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The Effect of Good Institutions on the Economic Consequences of Ethnic Fractionalization

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Miro Ahti

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Abstract of master's thesis

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Abstract

Research objectives
The purpose of this thesis is to study, whether institutions affect the negative long-term economic consequences of ethnic fractionalization. The hypothesis is that in more democratic and liberal context, ethnic fractionalization won't have the negative consequences on the economic well-being that it has in the less free institutional context.

Methodology
The thesis consist of a literature review and an econometric study. The effects of institutions are examined with OLS regressions as well as regressions, where institutions are instrumented. The study uses several different measures for institutional quality.

Research findings
While there are some theoretical reasons and some previous empirical work suggesting that institutions diminish the negative effects of ethnic fractionalization on long-term economic welfare, I can't find evidence to substantiate this claim in my own empirical work.

Keywords economics, economic growth, ethnic fractionalization, institutions, economic development

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Tutkimuksen tavoitteet
Tämän maisterin tutkielman tarkoitus on tutkia, vaikuttavatko instituutiot etnisen hajanaisuuden aiheuttamiin negatiivisiin pitkän ajan seuraamuksiin. Hypoteesi on, että demokraattisemmassa ja liberaalimmassa kontekstissa, etnisellä hajanaisuudella ei ole samoja negatiivisia vaikutuksia taloudelliseen hyvinvointiin kuin, mitä sillä on vähemmän vapaissa institutionaalisissa konteksteissa.

Tutkimusmenetelmät
Tutkielma koostuu kirjallisuuskatsauksesta ja ekonometrisesta tutkimuksesta. Instituutioiden vaikutusta tutkitaan OLS regressioilla, sekä regressioilla, jos instituutiot on instrumentoitu. Tutkielma käyttää erilaisia mittareita mittaamaan instituutioiden laatua.

Tutkimuksen tulokset
Aikaisempi tutkimus tarjoaa teoreettisia syitä, miksi instituutiot vähentävät etnisen hajanaisuuden negatiivisia seurauksia taloudelliselle hyvinvoinnille. Aikaisempi tutkimus antaa myös empiiristä näyttöä tästä. En kuitenkaan pysty vahvistamaan näitä tuloksia omassa empiirisessä tutkimuksessani.

Avainsanat taloustiede, talouskasvu, etninen hajanaisuus, instituutiot, kehitystaloustiede

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1. Introduction

There is a lot of evidence that ethnic fractionalization has a negative effect on the economic well-being of the society. In general it seems that countries, which are more ethnically diverse, are also poorer. At first this might seem counter-intuitive. It is easy to think of counter-examples, where multiethnic societies are very successful. United States and Switzerland are two examples that easily come to mind.

One explanation for this apparent conflict between empirical evidence and these common perceptions might be that ethnic fractionalization has different effect in different institutional contexts[1]. Maybe in liberal democracies such as the United States and Switzerland ethnic fractionalization is not really that harmful, while in societies that are less liberal and less democratic, such as many societies in Africa, ethnic fractionalization is more harmful.

There is indeed some evidence that institutional context matters for the effects of ethnic fractionalization, such as Easterly (2001) and Collier (2001). They present empirical evidence that the under different contexts ethnic fractionalization affects growth differently, and the latter paper also presents some theoretical justification for the differing effect in different contexts. Besides these two studies, there are, as far as I can tell, only two newer studies that study issues related to the question at hand, Miguel (2004) and Ahlerup and Hansson (2012), both of which study the topic from a slightly different angle.

There is a large literature in economics on the effects of ethnic fractionalization on growth. It is not completely clear, how the findings of papers such as Easterly (2001) and Collier (2001) relate to this larger literature, especially since a lot of this literature has been published after 2001, the year in which these two papers were published.

The other gap in the research is that the empirical findings of the papers are not completely convincing. Any study that has some measure of institutions as an independent variable is going to face problems of endogeneity. While institutions or institutions together with ethnic fractionalization might plausible affect growth, growth might also plausible affect institutions, as richer societies can afford better institutions.

[1] By institutions in this thesis I refer mainly to political institutions. Such institutions refer to, whether there are checks and balances on the executive, whether property rights are respected and whether the leaders are democratically elected. Obviously there are other institutions out there that might also create contexts, where ethnic fractionalization affects growth differently. One example of such institution might be religions. However, to keep the scope of this thesis manageable, I will only focus on political institutions.

There are two main research objectives for the thesis at hand. I will try to relate the issue of institutional context to the larger literature about ethnic fractionalization and economic growth through a literature review on the topic.

In the literature review, I will review papers that establish a strong link between ethnic fractionalization and economic well-being and also review some papers that show that the relationship is probably causal.

I will also review different models about how ethnic fractionalization negatively affects society. The five possible reasons are that ethnic fractionalization leads to a lower provision of public goods, resource expropriation by a dominant ethnic group, civil wars, lower social capital or to worse institutions.

The second objective of the thesis is to provide some new empirical evidence on the issue. I am going to try to address the issue of endogeneity by using an instrument for institutions. I will use settler mortality in former colonies as an instrument for institutions following Acemoglu, Johnson and Robinson (2001). My focus is also somewhat different from Easterly (2001) and Collier (2001) since I concentrate more on long-run economic well-being as measured by GDP/capita rather than short-term growth.

I cannot find any empirical evidence for my hypothesis that good institutions mitigate the negative effects of ethnic fractionalization. The regressions without instrumenting for institutions show that good institutions might actually exacerbate the negative effects of ethnic fractionalization in former colonies. In the regressions, where institutions are instrumented for there is little evidence that institutions are relevant in any way. They don't seem to mitigate or exacerbate the negative effects of ethnic fractionalization.

The next section in the thesis presents empirical evidence that ethnic fractionalization does actually cause lower economic growth and will lead also lead to worse longer-term economic well-being. I will also introduce previous empirical work suggesting that this effect might be different under different institutional contexts. In the following section 3 I go through various theories on why ethnic fractionalization might have a negative effect on economic well-being. I will also comment on how these theories might have different effects in different institutional contexts. For every theory presented, I will also discuss empirical evidence, which might prove or disprove the theory.

For the fourth section of the paper I will present my own empirical investigation on the interplay between institutions and ethnic fractionalization. The fifth section concludes.

2. Ethnic Fractionalization and Growth

2.1 Introduction

The purpose of this section is to present the empirical starting point for my work. I will show that there is strong evidence that ethnic fractionalization is indeed negatively related to economic well-being. I will also show that the relationship seems to be causal. Then I will present evidence that suggest that the effect of ethnic fractionalization is different, when the institutional context is different, which motivates the main approach of the thesis.

2.2 Measuring Ethnic Fractionalization

Before delving deeper into the effect of ethnic fractionalization on economic well-being, I will briefly discuss, what ethnic fractionalization actually is, and how to measure it. The generally used measure for ethnic fractionalization (EF) is the following:

$$EF = 1 - \sum_{i=1}^{I} \left(\frac{n_i}{N}\right)^2, \qquad i = 1, \dots, I,$$

where n_i is the size of one ethnic group and N is the size of the whole population. The measure corresponds to the probability that two randomly selected individuals from the population are members of different ethnic groups.

When constructing this measure empirically, the next question is what constitutes an ethnic group. There are actually several answers to this question, and I will present the two commonly used sources for the data on ethnic fractionalization. I will discuss the data in more detail, in the empirical section, when I discuss, which data I will use and why.

The most commonly used data on different ethnic groups comes from Atlas Narodov Mira, which is a Soviet constructed encyclopedia on different linguistic groups in the world. The encyclopedia was constructed in the 1960's. Easterly and Levine (1997) was among the first empirical papers to use this data and they summarize previous papers noting that the fact that the encyclopedia was Soviet constructed didn't introduce any bias to the results. According to Easterly and Levine there seem to be no ideologically based findings in the encyclopedia.

Posner (2004) notes, that the fact that the data is from 1960's might cause some problems. Since then there have been changes in the ethnic makeup of the countries and the changes are not random. For example, civil wars might cause significant changes in the ethnic makeup of a country. Civil wars also affect economic development, so using older data on ethnic fractionalization when studying growth might give misleading results.

Another frequently used source of data is Alesina et al. (2003). The paper constructs and index that is more current and relies on more than one sources for the different ethnic groups in the country. These alternative sources include: Encyclopedia Britannica 2001, CIA World Factbook and Minority Rights Group International.

Alesina et al. (2003) has three different measures for ethnic fractionalization. One is based on language, like most indices of ethnic fractionalization are. Other one is based on religion. The third index is based on, what are the perceived ethnic groups in the particular country. The differences can be based on criteria such as skin color in addition to linguistic differences.

2.3 Empirical Evidence on Ethnic Fractionalization and Growth

Paper	Dependent Variable	Independent variable of interest	Time Period
Easterly and Levine (1997)	Average annual growth of GDP per capita for different decades	Index of Ethnic Fractionalization based on Atlas Narodov Mira	1960-1990
Alesina et al. (2003)	Average annual growth of GDP per capita for different decades	Index of Ethnic Fractionalization based on Several Sources	1960-1991
Alesina et al. (2012)	Level of Per Capita Income estimared using data on luminosity	Ethnic Gini-coefficient	1992, 2000 and 2009
Ahlerup (2009)	Log of GDP per capita, growth of GDP per capita	Instrumented Index of Ethnic Fractionalization	2000 for income, 1980-2000 for growth

Table 1: Summary of important papers on ethnic fractionalization and growth.

A paper by Easterly and Levine (1997) studies directly the link between ethnic fractionalization and economic growth, using data from Atlas Narodov Mira. They estimate the effect of ethnic fractionalization on growth by estimating an OLS regression with ethnic fractionalization and

several other control variables as explanatory variables. The paper finds that there is a large and significant negative effect of ethnic fractionalization on growth.

The result is robust controlling for financial depth of the country, black market premium for the foreign exchange rate and fiscal surplus as a percentage of the GDP. The coefficient for ethnic fractionalization is not significant however, when controlling for the previously mentioned variables and the amount of telephones per worker. All of these variables are correlated with ethnic fractionalization, which will lower the coefficient for ethnic fractionalization, especially when including several control variables. The authors speculate that the lower coefficient is due to the fact that the negative effect of ethnic fractionalization on growth is through these control variables.

The paper also presents regression, where ethnic fractionalization is an explanatory variable for various measures of infrastructure and public policy, used earlier as control variables. According to the results there is a strong statistically significant link between ethnic fractionalization and high black market premiums, poor financial development, low provision of infrastructure and low levels of education. This is in line with the author's assumption that the negative effect of ethnic fractionalization is due to these variables.

The regressions presented in the paper rely on ethnic fractionalization being exogenous with respect to growth and the measures of public policy and infrastructure used in the later regressions. Later in this section I present reasons, why this can be doubted, which means that the effects presented here might not necessarily be causal. It might also be that the association is based on some unobserved factor, not controlled for in the regression. For example, distance from the equator is negatively associated with growth and has a positive association with ethnic fractionalization[2]. Based on this paper, however, it is reasonable to assume that there is at least a robust negative correlation between ethnic fractionalization and GDP growth.

The assumption that the effect of ethnic fractionalization is due to the policy choice variables mentioned is even more problematic. These measures are endogenous with respect to growth, which means that if ethnic fractionalization is robustly associated with slow growth through any mechanism, it will still have a statistically significant negative association with any of these variables.

[2]For example the measures of latitude and ethnic fractionalization that I use in my empirical part, have a negative correlation with each other of 0.48.

Alesina et al. (2003) is an empirical study on ethnic fractionalization that is very similar to Easterly and Levine (1997). The main difference is that they compile an index on ethnic fractionalization that is not only based on linguistic differences, but also other ethnic characteristics. The results are largely similar to those in the Easterly and Levine paper, with ethnic fractionalization having a large and significant negative effect on many measures of the country's wellbeing.

Alesina et al. (2012) studies the link between ethnic inequality and economic development. Unlike the two previous studies, the paper is focused on the level of economic development rather than its growth. The paper uses luminosity of an area as seen from space as a proxy for economic development. Luminosity refers to, how much light an area emits to space as measured in the night. As the paper notes GDP is in general highly correlated with luminosity. The paper then maps luminosity to areas occupied by different ethnic groups to estimate a measure on how wealth is divided between ethnic groups in a country. The paper then estimates a Gini coefficient to estimate ethnic inequality within countries. The measure of ethnic inequality is found to be negatively related to per capita income.

The paper also assesses the robustness of the link by using geographic endowments as an instrument for the ethnic inequality. The results remain are basically the same and still statistically significant.

Interestingly, the coefficient for ethnic fractionalization is not significant, when taking ethnic inequality into account. This paper is interesting in the regard that it suggests that the significant way in which ethnic fractionalization affects society, is through its effect on ethnic inequality and not through any effect of its own. This is something that should be kept in mind, when considering different causes by which ethnic fractionalization might affect the economic welfare of a society. Explanations that are more consistent with ethnic inequality being the ultimate cause are more plausible in the light of this empirical investigation.

While endogeneity might a problem for all these studies and there always might be an omitted variable bias, it is safe to say at least, that there exists a very robust negative correlation between ethnic fractionalization and economic development.

2.4 Possible Endogeneity of Ethnic Fractionalization

There are several possible reasons, why ethnic fractionalization might be endogenous with respect to economic welfare. Economic welfare might affect ethnic diversity itself. If this is the case, it becomes very difficult to assess the empirical relationship between these two things. In this section, I review mechanisms on why ethnic diversity might be endogenous with respect to economic development. I also review a paper by Ahlerup (2009), which tries to solve this problem by using instrumental variables.

One reason for an endogenous relationship between ethnic fractionalization, institutions and growth might be colonial past. There is a lot of evidence that colonial institutions affect current institutions. (see for example Acemoglu, Johnson and Robinson 2001 and Dell 2010). Colonial past might have also affected ethnic fractionalization, because of colonial borders splitting ethnic groups and also forcing several different ethnicities living in a same country. (Englebert et al. 2002)

Alesina et al. (2011) is a paper studying the effects of colonial past on current economic performance. The paper explains current economic performance in terms of border artificiality, which proxies some aspects of the colonial rule. The borders of a country are deemed more artificial, if they are closer to a straight line or if they split several ethnic groups to different countries. The border artificiality is negatively related income and quality of institutions. Especially the latter measure of state artificiality is correlated with ethnic fractionalization. If these border artificiality regressions are run controlling for ethnic fractionalization, the coefficient for ethnic fractionalization is only sometimes significant, though in most regressions it is significant at least at the 10%-level. This still gives an indication that part of the negative effect of ethnic fractionalization might only be because it is associated with the colonial past and the colonial borders.

A solution to the endogeneity problem of ethnic diversity is presented in the papers by Ahlerup and Olsson (2009) and Ahlerup (2009). The former paper presents determinants for ethnic fractionalization and the latter paper uses these determinants as instruments for ethnic diversity trying to find out, whether there is indeed a causal effect between ethnic diversity and economic wellbeing.

The Ahlerup and Olsson (2009) paper first presents a theory of how different ethnic groups come into being. In the paper ethnic groups are a mechanism for providing public goods. Public goods are more efficiently produced, when the group is larger and when there are fewer differences between

the recipients of the public goods. With time isolated groups of people develop differences in language and genes, and this makes provision of public goods to the group as a whole more difficult. With a longer period of time elapsed, it will be cheaper for the isolated groups to form their own ethnic groups and provide the public goods only for themselves.

An empirical prediction of the model is that areas, where humans have lived for longer have more ethnic diversity. More fractionalized geography will also lead to higher ethnic diversity, as the different groups will be more isolated in these areas. The Ahlerup and Olsson (2009) paper also runs regressions testing these empirical predictions of the model. In accordance with the predictions, the regression coefficients for both the duration of human settlement and fractionalized geography are positively associated with greater ethnic diversity.

Interestingly for the thesis at hand institutions also seem to affect ethnic diversity. The longer the history a state in a certain area, the less ethnic diversity the area will tend to have. This suggests that institutions of the state might have deliberately reduced ethnic diversity. An alternative explanation is that the bigger scale of human contact that a state provides will facilitate the assimilation of different ethnic groups.

Ahlerup and Olsson (2009) makes previous empirical studies of ethnic fractionalization seem more reliable. Clearly ethnic fractionalization is in general determined over very long term, at least when comparing countries to each other. Because these determinants are so long-term, it makes sense to treat ethnic fractionalization as exogenous with respect to income.

Ahlerup (2009) uses duration of human settlements, vegetation diversity and also number of years since independence and migratory distance from Ethiopia as instruments for ethnic fractionalization. Ethnic fractionalization is here used as an explanatory variable for the level of GDP per capita. Instrumenting for ethnic diversity, it seems that ethnic diversity does have a negative impact on current economic welfare. The impact actually seems to be even larger than one would assume based on the previous studies. There is also a negative relationship between ethnic diversity and corruption.

Another study that examines the long run determinants of ethnic fractionalization is Michalopoulus (2012). The study finds that geographic variability has a statistically significant positive relationship to ethnic fractionalization. Geographic variability is measured as standard deviation in the quality of land and elevation in land. This again suggests that ethnic fractionalization is determined in the long-term and it can be considered exogenous with respect to income. However the study also finds

that colonization affected the ethnic structure of the colonies. As colonization affected the colonized countries in many ways, besides affecting ethnic fractionalization, there might still be endogeneity with respect to income and the ethnic composition of the country

The evidence thus seems to suggest that ethnic fractionalization is the causal effect for worse economic outcomes. It can also be used as an exogenous variable without biasing the results too much. It is worth bearing in mind though, that ethnic fractionalization is affected by income and that this affect is probably stronger in previously colonialized countries.

2.5 Evidence that Institutional Context Matters

Paper	Dependent Variable	Independent variable of interest	Time Period
Collier (2000)	Average GDP per capita growth	Ethnic fractionalization*Democracy	1960-1990
Collier (2001)	Average GDP per capita growth	Ethnic fractionalization*Democracy	1960-1990
Easterly (2001)	Average annual growth of GDP per capita for different decades	Ethnic fractionalization*Average of different measures of institutional quality	1960-1990
Miguel (2004)	Quality of wells, School funding	Ethnic fractionalization*Kenya	1996 for Kenya, 2001-2002 for Tanzania
Ahlerup and Hansson (2012)	Government effectiveness	Ethnic fractionalization*nationalism	2008

Table 2: Summary of important papers about institutional context and the effects of ethnic fractionalization.

Collier (2000) tests if ethnic diversity affects democracies and dictatorships in a different manner. The paper runs a regression with a measure of democracy, ethnic fractionalization and several standard variables such as initial income and whether the country is landlocked, as the explanatory variables for growth. The paper also includes an interaction term, measure of democracy*ethnic fractionalization, for the interaction between democracy and ethnic fractionalization.

The interaction term is highly significant, with the coefficients for democracy and ethnic fractionalization being insignificant. Ethnic diversity is found to be more harmful in less democratic societies and with the maximum level of democracy ethnic fractionalization has no effect on growth.

Collier (2001) runs similar tests as those in Collier (2000). The interaction term of political rights*ethnic fractionalization is again significant, with better political rights diminishing the negative effects of ethnic diversity. The paper also tests, whether dominance by one ethnic group leads to lower levels of growth. The coefficient for dominance is negative, indicating that ethnic dominance is bad for economic growth. However the variable is not statistically significant.

The problem with both of the Collier studies is that democracy might be endogenous with respect to income. Economic growth in a country might make it more democratic. This might lead to the results of these two studies not being too reliable.

Another paper empirically examining the interplay between institutions, ethnic fractionalization and growth is Easterly (2001). The paper constructs an index for institutional quality composed of (a) freedom from government repudiation of contracts, (b) freedom from expropriation, (c) rule of law, and (d) bureaucratic quality. Somewhat similarly to Collier (2000) the paper regresses growth on an interaction variable of institutions and ethnic fractionalization, on various control variables and on ethnic fractionalization as a separate variable. The paper uses in general the same data as Easterly and Levine (1997)

The paper finds that ethnic fractionalization still has a negative effect on growth. The interaction variable suggests that better institutions diminish the negative effect of ethnic fractionalization on growth. With the highest quality institutions ethnic fractionalization has zero marginal effect on growth. The effect of ethnic fractionalization on growth seems to go through the same channels as in Easterly and Levine (1997) paper with institutions mitigating the effect of ethnic fractionalization on all of these.

The paper also tests, whether the quality of institutions or democracy is the more important mechanism diminishing the effect of ethnic fractionalization on growth. The paper adds an additional variable, which is an interaction variable between democracy and ethnic fractionalization. This variable is insignificant. The results suggest that institutional quality is the main factor affecting whether ethnic fractionalization diminishes growth. The result is in contrast with the Collier (2000) paper.

Institutions might be endogenous with growth. The amount of ethnic fractionalization also might affect institutional quality. Therefore the Easterly (2001) paper tries to evaluate the effect of institutions using instrumental variables. The instrument used for quality of institutions is years of independence. Using this instrument, the results are similar to those in the rest of the paper.

Institutions mitigate the negative effect of ethnic fractionalization on growth and at the highest level of institutions, there is no negative effect.

The instrument used for institutions in the Easterly (2001) study is not a very good instrument. For an instrument to be valid it should only affect the explained variable through the instrumented variable and the explained variable should not affect the instrument. Years of independence could affect GDP growth through many channels, for example by affecting the integration to international trade. Growth is also dependent on current income, and it might be that richer countries either gained independence earlier or later affecting both subsequent growth and obviously years of independence.

While endogeneity presents problems for causal interpretation with both studies, their results are similar in interesting ways. In both studies, ethnic fractionalization has a negative affect only in bad institutional contexts, while at the best level of institutions, there is no negative effect.

Another empirical study, which gives evidence that institutions matter with regards to ethnic fractionalization is Miguel (2004). The starting point of the study is to compare the funding of public goods in both Tanzania and Kenya. The study compares two districts in near the border of the two countries, Meatu in Tanzania and Busia in Kenya. The motivation is that Tanzania and Kenya are very similar in terms of ecology, natural resources and colonial legacy. However, they developed different institutions after independence, so if ethnic diversity has a different effect on the provision of public goods, this difference should be explained by the different institutions.

Miguel hypothesizes that the relevant difference between the two countries is the nation building programs initiated in Tanzania, but not in Kenya. An example of this is that, Tanzania teaches common Tanzanian history in the school curriculum, while the Kenyan teaching of history is more based on the histories of different ethnic groups in the area. However the institutional context between the two countries is very different in several ways, so some other differences might be actually more relevant.

The measure of public goods is the quality of wells and the amount of money donated to the local schools. In addition to having ethnolinguistic fractionalization as an explanatory variable, there is also an interaction variable kenya*ethnic fractionalization.

The result is that, ethnolinguistic fractionalization only has a negative effect on public good provision in Kenya, as expected by Miguel. This finding further suggests that institutional context is relevant for whether ethnic fractionalization has an effect on the society or not.

The result might be endogenous, with Tanzania initially having better ethnic relations, which lead to the nation building programs. Miguel also notes, that the interaction between institutions and ethnic fractionalization might not be due to the nation building programs. For example there was forced migration to villages in Tanzania, which could have led to better ethnic relations, as they had to live closer to each other.

While the comparison between the countries is not perfect the results suggest that institutional context does matter. Unfortunately the study doesn't shed too much light on, what are the relevant institutional differences. As Miguel notes, the institutions after independence for the two countries were quite different, with Tanzania being socialist.

Ahlerup and Hansson (2012) also study, how context might affect the negative effects of ethnic fractionalization. Similarly to Miguel (2004) the hypothesis is that nationalism might have an effect on, whether ethnic diversity is problematic or not.

The dependent variable is government effectiveness, which is a measure from the World Bank. It is intended to measure the government's ability to implement good policies and to produce public goods. Nationalism is measured as the level of national pride in the population, based on surveys.

The interesting independent variable for the purpose of this master's thesis, is an interaction variable for nationalism*ethnic fractionalization. If nationalism diminishes the negative effects of ethnic fractionalization on government effectiveness, this interaction term should be significant and positive.

The interaction term is not statistically significant, so nationalism doesn't seem to diminish the negative effects of ethnic fractionalization. However, if the sample is limited only to countries that were former colonies, the effect is significant and nationalism does seem to mitigate the negative effects of ethnic fractionalization.

While the Ahlerup and Hansson (2012) study gives weak indication, that nationalism might affect the effects of ethnic fractionalization in former colonies, the results still cast doubt on Miguel's (2004) interpretation of his results. The different effect of ethnic diversity in Tanzania and Kenya probably reflect other institutional differences between the two countries, as there is only very weak evidence that nationalism can diminish the negative effects of ethnic diversity.

The general finding of all these studies is that ethnic fractionalization is less harmful in some institutional contexts. According to all the studies, except Ahlerup and Hansson (2012), the

marginal effect of ethnic fractionalization on development might be even zero in some institutional contexts. However, endogeneity might be a problem on all of these studies and it is not completely clear which are the relevant institutions driving this result.

3. How Ethnic Fractionalization Affects Growth

3.1 Introduction

Overall, there is no clear consensus on how and why ethnic fractionalization affects economic development. There are, however, several models on how ethnic fractionalization might affect the society and these models present varying reasons on, why ethnic fractionalization does have a negative effect on development.

In most models ethnic fractionalization is relevant because of one of these three things: either ethnic groups have different preferences, information flows more freely inside ethnic groups or people base their vote in an election based on ethnicity. All these reasons provide institutions are role determining, whether ethnic fractionalization is harmful or not. Under different institutional contexts people's different preferences are more or less relevant or free flow of information is more or less important.

There are four likely ways, in which ethnic fractionalization might affect the economic welfare of a country. Ethnic fractionalization might lead to a lower provision of public goods, exploitation of one some ethnic groups by others, a higher likelihood of civil war, or a lower level of social capital in the society. It is of course possible that several of these reasons are behind the effects of ethnic fractionalization. There also exist several reasons, why all of these effects would be different under different institutional contexts.

Ethnic fractionalization might also have a negative effect on the institutions of the country. In the last part of this section, I will discuss this possibility and also, how it causes problems for the empirical investigation of the phenomenon that I'm interested in, namely, whether ethnic fractionalization has a different effect under different institutional contexts.

The evidence that ethnic fractionalization affects public goods, is the most robust. The evidence for a relationship between ethnic fractionalization and social capital is less robust, but there is quite a lot of evidence that the relationship is there. There is the least evidence that ethnic fractionalization would actually make civil war more likely. For exploitation, I haven't been able to find any empirical studies for the phenomenon, so it is hard to comment on the evidence one way or another.

3.2 Public Goods

There is robust empirical evidence that ethnic fractionalization is related to a lower provision of public goods. There are also theoretical reasons for assuming this. For this reason, it is a good starting place to start looking for reasons on why ethnic fractionalization might have a negative effect on economic development.

Alesina et al. (1999) presents a simple model, where ethnic diversity leads to a lower number of public goods compared to a more homogeneous society. In the model, the welfare of any voter is determined by the following utility function:

$$u_i = g^a(1 - l_i) + c$$

where g is the public good, a is a parameter on the general effectiveness of public goods , l_i is the distance between individuals preferred public good and the actual public good and c is private consumption.

Further in the model it is assumed that c = y – t, or income minus taxes. All taxes are spend on public good, so g = t.

The government is assumed to maximize the utility of the median voter $\hat{l}_i^m$. So the government solves the following maximization

$$Max\ u_i = g^a\left(1 - \hat{l}_i^m\right) + y - g$$

The solution is

$$g^* = [a\left(1 - \hat{l}_i^m\right)]^{1/(1-a)}$$

The amount of public good is diminishing in the median distance from the amount of public good determined by the median voter. In a society with highly polarized preferences the median distance is longer and therefore there will be less public goods. Ethnic fractionalization will be one measure affecting the polarization of the society, if the preferences of the different ethnic groups will be different, which is a reasonable assumption.

According to the model ethnically diverse societies produce less public goods. Insofar as public goods are good for economic development, the model would predict more diverse societies to be poorer. However the opposite might be true as well, if more public goods would lead to a higher level of distortionary taxes.

The model in a sense also implies that ethnic fractionalization might have a different impact in different institutional contexts. In this model the amount of public good provided is determined by the median voter. In a less democratic context it is reasonable to assume that the median voter has less impact on public policy choices. One implication of this could be that ethnic fractionalization is actually more detrimental in more democratic societies. This of course depends on the assumption that higher amount of public goods is actually good for the economy. Higher amount of public goods also leads to higher taxes, which might be bad for economic development. In this case, ethnic fractionalization would be less bad in democracies, as there are less public goods and less taxes.

Miguel and Gugerty (2005) present another model with an implication that ethnic diversity reduces the provision of public goods. The difference to the Alesina et al. (1999) is that, there it is not necessary to assume that the preferences of different ethnic groups are different. The main thrust of the model is that social sanctions will lead to a higher level of provision of public goods. The model is basically constructed in relation to the empirical work in the same paper[3]. Because of this, the model best applies to situations, where public goods are not provided by the government, because in such situations social sanctions will be much more relevant for the provision of public goods.

In the model it is assumed that social sanctions work better inside ethnic groups. As ethnic groups for example provide insurance to each other in the case of crop failure, exclusion from the group can be very expensive to the member that is excluded.

The model has two ethnic groups, A and B, with A being the bigger ethnic group. In this setting ethnic diversity can be measured simply as the proportion of the group B, with the higher proportion meaning higher ethnic diversity.

A member of an ethnic group chooses p_{ij} or whether to contribute to providing the public good or not. If the member contributes, then p_{ij} is 1 and this person faces a cost c. The benefits of the public good $b(p_i^e + p_{-e}^e)$ are an increasing function of contributions from both ethnic groups. The social sanctions $s_i = s(\frac{p_i}{n_i})$ is an increasing function of the amount of people from one's one ethnic group that contributes and decreasing in the share of the ethnic group n_i. The expected utility of an individual is:

$$E(u_{ij}) = b(p_i^e + p_{-e}^e) - p_{ij}c - (1 - p_{ij})s\left(\frac{p_i}{n_i}\right)$$

[3] I will discuss this empirical work later in this section.

Inside the ethnic group there are two equilibria, one where everybody contributes and one, where nobody contributes. The model assumes that the equilibrium with the higher pay-offs will be the one chosen. The difference between the equilibrium with contribution and without contribution is:

$$b(n_i + p^e_{-i}) - c - b(p^e_{-i})$$

The difference is increasing in the size of the ethnic group and weakly decreasing in the expected contribution of the other ethnic group. In this case, the public good is always paid for by a sufficiently large ethnic group and a sufficiently small ethnic group always free-rides. If the smaller ethnic group increases in size (which corresponds to increasing ethnic diversity) the amount of freeriders goes up, and there is less provision of public goods. If the share of the smaller ethnic group goes up sufficiently, both ethnic groups might free-ride. The model leads to a prediction then that more ethnic diversity leads to a lower provision of public goods due to social sanctions.

In this model, the institutional context is not too relevant. It is possible, however that social sanctions are less effective in more modern institutional contexts, as for example modern forms of insurance replace the traditional forms of insurance. This would again lead to a lower provision of public goods, under a better institutional context. Again this might either be a positive or a negative feature.

Collier (2001) presents a contrasting model, where ethnic fractionalization is more harmful under dictatorship and higher ethnic fractionalization actually leads to a higher provision of public goods causing higher distortionary taxes and therefore lower growth.

In this model the politics are characterized by provision of public goods, which only benefit a certain part of the population. The taxes required to provide the public goods have a negative effect on growth. The representative agent gets the utility:

$$U = (1 - t)Y + B$$

where t is taxes and B is the public good received from the government. The budget must be balanced so B = tY. Taxation reduces income below its potential (Y^p) in the following manner.

$$Y = (1 - t^2)Y^p$$

Thus in the model, taxes cause the economy to grow slower. The socially optimal solution would be to maximize the following function with respect to t:

$$(1 - t)(1 - t^2)Y^p + t(1 - t^2)Y^p$$

The optimal t in this case is 0.

In the model the politicians will try to maximize the benefits for their own constituents and will not choose the solution that is optimal for the society as a whole. A winning coalition of politicians requires more than half of the votes. The way to maximize the benefits of politician's own constituents and still be in a winning coalition is to form a coalition with little over half of the total votes. In this case, for the voter of the politician in the winning coalition B = 2tY, and politicians would maximize this equation:

$$(1-t)(1-t^2)Y^p + 2t(1-t^2)Y^p$$

The solution yields a higher t than zero. The growth rate will be lower as it depends negatively on taxes.

It is important to note that the winning coalition is not stable as it could be formed by a different group of politicians. Thus, the model leads to a situation, where taxes are permanently above the optimal level, but the beneficiaries of the public goods change.

The politicians could collude to keep the taxes low, if there are sufficient benefits in the long-term. The situation is similar to a repeated prisoner's dilemma, and colluding is easier the fewer participants there are. If politicians have to vote according to party lines, there will be in a sense fewer participants. Ethnicity might be one way to form stable political parties. If the country is not too ethnically fractionalized, a sufficiently low number of ethnic parties can sustain a collusive agreement with lower taxes. As the number of parties grows, it becomes more difficult to sustain the collusion which will lead to the suboptimal equilibrium described above. In this case ethnic fragmentation leads to lower growth, as it raises the probability that a collusive agreement can't be maintained.

There is a special case with one ethnic party representing the majority of the population. In this case, the dominant ethnic party always chooses to redistribute for itself, leading to suboptimal growth. The bigger share the dominant party has of the population the less distortionary the policy will be, as B approaches the standard case of tY, so in this case as well increasing ethnic homogeneity will lead to higher rates of growth.

In contrast a dictatorship is assumed to be held in power by an ethnic army. The dictator always chooses the public goods to be beneficial for the supporting group. The results are similar to those in the case of ethnic dominance, except that now the ruling ethnic group does not have to represent

the majority making distortions even worse. As the ethnic fractionalization of a society grows the dominant ethnic group is likely to be smaller. The smaller the dominant ethnic group, the worse are the distortion, so ethnic fractionalization has again a negative effect on growth, and as stated above this negative effect is likely to be worse than in multiethnic democracies.

There are several empirical papers, which suggest that there is a negative relationship between provision of public goods and ethnic fractionalization as implied by the first two models. This suggest that at least taken at face value the models of Alesina et al. (1999) and Miguel and Gugerty (2005) are more realistic.

The same Alesina et al. (1999) paper that presents the model on ethnic fractionalization and public goods, also presents empirical evidence about this relationship. The empirical part studies the relationship between public good provision and ethnic fractionalization in US cities and counties.

The results of the study indicate that ethnic fractionalization has negative effect on spending in education, roads and sewage and trash collection. The relationship is robust controlling for several variables, including interestingly the current level of income.

An issue with the Alesina et al. paper is that the ethnic make-up of a community can be endogenous. For example it might be that areas with better provision of public goods will attract people with a certain ethnic make-up that might be different from the population as a whole.

To alleviate concerns about endogeneity, the authors also instrument current ethnic fractionalization on ethnic fractionalization in 1979-1980. Some endogeneity concerns still remain though. The public goods could have already affected the ethnic composition in 1979-1980, and it is not even impossible to think, that the expectations of future public goods could affect this ethnic composition.

The Miguel and Gugerty (2005) paper also has an empirical part. The main analysis is on school funding, which is organized in such a manner, that bulk of the school funding comes from the parents of the school children. The paper tests, whether ethnic fractionalization has an effect on these contributions that the parents give to the school. The finding is that higher ethnic fractionalization is associated with lower funding to the schools.

The Miguel and Gugerty paper argues further that ethnic diversity leads to lower funding of the maintaining of community water wells in Kenya. The paper finds that empirically more diverse communities have water wells that are in poorer shape.

The paper also gives some indicative evidence that social sanctions are the reason for the lower provision of public goods. The paper finds that school committees in more ethnically diverse areas use less sanctions and give less verbal warnings to parents, who do not contribute to school fundraisings.

Banerjee and Somanathan (2007) also present some evidence that ethnic fractionalization leads to a lower level of public goods. In this study the dependent variables were, whether Indian villages had access to several public goods. These public goods included schools, wells, paved roads, electricity, hospitals and other similar public goods. Ethnic heterogeneity in the paper is measured in terms of religion. Different castes within the Hindu caste system, were also considered to be different groups, when constructing the measure of heterogeneity. Other religions were assumed to be homogeneous.

In line with other studies, there seems to be a negative relationship between heterogeneity and the provision of different public goods. The kind of religious fractionalization used in the study is different from ethnic fractionalization, which is based on language or other ethnic characteristics. However, if heterogeneous preferences are driving the lower provision of public goods, it might be that the preferences are heterogeneous among different religions or caste groups in India.

The general problem with the endogeneity of religious fractionalization doesn't affect this study too much. While it is reasonable to assume that between countries religious fractionalization is endogenous, as richer countries have more public goods and more freedom of religion, it is difficult to imagine, how religious fractionalization could be endogenous inside India.

Bandiera and Levy (2011) present a different model on public goods and ethnic fractionalization. In this model ethnic fractionalization does not lead to a lower provision of public goods. Instead it leads to a different provision of public goods. The provision is such that it closer represents the interests of the elites.

The model also ties into ethnic fractionalization's effect on institutions, which I will discuss more in a later chapter. In the model ethnic fractionalization will lead to more power by the elite group, which means that in a sense, ethnic fractionalization will worsen the institutions of a country.

In the model there are three groups with different preferences. One group is the majority poor group, other group is the elites and a third group is an ethnic minority poor group. The poor majority gets utility from a certain public good g. The elite also gets utility from g, but it also gets utility from a different public good s. The poor minority ethnic group gets utility from g and a

different public good e. The marginal utility from each is diminishing for all the groups. The majority poor group is the largest group.

Every group is represented by a party in the political process, and none of the groups can form a majority on its own. The parties can form coalitions. For a coalition to be stable, no party should be better off by splintering in to several parties and breaking the coalition. The elite and the minority ethnic group can form a stable coalition, where there is some of the public good g, some s and some e. If the coalition breaks, the situation will revert to poor majority control with only g provided. This makes the coalition stable and for similar reasons the poor minority can't join any stable coalition, since it would always have incentive to splinter.

Ethnic fractionalization in this setting is equivalent to a bigger share for the poor ethnic minority group. The bigger this group is, the more ethnic fractionalization there is. When this group is sufficiently big, it can form a coalition with the elites, thus leading to more power to the elites and a different allocation of the public goods.

Bandiera and Levy (2011) also empirically test this theory on Indonesian villages. Some of the villages are traditionally more controlled by elites, while others are more democratic. The authors run a regression with one independent variable being, whether the village is elite-controlled. Other independent variable is an interaction term between elite-controlled and the share of the minority population. If the signs for these two independent variables are opposite from each other, this means that the outcomes in ethnically diverse villages are more similar to these villages that are controlled by elites. The authors find that this is indeed the case, making the empirical results aligned with theory.

It is not clear, how the model relates to economic well-being however. It might be that public goods preferred by the poor might be more conducive to development than those preferred by the elites. Then again, the opposite might be true as well.

In the light of all these studies, there seems to be a robust negative link between ethnic fractionalization and the amount of public goods provided. The link is both theoretical and empirical. It remains unclear, whether this is sufficient explanation for the worse economic performance of more ethnically diverse countries, as there are several other factors through which ethnic fractionalization could affect growth even more.

3.3 Exploitation

Exploitation might be relevant factor explaining, why ethnic fractionalization leads to worse economic development. Exploitations is always costly, so if ethnic fractionalization leads to more exploitation, it is plausible that this would take a toll on the economy.

In this section I present two models that are related to exploitation by one ethnic group of other ethnic groups. In both models a certain ethnic group chooses to expropriate some resources for its own use. In this sense, these models are also related to models about ethnic fractionalization and its effects on institutions. As I will discuss further in the empirical section, risk of expropriation of you property is commonly used as a measure of institutional quality.

Caselli and Coleman (2006) present a model of ethnic exploitation. The basic idea of the model is that there are natural resources that one group can capture for themselves, which will increase their utility. This exploitation will be costly and the members of the exploited group can join the dominant group with some cost. This will sometimes prevent the dominant group from exploitation.

In the model there are two groups A and B, which have the population shares of n_a and n_b. There is a resource Z. y_a is individual income that can't be expropriated from a person. In the case, where there is no exploitation, the utility of a person in the group A will be

$$U_a = y_a + \frac{Z}{N}, where\ N = n_a + n_b$$

The model assumes that group A is a dominant group, which can also exploit the other group. In this case they expropriate all of Z to the members of their group. This will impose costs δ, which are proportional to the size of the economy. Members of the group B can also join group A with some cost. In the case of exploitation the share of group A is n'_a which is the original share of group A, and the additional members that join from group B. The utility for a member in group A is in the case of exploitation:

$$U_a = (1-\delta)(y_a + \frac{Z}{n'_a})$$

From these, we can solve the size of n'_a that causes conflict to be equilibrium. The condition is

$$n'_a < \frac{(1-\delta)\frac{Z}{N}}{\delta y_a + \frac{Z}{N}} \equiv \tilde{n}$$

The members of group B can switch to group a facing a cost ϕ. The cost is assumed to be proportional to their income. The members of group B will only switch, when there is exploitation. In the case they don't switch their identity, they receive the utility

$$U_b = (1 - \delta)y_b$$

In the case they switch their identity, they get the utility

$$U_b = (1 - \delta)((1 - \phi)y_b + \frac{Z}{n'_a})$$

We can also solve for the situation, when there will be members of group B switching ethnic identity. In this case:

$$n'_a < \frac{\frac{Z}{N}}{\delta y_b} \equiv \bar{n}$$

If n_a is bigger than $\bar{n}$, there is no switching. There are two scenarios with exploitation: $n_a < \bar{n} < \tilde{n}$, where some members of group B defect to group A and $\bar{n} < n_a < \tilde{n}$, when there is no switching.

A clear implication of the model is that in a sufficiently homogenous society, there is no exploitation as there would be too many people dividing the spoils. As the exploitation is costly, the prediction is that more ethnically fractionalized societies will be poorer.

Another consequence is that if it is not too costly to switch from one group to another, there will be no exploitation. The people in the exploited group would just switch their identity to the exploiting group.

A different model about exploitation is presented by Collier (2000). The model contrasts the public policy choice by either a democracy or a dictatorship. In a dictatorship, it is possible for one group to exploit the other groups. This leads to a situation, where ethnic fractionalization is harmful for a society. In a democracy such exploitation is impossible, which leads to ethnic fractionalization having no effect on the public policy choices.

The model is a two stage model, where the welfare of the median voter is determined by the following equation:

$$NPY = (1-t)Y + B_1 + \frac{(1-t)\big(1+g(t)\big)Y + B_t}{(1+r)}$$

where Y is income in period 1, t is the tax-rate, B is the benefits of public expenditure and g(t) is the growth rate. The growth rate is assumed to be a diminishing function of taxes.

Assuming that public expenditure equals its cost and that the budget is balanced, then

$$B_1 = tY_{mean} \; and \; B_2 = t(1+g(t))Y_{mean}$$

A democracy is assumed as usual to maximize the welfare of a median voter, so the maximized function is the following:

$$NPY = (1-t)Y_{median} + tY_{mean} + \frac{(1-t)\big(1+g(t)\big)Y_{median} + t(1+g(t))Y_{mean}}{(1+r)}$$

As the median income is always less than the mean income, the tax rate is positive and the growth is less than it could be.

According to the model in a democracy, ethnic diversity does not affect growth or the effect is indeterminate. In a democracy the benefits have to be distributed equally to all citizens. The model assumes that people vote for parties along ethnic lines. If income is related to ethnicity, the level of taxes is determined by median voter in the median income ethnic group. If there are a lot of ethnic groups the median voter in the median ethnic group is the same as the median voter in the economy in general. With less ethnic groups the median voter in a certain ethnic group might be richer or poorer than the median voter in the economy, so the effect on taxes in this case is indeterminate.

If ethnicity is unrelated to income, then the median income determines the level of taxation no matter what, since every ethnic party maximizes the welfare for a median income voter. So the result is the same as in the case, where ethnic fractionalization is irrelevant.

In a dictatorship the public policy choices are made in a very different manner. The model assumes that in a dictatorship, the dictator stays in power supported by an army composed of one ethnic group. The dictator doesn't have to share the benefits equally, so the benefits are only given to the ethnic group supporting the dictator. The dictator has to satisfy the median voter of the supporting ethnic group, as otherwise he would risk a coup. The dictator maximizes the following function:

$$NPY = (1-t)Y_{median} + tY_{mean} * \frac{100}{n} + \frac{(1-t)\big(1+g(t)\big)Y_{median} + t\big(1+g(t)\big)Y_{mean} * \frac{100}{n}}{(1+r)}$$

where n is the percentage share of the ethnic group supporting the dictator in the population. Clearly the taxes are higher than in a democracy, if n<100. The smaller the ruling ethnic group, the higher the taxes. Clearly in a more ethnically diverse society, it is likely that the ruling ethnic group will be smaller, leading to worse distortionary taxes.

The dictatorship's ability to raise taxes is also diminished by a chance of revolution by the other ethnic groups. The model claims that the chance of a revolution diminishes the more ethnic groups there are, as the revolution is sort of a public good, with the benefits shared by all ethnic groups, while the costs are incurred by individuals[4]. Higher ethnic diversity therefore diminishes the chances of a revolution, which leads to higher taxes and therefore slower growth.

The theory assumes that ethnic fractionalization has a different effect in democracies and dictatorships. The Collier (2000) paper that presents this model, also gives some empirical evidence of this claiming this to be evidence supporting the theory. This empirical evidence was already presented in the earlier section. However, there are several other reasons, why ethnic fractionalization might affect democracies and dictatorships in a different manner, so it is not clear that the mechanisms of this model are the ones driving this effect.

The model is obviously meant to be unrealistic, so all its empirical implications should not be taken too seriously. The model does imply that under any circumstances, dictatorships have slower growth than democracies. The empirical evidence can't find that autocracy affects growth in either positive or negative manner (see for example Easterly 2011). This model is probably then too unrealistic to be considered as a basis for ethnic fractionalizations negative effect on growth.

In general, it is difficult to find direct empirical evidence for either of these models. The Caselli and Coleman (2006) paper presents some anecdotal evidence supporting the theory. While it is difficult to find empirical evidence, both models especially the Caselli and Coleman model seem plausible, so further investigation on the area seems warranted.

3.4 Civil War

Civil war might be related to ethnic fractionalization as is shown in the following models. It is reasonable to assume that civil wars hinder the development of a country and lead to lower per

[4] This is a feature of the model that is not exactly supported by empirical evidence. The next section presents empirical evidence of civil war and there is no paper that finds that ethnic fractionalization is negatively related to the probability of a revolution.

capita income or at least slower economic growth. It is therefore important to study the link between civil war and ethnic fractionalization as civil wars might be the mechanism, which cause ethnically fractioned societies to be poorer.

Collier and Hoeffler (1998) present a model on civil war, where the likelihood of civil war is based on the incentives faced by the potential rebels. The rebels face the following utility function in the case of war, which determines, whether the potential payoff for civil war exceeds its costs:

$$U_w = \int_{t=D}^{\infty} \frac{p(T) * G(T,P)}{(1+r)^t} dt - \int_{t=0}^{t=D} \frac{f(Y)+C}{(1+r)^t} dt$$

p(T) stands for the probability of the rebels winning. It is a diminishing function of taxable base T, as the bigger the taxable base is the better equipment government can afford to buy to defend itself from the rebels. G(T,P) is for gains for the rebels in the case of victory. The gains are a positive function of the taxable base. The gains also positively depend on the size of the population P. This is based on the fact that higher population might lead to bigger gains in the case of secession. This is because the rebelling group might occupy an area, which is well-endowed with resources and in the case of secession it would not have to redistribute the resources to such a big group.

The costs of the rebellion are determined by f(Y) and C. The costs are an increasing function of income Y, as a rebellion is work intensive. The higher the income the more valuable is your time and the more appealing are alternatives to rebellion. C stands for costs of communication. The rebels need to communicate with each other and this communication needs to be kept secret from the government. This is costly.

In this model ethnic fractionalization is related to the costs of communication. The authors assume that information flows more freely inside an ethnic group. The paper hypothesizes that the costs of communication are lowest, when a country is dominated by two ethnic groups, one of which is the one associated with the government. A more homogenous country makes costs of communication for the rebels more expensive, as it is more difficult to keep communication secret from the government. Communication is also costly in an ethnically highly diverse society as it is costly to communicate between all the different ethnic groups. The paper then predicts an inverse-U shaped relationship between ethnic diversity and civil war.

If this model is to be believed ethnic fractionalization as such doesn't lead to a higher probability of civil war, as the probability of civil war is the highest at the middle-levels of ethnic fractionalization. Thus, even if true, the model cannot explain, why more ethnic fractionalization

has been associated with lower growth in per capita income, except in a subsample of countries that are at the lower end of ethnic fractionalization.

In this model ethnic fractionalization is only related to civil war through costs of communication. It is not completely clear, how institutional context would be relevant in a setting like this. It might be that in a less democratic society, keeping communication secret might be more difficult, making the cost of communication a more relevant issue.

Another model on civil war is presented by Chacón et al. (2006). In the model the sizes of competing political groups determine, whether the groups will try to gain power by winning an election or through violence. If the competing political groups are ethnic in nature, the model yields predictions about how the likelihood of ethnic violence changes, when the relative sizes of the ethnic groups change.

In the model there are two groups, which can choose to compete for power by elections or by waging war. The basic prediction of the model is that the likelihood of violence is largest when the two groups are similar in size. In a situation, when one group is dominant, the group will have a very high chance of winning an election. The smaller group will not want to contest this because they will also have a low probability of winning, when there is fighting. On the other hand, when the groups are of similar size, the group that loses the election still has incentive to start fighting, as it has a high probability of winning the fighting, as the groups are similar in size.

In the simplified context of this model, the likelihood of violence is bigger, when ethnic fractionalization is higher, which in the case of two groups means a situation, where the two groups are of similar size. It is not clear however, how this model generalizes to a situation, when there are more than two groups fighting for power.

Collier and Hoeffler (1998) also present an empirical investigation of their theory of civil war. The authors' dependent variables are the probability of occurrence of a civil war and the duration of the civil war. The data on ethnic fractionalization comes from the Atlas Narodov Mira.

The results for the regression on the duration of the civil war are similar to those predicted by their model. Ethnic fractionalization and ethnic fractionalization squared are significant at explaining the duration of the civil war. As predicted by their model the duration of the civil war seems to be longest at the middle levels of ethnic fractionalization which basically corresponds to the situation with two ethnic groups of equal sizes. The results from the probit-regression on the probability of civil war are similar to those in the regression for the duration. However, now neither ethnic

fractionalization nor ethnic fractionalization squared is a significant explanatory variable. The coefficients are however very similar to those in the regression for the duration of the civil war.

The results are also in line with Chacón et al. (2006) as the likelihood of war is the highest, with two equally sized groups. Obviously, this depends on how the model works in the situation of multiple groups.

Chacón et al. (2006) also presents empirical evidence of its own, although the contesting political groups are not ethnic in their empirical analysis. Instead the two groups are conservatives and liberals in Colombia. The paper finds that in 1946-1950, the probability of violent fighting between the two political groups was highest, when the support in the preceding election was equal for the two groups and less likely, when one group was dominant.

Fearon and Laitlin (2003) also empirically study the link between ethnic fractionalization and civil war. The main finding related to ethnic fractionalization is that, when controlling for income, higher ethnic fractionalization is not associated with civil war.

The paper also classifies some civil wars as ethnic civil wars. In these civil wars, ethnicity is a major dividing line between the different warring factions. Even in this case higher ethnic fractionalization is not related to a higher likelihood of war.

If the results of the Fearon and Laitlin (2003) study are to be taken seriously, the only way ethnic fractionalization might affect the probability of civil war, is through its effect on GDP. The usual problem of endogeneity applies, as income is endogenous with respect to civil war and with respect to ethnic fractionalization. Even expected civil war might affect income, as it might foe example cause human capital to leave the country.

The Fearon and Laitlin (2003) paper however doesn't take into account the fact that the relationship between civil war and ethnic fractionalization might be non-linear. Both theoretical and empirical reasons presented earlier seem to suggest that the most relevant measure might be ethnic fractionalization squared.

Another Collier and Hoeffler (2004) paper presents a model of a civil war from a slightly different perspective. The main driving force in the previous model was the cost of the civil war, which was compared to the benefits of the winning the war. The later paper takes into account the fact that civil wars might be financed during the war, thus making them less costly. Possible mechanisms for this include financing from diasporas, money from hostile governments and natural resources

extorted from the rebel-controlled areas. The paper also considers the possibility that civil war might be motivated by grievances against the rulers, instead of just economic motives by the rebels.

Ethnic fractionalization is again related to the costs of the rebellion. A more diverse rebel group is less socially coherent, so a more diverse army will function worse. This would actually suggest that civil war is less likely in ethnically diverse countries, as the pool to recruit soldiers from becomes smaller for any particular rebel group, as the soldiers need to be recruited from the same ethnic group as the rebels.

If instead the reason for a civil war is grievances instead of economic opportunities ethnic fractionalization might have a positive effect on the likelihood of a civil war. Collier and Hoeffler (2004) state that there might be some psychologically based hatred, if the ruling group is from a different ethnic group than the potential rebels. In this case, more ethnic fractionalization leads to higher probability that the ruling elite is from a different group.

If grievances are actually the reason for civil wars, it is easy to see, why ethnic fractionalization might lead to a higher chance of civil war in a context, where institutions are worse. If one ethnic group dominates the politics of the country, this domination will probably lead to much worse repression of the other ethnic groups under worse institutions, almost by definition. In this case, it would seem likely that ethnic fractionalization affects the likelihood of civil war more, when the institutions are worse.

The Collier and Hoeffler paper that presents this theory also empirically tests for the effect of ethnic fractionalization on civil war. The variable for ethnic fractionalization is significant and has a positive effect on the likelihood of a civil war in some regressions, but it is not significant in most. A measure for social fractionalization, which is a combined measure of ethnic and religious fractionalization, is negative in most regression and usually not significant. All and all the results don't suggest that there is a strong link between ethnic fractionalization and civil war.

A paper by Easterly et al. (2006) tackles a related question of mass killings, where a larger amount of people were killed by the state in a situation not related to a civil war. If mass killings are related to ethnic fractionalization, this would suggest that the relevant mechanism between ethnic fractionalization and civil wars is grievances. It doesn't seem likely that there exists an economically self-interested reason for mass killings.

Ethnic fractionalization and ethnic fractionalization squared are significant at explaining the probability of mass killings, with the highest probability of mass killings occurring at middle levels

of ethnic fractionalization. There is however no relationship between ethnic fractionalization and the intensity of the mass killings only their probability. This suggests that grievances might really be an important part of why ethnic fractionalization might cause civil wars.

The Easterly et al. (2006) paper also raises the possibility of reverse causality between civil war and ethnic fractionalization. If one ethnic group is persecuted in during a civil war, they are more likely to leave the country. Also, if the people killed belong predominantly to one ethnic group, the share of this group diminishes. So in both cases, ethnic fractionalization might actually diminish because of the civil war. Ethnic fractionalization might also diminish before the civil war, if anticipation of the war causes one group to leave the country. All of these mechanisms might bias the results against finding a link between civil war and ethnic fractionalization.

In conclusion, the link between ethnic fractionalization and civil war seems to be weak. The link between the two is not very strong theoretically. Empirical results suggesting this link are ambivalent at best and there are a lot of results suggesting that there is no link at all. It is more likely that civil wars are associated with a squared measure of ethnic fractionalization, but even this is not robustly proven by the empirical investigations discussed in this paper. This leads me to conclude that the link between ethnic fractionalization and poor economic performance is probably not through civil war.

3.5 Social Capital

The usual measure of social capital is trust. It seems likely that lower trust in a society leads to a lower level of per capita income. Trust might for example make people trade less with each other leading to unrealized gains from trade. Lower trust might also lead to a lower level of provision of public goods, make grievances worse, which increases to likelihood of civil war, and affect the public policy choices of the government.

There is empirical evidence that trust leads to lower GDP growth, which suggest that if ethnic fractionalization indeed affects trust it also affects economic well-being. Knack and Keefer (1997) finds that higher trust is associated with higher GDP growth. Trust is measured based on surveys in which people tell, whether they trust other people. High fraction of trusting people is associated with higher GDP growth and this relationship is statistically significant.

The paper also provides some evidence that the relationship is causal. According to the paper higher trust is related to faster subsequent economic growth, so trust seems to be a leading indicator. Changes in trust are also not correlated with changes in GDP.

One paper about social capital in ethnically fractionalized society is Fearon and Laitlin (1996). The paper presents a model on interethnic cooperation, where such cooperation sometimes breaks down. In the model, there are two equilibria in which the different ethnic groups trust each other. There is also a possibility of an equilibrium, in which members of different ethnic groups don't trust each other, which leads to a situation in which the members of the different ethnic groups don't cooperate. Cooperation in this model might, for example, mean trading with each other.

The starting point of the model is a matching game, where two individuals are randomly matched. When people are matched they can either cooperate or defect, in a prisoner's dilemma fashion, where cooperation leads to highest combined pay-offs, but defection is the dominant strategy in interactions that are repeated only once. As usual, repeated interaction with any two people mitigates the problem of defection, as the negative pay-offs from cheating get worse, as you lose benefits from the future interaction.

If contact with any two people is infrequent enough, the lost benefits of cooperating might be too small and cooperation could break down. If a person interacts with a lot of people, it is not necessary to cooperate with any of them, as any particular person become less important. The existence of ethnic groups mitigates this, as information is shared within ethnic groups, which can lead to punishment of cheaters.

This situation might lead to three possible equilibria within an ethnic group. First of all, there might be an equilibrium, where nobody cooperates. Secondly, there might be an equilibrium, where everybody cooperates and once someone defects, everybody moves to the first equilibrium with no cooperation. In the third case, cheaters are punished for a certain period.

In the case of several ethnic groups, the cheater from a different ethnic group can't be punished individually since he cannot be recognized within the ethnic group doesn't belong in. There are now two ways to sustain interethnic cooperation. Either the whole group gets punished by the cheating of one person. This would lead to escalation and breaking down of cooperation between the two ethnic groups. Fear of this escalation leads to cooperation.

The other cooperative equilibrium is where the cheating by a different ethnic group is ignored. In this case the ethnic group of the cheater is expected to punish the cheater for a certain period. This

equilibrium is again enforced by the fear of breakdown of trust between the ethnic groups, in which case there would be unrealized gains from trade.

Both equilibria will break down, if there is too frequent contact between the ethnic groups, as in that case there is no reason to cooperate within your own group, as you can instead transact with the other ethnic group and you own group becomes lot less necessary for you.

The equilibrium with escalation between groups is not robust with noise. If players accidentally sometimes defect the equilibrium will break down. Anticipating the breakdown of the equilibrium makes defection a good strategy during any round. There is no point in cooperating, if there is always going to be a breakdown of trust in any scenario. Even if there is tolerance for some amount of defections, noise will break down the equilibrium, as now it is beneficial to abuse the tolerance for defection and always defect.

Smaller groups can't use the fear of escalation as a deterrent for cheating, so they have a strong incentive to develop within group policing mechanisms. Big ethnic groups don't have much incentive to cooperate in either equilibrium. That would in a sense imply that ethnic fractionalization would cause the most problems at the middle-level of ethnic fractionalization. With a lot of ethnic fractionalization, all groups are small, so they have incentive to develop these group policing mechanisms. With very large ethnic groups there aren't as many opportunities for trust to break down. In countries with several medium-sized ethnic groups there are more possibilities for the trust to break down, which leads to a prediction that there is less trust in more heterogeneous countries up to a certain point.

The institutional context is relevant here as well. It might be that trust is more significant for economic development in countries with worse institutional development. For example it might be that well function courts replace the role that trust plays in societies with no well-functioning courts. This would lead to a prediction that ethnic fractionalization is more harmful in societies with worse institutions, as trust plays a bigger role in those societies.

Another model about ethnic fractionalization and trust is presented by Leeson (2005). In the model, diminishing the ethnic distance between two people, by for example learning each other's language increases trust. This implies that increased ethnic homogeneity is associated with increased trust, although neither might actually be the cause of the other. The model also implies that institutions might increase ethnic heterogeneity and decrease trust. If the model is true and institutions affect ethnic fractionalization, this will present problems later in the thesis, in the empirical section, as it

makes more difficult to determine which channels are causal. Leeson's model is developed especially in context of African ethnic institutions and the effect of colonialism on these institutions.

In the model the amount of trading that occurs is determined by, whether agents can signal their reliability. People, with short-term time-preferences are more are inclined to cheat as the gains of cheating overweight the possibilities of future co-operation for them. People, who discount future less, make more reliable trading partners, so it is important to distinguish the two. Preferably there needs to be a signal which is cheap for co-operators and expensive for cheaters.

Measures that reduce the ethnic distance between trading partners, such as learning each other's language or adopting other's religion, might be a good way to signal your trustworthiness. The benefits of such measures are necessarily long-term as the usefulness of such measures increases with repeated contact.

Certain institutions might break these signals and therefore lead to lesser trade, more ethnic fractionalization and lower GDP. For example, if a colonial administration has a preference toward certain language or religion, adopting the language or religion doesn't signal trustworthiness anymore. It might instead only tell about a person responding to incentives towards adopting a certain language or religion.

One could imagine that in this scenario, there would be new signals that would have been developed to replace to older ones. However, there are two reasons, why this is not the case. First of all, developing these signals might take time and in the intervening period trade is less frequent and subsequently growth slows down. Other reason is that the new signals might be too expensive. There is a reason, why the initial signals were chosen, and this is probably because these signals were the cheapest ones.

The link between ethnic fractionalization and trust has also been studied empirically. The Knack and Keefer (1997) study mentioned earlier also empirically investigates, what are the possible causes for some countries having higher trust than other. The study finds that countries that are more ethnically homogenous are more trusting.

Alesina and La Ferrara (2002) empirically study the determinants of trust in different cities and counties in the US. The study is based on surveys documenting individual attitudes on whether people trust each other. The surveys also include variety of other information regarding

characteristics of the respondents, including ethnic group, making it possible to study, whether ethnic fractionalization is related to trust.

The paper constructs an index of the racial heterogeneity in different areas and includes this as one of the possible explanatory variables explaining trust. The result is that racial heterogeneity reduces trust. Obviously there is a lot of mobility between different areas in the US. It might be that through some mechanism the more trusting people move out of the racially heterogeneous areas or that, somehow, less trusting areas attract a more diverse populations. While this is possible, it is difficult to imagine mechanisms on how something like this could happen.

Glaeser et al. (1999) experimentally study the determinants of trust. The experiment was performed on Harvard undergraduates. In the experiment the first player could give an amount between 0 and 15 dollars to the second player. The experimenter then added a matching amount of to the sum, which was then given to second player, who thus got two times the first players contribution. The second player could then return as much money as he wanted to the first player. In some versions of the game the second player could also promise to return at least as much money, as the first player had originally contributed.

The amount of money the first player decides to give is used to measure trust. The amount the second player decides to send is a measure of trustworthiness. As expected, if the players belonged to a different ethnic group, the first player was less trusting. However the effect is not quite statistically significant. The fact that players belonged to different ethnic groups was however statistically significantly and negatively related to the trustworthiness of the second player. The study thus gives some evidence, that ethnic fractionalization at least might have a negative effect on trust in a society or the very least a negative effect on some sort of social capital.

The authors also administered surveys, similar to those in Knack and Keefer (1997) and Alesina and La Ferrara (2002). The people who were more trusting in surveys were not more trusting in the experiments. This raises questions about relevance of studies based on these kinds of surveys. The answers to the surveys did however predict the trustworthiness of the people, so that the people claiming to be more trusting were actually more trustworthy. If these answers to survey questions do indeed measure trustworthiness, the Knack and Keefer (1997) results about economic growth might indicate that trustworthiness is related to economic growth. After all, the survey question did have a relationship with economic growth and trustworthiness, but not so much trust.

While there are valid theoretical reasons to assume that ethnic fractionalization has a negative effect on trust and while there is also some empirical indication of this, there is still reasonable doubt, whether this is in fact a robust relationship. It is not clear that surveys are a good measure of trust and it also seems that experimental evidence can't confirm that people trust other people who belong to a different ethnic group less. The evidence also seems to indicate that ethnic fractionalization is more important for trustworthiness, which might also be an important facet of social capital that affects growth.

Another commonly used indicator for social capital, besides trust, is participation in various social groups in the community, such as church groups or professional associations. There is also some empirical and theoretical evidence that ethnic fractionalization affects group participation in a negative manner.

Alesina and La Ferrara (2000) present a model of how racial heterogeneity affects participation in clubs. In the model there are two different racial groups, which gain utility from joining a club. The utility from joining a club is lower the more there are people from the other group and the further the individual distance from the club is. People are also heterogeneous with respect to their aversion to having people from the other group join the club.

In the case that there is only one club in the society, there are two equilibria. In one equilibrium only one group participates in the club and in other equilibrium the club is a mixed club. In the case that there is a mixed group, the fraction of the minority in the club is lower than the fraction of the minority group in the society. Individuals in the minority that are only slightly averse to diversity don't want to join the group, as there are so many members of the other group. On the other hand, even individuals from the majority group that are very averse to heterogeneity feel comfortable joining the group, as there aren't that many members of the minority group. This leads to the situation, where the minority group is underrepresented.

When there are two racial groups heterogeneity is largest, when the shares of the groups are equal. If we move towards more heterogeneity participation in the club diminishes. If the club is not mixed, the lower the share of the majority group, the less there are people to participate in the homogeneous group. If the group is mixed, lowering the share of majority group leads to bigger decrease in individuals from the majority group, who don't participate than the increase from the minority group, who now will participate. This is based on the fact that the majority group will always be overrepresented in the club.

The implications of the model are basically similar, if there are more groups. In the case of mixed groups, all the groups will be of similar size and the same logic that applies to one group applies to all of these groups.

The Alesina and La Ferrara (2000) paper also has an empirical part, that studies group participation in different US cities. The basic finding is in line with the model and it is found that probability of individuals joining some community group is lower in cities with more heterogeneity. The probability is lower for groups, where there is lots of interaction between the participants such as a church group than for groups for which there is not, such as professional associations. This suggests that the participation is driven by dislike for heterogeneity as assumed by the model.

A problem with the study is that heterogeneity is correlated with other variables, such as income inequality. The paper notes that running a regression with two measures of heterogeneity (racial fractionalization and ethnic fractionalization, which is based on the country of origin) and Gini-index, only the Gini-index is statistically significant. Therefore it is reasonable to assume that ethnic heterogeneity doesn't affect group participation while income inequality does.

Overall there are reasons to suspect that ethnic fractionalization is related to social capital at least in some ways. Depending on, how important social capital actually is for the society this might be a major reason, why ethnic fractionalization is related to worse economic performance in some societies.

3.6 Institutions

There exists both theoretical and empirical evidence suggesting the fact that ethnic fractionalization also has an effect on the institutions. This presents problems on the study of how institutional context affects the economic consequences of ethnic fractionalization. It is already likely that institutions affect economic development and that economic development affects institutions. Now also ethnic fractionalization affects institutions and ethnic fractionalization affects economic development differently with different institutions. Because of all of these linkages, it raises questions about, whether it is possible to find causal effects in relation to these three variables. I will discuss this further in my empirical section and in this section just demonstrate the theoretical and empirical links that link ethnic fractionalization to institutional quality.

Aghion et al. (2004) present a model of endogenous political institutions. The model is concerned, with the choice of how insulated the political leader is, which is measured in terms of, how big a majority the political leader needs to implement reform. The reform will benefit some part of the electorate and there is also a chance, that the elected leader will expropriate property from the electorate.

When choosing the size of the majority needed to pass reforms, the electorate has a trade-off between two things: if the required majority is large, even beneficial reforms will not be implemented, as even a small amount of people, who would lose from the changes would be able to block the reform. On the other hand, if the majority required is large, then the leader that wants to expropriate property can be more easily blocked. Clearly this leads to a function for the required majority that is increasing in the probability of bad leaders and the amount of property in the society than can be expropriated. It is a decreasing function of the usual benefits from the reform.

The political system develops differently, if the political process is initially controlled by some elite that is distinct from other people. When choosing institutional constraints the elite will choose differently than the population in general. If this elite will think they won't control the political process in the future, it makes sense for them to make the political leaders more insulated meaning that their decisions are less easily blocked by other branches of the government. The elite will be people, who benefit more from the reforms[5]. As explained in the previous paragraph the required majority is a decreasing function of the benefits from reform, so if the choice of majority is made by those, who benefit from the reform, they will impose lower required majority by the leader to make her decisions.

The way this ties into ethnic fractionalization is that it can be assumed and the authors do assume that with a more ethnically fractionalized society, it is more likely that there will be a politically dominant group that is different from everybody else.

Aghion et al. (2004) also present empirical evidence that higher ethnic fractionalization is associated with more insulated political leaders meaning political leaders. The paper employs, as a dependent variable, several measures of insulation: whether country is democratic or not, as dictatorship are more insulated, whether country has a presidential or a parliamentary system, where presidential system is assumed to be more insulated, and whether the system is more winner-take-

[5] In the paper the elite group is the group most benefiting from changes by definition. It makes sense that those, who control the political process will benefit more from changes

all, which again is assumed to be a more insulated system. The finding is that with every measure of insulation, higher ethnic fractionalization is associated with more insulation.

Shleifer and Vishny (1993) present an industrial organization type of model about corruption. They link corruption to ethnic fractionalization and show that bribes might be lower in an ethnically more homogenous society.

According to the model collusive corrupt bureaucrats demand less bribes than bureaucrats acting on their own, if different permits that the bureaucrats sell are complements. The basic intuition is simple, as the collusive bureaucrats take in to consideration the effects of the demand for other permits, when considering the price for the permits and charge less to make the complementary permits more attractive.

As lower bribes in general are better for the economy, the countries with collusive public workers tend to perform better than countries with public workers acting on their own. The authors speculate that ethnic homogeneity might make the public officials more collusive. The logic is that it easier to supervise different public workers that might deviate from the collusive agreement, as information flows more freely through family and kin connections, which are precipitated by ethnic homogeneity.

An empirical paper on ethnic fractionalization and corruption Mauro (1995) finds an empirical link between ethnic fractionalization and corruption. As usual, it not clear that the link is causal, as corruption is highly correlated with other measures of institutions, as different kinds of bad institutions go hand in hand. It might be that ethnic fractionalization worsens institutional quality in general. Also corruption might be higher in ethnically diverse societies just due to the reason that they are poorer.

Mauro (1995) studies the link between ethnic fractionalization and a more comprehensive measure of institutional quality. The paper constructs an index for bureaucratic efficiency by averaging measures of red tape, corruption and a measure for the integrity of the judiciary system. There is a negative relationship with bureaucratic efficiency and ethnic fractionalization.

La Porta et al. (1999) studies a wide range of measures for the quality of government. The paper empirically measures, whether ethnic fractionalization is connected to these variables. According to the study higher ethnic fragmentation is linked to lower protection for property rights, more bureaucratic delays, less tax compliance, higher infant mortality, worse quality of infrastructure and lower school attainment and again more corruption. The countries with more ethnic

fractionalization also have more state enterprises and less political freedom. Interestingly the countries with higher ethnic fractionalization have less transfers of income, lower public consumption and less public employment.

In the study the effect of ethnic fractionalization on institutions is not significant, when controlling for income. This makes it very questionable, whether the link between bad institutions and ethnic fractionalization is causal. A plausible explanation is that ethnic fractionalization causes countries to be poorer and this in turn negatively affects institutions. This is an especially plausible interpretation in the light of the fact that La Porta et al. (1999) do not provide any strong theoretical link between ethnic fractionalization and these particular measures of quality of government.

Another paper studying the determinants of quality of government is Alesina and Zhuravskaya (2011), which empirically studies the link between ethnic segregation and the quality of government. The paper constructs an index of ethnic segregation, where the index takes the value of 1, if every ethnic group lives in a completely homogenous area with no other ethnic groups. The index takes the value of 0, if the ethnic composition of each area is the same as the ethnic composition of the country as a whole.

The paper uses World Bank's The Worldwide Governance Indicators as a measure of the quality of the government. The paper finds that ethnic segregation has a negative link with every aspect of the quality of the government. Ethnic segregation also has a negative effect on trust and positive affect on the probability of ethnic parties.

Interestingly, when using only the subsample of democracies the link between ethnic segregation and quality of government is stronger. This seems to suggest that somehow ethnic segregation is more harmful in democracies.

When trust is controlled for in a regression explaining the quality of government, the coefficient for ethnic segregation goes down. This suggests that the mechanism causing ethnic segregation to lower the quality of government might be trust.

The paper also instruments for ethnic segregation by using the existence of the same ethnic group in a neighboring country as an instrument for the location of ethnic groups inside the country. The idea is that, if an ethnic group exists at the neighboring country, the same ethnic group is likely reside at the border of these two countries. The results are robust for using instrumental variables, which gives credence to the interpretation that the relationship is causal. It is still quite possible that ethnic segregation affects institutions through GDP per capita or some other variable.

Similarly to Alesina et al. (2012), the Alesina and Zhuravskaya (2011) paper tells that just focusing on ethnic fractionalization does not tell the whole story about ethnicity's effect on different countries. It should be kept in mind that there is more to the story.

While there are some theoretical reasons to think that ethnic fractionalization has a detrimental effect on institutions, the empirical evidence is not clear-cut. The evidence suffers for the problem that is very common for empirical investigations like the ones presented in this section. Bad things in an economy tend to be highly correlated, so it not clear, which are the causal mechanisms through which the effects of ethnic fractionalization go through.

3.7 Conclusion

As seen in this section, there are several possible ways, in which institutions are relevant for the effects of ethnic fractionalization to a society. Table 3 summarizes the ways in which institutional context can exacerbate the negative effects of ethnic fractionalization.

It is clear that, there are different kinds of institutional contexts that might be relevant. In some cases, it is relevant, whether the citizens of a country can freely vote, in others it is relevant, whether the property rights are secure. It might even be relevant, how well developed the insurance and other market like this are.

The general tendency is that more "modern" institutional contexts lessen the negative effects of ethnic fractionalization. The more free people are, the more secure their property rights and the more developed the markets are, less harmful ethnic fractionalization is.

Because it is not clear, what are the relevant institutions, I will use several different measures for institutional quality in my empirical section that follows.

Mechanism	**Relevance**	**Explanation**

Different institutions take the preferences of the voters into account to a different extent	Public goods	Ethnic fractionalization might affect the amount of public goods demanded by the median voter. In less democratic context, the opinion of the median voter is less relevant.
Social sanctions might be less effecive in modern institutional contexts.	Public goods	Social sanctions are more effective, when people rely on, for example, traditional forms of insurance. With some institutions ethnic fractionalization can't affect as much through social sanctions.
Taxation can be used to redistribute income to one ethnic group in a dictatorship.	Exploitation/Public goods	In a more dictatorial context, taxation yields larger benefits, as the benefits can be distributed among a small group. In a more democratic context, the income from taxation has to be distributed among a larger group.
Dictator might be held in power by an ethnic army.	Exploitation	A dictator might be held in power by an ethnic army. Therefore in a dictatorial context, ethnic fractionalization is more harmful as the benefits will be distributed to a smaller group.
In less democratic contexts, cost of communication is more relevant.	Civil War	Communication among rebels is costly at very low or very high levels of ethnic fractionalization making middle level of ethnic fractionalization most likely setting for civil war. Under less democratic settings the cost of communication might be more relevant.
Grievances are worse under dictatorships.	Civil War	Civil war might be more likely, if one groups feels they are treated badly. If the beneficiaries and victoms of a dictator are from a different ethnic group the grievances migh get worse.
Certain institutions make trust less necessary	Social capital	Some institutions, such as well functioning judicial system make trust less necessary as contracts can be better enforced.

Table 3: Summary of ways in which institutional context affects the effects of ethnic fractionalization.

4. Empirical Investigation

4.1 Introduction

The main objective of the empirical part of this thesis is to test, whether good institutions really diminish the negative effects of ethnic fractionalization on long-term economic well-being. There are several ways in which I will investigate this hypothesis.

The basic strategy is to run a regression with institutions, ethnic fractionalization and an interaction term between the two as explanatory variables. I will use several dependent variables, which measure economic outcomes. I will elaborate on this in the data section.

My empirical strategy is threefold. First I will run regressions similar to those of Easterly (2001) and Collier (2000) using a different sample of countries and a different dependent variable, as my interest is in the long-term economic development. Instead of growth, I use the level of GDP per capita. However to compare my results to these studies, I also run a regression with GDP growth as the dependent variable.

My sample consists of countries previously colonized by Europeans. The reason for this is that, I can later instrument for institutions and also, there is some reason to suspect that some institutions are more exogenous in these countries, as they are likely to reflect colonially transplanted institutions. If the results of Easterly (2001) and Collier (2000) are indeed robust, they should hold in a different sample of countries and possibly also for the level of GDP per capita.

A problem with previous studies of this type was the endogeneity of institutions. While institutions might affect current economic outcomes, current economic outcomes might affect institutions as well. There are two basic strategies, which I will try to take this into account.

My first way of doing this, is by using measures of institutions that are less subject to change. Following La Porta et al. (2003) I consider the relevant institutions be measures of judicial independence and judicial review of constitution. According to La Porta et al. (2003) these measures change much more slowly and are thus less dependent on current income. Again according to La Porta et al. (2003), there is evidence that these measures reflect colonially transplanted institutions, so it is probable that in my subsample of former colonies these measures

of institutions are not endogenous. I will discuss these institutional measures in more detail in a later section.

I will also try to reduce the problem of endogeneity by using an instrument for the quality of institutions. Following Acemoglu, Johnson and Robinson (2001), I use the settler mortality on former colonial countries as an instrument for the quality of institutions.

The basic idea for this instrument is that settler mortality affected, how many Europeans moved to a colony. In colonies with a lot of Europeans, the colonial powers set up institutions that were similar to those in Europe. In colonies with few Europeans the main purpose of the institutions was the extraction resources from these countries and for that reason, the colonial powers established worse institutions with, for example, weaker protection of property rights. Acemoglu, Johson and Robinson also find that there is a correlation between current and past institutional quality. The institutions seem to be highly persistent, with former colonies inheriting the colonial institutions. This is a reason, why settler mortality affects current institutions.

4.2 The Data

4.2.1 Dependent Variables

As the main dependent variable I use World Bank I use are logarithm of GDP per capita in 2010. I will also study changes in GDP per capita from 1996 to 2005. The data for both of these comes from the World Bank. Current GDP per capita is a comprehensive measure for the current economic well-being of the country. Using level of GDP per capita also makes my study more comparable with Acemoglu, Johnson and Robinson (2001), which is the basis for my study. Using also changes as the dependent variable makes my study more comparable to previous studies of ethnic fractionalization and growth, as most of these studies were concerned with changes in GDP per capita.

To check for robustness another dependent variable that I use, is logarithm of infant mortality in 2010 following the lead of Ahlerup (2009). The measure of infant mortality is infant deaths per 1000 live births. This data comes from World Development Indicators dataset, collected by the World Bank. The motivation to use infant mortality as a robustness check is that measures of infant mortality are highly negatively correlated with GDP per capita. GDP per capita might not be precisely measured, especially in the former colonies that comprise the dataset. It is possible that

infant mortality is more precisely measured than GDP. If the results are similar, when using GDP and infant mortality as the dependent variables, I can have more confidence in my results. I will also use changes in infant mortality as a dependent variable to compare them to results I get using changes in GDP as the dependent variable.

4.2.2 Data on Ethnic Fractionalization

For data on ethnic fractionalization I use the measures constructed by Alesina et al. (2003). There are three measures of fractionalization constructed Alesina et al. (2003), one for comprehensive ethnic fractionalization, one for linguistic fractionalization and one for religious fractionalization. The comprehensive ethnic fractionalization takes into account, besides linguistic differences, also other perceived differences in ethnicity. These perceived differences vary from country to country, but one example is, how people are assigned to an ethnic group based on skin color in the United States.

I will use the more comprehensive measure of ethnic fractionalization, as most of the models presented earlier are more driven by the effects of perceived ethnic differences, such as heterogeneous preferences or reduced social capital, rather than linguistic effects.

The Alesina et al. (2003) could be criticized on the grounds that division between different ethnic groups is not clear-cut. As Fearon (2003) notes, it is not clear which ethnic division is salient in the society, as this is based on the perception of people living in that society. A good example of this could be Latinos in the United States. Should Latinos form an ethnic group or are the relevant ethnic groups based on the country of origin, in which case Mexicans and Puerto Ricans would form their own ethnic groups.

Fearon (2003) takes this into account, when constructing another index of ethnic diversity. This is not only based on the size and amount of ethnic groups, but also on the distance between two ethnic groups. This distance is based on linguistic differences between the languages spoken by different ethnic groups. As an example imagine two countries which have two ethnic groups comprising half of the population, but in the first country the two groups speak very distinct languages. Using the Alesina et al. (2003) measure, the two countries would have the same amount of ethnic fractionalization, but using The Fearon (2003) measure of ethnic fractionalization the first country would be more diverse.

The Fearon (2003) index has problems of its own. The amount of ethnic groups, however imprecisely measured, might be more relevant for economic growth than a measure that takes the

distances into account. The Fearon (2003) measure is only based on ethnic groups that are separated by different languages and it might therefore omit some relevant information on the ethnic divisions in the society. Using United States again as an example, the Fearon measure of ethnic fractionalization would give a low measure for the country, even though United States is generally considered quite a heterogeneous country in terms of ethnic fractionalization.

I will use the Fearon measure of ethnic fractionalization as an alternative measure to check for the robustness of the results. While neither measure of ethnic fractionalization that I use is perfect, if the results using both of these measures are similar, I feel I can be confident in my results.

4.2.3 Data on Institutions

A general problem with measuring the quality of institutions is that different measures of institutional quality are highly correlated. While the risk of expropriation is clearly different from perceived corruption, the two measures have correlation coefficient of 0.69. Such a high correlation makes it likely, that it is impossible to separate the effect of these two variables on any dependent variable of interest.

Another problem is that any measure of institutions is always quite imprecise. The main measure that I use, risk of expropriation, is based on subjective evaluation on this risk. A subjective measure like this will contain some errors.

I will mainly use two measures of institutional quality in the following empirical work. The first one is a measure for the risk of expropriation that comes from International Country Risk Guide. The risk is based on subjective assessment of risk for international investors on the risk of government expropriation of their property.

The motivation for using this index is twofold. First of all, there are theoretical reasons to suspect that ethnic fractionalization might affect GDP differently in different contexts, where property rights are more or less protected. For example, property rights might make trust a less important feature in a society, which makes the negative effect of ethnic fractionalization on trust less meaningful. The second reason for using this index is that it is, as explained previously, highly correlated with different measures of institutional quality. For that reason, it can be thought of as a measure of institutional quality in general.

Glaeser et al. (2004) criticize using this risk of expropriation measure as a measurement of institutional quality based on several reasons. The first criticism is that this measurement doesn’t

really reflect institutions. Instead these measures could reflect policy choices that can be chosen in different institutional contexts. Glaeser et al. state that institutions should reflect constraints on the government and these constraints should be fairly durable. For example the authors note that an unconstrained dictator could choose to respect private property as a matter of policy.

Glaeser et al. substantiate these criticisms by noting that the risk of expropriation measure is quite volatile and therefore can't reflect deep institutional arrangements in a country. Institutions almost by definition should be something that change slowly. The paper also notes that this measure of institutions rises with per capita income which suggests that there might be some reverse causality between the two.

Risk of expropriation is also only weakly correlated with less volatile constitutional measures of institutions, such as measures of judicial independence and judicial review of constitutions. If you assume that these constitutional measures reflect deeper rules, by which the rulers has to abide by, then this lack of correlation can imply that risk of expropriation indeed only reflects the policy choices of the rulers, not institutions.

While risk of expropriation is a measure that is clearly imperfect, there are still reasons to use the measure. The fact that many measures of institutional quality are highly correlated with each other makes it more likely that the differences are not due to just policy choices, but that they reflect more permanent aspects of the society.

Another measure that I use in the empirical part is Gastil's measure of political rights, which can be thought of as a measure on democracy. The measure is based on, whether the citizens living in a country have certain political rights, such as a right to vote in an election. A lot of the models in the previous section were such, where ethnic fractionalization would have a different effect in more and less democratic countries. I find it then reasonable to study, whether democracy has a different effect compared to risk of expropriation.

Interestingly the two main variables that I use to measure institutional quality, the risk of expropriation and the measure for democracy are not that highly correlated. The correlation coefficient between the two variables is only 0.35.

4.2.4 Settler mortality as an instrument

The data for settler mortality comes from the working paper version of Acemoglu, Johnson and Robinson (2000) paper that establishes the link between settler mortality and the quality of institutions.

There is a lot of discussion on the validity of settler mortality as an instrument for institutions. Two main criticisms come from Albouy (2012) and Glaeser et al. (2004). I will present both of these criticisms in turn.

Albouy (2012) mainly criticizes the data used in Acemogly, Johnson and Robinson (2001). The data on mortality is mostly based on the mortality of the soldiers. Albouy (2012) criticizes that the mortality estimates come from military campaigns in some countries and from soldiers stationed in barracks in others. The paper also claims that the mortality rates are implausibly high in some cases, where the data only comes from a single campaign that experienced unusually high mortality based on an outbreak of disease.

The mortality data in Latin America comes from the mortality rates for bishops. Obviously the mortality rates are different for bishops and soldiers living in the same country, as bishops generally live under more sanitized conditions. The original Acemoglu, Johnson and Robinson paper fixes this by benchmarking the bishop on data based on countries, where there exists data for both soldiers and bishops.

Some of the mortality data comes from African laborers brought from another country. Albouy (2012) states that mortality rates from these laborers also can't be compared to those of soldiers.

Albouy (2012) also states that the mortality rates are incorrectly extrapolated to neighboring countries. The paper also claims that it is not transparent, how the extrapolation about settler mortality is made from one country to another. Therefore he claims that it is very difficult to evaluate, whether this extrapolation makes sense or not.

Albouy (2012) proposes to fix these problems by removing the extrapolated data and adding dummies for situations, where the data comes from campaigning soldiers, Latin American bishops or African laborers. The result from these changes is that the original results from Acemoglu, Johnson and Robinson are no longer significant.

The claims are countered in Acemoglu, Johnson and Robinson (2012). The paper states that the extrapolation to neighboring countries is based on historical evidence and it is legitimate. They also

share some methods for doing this interpolation. To counter the claim that mortality rates are implausible high in some countries, they cap the mortality rates at various levels. When this is done, the results are robust to all the other criticisms raised by Albouy (2012). Acemoglu, Johnson and Robinson (2012) also claim that Albouy's campaign dummy is inconsistently applied, and if applied more consistently, the results are robust.

Acemoglu, Johnson and Robinson (2012) also notes that Albouy needs to discard more than 60% of the data to get non-results even without capping the mortality estimates. The paper also notes that even then, the non-result is driven by one outlier Gambia, and if Gambia is removed the results are again significant. The authors claim that Gambia is an anomaly, with its post-1995 political performance implying much worse institutions than its 1995 score on institutional quality would imply.

While the counter-claims made by Acemoglu, Johnson and Robinson (2012) are reasonable, the criticism still shows some potential problems with the underlying data. If nothing else, it shows that it is difficult to have reliable data on the potential settler mortality during the colonial times. It is advisable then, to be cautious about the results based on this data.

Glaeser et al. (2004) also criticize the instruments used in the Acemoglu, Johnson and Robinson paper. As explained earlier Glaeser et al. (2004) note that constitutional measures of institutions are not highly correlated with the measures of institutions used in the Acemoglu, Johnson and Robinson paper. The paper notes that settler mortality is uncorrelated with these constitutional measures of institutions. This raises doubts, whether settler mortality really was a major determinant of institutions. Obviously, there are also problems using the constitutional measures to measure the institutional quality. I will discuss these problems in a later section.

Glaeser et al. also note that settler mortality could potentially affect current GDP through other means than institutions thus making the instrument invalid. The settlers that moved to the colonies brought with them other things than institutions, such as human capital or diseases. Acemoglu, Johnson and Robinson (2001) note that it is necessary to control for country characteristics that are related to both settler mortality and current income, but the human capital or disease issues mentioned by Glaeser et al. are not among the control variables.

The Glaser et al. paper notes that settler mortality is also highly correlated with schooling in 1960 and 2000, which might give some indication that the major channel by which settler mortality affects GDP is through human capital. When instrumenting for both schooling and institutions and

using the predicted values of both in a regression, schooling is significant and institutions are not. This suggests that settler mortality might not a valid instrument for institutions as there are other ways by which it could affect current income. Then again, schooling is not a perfect measure of human capital and institutions of the country as well as its GDP clearly affect the amount of schooling.

The criticisms of Glaeser et al. are quite severe and it is not completely clear, whether settler mortality really is a good instrument for institutions or not. Nonetheless, it is an instrument widely used in the literature and using the instrument for my empirical part can at least give some indication, whether institutions actually affect the effects of ethnic fractionalization in a robust manner.

4.2.5 Data on Constitutional Institutions

The data on constitutional measures of institutions comes from La Porta et al. (2004). The two measures are judicial independence and judicial review of constitution. The first variable takes a higher value, when constitutional rules allow the executive to have less say in the judicial process. The latter variable takes higher value, when the judiciary has more power to overturn laws that it deems unconstitutional.

Both of these measures can be thought of as constraints on the executive. As such, they are conceptually related to my main issues of interest democracy and property rights, although the correlation between other measures of property rights and democracy are not highly correlated with these variables. Because the constitutional variables can be thought of as deeper measures of these things that are less subject to change, it makes sense to use them as an alternative measure to test for the robustness of my empirical analysis.

These measures are intended to measure constitutional rules. It might well be that these constitutional rules are not followed. The measures are intended to measure constraints on the rulers. However, the fact that the measures are not highly correlated to, for example, the risk of expropriation makes it questionable, whether these measures are meaningful at all. If the executive can still choose to expropriate property, how is the executive constrained at all.

If this data is indeed meaningless, it is probable that there are no statistically significant relationships to GDP per capita or infant mortality, whether alone or in the interaction term with ethnic fractionalization. If the constitutional rules are just rules that are not followed, they shouldn’t affect the economic welfare of the country too much.

4.2.6 Control Variables

I use similar control variables as those used in the Acemoglu, Johnson and Robinson (2001) paper, which first instrumented institutions on settler mortality. The justification for this is that the main empirical part of the thesis, where I instrument for institutions is somewhat similar to the empirical analysis of that paper. The controls are also among the most common ones used in the literature on the topic.

First of all, I will control for latitude. Latitude is correlated with ethnic fractionalization and it also might affect economic development due to climate and other such considerations, such as disease environment. My measure of latitude comes from La Porta et al. (1999)

There will be controls for natural resources of the country. Natural resources might affect the GDP of the country through various means. There might be income from these resources and on the other hand Dutch disease might have a negative effect on the country. There is also some evidence (Sachs and Warner 1995) that natural resources affect the institutions of a country, so controlling for them is important. The measures of natural resources come from Parker (1997) and they include the amount of zinc, iron, gold and oil in a country and also a measure of how many minerals are found on the country.

For similar reasons, I will also control for soil quality. Soil quality might directly affect GDP by for example making agriculture more lucrative. Soil quality might also be correlated with institutions, if we assume that institutions might be different in a predominantly agrarian country. The measures of soil quality come from (Parker 1997).

In the instrumental variable regressions I will employ several more controls. There are reasons to expect that settler mortality is correlated with these measures and as such, not controlling for them, might give the impression that the relevant effect is through institution and not through some other variable that is correlated with settler mortality.

Current malaria environment is correlated with settler mortality, as malaria was a big killer for settlers in the colonial times and past malaria environment is correlated to current malaria environment. I will control for current malaria prevalence, using a measure of how much of the country resides in an area, where malaria is a risk. The measure comes from Gallup and Sachs (1998). The problem with using the current malaria environment as a control variable is that it is probably not exogenous with respect to GDP. Richer countries have been able to eradicate malaria.

I will also control for amount of population currently living in the country that is of European descent. This is clearly related to the amount of settlers that moved to a country. It might also affect current income if, for example, it facilitates trade with European countries. The measure is constructed by Acemoglu, Johnson and Robinson (2001).

I will take the criticism of Glaeser et al. (2004) into account by controlling for current schooling in different countries. The measure I use is the logarithm of average years of schooling by a resident in the country. The measure comes from Barro and Lee (2000). Obviously the point of Glaeser et al. (2004) was that, settler mortality could affect current development through various channels, and human capital proxied by the years of schooling is just one of the channels. Controlling for schooling still might make the results a little bit more reliable.

4.2.7 Missing Data

The fact that my data consists of only former colonies limits the sample size quite a bit. There are only 65 countries, which have the data available for institutions, settler mortality and current GDP. There is also some missing data on the control variables, so adding further controls diminishes the sample size even further. This increases the standard errors, which makes finding any statistically significant effect more difficult.

4.3 Analysis

4.3.1 Baseline results

Dependent variable is logarithm of GDP/capita in 2010

Ethnic fractionalization	-1.54***	1.83	1.99	3.00	3.73	6.06***
	(0.48)	(2.05)	(2.07)	(2.17)	(2.33)	(2.01)
Institutions	0.61***	0.89***	0.87***	0.97***	0.97***	1.00***
	(0.08)	(0.189)	(0.19)	(0.21)	(0.21)	(0.18)
EF*Institutions		-.054*	-0.54*	-0.79**	-0.85**	-0.95***
		(0.32)	(0.32)	(0.34)	(0.36)	(0.30)
Latitude			0.66	-0.23	0.06	0.20
			(1.08)	(1.26)	(1.36)	(1.13)
P-value for natural resources				0.14	0.22	0.24
P-value for soil quality					0.76	0.56
P-value for regional dummies						0.00
Adjusted R^2	0.54	0.56	0.58	0.58	0.56	0.70
N	65	65	65	65	65	65

Table 4: Regression results for risk of expropriation.

In this section, I will study the interaction between ethnic fractionalization and institutional quality without instrumenting for institutions. The institutions might be endogenous, which is a problem that I will take into account in the later sections.

I will first use risk of expropriation as the measure for the quality of institutions. As expected ethnic fractionalization has a negative effect on the current income. Better institutions have a positive effect, which is not too surprising either.

Next I add an interaction between institutions and ethnic fractionalization. Surprisingly now the sign for ethnic fractionalization is positive and the sign for the interaction term is negative, which suggest that ethnic fractionalization is actually worse for GDP per capita in countries with good institutions. The coefficient for ethnic fractionalization is not significant anymore, but the coefficient for the interaction term is significant at the 10%-level.

The results seem to suggest that the effect of institutions seems to be different in previously colonialized countries, when compared to a sample of all countries in general. Naive reading of the results would suggest that ethnic fractionalization only has a negative effect on income, when it is combined with good institutions. While this result is very counterintuitive, there is some theoretical justification for this, as explained earlier in the thesis.

The results are similar, when controlling for latitude. The coefficient for the interaction term is still barely significant at the 10% -level. Controlling for natural resources changes the results a bit. Now the coefficient interaction term for institutions and ethnic diversity is much larger and significant at the 5% -level. Adding controls for soil quality further increases the coefficient for the interaction term.

Adding dummies for Latin America and Sub-Saharan Africa also changes the results in an interesting way. The coefficient for the interaction term is still higher. The result is also significant at the 1% -level. The coefficient for ethnic fractionalization is also significant at the 1% -level and the coefficient is positive, as it was in the previous regressions.

When the measure of ethnic fractionalization is replaced by Fearon's (2003) measure of cultural distance the results remain basically the same. (For a table of results see appendix A) The interaction term is still negative, although now it is significant at the 5% -level, even without including any controls. This measure is correlated with the basic measure of ethnic fractionalization, so this is not highly surprising. The results with using this measure of ethnic

diversity are also robust to adding a wide range of control variables and the coefficient is significant in all the regressions ran.

I also see, whether the results are different, if the dependent variable is infant mortality instead of GDP per capita. (Again see appendix A) There is a strong negative correlation between infant mortality and income, so the results should be similar to the results presented previously.

The results are indeed similar. The interaction term is now positive and statistically significant. So again the naive reading of the results suggests that ethnic fractionalization increases infant mortality when the institutional context is more benign. The results are robust to adding a wide variety of control variables. In all the regressions run, the coefficient for the interaction term remained significant.

Interpretation of the interaction term is always somewhat ambiguous. It seems that higher ethnic fractionalization is only associated with negative outcomes, when it is paired with good institutions. Interestingly the coefficient for the interaction term and the term for institutional quality are in most of the regressions pretty close to each other. I could be that another plausible interpretation for the results would be that higher ethnic fractionalization leads to good institutions being less effective. With the maximal ethnic fractionalization of 1, good institutions no longer lead to better developmental outcomes.

The results, while interesting, can't be taken too seriously however. Institutions are endogenous with respect to income and with respect to infant mortality. This could bias the results towards larger coefficients and the results could be statistically significant, while there is no causal effect.

Dependent variable is logarithm of GDP/capita in 2010

Ethnic fractionalization	-1.90***	-1.62	-1.29	-2.04	-1.19	-0.85
	(0.59)	(1.32)	(1.33)	(1.43)	(1.51)	(1.04)
Democracy	0.30***	-0.27	-0.25	-0.26	-.022	-0.31*
	(0.08)	(0.17)	(0.17)	(0.17)	(0.17)	(0.18)
EF*Democracy		-0.07	-0.04	0.03	-0.03	0.36
		(0.29)	0.29	(029)	(0.30)	(0.30)
Latitude			1.90	0.62	1.01	0.66
			(1.31)	(1.49)	(1.58)	(1.51)
P-value for natural resources				0.03	0.03	0.08
P-value for soil quality					0.55	0.63
P-value for regional dummies						0.01
Adjusted R^2	0.34	0.31	0.32	0.40	0.39	0.49
N	65	65	65	65	65	65

Table 5: Regression results for democracy

If we use democracy as the measure of institutions the results are somewhat different. The interaction term is not significant in any regressions, which is in contrast with Collier (2000). The coefficient for the interaction term changes sign, depending on, what control variables are used, which is not surprising, because, as the standard errors indicate, the range for plausible values for the coefficient is quite wide. A reasonable conclusion is that democracy is not relevant in magnifying or diminishing the effects of ethnic fractionalization on GDP per capita.

Dependent variable is logarithm of GDP/capita in 2010

Ethnic fractionalization	3.02	3.05	3.65	4.82*	5.08**
	(2.52)	(2.54)	(2.50)	(2.70)	(2.37)
Institutions	0.86***	0.86***	0.96***	0.97***	0.96***
	(0.19)	(0.19)	(0.20)	(0.21)	(0.19)
EF*Institutions	-0.61*	-0.61*	-0.86**	-0.94***	-.091***
	(0.32)	(0.32)	(0.33)	(0.14)	(0.31)
Democracy	-0.11	-.011	-0.20	-0.16	-0.16
	(0.13)	(0.13)	(0.13)	(0.14)	(0.14)
EF*Democracy	-0.13	-0.12	0.004	-0.06	0.20
	(0.24)	(0.24)	(0.24)	(0.25)	(0.24)
Latitude		0.22	-0.40	-0.14	-0.04
		(1.05)	(1.19)	(1.29)	(1.15)
P-value for natural resources			0.07	0.11	0.20
P-value for soil quality				0.72	0.60
P-value for regional dummies					0.00
Adjusted R^2	0.59	0.62	0.69	0.70	0.70
N	65	65	65	65	65

Table 6: Regressions results for democracy and risk of expropriation

If we include both risk of expropriation and democracy as the measures of institutions, the interaction term is significant, when the measure of institutions is the risk of expropriation. Again the interaction term with democracy is not significant. The results are similar to those in Easterly (2001), where the interaction term with democracy was not significant either. The sign for the interaction term with risk of expropriation is still the opposite from the previous studies.

It is quite worrying that the results are in contrast with all the previous studies studying the interaction between ethnic fractionalization and institutions, most notably, those of Collier (2000) and Easterly (2001) There are several possible reasons for this. Either the effect of the interplay between institutions and ethnic fractionalization is different in countries that were previously colonializes, or there is something wrong with my results or the results of Collier (2000) and Easterly (2001). Or there is something wrong with both my results and theirs. Other reason might

be that effects are different in the long-term explaining the differences with my regressions dealing with level of GDP per capita and Collier's and Easterly's which are more concerned with growth.

As a further check for robustness I will use changes in GDP per capita and in infant mortality as the dependent variables. The changes are from 1995 to 2005. The motivation for this is to see, whether the results are similar to these presented previously. It will also make it easier to compare the results to the previous studies on ethnic fractionalization, some of which were concerned with changes in the GDP rather than the level of per capita GDP.

As can be seen from appendix B, none of the coefficients is significant in any regressions. The only exception is that ethnic fractionalization slows the decline in infant mortality, which is probably due to the fact that decline in infant mortality is related to public good provision, which as shown previously is negatively affected by ethnic fractionalization.

The main conclusion about the regressions with changes should probably be that there is too much noise in the short-term rates of growth, and even if some issue is relevant in the longer term, it is not significant during a ten year period.

4.3.2 Constitutional Measures of Institutions

Dependent variable is logarithm of GDP/capita in 2010					
Ethnic fractionalization	4.81	6.08*	3.27	3.08	0.69
	(3.59)	(3.40)	(3.47)	(3.54)	(3.99)
Judicial Independence	3.96**	3.70**	2.55	3.25	1.51
	(1.81)	(1.69)	(1.75)	(1.80)	(1.85)
EF*Judicial Independence	-7.42*	-7.78**	-5.13	-1.58	1.56
	(4.03)	(3.76)	(3.88)	(4.33)	(4.98)
Latitude		3.68**	1.51	1.31	2.09
		(1.64)	(3.28)	(2.26)	(2.31)
P-value for natural resources			0.27	0.37	0.25
P-value for soil quality				0.81	0.62
P-value for regional dummies					0.28
Adjusted R^2	0.09	0.20	0.26	0.29	0.31
N	31	31	31	31	31

Table 7: Regression results with judicial independence as the measure of institutions

I will at first use judicial independence as the measure of institutions replacing the risk of expropriation measure. In the regression with no controls, the effect of the interaction term is similar to that in the previous section. The coefficient is similar in magnitude and it is statistically significant at 10% -level.

Adding control for latitude doesn't change the results much. However adding controls for natural resources diminishes the coefficient somewhat and the coefficient is no longer statistically significant.

When I added further controls for soil quality changes the sign of the coefficient for the interaction term. The coefficient is now positive, quite small and not statistically significant.

The results when the dependent variable is infant mortality are quite similar (see appendix D). At first the coefficient for the interaction term is positive as expected in the light of the previous regressions and also significant at 5% -level. The coefficient is significant at the 10%-level, when controlling for latitude. With any further controls added, none of the coefficients is significant any longer. This result seems to be in line, with the results from the regressions with GDP/capita as the dependent variable.

Dependent variable is logarithm of GDP/capita in 2010					
Ethnic fractionalization	0.32	1.72	-1.42	0.78	0.48
	(4.07)	(3.85)	(3.76)	(5.60)	(5.60)
Constitutional Review	0.87	1.28	-1.77	-1.37	-1.63
	(3.14)	(2.94)	(2.93)	(3.63)	(3.62)
EF*Constitutional Review	-2.03	-2.92	0.96	0.72	1.84
	(5.91)	(5.52)	(5.32)	(8.34)	(8.46)
Latitude		3.89**	1.12	1.15	1.67
		(1.73)	(2.28)	(2.77)	(2.79)
P-value for natural resources			0.10	0.14	0.36
P-value for soil quality				0.76	0.97
P-value for regional dummies					0.34
Adjusted R^2	-0.07	0.07	0.24	0.13	0.15
N	31	31	31	31	31

Table 8: Regression results with constitutional review as the measure of institutions

Next I will use judicial constitutional review as the measure of institutions. The results are somewhat similar in nature. While there is a negative coefficient for the interaction term, the coefficient is much smaller than in the previous regressions. It is also not statistically significant. The coefficient has a different sign, when controls for latitude and natural resources are added.

All and all, these results suggest that institutional context, at least with these measures of institutions, does not mitigate or exacerbate the negative effects of ethnic fractionalization. The results presented here also cast some doubt on the results of the previous section. It could be that the results of the previous section are robust and these constitutional measures of institutions are

different and do not affect the negative effects of ethnic diversity in a similar way or at all. It could still be that institutions proxied by risk of expropriation do worsen the effect of ethnic diversity.

It is also possible that these constitutional measures reflect only constitutional rules that are not followed by the leaders of the country. In this case these measures are not a meaningful measure of anything, as discussed earlier in the data section. If this is really the case, it would be surprising, if I did find any statistically significant results.

Another concern is that there is relatively little data for these regressions. The data for the constitutional measures is only available for 31 countries in my sample. It might be difficult to find any statistically relationship in such a small sample, especially with a lot of controls. It is important to note that none of the coefficient for any control variable is significant either in the regressions with a lot of controls. It might be that the lack of any results in these regressions just reflects the fact that there is too limited data.

4.3.3 Instrumenting for Institutions

Dependent variable is logarithm of GDP/capita in 2010								
Two Stage Least Squares								
Ethnic fractionalization	-8.64	-10.59	-12.70	-20.13	-2.47	-0.63	-84.12	8.41
	(7.56)	(2.97)	(19.59)	(35.20)	(10.53)	(8.00)	(1201.47)	(10.57)
Insitutions	0.67	0.71	0.91	1.03	0.95**	0.95***	0.38	0.68
	(0.47)	(0.51)	(0.88)	(1.15)	(0.44)	(0.35)	(5.56)	(0.47)
EF*Institutions	1.31	1.54	2.02	3.06	0.30	-0.05	11.70	-1.25
	(1.27)	(1.54)	(3.41)	(5.73)	(1.65)	(1.27)	(168.77)	(1.45)
Latitude		-3.09	-2.30	-4.99	-1.89	-2.89	-28.38	-0.60
		(1.97)	(3.76)	(7.68)	(2.14)	(1.77)	(375.60)	(2.57)
Europeans in 1975						1.53**	7.34	1.29
						(0.74)	(87.74)	(0.87)
Schoooling in 2010							-8.02	1.30
							(122.87)	(1.09)
Current malaria prevalence					-1.01	-0.68	-1.66	-0.68
					(0.72)	(0.58)	(12.32)	(1.02)
P-value for natural resources			0.96	0.99	0.94	0.64	1.00	0.69
P-value for soil quality				0.99	0.92	0.83	1.00	0.50
P-value for regional dummies								0.73
First Stage for Institutions								
Log Mortality	-1.46***	-1.37***	-1.19**	-1.15**	-1.40***	-1.39***	-1.32**	0.97
	(0.40)	(0.40)	(0.45)	(0.45)	(0.51)	(0.52)	(0.52)	(0.69)
Log mortality*ethnic fractionalization	1.39**	1.35**	1.26*	1.21*	(1.50	1.47*	1.85**	1.60
	(0.58)	(0.57)	(0.65)	(0.66)	(0.75)	(0.76)	(0.79)	(1.04)
Adjusted R^2	0.28	0.30	0.33	0.33	0.38	0.37	0.45	0.45
First stage for EF*Institutions								
Log Mortality	-0.19	-0.13	-0.08	-0.03	-0.11	-0.10	-0.04	0.08
	(0.26)	(0.25)	(0.30)	(0.29)	(0.34)	(0.34)	(0.35)	(0.46)
Log mortality*ethnic fractionalization	-0.09	-0.11	-0.07	-0.10	-0.08	-0.11	0.04	0.10
	(0.38)	(0.37)	(0.43)	(0.43)	(0.50)	(0.50)	(0.52)	(0.69)
Adjusted R^2	0.75	0.76	0.76	0.77	0.78	0.77	0.80	0.81

Table 9: Regression results with instrumented institutions

The basic variable of interest is the interaction term institutions*ethnic fractionalization, with institutions being instrumented by settler mortality.

Because I have two instrumented variables institutions and institutions*ethnic fractionalization, I also need two instruments. If the logarithm of settler mortality is a valid instrument then log settler mortality*ethnic fractionalization should be a valid instrument as well and I can therefore use that as the second instrument.

In the regression with not controls, the coefficients in terms of their sign and magnitude are closer to those expected in the light of previous literature. Now ethnic fractionalization has a negative affect that is mitigated by good institutions, and with the best institutions the ethnic fractionalization the marginal effect of ethnic fractionalization on GDP is small or non-existent. However, none of the included variables is significant, not even institutions.

It is also questionable, how reliable are the results that are completely opposite from the results reached without the instruments. It is difficult to imagine a source of bias that would completely overturn the results. A more likely interpretation is that the underlying relationship is weak.

When controls are added for latitude and natural resources, the results are basically the same. The coefficient for ethnic fractionalization and the interaction term are now larger, but the standard errors are also larger, so the coefficients are still not significant.

Adding another control for malaria prevalence changes the sign for both ethnic fractionalization and interaction term. The coefficients are not significant. Adding other controls for the amount of current Europeans and schooling do not basically change the results. The magnitude of coefficients change, but they are not significant in any of the instrumental variable regressions run here.

The results are very similar, when infant mortality is the dependent variable, as can be seen from appendix E. However, in this case ethnic fractionalization and the interaction term are significant at the 10%-level in the regression with no controls. According to the results ethnic fractionalization causes the infant mortality to be higher and good institutions diminish this effect. In regressions with any controls this relationship is no longer statistically significant.

Based on the IV regressions one forced to conclude that there is little evidence of institutions having a causal effect mitigating or exacerbating the effects of ethnic fractionalization. The instrumented interaction term was not significant in any of the regressions, and the coefficient changed sign, when adding for controls, which even further suggest that the results reached were basically random.

5. Conclusion

The main aim of the thesis was to find out, whether the negative link between ethnic fractionalization and negative economic outcomes could be mediated by good institutions. There were some theoretical and empirical reasons to expect that this would be the case.

While there was not too much actual theory on, how ethnic fractionalization would have different effects in different contexts, most theories on the topic were quite context dependent, so it is plausible to assume that the effects of ethnic fractionalization would indeed be different under different institutional contexts.

In the empirical part of the paper I could not find any evidence for my hypothesis that institutions mitigate the negative effects of ethnic fractionalization. On the contrary, I did find some weak evidence that ethnic fractionalization might only cause problems in societies with good institutions. Even these results were not robust, when using a less volatile measure of institutions or when using instrumental variables for institutions.

There are several reason, why institutions might not actually be relevant for the economic effects of ethnic fractionalization.

A model, where the institutional context is explicitly relevant is Collier (2000). In the model ethnic fractionalization is more harmful under a dictatorship, as a dictator can choose higher level of taxes to distribute this tax income to a relatively small ethnic group. The model doesn't take into account the fact that this might happen in more democratic context as well, as political power might be unevenly divided between different ethnic groups.

In relation to public goods, I speculated that the preferences of median voter are not taken into account in less liberal context. This might not be true to a large enough extent to make a difference, as even under a dictatorship, the preferences of the people are taken into account as the leaders might be afraid of unrest and revolts.

It is also not clear that more public goods always translates into a richer society. Therefore, it might be that the fact that ethnic fractionalization diminishes the amount of public goods would be good for the society. It is also possible that the amount of public goods is not too relevant for growth, which would make institutions that take the median voter into account less relevant.

I also speculated that under some institutional contexts trust is less necessary for the functioning of the society. For example, modern judicial systems make trust less necessary. On the other hand, there are reasons, why trust is more necessary under modern institutional context. In more modern context it is more important to interact with strangers through markets than it is under less developed institutional context. This would make trust more important for the society.

It might that institutional context is therefore not relevant. This leaves the mystery that my results are different from previous studies on the topic. There are reasons to not take the results of this study too seriously.

The absence of evidence is not evidence of absence. What I think the empirical work presented here most clearly shows, that this is an issue that is very hard, if not impossible, to study in the context of cross country regressions. The problems include lack of data, multicollinearity as many of the variables of interest are highly correlated and the difficulty of finding good instruments for the variables of interest. The multicollinearity problem is worsened, when adding interaction variables. It might that this kind of data cannot yield any conclusions on the topic.

While my empirical investigation suggests that institutional context doesn't matter on, whether ethnic fractionalization has a negative effect on the society, it is still my opinion that this is an area, where further empirical investigation might be warranted. It still cannot be overlooked that previous empirical findings did find that institutional context does matter and in my own regressions without instrumenting for institutions, the institutional context did matter.

There are several problems in my empirical investigation and there are also several problems in the previous empirical investigations on this topic. It would be interesting to study this with more micro-level data, as in Miguel (2004). Unfortunately, I have no idea on, where one could find such data.

References

Acemoglu D, Johson S. and Robinson J. 2000 “The Colonial Origins of Comparative Development: An Empirical Investigation ” NBER Working Paper 7771

Acemoglu D, Johson S. and Robinson J. 2001 “The Colonial Origins of Comparative Development: An Empirical Investigation ” The American Economic Review, Vol. 91, No. 5, pp. 1369-1401

Acemoglu D, Johson S. and Robinson J. 2012 (forthcoming) “Hither Thou Shalt Come, But No Further - Reply to The Colonial Origins of Comparative Development - An Empirical Investigation – Comment” American Economic Review

Aghion P. Alesina A. and Trebbi F. 2004 “Endogenous Political Institutions” The Quarterly Journal of Economics, 119 (2): 565-611.

Ahlerup P. 2009 “The Causal Effects of Ethnic Diversity: An Instrumental Variables Approach” Presented at Economic Development in Africa (CSAE), CSAE, Oxford

Ahlerup, P. and G. Hansson 2012 (forthcoming) "Nationalism and Government Effectiveness" Journal of Comparative Economics

Ahlerup P. and Olsson O. 2012 “The Roots of Ethnic Diversity” Journal of Economic Growth, Volume 17, Number 2, 71-102

Albouy D. 2012 “The Colonial Origins of Comparative Development: An Empirical Investigation: Comment.” American Economic Review, 102(6),, pp. 3059-3076

Alesina, A., Arvind D., Easterly, W., Sergio K., and Romain W. 2003 “Fractionalization” Journal of Economic Growth, 8, no. 2: 155-194.

Alesina A. Baqir R. and Easterly W. 1999 “Public Goods and Ethnic Divisions” The Quarterly Journal of Economics 114 (4): 1243-1284.

Alesina A. Easterly W. and Matuszeski 2011 “Artificial States” Journal of the European Economic Association Volume 9, Issue 2, pages 246–277

Alesina A. and La Ferrara E. 2000 “Participation in Heterogeneous Communities” The Quarterly Journal of Economics, 115 (3): 847-904.

Alesina A. and La Ferrara E. 2002 “Who trusts others?“ Journal of Public Economics Volume 85, Issue 2, Pages 207–234

Alesina A. Michalopoulos S. and Papaioannou E. 2012 “Ethnic Inequality” Unpublished

Alesina A. and Zhuravskaya E. 2011 “Segregation and the Quality of Government in a Cross Section of Countries” The American Economic Review, Volume 101, Number 5, pp. 1872-1911(40)

Banerjee A. and Somanathan R. 2007 “The political economy of public goods: Some evidence from India” Journal of Development Economics, Volume 82, Issue 2, Pages 287–314

Bandiera O. and Levy G. 2011 “Diversity and the power of the elites in democratic societies: evidence from Indonesia” Journal of public economics, 95 (11-12). pp. 1322-1330

Barro R. J. and Lee J. W. 2000 “International Data on Educational Attainment: Updates and Implications” Working Paper 42, Center for International Development

Caselli F. and Coleman W. J. 2006 ”On the Theory of Ethnic Conflict” NBER Working Paper No. 12125

Chacón M. Robinson J. and Torvik R. “When is Democracy an Equilibrium?: Theory and Evidence from Colombia's La Violencia” Unpublished

Collier P. 2000 “Ethnicity, Politics and Economic Performance” Economics & Politics, Volume 12, Issue 3, pages 225–245, November 2000

Collier P. 2001 “Implications of Ethnic Diversity” Economic Policy, Volume 16, Issue 32, pages 127–166

Collier P. and Hoeffler A. 1998 “On the Economic Causes of Civil War” Oxford Economic Papers 50 (4): 563-573.

Collier P. and Hoeffler A. 2004 “Greed and grievance in civil war” Oxford Economic Papers, Volume 56, Issue 4,Pp. 563-595.

Dell M. 2010 “The Persistent Effects of Peru's Mining Mita” Econometrica, Volume 78, Issue 6, pages 1863–1903

Easterly W. 2001 “Can Institutions Resolve Ethnic Conflict?” Economic Development and Cultural Change, 49, no. 4: 697-706.

Easterly W. 2001 “Benevolent Autocrats” Unpublished

Easterly W, Gatti R. and Kurlat S. 2006 “Development, Democracy, and Mass Killings” Journal of Economic Growth, Volume 11, Number 2, 129-156

Easterly W and Levine R. 1997 “Africa's Growth Tragedy: Policies and Ethnic Divisions”, The Quarterly Journal of Economics 112 (4): 1203-1250.

Englebert P. Tarango S. and Carter M. 2002 “Dismemberment and Suffocation: A Contribution to the Debate on African Boundaries” Comparative Political Studies, vol. 35 no. 10, 1093-1118

Fearon J. 2003 “Ethnic and Cultural Diversity by Country” Journal of Economic Growth, Volume 8, Issue 2, pp 195-222

Fearon J. and Laitlin D. 1996 “Explaining Interethnic Cooperation” The American Political Science Review, Vol 90, No. 4, pp. 715-735

Fearon J. and Laitlin D. 2003 “Ethnicity, Insurgency, and Civil War” American Political Science Review, Volume 97, Issue 01, pp 75-90

Freedom House: Freedom in the World 2012. Data retrieved in October 2010

Gallup, J. and Sachs J. 1998 “The Economic Burden of Malaria,” Unpublished paper, Harvard Center for International Development, October.

Glaeser E. Laibson D, Scheinkman J. and Soutter C. 1999 “What Is Social Capital? the Determinants of Trust and Trustworthiness” NBER Working Paper No. w7216

Glaeser E. La Porta R. Lopez-de-Silanes F. and Shleifer A. 2004 “Do Institutions Cause Growth?” Journal of Economic Growth, Volume 9, Issue 3, pp 271-303

Knack S. and Keefer P. 1997 “Does Social Capital Have an Economic Payoff? A Cross-Country Investigation” The Quarterly Journal of Economics 112 (4), pp. 1251-1288

La Porta R. Lopez-de-Silanes F. Pop-Eleches C. and Shleifer A. 2004. “Judicial checks and balances.” Journal of Political Economy 112(2): 445-470.

La Porta R. Lopez-de-Silanes F. and Vishny R. 1999 “The Quality of Government” Journal of Law, Economics, and Organization, Volume 15, Issue 1, Pp. 222-279.

Leeson P. T. 2005 “Endogenizing Fractionalization” Journal of Institutional Economics, Volume 1, Issue 01, pp 75-98

Mauro P. 1995 “Corruption and Growth” The Quarterly Journal of Economics, Vol. 110, No. 3, pp. 681-712

Michalopoulus S. 2012 “The Origins of Ethnolinguistic Diversity” The American Economic Review, Volume 102, Number 4, pp. 1508-1539(32)

Miguel E. 2004 “Tribe or Nation? Nation Building and Public Goods in Kenya versus Tanzania” World Politics, Vol. 56, No. 3, pp. 327-362

Miguel E. and Gugerty M. K. 2005 “Ethnic diversity, social sanctions, and public goods in Kenya” Journal of Public Economics Volume 89, Issues 11–12, Pages 2325–2368

Parker, P. 1997 “National Cultures of the World: A Statistical Reference, Cross-Cultural Statistical Encyclopedia of the World” Volume 4, Greenwood Press, Westport, CT.

Posner D. N. 2004 “Measuring Ethnic Fractionalization in Africa” American Journal of Political Science, Volume 48, Issue 4, pages 849–863

PRS group: International Country Risk Guide. Retrieved from Acemoglu et al. (2000)

Sachs J. and Warner A. 2000 "Natural Resource Abundance and Economic Growth," Leading Issues in Economic Development, Oxford University Press, 2000.

Shleifer A. and Vishny R. W. 1993 “Corruption” The Quarterly Journal of Economics , Vol. 108, No. 3 pp. 599-617.

World Bank: World Development Indicators. Data retrieved in October 2012 from World Development Indicators Online (WDI) database.

Appendix A: Robustness checks for baseline regressions

Dependent variable is logarithm of GDP/capita in 2010						
Ethnic distance	3.69	4.00	4.06	5.00	5.72*	
	(2.47)	(2.50)	(2.59)	(3.29)	(3.14)	
Institutions	0.96***	0.94***	0.89***	0.96***	0.86***	
	(0.16)	(0.16)	(0.19)	(0.21)	(0.20)	
ED*Institutions	-0.88**	-0.90**	-0.97**	-1.15**	-1.02**	
	(0.38)	(0.39)	(0.41)	(0.51)	(0.49)	
Latitude		0.86	-0.32	-0.38	-0.67	
		(0.95)	(1.14)	(1.23)	(1.16)	
P-value for natural resources			0.18	0.38	0.37	
P-value for soil quality				0.76	0.97	
P-value for regional dummies					0.002	
Adjusted R^2	0.60	0.60	0.62	0.60	0.68	
N	60	60	60	60	60	

Dependent variable is logarithm of infant mortality						
Ethnic fractionalization	1.82***	-0.79	-0.72	-1.88	-2.14	-3.33***
	(0.29)	(1.21)	(1.22)	(1.30)	(1.37)	(1.21)
Institutions	-0.34***	-0.57***	-0.58***	-0.72***	-0.72***	-0.70***
	(0.05)	(0.11)	(0.11)	(0.13)	(0.13)	(0.11)
EF*Institutions		0.42**	0.42**	0.68***	0.72***	0.73***
		(0.19)	(0.19)	(0.21)	(0.22)	(0.18)
Latitude			0.32	1.17	0.65	0.60
			(0.63)	(0.73)	(0.77)	(0.66)
P-value for natural resources				0.11	0.47	0.46
P-value for soil quality					0.41	0.76
P-value for regional dummies						0.00
Adjusted R^2	0.65	0.66	0.66	0.68	0.68	0.77
N	64	64	64	64	64	64

Appendix B: Regressions with changes

Dependent variable is changes in GDP/Capita from 1995 to 2005

Ethnic fractionalization	0.20	0.17	0.50	0.54	0.65	0.97	0.28	0.99
	(0.28)	(0.29)	(1.27)	(1.37)	(1.41)	(1.58)	(1.74)	(1.83)
Institutions		-0.02	0.01	0.02	0.02	0.06	0.01	0.02
		(0.05)	(0.12)	(0.15)	(0.16)	(0.19)	(0.20)	(0.19)
EF*Institutions			-0.05	-0.06	-0.07	-0.14	-0.03	-0.07
			(0.20)	(0.22)	(0.22)	(0.26)	(0.28)	(0.28)
Initial GDP/capita				0.00	0.00	-0.00	-0.00	-0.00
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Latitude					0.27	0.11	-0.42	-0.49
					(0.70)	(0.82)	(0.89)	(0.90)
P-value for natural resources						0.71	0.79	0.77
P-value for soil quality							0.62	0.51
P-value for regional dummies								0.44
Adjusted R^2	-.001	-0.02	-0.04	-0.05	-0.07	-0.11	-0.14	-0.15
N	65	65	65	65	65	65	65	65

Dependent variable is changes in infant mortality from 1995 to 2005

Ethnic fractionalization	0.23***	0.24***	0.36	0.41*	0.34	0.42*	0.33
	(0.05)	(0.05)	(0.23)	(0.23)	(0.23)	(0.23)	(0.24)
Institutions		0.01	0.02	0.01	0.01	0.01	0.01
		(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
EF*Institutions			-0.02	-0.02	-0.01	-0.02	-0.01
			(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Latitude				0.23	0.13	0.09	0.11
				(0.12)	(0.13)	(0.13)	(0.13)
P-value for natural resources					0.00	0.03	0.04
P-value for soil quality						0.15	0.25
P-value for regional dummies							0.38
Adjusted R^2	0.22	0.22	0.20	0.24	0.40	0.44	0.44
N	64	64	64	64	64	64	64

Appendix C: Regression with both judicial independence and constitutional review

Dependent variable is logarithm of GDP/capita in 2010					
Ethnic fractionalization	4.24	6.34	1.85	-0.00	-2.66
	(5.01)	(4.78)	(4.75)	(7.17)	(7.49)
Judicial Independence	4.21**	3.83**	2.92	2.65	1.79
	(1.96)	(1.84)	(1.80)	(1.98)	(2.06)
EF*Judicial Independence	-7.85*	-8.01**	-5.79	-1.85	1.17
	(4.27)	(3.99)	(3.94)	(5.00)	(5.79)
Constitutional Review	-1.22	-0.47	-2.80	-2.82	-2.90
	(3.16)	(2.97)	(2.97)	(3.54)	(3.49)
EF*Constitutional Review	1.34	-0.13	2.66	4.15	5.40
	(5.87)	(5.53)	(5.37)	(8.46)	(8.37)
Latitude		3.68**	0.77	0.67	1.78
		(1.71)	(2.27)	(2.67)	(2.80)
P-value for natural resources			0.18	0.14	0.29
P-value for soil quality				0.56	0.72
P-value for regional dummies					0.33
Adjusted R^2	0.02	0.15	0.25	0.22	0.24
N	31	31	31	31	31

Appendix D: Regression with infant mortality and constitutional institutions

Dependent variable is logarithm of infant mortality in 2010					
Ethnic fractionalization	-2.20	-2.59	-1.38	-0.91	0.83
	(2.24)	(2.27)	(2.50)	(2.53)	(2.86)
Judicial Independence	-2.31**	-2.24*	-1.81	-1.42	-0.96
	(1.13)	(1.13)	(1.26)	1.29	(1.32)
EF*Judicial Independence	4.35**	4.46*	3.48	0.78	-1.49
	(2.51)	(2.51)	(2.79)	(3.10)	(3.56)
Latitude		-1.13	0.25	-0.11	-0.68
		(2.51)	(1.56)	(1.62)	(1.65)
P-value for natural resources			0.68	0.65	0.46
P-value for soil quality				0.70	0.49
P-value for regional dummies					0.30
Adjusted R^2	0.14	0.14	0.08	0.12	0.15
N	31	31	31	31	31

Appendix E: Regression with infant mortality and instrumented institutions

Dependent variable is logarithm of infant mortality in 2010

Two Stage Least Squares								
Ethnic fractionalization	459.04*	524.60*	755.68	899.47	378.15	350.44	8176.95	-109.60
	(230.92)	(291.04)	(824.21)	(1216.18)	(369.84)	(308.46)	(240907.2)	(537.30)
Insitutions	7.58	5.03	6.12	2.14	4.51	4.79	173.59	12.44
	(14.70)	(16.51)	(41.63)	(45.25)	(18.73)	(16.54)	(4976.84)	(28.21)
EF*Institutions	-69.03*	-76.14	-121.07	-135.61	-55.22	-50.34	-1195.95	14.75
	(39.06)	(47.65)	(144.148)	(199.72)	(59.85)	(49.87)	(35300.49)	(77.84)
Latitude		117.65	89.39	152.05	60.86	69.71	2254.52	7.51
		(84.50)	(133.47)	(234.14)	(63.95)	(59.77)	(66553.2)	(122.69)
Europeans in 1975						-16.47	-596.16	-22.56
						(25.21)	(17595.11)	(42.79)
Schoooling in 2010							667.22	-50.26
							(20726.08)	(43.79)
Current malaria prevalence					33.88	32.04	162.54	44.09
					(21.22)	(19.20)	(3820.22)	(53.52)
P-value for natural resources			0.98	0.99	0.95	0.92	1.00	1.00
P-value for soil quality				0.98	0.87	0.86	1.00	1.00
P-value for regional dummies								0.71
First Stage for Institutions								
Log Mortality	-1.56***	-1.43***	-1.20**	-1.14**	-1.57**	-1.52**	-1.67**	-1.26
	(0.44)	(0.43)	(0.53)	(0.54)	(0.67)	(0.69)	(0.70)	(0.97)
Log mortality*ethnic fractionalization	1.52**	1.44**	1.28*	1.21	1.73*	1.65	2.35**	2.01
	(0.64)	(0.62)	(0.76)	(0.77)	(0.97)	(0.99)	(1.04)	(1.44)
Adjusted R^2	0.26	0.29	0.32	0.32	0.37	0.35	0.44	0.43
First stage for EF*Institutions								
Log Mortality	-0.25	-0.17	-0.13	-0.07	-0.23	-0.20	-0.24	-0.12
	(0.28)	(0.28)	(0.35)	(0.35)	(0.45)	(0.46)	(0.47)	(0.65)
Log mortality*ethnic fractionalization	-0.004	-0.06	0.00	-0.05	0.07	0.02	0.32	0.39
	(0.41)	(0.41)	(0.50)	(0.50)	(0.65)	(0.66)	(0.70)	(0.95)
Adjusted R^2	0.73	0.75	0.75	0.76	0.79	0.75	0.75	0.80