

**ETHNIC DIVERSITY AND INEQUALITY:  
A CROSS-COUNTRY ANALYSIS**

by

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## **ABSTRACT**

This paper analyzes the impact of ethnic diversity on inequality for a panel of countries using insights from existing literature on race relations, redistribution and ethnic/racial politics. The empirical evidence suggests that ethnic diversity as measured by an index of fractionalization has a statistically significant inequality-increasing effect that is robust to specification changes. This inequality-increasing effect appears to decrease with greater democracy, lower concentration of political power and improvements in law and order. However, there does not appear to be systematic evidence supporting the hypothesis that greater ethnic diversity increases inequality through lowering redistribution as some researchers have previously suggested.

**Keywords:** ethnic diversity, ethnic fractionalization, inequality, democracy, redistribution

**Subject Terms:** Ethnic Diversity, Inequality

*To Mieko and Haris with love*

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## TABLE OF CONTENTS

<b>Approval</b> .....	<b>ii</b>
<b>Abstract</b> .....	<b>iii</b>
<b>Dedication</b> .....	<b>iv</b>
<b>Acknowledgements</b> .....	<b>v</b>
<b>Table of Contents</b> .....	<b>vi</b>
<b>List of Figures</b> .....	<b>vii</b>
<b>List of Tables</b> .....	<b>vii</b>
<b>1. Introduction</b> .....	<b>1</b>
<b>2. Review of Literature</b> .....	<b>3</b>
<b>3. Data and Methodology</b> .....	<b>10</b>
3.1 Ethnic Diversity .....	10
3.2 Inequality.....	14
3.3 Data and Methodological Issues .....	15
3.4 Estimation Strategy .....	17
<b>4. Results and Discussion</b> .....	<b>20</b>
4.1 Ethnic Diversity, Income and Democracy .....	20
4.2 Ethnic Diversity and Other Political Variables .....	28
4.3 Ethnic Diversity and Redistribution.....	32
<b>5. Conclusion</b> .....	<b>36</b>
<b>APPENDIX</b> .....	<b>38</b>
<b>Reference List</b> .....	<b>47</b>

## LIST OF FIGURES

Figure 1	Average Gini coefficients and ethnic fractionalization.....	38
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## LIST OF TABLES

Table 1	Index of ethnic fractionalization .....	13
Table 2	Summary statistics .....	18
Table 3	Democracy and ethnic diversity.....	23
Table 4	Pairwise correlation of democracy measures.....	28
Table 5	Primary school attainment, government spending and ethnic diversity .....	33
Table A1	Ethnic diversity and inequality .....	39
Table A2	Ethnic diversity, political factors and inequality.....	42
Table A3	Inequality, ethnic diversity and schooling .....	44
Table A4	Inequality, ethnic diversity and government expenditure.....	45
Table A5	Data Sources.....	46

# 1. INTRODUCTION

The impact of ethnic diversity on social and political outcomes is well known in the social sciences. However, it was not until a seminal publication by Easterly and Levine (1997) that ethnic diversity received academic interest in economics. Using cross-country growth regressions, Easterly and Levine (1997) argue that, *ceteris paribus*, more ethnically fragmented countries grow less and that this factor is a significant determinant of Africa's poor economic performance. Several subsequent studies also identify ethnic diversity as a major explanation for low growth, poor quality of institutions, poorly designed public policies and inter-group conflict.<sup>1</sup>

Although much of the existing literature analyzes the effect of ethnic diversity on growth and institutional outcomes, little work has been done to understand the relationship between ethnic diversity and inequality. A working paper by Milanovic (2003) is perhaps the only broad-based multi-country analysis of ethnic diversity and inequality. Milanovic investigates the role of political and social factors in explaining high levels of income inequality in Africa. He concludes that ethnic diversity, measured by ethnic fractionalization, contributes to greater inequality, especially within sub-Saharan Africa. He also documents that an improvement in the political climate (i.e. greater democracy) diminishes the inequality-increasing effect of ethnic diversity and leads to more egalitarian outcomes.

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<sup>1</sup> See references for complete list.

This paper attempts to expand Milanovic's empirical analysis of ethnic diversity and inequality using insights from existing literature on race relations, redistribution and ethnic/racial politics. From a broad survey of the literature, I identify two possible channels via which ethnic diversity might impact inequality. The first is a simple preference argument: members of one ethnic group dislike interacting with and assisting members of other groups. These biases might affect inequality indirectly through their impact on redistributive policies towards the poor. Secondly, ethnic or racial prejudices might increase inequality if exploited by entrepreneurial politicians. Ethnic tensions might be played out in the political arena resulting in policies that favour or discriminate target groups.

I investigate these potential channels for a broad panel of countries for the period 1950-1999 and find that ethnic diversity as measured by an index of ethnic fractionalization has an inequality-increasing effect that is robust to specification changes. This effect appears to be less pronounced with greater democracy, improvements in law and order and less concentration of political power. However, there does not appear to be systematic evidence supporting the hypothesis that greater ethnic diversity increases inequality through lowering redistribution as some researchers have previously suggested.

The paper is organized as follows: section 2 provides a broad survey of the literature and describes the key theoretical channels via which ethnic diversity might affect inequality; section 3 discusses the data and estimation strategy with particular emphasis on data and methodological issues; section 4 presents and analyzes the key empirical results; and, section 5 concludes.

## **2. REVIEW OF LITERATURE**

This section briefly reviews the existing literature on ethnic diversity, redistribution and the political process. Using insights drawn from the literature, I attempt to identify possible theoretical channels that relate ethnic diversity to the level of income inequality.

A natural starting point of an analysis on ethnic diversity and inequality is the modern literature on racial prejudice and discrimination that can be traced back to Gary Becker (1957). According to Becker, if a person has a “taste for discrimination”, he must act as if he were willing to forfeit income in order to be associated with some persons or groups instead of others. A “taste for discrimination” is the combination of both prejudice and ignorance and depends on a number of factors: the social and physical distance between groups; the relative socioeconomic status of groups; the relative size of the minority group; the frequency and regularity of contact between groups; variations across regions (urban vs. rural) and time periods; and personality differences.

A substantial body of research following Becker’s analysis has applied racial prejudice in a wide variety of contexts. More recently, Alesina and La Ferrara (2000) provide evidence that participation in social activities involving direct contact between individuals is lower in racially diverse communities in the United States. Using a model of group participation, the authors show that the members of the non-majority group derive positive utility from interacting with the members of the same group and negative utility from interacting with the members of the majority group. In another study, the

same authors find that trust is higher in racially homogeneous communities (Alesina and La Ferrara, 2002).

The tendency for individuals to favour members of their own group can also impact the degree of altruism and the level of redistribution. In an interesting study, Alesina and Glaeser (2004) argue that ethnic diversity has the tendency to limit redistribution since members of one ethnic group are less willing to support redistributive policies that could also benefit other ethnic groups. Using US state-level data for 1990 and controlling for median per capita state income, the authors find that welfare payments are less generous in states with a higher proportion of minorities (Southern states) compared to their more homogeneous Northern counterparts. More specifically, as the black population in a state increases by 20 percent, the maximum level of welfare payments (Aid to Families with Dependent Children or AFDC) declines by \$138. Other studies have broadly confirmed these findings (Luttmer, 2001; Alesina and La Ferrara, 2001). For instance, Luttmer (2001) documents that individuals are less likely to support welfare programs in the US if they live near welfare recipients of another race.

The inverse relationship between racial diversity and social welfare spending also manifests at the country level. In a sample of 52 countries for the period 1988-1992, Alesina and Glaeser (2004) find that racially diverse countries spend less on welfare. Assuming correlation is causal and using an index of fractionalization as a measure of racial diversity, the authors estimate that if a highly homogeneous country like Denmark (fractionalization index of 0.02) became as racially diverse as the United States (fractionalization index of 0.49), the share of social spending as a fraction of GDP would

decline by 4.7 percentage points, holding other things constant.<sup>2</sup> From their cross-country regressions, the authors estimate that approximately 50 percent of the gap in welfare spending between the US and Europe might be explained by differences in ethnic composition since the US is much more ethnically diverse than Europe. They also argue that the remaining 50 percent of the welfare gap could be explained by differences in American and European political institutions, specifically American majoritarianism, federalism and the separation of powers in contrast to the European centralization of political power.

Alesina and Glaeser suggest two possible explanations for this observed association of racial diversity and social welfare spending. First, they attribute it to a simple preference argument as in Becker (1957): members of one racial or ethnic group naturally dislike members of other groups and hence, taxpayers are more supportive of welfare programs that benefit those who physically and socially resemble themselves. Second, the authors propose that racial hatred is endogenously generated by entrepreneurial politicians who target hostility against certain groups to gain support from voters. The latter being their preferred explanation, the authors suggest that changing political situations can improve race relations.

Although direct welfare payments and government social spending represent major forms of redistribution from rich to poor, the provision of common public goods such as publicly provided primary education are also important indirect sources of

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<sup>2</sup> In a similar study, Alesina et al. (2001) find that even after controlling for a number of country-level characteristics (income, share of working-age population, political systems and geographical areas) the coefficient on racial fractionalization remains significant despite its small magnitude. Specifically, an increase in racial diversity from Denmark's level to that of the US reduces the proportion of social welfare spending by 0.04 percent.

redistribution. Alesina, Baqir and Easterly (1999) examine the impact of ethnic diversity on the amount and type of public goods supplied by a jurisdiction (city, metropolitan area or urban county) in the US. They find that the shares of jurisdictional spending on common public goods such as education, roads, sewers, and trash collection are inversely related to the level of ethnic diversity. The results remain robust to controls for other socioeconomic and demographic determinants of public goods provision. In contrast, they find that transfer-type payments targeted to ethnic and racial groups and spending on public employment tend to be larger when diversity is greater. These findings suggest that public goods provision might be lower in racially fragmented cities because racial/ethnic groups have difficulties in reconciling their preferences in determining the types and quantities of common public goods.

More recently, attempts have been made to extend the analysis of diversity and redistribution to explain inequality. In a working paper, Dincer and Lambert (2006) analyze the direct and indirect effects of ethnic and religious diversity on income inequality and welfare programs across US states. To compute measures of diversity for the US, the authors apply the indices of fractionalization and polarization commonly used in cross-country studies to state-level data on ethnic and religious groups for 1980 and 1990. State-level Gini coefficient data is used to measure relative income inequality. The authors find a significant positive relationship between ethnic/religious polarization and income inequality (as measured by state-level Gini coefficients) and an inverse U-shaped relationship between ethnic/religious fractionalization and income inequality. In the case of welfare programs, there appears to be a negative relationship between ethnic/religious polarization and monthly AFDC/TANF (Aid to Families with Dependent Children /

Temporary Assistance to Needy Families) payments whereas ethnic/religious fractionalization and monthly welfare payments display a U-shaped relationship. These results confirm the hypothesis that the likelihood of ethnic/religious tensions is lower in both highly homogeneous and highly heterogeneous societies. Hence, there appears to be an inequality maximizing level of ethnic/religious diversity after which a marginal increase in diversity does not reduce redistribution or increase inequality. These observations are consistent with the literature on ethnic conflict which observes that ethnic/racial hostility is minimal or absent in both highly homogeneous and highly fragmented communities.<sup>3</sup> This might suggest that the relationship between ethnic diversity and inequality is not monotonic and there exists an inequality maximizing level of ethnic or racial diversity.

Apart from its redistributive consequences, ethnic diversity could also impact inequality via the political process. In his ethnicity-as-politics (EP) hypothesis, Milanovic (2003) suggests that inequality is primarily the result of political factors working through ethnic (and religious) diversity. According to the EP hypothesis, ethnicity represents a salient and effective means around which to organize political groups. If each group attempts to maximize the spoils for its own constituents, the division of the polity into many ethnicities proxies the political decisions that result in poor economic outcomes and inequality. Milanovic tests the EP hypothesis for a sample of over a hundred countries spanning the period 1950-2000. Specifically, he measures the impact of ethnic fractionalization on within-country Gini coefficients after controlling for income, political factors, commodity dependence and regional factors. Milanovic concludes that

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<sup>3</sup> See Horowitz (1985), Collier and Hoeffler (1998, 2002), Montalvo and Reynal-Querol (2004), Fearon and Laitin (2003), Annett (2001).

ethnic fractionalization has an inequality-increasing effect but its impact diminishes at higher levels of income and democracy. He also finds that political factors are significant in explaining inequality: a presidential system is consistently associated with greater inequality compared to a parliamentary system. Interestingly, the inequality reducing effect of democratization is particularly strong in a sub-sample of African countries suggesting that democracy leads to a change away from ethnically-mobilized politics in this region.

The above survey of the literature suggests that ethnic or racial diversity has both direct and indirect effects on the level of inequality in a society. Ethnic diversity directly explains inequality to the extent that different ethnic groups have different levels of income. This in turn might be determined by discrimination, colonial experience, slavery or uneven levels of development within countries (Alesina and Glaeser, 2004).

The literature identifies two potential indirect channels via which ethnic diversity impacts inequality outcomes. First, ethnic/racial prejudices might influence economic decision-making by entering individual preferences. According to this view, members of one ethnic group dislike interacting with and assisting members of other groups. Thus, ethnic/racial segregation can marginalize members of some ethnic/racial groups.

These underlying racial prejudices could affect inequality indirectly through their impact on redistributive policies, where redistribution is broadly defined to include both welfare payments to the poor as well as public goods such as primary schooling and basic health care. Greater ethnic or racial diversity in a jurisdiction might reduce support for redistribution that benefits all groups. In addition, ethnic/racial groups in a diverse society might find it difficult to reach consensus on the nature and types of common public

goods, which ultimately results in an under-provision of these goods (Alesina, Baqir and Easterly, 1999).

Second, racial prejudices or race hatred could produce inequitable outcomes if exploited by entrepreneurial politicians (Alesina and Glaeser, 2004). An ethnically divided polity might pit one group against another and result in policies that favour or discriminate target groups. However, the “ethnicity-as-politics” argument might not automatically result in discrimination; much depends on the de facto political power of minorities in a society which itself might be endogenously determined by their economic power. Thus, the ethnicity-as-politics hypothesis becomes particularly compelling when minorities disproportionately represent the poor.<sup>4</sup>

For the purposes of this exploratory study, I outline three broad groups of testable hypotheses based on the above theoretical channels. The first is based on Milanovic’s (2003) empirical study: ethnic diversity is likely to have a less pronounced impact on inequality when countries become more affluent and/or democratic. Similarly, improvements in institutional quality might mitigate the discriminatory tendencies in a fragmented society. Second, a possible test of the “ethnicity-as-politics” hypothesis might be described as follows: a concentration of political power is likely to result in greater inequality since it might enable politically dominant ethnic groups to marginalize minorities. A final testable hypothesis relates to the literature on ethnic diversity and redistribution: a more fragmented society might increase inequality through less redistribution, where redistribution is broadly defined to include public goods (e.g. education) as well as direct social welfare spending.

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<sup>4</sup> Another important caveat here is that the targets of discrimination are often situational and might not be related to ethnicity or race.

### **3. DATA AND METHODOLOGY**

The following sub-sections discuss the key data used in this paper along with a discussion of the proposed estimation strategy to test the hypotheses described in the theory section. Throughout this study, the unit of analysis is a single country in a given year.

#### **3.1 Ethnic Diversity**

Ethnic diversity is an amorphous concept. It is difficult to define its boundaries due to the multifaceted nature of group membership that includes and overlaps physical attributes (race, colour), long-lasting social conventions (language and cultural norms) and social definitions of group identity whether designated by those within or outside the group (Alesina et al., 2003). Any definition of ethnicity and its classification requires an understanding of disciplines ranging from anthropology, sociology, political science and linguistics. It is beyond the scope of this paper to delve into a detailed discussion of ethnic diversity. However, the following basic points are relevant for this study.

First, the definition of ethnicity used here is primarily based on physical or racial characteristics. Second, although greater emphasis is placed on physical attributes, ethnicity is highly correlated with cultural factors like language. Hence, the definition is not one that is purely “ethnic” or “racial” but rather one that is “ethno-linguistic”. Of course, the classification of ethnic groups depends on the judgments of anthropologists and linguists which are themselves ultimately based on socially constructed distinctions.

However, for the purposes of this study I assume that such groups are those that people persistently identify with and which they can potentially mobilize into political coalitions.

Most studies on ethnic diversity use an index of fractionalization to measure the degree of ethnic diversity in a jurisdiction. The fractionalization index measures the probability that two randomly selected individuals from a country/region belong to two different groups. Fractionalization, which is based on the Herfindahl index of market power, is defined as follows:

$$Ethnic_j = 1 - \sum_{i=1}^N s_{ij}^2 \quad (1)$$

where  $s_{ij}$  is the share of group  $i$  in country/region  $j$ . The index maximum (i.e. 1) is reached when each person in a country/region belongs to a different group.

Many previous studies on ethnic diversity use an index of ethnolinguistic fractionalization (ELF) based on data published in the Atlas Narodov Mira (1964) by the Soviet Union. Although the Atlas has a broad coverage of countries, it is based on data from the early 1960s. More recently, Alesina et al (2003) compiled an extensive dataset of ethnic, linguistic and religious groups for up to 198 countries. The authors report the most disaggregated group data wherever possible and use multiple data sources<sup>5</sup> in order to perform cross-checks for consistency. They also calculate separate indices of fractionalization based on their ethnicity, language and religion data. Due to these advantages, I use the ethnic data and indices reported in Alesina et al. (2003) for the purposes of this study.

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<sup>5</sup> The primary sources for Alesina et al's (2003) dataset are the Encyclopedia Britannica (2000), CIA (2000), Levinson (1998), Minority Rights Group International (1997) and national censuses (various years).

Table 1 reports the ethnic fractionalization index (Ethnic) for the most diverse and the least diverse countries within the sample of 131 countries used in this study. Out of the 15 most fractionalized countries in the sample, all except one are from Sub-Saharan Africa. Uganda, the most ethnically fragmented country, has an Ethnic index of 0.930 while South Korea, the least ethnically diverse country in the sample, has an index close to zero. Canada ranks amongst the most diverse countries in the sample (0.712, not shown in table) while the United States is moderately diverse (0.490).

Alesina et al's dataset also reports the composition of different ethnic groups in countries. To illustrate, Sierra Leone, one of the most diverse countries with a fractionalization index of 0.819, has 12 different groups: Temne (30 percent), Mende (29 percent), Limba (6 percent), Kono (2.6 percent), Kuranko (2.3 percent), Sherbro (2 percent), Krio (2 percent), Fulani (1.7 percent), Loko (1.7 percent), Susu (1.7 percent), Mandinka (1.3 percent) and Kissi (1.3 percent). In contrast, South Korea, one of the most homogeneous countries in the sample has only two groups: Koreans (99.9 percent) and others (0.1 percent).

**Table 1. Index of ethnic fractionalization**

Country	Ethnic	Country	Ethnic
<u>15 most fractionalized</u>		<u>15 least fractionalized</u>	
Uganda	0.930	Korea, Republic of	0.002
Madagascar	0.879	Japan	0.012
Cameroon	0.864	Tunisia	0.039
Chad	0.862	Bangladesh	0.045
Kenya	0.859	Portugal	0.047
Nigeria	0.851	Norway	0.059
Central African Republic	0.830	Sweden	0.060
Sierra Leone	0.819	Hong Kong	0.062
Guinea-Bissau	0.808	Denmark	0.082
Djibouti	0.796	Australia	0.093
Gambia, The	0.786	France	0.103
Zambia	0.781	Netherlands	0.105
Gabon	0.769	Austria	0.107
South Africa	0.752	Italy	0.115
Bolivia	0.740	Poland	0.118

Source: Alesina et al. (2003).

An important caveat regarding the use of the ethnicity data relates to an issue mentioned at the beginning of this section: the identification and classification of “salient” ethnic groups is one that depends on the subjective judgments of anthropologists, ethnologists and linguists. Arguably, these classifications are subject to debate since there might be a certain degree of arbitrariness involved. For example, the following ethnic groups are reported for Canada: Dutch (1.3 percent), Ukrainian (1.5 percent), Amerindian (1.7 percent), Chinese (2.2 percent), Italian (2.8 percent), German (3.4 percent), British (20.8 percent), French (22.8 percent) and Other Canada (43.5 percent). The data does not further disaggregate the group “Other Canada”. In contrast, the classification of ethnic groups for the United States does not indicate the national origin of the “White” population. The identified ethnic groups for the US are as follows: White (69.1 percent), Hispanic (12.6 percent), Black (12.1 percent), Asian (3.6 percent), other race or two more races (1.8 percent), American Indians or Alaska Natives (0.74

percent) and Hawaiian and other Pacific (0.13 percent). Again, due to these definitional issues, the results should be interpreted broadly.

### **3.2 Inequality**

To measure relative inequality within countries, I use data on Gini coefficients compiled by Dollar and Kraay (2002) for their study on inequality and growth. Dollar and Kraay consolidate data on country income distributions separately reported by the UN-WIDER World Income Inequality Database (2000), Deininger and Squire (1996), Chen and Ravallion (2000) and Lundberg and Squire (2000). The dataset forms an unbalanced and irregularly-spaced panel of 953 observations for 137 countries over the period 1950-1999.

A pair-wise correlation of the ethnic fractionalization index and the Gini coefficient for the sample of 131 countries for which data are available gives a coefficient of 0.315. This suggests that the measure of ethnic diversity and the Gini coefficient may be positively related.<sup>6</sup> Figure 1 (see Appendix) provides further evidence of this relationship. It shows a scatter plot of the average country Gini coefficients and the index of ethnic fractionalization. The fitted line suggests a positive association between the two variables.

Whether this observed correlation translates into a significant causal relationship will be examined in the results section. As outlined in the theoretical discussion, there are a priori reasons to believe that such causation is plausible. It is also reasonable to assume that ethnic compositions are fairly stable and exogenous, at least over a time-period

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<sup>6</sup> Alesina et al. (2003) also report linguistic and religious fractionalization indices in their dataset. However, ethnic fractionalization appears to hold the strongest statistical relationship with the Gini coefficient compared to these other measures, although they are strongly positively correlated.

spanning three to four decades, although in the long-run different fertility rates across ethnic groups, migration or changes in group definitions could alter the ethnic mix (see section on methodological issues below).

### **3.3 Data and Methodological Issues**

An important consideration in a study of ethnic diversity and economic outcomes is the issue of the endogeneity of ethnicity. Although it is reasonable to assume that ethnic compositions in a society are fairly stable over the short-run, differences in fertility rates across ethnic groups or migration could change the ethnic mix in the long-run. Apart from variations in fertility rates or migration, changes in the shares of ethnic groups might be driven by changes in the definitions of group-identity over time. The “reflexive” school of ethnology and sociology argues that an individual’s self-identification to groups is a function of social, political and economic variables (Alesina et al., 2003). Hence, these factors could endogenize ethnicity in the long-run. Somalia is a good illustration of the changing dimensions of group-identity. Prior to the 1991 civil war, Somalia appeared to be a relatively homogeneous country with 85 percent of the population identifying themselves as Somalis (Alesina et al., 2003). However, the civil war caused rifts within this apparently homogeneous society and “clans” became the new dimension of ethnic cleavage. According to Alesina et al.’s measure of fractionalization, Somalia now ranks as one of the most ethnically fractionalized nations with an index of 0.812. The data for Somalia report 6 different ethnic groups or “clans”: Hawiye (25 percent), Isaaq (22 percent), Darod (20 percent), Rahanwein (17 percent), Dir (6 percent) and Bantu (6 percent). Hence, given the potential endogeneity of ethnicity, the estimation results need to be interpreted with some caution.

A related concern is the fact that all available measures of ethnic diversity across countries are time invariant measures. The data for Alesina et al.'s index of ethnic fractionalization are mostly drawn from sources in the 1990's or 1980's. Thus, there are obvious objections to using a fixed measure of ethnic diversity in a panel analysis, particularly to proxy the degree of ethnic diversity in the beginning of the sample period, i.e. 1950's. Due to data limitations, this issue cannot be fully addressed in this paper and hence, the results must be interpreted as displaying a broad rather than a definitive relationship between ethnic diversity and inequality. However, if we subscribe to the assumption that ethnic cleavages change slowly over time, with examples like Somalia being exceptions rather than the rule, this might not be too serious a problem.

Finally, as discussed by Atkinson and Brandolini (2001), there are considerable difficulties in comparing income distribution data across countries. Data sources differ with respect to the measure of inequality (income versus consumption), the coverage of the survey (national versus sub-national), the measure of income (gross versus net) and the unit of observation (individuals versus households). While these differences cannot be fully accounted for, Dollar and Kraay's dataset has the advantage of including dummy variables to differentiate the above sources of variation.<sup>7</sup> Specifically, they use separate dummy variables that take the value of one when the Gini coefficient data is based on income, gross income and individuals respectively. They also restrict their sample to data from nationally representative surveys. Although these are simple adjustments, they improve the identification of the variables of interest reported in the next section.

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<sup>7</sup> Another possible source of variation is whether the survey data is based on the residents or the citizens of a country. Country Gini coefficients might be larger or smaller depending on the chosen group and this could lead to a significant difference for countries with large numbers of guest workers.

### 3.4 Estimation Strategy

In order to identify the impact of ethnic diversity on inequality, I estimate variants of the following regression specification:

$$Gini_{it} = \beta_0 + \beta_1 y_{it} + \beta_2 y_{it}^2 + \beta_3 Ethnic_i + \beta_4' X_{it} + \beta_5' D_i + u_{it} \quad (2)$$

where the Gini coefficient is the dependent variable,  $y_{it}$  and  $y_{it}^2$  represent the log of the three-year lagged average GDP per capita and its square,  $Ethnic_i$  is the ethnic fractionalization index and  $i$  and  $t$  index countries and years respectively. The data for GDP per capita comes from the Penn World Tables Version 6.2. Other controls represented in equation (2) by the  $X_{it}$  vector include political variables (democracy, civil liberties, political rights, government cohesiveness, law and order and democratic accountability), social variables (primary school attainment) and other economic variables (share of government consumption, share of government social spending).<sup>8</sup>  $D_i$  represents a vector of regional dummy variables to capture unobserved region-specific effects. To account for the definitional differences in the Gini coefficient data, all specifications include dummy variables that take the value of 1 if the Gini coefficient is based on income, gross income and individuals as the unit of analysis. To estimate equation (2), I also make the following assumption on the conditional distribution of  $u_{it}$ :

$$E(u_{it} | y_{it}, y_{it}^2, Ethnic_i, X_{it}, D_i) = 0 \quad (3)$$

Table 2 below provides the summary statistics of key control variables used.

---

<sup>8</sup> See Appendix for a complete list of variables and data sources used.

**Table 2: Summary statistics**

	Variable Name	N	Min	Mean	Median	Max	Standard Deviation
<b><i>Dependent Variable</i></b>							
Gini coefficient	<i>Gini</i>	953	16.63	37.04	34.88	74.33	10.07
<b><i>Independent Variables</i></b>							
Ethnic fractionalization	<i>Ethnic</i>	938	0.002	0.363	0.423	0.93	0.237
GDP per capita	<i>y</i>	818	481.75	9037.41	6915.43	30316.85	7029.01
Democracy	<i>Democ</i>	808	0	5.98	8	10	4.22
Political Rights	<i>PR</i>	492	1	3.11	2.67	7	2.03
Civil Liberties	<i>CL</i>	488	1	3.25	3	7	1.78
Herfindahl Index of government concentration	<i>Gov</i>	621	0.007	0.822	1	1	0.264
Law and order	<i>Law</i>	352	0.61	3.77	4	6	1.61
Democratic Accountability	<i>Acc</i>	350	1	3.87	4	6	1.44
Primary schooling	<i>Primary</i>	684	0.43	42.27	44.17	86.83	17.66
Central government social welfare spending	<i>Ssw</i>	282	0.06	9.32	8.05	24.1	6.38
Central government expenditure	<i>Cgexp</i>	465	8.1	26.54	23.32	57.75	11.44

Note: All variables excepting *Gini* and *Ethnic* are three-year lagged averages. N represents country-year observations.

Since the underlying data for estimating equation (2) forms an unbalanced panel with ethnic fractionalization and regional dummies as time-invariant controls, this effectively rules out a fixed-effects estimation. Instead, I use a pooled OLS estimation with standard errors that are robust to heteroskedasticity and correlation in uit across time-periods for each country. Due to the exploratory nature of this study, a simple estimation strategy is preferred to identify the effect of ethnic diversity on inequality.

I use two simple procedures in order to test the hypotheses described in the theory section. First, I interact some of the control variables in equation (2) with *Ethnic* to determine if the interaction changes the relationship between ethnic fractionalization and inequality. Second, in order to identify if ethnic fractionalization directly affects other

control variables in equation (2), I estimate a reduced form equation for some of the control variables as follows:

$$x_{it} = \alpha_0 + \alpha_1 y_{it} + \alpha_2 Ethnic_i + \alpha_3 D_i + v_{it} \quad (4)$$

under the assumption that:

$$E(v_{it} | y_{it}, Ethnic_i, D_i) = 0 \quad (5)$$

where  $x_{it}$  represents a control variable in  $X_{it}$  used in equation (2),  $y_{it}$  is the log of GDP per capita,  $Ethnic_i$  is the ethnic fractionalization index and  $D_i$  represents a vector of regional dummy variables to capture unobserved region specific factors. Equation (4) is also estimated using pooled OLS with standard errors that are robust to heteroskedasticity and correlation in  $u_{it}$  across time for each country.

## **4. RESULTS AND DISCUSSION**

### **4.1 Ethnic Diversity, Income and Democracy**

This section discusses the relationship between the level of income, democracy and ethnic fractionalization. Table A1 (see Appendix) reports the regression results. In the basic specification (column 1), I regress the Gini coefficient on the log of GDP per capita, the square of the log of GDP per capita, index of ethnic fractionalization and dummy variables indicating if the Gini coefficient is based on income, gross income and individuals respectively. To reduce possible endogeneity resulting from the contemporaneous effect of inequality on income, I use the log of the three-year lagged average GDP per capita. As shown in column 1, the coefficients on the per capita income terms are highly significant at the one percent level suggesting a Kuznets-type relationship between income per capita and inequality.<sup>9</sup> Specifically, the estimated relationship implies that the Gini coefficient rises with GDP per capita for values of GDP less than \$2697 (2000 U.S. dollars) and declines thereafter.

The dummy variable for income indicates that the Gini coefficient will be 2.4 percentage points higher if the welfare measure is income as opposed to consumption. Moreover, if the welfare measure is gross income, the Gini is nearly 4.3 percentage points greater compared to the case where the Gini is based on net income. These results are reasonable since taxes tend to have an equalizing effect and income measures of

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<sup>9</sup> According to Nobel Laureate Simon Kuznets (1955), the relationship between a country's income per capita and inequality is such that as per capita incomes increase from very low levels, the distribution of income at first worsens and later improves.

inequality are typically more volatile than consumption measures (Barro, 2000). The Gini coefficient is lower by more than a percentage point if the unit of analysis is a person rather than a household. There is, however, no clear *a priori* coefficient sign for this variable. Apart from the dummy for gross income, the remaining definitional dummy variables do not have a statistically significant association with the Gini coefficient in the remaining regressions in Table A1 although their coefficient signs remain unchanged.

The coefficient on the variable of interest, *Ethnic*, is positive and statistically significant. Specifically, it implies that an increase in the index of ethnic fractionalization from perfect homogeneity (index of 0) to perfect heterogeneity (index of 1) would increase the Gini coefficient by 13.32 percentage points. This increase represents approximately 36 percent of the average value of the Gini coefficient in the sample. Alternatively, a one standard deviation increase in *Ethnic* (0.237) results in a 3.16 percentage point increase in the Gini. The result suggests that countries with greater ethnic diversity have higher inequality as measured by the Gini coefficient, other things being equal.<sup>10</sup> Subsequent specifications test the robustness of the index of ethnic fractionalization.

The results in column 2 are based on the same basic specification, expecting the inclusion of a squared *Ethnic* term. This tests whether the inequality-increasing effect of ethnic fractionalization diminishes at higher levels of fractionalization as Dincer and Lambert (2006) found using US state-level data. The coefficient signs suggest a non-linear relationship but are individually insignificant. Interestingly, an F-test of joint

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<sup>10</sup> Interestingly, in an analysis of growth and inequality, Barro (2000) finds that his measure of population heterogeneity (ethnolinguistic fractionalization) has almost no bearing on the Gini coefficient. This might, of course, largely reflect data and methodological differences.

significance of *Ethnic* and *Ethnic squared* turns out to be significant (p-value of 0.020). This implies that a one standard deviation increase in *Ethnic* (0.237) from its sample median value of 0.423 (in this case, the Bahamas) would increase the Gini coefficient by approximately 3.17 percentage points. However, given no change in the R-squared (0.3028) from the previous specification, the results should be treated with caution.

Another key point of interest given the thesis discussion is the effect of greater democratization on inequality. To measure democracy, I use a variable of institutional democracy (*Democ*) reported by the Polity IV database (September 2002 version). *Democ* is constructed as a weighted average of variables in the following four areas: (1) the competitiveness of political participation; (2) the competitiveness of executive recruitment; (3) the openness of executive recruitment; and (4) constraints on the chief executive. The variable is measured on an additive eleven-point scale ranging from 0 to 10 with higher values indicating greater democracy. Once again, to reduce potential endogeneity that might arise due to the contemporaneous effect of inequality on democracy, I use a three-year lagged average value of *Democ* in all regressions.

Before investigating the relationship between democracy and inequality, I estimate equation (4) with *Democ* as the dependent variable in order to determine if there exists a statistically significant association between democracy and ethnic fractionalization. Basic control variables include the log of GDP per capita and regional dummy variables for Sub-Saharan Africa (*SSA*), Latin America and the Caribbean (*LAC*), Eastern Europe and Central Asia (*ECA*), East Asia and the Pacific (*EAP*), Middle East and North Africa (*MENA*) and South Asia (*SA*) to capture unobserved region-specific factors (Western Europe and North America is the omitted category). Table 3 below

reports the regression results. Ethnic fractionalization does not appear to have a statistically significant association with democracy although income per capita and some regional dummies are very significant. Hence, it seems unlikely that ethnic fractionalization affects inequality indirectly through democracy.

**Table 3. Democracy and ethnic diversity  
(Dependent variable is democracy).**

Variable	Coefficient	t-statistic
ln (GDP per capita)	2.624***	6.33
SSA	-0.467	-0.33
LAC	-0.2851	-0.32
ECA	-1.795**	-2.02
EAP	-2.008	-1.81
MENA	-3.946***	-3.69
SA	3.086*	1.71
Ethnic	-1.304	-1.14
Constant	-15.323***	-3.79
No. of observations	773	
No. of country clusters	105	
R-squared	0.5395	

Notes: Estimated using pooled OLS with robust standard errors clustered for each country. \* (\*\*) (\*\*\*) denote significance at the 10 (5) (1) percent levels.

Returning to the main analysis of inequality and democracy, column 3 in Table A1 reports the estimation results including the democracy variable. Although *Ethnic* is highly significant, *Democ* does not appear to have a statistically significant direct relationship with inequality. Interestingly, the result contradicts Milanovic (2003) who found a significant negative relationship of the same democracy variable with the Gini coefficient although data and specification differences between the two studies could partly explain the difference in the democracy outcome on inequality.

A possible explanation for the seemingly negligible relationship between democracy and inequality in column 3 might be because democracy is highly correlated with other measures of development like per capita income. Also, the measure of

democracy used here might be too general and too broad a concept. As many studies have shown, analyses of democracy on economic development are beset with definitional and measurement difficulties and are often inconclusive (Persson and Tabellini, 2006). Although a more fine-tuned analysis of democracy is beyond the scope of this paper, I further test the significance of democracy on inequality using alternative measures in section 4.2.

Since the impact of greater democracy on inequality might work in conjunction with the level of economic development and ethnic fractionalization, I test these possibilities using interactions of democracy with income per capita and ethnic fractionalization. Columns 4 and 5 report these results. In column 4, *Democ* is not very significant but the coefficient on the interaction term between *Democ* and *Ethnic* is negative and significant at the 5 percent level. Also, a test of joint-significance reveals that *Democ* and its interaction term with *Ethnic* are significant at the 5 percent level (p-value of 0.044). The joint outcome of these variables on inequality is best illustrated with an example. If a country with a sample median ethnic fractionalization index of 0.423 experienced a one-standard deviation increase in its democracy ranking (i.e. by 4.22), the joint effect of democracy would reduce the Gini value by 0.43 percentage points, other things being equal. The joint effects of *Ethnic* and its interaction term with *Democ* are also highly significant (p-value of 0.001). To illustrate, if we hold the level of democracy constant at its sample median value of 8, a one standard deviation increase in ethnic of 0.237 would produce a *ceteris paribus* increase in the Gini coefficient by over 2.2 percentage points.

Column 5 presents the results of an interaction of democracy with the log of per capita income. The interaction of democracy and income per capita increases inequality marginally but remains statistically insignificant. However, as shown in column 6, ethnic fractionalization and its interaction with the log of per capita income turn out to be jointly significant (p-value of 0.001) and appear to have an inequality increasing effect. Hence, if a country with a median per capita income of \$6915 experienced an increase in *Ethnic* by one standard deviation, its Gini value would increase by approximately 3.11 percentage points. On first glance, this result appears to counter my initial hypothesis that ethnic fractionalization has a more deleterious effect on inequality in a relatively poor country. However, the result would make sense if we allow for socioeconomic differentials across ethnic groups. The United States offers a good example of a society where ethnic/racial cleavages are correlated with socioeconomic standing.<sup>11</sup> Alternatively, diversity might increase inequality in more affluent countries if we account for in-migration, e.g. illegal migration from Mexico and the Caribbean to the US. The in-migration might affect the bottom of the income distribution if the migrants are also relatively unskilled workers. The historical experience of the US in the early nineteenth century offers some support for this explanation.<sup>12</sup> The above conjectures, however, ignore the impact of redistribution and welfare systems that might mitigate the inequality-increasing tendency of diversity.

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<sup>11</sup> A recent study by Sala-i-Martin (2006) suggests that inequality in the US has been increasing over the last three decades.

<sup>12</sup> Mass migration of unskilled workers from Europe to the United States in the early nineteenth century swelled the bottom of the income distribution causing later backlashes to open immigration policies. However, at the same time, US GDP per capita was converging to the higher European levels (Williamson, 1998).

Columns 7 to 9 consider the results of including the above interaction terms together in the same regression. In all three specifications, the interaction of *Democ* and *Ethnic* remain negative and significant suggesting that for any given level of ethnic diversity, greater democracy lessens inequality, a result consistent with the theoretical prediction. In column 8, although ethnic fractionalization and its interaction terms with per capita income and democracy are individually not very significant, they are nonetheless, jointly very significant (p-value of 0.002). Hence, if we consider the combined outcome of all three variables on a hypothetical country with a median income of \$6915 and a democracy level of 8, a one standard deviation increase in *Ethnic* leads to a 1.97 percentage point increase in the Gini coefficient. When I use all interaction terms together as in column 9, *Ethnic* and its interaction terms are jointly significant but *Democ* and its interaction terms are jointly insignificant. This suggests that ethnic fractionalization has a persistent association with inequality that also works in conjunction with other variables like per capita income and democracy.

In the literature, it is common practice to use regional dummy variables to capture unobserved region-specific factors. In order to account for systematic differences in inequality across regions, I include regional dummies for Sub-Saharan Africa (*SSA*), Latin America and the Caribbean (*LAC*) and Eastern Europe and Central Asia (*ECA*) in the remaining specifications.<sup>13</sup> Columns 10 to 12 are similar to those in the preceding three columns, except for the inclusion of regional dummy variables. The R-squared for the modified specifications jump from approximately 0.3600 to above 0.6100 indicating improved model fit. The regional dummies for Africa (*SSA*) and Latin America and the

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<sup>13</sup> I chose to include these regional dummies since the average Gini values for the sample period are highest in SSA (45.71) and LAC (49.73) and lowest in ECA (28.95).

Caribbean (*LAC*) are large and highly significant implying that there are unobserved factors specific to these regions that increase inequality. The dummy for Eastern Europe is negative but insignificant.

It might be the case, however, that these dummy variables are absorbing the effects of other variables on inequality. There are reasons to believe so since the income per capita variables that were significant in preceding specifications, become very insignificant in the specifications with regional dummies. The coefficient signs on the other variables in columns 10 to 11 are broadly similar to the previous specifications without regional dummies although some variables, including democracy, become significant. Again, as in the previous analysis, the overall impact of *Ethnic*, inclusive of its joint effect, appears to increase the Gini value.

To summarize, ethnic fractionalization appears to have a statistically significant relationship with inequality in the majority of the specifications considered. Although by itself, democracy does not appear to reduce inequality, there is evidence that greater democracy reduces inequality for a given level of ethnic fractionalization and this result appears to be robust to specification changes. Contrary to *a priori* expectations, the interaction of ethnic fractionalization and income per capita appears to increase inequality. This might be explained if we account for socioeconomic differences across ethnic groups or the in-migration of unskilled workers. Finally, the dummies for Africa and Latin America and the Caribbean are positive and highly significant suggesting a persistent region-specific association with inequality that is not explained by other factors.

## 4.2. Ethnic Diversity and Other Political Variables

In this section, I test the implication of other political factors on inequality and their relationship with ethnic fractionalization. The political variables considered include alternative measures of democracy, government cohesiveness and law and order to measure institutional quality.

Given the variations in the definition of democracy across studies, I use alternative measures of democracy for robustness. Freedom House (2006) reports separate indices for civil liberties (*CL*) and political rights (*PR*), each measured on a scale of 1 to 7, with one representing the highest degree of freedom and seven the lowest. Table 4 below shows the pairwise correlations between the three indices of democracy to determine the degree of overlap in what is being measured. The correlations between *Democ*, *CL* and *PR* are large and negative as expected.

**Table 4. Pairwise correlation of democracy measures**

	PR	CL	Democ
PR	1		
CL	0.9434	1	
Democ	-0.8931	-0.9344	1

Note: All variables are three-year lagged averages.

Columns 1 to 4 in Table A2 (see Appendix) present the estimation results from using these alternative measures of democracy. When used individually, the three-year lagged average values of *PR* and *CL* are statistically insignificant. However, when the democracy variables are interacted with the index of ethnic fractionalization, they become significant both individually and jointly. According to column 3, an improvement in political rights by one standard deviation (2.03) leads to a 1.05 percentage point increase in the Gini value for a median level of ethnic fractionalization

(0.423), other things being equal. Likewise, in column 4, a *ceteris paribus* improvement in civil liberties by one standard deviation (1.78) leads to a 0.73 percentage point increase in the Gini value holding ethnic fractionalization fixed at 0.423. Similar conclusions are drawn when *CL* and *PR* along with their interactions with *Ethnic* are used in the same specification (not shown). Interestingly, these findings contradict the previous results obtained using the Polity IV index of democracy where greater democracy reduces inequality.

Clearly, these contradictory results suggest that the definition of democracy is important in determining its impact on inequality. Recall that *Democ* measures the political structure as opposed to *CL* and *PR* which measure individual rights. It appears that an improvement in the political structure in favour of a more representative and competitive process in determining the leadership of a country has a significant inequality-reducing effect. On the other hand, an improvement in the rights of citizens appears to have a marginal inequality-increasing effect. This might be the case because the achievement of equity is a national rather than an individual goal and policies that favour redistribution might more likely be advocated by a competitively-elected and representative leadership.

In columns 5 and 6, I use the Herfindahl index of government concentration (*Gov*) from the Database of Political Institutions (March 2002 version) originally developed by Beck et al. (2000) to measure the degree of government cohesiveness. This variable is measured as the sum of the squared seat shares of all parties represented in government

and ranges from 0 to 1, with higher values denoting a more fragmented government.<sup>14</sup> In the basic specification, the coefficient for *Gov* is small and statistically insignificant (column 5). Incidentally, when *Gov* is interacted with *Ethnic*, the coefficient on the interaction term becomes negative and marginally significant (column 6). The result suggests that a more fragmentary government (e.g. a coalition government with many parties) reduces inequality for a given level of diversity, perhaps because such a government is less likely to promote policies that favour one constituency over another.<sup>15</sup>

In the last two specifications, I test the impact of including measures for law and order (*Law*) and democratic accountability (*Acc*) on inequality. The variables come from the International Country Risk Guide (ICRG) compiled by Political Risk Services (2005). *Law* is a composite variable that measures both the “strength and impartiality of the legal system” and “the popular observance of the law” (Political Risk Services, 2005). *Acc* is a measure of the responsiveness of the government to its people.<sup>16</sup> Both variables are ordered on a scale from 1 to 6, with 6 representing the highest ranking. As before, I use the three-year lagged average of each variable in order to reduce endogeneity. In column 7, holding all other things constant, a one standard deviation increase in the index of law and order (1.61) reduces the Gini value by nearly 2.7 percentage points which is statistically significant at the 5 percent level. On the other hand, the index of democratic

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<sup>14</sup> In the DPI dataset, the index is coded as “NA” if: (1) there is no parliament; (2) there are government parties with seats unknown; and (3) there are no parties in the legislature. Independents are calculated as individual parties with one seat each. (Keefer, 2002).

<sup>15</sup> I also used other measures of political systems including measures of electoral rules (proportional versus plural representation) and the degree of party competitiveness in the electoral process (all variables from Polity IV database, 2002). The coefficient estimates were, however, statistically insignificant.

<sup>16</sup> In order to rank the degree of democratic accountability, five types of governance are identified, namely: (1) alternating democracies; (2) dominated democracies; (3) de-facto one-party state; (4) de jure one-party state; and (5) autarky. In general, the highest rank is assigned to alternating democracies while the lowest rank is assigned to autarchies (Political Risk Services, 2005).

accountability does not appear have any noteworthy association with inequality. When an interaction of *Law* and *Ethnic* is used, the law variable becomes statistically insignificant although still maintaining a negative coefficient sign. However *Law* and its interaction with *Ethnic* are jointly significant (p-value of 0.074) indicating that for a median level of fractionalization of 0.423, an improvement in *Law* by one standard deviation reduces the Gini coefficient by nearly 2.6 percentage points. Since law and order is an important dimension of institutional quality, the results suggest that better quality institutions somewhat mitigate the positive association between ethnic fractionalization and inequality, perhaps by reducing corruption and protecting individual rights.

Finally, I estimate equation (4) with each political variable used above as the dependent variable in order to investigate if there is a significant association between ethnic fractionalization and measures of democracy, government cohesiveness and law and order. The estimation results (not reported here for brevity) suggest that ethnic fractionalization does not have a statistically significant relationship with each of these variables. This result appears to counter the theoretical hypothesis that ethnic fractionalization might work through political variables to impact inequality.

The evidence presented here suggests that the interaction of ethnic fractionalization and political variables appear to have a statistically significant association with inequality. Ethnic fractionalization does not appear to work through political variables to influence inequality but rather appears to interact with political factors to influence inequality. The Herfindahl index of government concentration provides support for the hypothesis that less concentration of political power reduces inequality for a given level of ethnic fractionalization. Similarly, better institutional

quality as proxied by an index of law and order reduces inequality for a given level of diversity. Interestingly, improvements in civil liberties and political rights appear to increase inequality for a given level of ethnic fractionalization suggesting that the goal of enhancing individual freedoms might not necessarily relate to the goal of equity.

### **4.3 Ethnic Diversity and Redistribution**

This section attempts to test the indirect effect of ethnic fractionalization on inequality through redistribution. The testable hypothesis is whether a more fragmented society leads to less redistribution either through reduced government spending on public goods like education or reduced social spending. Testing the first channel requires data on government expenditure on education but such data is publicly unavailable for a large number of countries for the sample period considered in this study. The World Bank reports data for recent years but only beginning the late 1990's.

Fortunately, Barro and Lee (2000) reports quinquennial data on educational attainment at different levels (primary, secondary and tertiary) for a large panel of countries for the years 1960-1999. Hence, I use the three-year lagged average percentage of primary school attained in the total population (*Primary*) as a proxy for the public education good.<sup>17</sup> Arguably, this approach is not the first best since primary school attainment in a country need not be associated with the proportion of public spending on primary education: a country with a high per capita private expenditure on education might also achieve the same outcome. However, this approach might be reasonable given

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<sup>17</sup> Due to the lack of yearly data on schooling, I assume that the quinquennial observation applies to each year in the 5-year period.

that in developing countries, primary education is often only made available to the masses through government provision.

To investigate if there is a significant association between primary school attainment and ethnic fractionalization, I report the result of estimating equation (4) with *Primary* as the dependent variable in Table 5 below (the full regression results are not reported here for reasons of brevity). The coefficient on *Ethnic* is negative and statistically significant indicating that an increase in ethnic fractionalization reduces primary school attainment in a country, holding all else constant.

**Table 5. Primary school attainment, government spending and ethnic diversity.**

Dependent Variable	Ethnic	t-statistic	N	R-squared
Primary	-23.018**	-2.72	683	0.3478
Ssw	-8.820**	-2.33	312	0.6373
Cgexp	-13.937*	-1.77	464	0.4748

Note: Estimated using pooled OLS with robust standard errors clustered for each country. All regressions include controls for ln GDP per capita and regional dummies for SSA, LAC, ECA, EAP, MENA and SA (WE and NA being the omitted categories). \* (\*\*) (\*\*\*) denote significance at the 10 (5) (1) percent levels.

Next, to determine if primary school attainment affects inequality, Table A3 (see Appendix) reports the results of the basic specification used previously with variables for primary schooling and its interaction term with ethnic fractionalization. The coefficient on *Primary* is negative but not statistically significant. The coefficient on the interaction term of *Primary* and *Ethnic* is (0.417) however positive and significant at the 10 percent level. It implies that for a median level of primary school attainment (44.17), a one standard deviation increase in ethnic fractionalization (0.237) results in a 4.34 percentage point increase in the Gini value. This result appears to lend support to the hypothesis that

ethnic fractionalization is associated with greater inequality through reduced primary school attainment.

The second channel – the indirect effect of ethnic diversity on inequality via its impact on social spending – is even harder to test due to data limitations. However, Persson and Tabellini (2003) use data on central government expenditure ( $Cgexp$ ) and central government social welfare spending ( $Ssw$ ) as a percentage of GDP to study the impact of electoral systems on redistribution. I use their data on government spending for the purposes of this study.

Table 5 reported earlier shows that ethnic fractionalization is negatively associated with both government spending variables suggesting that ethnic fractionalization might work through these variables to impact inequality. To test if this is indeed the case, Table A4 (see Appendix) reports the estimation results of including the new variables in the basic specification. Column 1 includes the three-year lagged average of government social welfare spending ( $Ssw$ ). The coefficient on  $Ssw$  is negative and significant at the 10 percent level indicating that a 10 percent increase in government social welfare spending leads to a 2.62 percentage point decrease in the Gini value. Column 2 introduces an interaction of  $Ssw$  with *Ethnic*. Although the coefficient on the interaction term is negative, it is not statistically significant. Similarly,  $Cgexp$  and its interaction term with *Ethnic* do not appear to have a statistically significant association with inequality (column 4). These findings appear to counter my initial hypothesis that redistribution lessens in a more fragmented society but since the coefficients of interest are both individually and jointly insignificant, the results are not very conclusive.

Overall, the results from this sub-section are rather speculative and should be treated with caution. Although there appears to be a significant inverse relationship between ethnic fractionalization, primary school attainment and government social spending, there does not seem to be a robust link between these variables and inequality as some researchers have previously suggested. Further investigation using a dataset with a broader coverage of countries might yield more definitive results.

## 5. CONCLUSION

Evidence from a broad panel of countries suggests that ethnic diversity has a statistically significant relationship with inequality. Specifically, an increase in ethnic fractionalization is associated with an increase in the Gini coefficient and this relationship appears to be robust to specification changes. There is also evidence supporting the theoretical prediction that greater democracy reduces inequality for a given level of ethnic fractionalization. However, contrary to theoretical expectations, higher income per capita levels do not appear to mitigate the inequality-increasing effect of ethnic fractionalization. This might be explained nonetheless, if we account for socioeconomic differences across ethnic groups or the in-migration of unskilled workers.

Further analysis using alternative measures of democracy, government cohesiveness and rule of law suggests that ethnic fractionalization does not work through political variables to influence inequality as hypothesized but rather appears to interact with political factors to influence inequality. The empirical evidence suggests that a lower concentration of political power and improvements in law and order reduce inequality for a given level of ethnic fractionalization. Interestingly, improvements in civil liberties and political rights appear to increase inequality for a given level of ethnic fractionalization suggesting that the goal of enhancing individual freedoms might not necessarily relate to the goal of equity.

Finally, there appears to be some evidence that greater ethnic fractionalization reduces government social spending and primary education which might in turn increase

inequality. However, due to the lack of redistribution data for a large sample of countries, this result is more speculative and should be treated with caution.

In summary, this exploratory study attempts to contribute to our understanding of how and why ethnic fractionalization appears to impact inequality across countries. It is difficult to precisely evaluate the size of this effect because ethnic fractionalization might be correlated with other potential explanatory variables. Further research in this area, particularly with respect to the formalization of the theoretical links between ethnic diversity and inequality, is required to enhance our understanding of these relationships.



**Table A1. Ethnic diversity and inequality (Dependent variable is the income Gini coefficient)**

<b>Variable</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
ln (GDP per capita)	35.392*** (2.65)	35.353*** (2.66)	38.946*** (2.80)	44.939*** (3.35)	39.276** (2.58)
ln (GDP per capita) squared	-2.240*** (-2.83)	-2.238*** (-2.86)	-2.469*** (-3.00)	-2.835*** (-3.51)	-2.492** (-2.60)
Dummy for income	2.392 (1.00)	2.390 (1.01)	3.559 (1.39)	3.769 (1.48)	3.552 (1.37)
Dummy for individual	-1.061 (-0.65)	-1.063 (-0.65)	-0.793 (-0.48)	-0.477 (-0.30)	-0.789 (-0.48)
Dummy for gross income	4.299** (2.41)	4.298** (2.37)	3.218 (1.64)	4.312** (2.50)	3.220 (1.64)
Democ			0.021 (0.07)	0.742* (1.71)	-0.064 (-0.03)
ln (GDP per capita) x Democ					0.010 (0.04)
Ethnic x Democ				-1.994** (-2.49)	
Ethnic squared		-0.186 (-0.01)			
<b>Ethnic</b>	<b>13.315***</b> <b>(2.75)</b>	<b>13.451</b> <b>(1.15)</b>	<b>13.920***</b> <b>(2.72)</b>	<b>25.291***</b> <b>(3.86)</b>	<b>13.923***</b> <b>(2.71)</b>
Constant	-106.078* (-1.88)	-105.926* (-1.87)	-120.204** (-2.05)	-149.706*** (-2.68)	-121.323* (-1.98)
No. of observations	753	753	694	694	694
No. of country clusters	104	104	95	95	95
R-squared	0.3028	0.3028	0.3209	0.3616	0.3209

Notes: t-statistics are in parentheses. Estimated using pooled OLS with robust standard errors clustered for each country. ln (GDP per capita) and Democ are three-year lagged averages. \* (\*\*) (\*\*\*) denote significance at the 10 (5) (1) percent levels.

**Table A1 continued. Ethnic diversity and inequality (Dependent variable is the income Gini coefficient)**

<b>Variable</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
ln (GDP per capita)	47.057*** (3.07)	41.027*** (2.76)	40.373** (2.52)	36.442** (2.18)
ln (GDP per capita) squared	-2.843*** (-3.23)	-2.554*** (-2.73)	-2.657*** (-2.97)	-2.376** (-2.44)
Dummy for income	3.792 (1.52)	3.863 (1.49)	3.651 (1.43)	3.746 (1.44)
Dummy for individual	-0.772 (-0.47)	-0.520 (-0.33)	-0.378 (-0.24)	-0.422 (-0.27)
Dummy for gross income	3.950** (1.99)	4.327** (2.49)	4.102** (2.34)	4.117** (2.33)
Democ	0.022 (0.08)	1.838 (0.88)	1.005 (1.62)	2.106 (1.03)
ln (GDP per capita) x Democ		-0.129 (-0.52)		-0.129 (-0.55)
ln (GDP per capita) x Ethnic	-4.970 (-1.45)		4.1435 (0.75)	4.148 (0.76)
Ethnic x Democ		-2.065** (-2.58)	-2.725* (-1.96)	-2.797** (-2.05)
<b>Ethnic</b>	<b>57.084*</b> <b>(1.97)</b>	<b>25.653***</b> <b>(3.91)</b>	<b>-6.528</b> <b>(-0.16)</b>	<b>-6.203</b> <b>(-0.15)</b>
Constant	-162.971** (-2.44)	-136.761** (-2.30)	-124.862* (-1.75)	-111.844 (-1.55)
No. of observations	694	694	694	694
No. of country clusters	95	95	95	95
R-squared	0.3342	0.3629	0.3653	0.3667

Notes: t-statistics are in parentheses. Estimated using pooled OLS with robust standard errors clustered for each country. ln (GDP per capita) and Democ are three-year lagged averages. \* (\*\*) (\*\*\*) denote significance at the 10 (5) (1) percent levels.

**Table A1 continued. Ethnic diversity and inequality (Dependent variable is the income Gini coefficient).**

<b>Variable</b>	<b>10</b>	<b>11</b>	<b>12</b>
ln (GDP per capita)	14.487 (1.07)	13.719 (0.88)	7.148 (0.48)
ln (GDP per capita) squared	-0.844 (-1.01)	-1.038 (-1.14)	-0.542 (-0.63)
Dummy for income	2.592 (1.20)	2.029 (0.98)	2.369 (1.11)
Dummy for individual	-2.049 (-1.56)	-1.966 (-1.48)	-2.007 (-1.54)
Dummy for gross income	2.904* (1.96)	2.560* (1.79)	2.603* (1.78)
SSA	11.751*** (4.28)	11.399*** (4.38)	12.305** (4.94)
LAC	12.916*** (6.16)	13.321*** (6.29)	13.161** (6.27)
ECA	-3.569 (-1.16)	-2.621 (-0.92)	-3.014 (-1.03)
Democ	2.526** (2.09)	0.558 (1.39)	2.927*** (2.77)
ln (GDP per capita) x Democ	-0.277* (-1.93)		-0.279** (-2.24)
ln (GDP per capita) x Ethnic		6.016* (1.68)	6.050* (1.80)
Ethnic x Democ	-0.926 (-1.57)	-1.879** (-2.21)	-1.972** (-2.38)
<b>Ethnic</b>	<b>10.491** (2.16)</b>	<b>-36.283 (-1.30)</b>	<b>-36.290 (-1.39)</b>
Constant	-30.291 (-0.55)	-11.376 (-0.17)	8.696 (0.14)
No. of observations	694	694	694
No. of country clusters	95	95	95
R-squared	0.6135	0.6154	0.6213

Notes: t-statistics are in parentheses. Estimated using pooled OLS with robust standard errors clustered for each country. ln (GDP per capita) and Democ are three-year lagged averages. \* (\*\*) (\*\*\*) denote significance at the 10 (5) (1) percent levels.

**Table A2. Ethnic diversity, political factors and inequality (Dependent variable is the income Gini coefficient)**

Variable	1	2	3	4
ln (GDP per capita)	28.095*	30.465*	37.997**	38.459**
	(1.69)	(1.86)	(2.22)	(2.32)
ln (GDP per capita) squared	-1.882*	-2.021**	-2.472**	-2.494**
	(-1.97)	(-2.12)	(-2.48)	(-2.55)
Dummy for income	5.523**	5.237**	6.232**	6.042**
	(2.07)	(2.03)	(2.42)	(2.43)
Dummy for individual	1.125	1.133	1.243	1.172
	(0.70)	(0.69)	(0.78)	(0.71)
Dummy for gross income	3.603*	3.740*	4.705**	4.905**
	(1.80)	(1.85)	(2.59)	(2.61)
PR	-0.810		-2.172***	
	(-1.19)		(-2.64)	
PR x Ethnic			3.911**	
			(2.40)	
CL		-0.916		-2.377***
		(-1.40)		(-3.12)
CL x Ethnic				4.648**
				(2.55)
Ethnic	15.563***	15.445***	3.472	0.900
	(2.84)	(2.87)	(0.48)	(0.12)
Constant	-70.643	-79.922	-108.709	-110.149
	(-0.97)	(-1.13)	(-1.49)	(-1.57)
No. of observations	400	398	400	398
No. of country clusters	94	95	94	95
R-squared	0.3112	0.3069	0.341	0.3394

Notes: t-statistics are in parentheses. Estimated using pooled OLS with robust standard errors clustered for each country. ln (GDP per capita), CL and PR are all three-year lagged averages. \* (\*\*) (\*\*\*) denote significance at the 10 (5) (1) percent levels.

**Table A2 continued. Ethnic diversity, political factors and inequality (Dependent variable is the income Gini coefficient)**

<b>Variable</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
ln (GDP per capita)	27.570 (1.60)	26.818 (1.55)	16.319 (1.01)	15.427 (0.86)
ln (GDP per capita) squared	-1.801* (-1.79)	-1.753* (-1.74)	-0.994 (-1.08)	-0.932 (-0.89)
Dummy for income	3.981 (1.44)	3.912 (1.43)	7.273** (2.32)	7.158** (2.38)
Dummy for individual	-1.678 (-0.97)	-1.694 (-0.97)	2.611* (1.68)	2.726* (1.76)
Dummy for gross income	3.127 (1.42)	3.171 (1.44)	3.883* (1.95)	3.802 (1.90)
Gov	-0.886 (-0.35)	0.721 (0.22)		
Gov x Ethnic		-4.669* (-1.85)		
Law			-1.667** (-2.11)	-1.668 (-1.47)
Law x Ethnic				0.138 (0.06)
Acc			0.146 (0.14)	
Ethnic	17.025*** (2.99)	20.864** (2.17)	15.173*** (2.67)	14.688 (1.57)
Constant	-71.835 (-0.98)	-70.241 (-0.95)	-34.807 (-0.50)	-31.167 (-0.40)
No. of observations	514	514	285	285
No. of country clusters	93	93	78	78
R-squared	0.3327	0.3335	0.3405	0.3407

Notes: t-statistics are in parentheses. Estimated using pooled OLS with robust standard errors clustered for each country. ln (GDP per capita), Gov, Law and Acc are all three-year lagged averages. \* (\*\*) (\*\*\*) denote significance at the 10 (5) (1) percent levels.

**Table A3. Inequality, ethnic diversity and schooling (Dependent variable is the income Gini coefficient)**

<b>Variable</b>	<b>1</b>	<b>2</b>
ln (GDP per capita)	45.204*** (2.17)	41.594*** (2.29)
ln (GDP per capita) squared	-2.806*** (-2.29)	-2.544*** (-2.36)
Dummy for Income	2.925 (0.96)	3.352 (1.51)
Dummy for individual	-0.672 (-0.38)	-2.336* (-1.75)
Dummy for Gross Income	3.738 (1.64)	2.730* (1.87)
SSA		15.531*** (4.75)
LAC		13.047*** (5.60)
ECA		-6.579** (-2.19)
Primary	-0.122 (-1.31)	-0.144** (-2.07)
Primary x Ethnic	0.417* (1.90)	0.181 (1.19)
Ethnic	-3.661 (-0.44)	-5.010 (-0.75)
Constant	-142.688 (-1.65)	-128.998* (-1.73)
No. of observations	622	622
No. of country clusters	74	74
R-squared	0.3817	0.663

Notes: t-statistics are in parentheses. Estimated using pooled OLS with robust standard errors clustered for each country. ln (GDP per capita) and Primary are three-year lagged averages. \* (\*\*) (\*\*\*) denote significance at the 10 (5) (1) percent levels.

**Table A4. Inequality, ethnic diversity and government expenditure (Dependent variable is the income Gini coefficient)**

Variable	1	2	3	4
ln (GDP per capita)	64.023** (2.1)	68.817** (2.28)	69.838*** (3.41)	67.025*** (3.55)
ln (GDP per capita) squared	-3.925** (-2.22)	-4.176** (-2.38)	-4.304*** (-3.58)	-4.488*** (-3.71)
Dummy for income	5.765 (1.65)	5.631 (1.62)	7.056** (2.64)	6.983** (2.62)
Dummy for individual	2.268 (1.17)	2.200 (1.13)	1.532 (0.75)	1.389 (0.67)
Dummy for gross income	4.790** (2.65)	4.789*** (2.80)	4.746** (2.53)	5.042*** (2.89)
Ssw	-0.262 (-1.31)	-0.084 (-0.36)		
Ssw x Ethnic		-0.701 (-1.39)		
Cgexp			0.003 (0.04)	0.100 (0.97)
Cgexp x Ethnic				-0.379 (-1.47)
Ethnic	4.412 (0.66)	10.701 (1.35)	8.723 (1.61)	17.812** (2.05)
Constant	-222.873 (-1.66)	-215.708* (-1.57)	-219.725* (-1.58)	-266.049** (-2.05)
No. of observations	268	268	421	421
No. of country clusters	44	44	48	48
R-squared	0.6133	0.6197	0.5531	0.5597

Notes: t-statistics are in parentheses. Estimated using pooled OLS with robust standard errors clustered for each country. ln (GDP per capita), Ssw and Cgexp are all three-year lagged averages. \* (\*\*) (\*\*\*) denote significance at the 10 (5) (1) percent levels.

**Table A5. Data Sources**

Variable	Source
Ethnic fractionalization	Alesina et al. (2003). Based on ethnic group compositions reported by Encyclopedia Britannica (2000), CIA (2000), Levinson (1998), Minority Rights Group International (1997) and national censuses (various years).
Gini Coefficient	Dollar and Kraay (2002) income distribution dataset Originally compiled from UN-WIDER (2000), Deininger and Squire (1996), Chen and Ravallion (2000), Lundberg and Squire (2000).
GDP per capita	Penn World Table Version 6.2. PPP-adjusted constant 2000 dollars.
Democracy	Polity IV database (September 2002 version)
Civil liberties	Freedom House (2006)
Political rights	Freedom House (2006)
Law and order	Political Risk Services (2005)
Democratic accountability	Political Risk Services (2005)
Government cohesiveness	Database of Political Institutions (March 2002 version) developed by Beck et al. (2000)
Primary education	Barro and Lee (2000) educational attainment dataset
Social welfare spending / GDP	Persson and Tabellini (2003) regression dataset
Central government spending / GDP	Persson and Tabellini (2003) regression dataset

Note: Dollar and Kraay (2002) income distribution dataset is available online at <http://econ.worldbank.org/>. Persson and Tabellini (2003) regression dataset is available online at <http://www.igier.uni-bocconi.it/>.

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