

Long-run Relationship between Inequality and Democracy

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Abbreviations

GDP	Gross Domestic Product
EA	East Asia
EEU	Eastern Europe
IMF	International Monetary Found
LAC	Latin America
MEN	Middle East and Northern Africa
NAA	Oceania, Caribbean and Non-Latin Americas
SA	South Asia
SEA	South East Asia
SSA	Sub-Saharan Africa
WEE	Western Europe

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1. Introduction

In the past 200 years, the world has undergone dramatic political changes. Many countries have become more or less solid democracies, but a huge amount of independent countries remain autocracies. As with economic development, even political development has been volatile in some countries. Argentina or Spain for instance, lived through intermittent periods of democracy and autocracy. Developmental policy aims for the establishment of democracies in the world. But what are the factors that influence whether a country becomes democratic? After a breakdown of an authoritarian regime many outcomes are possible. It is desirable to establish a long lasting democratic regime, but reality shows that swifts to dictatorships are also possible. Democracies are often unstable as it was the case in Argentina during the 1950s and 60s. The aim of a durable democracy will only be reached if political forces agree to an appropriate institutional framework (Przeworski 1991). Since Lipset published his theory concerning a positive correlation between economic development and democracy, researchers amplified investigations concerning the emergence of democracy. Lipset emphasizes the positive impact and the decisive role of wealth for countries to become democratic; this relation has also been suggested by several other authors. Furthermore, Lipset found a positive influence of industrialization, urbanization, education, literacy and per capita income on democracy. According to him, social inequality can lead to oligarchy or tyranny (Lipset 1962/ 1959). This relationship between inequality and democracy has shifted more and more into focus of recent research. The results however, are less clear and sometimes even contradictory compared to the relationship between democracy and the GDP. The positive impact of GDP on democracy is out of doubt. For the relationship between inequality and democracy several conclusions are drawn. While some claim a negative relationship deny others a connection between inequality and democracy at all. Bourguignon and Verdier (2000) for instance, showed that countries with a high unequal income distribution implemented democracies later than those with a more equal income distribution. If this is true, can dictatorships be removed if inequality decreases?

The empirical demonstration of this hypothesis is hampered by finding appropriate data. Until now most investigations suffer an unbalanced data selection. Data for less

developed, and especially African countries are only hard to come by. Deininger and Squire for instance focus on the Western developed countries including only less than 8% from Sub-Saharan Africa (Deininger & Squire 1996). On the other hand, Houle emphasized that the coverage of all world regions has important impact. He indicates that Middle Eastern and African countries have intermediate levels of inequality and mainly nondemocratic regimes. This raises the question whether the exclusion of these regions left Acemoglu and Robinson to find an inverted U-shaped relationship between inequality and democracy (Houle 2009).

The contribution of this thesis to existing research is twofold: First, I extended the existing data by adding inequality data for the African continent. Second, new insights about the evolution of democracies with a special focus on the role of inequality will be gained and existing theories about a negative or inverted U-shaped relation tested. Fifty years after seventeen African countries reached their independence and the end of colonialism it is time to draw a conclusion. Fifty years is a long enough time period to include the African continent into the examination and find out why some countries became stable democracies and others not.

The paper is structured in the following parts. First, I describe the theoretical relations between inequality and democracy. More specifically, I describe the mechanism which explains why unequal countries switch to democracy. Subsequent to the introduction I provide an intuitive explanation of the relationship between inequality and democracy. Then I review previous studies to this topic to address results that have been found and improvements that can be made to current studies. Also, I provide a summary of theory and evidence. In a third part I introduce the data that I used for the empirical analysis. I discuss the sources, composition, strength and drawbacks of the dataset. With the help of descriptive statistics the reader will become familiar with the data and get an impression of the historical development of democracy as well as inequality. Afterwards, I introduce the model and discuss the regression results. The paper closes with a conclusion and gives perspectives for future research. The main influence factors on the emergence of democracy are summarized with a special focus on inequality.

2. Inequality and Democracy: Theoretical Effects

Many factors determine the existence of a political regime in a country. The difficulty is that democracy can exist under conditions that in actual fact do not promote its genesis. Furthermore democracy can be a consequence of one-time historical facts as it was the case in Germany 1945 (Lipset 1962). In this section I present theoretical effects between democracy and inequality because they are part of the most important influence factors for economic development: Democracies are believed to ease inequality. But, which conditions make democracy possible?

In general two theories can be distinguished that describe the relationship between democracy and inequality: Genesis and consolidation hypotheses. This paper considers the probability that a country has a democratic political system, irrespectively whether it was authoritarian or democratic before it turns to democracy. For theoretical understanding, the difference between the emergence and consolidation of a democracy is important. However, inequality is very important for both the transition to democracy and its stability (Easaw et al 2006).

Which role does the inequality level play when a political regime changes? Boix claims that unequal authoritarian countries are less likely to democratize, i.e. the more equal a society the higher the probability for democracy. What explains the association of democracy with equality? Political participation of the society ends usually up in a higher redistribution of income. If the political power is concentrated on contrast, the small wealthy elite fears redistribution of economic power and is not willing to implement this on their own (Houle 2009). To say it differently, the higher the initial level of inequality, the more elites will resist a transition towards democracy. The reason is that this increases the extent to which they would be worse off (Easaw et al 2006). A more detailed explanation is given by Robinson and Quinlan (1977) who argue from the point of an egalitarian society. Here this egalitarian distribution of income indicates a strong middle class that supports democracies, insists on their rights and make therefore dictatorships less probable (Muller 1988). Even Aristoteles, 400 years before Christ, spoke of the importance of a strong middle class to promote democracy. Later, Marx states that the bourgeoisie strives to establish democratic structures converting its economic powers into political ones (Bollen & Jackman 1985).

One can conclude that some theorists claim a linear negative relationship between inequality and democracy. Hence, the more equal a society the higher the probability that the country democratizes.

A second group of researchers however claims that the relationship between inequality and democracy follows an inverted U-shaped pathway. This means that countries with a middle inequality level are democratic whereas extreme low and high inequality promotes authoritarian regimes. This can be explained by the connection between revolutionary threat and redistribution costs. In very unequal countries power is not transferred to society because the costs of redistribution are higher than those of repression. For the dictator it is easier to repress and to keep the wealth concentrated. As inequality decreases, the redistribution is comparatively inexpensive, because the society is composed of many rich and poor people. The political leaders are more willing to democratize. In a totally egalitarian society however, redistribution gains are small and no revolution threat exists. Only in a middle level of inequality the elites are willing to give up power and the poor are able as well as willing to revolt (Houle 2009). A similar, if even slightly different argumentation is given by Rueschemeyer et al (1992). He stresses the role of the working class instead of the middle class, because the former has a more consistent interest in democracy. Consistent with Kuznets, middle income countries have the highest inequality. During economic development, the working class increases but the anti-democratic landowning class decreases. The demand for democracy of working class and middle class is high because they start to insist on their right for political participation. They will use this to ask for redistribution. At the same time, these demands decrease the dominant power of the upper class (Muller 1995). More inequality makes the rich hostile to democracy, because it threatens their privileges. The upcoming middle class, which is connected with the industrialization, is an important pro-democratic force. This argumentation was supported by Jackman and Bollen (1985). A huge part of Europe experienced the transition towards democracy during the period of industrialization. Stephens concludes that the working class might be the final push factor for democratization (Stephens 1993). A greater inequality makes revolution more attractive, because more people see the democratization as a hope for redistribution. On the other hand, greater inequality means a greater burden for the elites, which can lead to greater repression of the poor (Acemoglu & Robinson 2006).

The second approach, the consolidation hypothesis, examines the effect of inequality on existing democracies. The empirical investigation and the focus of this paper lie on the probability that a country is democratic. There is no differentiation between the emergence and the consolidation of democracies. Nonetheless, due to completeness, the idea of this approach should be discussed in a briefly manner. In focus of the consolidation hypothesis is the stabilization of democracies and the question whether inequality is a possible threat. According to Dahl (1971), a concentrated economic power can be translated to a concentrated political power and it inhibits an extension of rights and liberties. This means high economic inequality can be translated in unequal political participation. The rich use their economic power to gain political power, which again worsens the situation of the poor. A second argumentation line is very present today. Inequality generates frustration and charges legitimacy as the basis of democracy (Bollen & Jackman 1985). According to the UN Development Program 1999, the spread of democracy is accompanied by increasing inequality within and between countries. Democracy does not end inequality, but it improves the situation because workers use their vote to improve their living conditions. Friedman assumes that democracy will only survive if it successfully narrows the gap between rich and poor (Friedman 2002). Lamounier states that today social inequalities have no longer the same ability to undermine democracy as in the past. But anyhow, social inequality is still an important influence factor (Lamounier 2002). It motivates the poor to engage in crime, riots and other disruptive activities. Even dictators would favor income-equalizing transfers if then social unrest decreases (Barro 2000).

For the ongoing discussion it is important to summarize the theoretical statements. We want to find out how far inequality influences democracy. From the theoretical point of view, the relation is negative or at least inverted U-shaped. Whether these effects are confirmed by previous empirical investigations will be seen in the next section.

3. Literature Review

Most studies handling of the emergence of democracy bring the economic development into focus. Sincerely, the GDP or growth rates play a decisive role. Others concentrate on how political regimes shape economic development, especially economic growth. Examinations concerning inequality and democracy on the other hand are more sporadic. In addition the results vary a lot. The following table presents the results of some meaningful investigations.

Table 1: Literature Review

Studies	Inequality data	Method	Effect of inequality
Bollen & Jackman (2005)	Income quintiles (WB)	2SLS	None
Houle (2009)	Capital share	Dynamic probit	None
Muller (1988)	Income gini	Bivariate regression	None
Przeworski (2000)	Income gini	Dynamic probit	None
Acemoglu & Robinson (2006)	Income shares	Case studies	Inverted U
Burkhart (1997)	Income quintiles	2SLS	Inverted U
Barro (1999)	Income gini/ quintiles		Negative
Boix (2003)	Income gini	Dynamic probit	Negative
Hamanka (2008)	Income gini	Ordered probit	Negative
Muller (1995)	Income gini	OLS	Negative

This overview contains the most important empirical studies published about the research question. It shows that the results are totally mixed. Three outcomes can be expected: (1) a negative linear relationship, (2) an inverted U-shaped path or (3) no relationship at all. Houle criticizes most of the studies are either lacking nonlinear tests or data quality. Many used the dataset by Deininger and Squire or the World Bank that unfortunately consists of different sources. This casts doubt on the comparability because observations are based on expenditures as well as income, net and gross

income, household and per capita surveys (Houle 2009). Nonetheless, previous results give a meaningful insight on the topic.

Acemoglu and Robinson distinguish between two political groups within a society: elites and citizens. This reflects the contrasting pair of rich and poor, and upper class and lower class. The social conflict between these groups and therefore possible threat of revolution has led to a change of the political system in many countries. Using case studies, Acemoglu and Robinson (2006) tested for an inverted U-shaped relationship. This was also done by Burkhart, who measured democracy with the Freedom House scores and not the probability of regime transition. Burkhart lacks a broad dataset because he concentrates on 56 countries and misses many countries from the Middle East and Sub-Saharan Africa. He, as well as Acemoglu and Robinson, found an inverted U-shaped relationship. In addition, Houle mentions further unpublished studies by Papaioannou and Siourounis (2005) as well as Ansell and Samuels (2008) who found an inverted U-shaped relation. They employed a probit model on the basis of income gini (Houle 2009).

Many other researchers such as Robinson and Quinlan (1977) examined the genesis hypothesis but found no support in the data at all (Muller 1988). Hamanka 2008 cites Bollen and Jackman who deny any causal relationship between the two variables, too. Houle, who precisely distinguishes between consolidation and genesis hypotheses, demonstrates that inequality harms consolidation but it has no effect on democratization (Houle 2009).

The third group of studies comes up with a negative relationship between inequality and democracy. This seems theoretically logical, but it suffers methodological drawbacks. Boix's results are based on a few observations, mainly covering highly developed countries of the Western hemisphere. This bias exists for all studies using the Deininger and Squire data. Muller however uses another dataset, including countries from Africa. In a sample of 58 countries Muller observed from 1965-1980 a negative correlation between inequality and a change of democracy. Anyhow, the amount of observations is few and the time period limited (Muller 1995).

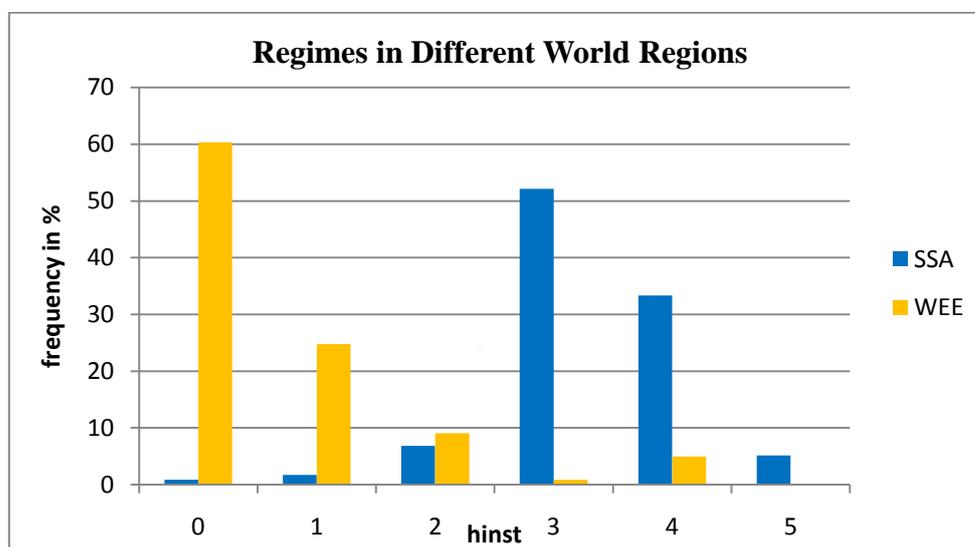
4.1 Dependent Variable: Democracy

The measurement of democracy is controversial. This is due to the difficulty to find appropriate indicators that cover the manifoldness of democratic systems. For the empirical investigation, I used two different datasets. First, I referred to the Polity IV index by University of Maryland. Polity IV index provides several indicators according to the regime in a country, covering the years 1820-2000. The main polity regime variable (POLITY2) scores political regimes on a scale from -10 (autocracy) to 10 (democracy). With this indicator, a dummy variable was designed to make the broad distinction between autocracy and democracy possible. Furthermore, I used specific variables for democracies and autocracies. Each variable measures the regime on a scale from 0-10, with increasing points according to the regime measured. These autocracy and democracy variables include also a coding for regime transition periods and interruption (coded -88, -77, -66). To distinguish here between the broader categories of dictatorship and democracy I coded, similar to Baten and Fraunholz (2004), all countries with democracy scores from 1 to 4 as dictatorships and the others as democracies. The basis for the democracy score are three essential elements: First, the presence of institutions and procedures that give citizens the possibility to express their preferences about political leaders. Second is the existence of institutionalized constraints on the exercise of power by the executives. Third, civil liberties to all citizens must be guaranteed. In contrast, an autocracy is defined as a system that restricts or suppresses competitive political participation.¹ This definition is very closed to that of other researchers. Bollen's (1980) Political Democracy Index for instance consists of four characteristics. First, the executive must be elected or responsible to an elected assembly. Second, at least two competitive, free and fair elections must be held. Third, a majority of the adult population has the right to vote. Lastly, respect of the freedom of speech and assembly right must be fulfilled (Muller 1988). A further definition of democracy is established by Dahl (1956), Downs (1957) and Neubauer (1967). Components are electoral participation, political competition and access to information (Jackman 1974). One can conclude that the Polity IV dataset provides qualitatively high variables. The variable definitions are closed to the ones used by other researchers. But even if the Polity IV dataset gives a very detailed and reliable

¹ For a more detailed description of the variable coding, see "Polity IV Project: Dataset User's Manual".

overview of the development of political indicators in several countries over a long time (1820-2000), more influence factors are necessary for a reliable investigation. Therefore, I used a further dataset that includes regime indicators as well further explanatory variables.² This dataset, to which I refer to as “dsdata” in the ongoing description, covers 117 countries for the time period from 1950-2000. This is a small loss compared to the polity dataset, which covers 124 countries but for a much longer time period. For robustness and constancy, I employ in addition a further democracy dummy, which is only available in this data. It takes on the number one if the regime is a democracy and a zero otherwise. The basis variable for this distinction (HINST) classifies regimes on a scale from 0 to 5, including parliamentary democracies (0), mixed democracies (1), presidential democracies (2), civilian (3), military dictatorships (4), and monarchies (5). I divided the classification to make a dummy where 0-2 displays democracies and 3-5 an autocratic regime, respectively. In contrast to others, Houle for instance, I did not differentiate between communist and non-communist dictatorships. The following figure shows the distribution of various regimes in Sub-Saharan Africa compared to Western Europe.

Figure 2: Regimes in Different World Regions



(Source: see Appendix A.1.3)

While parliamentary democracy is the predominant regime in Western Europe for the last decades (1950-2000), this makes out less than 1% in Sub-Saharan Africa; in Sub-Saharan Africa we find many civilian and military dictatorships. Monarchies are only

² Thanks to Prof. Baten and the Chair of Economic History, University of Tübingen, who friendly provided this dataset.

existent in Sub-Saharan Africa. In different regions of the world, different political regimes are preferred. I want to reduce the distinction between parliamentary or presidential democracy (and civilian or military dictatorship). The focus should be on the question whether countries are democratic and on the impact of inequality on the political regime.

4.2 Independent Variable: Inequality

As well as the democracy score, the measurement of inequality is disputable. The gini coefficient is the standard variable to measure inequality. It has several advantages, but for cross-country comparison, the variable must rely on the same definition. One distinction is whether the data refers to households or individuals. Second, the basis can be expenditures or income, gross or net of taxes (Barro 2000).

Deininger and Squire established standards for the inequality measurement. Thus, the data must be based on household surveys, the covered group must be representative for the whole population and the measure of income or expenditure must include all forms of income, i.e. self-employment and nonwage earnings as well (Forbes 2000).

These problems are avoided here by using heights for the calculation of inequality. Especially in economic history this indicator has several advantages over the GDP. First, this indicator does not only cover wage recipients, but also self-employed, unemployed and all groups that do not participate in the market economy. This is especially helpful for less developed countries, where many people do not receive wages. Instead they are self-employed or work in the shadow economy. Second, I like to examine the long-run relationship between inequality and democracy. Data for GDPs are not available for former periods and especially not for less developed countries. Heights in contrast are much more available and are an outcome indicator. This means public goods as health systems, transfers etc. that determine an important part of the standard of living are included in the indicator (Baten & Fraunholz 2004).

Possible criticism, for instance that genes play a major role, can be replied. Genetic dependency cancels out when we refer to average heights. What remains is a biological variance even in the case of perfect equality. Second, we observe a long term change

within countries. According to Steckel we can assume that the composition of genes within the population does not change over this time (Steckel 1995). Increasing heights are common in highly developed countries. The height, besides other factors, is influenced by education, income and demographic factors. A huge population growth reduces the resources available for each child. Especially the nutrition during childhood (between age zero and five) is decisive for the body growth. Therefore a rapid population growth leads to less consumption for each child and stagnating or decreasing heights (Baten & Böhm 2009). All in all studies proof that heights display trends and fluctuations in living standards. A'Hearn sums up that "in almost all cases patterns of variation are not attributable to genetic potential, but correspond well with observable differences in income, the disease environment and other factors known to affect average net nutrition data" (A'Hearn 2003:345-355). The display of living standard can then be used to compare the differences, i.e. the inequality within a country. The unequal allocation of nutrients and the different access to medical care let the height of people vary more than due to the biological variance (Baten, Foldvari, van Leeuwen, van Zanden 2010).

The height specifications were collected from historical literature. Most of the data exists of individual height measurements and only a minimum are average heights of populations or tribes. The tribes of former countries were converted according to today's borders. I only used adults older than 18, because younger have not yet reached their final height, which would lead to a downward bias. At the same time people start to shrink after an approximate age of 50, that's why they are excluded from the data (Komlos & Kriwy 2003). Anyhow, many measurements go back to recruits for the military and bias the sample. They do not represent the whole population, because recruits are more equal distributed than the population because of height boundaries. This overrepresentation of recruits is visible in a histogram that shows high density for heights around 166-168 centimeters and is displayed in the appendix (A1.2). Heights are not normally distributed when all observations are included. The bias follows from tribes of short nature, like the African pygmies. I deleted these tribes to avoid outliers and assure normal distribution.

A further bias could result from location of measurement. People from large cities are often smaller than those of the countryside. One possible explanation is the cultivation of crops that gives the nearness to nourishment. A second one is the lower average

income and higher prices within large cities. This might be extreme in the beginning of structural change, i.e. industrialization. When a certain threshold level of economic development is reached the height in both, rural and urban areas, increases. This relation yields mainly for developed countries. In developing countries the relation is vice versa³. Another problem of the data is the comparison of different professional groups. The problem that arises with recruits and soldiers is already mentioned. But students are in average taller than peasants for instance. A possible explanation is the better economic condition of their family background. The social position of their parents is statistically higher and makes better nourishment possible. If a sample does only consist of students the real inequality is not displayed (A'Hearn 2003). In the data used here, most of the drawbacks can be neglected. Though an overrepresentation of recruits exists, in more than 20,000 observations nearly all social groups are included and observations from the periphery and urban areas are balanced. Age misreporting and age estimations are not a huge problem because birth cohorts for all five years are constructed. In addition one might have doubts about the gender constitution of the data for different countries. This problem was solved by converting female heights into male heights.⁴

How did I use the height measurements for estimating inequality? Possibilities are standard deviations or variance. As Baten found out, standard deviations are not proper for the measurement due to the increase with average height (Baten 2000). Instead he suggests a gini coefficient calculated by

$\text{gini}_{it} = -33.5 + 20.5 \cdot \text{CV}_{it}$, with

$$\text{CV}_{it} = \frac{\sigma_{it}}{\mu_{it}} \cdot 100.$$

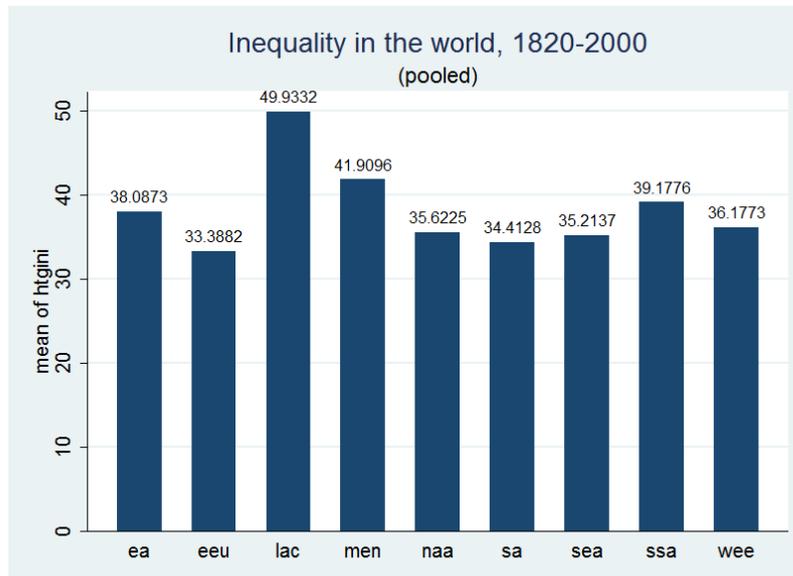
The height ginis are calculated for each country i to a given time t . The time period is set to intervals of five years. σ is the variable for the standard deviation, μ for the mean. Baten tested the robustness of these formulas. He found out that social and occupational differences are reflected in a satisfying manner. Furthermore, a high correlation with income ginis underlines the usefulness of the measures (Baten, Foldvari, van Leeuwen, van Zanden 2010).

³ See Mironov 1999. The peasants have higher energy consumption and are potentially exploited by the landlords.

⁴ Thanks to Prof. Baten for his formula, looking as follows: Male height = 24.9879 + 0.9175 * female height

The next step is to use the numbers. Figure 3 shows the inequality in different world regions over the whole time period from 1820-2000. Which within-country inequality differences would one expect in different world regions?

Figure 3: Inequality in the World, 1820-2000



(Source: Own calculations, see Appendix A1.8)

As described by other researchers it is clearly visible that Latin America is the most unequal world region over the last two centuries. The roots of this go back to periods of high unemployment under the colonial era, according to Bertola (Bertola et al 2009). During that time domestic wealth was concentrated and simultaneously international dependency developed. Latin America is followed by Northern Africa and the Middle East. I present how the inequality developed in each world region over time in the Appendix. With this new dataset it is especially interesting to take a look at the inequality on the African continent. The south of the continent is apparently more equal than the rest. The highest inequality can be found in the middle. Here are the poorest countries and the most limited vegetation. The northern countries have closer contact to European economies, which might cushion the situation (A1.6).

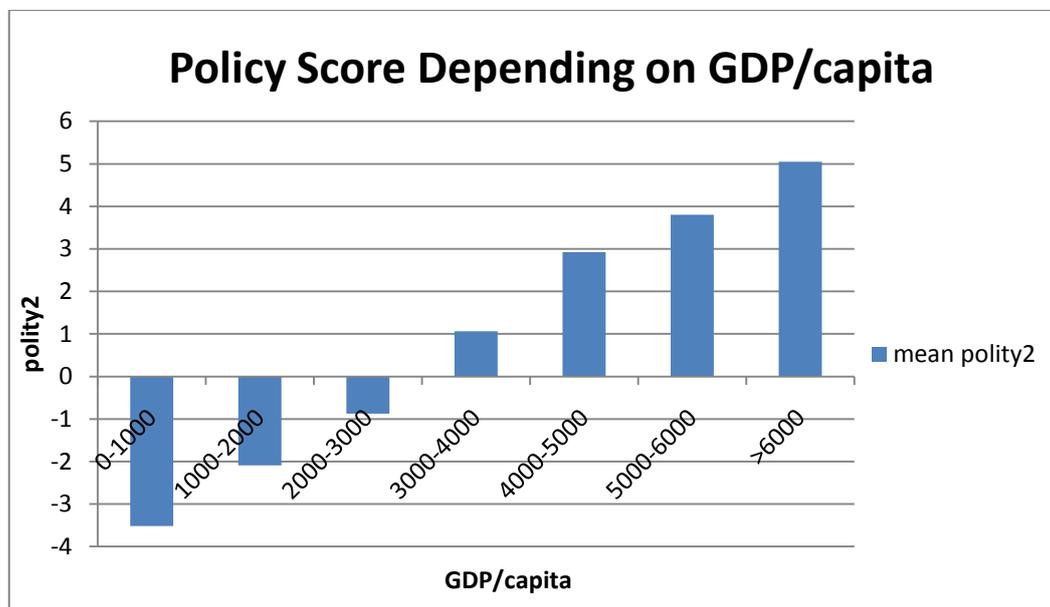
4.3 Other Independent Variables

4.3.1 Economic Development

To measure the relation between inequality and democracy we need to control for several other variables that might have an impact. Without doubt, the most important influence factor is the economic development. Moffett mentions four reasons why the economic development plays an important role. First, economic development fosters the demand of democracy. This is second due to a change of values during economic development. Things as trust, satisfaction and competence become meaningful. Third, economic development is accompanied by education. More educated people demand political rights and therefore democracy. Finally, economic wealth is a precondition to redistribute. Redistribution is possible as soon as the government has the necessary resources. Then economic inequality can be smoothed and political clashes avoided.

After this short description one would expect a positive impact of economic development on democracy. Which impression does the data give?

Figure 4: Policy Score Depending on GDP/capita



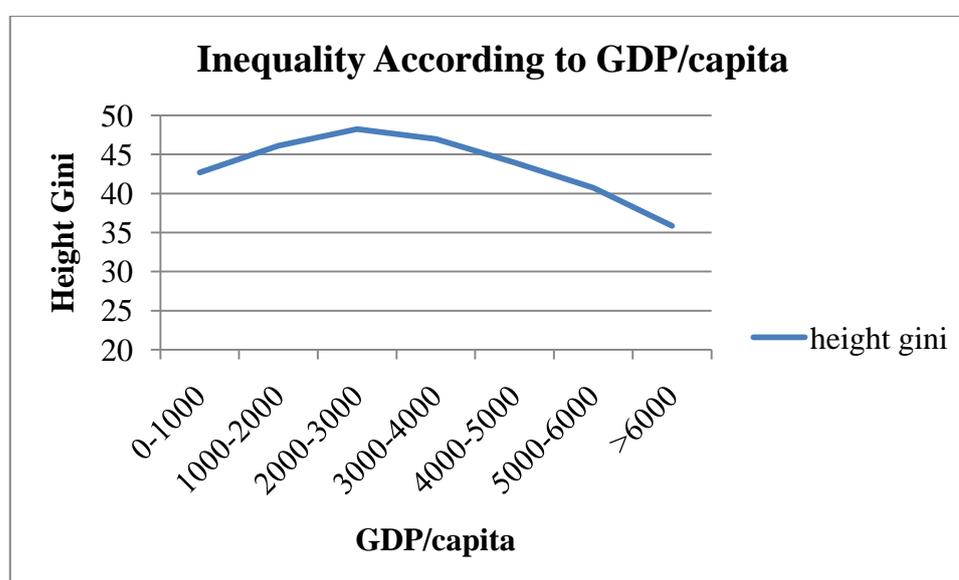
(Source: Own calculations, see Appendix A1.9)

Figure 4 plots average policy scores depending on the GDP per capita. The basic variable (POLITY2) ranges from -10 (autocracy) to +10 (democracy). A clear upward trend is visible depending on the GDP per capita. While in countries with a GDP per

capita below 3000\$ the average policy score is negative, i.e. autocratic regimes, it becomes positive in countries with a GDP per capita above 3000\$. This does not mean that poor countries cannot live under democracy. I want to emphasize that these are average values pooled over countries and birth decades. Anyhow, the relationship leaves no doubt that economic development is an important influence factor. It implies that an increase of the level of development produces an increase in the level of democracy.

Furthermore economic development stays in relation with inequality. Here the inverted U-shape relation, first introduced by Simon Kuznets, is displayed for the used data. Clearly visible, middle income countries have the highest inequality.

Figure 5: Inequality According to GDP/capita



(Source: Own calculation)

This result, i.e. that the highest levels of inequality occur in countries with intermediate levels of economic development, holds across a wide variety of datasets (Muller 1995). The fact that it is also displayed here, underlines the reliability of height ginis to measure inequality. The theory behind the Kuznets curve was generated on the structural change from agriculture to industry. Especially in poorer countries the agriculture constitutes the bulk of economy. Then, the industrial sector with higher wages starts to develop. The inequality within this sector is higher than in the rural area. As economic development takes places, people shift from agriculture to industry. These people increase their income and at early stages the inequality in society is extreme. The more workers move to industry, the lower became the agricultural sector. More people

earn a higher wage and more workers that started at the bottom of industrial work increase their income. The wages increase in agriculture as well due to lack of workers. So, at later stages of development, the inequality decreases (Barro 2000).

4.3.2 Control Variables

Although economic development and inequality are the most important economic determinants of democracy, further noneconomic variables need to be taken into account. By that way the true impact of the economic determinants can be found out. The quantity of possible control variables is large if one takes all suggestions of researcher into account. I tried to cover the plausible and most important ones.

Some scholars indicate that the predominant religion in a country stays in relation with the political regime. But what has religion to do with democracy? First introduced by Lipset (1959) was the idea that Protestantism fits to democratic values, as tolerance. Islamistic countries are on the other hand more often non-democratic. Bollen and Jackman claim Islamic countries to be less likely to democratize or at least that democracies are less stable in Islamic countries, too (Bollen & Jackman 1985). Sincerely, this is not always true. Democracies can exist in mainly Islamic countries and dictatorships can occur in Christian countries. India as a non-Protestant country is a democracy, while Nazi Germany is an example for a dictatorship in a non-Islamic country. Nonetheless, many researchers claim that Protestant values facilitate the emergence of democracy. If in fact a relation exists, it will be seen during the regression analysis. The idea is that in the Islamic religious culture no or only a weak distinction between religion and politics exists. Political participation was a historically rareness (Muller 1995). Barro (2000) however found in his regressions that Protestant countries are mainly democratic and confirms the idea that Moslem countries are less likely to democratize. Besides the impact of single religions, the religious composition of a country might also play a role. Przeworski claims that in religious heterogenous countries political systems are less stable (Przeworski 2000). I consider the religious impact by including the shares of Moslems, Catholics and Protestants in a country. Furthermore a variable (RELD) measures the fractionalization. It is calculated as

$1 - \sum(p_i^2)$, with p_i as the share of Protestants, Catholics, Moslems and others in the population.⁵

In connection with this is also the ethnological fractionalization, including language, culture and ethnicity. Barro describes that the more heterogeneous a country, the more difficult is it to sustain democracy (Barro 2000). The dataset contains different measurements of fractionalization. These differ slightly and show different results in the regression, which will be discussed later on.

Lipset (1969) argues that the British rule during the colonial time provided crucial learning experience for subsequent democracy. Similar positive impact was stated by Bollen and Jackman as well as Przeworski. On the other hand, Belgium, France, Netherlands, Spain, and Portugal left their colonies in a way that hamper a democratic transition. The Brits however introduced reforms that facilitated the way towards democracy (Bollen & Jackman 1985). These reforms are for instance bureaucratic structures or the rule of law (Rueschemeyer et al 1992). The data set includes therefore a dummy variable taking on a one if the country was a former British colony after 1919, and zero otherwise.

Besides the colonial heritage, Przeworski mentions the phenomenon of political learning in general. A country with more transitions in the past is less likely to be stable in future (Przeworski 2000). The political learning is given consideration with a variable counting the experienced transitions to authoritarianism in a country.

Whether a country is oil-exporting is indicated by a dummy variable coded one if the average ratio of fuel exports to total exports exceeds 50%. Source of the information is the IMF 1999. The reason why oil production stays in contact with the political regime is given by Barro. He states that with oil export, income can be generated which a benevolent dictator can distribute and keep the political atmosphere calm. This creates less pressure for democratization than income generation associated with the accumulation of physical and human capital (Barro 2000).

Other factors that might also have an impact are included into the data set. The number of other democracies in the world, for instance is claimed to be an influence factor on a

⁵ The data belongs to the dsdata friendly provided by Prof. Baten. It was acquired from Leksykon Pan'stw S'wiata and Encyclopedia Britannica's online Statistical Info for Countries.

particular country. Considering the European Union, one can ascertain that bordering countries become more and more democratic or rather stay democratic. Whether the political environment really has an impact on political system within a particular country will be seen during the regression. The variable is measured as the percentage of democratic regimes within a year.

Another possible influence factor on the regime in a country is the geographic dispersion. It is based on 400km² cells and calculated as an index with a range from one to zero. One indicates total concentration of the population in one area. Theoretically it could be more difficult to rule democratically in a widespread country. For example, politicians claim that Russia is more difficult to rule because of the huge size and the distribution of the population.

A further dummy variable is included, that is coded one for every year in countries that become independent after 1945. It is acquired from Bank's Political Handbook of the World (1997). Behind this variable is the assumption, that younger countries are less stable. Durable democracies have often grown over a longer period of time.

Certainly other influence factors are also assumable. Human capital, demographic effects, urbanization or structural changes are not covered in particular variables but displayed through others. Economic development, for instance, is closely associated with an increase in education, which promotes political attitudes in favor of democracy (Muller 1995). Increases in literacy, mass communication, and social mobilization intensify the demand of democracy in a population (Bollen & Jackman 1985). These factors are highly connected with economic development. The drawback that they are not particularly added to the data is weak. An additional inclusion would strengthen the problem of multicollinearity, whose possibility of existence cannot be excluded with the mentioned variables either. The distribution of religions is correlated with each other, for instance. Another example is the relation between inequality and GDP (Kuznets). Multicollinearity will be a problem when I discuss the impact of each explanatory variable on democracy, because the p-values can be misleading. A solution suggested by Wooldridge is the increase of observations. A robustness test will show whether the results differ with less observations. I will also try to drop variables. I keep in mind that this can lead to a bias if the variable is essential for the model (Wooldridge 2009). Here I want to point out that multicollinearity might be a problem. The handling will be

discussed later on. Table A1.9 in the appendix summarizes the descriptive of the most important variables in the regression.

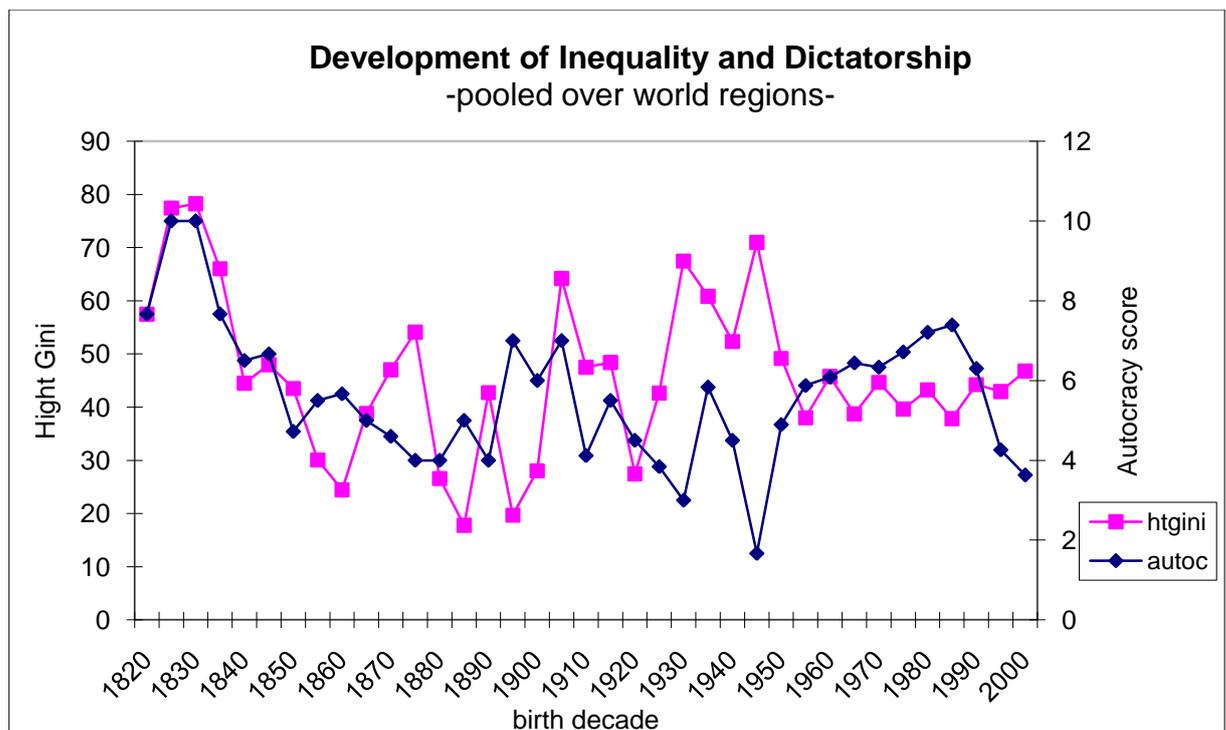
5. Analysis

5.1 Descriptive Analysis

Some first impressions are already gained through the description of the particular variables. Before undertaking the regression analysis, I take a bit closer look at the data.

Looking at the long-run development of democracy in the world and adding the long-run development of autocracy score one would suspect an increasing autocracy score in times of increasing inequality. This is at least what some researchers predict claiming a negative relationship between democracy and inequality. Figure 6 shows the relationship pooled for all countries.

Figure 6: Development of Inequality and Dictatorship



(Source: own calculations)

As visible in Figure 6, the autocracy score and the height gini develop in a similar manner. A decrease in the autocracy score, i.e. an increase in the democracy is attended by a decrease in the height gini. Especially during the first decades from 1820-1850 the path is almost identical. Even later on amplitudes in the autocracy score are accompanied by amplitudes in the height gini. This supports the thesis that more egalitarian societies are more often democracies. The only exception is around 1950 when the autocracy score decreased but the inequality stayed high. A possible explanation is the interruption in the political regimes after World War II. But in general the similar path is quite impressing. Furthermore, important political intersections are displayed. The highest inequality values are reached immediately after the Great Depression and the World War II.

Now we table the most important influence factors to get a first impression whether a relationship between the regime and the variables can be seen. The following cross table chart shows the different values for the two cases, democracy, or dictatorship. Basis for this evaluation is the democracy value in the Polity IV dataset. Here the mean calculation is pooled over all countries and decades. A separation for world regions is displayed in the appendix A2.1.

Table 2: Cross-table

	dictatorship	democracy
Htgini	43.48991	40.66941
GDP/capita	2254.025	8019.555
Newc	0.5941176	0.325
Reld	0.3082312	0.317304
Odwp	0.391919	0.430116
Britcol	0.242647	0.2520833
Cath	27.48632	41.31979
Prot	9.899559	21.99417
Moslem	35.53985	9.694167
Oil	0.13971	0.045833
Fearon	0.530883	0.383213
Geogia	0.6034529	0.610867

It is directly visible that - in average - countries under a dictatorship have higher inequality and an amazing lower GDP per capita. These results are consistent with Houle 2009 and several other studies. Furthermore, dictatorships are more likely in countries that became independent after 1945 (NEWC). The share of other democracies in the world (ODWP) and a British colonial heritage (BRITCOL) show no huge

difference under the two regimes. Very interesting is also the question whether religion has an impact on the regime. The values indicate in a clearly manner that democracies have a higher share of Christians. Under dictatorship the percentage of Moslems is apparently higher than under democracy, i.e. 35% compared to 9%. The religious fractionalization itself shows no huge differences between the regimes. In addition, it seems to be important whether a country is oil producing. Nearly 14% off dictatorships are oil producing, while in democracies these are only 4%. Ethnical fractionalization shows a slightly higher value in autocratic regimes. The geographical dispersion does not differ.

The next table displays the different inequality values by per capita income differentiated by the regime. The data is pooled over all countries and decades.

Table 3: Inequality by per capita income

Level	Democracies		Dictatorships		All	
0-1000	42.64	(10)	42.71	(33)	42.69	(43)
1000-2000	48.18	(13)	45.26	(32)	46.1	(45)
2000-3000	48.99	(16)	47.34	(13)	48.25	(29)
3000-4000	46.98	(11)	46.98	(9)	46.99	(20)
4000-5000	51.11	(7)	37.69	(8)	43.96	(15)
5000-6000	41.59	(12)	38.04	(4)	40.71	(16)
>6000	35.87	(86)	36.14	(1)	35.87	(87)

Note: Number of observations in parentheses.

In contrast to the theory, democracies do not have lower inequality. The opposite is true and for nearly all levels of income the inequality in authoritarian countries is lower than in democratic ones. Visible is also the above discussed Kuznets effect. During the middle incomes (2000-5000\$ per capita) inequality is highest irrespectively from the political regime. The numbers in parentheses are the numbers of observation for each case. While 86 democracies have a per capita income above 6000\$, this yields only for one dictatorship. Autocratic regimes are much more existent in poorer countries.

5.2 Regression Analysis

The descriptive analysis helped to get a first impression. Whether a relationship between the variables exists and how it looks like will be seen in this section. The empirical analysis proceeds in several stages: First, I take a closer look at the time 1820-2000 only considering the political regime, the inequality and the GDP. Then I go a step further and take all possible explanatory variables into account. This over identified model will then be restricted step by step until the best fitting model is found. Then I check the robustness of the model, controlling for potential outliers and varying the number of observations.

5.2.1 The Very Long Run: 1820-2000

After summarizing theoretical effects and the introduction of the data, now the results of the empirical investigation will be discussed. How is the model specified and which results can be gained from this examination? As mentioned above I used different data sets. The polity IV data makes a long-run investigation from 1820-2000 possible. Unfortunately, it misses other independent variables besides inequality and GDP per capita. Nonetheless, the Polity IV data is useful to see a first correlation between inequality and democracy.

Boix (2000) criticizes other studies that found a negative relationship that they did not tested whether a nonlinear relationship is existent. To improve these studies I test whether the relation follows a linear path before running the first regressions. The results leave no doubt that an inverted U-shaped relation is existent (see Appendix). Hence, a squared height gini is included in the model. The first equation to be estimated with the restricted Polity IV data is:

Model 1:

$$\text{reg}_{it} = b_0 + b_1 \text{percapitagdp}_{it} + b_2 \text{htgini}_{it} + b_3 (\text{htgini}_{it})^2 + e_{it},$$

with i as the country and t as the time period. I used a logistic model for panel data, because REG is the democracy dummy that can only take values between 0 and 1. An

OLS regression would be problematic, because the assumptions are violated when using a binary response variable. I tested random as well as fixed effects and controlled for robust standard errors. The results are displayed in Table 4.

Table 4: Logistic Regression of Democracy and Dictatorship

	(1)	(2)	(3)	(4)
COEFFICIENT	reg	reg	autoc_dum	autoc_dum
percapitagdp	0.000526*** (0.0000936)	0.000463*** (0.000107)	-0.000375*** (0.0000792)	-0.000293*** (0.0000875)
htgini	0.378*** (0.135)	0.261* (0.144)	-0.225** (0.104)	-0.134 (0.105)
htgini_squ	-0.00412*** (0.00145)	-0.00297** (0.00150)	0.00241** (0.00111)	0.00154 (0.00110)
Constant	-9.801*** (3.183)		5.464** (2.471)	
Observations	374	233	374	243
Number of cono	51	25	51	27

Note: Standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Model (1) and (3) refer to random effects, (2) and (4) to fixed-effects

The table displays the results for two different transition dummies. REG bases on the polity2 value and takes on the value 1 if a country becomes a democracy. AUTO_C_DUM however works the other way around. It bases on the autocracy score in the Polity IV data. A one indicates that a country becomes an autocracy. The coefficients should show the opposite sign for each variable to confirm the results. For both models a regression with random and fixed-effects was performed, but we have a huge loss of observations during fixed-effects regressions. Let's first discuss regression (1) and (2). In both cases the GDP per capita has a statistically significant positive impact on the probability that a regime changes to a democracy. So far, this is no new insight and confirms results of other researchers. But what's about inequality? The height gini itself has a positive sign, the squared one a negative, confirming the hypothesis that the relationship between democracy and inequality is inverted U-shaped. If the squared height gini is left out, the impact of height gini itself becomes insignificant. This is a further confirmation that the relationship between inequality and democracy follows an inverted U-shaped path.

Let us turn to regression (3) and (4), which focus on the impact of variables on the probability that a regime is a dictatorship. The signs of the coefficient must be the other

way around than in the former two models. The results show that this is exactly the case. A higher GDP per capita lowers the probability that a political regime becomes a dictatorship. Inequality however increases that probability but follows an U-shaped path. The results are mainly significant. The only exception found is for the autocracy dummy when I controlled for fixed-effects.

In the appendix, a third regression with another dependent variable (DEMOC_DUM) is displayed. This bases on the democracy value, as suggested by Baten and Fraunholz, and can be seen as a substitute for model (1) and (2). It confirms the results and provides significant estimates under random and fixed effects. In addition, this validates the robustness of the model.

I controlled for robust standard errors, although the necessity is still disputable for binary response models in econometrics. The results differ for the different dependent variables. In the first case (REG), the results stay significant. In the other cases, the inequality coefficients become insignificant while those for the GDP do not.

One can conclude from this first investigation that a relationship between inequality and democracy is without a doubt existent. In case of the random-effects estimation a period of 180 years and 51 countries are considered, covering all continents of the world. The drawback lies in the lack of other important independent variables. That's why I gave up some years of observation gaining further explanatory variables using another dataset.

5.2.2 Determinants of Democracy

From the section above it seems that economic performance and inequality are the main explanatory factors of democracy. To determine their real impact, other potential influence factors need to be taken into account. Therefore, let's go a step further and consider a complete model. I used the dsdata set introduced above because it contains all control variables and covers the period from 1950-2000. Then, I merged this with the Polity IV data set and my inequality data containing the height ginis.

Przeworski has written much about the emergence and stability of democracies in the world. In a panel analysis from 1950-2000 he determined possible influence factors of a

regime transition to democracy as well as dictatorship. In a further part he describes the connection between inequality and democracy. Unfortunately he lacks a regression model that incorporates an inequality variable. His empirical analysis concerning the impact of inequality focuses on descriptive statistics indicating regime transitions for different gini coefficients and labor shares. In this section, a progress to the analysis of Przeworski will be made. The height ginis measuring inequality will be part of the regression model. First, I re-estimated a model that is quite similar to the one of Przeworski (1). Then, I incorporated inequality in the regression (2) and tested different models, starting with the broadest and taking out variables step by step (3 and 4).

Table 5: Logistic Regression Results: Determinants of Democracy

COEFFICIENT	(1)	(2)	(3)	(4)
	democ_dum	democ_dum	democ_dum	democ_dum
n_growth	0.111*** (0.0359)	0.164** (0.0684)	0.117** (0.0495)	
htgini		1.307** (0.578)	0.779* (0.405)	1.029** (0.427)
htgini_squ		-0.0138** (0.00606)	-0.00853* (0.00438)	-0.0112** (0.00460)
odwp	15.26*** (3.221)	27.11*** (8.474)	19.82*** (5.493)	20.66*** (5.810)
nlevlag	0.00102*** (0.000235)	0.00156*** (0.000498)	0.00111*** (0.000298)	0.000702*** (0.000215)
reld	-7.853* (4.245)	-14.77* (8.276)	-7.692 (4.883)	-8.687* (5.100)
cath	0.0171 (0.0235)	0.0555 (0.0354)	0.0302 (0.0261)	0.0443 (0.0297)
prot	0.0544 (0.0482)	0.177 (0.118)	0.0799 (0.0649)	0.126* (0.0760)
moslem	-0.0750*** (0.0289)	-0.0629 (0.0385)	-0.0661** (0.0309)	-0.0711** (0.0359)
oil		-29.54 (24295)	-29.71 (121518)	-26.06 (25094)
newc	2.283 (1.818)	-0.961 (2.905)	2.676 (2.128)	
britcol	4.782*** (1.704)	6.632** (2.930)	4.682** (2.077)	5.523** (2.469)
stra	-0.117 (0.466)	-2.378** (1.011)		-2.020** (0.867)
geogia		-9.766* (5.186)		
krain		7.066* (3.920)		
Constant	-8.568***	-39.74***	-28.41***	-31.55***

Table 5, cont.

	(2.832)	(13.84)	(9.691)	(10.25)
Observations	385	236	248	248
Number of cono	51	47	50	50
Wald chi2	36.66	13.44	22.35	21.68
Prob>chi2	0.0001	0.5687	0.0338	0.027
LL	-96.5653	-44.45967	-52.32001	-53.4997
AIC	217.1306	122.9193	132.64	132.9994
BIC	264.5695	181.8045	181.282	178.674

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, *p<0.1

Table 5 shows the different model specifications. Model 1 refers to the re-estimation of the Przeworski model, leaving out inequality and other possible influence factors on the emergence of democracy. This model shows the meaning of the economic development for democracies. The insight from the descriptive analysis is strongly confirmed. Economic growth and the level of the GDP per capita increase the probability of democracy. Both coefficients are highly significant. This is consistent with Huntington's thesis which states that poor economic performance undermines the legitimacy of authoritarian regimes and is thus a cause of democratization (Huntington 1991). A further very decisive influence factor is the share of other democracies in the world. This increases the probability that democracy emerges in a certain country. Very interesting is the relation between democracy and religion. Do the religious composition and the particular religions really have an influence on the political regime? The regression results indicate that. Even if the significance of the religious fractionalization coefficient is weak, it apparently hinders the chances for democracy. The impact of the single religions is not that clear. The signs of the coefficients confirm the hypothesis, that Christian values promote democracy, while a huge share of Moslems in a society decreases the probability. Nonetheless, I need to mention that only the coefficient for Moslems is highly significant. In contrast, the question whether the country became independent after 1945 (NEWC) and the sum of past transitions to authoritarianism (STRA) have no influence. The situation is different for the question whether a country was a British colony. This indeed enhances the chances for democracies. The results are mainly consistent with the ones of Przeworski who applied a dynamic probit model. The signs of the coefficients agree in most points. Furthermore, the model itself performs very well. The overall significance is high ($p=0.0001$).

So far, the investigation repeats models that were already estimated by other researchers in a slightly different manner. The results show a huge accordance with the results of Przeworski. The dataset seems to be reliable so that we can go a step further and incorporate inequality in our model. The estimation method stays a logit model. Model 2 is the unrestricted model, looking as follows:

Model 2:

$$\text{democ_dum}_{it} = b_0 + b_1 \text{n_growth}_{it} + b_2 \text{htgini}_{it} + b_3 (\text{htgini}_{it})^2 + b_4 \text{odwp}_{it} + b_5 \text{nlevlag}_{it} + b_6 \text{cath}_{it} + b_7 \text{prot}_{it} + b_8 \text{moslem}_{it} + b_9 \text{newc}_{it} + b_{10} \text{oil}_{it} + b_{11} \text{britcol}_{it} + b_{12} \text{stra}_{it} + b_{13} \text{geogia}_{it} + b_{14} \text{krain}_{it} + e_{it}$$

I tried different variables measuring the ethnical fractionalization with the result that the Krain index performs best.⁶ The positive impact of economic growth stays the same. The focus however in this model is on the inequality variable. It is clearly visible and also significant, that higher inequality increases chances for democracy. The additional squared term has a negative coefficient and is also significant. If it is left out, the height gini itself becomes insignificant. This confirms the thesis of an inverted U-shaped relationship. The positive impact of inequality on democracy yields until a certain threshold is reached. After this threshold, i.e. in countries that are extremely unequal, the chances for a democracy decrease. The impact of the other factors stay mainly the same compared to Model 1. The chances for democracies increase by the share of other democracies in the world and a colonial heritage. On the other hand, it decreases by religious fractionalization, the sum of past transitions to authoritarianism, and the geographic concentration of the population. These coefficients are all significant. The impact of the particular religions stays the same, even if the coefficients are now insignificant. A bit confusing is the positive impact of ethnical fractionalization. This would mean that a more ethnical dispersed country has higher chances for a democracy. Intuitively, an ethnically equal country is highly expected to be democratic. The sign of the variable vary in other models and is in my opinion not reliable. How does oil as another new variable perform? The sign is negative, which is in accordance with theory. Therefore, oil producing countries have lower chance for a regime transition toward democracy. Anyhow, the coefficient is not significant. The results are satisfying in

⁶ $\text{Krain} = 1 - \sum n/N$, with n as the number of people in the i th group, N as total population and l as the number of ethnic groups within the country.

general. But the overall significance of the model leads me to test other restricted models to improve the information criteria and overall significance.

Model (3) and (4) perform best of all estimated models that are more than could be displayed here. First, I left out the ethnological fractionalization and geographical dispersion. This did not lead to the hoped improvement. First the outtake of the sum of transitions to authoritarianism (STRA) makes the model itself significant. After trying further combinations, the sum of transitions can be left in if growth and the new country dummy are taken out (Model 4). Although growth is very important, the macroeconomic performance is still captured in the GDP per capita. Furthermore, Muller 1995 applied omittance of growth. In these models, the information criteria as well as overall significance are the best. Several other combinations are supposable. Here, nearly all coefficients are significant and confirm the theoretical effects: a positive impact of the share of other democracies in the world, GDP per capita, share of Protestants in the society and a British colonial heritage. On the opposite, the probability of democracy decreases with a higher religious fractionalization, a higher share of Moslems, oil production and transitions to authoritarian regimes in the past. The inverted U-shaped relationship between inequality and democracy is confirmed.

5.2.3 Determinants of Dictatorship

In a next step I run the opposite regressions, measuring a transition towards dictatorship. The dependent variable is called `autoc_dum` and takes on the value one in case of an autocratic regime, 0 otherwise. If the results of the former part are confirmed, we must achieve approximately opposite signs for the different coefficients. Otherwise the variable has an impact on each regime in the same way. I started again with a model according to Przeworski, concentrating on the impact of the economic performance. Then I added an unrestricted model and tested further restricted models to end up with the best fitting ones. Table 6 shows the results.

Table 6: Logistic Regression Results: Determinants of Autocracy

COEFFICIENT	(1) autoc_dum	(2) autoc_dum	(3) autoc_dum	(4) autoc_dum
n_growth	-0.0317 (0.0219)	-0.0260 (0.0246)	-0.0225 (0.0242)	
htgini		-0.551* (0.305)	-0.503* (0.295)	-0.509* (0.292)
htgini_squ		0.00638* (0.00329)	0.00591* (0.00322)	0.00599* (0.00319)
odwp	-9.562*** (2.161)	-11.06*** (3.369)	-11.62*** (3.325)	-11.80*** (3.303)
nlevlag	-0.000357** (0.000145)	-0.000366** (0.000179)	-0.000347** (0.000177)	-0.000270* (0.000149)
reld	-1.243 (2.825)	2.272 (3.488)	-0.893 (3.181)	-0.786 (3.151)
cath	-0.0264 (0.0198)	-0.0273 (0.0235)	-0.0278 (0.0234)	-0.0298 (0.0232)
prot	-0.00854 (0.0285)	-0.0308 (0.0352)	-0.00983 (0.0321)	-0.0174 (0.0312)
moslem	0.0163 (0.0217)	0.00975 (0.0265)	0.00761 (0.0264)	0.00805 (0.0263)
newc	1.035 (1.289)	2.260 (1.618)	2.164 (1.534)	2.282 (1.523)
oil		0.723 (2.298)	0.539 (2.349)	0.318 (2.326)
britcol	-0.752 (1.206)	-0.912 (1.448)	-0.449 (1.433)	-0.493 (1.430)
stra	-0.137 (0.455)	0.421 (0.584)	0.444 (0.588)	0.470 (0.587)
geogia		2.929 (2.809)		
krain		-2.385 (2.478)		
Constant	5.266** (2.126)	14.78** (6.776)	15.24** (6.757)	15.24** (6.657)
Observations	385	236	248	248
Number of cono	51	47	50	50
Wald chi2	35.9	22.92	23.83	24.64
Prob>chi2	0.0001	0.0858	0.0327	0.0166
LL	-146.1922	-85.39005	-88.48614	-88.26487
AIC	316.3843	204.7801	206.9723	205.9297
BIC	363.8233	263.6652	259.6737	255.1177

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, *p<0.1

In contrast to the democracy model, growth never has a significant impact. The sign however is negative, that economic growth lowers the probability of dictatorship. The lagged level of GDP per capita has also the expected negative sign. In all four models

this coefficient is statistically significant. If we concentrate for a while on Model 1, we leave out inequality. In accordance with the democracy model, a high share of other democracies in the world lowers the probability that a regime becomes autocratic. This yields also for former British colonies and the share of Christians in society, although the latter have no significant coefficients. Unfortunately, most of the coefficients are not significant. But even Przeworski did not achieve high significance values for many variables. The model itself performs very well ($p=0.0001$). Let's go a step forward and incorporate inequality and all other possible explanation variables. In contrast to the democracy model, the overall significance is in all cases satisfying, but not the high values of the information criteria. Model restrictions improve some indicators, but they change other for the worse. All in all the changes are small and some general results can be gained. The unrestricted Model 2 shows that, for the probability of an autocracy, a significant U-shape relation exists with inequality. Exactly in contrast to the democracy model the coefficient of the height gini is negative, that of the squared height gini positive. A higher inequality also decreases the probability of autocracy, whereas very equal and very unequal societies have the highest probability for a dictatorship. For this model I tested again what happens if the squared height gini is left out. As in the democracy case, the height gini coefficient itself becomes insignificant. Hence, measuring dictatorship, the relation to inequality is U-shaped. The existence of many democratic countries in the world and a prospering economy hinders autocracies. For all other explanatory variables no significant values could be gained in the unrestricted model. If the geographic dispersion and ethnological fractionalization are taken out, the performance of the model becomes better. The coefficients however do not change their direction with exception of the religious fractionalization. An improvement could also not be reached if the sum of past transitions towards autocracy is taken out (STRA), which does only reach insignificant coefficients (not shown here). The outtake of the growth rate (N_GROWTH) does again improve the fitness of the model itself, but many of the explanatory variables stay insignificant. The sign however are in accordance with Przeworski's transition to dictatorship model and opposite to the democracy model, as expected.

We can summarize that a high share of Moslems in society, countries that became independent after 1946 and oil export make a country more likely to live under an authoritarian regime. In contrast, the probability decreases with increasing income, other democracies in the world, shares of Christians in society and a British colonial

heritage. The relationship between autocratic regimes and inequality is U-shaped. This means that middle inequality countries are least likely to be autocratic.

5.3 Comparison and Discussion of the Models

5.3.1 Comparison

So far I reported models measuring the probability that a country is democratic or autocratic. For the democracy dummy, I have two different variables (REG and DEMOC_DUM). Just to remember, the latter bases on the democracy score and the former on the polity2 variable, both from the Polity IV dataset from the University of Maryland. The regressions do not differ a lot. The different model specifications are displayed in the appendix (A2.4). Here in this new regression, the variables connected with religion gain significant coefficients. This can be seen as an additional proof of the effect on the political regime. Even the impact of the geographic dispersion, ethnic fractionalization and summed past transitions to an autocratic regime have a significant influence on the chances that democracy occurs. To make a comparison of all models possible I arrived at the following model:

Model 3:

$$\text{reg}_{it} = b_0 + b_1 \text{ngrowth}_{it} + b_2 \text{htgini}_{it} + b_3 (\text{htgini}_{it})^2 + b_4 \text{odwp}_{it} + b_5 \text{reld} + b_6 \text{nlevlag}_{it} + b_7 \text{cath}_{it} + b_8 \text{prot}_{it} + b_9 \text{moslem}_{it} + b_{10} \text{oil}_{it} + b_{11} \text{britcol}_{it} + e_{it}$$

This model is truly not the best for all dependent variables as seen before. REG can be substituted by the two other regime dummies. For the sake of comparison I juxtapose the regression results in Table 7.

Table 7: Logistic Regression Results - Comparison

COEFFICIENT	(1) democ_dum	(2) Reg	(3) autoc_dum
n_growth	0.117** (0.0495)	0.102** (0.0463)	-0.0231 (0.0240)
htgini	0.779* (0.405)	0.741** (0.356)	-0.513* (0.291)
htgini_squ	-0.00853* (0.00438)	-0.00791** (0.00383)	0.00605* (0.00318)
odwp	19.82*** (5.493)	19.05*** (4.997)	-11.30*** (3.256)
nlevlag	0.00111*** (0.000298)	0.000958*** (0.000267)	-0.000339** (0.000170)
reld	-7.692 (4.8 83)	-3.248 (3.584)	-1.026 (3.064)
cath	0.0302 (0.0261)	0.0245 (0.0231)	-0.0238 (0.0220)
prot	0.0799 (0.0649)	0.0573 (0.0496)	-0.00876 (0.0310)
moslem	-0.0661** (0.0309)	-0.0524** (0.0266)	0.00763 (0.0255)
oil	-29.71 (121518)	-25.60 (31740)	2.027 (1.473)
newc	2.676 (2.128)	0.647 (1.665)	0.336 (2.254)
britcol	4.682** (2.077)	4.139** (1.810)	-0.432 (1.376)
Constant	-28.41*** (9.691)	-27.37*** (8.729)	15.41** (6.646)
Observations	248	248	248
Number of cono	50	50	50
Wald chi2	22.35	23.6	24.47
Prob>chi2	0.00388	0.0231	0.0176
LL	-52.32001	-57.044	-88.7858
AIC	181.828	191.2766	254.7595
BIC	132.64	142.0886	205.5715

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, *p<0.1

All three models show an overall significance from at least 5%. Nonetheless, we need to keep in mind the problem of multicollinearity. As one can see in regression (1) and (2) the coefficients shows the log odds of the variable that the country is a democracy. Model (3) works the opposite way: how are the log odds that the country is a dictatorship if the independent variables change one unit?

What does influence the emergence of democracy? As already seen in the regressions in the two previous sections, the economic development of a country plays a decisive role. The economic growth and the lagged real GDP per capita increase the chances for democracy and decrease the probability of dictatorship. The focus in this paper lies on the relationship between inequality and democracy. The hypothesis of the inverted U-shaped relation can be confirmed in every regression. The height gini itself has a positive sign when we refer to model (1) and (2). For the model (3), measuring the odds of autocracy it has a negative sign. If the inequality increases in a country, the chances for democracy also increase. This sounds a bit unusual and might be connected with the level of GDP per capita. Here the Kuznets relation becomes visible. In countries with an increasing GDP, the inequality increases in the beginning and decreases after reaching a certain threshold. For the relationship between democracy and inequality it seems to be exactly the same. The squared height gini has a negative sign in model (1) and (2), a positive one respectively if we consider the odds of an autocracy. The coefficients are all statistically significant. We can conclude that a certain range of inequality exists, where the chances for a democracy are highest. What about the other influence factors? Here the impression started by Przeworski and many other researchers are mainly confirmed. Without doubt an environment of democracies enhances the chance in a country to get rid of an autocratic system and to live under a stable democracy. At the same time the chances for dictators decrease if the number of democracies in the world increases. The development of the European Union can be mentioned as an example for this phenomenon. More and more countries at the external border of the Community become democracies.

The impact of the religion has become in the centre of interest since a new conflict between the Islamic and the Western World has broken out. Does Islam prevent countries from becoming democratic or are the religious and democratic values compatible? The idea is that Christian values have a huge overlap with the democratic ones. The data gives some hints with regard to this hypothesis. The coefficient of the share of Christians are constantly positive controlling for democracy and negative for autocracy. Nonetheless, one has to admit, that the coefficients are not statistically significant. In other restricted models however, significant values were achieved. At the same time, the impact of the share of Moslems in a country is negative on the chances for a democracy and positive for autocracies. Furthermore, these coefficients are in two of three cases significant. The measurement of religious fractionalization was in none of

my regressions significant. One can conclude that rather the predominant religion has an important impact than the number of religions within a country. Anyhow, in other restricted models, the religious fractionalization is also important. It sometimes changes its sign, but especially in the regressions with the democracy dummy called REG (see appendix) show a significant negative impact on the probability of democracy. This is why reaching transitions to democracy and stabilizing already implemented democracies could be a challenge in the future multicultural world. It will surely be an interesting insight for an ongoing discussion, whether Islamic immigrants put the democracies at risk. What is left is the impact of oil production, the colonial heritage and whether a country became independent after 1945. To start with the last, no clear impact could be made out. The signs of the coefficients hint at a positive relationship between democracy as well as autocracy, but do not achieve high significance values. What does it mean if a country is oil producing? For the chances of a democracy it is counterproductive and enhances the probability of an autocratic regime. However, even in the restricted models I tested, the coefficients never reached a significant level. A Hausman test showed that nonetheless, oil production is an important influence factor and that the variable may not be left out. Very interesting is the historical influence. Do countries that have been a British colony have higher probabilities to become democratic? Here the huge advantage of covering also the African country becomes again visible. The data shows that indeed a relation can be made. The odds for democracies increase significantly if a British colonial heritage is existent. A possible explanation is that the Brits already established institutions. Although the colonial era should not be judged here, the colonial heritage gives politically a good starting position to build up democracies.

5.3.2 Discussion

The described models were all estimated using random-effects. This is one standard method of panel estimation. The other usual one are fixed-effects estimation. This minimizes the problem of sample selection. Fixed-effects estimates are calculated from differences within each country across time. Unfortunately not every country provides information about the whole time-period. Furthermore, random-effects estimates are more efficient. This is because information across individual countries and periods are

incorporated in random-effects. I performed a Hausman specification test to see whether I can rely on the random-effects models (Forbes 2000). The test showed that the random-effects model can be used. These estimates are more efficient because they include information across individual countries and across periods. The drawback that they are only consistent if country specific effects are uncorrelated with other explanatory variables can be neglected after the Hausman test. Furthermore, by using random-effects, the problem of a huge loss of degrees of freedom is no longer existent (Hamanka 2008). When I still performed fixed-effects regression many variables are omitted and a complete analysis is no longer possible. These arguments are suggesting that we need to rely on random-effects even if the Hausman specification test came to different results. The test itself is disputed because the assumption that one of the estimators is efficient is demanding. Even if this assumption is not violated, one can get misspecified results in small samples.

A further approach that I want to mention is the use of an instrument variable. An influence of inequality on democracy is as possible as an influence of democracy on inequality. Some studies only test whether democracies reduce inequality after being implemented a certain period of time. This recommends an estimation with an instrument. Former investigations on my topic do mainly resign this. So I stick to the model without an instrument. Furthermore, this instrument variable is hard to find. Durlauf et al (2004) propose the number of municipal townships in 1962, share of labor force in manufacturing in 1990, or the percentage of revenue from intergovernmental transfers in 1962 as an instrument variable for gini coefficients. Data for this is hard to find especially for less developed countries. The specific on the used dataset is the inclusion of many African countries and therefore an equable coverage of all continents. An instrument variable that is only available for parts of the dataset would destroy the new insights that could be gained from the completeness of the data. Therefore, this is an approach for future research.

I do not control for robust standard errors in the section 5.2.2 and 5.2.3 for two reasons. First, the problem and handling of homoskedasticity is highly disputed in case of logistic models in econometrics. Second, the results did not become better through the bootstrap mechanism.

Different possibilities exist to test the robustness of the models. First, I controlled for outliers especially concerning the inequality. A limit of the height ginis is senseless,

because their range was observed and detected outliers were eliminated from the beginning. Therefore, no outliers bias the estimation results.

A further possibility to test the robustness of the model is to create subsamples to vary the number of observations. Here I used the differentiation by world regions. I focused on the three regions with most observations, namely Sub-Saharan Africa, Latin Americas and Western Europe. Most of the coefficient signs stay the same, but the overall significance of the model and the significance of the particular estimators become weak. This might be due to too few observations for the specific world regions, precisely 57 for Latin Americas, 36 for Sub-Saharan Africa and 80 for Western Europe. Then, I excluded all African countries from the regression to obtain a higher number of observations but nonetheless a subsample ($n=203$). The estimation coefficients have indeed lower significance values, but the signs are the same. Moreover, the coefficients are significant for the main explanatory variables. In precise, economic growth, share of other democracies in the world and the lagged GDP per capita increase the probability of democracy. The relation between inequality and democracy is again inverted U-shaped (concrete results in appendix A2.7).

Finally, the different definitions of the dependent variable (DEMOC_DUM vs. REG) can also be seen as robustness test. Although these are two different definitions of the political regime, the regression results are similar. I also run regressions for a different dataset. There, the polity variable distinguishes specific forms of democracy (parliamentary, presidential, mixed) as well as dictatorships (civilian, military, monarchy). I build up a democracy dummy where the first three refer to democracy and the latter to autocracy and run the same regressions. The estimation results (see appendix) confirm former results. We can conclude that the model is robust. The only doubt can come up considering the high insignificance when the number of observations is limited by concentration on world regions. On the other hand, results basing on too few observations are not reliable.

6. Conclusion

The described analysis rests upon a new and meaningful dataset. Especially the selection problem was solved, by adding data for African countries that goes about 200 years back in history. This provides further interesting investigation possibilities. To concentrate on the investigation here, nearly all variables that are discussed in theory to explain democracy are included. The only possible drawback is that an education variable or human capital index is not covered. Przeworski mentions, that income is a proxy for education, so this factor is not totally ignored (Przeworski 2000). This dataset allows for testing empirically the theoretical impact of inequality on democracy. It provides important descriptions of interactions between economic and non-economic influences and the political regime, so that important insights could be gained. The results are impressive but further research could be done in a specific differentiation between consolidation and emergence of democracy. Maybe the impact of inequality differs for these two models.

Several important conclusions can be drawn from this pooled analysis. First, the highest probability that a country becomes democratic is at intermediate inequality levels. These countries are more likely to experience a transition toward democracy than are countries at high or low levels of inequality. Only at these middle inequality levels the regime is willing to deliver power and at the same time the willingness of revolution is threatenful. It would be too easy to claim that only high inequality fosters democratization. In very unequal societies the poor can be too weak for revolution. The importance of the middle class is decisive. Therefore, the doubt that Acemoglu and Robinson did only achieve an inverted U-shaped relation because their investigation was limited on the Western developed world, no longer exists. The inclusion of less developed countries and especially the African continent confirms the results by Acemoglu and Robinson (2006).

The relationship between inequality and democracy equals the one between inequality and development, i.e. the Kuznets curve. Inequality is an inverted U-function of the level of economic development. Countries at intermediate levels of economic development tend to have the highest levels of inequality (Muller 1995). At these very high levels of inequality countries are less likely to become democratic. At certain parts

the positive impact of economic development on democracy can be counteracted by high inequality. This is especially the case for countries in transition to leave the group of least developed countries and therefore highly interesting for development policy.

The most important economic determinants of democracy are economic development and inequality. To determine the true relevance the effects of other noneconomic variables must be taken into account. We have seen in chapter five that the impact factors are manifold. To summarize the results briefly, wealthy countries are more likely to be democratic than poor ones, measured on GDP per capita. Wealth lowers distributional conflicts which makes the emergence of democracy easier. But, other factors also influence the political regime and the amount of political participation. The results are mainly in accordance with the ones of Przeworski, but extended for inequality. Former British colonies are more likely to become democratic. This also yields for Protestant societies, whereas Islamic and fractionalized (religious, ethnological) societies are less likely to leave authoritarianism. A main part plays the political environment. The more countries are democratic in the world, the higher the likelihood that a particular country also changes toward democracy. When politicians want to prevent dictatorships and promote democracy it is nice to know under which circumstances democracy emerges. But, it is also helpful to know, what makes dictatorships more probable. The more Moslems are in the society the higher the probability for an autocratic regime. Furthermore, oil production makes dictatorships more likely. On the contrary, a tough economy, middle inequality, democratic environment, Christian population, and British colonial heritage hinder dictatorships. Countries that are “young” nations, i.e. became independent after 1945, are more unstable. This decreases the chances for both regimes.

These findings have important implications for the understanding of what determines democracy and give in addition new hints for developing politics. The fact that many poor countries as Costa Rica or Mauritius established democracies was not consistent with the main influence of economic performance. The reason which is now found is that besides the GDP even the inequality plays a decisive role. Nigeria or Peru for instance are poor but unequal and experienced several regime transitions (Houle 2009). The dictatorships in South Korea and Taiwan in the 80s and the growth in communist Romania show that growth cannot be the only decisive determinant. Developmental politics should consider that some influence factors as the colonial heritage or religious

composition are important, but cannot be changed from outside. If growth is promoted, one should be careful not to provide a huge inequality. While this is a threat for democracy, a middle inequality might be helpful. Reducing inequality in low developed countries should become a priority because it promotes democracy which itself is growth promoting.

7. References

- A'Hearn, Brian (2003): Anthropometric Evidence on Living Standards in Northern Italy, 1730-1860. *The Journal of Economic History*, Vol.63 (2), pp.351-381.
- Acemoglu, Daron & Robinson, James A. (2006): *Economic origins of dictatorship and democracy*. Cambridge Univ. Press.
- Barro, Robert J. (2000): Inequality and growth in a panel of countries. *Journal of Economic Growth*, Vol. 5, pp.5-32.
- Baten, Jörg & Böhm, Andreas (2009): Children's height and parental unemployment. A large scale anthropometric study on Eastern Germany, 1994-2006. *German Economic Review*, Vol. 11(1), pp.1-24.
- Baten, Jörg & Fraunholz, Uwe (2004): Did partial globalization increase inequality? The case of the Latin America periphery, 1950-2000. *CESifo Economic Studies*, Vol. 50 (1), pp.45-84.
- Baten, Jörg (2000): Economic development and the distribution of nutritional resources in Bavaria, 1797-1839. *Journal of Income Distribution*, Vol. 9, pp.89-106.
- Bertola, Luis/ Castelnovo, Cecilia/ Rodriguez, Javier/ Willebald, Henry (2009): Income distribution in the Latin American Southern cone during the first globalization boom and beyond. *International Journal of Comparative Sociology*, Vol. 50, pp. 452-486.
- Boix, Charles (2000): *Democracy and Inequality*.
- Bollen, Kenneth A. & Jackman, Robert W. (1985): Political Democracy and the Size Distribution of Income. *American Sociological Review*, Vol. 50(4), pp.438-457.
- Bourguignon, François & Verdier, Thierry (2000): Oligarchy, democracy, inequality and growth. *Journal of Developmental Economics*, Vol. 62, pp.285-313.
- Cameron, Colin A. & Trivedi, Pravin K. (2010): *Microeconometrics using Stata*. College Station, Tex.: Stata Press.
- Dahl, Robert A. (1971): *Polyarchy: participation and opposition*. Yale University Press.
- Deininger, Klaus & Squire, Lyn (1996): A new data set measuring income inequality. *The World Bank Economic Review*, Vol. 10(3), pp. 565-591.
- Durlauf, Steven N./ Johnson, Paul A./ Temple, Jonathan R.W. (2004): *Growth Econometrics*. SSRI working papers 18.
- Easaw, Joshy/ McKay, Andrew/ Savoia, Antonio (2006): *Inequality, Democracy and Institutions*. University of Bath.

- Fogel, Robert W./ Engerman, Stanley L./ Trussel, James (1982): Exploring the Uses of Data on Height: The Analysis of Long-Term Trends in Nutrition, Labor Welfare, and Labor Productivity. *Social Science History*, Vol.6 (4), pp. 401-421.
- Forbes, Kristin (2000): A Reassessment of the Relationship Between Inequality and Growth. *American Economic Review*, Vol. 90(4), pp. 869-887.
- Friedman, Steven (2002): Democracy, inequality and the reconstitution of politics. In: Tulchin, J. (edit.): *Democratic governance and social inequality*.
- Hamanka, Shingo (2008): Inequality and Authoritarianism in the Developing Countries. *International Political Economy*, Vol. 22, pp. 57-74.
- Houle, Christian (2009): Inequality and Democracy: Why Inequality Harms Consolidation but Does Not Affect Democratization. *World Politics* Vol. 61(4), 589-623.
- Huntington, Samuel P. (1991): *The Third Wave*. University of Oklahoma Press.
- Huntington, Samuel P.: Will More Countries Become Democratic? *Political Science Quarterly*, Vol. 99, pp.193-218.
- Jackman, Robert W. (1974): Political Democracy and Social Equality: A Comparative Analysis. *American Sociological Review*, Vol. 39(1), pp.29-45.
- Kohler, Ulrich & Kreuter, Frauke (2008): *Datenanalyse mit Stata: allgemeine Konzepte der Datenanalyse und ihre praktische Anwendung*. 3. Aufl., München; Wien: Oldenbourg.
- Komlos, John & Kriwy, Peter (2003): The Biological Standard of Living in the Two Germanies. *German Economic Review* Vol. 4(4), pp. 459-473.
- Komlos, John (1985): Stature and Nutrition in the Habsburg Monarchy: The Standard of Living and Economic Development in the Eighteenth Century. *The American Historical Review*, Vol. 90(5), pp.1149-1161.
- Lamounier, Bolivar (2002): Globalization, social inequality and democracy. In: Tulchin, J. (edit.): *Democratic governance and social inequality*.
- Lipset, Seymour M. (1969): *Politics and Social Sciences*. New York; Oxford University Press.
- Lipset, Seymour M. (1959): Some Social Requisites of Democracy: Economic Development and Political Legitimacy. *The American Political Science Review*, Vol. 53(1), pp.69-105.
- Lipset, Seymour M. (1962): *Soziologie der Demokratie*. Neuwied am Rhein; Berlin: Luchterhand.
- Marshall, Monty G. & Jagers, Keith (2009): *Polity IV Project: Dataset User's Manual*. Center for Systemic Peace.

- Mironov, Boris (1999): *New Approaches to Old Problems: The Well-Being of the Population of Russia from 1821 to 1910 as Measured by Physical Stature*. *Slavic Review*, Vol. 58(1), pp.1-26.
- Mukherjee, Chandan/ White, Howard/ Wuyts, Marc (1998): *Econometrics and Data Analysis for Developing Countries*. London: Routledge.
- Muller, Edward N. (1988): *Democracy, Economic Development, and Income Inequality*. *American Sociological Review*, Vol. 53(1), pp.50-68.
- Muller, Edward (1995): *Economic Determinants of Democracy*. *American Sociological Review*, Vol. 60(6), pp.966-982.
- Persson, Torsten & Tabellini, Guido (2006): *Democratic Capital: The Nexus of Political and Economic Change*. NBER Working Paper 12175.
- Przeworski, Adam/Alvarez, Michael/ Cheibub, Jose A./ Limongi, Fernando (2000): *Democracy and development. Political Institutions and Well-Being in the world, 1950-1990*. Cambridge Univ. Press.
- Przeworski, Adam (1991): *Democracy and the market: political and economic reforms in Eastern Europe and Latin America*. Cambridge Univ. Press.
- Rueschemeyer, Dietrich/ Huber Stephens, Evelyn/ Stephens, John D. (1992): *Capitalist Development and Democracy*. Cambridge: Polity.
- Steckel, Richard H. (1983): *Height and Per Capita Income*. *Historical Methods*, Vol. 16(1), pp. 1-7.
- Steckel, Richard H. (1995): *Stature and the Standard of Living*. *Journal of Economic Literature*, Vol. 33(4), pp.1903-1940.
- Sunde, Uwe (2006): *Wirtschaftliche Entwicklung und Demokratie : Ist Demokratie ein Wohlstandsmotor oder ein Wohlstandsprodukt?* IZA Discussion Paper No. 2244, Bonn.
- Wooldridge, Jeffrey M. (2009): *Introductory Econometrics: A Modern Approach*. 4. ed., Mason, Ohio: South Western cengage learning.

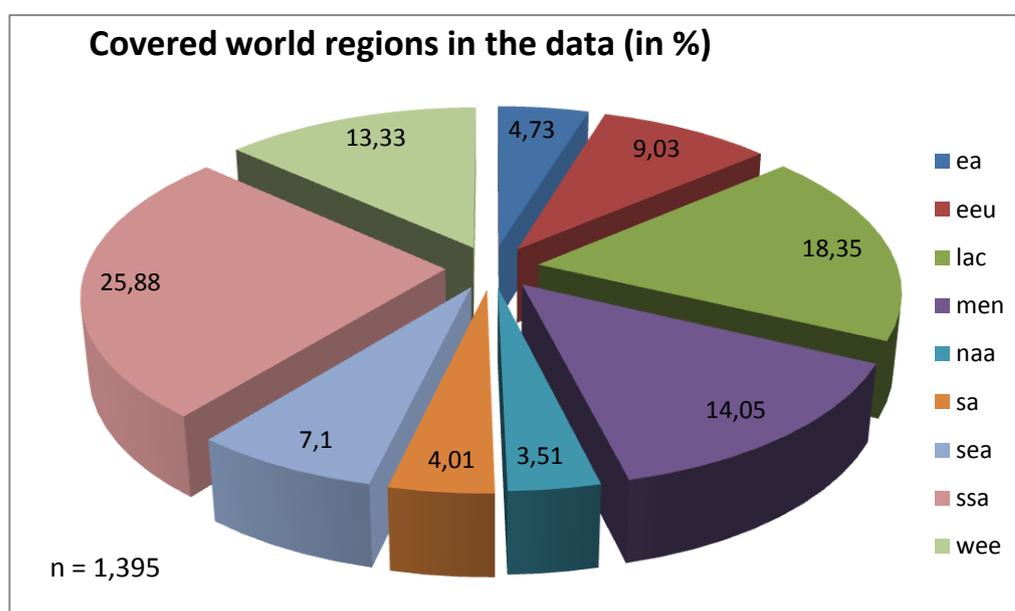
8. Appendix

A1: The data

A1.1 Countries covered in data

- | | | |
|------------------------------|------------------------|---------------------|
| 1. Andamanen & Nikobaren | 35. Dem. Rep. Congo | 69. Macedonia |
| 2. Angola | 36. Denmark | 70. Malawi |
| 3. Armenia | 37. Djibouti | 71. Malaysia |
| 4. Australia | 38. Dominican Republic | 72. Mali |
| 5. Austria | 39. Ecuador | 73. Mauretania |
| 6. Azerbaijan | 40. Egypt | 74. Mexico |
| 7. Bahamas | 41. Estonia | 75. Namibia |
| 8. Bangladesh | 42. Ethiopia | 76. Nepal |
| 9. Barbados | 43. Fiji | 77. Netherlands |
| 10. Belarus | 44. Finland | 78. Niger |
| 11. Belgian Congo | 45. France | 79. Nigeria |
| 12. Belgium | 46. Gabon | 80. Norway |
| 13. Benin | 47. Gambia | 81. Pakistan |
| 14. Bolivia | 48. Georgia | 82. Philippines |
| 15. Botswana | 49. Germany | 83. Rumania |
| 16. Brazil | 50. Ghana | 84. Russia |
| 17. British India | 51. Great Britain | 85. Rwanda |
| 18. Bulgaria | 52. Greece | 86. Samoa Islands |
| 19. Burkina Faso | 53. Guatemala | 87. Senegal |
| 20. Burundi | 54. Guinea | 88. Slovak Republic |
| 21. Cameroon | 55. Guinea-Bissau | 89. South Africa |
| 22. Canada | 56. Guyana | 90. Spain |
| 23. Cech Reublic | 57. Honduras | 91. Sudan |
| 24. Central African Republic | 58. India | 92. Switzerlad |
| 25. Ceylon | 59. Indonesia | 93. Syria |
| 26. Chad | 60. Iran | 94. Tadjikistan |
| 27. Chile | 61. Iraq | 95. Tanzania |
| 28. China | 62. Ireland | 96. Togo |
| 29. Columbia | 63. Italy | 97. Uganda |
| 30. Congo | 64. Japan | 98. Ukraine |
| 31. Costa Rica | 65. Kenya | 99. Urundi |
| 32. Cote d'Ivoire | 66. Kyrgyztan | 100. USA |
| 33. Croatia | 67. Liberia | 101. Uzbekistan |
| 34. Cyprus | 68. Lithuania | 102. Yemen |

A1.2 Covered world regions in the data (in %)

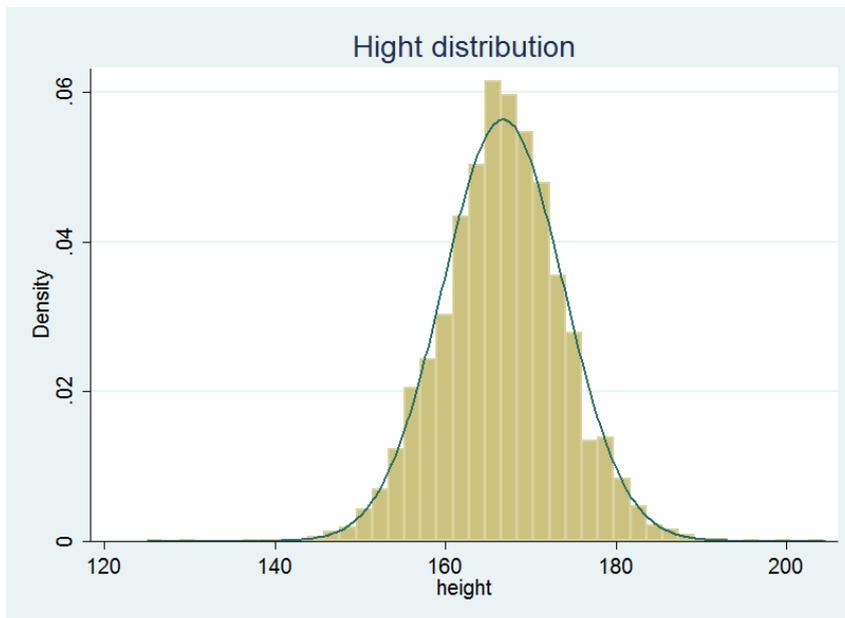


A.1.3 Distribution of policy regimes (HINST) in world regions (in %)

	0	1	2	3	4	5
lac	10.92		57.98	11.76	19.33	
eeu	23.53	11.76		64.71		
wee	60.33	24.79	9.09	0.83	4.96	
men				24.39	53.66	21.95
ssa	0.85	1.71	6.84	52.14	33.33	5.13
sea			5.56	44.44	50	
sa	76.47			11.76	11.76	
ea				100		
naa	100					

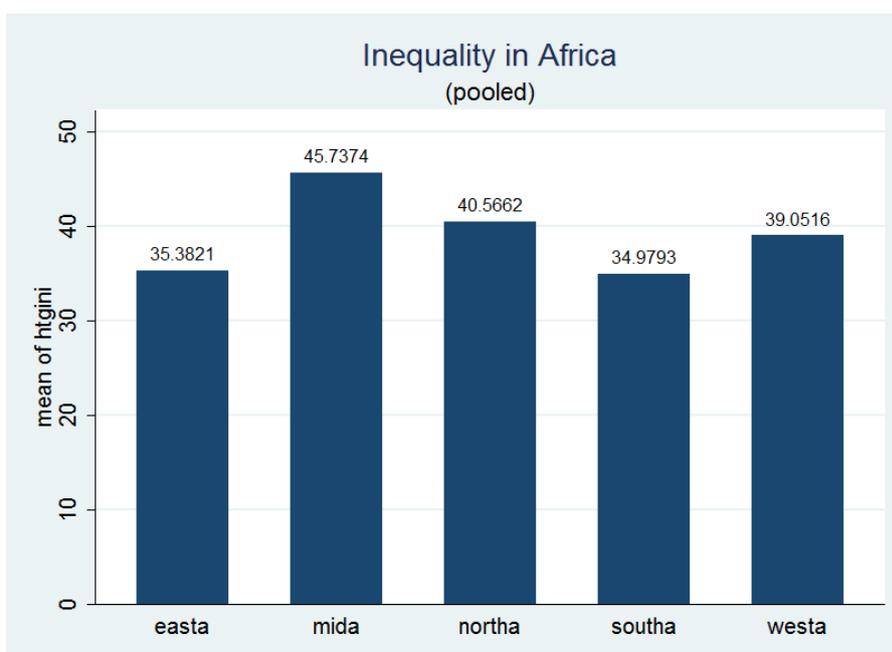
Note: 0 – parliamentary democracy
 1 – mixed democracy
 2 – presidential democracy
 3 – civilian dictatorship
 4 – military dictatorship
 5 – monarchy

A1.4 Histogram of height distribution



Height distribution from individual data without pygmies. One can see the frequencies in the mid 1960cm possibly due to recruits.

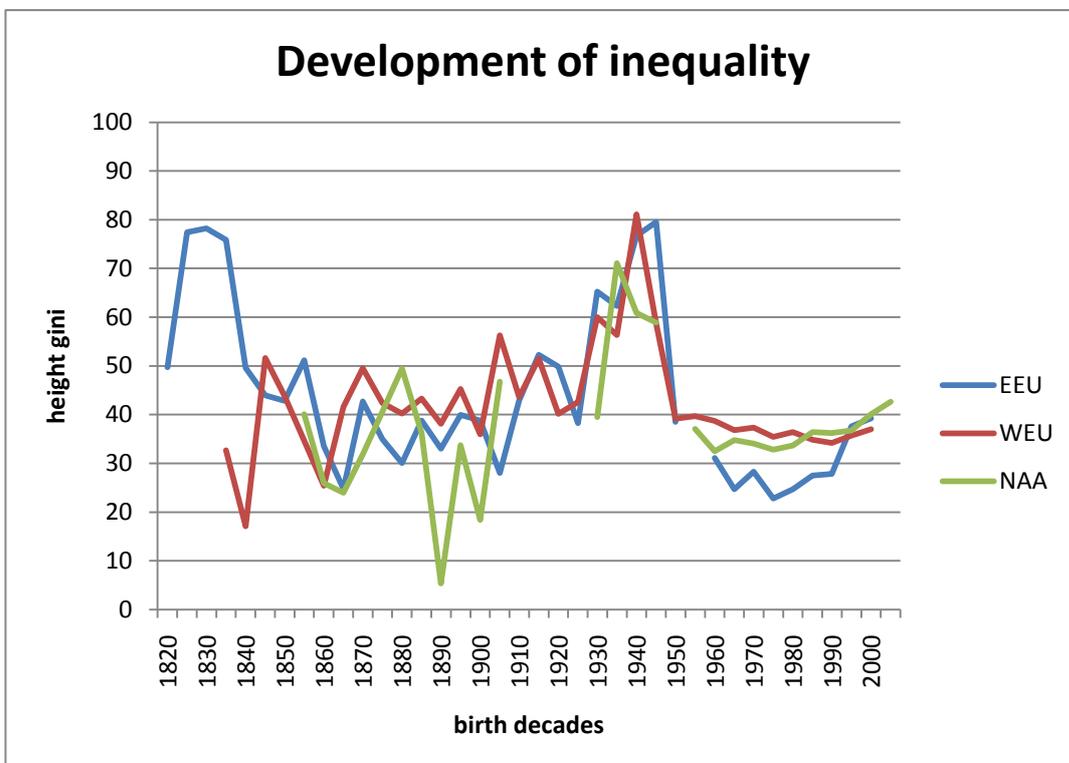
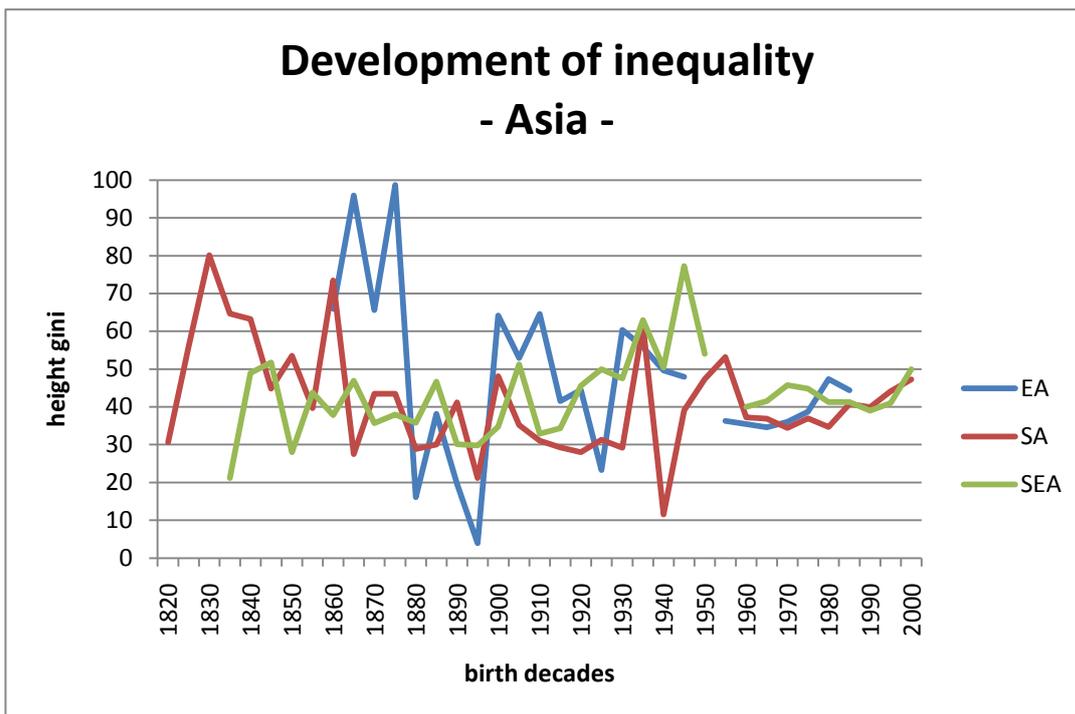
A1.6 Inequality in Africa

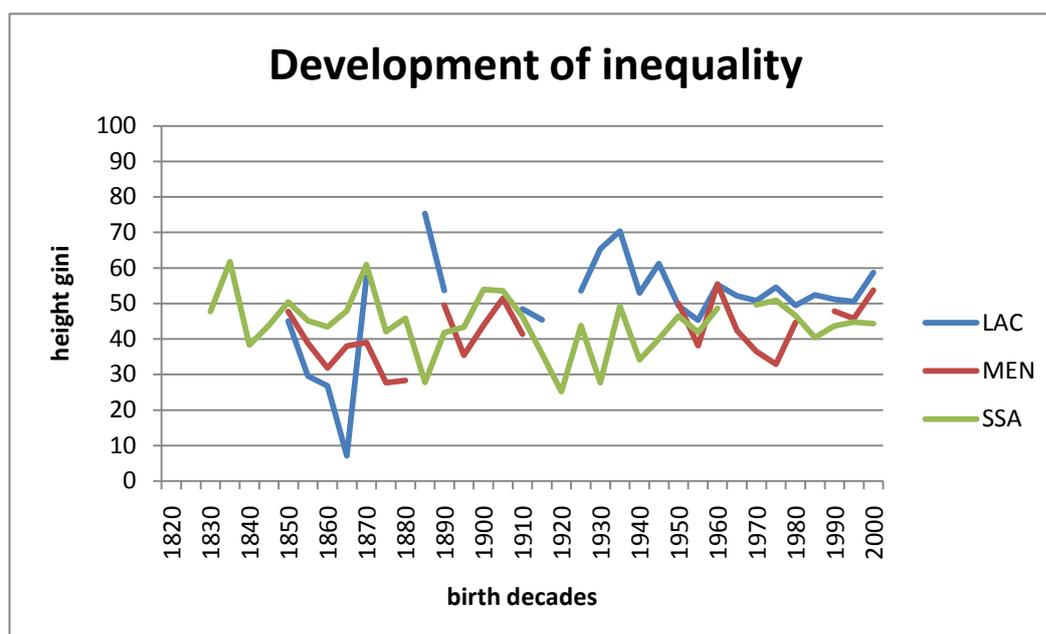


A1.7 Development of inequality - Table

bdec	ea	eeu	lac	men	naa	sa	sea	ssa	wee
1820	40.98	72.87	79.40						53.31
1825		77.41							
1830		78.22							
1835	89.46	75.89							32.68
1840		71.90			55.49				17.10
1845		43.93							50.03
1850	36.77	42.57	45.01						46.24
1855		44.54	1.31		0.81				37.20
1860	65.92		3.41		23.94				34.96
1865	95.92	23.58	1.82		49.08				38.81
1870	35.43	25.76	57.33	42.42	38.93				51.68
1875	98.73				49.47				31.77
1880		14.69			36.19			9.76	37.79
1885	16.09	26.78			5.33	19.50			25.82
1890	38.16	39.34	51.31	46.49	30.84				37.36
1895	19.69				13.13				39.10
1900	3.95							52.11	25.38
1905	64.19								53.27
1910	52.89		48.99	36.57	41.01			37.77	43.48
1915	64.63	75.90						26.55	46.55
1920								27.47	40.39
1925	41.54	32.76	53.61	40.56	39.52			34.35	42.59
1930		82.93	68.25		71.11			52.11	60.00
1935	44.49	77.20	70.42		60.85			58.27	57.35
1940	38.72	76.74	64.07		58.91	2.19			81.14
1945	37.33	79.54	61.22				90.47		58.66
1950	55.80		49.59	49.95	37.10	50.34	54.00	49.97	39.19
1955			45.33	38.12	32.48	53.16			39.70
1960	30.50	25.51	57.51	55.42	34.80	37.26	39.98	48.62	38.69
1965		24.21	52.18	42.33	34.08	39.42	41.53		36.83
1970	27.90	24.20	51.30	36.53	32.80	39.83	45.79	49.60	37.36
1975	26.60	21.73	54.85	32.94	33.69	37.00	44.83	50.90	35.44
1980	29.51	24.45	50.72	44.68	36.43	34.71	41.25	46.60	36.43
1985	29.85	27.87	53.65		36.21	40.76	41.31	40.48	34.83
1990	33.86	25.38	51.85	47.82	36.73	39.93	39.00	43.71	34.22
1995	42.63	39.28	51.42	45.78	40.06	44.14	41.00	44.77	35.71
2000	44.43	40.39	58.68	53.78	42.64	47.30	50.00	44.29	37.00

A1.8 Development of inequality – Graphs





The time trends for the different world regions show many similarities. I used three charts to represent the particular trends more clearly. Latin America has a steady high inequality without many amplitudes. Also nice to see in the last chart is the almost complete time series for Sub-Saharan Africa. The Asian continent has especially in the last 50 years less high inequality but with a patchy trend. An example is the high inequality at the end of the 19th century for East Asia. In Europe and Non-Latin America the trend is more or less equal which shows the high dependence between these regions. Political interruptions as the Great Depression followed by the 2nd World War are clearly visible.

A1.9 Policy score depending on GDP/capita

gdp/cap	Mean (polity2)	n
0-1000	-3.5135	111
1000-2000	-2.0877	114
2000-3000	-0.8732	71
3000-4000	1.0638	47
4000-5000	2.9286	42
5000-6000	3.8065	31
>6000	5.0489	266

Data according to graph page 19.

A1.10 Descriptive summary of main variables⁷

Variable	Label	Obs.	Mean	Min.	Max.
htgini	Height gini	313	41.76 (9.42)	17.83	66.84
percapitagdp	GDP / capita	462	5151.48 (5399.969)	390.07	22966.15
democ	Democracy score (0-10,-88,-77,-66)	1382	0.1223 (17.61)	-88	10
autoc	Autocracy score (0-10,-88,-77,-66)	1382	0.2554 (17.522)	-88	10
polity2	Combined polity score (-10-(+10))	1370	-0.1496 (7.4942)	-10	10
odwp	Other democracies in the world in %	1395	0.4123 (0.1107)	0.2848	0.6
nlevel	Lagged real GDP per capita	1395	2593.516 (4531.921)	-999	44792.4
newc	New country	1395	0.5054 (0.5002)	0	1
britcol	British colony	1395	0.2437 (0.4295)	0	1
oil	Oil-producing country	1395	0.0996 (0.2996)	0	1
cath	% of Catholics in population	1395	28.4641 (76.9183)	-999	99
prot	% of Protestants in population	1395	10.3882 (70.2921)	-999	90.6
moslem	% of Moslems in population	1395	20.1476 (76.5303)	-999	99.9
reld	Religious fractionalization	1389	0.31265 (0.22399)	0	0.7342
stra	Sum of past transitions to authoritarianism	1395	0.36559 (0.71143)	0	5
krain	Ethnic fractionalization	1395	-59.055 (236.49)	-999	0.89
geogia	Geographic dispersion of the population	1395	-126.9486 (333.6281)	-999	0.971
autoc_dum	Autocracy dummy	1395	0.4 (0.4901)	0	1
democ_dum	Democracy dummy	1395	0.453 (0.4979)	0	1
reg	Democracy dummy	1395	0.4538 (0.4980)	0	1

*Standard deviations in parentheses

⁷ For a more detailed description of variables, refer to codebooks from Polity IV project and DSDATA codebook. Here the aim is to create an overview of most important numbers.

A.2: Analysis

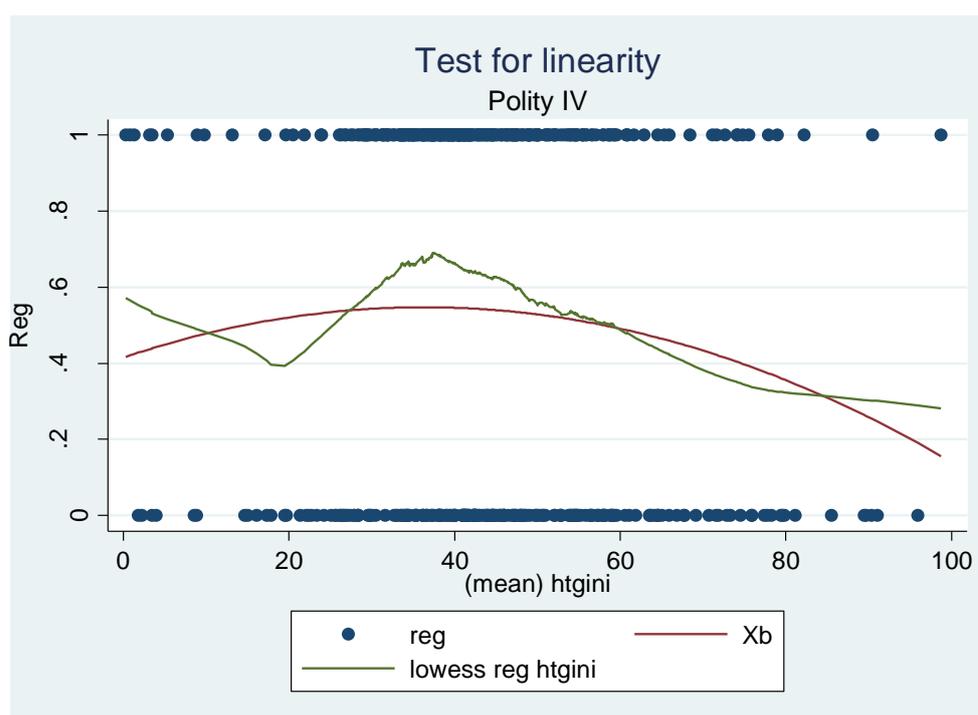
A2.1: Cross-tables for each world region

	EA		SEA		SA	
	dictatorship	democracy	dictatorship	democracy	dictatorship	democracy
htgini	31.55		41.46	45.04	37.51	41.27
GDP/capita	1570.41	7291.6	1558.27	2608.9	937.86	1245.14
newc	0.38	0.23	0.73	0.95	0.6	0.92
reld	0.19	0.14	0.19	0.42	0.1	0.21
odwp	0.36	0.41	0.36	0.39	0.34	0.41
britcol	0	0	0.23	0.7	0.33	0.88
cath	0	0	12.04	21.03	0	0
prot	10.69	8.65	3.49	19.19	0.53	3.82
moslem	1.83	0.38	28.97	19.87	56.41	25.99
oil	0	0	0	0	0	0
fearon	0.11	0.03	0.51	0.46	0.51	0.59
georgia	0.65	0.52	0.61	0.45	0.51	0.52

	WEE		EEU		NAA	
	dictatorship	democracy	dictatorship	democracy	dictatorship	democracy
htgini	35.49	36.56	26.46	34.41		36.36
GDP/capita	3648.41	9078.91	3269.38	3807.98		10686.59
newc	0.08	0.03	0	0.22		0
reld	0.08	0.28	0.44	0.41		0.62
odwp	0.33	0.38	0.32	0.51		0.38
britcol	0.08	0.09	0	0		0
cath	95.62	52.47	50.33	45.67		20.65
prot	0.053	35.85	6.71	6.38		48
moslem	0.17	0.72	3.17	3.11		0
oil	0	0	0	0		0
fearon	0.26	0.21	0.39	0.32		0.25
georgia	0.72	0.6	0.41	0.3		0.92

	SSA		MEN		LAC	
	dictatorship	democracy	dictatorship	democracy	dictatorship	democracy
htgini	46.71	45.72	44.94	.	55.31	51.12
GDP/capita	959.77	1799.03	5748.4	4990.12	2467.59	3626.51
newc	0.97	0.84	0.65	0.56	0.05	0.17
reld	0.5	0.47	0.09	0.15	0.23	0.28
odwp	0.36	0.4	0.37	0.38	0.35	0.41
britcol	0.27	0.58	0.49	0.56	0.05	0.17
cath	20.99	13.41	0.29	0	83.99	75.93
prot	18.66	27.66	0	0	8.46	8.65
moslem	31.04	24.86	90.44	51.5	0.49	0.56
oil	0.1	0.09	0.5	0	0.01	0.16
fearon	0.67	0.69	0.46	0.42	0.42	0.43
geogia	0.59	0.56	0.63	0.61	0.7	0.69

A2.2: Linearity test



The relation between inequality and democracy (here REG) does not follow a linear path. The best approximation is an inverted U-shape.

A2.3 Logistic regression - Polity IV data

	(1)	(2)
COEFFICIENT	democ_dum	democ_dum
percapitagdp	0.000593*** (0.000102)	0.00053*** (0.000115)
htgini	0.328** (0.136)	0.253* (0.147)
htgini_squ	-0.00341** (0.00145)	-0.00257* (0.00149)
Constant	-9.548*** (3.246)	
Observations	374	224
Number of cono	51	24

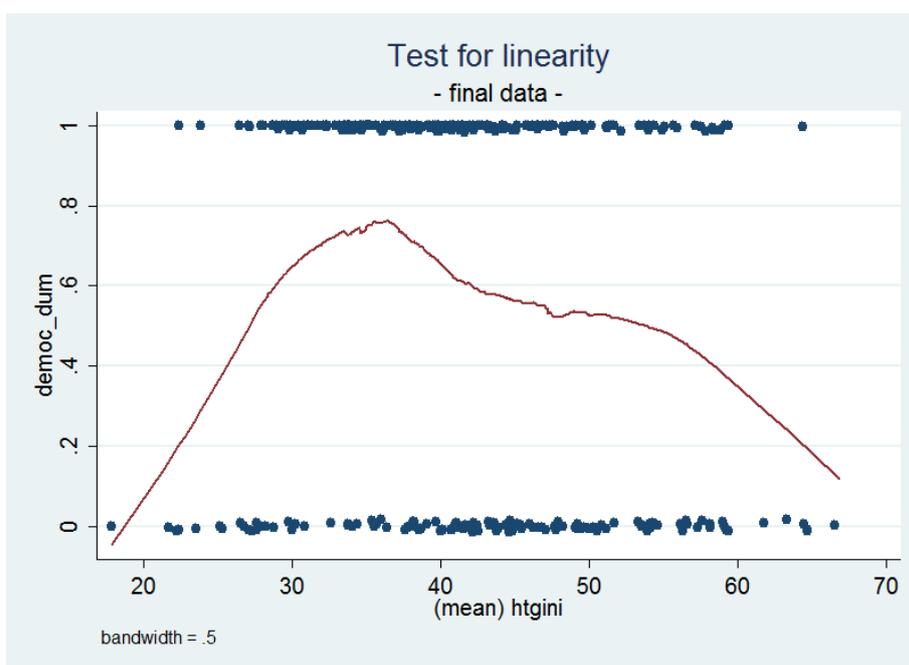
Note: Standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1. Model (1) refers to random-effects, model (2) to fixed-effects.

A2.4 Logistic regression without squared height gini

	(1)	(2)	(3)	(4)	(5)	(6)
COEFFICIENT	reg	reg	democ_dum	democ_dum	autoc_dum	autoc_dum
percapitagdp	0.000532*** (0.0000970)	-0.000311*** (0.0000893)	0.000602*** (0.000105)	0.000560*** (0.000119)	-0.000376*** (0.0000805)	0.000500*** (0.000111)
htgini	-0.00504 (0.0202)	0.00908 (0.0200)	0.00770 (0.0211)	0.00379 (0.0226)	-0.000464 (0.0184)	-0.0174 (0.0217)
Constant	-1.318 (1.034)		-2.414** (1.109)		0.477 (0.944)	
Observations	374	243	374	224	374	233
Number of cono	51	27	51	24	51	25

Note: Standard errors in parentheses. *** p<0.01, **p<0.05, *p<0.1. Model (1), (3) and (5) refer to random-effects estimations, model (2), (4) and (6) to fixed-effects estimations.

A2.5 Linearity test – final dataset



A2.6 Logistic regressions - Different dependent variable

	(1)	(2)	(3)	(4)
COEFFICIENT	reg	reg	reg	reg
n_growth	0.130*** (0.0499)			
htgini	1.047*** (0.404)	1.019*** (0.358)	0.835** (0.344)	0.838** (0.341)
htgini_squ	-0.0106** (0.00418)	-0.0105*** (0.00372)	-0.00882** (0.00367)	-0.00886** (0.00364)
odwp	21.01*** (5.943)	17.53*** (4.837)	18.48*** (4.774)	18.48*** (4.775)
nlevlag	0.00123*** (0.000328)	0.000705*** (0.000189)	0.000631*** (0.000190)	0.000629*** (0.000185)
reld	-12.53** (5.608)	-12.11** (4.971)	-4.870 (3.912)	-4.767 (3.547)
cath	0.0315 (0.0244)	0.0332 (0.0218)	0.0369 (0.0238)	0.0365 (0.0229)
prot	0.163** (0.0829)	0.177** (0.0747)	0.0987* (0.0568)	0.0978* (0.0549)
moslem	-0.0491* (0.0259)	-0.0497** (0.0248)	-0.0532** (0.0269)	-0.0531** (0.0269)
oil	-27.89 (56881)	-26.05 (61744)	-28.88 (215226)	-28.83 (216567)
newc	-0.822		0.108	

A2.6, cont.

	(2.030)		(1.685)	
britcol	4.498**	3.907**	4.151**	4.171**
	(1.829)	(1.657)	(1.830)	(1.811)
stra	-1.225**	-1.128**	-1.101*	-1.104*
	(0.614)	(0.563)	(0.601)	(0.600)
geogia	-8.242**	-5.315*		
	(3.535)	(2.937)		
krain	6.044**	3.308		
	(2.711)	(2.172)		
Constant	-31.95***	-29.05***	-27.91***	-27.94***
	(9.436)	(8.212)	(8.344)	(8.342)
Observations	236	236	248	248
Number of cono	47	47	50	50
Wald chi2	20.92	27.52	26.5	26.48
Prob>chi2	0.1393	0.0106	0.0091	0.0055
LL	-48.90897	-55.15074	-59.4397	-59.44176
BIC	131.8179	140.3015	146.8795	144.8835
AIC	190.7031	192.259	196.0675	190.5581

Note: Standard errors in parentheses. *** p<0.01, **p<0.05, *p<0.1

A2.7: Robustness check: Regression for non-African countries

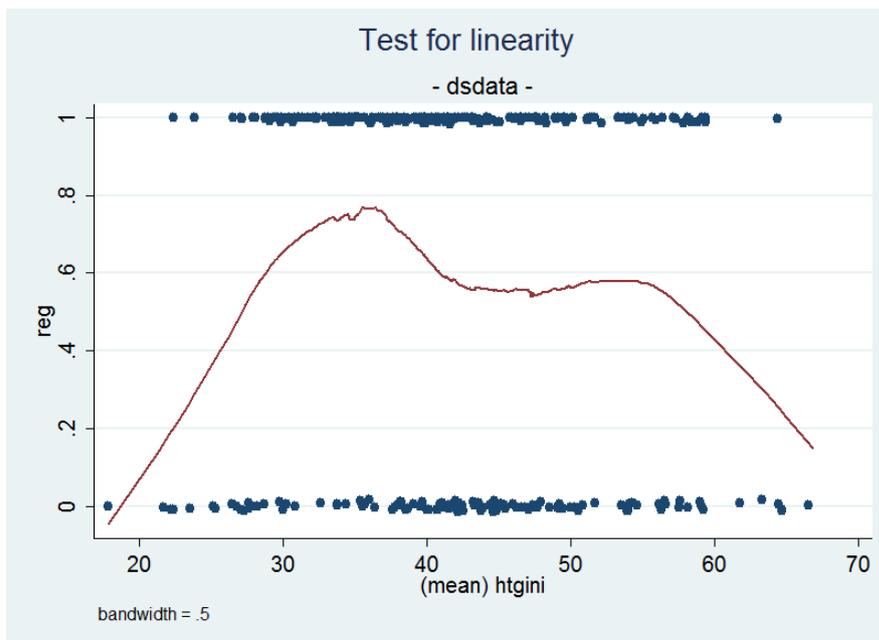
COEFFICIENT	(1)	(2)
	reg	autoc_dum
n_growth	0.122*	-0.0221
	(0.0660)	(0.0280)
htgini	1.020*	-0.620*
	(0.557)	(0.354)
htgini_squ	-0.0114*	0.00707*
	(0.00608)	(0.00381)
odwp	40.11***	-14.87***
	(13.37)	(5.279)
nlevlag	0.00133***	-0.000353
	(0.000474)	(0.000218)
reld	2.449	-7.904
	(7.238)	(6.238)
cath	0.0774*	-0.0135
	(0.0457)	(0.0337)
prot	0.0856	0.0165
	(0.0721)	(0.0428)
moslem	-0.0615	0.00842
	(0.136)	(0.0648)
oil	-49.67	2.324
	(73558)	(7.323)
newc	2.183	4.747
	(11.13)	(4.504)

A2.7, cont.

britcol	35.41	-0.904
	(36982)	(3.406)
Constant	-46.53***	18.93**
	(17.01)	(8.387)
Observations	203	203
Number of cono	35	35
Prob>chi2	0.5613	0.3074
LL	-32.79785	-59.44795
AIC	93.59571	146.8959
BIC	139.9806	193.2808

Note: Standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1

A2.8 Test for linearity – dsdata



A2.9: Robustness check: Regression with different dataset (dsdata)

COEFFICIENT	(1) reg	(2) reg	(3) reg	(4) reg	(5) reg
n_growth	0.183** (0.0834)	0.187** (0.0879)	0.140** (0.0613)		
htgini	1.256* (0.672)	1.217* (0.674)	1.011** (0.494)	1.085** (0.468)	1.021** (0.448)
htgini_squ	-0.0141** (0.00719)	-0.0137* (0.00725)	-0.0114** (0.00539)	-0.0122** (0.00509)	-0.0115** (0.00488)
odwp	31.73*** (11.01)	31.96*** (11.74)	23.18*** (7.491)	22.55*** (7.160)	22.56*** (7.134)
nlevlag	0.00168*** (0.000642)	0.00171** (0.000689)	0.00125*** (0.000406)	0.000670*** (0.000232)	0.000706*** (0.000230)
reld	-10.07 (7.890)	-11.10 (7.520)	-6.641 (5.092)	-8.140 (6.273)	-9.931 (6.065)
cath	0.0878 (0.0585)	0.0941 (0.0589)	0.0507 (0.0339)	0.0632 (0.0392)	0.0720* (0.0387)
prot	0.138 (0.0949)	0.145 (0.0969)	0.0937 (0.0684)	0.146* (0.0830)	0.160* (0.0826)
moslem	-0.0826 (0.0616)	-0.0844 (0.0614)	-0.0612 (0.0410)	-0.0594 (0.0426)	-0.0614 (0.0419)
newc	-1.222 (3.962)			-2.059 (2.682)	
britcol	4.740 (3.876)	4.418 (3.566)	3.092 (2.391)	2.972 (2.561)	2.402 (2.378)
oil	-35.83 (24131)	-35.86 (16035)	-28.80 (51394)	-26.38 (32151)	-28.45 (50370)
stra	-2.001* (1.146)	-2.001* (1.209)		-1.416 (0.890)	-1.356 (0.881)
Constant	-45.30** (18.50)	-44.98** (19.52)	-35.67*** (12.98)	-34.23*** (11.58)	-33.54*** (11.33)
Observations	248	248	248	248	248
Number of cono	50	50	50	50	50
Wald chi2	11.26	9.88	14.21	17.23	17.58
Prob>chi2	0.5894	0.6263	0.2216	0.1412	0.0918
LL	-48.76115	-48.83959	-51.18744	-54.62748	-54.95137
AIC	127.5223	125.6792	128.3749	137.255	135.9027
BIC	180.2237	174.8672	174.0495	186.443	181.5773

Note: Standard errors in parentheses. *** p<0.01, **p<0.05, *p<0.1