-0.01 (-0.29)
Ppdev	-0.03 (-1.08)	-0.03 (-1.19)	-0.03 (-1.12)	-0.03 (-1.37)
AD		**-0.47** **(-3.47)**	**-0.54** **(-5.03)**	
Lpop		-0.00 (-1.44)	-0.00 (-1.352)	
MIX2	**-0.2271** **(-3.07)**			
safrica	**-0.06** **(-1.96)**	**-0.02** **(-0.82)**		**-0.07** **(-3.27)**
R2	0.3418	0.3088	0.3075	0.2791

Dummies for each religion have been used in order to isolate the effect of polarization, except for regression 2b, in which just the dummy for the animist religion has been used.

INSERT Table 4 and 5

Notice that the religious conflict indexes (religious polarization, animist diversity and the mixing variables) 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 and the mixing index remain 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 estimations procedures, index of polarization, set of other explanatory variables or specific data set.

6 ETHNIC CONFLICT: POLARIZATION VERSUS FRAGMENTATION

Ethnic conflict is a recurrent phenomenon affecting many countries. Ethnicity is at the center of politics in divided societies. Ethnic conflicts lead to problems inside countries and international tensions. For instance, in our days there is ethnic tension in Chad, Lebanon, Sudan, Nigeria, Afganistan, Kosovo, etc.

In the economic literature the study of ethnic conflict and how this phenomenon can affect economic processes has not attracted a lot of attention. In answering the question of which are the determinants of growth most of the economic literature have not pay any attention to the social characteristics of the countries. Low investment, low level of education, high population growth, high levels of political instability, etc have became the major answers to explain why some economies grow slowly. However, the ethnic characteristics of a society can be not only the explanation of, for example, investment and political instability [22], but they can also affect growth directly through similar arguments as the ones discussed when religious polarization was first introduced in this paper.

6.1 Ethnic fragmentation versus polarization

In trying to show the importance of ethnic diversity in the economic process there are at least two important aspects that have to be addressed: first it is necessary to clarify the concept of ethnicity in order to select the variables that capture ethnic

[22] For a discussion of direct versus indirect effects of ethnic and religious conflict see section 7.

TABLE 4
Robust analisis I

		CONFLICT INDEX				**USING ESTEBAN AND RAY INDEX**				
		IRC1	**AD**	**MIX1**	**R2**	**IRC2**	**MIX2**	**R2**	**Variables Specif.**	**Sample N**
Pool	**Data**	-0.09 (-2.51)			0.2875	-0.33 (-3.06)		0.2928	Barro	Barrolee N=429
	WC	-0.58 (-1.55)			0.2911	-0.12 (-1.27)		0.2897	Barro	Barrolee N=428
	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**		-0.33 (-4.19)		0.2992				Barro	Barrolee N=429
	WC		-0.29 (-3.77)		0.2948				Barro	Barrolee N=423
	Data		-0.29 (-4.03)		0.2085				Lev&Ren	Barrolee N=
	WC		-0.30 (-4.03)		0.2058				Lev&Ren	Barrolee N=481
Pool	**Data**			-0.12 (-4.03)	0.3114		-0.31 (-5.15)	0.3279	Barro	Barrolee N=429
	WC			-0.08 (-2.61)	0.3044		-0.19 (-3.06)	0.3086	Barro	Barrolee N=422
	Data			-0.14 (-4.91)	0.2348		-0.32 (-5.48)	0.2377	Lev&Ren	Barrolee N=485
	WC			-0.11 (-3.67)	0.2207		-0.23 (-3.73)	0.2214	Lev&Ren	Barrolee N=477

TABLE 5:
ROBUSTNESS ANALYSIS II

		CONFLICT INDEX				**ESTEBAN AND RAY INDEX**				
		IRC1	**AD**	**MIX1**	**R2**	**IRC2**	**MIX2**	**R2**	**Variables Specif.**	**Sample N**
RE	**Data**	-0.11 (-2.59)			0.2807	-0.40 (-3.07)		0.2868	Barro	Barrolee N=429
	WC	-0.06 (-1.42)			0.2820	-0.15 (-1.25)		0.2807	Barro	Barrolee N=428
	Data	-0.12907 (-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**		-0.51 (-4.15)		0.3029				Barro	Barrolee N=423
	WC		-0.44 (-4.09)		0.2956				Barro	Barrolee N=423
	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**			-0.13 (-3.45)	0.2924		-0.37 (-4.61)	0.3126	Barro	Barrolee N=429
	WC			-0.09 (-2.42)	0.2922		-0.23 (-3.03)	0.2992	Barro	Barrolee N=422
	Data			-0.14 (-4.60)	0.2275		-0.34 (-5.26)	0.2377	Lev&Ren	Barrolee N=485
	WC			-0.11 (-3.60)	0.2199		-0.23 (-3.73)	0.2213	Lev&Ren	Barrolee N=477
RE	**Data**		-0.34 (-3.20)			-0.34 (-3.31)		0.2377	Lev&Ren	Barrolee N=485
	Data	-0.10 (-3.04)	-0.36 (-3.33)		0.2350				Lev&Ren	Barrolee N=485
	WC		-0.24 (-3.02)			-0.21 (-2.19)		0.2214	Lev&REn	Barrolee N=477
	WC	-0.08 (-2.52)	-0.22 (-2.79)		0.2239				Lev&Ren	Barrolee N=477

diversity. Second, we need to justify the use of a particular index of fragmentation or polarization.

6.1.1 The concept of ethnicity

Following Horowitz (1985) the inclusive conception of ethnicity covers differences identified by 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 closed to Max Weber's conception of a subjective belief in common decent ... 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."

Therefore following Horowitz (1985) 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[23].

6.1.2 Measures of ethnicity: fragmentation versus polarisation.

To construct an index of religious conflict we need more than 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? There is no easy answer to this question. Firstly, we need to study the mechanism through which these groups interact and analyze in which situations tensions arise more easily. Secondly, the three variables that define ethnicity can work in different ways. For instance, 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

[23]The study of skin color is postpone to future research given the difficulty of obtaining data on this issue.

not much theoretical work done on this area[24].

In the literature there is only one type of index that has been applied to linguistic and color differences[25]. The measure most commonly used in the literature that works with linguistic differences is the index of linguistic fragmentation of Taylor and Hudson (1972). In fact this index is considered as the only measure of ethnic diversity by many authors. This indicator captures 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 how African nation' unusually high linguistic fragmentation explains a significant part of their poor policies and slow growth. The ethnic variable in growth regressions modestly weakens the significance of the dummy for Africa.

There are three important shortcomings to the use of this variable: The first, and probably the most important, is the use of linguistic fragmentation as the only measure of ethnic diversity. As we showed above, ethnic diversity involves more dimensions than just linguistic differences. Therefore, a measure of ethnic diversity should take into account not only linguistic but also religious and color differences or, if not, it should compare the performance of the chosen variable versus the other measures. The second problem is that Easterly and Levine (1997), as many others, do not consider the possibility of a polarization index as an alternative to the ethnolinguistic fragmentation index of country i, ELF_i

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

where n_{ij} is the number of people who profess religion j in country I and N_i is the population of country i.

As we showed before the choice of index is a very important decision not only from the empirical point of view but also from its theoretical implications. The third shortcoming is that, from the results they obtain, it is not even clear that linguistic differences play such a significant role in explaining Africa' s growth tragedy, because the dummy for Africa is still very significant in the presence of linguistic fragmentation, which means that what was not explained about Africa's growth experience still remains to be explained.

The literature has not work too much on the racial (colour) variable. Alesina

[24]Minorities at risk project is dedicated to the detailed, empirical study of ethnopolitical groups around the world. They are currently planning an expansion of project, making more efficient the access to the qualitative information.

[25]With respect to religions the first index that we are aware of is the one constructed in section 3 of this paper.

et al. (1997) construct a mesure 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. They present a model that links the heterogeneity of preferences across ethnic groups in a city to the amount and type of public goods the city supplies. They test the implications of the model with three related datasets: US cities, US meropolitan areas and US urban counties. The results show that productive public goods-education, roads, libraries, sewers and trash pickup- in US cities are inversly related to the city's ethnic fragmentation. They argue that color fragmentation reduces spenditure in productive public services and increases rent-seeking expenditures. Once more that paper tries to capture ethnic diversity using only one dimension of the concept of ethnicity.

As we already pointed out the effect of religious polarization on economic growth and other economic processes has not been in the research agenda of the convergence literature. Only recently economists have considered religion as a regional dummy variable but without investigating, in general, the role of religious diversity or religious conflict. Collier and Hoeffler(1999) construct an index of religious fractionalization to analyze its effect on civil war. The basic data for the construction of the index come from Barro (1997) and the functional form is the same as the above metioned for ethnolinguistic fragmentation. Their results show that this variable has no influence on the probability of civil wars.

After our discussion on section 3 we use a measure of religious polarization as the appropriate index for religious tensions. Our index of polarization, 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 lost of communication because of the tensions. However, while in the linguistic case the problems on communication derive from difficulties in communicate because of different languages [26], in the religious dimension it is essentially different, as section 3 argues.

We concentrate on the study of religious conflict rather than linguistic or racial differences but we compare our results with the ones obtained using the available indices of ethnolinguistic fragmentation [27].

[26] Therefore, in principle, it is reasonable to think that more diversity leads to worse results.

[27] However it would be interesting to know the empirical performance of an index of ethnolinguistic

The index of religious conflict was defined as

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

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

In table 6 we observe the effect of ethnolinguistic fragmentation versus several alternative religious conflict index. The explanatory variables are the ones included in Barro (1991). When ELF is included jointly with animist diversity or the mixing variables its coefficient turns out to be no significant. By contrat the coefficient on animist diversity and the mixing variable remain negative and significantly different from 0.

In table 7 we analize the effects of constructing a fragmentation index using data on religion. For this purpose we use the religious fragmentation of Collier and Hoeffler(1999), 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). Tha first three columns analyze the explanatory power of this variable using pool estimation, and the last three columns (4, 5 and 6) using random effects estimation. The results using these two estimation methods are very similar, and they show that religious fragmentation does not seems to be a robust explanatory variable for economic growth, no matter if we include it linearly or squared while animist diverstity is still an important determinant.

INSERT Table 6 and 7

6.2 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 three dimensions already mentioned. The index of racial tension used in some studies indicates the number of racial uprisings in a country. This is neither an index of diversity nor an index of polarization. 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=index of religious conflict

polarization in spite of the intuition that says that the more diversity of languages the worse.

TABLE 6
Set of explanatory variables Barro in (1991)

Dep var Growth	(2)	(3)	(1)	(1b)
No obs	396	396	396	396
Const	0.78 (7.44)	0.80 (7.57)	0.81 (7.31)	0.88 (8.00)
Inv	0.61 (4.97)	0.57 (4.57)	0.60 (4.80)	0.58 (4.68)
L(int.gdp)	-0.08 (-6.01)	-0.08 (-6.12)	-0.07 (-5.32)	-0.08 (-6.05)
Sec	0.13 (2.23)	0.12 (2.07)	0.13 (2.18)	0.13 (2.29)
Pri	0.01 (0.35)	0.01 (0.25)	-0.00 (-0.06)	0.01 (0.18)
Gov	-0.61 (-4.62)	-0.59 (-4.51)	-0.51 (-3.77)	-0.53 (-4.05)
Rev	0.34 (2.51)	0.35 (2.59)	0.30 (2.23)	0.34 (2.52)
Ass	-0.50 (-2.60)	-0.52 (-2.68)	-0.45 (-2.32)	-0.51 (-2.63)
Coup	-0.09 (-1.3)	-0.09 (-1.3)	-0.05 (-0.69)	-0.06 (-0.94)
Pish	-0.01 (-0.46)	-0.01 (-0.54)	-0.034 (-1.46)	-0.02 (-1.04)
Ppdev	-0.02 (-0.85)	-0.027 (-0.99)	-0.01 (-0.31)	-0.01 (-0.34)
Laam	-0.05 (-2.45)	-0.06 (-2.7)	-0.04 (-1.69)	-0.05 (-2.22)
Asiae	0.11 (2.84)	0.12 (2.99)	0.10 (2.53)	0.12 (3.06)
ELF	**-0.06** **(-1.98)**	**-0.06** **(-1.90)**	**-0.07** **(-1.89)**	**-0.05** **(-1.42)**
AD	**-0.34** **(-3.99)**	**-0.76** **(-2.36)**		
Lpop	0.00 (0.11)	0.001 (0.19)	-0.01 (-1.19)	-0.00 (-0.35)
MIX1			**-0.07** **(-2.27)**	
MIX2				**-0.26** **(-4.04)**
Interaction		0.36 (1.36)		
R2	0.3724	0.3755	0.3544	0.3730

Dummies for each religion have been used in order to isolate the effect of polarization, except for regression 3, in which just the dummy for the animist religion has been used.

TABLE 7
Set of explanatory variables Barro (1991)

Dep var Growth	(1)Pool	(2)Pool	(3)Pool	(4)RE	(5)RE	(6)RE
No obs	363	363	363	363	363	363
Const	0.58 (5.65)	0.58 (5.67)	0.77 (6.48)	0.83 (6.57)	0.84 (6.60)	0.97 (7.05)
Inv	0.42 (3.06)	0.44 (3.23)	0.42 (3.13)	0.49 (3.23)	0.50 (3.30)	0.46 (3.14)
L(int.gdp)	-0.52 (-3.83)	-0.05 (-3.99)	-0.06 (-4.46)	-0.08 (-4.85)	-0.08 (-4.96)	-0.08 (-5.13)
Sec	0.09 (1.53)	0.09 (1.54)	0.08 (1.47)	0.06 (1.03)	0.07 (1.04)	0.07 (1.08)
Pri	0.023 (0.40)	0.025 (0.55)	0.01 (0.33)	0.13 (0.24)	0.01 (0.26)	0.01 (0.24)
Gov	-0.57 (-4.12)	-0.58 (-4.19)	-0.62 (-4.52)	-0.72 (-4.35)	-0.72 (-4.37)	-0.72 (-4.59)
Rev	0.42 (3.14)	0.41 (3.10)	0.37 (2.77)	0.42 (3.06)	0.43 (3.05)	0.38 (2.79)
Ass	-0.63 (-3.24)	-0.62 (-3.21)	-0.56 (-2.89)	-0.64 (-3.14)	-0.63 (-3.14)	-0.58 (-2.89)
Coup	-0.04 (-0.50)	-0.03 (-0.46)	-0.04 (-0.61)	-0.56 (-0.72)	-0.06 (-0.72)	-0.06 (-0.77)
Pish	-0.035 (-1.42)	-0.03 (-1.38)	-0.03 (-1.26)	-0.05 (-1.64)	-0.05 (-1.62)	-0.04 (-1.35)
Ppdev	-0.02 (-0.74)	-0.02 (-0.78)	0.00 (0.06)	-0.02 (-0.52)	-0.02 (-0.54)	0.00 (0.13)
Laam	-0.06 (-2.57)	-0.06 (-2.54)	-0.08 (-3.39)	-0.07 (-2.48)	-0.07 (-2.50)	-0.09 (-3.35)
Asiae	-0.005 (-0.08)	-0.00 (-0.06)	0.02 (0.36)	-0.01 (-0.19)	-0.01 (-0.18)	0.022 (0.29)
Rf	**-0.07** **(-1.72)**			**-0.05** **(-0.95)**		
Rf2		**-0.09** **(-1.67)**	**-0.04** **(-0.64)**		**-0.08** **(-1.04)**	**-0.01** **(-0.22)**
AD			**-0.23** **(-2.4)**			**-0.27** **(-2.48)**
lpop			-0.01 (-1.46)			-0.01 (-1.43)
R2	0.3426	0.3422	0.3630	0.3318	0.3315	0.3577

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

IRC2=index of religious conflict using the Esteban and Ray measure

ELF= measure of linguistic fragmentation

RACIALT= measure of racial tensions

INSERT Table 8

In table 8 we observe the effect of ethnic differences on growth for a cross-section of countries. The fact that there are no good time series data on the racial variable imposes the use of a single cross section when comparing the importance of the three dimensions of ethnicity. The explanatory variables are the ones included in Barro (1991), which takes into account many aspects that could be correlated with the effects of ethnic diversity like assesinations and coups [28]. When the three ethnic variables are included separately two of them have a negative and significant coefficient, IRC1 and ELF[29], and the racial variable has a positive sign which is difficult to justify. The MIX variable for religious conflict has also a negative and significant effect on growth. However, when all of them are included together in the same specification the only one that retains significant explanatory power is the indicator of religious conflict. Last column in table includes the interaction between religious conflict and linguistic diversity. It is interesting to notice that its coefficient is very significant and negative. Therefore, from the results in table 8 we could conclude that the religious characterization of ethnic diversity seems to be more robust than the other dimensions of ethnicity. The negative and significant effect of the interaction element points out that the explanatory power of the religious conflict index depends on the linguistic fragmentation of the country. In other words, the effect of religious polarization is amplified when there exist also linguistic fragmentation.

Given that the racial indicator seems to be unrelated with growth and that it was the constraint in order to use the time series dimension of the data we can now check if the results obtained in table 8 are mantained when using panel data on religious conflict and ethnolinguistic fragmentation. The results in table 6 corroborate what has been obtained in the cross-country growth regressions. Religious conflict has a strong effect on economic growth, no matter which polarization index is used. Moreover, the animist fragmentation plays also an important role. As before, it can be seen that the interaction between religious conflict index and linguistic fragmentation is an important element to take into account when analyzing the relationship between religious conflict and growth.

[28] 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.

[29] In the case of ELF, opposite to what happen with IRC1, if the dummy variables for Asia and Latin America are included it looses all its explanatory power.

TABLE 8:Barro's specification.

Regression	(1)	(2)	(3)	(4)	(5)	(6)
No. Obs	(67)	(66)	(64)	(66)	64	66
Dep. Var. Growth						
Constant	0.04 (3.42)	0.03 (3.143)	0.017 (1.87)	0.04 (4.91)	0.06 (4.03)	0.04 (4.91)
Inv	0.06 (2.06)	0.066 (2.269)	0.08 (2.85)	0.78 (2.92)	0.73 (2.24)	0.081 (3.01)
Lgdp 60	-0.00 (-2.32)	-0.00 (-2.66)	-0.00 (-4.04)	-0.00 (-1.98)	-0.00 (-1.60)	-0.00 (-1.86)
Sec 60	0.00 (0.45)	-0.00 (-0.04)	0.00 (0.14)	0.00 (0.83)	0.00 (0.82)	0.00 (1.02)
Pri 60	0.00 (1.50)	0.00 (0.26)	0.00 (0.69)	0.00 (0.64)	0.00 (0.66)	0.00 (0.44)
Govx	-0.07 (-2.29)	-0.07997 (-2.69)	-0.13 (-4.40)	-0.05 (0.63)	-0.07 (-2.16)	-0.04788 (-1.620)
Revcoup	-0.00 (-0.02)	-0.01 (-1.09)	-0.01 (-1.35)	0.01 (0.596)	0.00 (0.32)	0.01 (0.61)
Assass	-0.00 (-0.46)	-0.00 (-0.02)	0.00 (0.44)	-0.00 (-0.76)	-0.00 (-0.49)	-0.0 (-0.82)
Pish560	-0.00 (-0.51)	-0.00 (-0.70)	-0.00 (-0.65)	-0.00 (-1.56)	-0.01 (-1.56)	-0.01 (-1.63)
Ppdev	-0.00 (-0.44)	-0.00 (-0.42)	-0.00 (-0.34)	0.00 (0.97)	0.00 (0.96)	0.001 (1.24)
Laam	-0.00346 (-0.849)	-0.01 (-2.70)	-0.01 (-2.02)			
Asiae	0.01 (2.09)	0.02 (4.99)	0.020 (5.01)			
MIX1	-0.01 (-2.77)				-0.01 (-2.09)	
ELF		-0.02 (-2.66)			-0.01 (-1.30)	
RACIAL T			0.00 (1.94)		-0.00 (-0.47)	
Interact. M*E				-0.02 (-4.59)		
Interc. M*E*R						-0.03 (-4.73)
R-squared	0.7750	0.7126	0.7426	0.7964	0.7879	0.8003

See apendix for definition of variables.

7 RELIGIOUS POLARIZATION: DIRECT VERSUS INDIRECT EFFECT

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. The instability implies an increase in uncertainty and, therefore, could lead to a reduction of the investment rate and could even finalize in 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 ethnic indicators are included as explanatory variables. The forth equation is just the traditional growth regression[30].

Table 9 presents the results of the estimation of this system. First of all neither the index of ethnolinguistic fragmentation nor the index of religious conflict seems 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 conflict (IRC1) has an indirect effect through the reduction of the rate of investment, the increase in government expenditure and the probability of a civil war. The index of ethnolinguistic fragmentation turn out to be also statistically insignificant in the explanation of those three variables.

8 CONCLUSIONS

We analyze the role that religious polarization and animist diversity play in the process of economic development of a country. We construct an index that reflects religious tensions. Using this index the paper reports empirical evidence that supports the relevance of religious conflicts in the explanation of growth. In addition, we found that animist diversity can be an important explanation for Africa´s growth tragedy.

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

[30] This approach is similar to the methodology used by Tavares and Wacziarg (1996) to explain the effect of democracy on growth.

TABLE9:
3sls.

	GROWTH	Investment	Government expenditures	Civil war
Const	0.72 (6.44)	-0.14 (-2.81)	0.28 (6.48)	-0.35 (-1.28)
Inv	0.58 (4.79)			
Ln(Int.gdp)	-0.07 (-5.29)	0.05 (9.46)	-0.01 (-1.84)	-0.01 (-0.30)
Sec	0.07 (1.22)		0.04 (1.62)	
Pri	0.01 (0.15)			
Hum				-0.02 (-1.68)
Gov	-0.65 (-4.86)	0.02 (0.42)		
Rev	0.18 (1.33)		0.03 (0.53)	
Ass	-0.28 (-1.41)	-0.19 (-2.10)	-0.05 (-0.66)	
Coup	-0.06 (-0.87)	-0.04 (-1.06)	-0.06 (-2.09)	
Civwar	-0.07 (-3.08)			
Pish	-0.03 (-1.31)			
Ppdev	-0.01 (-0.23)			
Ex				-0.31 (-0.72)
Ex2				0.67 (0.90)
Laam	-0.05 (-2.51)			
Asiae	0.09 (2.12)			
Square root(IRC1)				**0.23 (2.99)**
IRC1	**-0.004 (-0.11)**	**-0.05 (-2.86)**	**0.04 (2.68)**	
AD	**-0.25 (-2.85)**	**0.01 (0.36)**	**0.4 (1.21)**	
Lpop	0.004 (0.72)	-0.003 (-0.92)	-0.01 (-3.86)	0.05 (3.75)
ELF	**-0.06 (-1.75)**	**-0.002 (-0.132)**	**0.02 (1.62)**	**-0.02 (-0.33)**
Demo				0.01 (1.27)
R-squared	0.3883	0.4983	0.2879	0.1200

Dummies for each religion have been used in order to isolate the effect of polarization,
The AD variable is calculated using the pop values for each perid

polarization indicator. We also compare the results when other measures of ethnic conflict are included in the regression.

In addition we study the channels that could explain the effect of religious polarization 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. This are the results that we should expect given that 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 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 between religion, democracy and political structure[31]. Finally, there should be more research on the theory and empirical explanations for civil wars[32].

[31] Reynal (1999) has already developed some ideas for modeling this relationship.
[32] Collier and Hoeffler (1998); Collier and Hoeffler (1999).

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APPENDIX 1: DEFINITION 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 assassassination 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 begining of the period. (U.S=1.0). Source: SH v.5.5.

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

Ppdev = abs(Pishx - 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 openess of the political institutions (0=loww; 10=high)Source: PolityIII data set. (http://www.colorado.edu/IBS/GAD/spacetime/data/Polity.html

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

Ethnic variables:

ERC1: square of the religious polarization index

ERC2: square of the religious polarization using the application of Esteban and Ray polarization index

AD: Log of the animist diversity index

MIX1: sum of ERC1 and AD

MIX2: sum of ERC2 and AD

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.

Variables used in the cross-section analisis:

y: growth rate of real GDP per capita.Source: Summers and Heston.

Inv: Average ratio of real domestic investment (private plus public) to real GDP.

lgdp60: Real GDP per capita of 1960 (1985 international prices).Source: SH v.5.5.

Sec60: Percentage of secondary school attained by the total population. Source:

Barro and Lee.

Pri60: Percentage of "Primary school attained" in the total population. Source: Barro and Lee.

Govx: Average of ratio of real government "consumption"expenditure net of spending on defense and on education to real GDP. Source: SH v.5.5.

Revcoup: Number of revolutions and coups per year, averaged over the period, 1960-84. Source: Barro and Lee.

Assass: average number of assassinations per million population per year. Source: Banks

Pish560: Price level of investment (PPP I / Xrate relative to U.S.) in 1960. (U.S=1.0). Source: SH v.5.5.

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

Ppdev = abs(Pish560 - sample mean)

gpop: average annual rate of population growth (1960-1985). Source: SH v.5.0