“Economic and Political Determinants of Income Inequality”

By Zlatko Nikoloski

Advisors: Dr. Christopher Gerry and Dr. Tomasz Mickiewicz

University College London, London, United Kingdom

"If a free society cannot help the many who are poor, it cannot save the few who are rich."
John F. Kennedy

1. INTRODUCTION AND LITERATURE REVIEW

At the beginning of the 21st century, the exuberance of the Third Wave of democratization (Southern Europe, Latin America, Central and Eastern Europe) has been slowly replaced by a more sombre realization that democracy in the world is receding. The resurgence of mild authoritarianism in Russia and China's attempts to censure popular internet search engines are but mere examples of this phenomenon. Concurrently, the income disparities in the world's emerging economies (but also increasingly, in the high income countries) are worsening. A recent report in the US[1] found that income disparities in the United States of America have increased by 10 percent between 2002 and 2006. These trends challenge the established notion that democracies are characterized by more egalitarian distribution of income than non-democracies and call for a deeper analysis of the impact of political regimes on income inequality. This essay is hence an attempt to provide a further analysis of the determinants of inequality.

To date, the political economy of inequality (and its determinants) has been widely studied, albeit focusing on the economic origins of inequality in the context of growth and development studies. In an influential article, Kuznets (1963) argues that there is an inverted U - shape curve between growth and inequality, i.e. higher growth is associated with higher levels of inequality in the short run, but with lower levels of inequality in the longer run[2]. Barro (2000) analyzes the relationship between growth and inequality and discovers that higher inequality retards growth, while lower levels of inequality are conducive to higher growth. By using social polarization as a proxy for income inequality, Keefer and Knack (2002) discover that inequality retards growth by the way of attenuating the rule of law. Gregorio and Lee (2002) use panel data in order to assess the impact of education on inequality, while Breen and Garcia-Penalosa (2005) conclude that higher levels of macroeconomic volatility are associated with higher levels of inequality. Finally, Mickiewicz and Gerry (2008) find a strong positive association between equality and tax collection, but also note that this relationship is significantly stronger under authoritarian regimes than under democracies.

In the last couple of decades a different strand of literature has emerged which is primarily focused on researching the political determinants of inequality: how institutions and types of political regimes influence the levels of inequality. Democracy is the main focus of research for Bollen and Jackman (1985), Lee at al (1998), Rodrik (1999) and

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[1] "Working Hard, Still Falling Short", prepared by the workingpoorfamilies.org

[2] This relationship between income inequality and growth has been scrutinized numerous times by applying different econometric techniques to different data sets. Researches have found, at best, mixed evidence for the existence of an inverted U shaped relationship between growth and income inequality. Ahluwalia, Carter and Chenery (1979) and Higgins and Williamson (1999) find evidence of the Kuzents hypothesis. However, Deininger and Squire (1996) and Weede (1997) cast doubts on the previously existing relationship between less growth and more inequality and less inequality and more growth.

Reuveny and Lee (2003). The majority of these works claim that democracies tend to redistribute more towards the poor (consistent with the median voter model by Richard and Meltzer (1981)) with decreasing inequality as a final result. As a counterbalance to this, there has been a strand of literature which has claimed that redistribution in different types of political regimes is primarily influenced by decisions of efficiency rather than politics (Sala-i-Martin (1996), Benabou (1996), Rodriguez (2004)). This group of authors tend to conclude that regime type cannot be considered as one of the main determinants of inequality. On the other hand, the impact of institutions on inequality and vice versa has been the main focus of analysis for a significant group of researchers (Engerman and Sokoloff (1997) and Sokoloff and Engerman (2000), Gradstein and Chong (2007)). Finally, some of the extant research attempted to disentangle the impact of ideology on inequality (Milanovic, Gradstein and Ying (2001)) and the impact of corruption on inequality and poverty (Gupta and Davoodi (2002)).

Thus, the academic quest for unearthing the determinants of inequality to date, has opened Pandora's box leaving a host of important questions unanswered, which merit further study. Likewise, efforts at understanding the causal pathways and transmission mechanisms through which various factors impact inequality over the short and long run are in their infancy. What is clear however, is that income inequality (as measured by the Gini coefficient) is highly correlated with some of the variables mentioned above, which gives us a good starting point in our research. The coefficient of correlation between inequality (Gini coefficient) and regime type (measured through the Freedom House Index[3]) is 0.4163, while the correlation coefficient of inequality (Gini) and GDP per capita (defined and measured by the World Development Indicators) is -0.5167.

These simple statistics however, reveal but a little of the intricate relationship between inequality and its determinants. Indeed, even if we assume that regimes are the principal factor that determines the level of inequality, we are left with an incomplete answer. Regimes are not created in a vacuum: they emerge (prosper or falter) based on a complicated interplay between a country's historical experience, its natural resource endowments and the interplay between its economic and political agents. Furthermore, growth and development can be driven by different sectors (primary sector – ores, metals, oil and gas; secondary sector – industry, or tertiary sector – services), in different settings over time and place. This in itself can be expected to have a profound and, potentially, conflicting impact on the level of inequality.

This chapter is therefore an attempt to further the existing knowledge in the area of inequality and its determinants. The chapter itself adds to the existing knowledge in several important ways. Firstly and crucially in view of the complexities hinted at above, it employs system GMM techniques in order to deal with some of the recurrent problems of empirical research in the social sciences, such as unobserved heterogeneity and endogeneity of the regressors. Secondly, in employing this approach, it introduces

[3] The Freedom House has developed an index of political rights and civil liberties, whereby all countries in the world are assessed on a scale from 1 to 7 (one being perfectly free and democratic society, 7 being a perfectly oppressive society). For the exercise above the simple average of the civil liberties and political rights is used.

exogenous instruments for democracy and regime type in general to the system GMM estimates. Thirdly, it analyzes a comprehensive set of theoretically motivated channels through which inequality determinants impact the level of inequality and in so doing explores some interesting interactive effects.

We argue that there is a dynamic effect in determining the level of inequality. In addition, we posit that natural resource abundance, the level of economic growth and GDP per capita as well as openness to international trade flows are crucial economic determinants of the levels of inequality. In addition, we find evidence that industrialization decreases inequality. Finally, we do not find any evidence that democracies are associated with lower levels of inequality and more egalitarian distribution of income. We also control for a few interaction terms (between natural resource abundance and growth, and natural resource abundance and democracy) which also gives us interesting results. The article itself is organized as follows. In the next section we analyze the channels through which the determinants of inequality impact it. We then present the data and some of the basic empirical links and finally we present our methodology, the results and the conclusion.

2. DETERMINANTS OF INCOME INEQUALITY

2.1 Economic determinants of income inequality

2.1.1 Natural Resources

Natural resource abundance is one of the principal determinants of inequality. The production of and the overall reliance on natural resources has the capacity to create rents that are easily captured by the ruling elite, which in turn results in exacerbation of the income gap between the ruling minority and the poor majority. Moreover, the high levels of inequality in the resource rich countries are also due to the intransigence of elites to redistribute towards the poor. The issue of reliance on natural resources has been researched somewhat in the area of political economy of inequality. As indicated by Stevens (2003), heavy reliance on natural resources tends to increase inequality. The same conclusion has been reached through the works of Auty (1994), Fields (1989) as well as Sarraf and Jiwanji (2001). McKay et al (2003) argue that natural resources provide a plausible explanation as to why the observed levels of inequality are higher in sub-Saharan Africa and Latin America (with predominantly high ratios of natural resources to other factors) than in South or East Asia.

Here we posit that there are several channels through which natural resources influence inequality. First and foremost, the reliance on natural resources creates rents that are easily captured by the ruling elites, which in turn exacerbates the income gap between the higher and the lower classes. The notion that natural resources are prone to rent creation is confirmed by Auty (2004). He argues that rent-seeking states have diverted their efforts into capturing more immediate gains from rent extraction and distribution and have neglected the long-term benefits from competitive investment in wealth creation. Similarly, Boix and Garicano (2001) argue that initial dependence on plantation and natural resources is associated with higher inequality and less diffused distribution of

capital. Moreover, in countries that depend on natural resources, the ruling class (landowners, owners of mines and plantations) will oppose taxation and redistribution, which in turn would have an indirect effect on increasing inequality. Land is immobile and visible and so much easier to tax, so the landowners will avoid taxation as much as they can (Easterly (2007)). It thus comes as no surprise that in the poorer agrarian countries there are fewer taxes that are collected and thus fewer funds available for redistribution (Di John (2006)). Ali (2004) also confirms this notion of opposition that the rich land-owning elites had had in the post-colonial history of Pakistan.

Secondly, the reliance of natural resources retards the emergence of manufacturing and industrialization and hence, has an indirect effect on increasing the level of inequality. As pointed by Leamer et al. (1999), manufacturing promotes equality by raising wages for unskilled workers and by increasing the demand for human capital which, by its nature, is more broadly owned than land or physical capital. A shift towards manufacturing and services also promotes educational development (as capital needs skilled workers to operate it) (Inglehart (1997)). Increases in education attainment might in turn decrease inequality (Birdsall (1998)). It has also been argued that some states that rely on natural resources will oppose industrialization because it means that alternative sources of power would desire to tax-away the rents from oil and commodities (Isham et al. (2005)).

Finally, the reliance on natural resources impedes the creation of effective and efficient institutions that would put more stringent constraints on the possibilities of rent expropriation and would also redistribute more towards the disadvantaged parts of society. As indicated by Fors and Olsson (2007), if a country is more abundant with natural resources, then the elites have less pressure to install institutions that would put constraints on the possibility to extract rents, thus leading to higher inequality. In that respect, some countries lacking the institutional and technological sophistication to shift their production towards the secondary and the tertiary sectors remain at or close to the equilibrium of high inequality and low democracy (for example Russia and Mexico which are discussed at length in Acemoglu and Robinson (2006)).

Hypothesis 1: Countries rich in natural resources (oil and commodities) are associated with higher levels of income inequality.

2.1.2 Economic growth and GDP per capita

There have been attempts to establish links between GDP per capita and economic growth on one side and inequality on the other since the mid-1950s. In an influential article, Kuznets (1963) postulates that in the early stages of development, both a country's economic growth and its inequality increase. As countries grow and develop, the income gap between the rich and the poor should decrease. Indeed, according to Kuznets, there is a gradual shift from a low-inequality, low-income, agricultural economy, towards a high-income and medium-inequality economy characterized by industrial production. This shift would lead to the inverted U-shaped relationship between real GDP per capita and inequality. Kuznets argues that in the initial period, agriculture represents the bulk of a country's economy, which is also characterized by low levels of

inequality. A shift towards the secondary and the tertiary sectors has in essence two effects in the short run. The first effect is that it accelerates economic growth leading to higher levels of GDP per capita. The second and most dramatic effect is that this increases the level of inequality. Consequently, in the initial stages of economic development, the level of GDP per capita and inequality are positively correlated. As countries develop they shift more and more resources from agriculture to industry (and later to services), and this will in time decrease the income gap between the industry and agriculture simply because there will be more and more workers working in the industrial sector. Consequently, the long run relationship between inequality and GDP per capita is negative.

Despite the data and methodological shortcomings, the validity of the Kuznets's hypothesis has been investigated repeatedly and with conflicting results. While some research has confirmed it, the bulk finds no evidence for the existence of such a deterministic relationship. Needless to say, testing the Kuznets hypothesis requires disaggregated data on employment in all three sectors of the economy as well as shares of each individual sector in the final output, which for many countries is unavailable or with dubious quality. Stemming from the Kuznets hypothesis, here we focus on the aggregate level and we posit that levels of economic development (captured by GDP per capita) influence inequality non-linearly. In other words, in the short run, higher levels of GDP per capita will be associated with higher levels of inequality, while in the longer run, higher levels of GDP per capita will be associated with lower levels of inequality.

Hypothesis 2: Higher levels of GDP per capita are associated with higher income inequality in the short run and with lower income inequality in the long run.

Closely related to the Kuznets hypothesis is the role that economic growth plays in the distribution of income. According to economic theory, the "growth" effect tends to decrease inequality as the income of the poor increases due to increases in average income (McKay et al (2003))[4]. White and Anderson (2001) find that the "growth effect" has been the main source of income growth for the poor in the developing world. In a similar fashion, Ravaillon (2001) argues that poverty reduction has been more successful in those developing countries that combined high growth rates with falling inequalities. Barro (2000) finds evidence that growth decreases inequality. In addition, Birdsall, Ross and Sabat (1995) find evidence that long term growth decreases inequality (through increasing educational attainments in the long run). Panizza (2002) finds similar evidence pertaining to the relationship between inequality and growth. Finally, Stephen Knowles (2005) takes a different approach in measuring inequality and he still finds a negative relationship between growth and inequality in long run.

It also has to be noted that the relationship between economic growth and inequality is complicated one due to the presence of reverse causality. Hence, a wide body of empirical research has found that countries with higher levels of inequality experience

[4] In addition to the "growth" effect, there is also a "redistribution" effect which argues that inequality decreases due to the increase of the poor's share in total income (McKay et al (2003)).

lower levels of growth (Persson and Tebellini (1994); Allesina and Rodrik (1994) and Deninger and Squire (1996)).

Hypothesis 3: Higher levels of economic growth are associated with lower levels of income inequality.

2.1.3 International Trade Flows

We posit that international trade is another determinant of inequality. In international trade theory the relationship between trade and inequality has been expressed via the Hecksher-Ohlin theorem according to which, international trade openness increases the returns of the relatively abundant factor of production and decreases the return of relatively scarce factor of production. Hence, trade openness would result in an increase in inequality in the capital rich countries and in a decrease in inequality in the labour abundant countries (especially those well endowed with unskilled labour).

However, the existing research on the impact of trade openness on inequality derives inconclusive results. According to some authors, trade is associated with increases in inequality due to trade differentials. As indicated by Sharma and Morrissey (2006), trade liberalization does appear to be associated with increased inequality, at least in terms of wages, largely because dynamic export sectors are skill intensive. Thus, contrary to the predictions of standard theory, export growth in unskilled labour abundant economies, appear to offer the greatest benefits to relatively skilled labour (Sharma and Morrissey (2006)).

Some authors argue that the relationship between trade openness and inequality depends on factor endowment and thus its effect could not be easily assessed. Gourdon et al. (2006), find consistent evidence that conditional effects of trade liberalization on inequality are correlated with relative factor endowments. Trade liberalization is associated with increases in inequality in countries well-endowed in highly skilled workers or capital, or workers that have very low education levels, and in countries relatively well-endowed with fuel or mining. On the other hand, trade-liberalization is associated with decreases in inequality in countries that are well-endowed with primary-educated labour.

Lastly, a third group of authors argues that international trade decreases inequality. Rodrik (1997) argued that the winners from international trade could compensate the losers hence reducing inequality as a final result (also presuming there are strong institutions in place that would conduct the exchange as it is almost never voluntary). According to Birdsall (1998), trade intensifies economic competition, which reduces the price of basic consumption goods. This benefits the poor more than the rich because the poor spend relatively larger shares of their incomes on basic consumption goods. The competition also diminishes the monopoly position enjoyed by the upper class, reducing inequality (Birdsall (1998)). Another argument is that trade increases labour productivity, which leads to increased wages and reduced inequality (Held et al. (1999)). To the extent that trade reduces the wages of unskilled labour, it provides incentives for workers to

acquire education and for firms to employ more unskilled labour, again reducing inequality (Blanchard (2000)).

Here we posit that international trade flows decrease income inequality, albeit indirectly. Opening to international trade flows spurs growth (Dollar and Kraay (2001)), which in turn decreases inequality (as hypothesized in the previous section). In addition, it could be argued that international trade weakens unfair advantages enjoyed by the rich and connected, thus undermining economic privileges and monopolies (Birdsall, 1998).

Hypothesis 4: Higher international trade exchange is associated with lower levels of income inequality.

2.2 Political determinants of income inequality

2.2.1 Democracy

2.2.1.1. Literature Review, Defining and Measuring Democracy

It has been argued that democracies are prone to adopting more redistributive policies, such as welfare spending, progressive taxation, minimum wage laws, price subsidies, and public work provisions (Reuveny and Lee, 2003). This has led some researchers to claim that democracies are unequivocally associated with less inequality. The empirical evidence to date however shows conflicting results. Some studies find evidence that indeed democracies are associated with lower inequality (Rodrick (1999)), while other find that democracies have no impact on inequality whatsoever (Bollen and Jackman (1985)).

Needless to say, the notion of democracy is fuzzy, open to discussion and interpretation. Moreover, the process of defining and measuring democracy still stirs passions in the intellectual world and it is the pivotal issue in an on-going debate (for a complete survey of definitions and measurements of democracy refer to Annex 2). However, when defined, the concept of democracy is usually treated as a political concept and as such it usually revolves around the issues of political participation of the populace, popular control and popular organization (also including the rights and liberties to do so). Equally conflicting is the issue of measuring democracy with researchers usually clashing on whether democracy should be treated as a dichotomous variable, or whether one should apply a gradient approach while measuring it. Given that in this study we analyze the long term effects of democracy (and regimes in general) on inequality, we apply a gradient approach towards measuring democracy and use two of the most widely used datasets (Freedom House Index and Polity IV). In the following section we analyze some of the causal mechanism through which democracy may influence the level of inequality.

2.2.1.2. Causal mechanisms

Reuveny and Lee (2003) argue that policies in democracies will always be designed so that there is more redistribution going towards the middle and the poorer classes in the

society, leading to lower levels of inequality. Indeed, a special strand of literature emerged in the early 1980s that tried to disentangle the link between democracy and inequality (especially through the redistributive channel) synthesized in the median voter model by Meltzer and Richard (1981). The model rests on two fundamental assumptions: (i) decisions to redistribute are based on rational choices of utility-maximizing individuals; and (ii) all individuals are voters, which would imply that the link between market-generated inequality and redistribution is higher in democracy than in non-democracy (Richard and Meltzer (1981)). Since in societies with higher inequality, income distribution is skewed to the left, implying that average income is always higher than median income, the median voter shall always have incentive to vote for higher redistribution and taxation of higher incomes (p.916). Furthermore, under progressive taxation, the median voter will gain more from redistribution than from taxation. Thus it follows that the more unequal the society is, the more the median voter will vote for higher taxes. In other words, in more unequal societies, the median income voter is expected to exert pressures for more redistribution, as the benefits that she gets from redistribution are higher than the costs associated with higher taxation (De Mello, p.283).

To date, strong empirical evidence that would support the median voter hypothesis is lacking. Milanovic (2000) found weak evidence that redistribution takes place through the median voter channel. Milanovic (2000) speculates that there are three reasons for his findings. The first one is that the level of the decisive voter, in the income distribution, is much lower than the median, which apparently is contrary to the latest findings (Bassett, Burkett and Putterman, (1999)). Second, there may be some long-term gains from redistributive policies, which the middle class is expecting. For example, the middle class may not be benefiting from unemployment benefits now, but they may do so in the long run. Finally, another mechanism through which the redistribution takes place may have to be defined.

Stemming from results of the study by Milanovic (2000), it could be argued that poorer segments of society may not always push for higher taxation, leaving open the possibility for less than egalitarian democracies (e.g. the Latin American democracies). Segura-Ubiero (2007) claims that low income groups are likely to press governments for higher levels of social spending only to the extent that these expenditures reach and benefit them directly. This is why the effect of democracy tends to be negative vis-à-vis social security expenditures (which in Latin America are regressive) and turned positive with respect to health and education expenditures (which tend to be more progressive). This corroborates the findings from a number of studies that have documented that social security spending in Latin America is based on legal employment in the formal sector, which makes most of the lower classes ineligible for this kind of transfers (mainly pensions). It is therefore not surprising that low-income groups that presumably gain political power with democracy do not press governments to increase social security programs that will not benefit them directly.

Whether or not the poor will push for higher taxation depends on their capacity to organize themselves or as McKay et al (2003) point out, this will depend on the construction of an inclusive lower-class identity. The ability of the poor to form broad

horizontal alliances, and to parlay these into social movements and political parties, will be a key factor in determining whether they are able to push through comprehensive approaches to structural problems of asset inequality. (McKay et al. (2003))

While the assumption that middle classes prefer higher redistribution could be valid (Reuveny and Lee (2003)), this argumentation need not always hold especially since the interests of the lower and the middle classes do not always rest on the claims of increased redistribution and since they are not always compatible. According to Ringen (2007), the middle classes are interested in prosperity and efficiency but they are also interested in helping the lower classes as poverty threatens the established order and it is a nuisance in an otherwise well established middle class life. Similarly, according to Rueschemeyer, Stephens and Stephens (1992), the primary economic interest of the middle class lies in the development and guarantee of the institutional infrastructure of market development – in the institutions of property and contract, in the predictability of judicial decisions, in the functioning of markets for capital, goods, services and labour, and in the protection against unwelcome state intervention.

Therefore, middle classes are not always the principal actors of higher redistribution. They will however, in certain instances embrace the poorer classes, especially when the poorer classes are smaller and with uneven development and when they demand less redistribution. This hypothesis is supported by the works of Rueschemeyer, Stephens and Stephens (1992) who claim that in late developing countries, the relative size of the urban poorer class is typically smaller because of uneven, “enclave” development, because of changes in the overall transnational structure of production, and because of the related stronger growth of the tertiary sector. This means that alliances across class boundaries could possibly emerge (p.59). These types of alliances emerged in some European countries, such as for example Switzerland, towards the end of the nineteenth century. The middle class realizes that the poor is small and fragmented and hence it will not require much redistribution. Hence, it is more amenable to accommodate its demands while pursuing its own goals of economic development and further economic and political power. In cases like this, democracy may not be associated with more redistribution and lower inequality.

Finally, some regimes that stand on the opposite side of the spectrum (in respect to democracy) may exhibit lower levels of inequality. For example, despite their brutality and oppression, communist regimes were characterized by relatively egalitarian distributions of income. As indicated by Gradstain, Milanovic and Ying (2001) this situation in the former communist countries arose as their ideology was deeply rooted in the egalitarian tradition. While differences in political power and in social status existed, income differences were not approved by the overall population. As they further indicate, richness was frowned upon while modest lifestyles were praised (Gradstain, Milanovic and Ying (2001)).

Hypothesis 5: Democracy does not have an impact on the levels of income inequality.

Finally, we posit that in certain instances, there could be a conjoint impact of the political and economic determinants on the levels of inequality. We explore this notion in the empirical part of the study, where we introduce interactive terms between the trade openness and democracy as well as dependence on natural resources and democracy.

3. DATASET AND BASIC EMPIRICAL LINKS

Before we introduce our methodology, estimation techniques and our results we turn to explaining the dataset and our variables. For the purpose of the project, we assembled a panel dataset covering 81 countries (for a full set of countries included in the dataset refer to Annex 3). In addition and in order to overcome some of the shortcomings associated with unavailability of data for income inequality[5] we opt for transforming the dataset into five-year averages, thus ending up with a maximum of 9 data points per country for the period 1962-2006 (for a full set of variables used in the model please refer to Table 1)[6].

3.1 Dependent variable

Income inequality measured as a Gini coefficient is the dependent variable in our model. The Gini coefficient is the most widely used measure of inequality. The coefficient itself is based on the Lorenz curve, which measures the proportion of income held by different shares of the population. A perfectly flat line (of 45 degrees) suggests perfect equality – 25 percent of the population holding 25 percent of the income in the society, and so on. Given that empirically such situation is not plausible, the Lorenz curve will always lie below the 45 degrees line. In fact, the Gini coefficient corresponds to the area between the 45 degrees line and the Lorenz curve. The Gini coefficient is a number between 0 and 100 where 0 means perfect equality (everyone has the same income) and 100 means perfect inequality (one person has all the income, while everyone else has nothing). A higher level of Gini represents a higher level of inequality in the distribution of individual incomes.

One of the main problems that we encounter with research relying on the Gini coefficient is associated with its availability and quality. The quality of the existing inequality datasets has been discussed numerous times (Deininger and Squire (1996)). Faced with this problem, we opted for using the United Nation's WIDER dataset. It is the most comprehensive dataset of inequality data (measured in Gini, but also in distribution of income by population's deciles), which also contains data based on a variety of measures (consumption and income), levels of aggregation (urban, rural, regional) and different characteristics of the labour force (working age, employed, unemployed).

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[5] By averaging the data we also managed to overcome some of the shortcomings associated with too many instruments, when estimating a model with General Methods of Moments (the problem of too many instruments has been indicated by Roodman (2006) for example).

[6] In fact we had commenced our estimation with non-averaged and three-year averaged data. However, we had run into problems of too many instruments while running the "difference" and "system" GMM methods. The problem of too many instruments is also explained by Roodman (2006) for instance.

Given this problem with raw data, we decided to use an algorithm as described by Mickiewicz and Gerry (2008) in order to come up with inequality data based solely on income and with high quality. Mickiewicz and Gerry (2008) first retained income-based data and eliminated all data based on consumption measures as well as all data points not based on representative coverage of the whole population. Where possible, they preferred data emanating from studies based on the Canberra group definition, where income includes production, barter and other non-cash income. The income in question is disposable income, not gross income (therefore, incorporating the impact of redistributive policies of the government). In addition, the preferred methodology identifies households as the appropriate sampling units, adjusted with equivalence scales. In case two results based on a similar methodology were available, they have taken the source that was more recent and that covered a longer time series. Finally, a supplementary criterion used to purge the data was the quality ranking of studies, available from the WIDER dataset, which grossly confirms the criteria enumerated above.

We have conducted a secondary transformation of the Gini data, as described in Reuveny and Lee (2003). According to them, the usual practice is to transform a bounded variable (such as the Gini coefficient) into an unbounded one. We transform the bounded Gini into an unbounded variable by using the following transformation equation (Gini/(100-Gini)).

After doing the aforementioned data cleaning and transformation (including data averaging) we are left with 293 5-year averaged data points for the Gini coefficient. For further descriptive statistics of the Gini coefficient, please refer to Table 1.

3.2 Core independent variables

In order to test the hypotheses above we use several variables that make up the list of our core variables. The first core variable is the *lagged value of Gini*. We expect the lagged values of inequality used in the econometric simulations to be associated with higher contemporaneous levels of Gini. The usage of our methodological approach (to be explained below) is associated with inclusion of lagged values of the dependent variable. The inclusion of this variable is evident in many empirical papers and is consistent with the tendency of inequality to persist over time. As indicated by Reuveny and Lee (2003), the inclusion of the lagged values of inequality helps to control for some excluded but potentially important variables in the model. Gupta and Davoodi (2005) also include lagged values of the Gini coefficient in their model.

We use *democracy* in order to gauge the effect of the political regime on inequality. The problem of defining and measuring democracy is an ongoing issue in social science research that deals with the topic (for possible approaches to defining and measuring democracy levels please refer to Annex 2). Given that we are interested in the impact of regimes on inequality in the longer period (rather than analyzing the impact of transitional democratizations) we use a gradient approach to measuring the concept of democracy. We therefore opt for using measures for political rights and civil liberties as defined by the Freedom House. The Freedom House index assigns the countries a

specific score corresponding to their level of political rights and civil liberties in the country (1 being most democratic and 7 being least democratic and more authoritarian). Finally we derive a variable *democracy* which is a simple average of the political rights and civil liberties. After transforming and averaging the raw index, we distil a total of 508 5-year averaged data points for the democracy variable[7].

We also believe that democracy is an endogenous variable in the model. As briefly explained in the natural resources section, natural resources abundance (and its capacity of rent creation) could have a tremendous impact on the prospect of democratization. In addition, the modernization theory developed by Lipset argues that the prospects of democratization increase as the country develops and diversifies its economy. While the use of lagged values as instruments for the endogenous variables has been a custom in the past, we depart from this notion and opt for exogenous instruments for democracy. In fact, one of the contributions to knowledge that we make in our paper consist of the introduction of exogenous instruments for democracy. Given the problems associated with finding exogenous instruments for endogenous variables (Roodman (2006)), we devoted some time to researching the possible candidates for exogenous instruments for democracy (for a full discussion please refer to Annex 1). After careful consideration and data availability we opt for using colonial past/legal origins as instruments for democracy. We explain the rationale for this in section 3.4 below.

Furthermore, we check the robustness of our results by using democracy data taken from Polity IV. That dataset also offers a gradient approach to measuring the level of democracies and it ranks the countries of the world on a spectrum ranging from fully institutionalized autocracies through mixed or incoherent autocratic regimes ending with fully institutionalized democracies. The nature of the regime is measured on a 21 point scale ranging from -10 (full autocracy) to +10 (full democracy). We also transform the Polity IV variable by subtracting the autocracy score from the democracy score (also adding 10) thus arriving at a gradient measure of democracy that ranges from 0 to 20 (0 being perfectly autocratic and 20 being perfectly democratic). It should be noted however that the definition of democracy according to Polity IV is somewhat more narrow and constrained compared to the Freedom House Index. Unlike the Freedom House Index that focuses on both political right and civil liberties, Polity IV consists of six component measures that record key qualities of executive recruitment, constraints on the executive authority and political competition. It also records changes in the institutionalized qualities of governing authority. This more constrained definition of democracy applied by Polity IV, according to some authors, renders it more appropriate in applying this particular dataset in empirical studies (Munck and Verkuilen (2002)).

Data on *oil and gas* comes from the US Department of Energy. We proceeded with transforming the original data and expressing it in terms of GDP (in order to better illustrate the extent of dependence on natural resources). As indicated in our argumentation above, we expect oil and gas to increase inequality. In our sample, we have a total of 357 data points for this variable.

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[7] In addition, in our robustness checks we experiment with additional measures for democracy (Polity IV and Freedom House dummy for electoral democracy).

Data on *ores and metals in percent of total exports* comes from the World Development Indicators (WDI). Coupled with the data on oil and gas in terms of GDP (as described above), this data also illustrates the extent of dependence on natural resources. In our final data set we ended up with 544 5-year averaged data points for ores and metal exports in percent of total exports. As previously argued, natural resources create initial income disparities, which increase income inequality in the long run. However, natural resources also create rents that could be easily captured and could also increase the income gap between the rich and the poor members of the society.

In order to test our claim in hypothesis 2, we define *trade openness*, as the sum of imports and exports as a percentage of GDP. Data for trade openness comes from the World Development Indicators. As indicated above, we expect to find a negative link between the levels of inequality and the levels of international trade flows. After we have transformed the raw data, we obtained a total of 595 data points for trade openness.

In order to test our claims in hypothesis 3 we introduce the *natural log of the GDP per capita*. Since we posit that the short term effects of GDP per capita would increase inequality, while long term effects would decrease it, we also introduce a *squared term of the log of GDP per capita*. This is a standard variable that is used as a control in similar studies that are focused on researching the political economy of inequality. In economics, GDP per capita is used as a proxy for the level of development and it is tightly connected with the impact of economic development (in the short run as well as in the long run) on inequality (the so called Kuznets effect). Ahluwalia, Carter and Chenery (1979) and Higgins and Williamson (1999) find evidence of the Kuznets hypothesis. However, Deininger and Squire (1996) do not find any evidence for the existence of such a relationship between development and inequality. Given its widespread usage as a control variable in almost every study in the political economy of inequality, data for GDP per capita was not very difficult to obtain and we finally end up with 618 5-year averaged data points for GDP per capita.

In order to test our claim in hypothesis 4 we use data for *economic growth* (as captured by GDP growth). Data for GDP growth is taken in raw format from the World Development Indicators (in our dataset we have a total of 621 data points for real GDP growth).

3.3 Control variables

In order to control for the gradual shift towards industry and manufacturing (and in general in order to control for the overall level of industrialization) we use *industry value added (in percent of GDP)*. The source of this variable is also the World Development Indicators (WDI). The use of the variable is consistent with our hypothesis that a move from the initial reliance on natural resources towards the secondary and the tertiary sectors is conducive to decreasing the overall levels of inequality. Since industry value added is often used as a proxy for the level of industrialization, data for this variable was

relatively easy to find, so we finally end up with 549 5-year averaged data for industry value added.

We use *agriculture value added (in percent of GDP*) as a proxy for the share of the agricultural sector in the economy. Data comes from WDI (World Development Indicators). As previously discussed, the inclusion of this variable corresponds to the developmental path of a country, i.e. heavy reliance on agriculture tends to be associated with lower levels of inequality.

Credit to private sector is a proxy for development of the financial sector and has also been used widely in the research area of growth, development and inequality. Credit to private sector has also been used numerous times in order to gauge the effect of the financial sector development onto growth, as well as democracy and inequality. Most recently, it has been used in Chong and Gradstein (2007) in their analysis of the impact of institutions on inequality. Data for credit to the private sector comes from the World Development Indicators and for the purpose of this essay, we managed to extract 560 5-year averaged data points for credit to the private sector in percent of GDP.

In order to control for the size of the countries we alternate between two variables. We start by using *country size (in km squared)*. Data for this variable is available from the World Development Indicators. In the latter models we also use *log of population*, as another proxy for the size of countries. Data for this variable is also taken from the World Development Indicators.

We also control for *government spending (in percent of GDP)*, inter alia, in order to capture the government involvement in the economy (as well as a wider proxy of the effect of redistribution). The source of the data is the World Development Indicators (WDI). In our final dataset we arrived at 586 5-year averaged data points for government spending. In order to further enhance our conclusions, we experiment by dividing the government spending into that on *military* and *non-military* and we argue (as indicated below) that these two variables should work in opposite direction, i.e. military government spending will pull resources away from the regular redistributive process, thus increasing the level of inequality, while the effect of non-military government spending is more likely to be the opposite. However, we have managed to obtain only 288 data points for these two variables and therefore the results are to be interpreted cautiously.

Finally, there has been some body of research that has tapped into the relationship between *inflation* and inequality. Inflation is one of the standard variables are used in order to gauge the impact of macroeconomic volatility. Data for inflation comes from the IMF's International Finance Statistics. The usage of inflation as a control variable in inequality/growth/democracy studies has been noted several times. Most recently Desai, Olofsgard and Yousef (2003) find that in countries with a Gini coefficient below 40, democracy helps in maintaining low levels of inflation.

3.4 Instruments for democracy

As we indicated in our discussion above, we expect democracy to pose problems of endogeneity in our model and hence we resort to using exogenous instruments for it (for a more detailed discussion of instrumenting democracy, refer to Annex 1). After careful consideration and given the nature of the instruments, we decided to use three instruments in the difference section of the GMM command (measure of inequality and two measures for reliance on natural resources, respectively). In addition, we opted to include dummies for the four legal origins and latitude in the level section of the GMM command[8]. By having this set up of instruments, we essentially reconcile against the two strands of literature which claim that natural resources and legal origins, respectively account as sole factors in carving countries' developmental paths (Levine (2005)).

Legal origins. In the model we differentiate four types of legal origin: British, French, Germanic and Scandinavian (the authors of the database considered a fifth type as well (socialist) which we now chose to abandon since most former socialist countries have reverted to their Germanic or French legal origin). The source of the data is La Porta et al. (2008).

Latitude. Latitude has numerous times been used as an instrument for democracy and level of institutional development. It has also been included as an individual regressor (Dollar and Kraay (2002)). Given its nature (it does not change over time) in this case we include it as an instrument for democracy.

[8] Given the nature of the legal origin dummies and latitude (they are essentially non-changeable across time) their inclusion in the difference section of the GMM command would have eliminated them all together, hence not adding much value to their inclusion in the estimation.

Table 1: Basic descriptive statistics

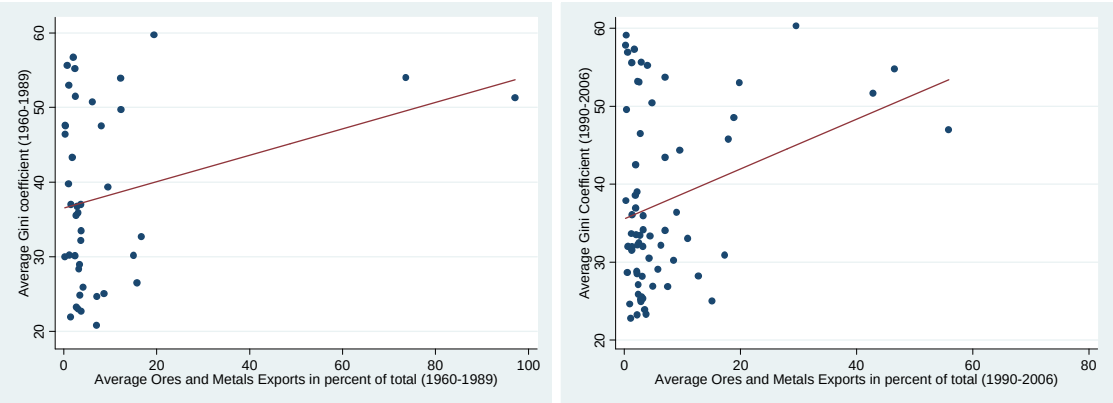
Variable	*Number of observations*	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
Gini coefficient	293	35.86	11.16	18.43	62.50
GDP per capita (in 2000 US dollars, PPP)	618	7876.00	9006.56	89.25	50978.79
Freedom House Political Rights	508	2.75	1.92	1.00	7.00
Freedom House Civil Liberties	508	2.91	1.69	1.00	7.00
Industry Value Added (in percent of GDP)	549	32.48	9.63	4.75	62.54
Inflation (in percent)	549	30.28	171.10	-1.74	2741.29
GDP growth (real, in percent)	621	3.46	3.89	-21.10	23.16
Private Credits (in percent of GDP)	560	47.27	38.68	1.53	218.00
Trade Openness	595	69.25	39.32	5.55	281.16
Oil Production (in percent of GDP)	418	3.50	9.19	-0.14	55.22
Gas Production (in percent of GDP)	361	0.79	2.22	0.00	21.02
Ores and Metals exports (in percent of total exports)	544	7.94	15.55	0.00	97.44
Agricultural Value Added (in percent of GDP)	534	13.88	12.38	0.50	82.78
Government Expenditure (in percent of GDP)	586	15.76	5.43	4.00	39.34
Government Military Expenditure (in percent of GDP)	288	2.13	1.74	0.19	16.49
Government Non-Military Expenditure (in percent of GDP)	281	14.43	4.91	2.36	25.83

Sources: WIIDER, World Development Indicators (WDI), Freedom House Index, International Financial Statistics (IFS) and US Department of Energy

3.5 Basic empirical evidence

Before we turn to presenting our model and estimation techniques, we present several scatter plot charts in order to capture the basic empirical regularities within our data. Below we present seven sets of charts that gauge the relationship between inequality and: the regime type (as proxied by the Freedom House Index); natural resources reliance (proxied by ores and metal exports in percent of total exports); government non-military spending in percent of GDP; trade openness and the natural log (and the associated squared term). In order to control for the effect of the more historically egalitarian communist countries, we divide the sample into two periods: one from 1962 until 1989 (left plot) and the other one from 1990 until 2006 (right plot). Finally, we explore the possibility of democracy being endogenous to the model by presenting a scatter plot between the democracy and ores and metals exports.

Figure 1. Average Ores and Metal Exports and Average Gini coefficient



In order to visualize the empirical links that form the basis for our first hypothesis, we created a scatter plot chart that captures the relationship between average ores and metal exports (in percent of total exports) and average Gini. In both charts a clear positive relationship between the two variables emerges (which could indicate that higher levels of ores and metals exports are associated with higher levels of inequality). The coefficient of correlation between average ores and metal exports and gini coefficient is 0.27 and 0.30 in the first and the second case, respectively. Regressing gini on ores and metal exports produces a slope of 0.17 and 0.31 respectively, with significance of 10 and 5 percent. In both charts we observe traces of heteroskedasticity, which we ought to take in consideration while conducting the empirical estimations. This positive association between the ores and metal exports and gini does not come as a surprise given our discussion above. As previously indicated, natural resources abundance: (i) creates rents that are easily captured by the ruling elite hence exacerbating the income gap between the higher and the lower classes; (ii) is associated with retardation of the emergence of manufacturing and industrialization and (iii) impedes creation of effective and efficient institutions that would put more stringent constraints on the possibilities of rents expropriation.

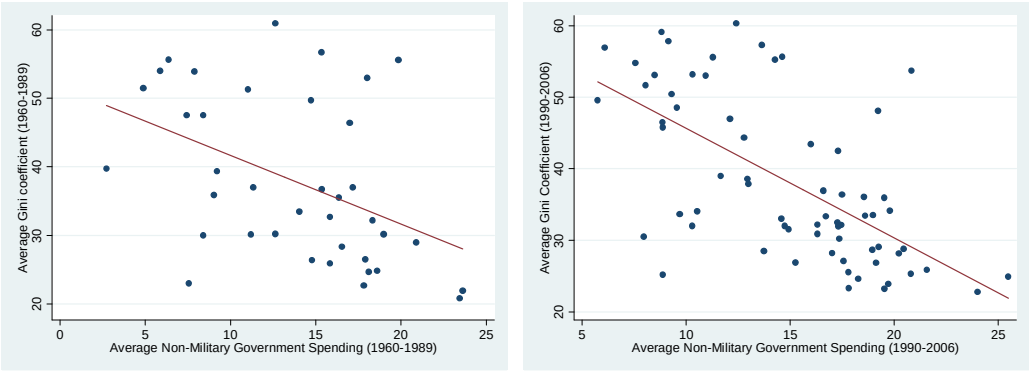
Figure 2. Average Freedom House and Average Gini coefficientt

The charts above help us visualize data links that enter our second hypothesis. The chart on the right exhibits a clear positive relationship between the average Freedom House Index and the average Gini (albeit with increased variability, which clearly suggests the presence of heteroskedasticity). The relationship between democracy and inequality in the first chart is fuzzier, which stems from the reported egalitarian distribution of income in the communist countries. The cluster in the lower right angle of the chart corresponds to the communist countries (low inequality and high average Freedom House index). The correlation coefficient between the variables in the first chart is 0.41, while the slope of the regression line is 2.68 (with 1 percent level of significance).

A similar situation emerges in the second chart, though the relationship appears stronger (which may also be a result of data availability). Similarly to the previous case, there is a strong correlation coefficient between the Freedom House index and gini (0.54). In addition, the slope of the fitted line is 3.90 (with 1 percent level of significance), which clearly suggests a strong link between the two variables.

As we have pointed out previously however, democracy is a complex concept, defined and measured in different ways, and hence, a strong positive correlation between the two variables could be misleading and in addition could be influenced by additional factors.

Figure 3. Average Non-Military Spending and Gini coefficientt



In order to further examine the links behind our democracy hypothesis, we observe the relationship between non-military government spending (in percent of GDP) and the Gini coefficient. In the first chart the correlation coefficient between the two variables is -0.44 while the slope of the fitted line is -1.00 (at 1 percent level of significance). In the second chart, the correlation coefficient between the two variables is -0.62, while the slope of the fitted line is -1.53 (at 1 percent level of significance). However, the chart on the right is overburdened with many outliers, which could be indicative of a complex relationship between government spending and Gini. Hence, a further empirical testing of the relationship between the two variables is needed. In any case, the plotted relationship confirms our analysis in the theoretical section that higher government spending (non-military) is associated with lower levels of inequality.

In a sequential order, we explore the links between GDP per capita and real GDP growth on one side and the Gini coefficient on the other side in a set of charts below. The first set of charts depicts the relationship between the natural logarithm of the GDP per capita (measured in 2000 USD, PPP) and the Gini coefficient. However, in contrast to our expectation based on the theoretical overview, from the charts below we can only observe a negative relationship between natural logarithm of GDP per capita and the Gini coefficient. The correlation coefficient between the two variables is -0.53, while the slope of the fitted line is -4.40 (at 1 percent level of significance). In the second chart, the correlation coefficient between the two variables is -0.61, while the slope of the fitted line is -5.00 (at 1 percent level of significance). Contrary to our expectations, the simple empirical links below do not exhibit a clear positive link between the real GDP per capita and gini.

Hence, we further examine the relationship by constructing a scattered plot between the square of the natural logarithm of the GDP per capita and Gini coefficient. As expected, the latter relationship supports our conjectures stated in the literature overview of the paper that the relationship between the real GDP per capita and gini (in the longer run) is negative. In the first chart, the correlation coefficient between the variables is -0.56, while the slope of the fitted line is -0.299 (with 1 percent level of significance). There is also a strong link in the second chart. The correlation coefficient in this case is -0.62, while the slope of the fitted line is -0.30 (with 1 percent level of significance).

Figure 4. Average log of GDP per capita and Gini coefficient

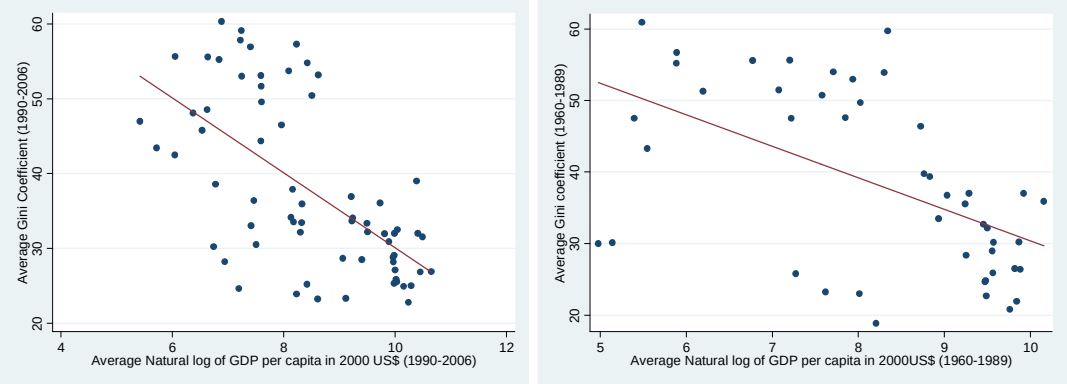
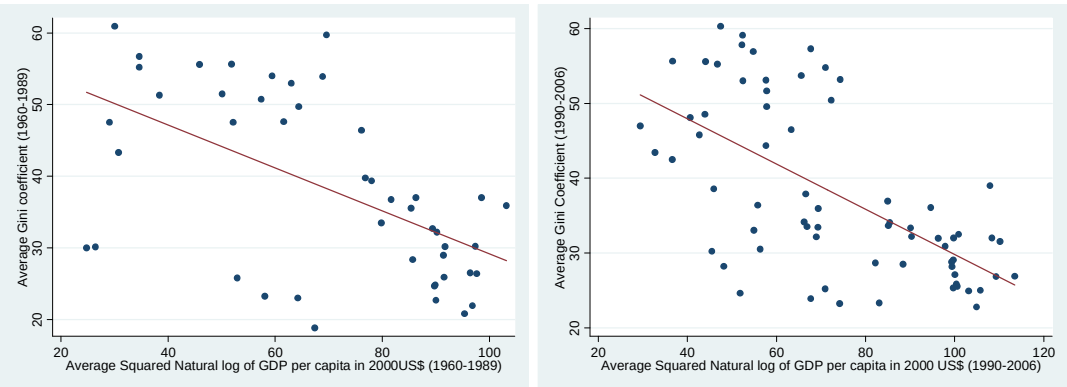
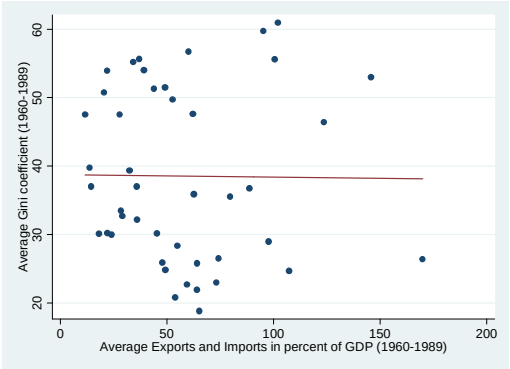


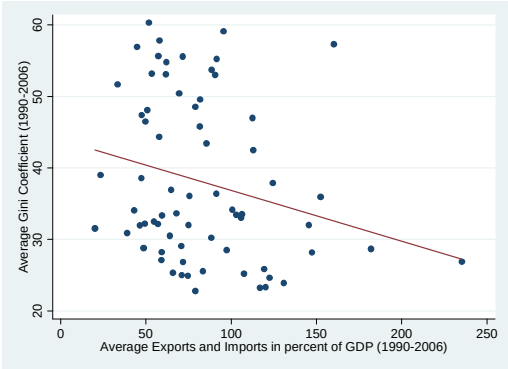
Figure 5. Average squared log of GDP per capita and Gini coefficient



We explore our last hypothesis with a set of charts below, where we try to gauge the effect of trade openness onto inequality. While the chart on the left does not reveal much about the relationship between trade openness and inequality, the chart on the right exhibits some weak negative relationship between inequality and trade openness. The correlation coefficient between the two variables in the first chart is -0.01. In addition, the slope of the line is very small (-0.003), while international trade appears insignificant. The chart on the right however exhibits much clearer relationship between the two variables. Although the correlation coefficient is still relatively low (-0.23) as well as the slope of the line (-0.07), international trade appears to be much more significant in this case (it is significant at 5 percent). The intensification of trade after the completing of the Uruguay Round (which may have had some impact on the level of growth) could be a possible explanation for this empirical regularity.

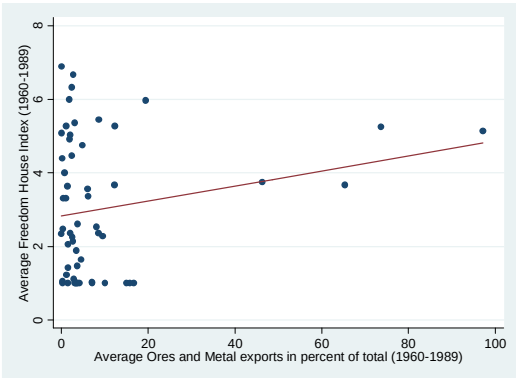
Figure 6. Average trade openness and Gini coefficient

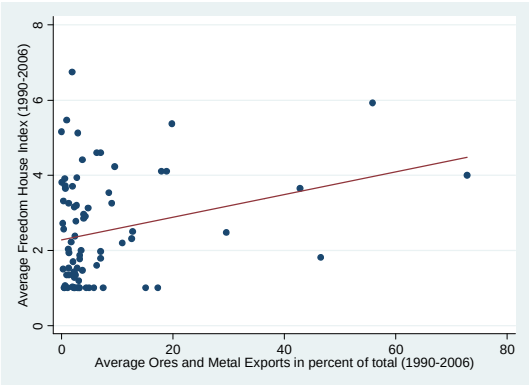




Finally, with the charts below, we try to investigate the possibility that democracy may be an endogenous through a scatter plot of democracy against a variable that we believe is exogenous (ores and metal exports in percent of total exports).

Figure 7. Average Ores and Metals Exports and Average Freedom House Index





The first chart above exhibits a much weaker relationship between the two variables (the correlation coefficient is 0.20, while the slope of the line is 0.02 and ores and metals appear as insignificant. The relationship is much stronger in the second chart. Here, the correlation coefficient between the variables is 0.26. Also, while the slope of the line is still small (0.030), it appears to be more significant than the previous case (albeit at 5 percent level of significance).

4. ESTMATION MODEL AND ESTIMATION TECHNIQUES

4.1 Estimation Equation

Given our literature review and our elaboration of the core and control variables (as well as the possible empirical links between them), we arrive at the following estimation equation:

lGini = lGini(t-1) + Democracy + Ores and Metal Exports + Oil and Gas Production + Log GDP per capita + Log of GDP per capita squared + Industry Value Added + Agriculture Value added + GDP growth + Credit to Private Sector + Trade Openness + Government Expenditure + size of the country + error term

In order to test the hypotheses stated in the previous section, we proceed with using a dynamic system GMM estimation procedure. Bearing in mind the sensitivity of the estimation procedures to a high number of instruments, we proceed with using a compressed version of our sample, consisting of 5 year averages. As mentioned above, this compressed version of the sample also helps in dealing with missing observations of the Gini coefficient.

Given the structure of the estimator and provided the literature review and the possible determinants of inequality stemming from our literature review, we proceed with using inequality, oil and gas as percent of GDP as well as the military as exogenous instruments in the GMM differences equation, while we proceed with using a dummy for the year as well as the four legal origin dummies as and latitude instruments in the GMM levels equation. The benefits of instrumenting the equation in this manner are manifold. First and foremost, by including the natural resources as instruments in the differences equation, we can ensure that the instruments that we are using are exogenous. Also, given the nature of the legal origin dummies (they are essentially dummy variables), by using them in the GMM levels equations, we ensure that they are not eliminated altogether (which would have happened if they were to be included in the difference part of the GMM estimator). Finally, by using this set up of the estimator, we essentially bridge the two strands of literature which, each in its own right, argue that natural resources and legal origins, respectively are solely responsible for the economic path of developing countries (Levine (2005)).

4.2 Econometric methodology

With the advancement of technology and research, a variety of econometric techniques have become available to deal with the issue of endogeneity of one (or many) of the regressors in the econometric specification. In order to deal with these problems, researches have come up with variety of research methods, out of which instrumental variable approach (IV or 2SLS) is perhaps the simplest one, though not without a certain level of criticism. Gerry, Lee and Mickiewicz (2008), argue that the appropriateness of the 2SLS as a general solution of the endogeneity problem is, at best, questionable. Fortunately, with the adoption of new econometric software packages and better data sets, economists and political scientists have been able to take advantage of the Generalized Method of Moments (GMM) in dealing with the issues of endogeneity and unobserved heterogeneity. The difference and system GMM estimators can be seen as part of a broader historical trend in econometric practice towards estimators that make fewer assumptions about the underlying data-generating process and use complex techniques to isolate useful information (Roodman, 2008).

Furthermore, according to Roodman (2008), the difference and system GMM techniques applicable to panel data rest on a few assumptions that are worth noting: (i) the process should be a dynamic one, with current realizations of the dependent variable influenced by past values; (ii) there maybe arbitrarily distributed fixed effects in the dynamic, so that the dependent variable changes consistently faster for some observational units than for others; (iii) some regressors may be endogenous; (iv) the idiosyncratic disturbances may have individual-specific patterns of heteroskedasticity and serial correlation; (v) the idiosyncratic disturbances are uncorrelated across individuals; (vi) some regressors may be predetermined but not strictly exogenous; (vii) the number of time periods in the data should be small, while the number of observations large (small T and large N).

Given our argumentation above, it is easy to conclude that in our case, the use of difference and system GMM would be appropriate in order to deal with the issues at hand and to arrive at consistent and efficient parameters.

4.2.1. "Difference" GMM model

The difference GMM model is advantageous on several levels. Firstly, by specifying the regression equation in differences it allows elimination of the country-specific effect. First-differencing yields the following equation:

$$y_{i,t} - y_{i,\,t-1} = \beta_1(y_{i,t-1} - y_{i,t-2}) + \beta_2(X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (1)$$

The use of instruments is required in order to deal with two issues: the first one is the likely endogeneity of the independent variable, while the second one is the correlation of the new differenced error term with the differenced lagged dependent variables. As previously explained, we assume weak exogeneity (i.e. that present values of democracy could be influenced by present or past values of inequality, but not by future realizations of the dependent variable). Under these assumptions that the error terms is not serially correlated and the explanatory variables are weakly exogenous, the moment conditions that apply are the following:

$$E\,[y_{i,t-s} \times (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3, \ldots, T \quad (2)$$
$$E\,[X_{i,t-s} \times (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3, \ldots, T \quad (3)$$

The GMM estimator based on the moment conditions in equation (2) and (3) is known as the "difference" GMM estimator.

Given the shortcomings associated with using endogenous variables as their own instruments (Bobba and Coviello (2007)), we are able to take a step forward with our empirical approach by arguing that there are exogenous instruments for democracy as our independent variable (which are going to be described bellow). Hence, the moment conditions in our case will be:

$$E\,[y_{i,t-s} \times (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3, \ldots, T \quad (4)$$
$$E\,[Z_{i,t-s} \times (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3, \ldots, T \quad (5)$$

Given that:

$\text{Corr}\ (Z_{it}, X_{it}) \neq 0$
$\text{Corr}\ (Z_{it}, \varepsilon_{it}) = 0$

The GMM estimator based on the moment conditions in equations (4) and (5) above give us the "difference" GMM estimator with exogenous instruments.

4.2.2. "System" GMM

Although asymptotically consistent, this difference GMM estimator has low asymptotic precision and large biases in small samples, which leads to the need to complement it with the regression equation in levels. Furthermore, Blundell and Bond (1998) argue that estimators relying on lagged variables are weak instruments if the data in question are close to being a "random walk". As indicated by Gerry, Lee and Mickiewicz (2008) in these cases, the 'difference' GMM performs poorly as the coefficient variances are inflated and finite sample bias becomes an issue. To deal with these issues, a few articles propose the use of system GMM (Arellano and Bover (1995), Blundell and Bond (1998); Bond (2002)).

According to Bond, Hoeffler and Temple (2001) the system GMM estimator combines the standard set of equations in first differences with suitable lagged levels as instruments, with an additional set of equations in levels with suitably lagged first-differences as instruments.

The equations for the system GMM and the moment conditions are presented below (equations 6 and 7) and are taken from Gerry, Lee and Mickiewicz (2008).

$$E\ [(X_{i,t-1}-X_{i,t-2})\ (c_i + u_{i,t})] = 0 \qquad (6)$$
$$E\ [(X_{i,t-1}-X_{i,t-2})\ X_{i,t}] \neq 0 \qquad (7)$$

By using exogenous variables as instruments, the moment conditions for the "system" GMM with exogenous instruments would be substituted by equations (8) and (9):

$$E\ [(Z_{i,t-1}-Z_{i,t-2})\ (c_i + u_{i,t})] = 0 \qquad (8)$$
$$E\ [(Z_{i,t-1}-Z_{i,t-2})\ Z_{i,t}] \neq 0 \qquad (9)$$

Again, given that:

$\text{Corr}\ (Z_{it}, X_{it}) \neq 0$
$\text{Corr}\ (Z_{it}, \varepsilon_{it}) = 0$

as indicated by Gerry, Lee and Mickiewicz (2008), system GMM reduces any bias of the estimators that may be associated with the difference GMM.

Finally, as an empirical matter, the validity of these additional instruments can be tested using the standard Sargan test of over-identifying restrictions, or using Difference Sargan or Hausman comparisons between the first-differenced GMM and system GMM results (Arelano and Bond (1991)).

As mentioned above, our only departure from the standard GMM assumptions is the availability of good instruments. Unlike the general assumption that the only good instruments are internal (based on lags of the instrumental variable), we argue that there are good exogenous instruments for the dependent endogenous variables. The usage of exogenous instruments, although a difficult task, has also been confirmed by Arellano and Bond (1991) and Roodman (2008).

5. RESULTS AND ROBUSTENESS CHECKS

5.1. Results

We start with estimating model 1, which is the most basic one including surface as a control variable for the size of the country. Model 2 adds inflation as a proxy for macroeconomic volatility, while still keeping surface as a proxy for the size of the economy. Model 3 uses population as a proxy for country size, while keeping inflation as a proxy for macroeconomic volatility. We finally end our estimation with a comprehensive model 4, which also includes disaggregated data for government spending (military and non-military government spending).

There are a few important results that emerge from our analysis. We find strong support for a dynamic effect of inequality in the model (as expressed by the lagged value of inequality). As we have argued above, inequality is characterized by a certain degree of inertia, which does not allow for a rapid and dramatic change. Indeed, higher past levels of inequality are associated with higher current levels of inequality. Model 4 however does not exhibit this dynamic relationship. We suspect that the inclusion of the additional variables (disaggregated data on government spending) which also decreases the size of the sample may affect the already established dynamic relationship between past and present values of the Gini coefficient. Lagged levels of transformed Gini are significant at 10 percent in our Model 1, while they are significant at 1 percent in Model 2 and Model 3. The existing research in the area of inequality has come to this conclusion numerous times. The dynamic link in the inequality equation has been used by Calderon and Chong (2001), Li and Zou (1998), as well as Ranjan (2003). As in our case, they find a strong positive correlation between past and present values of the Gini coefficient.

In order to validate our findings and to justify the usage of System GMM method, we also present a table where we estimate the baseline model (and the addition models) with fixed effects (within groups), which should be the lower bound for the autoregressive

Table 2 - System GMM Estimation Results for dependent variable: Transformed Gini and latitude as an instrument

Variable	Model 1	Model 2	Model 3	Model 4
Lagged transformed Gini	.29** (.12)	.48*** (.101)	0.46*** (.10)	.48*** (.13)
Democracy (FREEDOM HOUSE)	.01 (.054)	-.046 (.064)	-0.049 (0.061)	-.076 (.061)
Ores and Metals exports	.008** (.004)	.007* (.004)	.007* (.004)	.008* (.005)
Oil and Gas production	.018* (.011)	.018* (.011)	.016* (.009)	.021** (.008)
Log GDP per capita	1.45 (1.01)	2.32** (1.11)	1.93* (1.16)	2.79*** (.84)
Log GDP per capita squared	-.010* (.057)	-.14** (.064)	-.122* (.069)	-0.16*** (0.049)
Industry value added	-.036*** (.011)	-.029*** (.010)	-.028*** (.010)	-.016 (.014)
Agriculture Value added	-.011 (.027)	.008 (.021)	.013 (.021)	.051** (.020)
GDP growth	-0.011 (.012)	-.017 (.018)	-.021 (.015)	-.019 (.015)
Credit to private sector	.005*** (.001)	.005*** (.001)	.004** (.001)	.004*** (.001)
Trade openness	-.004* (.002)	-.002 (.002)	-.002 (.001)	.000 (.001)
Government Expenditure	-.005 (.012)	.000 (.014)	-.003 (.015)	
Surface	-1.21e-08 (2.57e-08)	-7.13e-09 (1.87e-08)		
Log Population			.027 (.053)	.064 (.051)
Inflation		.000 (.001)	.000 (.000)	-0.002** (0.0009)
Military Government Expenditure				-.075 (.055)
Non-Military Government Expenditure				.010 (.015)
Constant	-3.9 (4.73)	-8.46* (4.96)	-7.35 (4.87)	-12.76*** (3.75)
Sargan Test for Overqualifying restrictions	0.8	0.94	0.89	0.71
Hansen Test for Overqualifying restrictions	0.62	0.66	0.21	0.45
Number of Observations	136	127	127	112
Number of Instruments	43	43	43	36

Notes: All models are estimated with system GMM estimation results applied to 5 year averaged data for the variables in the model; in addition, the reported standard errors are robust standard erros. *** signficant at 1 percent level of signficance, ** signficant at 5 percent level of significance, * signficant at 10 percent level of signficance. Instruments used in the difference portion of the system GMM (lgini, oresmet, oil and gas). Instruments used in levels portion of the system GMM (dummies for British, French, Germanic and Scandinavian legal origins as well as latitude).

Table 3 - Estimation Results for dependent variable: Transformed Gini

Variable	Model 1		Model 2		Model 3		Model 4	
	Within Groups (FE)	***Pooled OLS***	***Within Groups (FE)***	***Pooled OLS***	***Within Groups (FE)***	***Pooled OLS***	***Within Groups (FE)***	***Pooled OLS***
Lagged transformed Gini	.11 (.098)	.76*** (.044)	.224** (.095)	.79*** (.040)	.20** (.09)	.79*** (.041)	.28** (.106)	.813*** (.043)
Democracy (FREEDOM HOUSE)	.045 (.034)	-.002 (.012)	-.015 (.036)	-.013 (.017)	-.03 (.03)	-.015 (.016)	-.0067 (.0384)	-.009 (.024)
Ores and Metals exports	.008 (.009)	.001 (.002)	-.004 (.009)	.001 (.002)	-.016 (.009)	.0013 (.0016)	-.010 (.009)	.0009 (.001)
Oil and Gas production	.009 (.007)	.0019 (.003)	.002 (.007)	.001 (.002)	-.009 (.008)	.0016 (.002)	.0045 (.011)	.0014 (.002)
Log GDP per capita	.726 (.443)	.079 (.27)	-.567 (.815)	.067 (.207)	-1.33* (.80)	.093 (.209)	-.114 (.937)	.200 (.247)
Log GDP per capita squared	-.038 (.025)	-.011 (.015)	.033 (.043)	-.0097 (.0113)	.083* (.043)	-.011 (.011)	.0088 (.0517)	-.015 (.013)
Industry value added	-.011* (.005)	-.004** (.002)	-.003 (.005)	-.003* (.002)	-.0007 (.0054)	-.003 (.002)	.00082 (.0066)	-.001 (.002)
Agriculture Value added	-.013 (.011)	-.010 (.006)	-.0007 (.01)	-.009* (.004)	.003 (.010)	-.007* (.004)	.0081 (.011)	-.004 (.005)
GDP growth	.007 (.005)	-.001 (.005)	-.0013 (.008)	-.002 (.005)	-.004 (.007)	-.002 (.006)	-.0043 (.0079)	-.002 (.005)
Credit to private sector	.0001 (.0006)	.001*** (.0003)	.0001 (.0006)	.0009*** (.0003)	.0005 (.0006)	.0009** (.0003)	.0008 (.0006)	.0007** (.0003)
Trade openness	.0004 (.001)	-.0005** (.0003)	-.0002 (.001)	-.0005** (.0002)	-.0005 (.001)	-.0003 (.0003)	.0006 (.001)	-.0003 (.0003)
Government Expenditure	.004 (.0102)	-.006* (.003)	-.0006 (.009)	-.0057* (.0032)	.0027 (.009)	-.005* (.003)		
Surface	.00006 (.00009)	5.19e-10 (3.80e-09)	.00004 (.00008)	-2.38e-11 (3.42e-09)				
Log Population					-.901** (.29)	.007 (.011)	-.66* (.360)	.002 (.011)
Inflation			-.0006 (.0007)	.0002 (.0005)	-.0008 (.0006)	.0001 (.0005)	-.0009 (.0006)	-.00002 (.0005)
Military Government Expenditure							-.009 (.040)	-.0012 (.013)
Non-Military Government Expenditure							-.003 (.009)	-.004 (.0034)
Constant	-97.85 (137.80)	.33 (1.34)	-53.04 (103.079)	.32 (1.008)	19.47 (6.68)	.065 (1.059)	10.52 (7.82)	-.53 (1.264)
Number of Observations	153	153	142	142	142	142	127	
R^2		0.91		0.93		0.93		0.93
Number of Groups	55		51		51		50	

coefficient of Gini, and pooled OLS, which should represent the upper bound for the autoregressive coefficient of Gini. Indeed when we run our 4 models, the system GMM autoregressive coefficient always lays between the two bounds mentioned above (please refer to Table 3).

Furthermore we find strong evidence that natural resources endowments are associated with higher levels of inequality. This result is consistent with the resource course that was elaborated in the literature review of the paper. Moreover, as we have pointed out above, natural resource dependence increases the possibility of rent capture and the creation of a rentier state which exacerbates the inequality not only because of the rent extraction by the ruling elite but also because of limited redistribution towards the lower socio-economics segments of the population. In our Model 1, both oil and gas production, as well as ores and metal exports are significant at 5 and 10 percent level of significance respectively. In Model 2, both oil and gas and ores and metals are statistically significant at 10 percent level of significance. In Model 3 and 4 ores and metal exports and oil and gas production both appear statistically significant at 5 percent level of significance. In all 4 models, the relationship between the two variables and inequality is positive, which suggest that higher reliance on oil and gas production as well as higher metal and ores exports increase inequality. To reiterate again, we argue that there are essentially two channels through which reliance on natural resources increases inequality: (i) by creating rents that are captured by the ruling elite; and (ii) by weakening the institutional base and redistributive policies.

We however, do not find evidence that government expenditure influences inequality. In all of our models where we use data for government expenditure it is insignificant. This result is consistent with the results obtained in similar studies. Ivashchenko (2005) does not find evidence that government consumption decreases inequality (in a panel dataset for the former communist countries). In order to further analyze the effect of government spending, we also use disaggregated values for the government spending (military and non-military spending) (in model 4). While the sign of the relationship is intuitive, neither military nor non-military spending is significant and hence we find no evidence that government spending decreases inequality.

In order to control for the size of the countries, we include two additional variables in the estimations – size and population. We find that the size of the countries is insignificant, which is somewhat different from the conclusion of Mickiewicz and Gerry (2008) who find that bigger countries (in the context of the former communist countries) tend to have higher inequality compared to the smaller countries. We then proceed with using the population size as a proxy for the size of the economy (also expecting that more populous countries will be more unequal as well, i.e. it is always easier to spread the wealth among the populace of a smaller country then among the populace of a bigger country). In our basic model however, we find no evidence that population is associated with increases of inequality.

We also do not find evidence that democracy has any impact on inequality. In all of our specifications, democracy appears as insignificant. In that respect, our results are

somewhat different compared to the bivariate relationship between democracy and inequality presented above. In order to see to what extent this result is product of a misleading bivariate relationship or product of the interaction between democracy and other control variables in the model, we run a simple GMM model including only the Gini, its past values and democracy. While in the basic model, democracy is significant at 10 percent level of significance, the model does not pass the Sagran test of overidentifying restrictions. This would imply that even the simplest estimation equation between democracy and inequality does not yield robust results that could be used to prove whether democracy has any impact on inequality.

In addition, we find evidence of existence of Kuznets curve. In all of our models, GDP per capita and the squared term of the GDP per capita enter the equations with the expected sign (GDP per capita is positive, while the square term is negative). Furthermore, in Model 2 and Model 3, both variables are significant at 10 percent level of significance, while in Model 4 their significance increases to 5 percent.

In three of our four models, we find strong statistical evidence that industrialization decreases inequality (at 1 and 5 percent statistical significance). This finding is consistent with Kuznets's finding that industrialization decreases inequality and that deindustialization increases inequality. Our findings are consistent with Ivashcneko's findings (2005) of strong statistical evidence that industrialization decreases inequality.

What we do find however, is that development of the private sector (as proxied by the credit to the private sector) increases inequality. While this is in conflict with the existing knowledge in the area of inequality, poverty and private sector development, we argue that the development of the private and financial sector increases inequality due to the emergence of a well paid "financial nomenklatura" that augments the gap between them and the rest of the population. While the relationship between inequality and the financial sector development has not been researched extensively, most of the available papers find a negative relationship between private sector development and inequality. Levine, Beck and Demigurc (2007), using OLS as well as dynamic panel approaches, find a negative relationship between private sector development and inequality.

Acknowledging that inequality hurts macroeconomic growth and that redistributive policies may sometime have negative effect on growth, Beck, Demigurc and Levine chose a different approach, one that focuses on financial sector reform that reduces market frictions, which further reduces inequality. Clarke at al (2006) also find that financial sector development reduces inequality. Beck, Demigurc and Levine's hypothesis is driven by the fact that in countries with underdeveloped financial markets, the poor cannot borrow money which in turn decreases the educational attainment of the poor's children thus resulting in increasing inequality. This theme is perpetual in a few papers (Jackoby (1994), Skoufias (1997), Dehejia and Gatti (2003) and Beegle et al. (2003)). However, what Beck, Demigurc and Levine fail to account for is that the development of the financial sector may in fact create some form of "financial nomenklatura", which is highly paid and detached from the other service sectors, which in turn may exacerbate the level of inequality. Another possible explanation maybe the

existence of an inverted U shaped relationship between the financial sector development and inequality (a la Kuznets). As indicated by Cox and Jimenez (1990), financial sector development initially may be responsible for the break down of the informal private transfers and borrowing, which may in turn may increase inequality in the short run.

Finally, in our Model 1 and Model 2, we find evidence with 5 percent level of significance that trade openness decreases inequality. As discussed in our literature review, we hypothesised that countries that are more open and more involved in the international trade exchange tend to exhibit lower levels of inequality.

5.2 Robustness checks

In order to check the robustness of our results, we conduct 3 robustness checks. In the first one, we introduce a dummy variable for the communist countries. As previously discussed in the section exploring the basic links between our variables, we divided our period of analysis on two parts (one from 1960 until 1989 and the other one from 1990 until 2006) in order to visualize the impact of the communist rule on the levels of inequality. The results of this estimation are presented in Table 4.

We find strong evidence that oil and gas production as well as ores and metal exports are associated with increases in inequality. In our Model 1 ores and metals are significant at 5 percent level of significance. In Model 2, both variables are significant at 10 percent level of significance, while in Model 3 ores and metal exports are significant at 10 percent level of significance and oil and gas production is significant at 5 percent. Finally, in Model 4 only the oil and gas are significant (at 5 percent level of significance). In all of the four models, the relationship between the two variables and inequality is positive, which clearly suggests that reliance on natural resources is associated with in increases inequality.

Our findings of dynamic relationship in the inequality equation are reconfirmed. In model 1, inequality is significant at 5 percent level of significance, while in Model 2, Model 3 and Model 4 it is significant at 1 percent.

Table 4 - System GMM Estimation Results for dependent variable: Freedom House and Communist dummy

Variable	Model 1	Model 2	Model 3	Model 4
Lagged transformed Gini	.30** (.13)	.50*** (.10)	.45*** (.10)	.49*** (.13)
Democracy (FREEDOM HOUSE)	.009 (.063)	-.052 (.078)	-.047 (.072)	-.079 (.063)
Ores and Metals exports	.008** (.004)	.007* (.004)	.007* (.004)	.008 (.005)
Oil and Gas production	.018 (.011)	.018* (.010)	.017** (.008)	.021** (.009)
Log GDP per capita	1.49 (.98)	2.26* (1.28)	1.94 (1.18)	2.75*** (.96)
Log GDP per capita squared	-.104* (.056)	-.14** (.072)	-.12* (.068)	-.16*** (.054)
Industry value added	-.037*** (.012)	-.030** (.011)	-.028** (.011)	-.017 (.015)
Agriculture Value added	-.014 (.032)	.004 (.033)	.014 (.035)	.047 (.038)
GDP growth	-.011 (.013)	-.017 (.019)	-.021 (.016)	-.018 (.015)
Credit to private sector	.004** (.001)	.004** (.001)	.004** (.001)	.004*** (.001)
Trade openness	-.004 (.002)	-.003 (.002)	-.002 (.002)	-.0003 (.002)
Government Expenditure	-.004 (.013)	.001 (.014)	-.003 (.015)	
Surface	-1.19e-08 (2.56e-08)	-7.58e-08 (2.02e-08)		
Log Population			.028 (.061)	.061 (.060)
Inflation		-.0001 (.001)	-.000 (.001)	-.002 (.001)
Military Government Expenditure				-.072 (.060)
Non-Military Government Expenditure				.011 (.015)
Communist dummy	.10 (.51)	.14 (.65)	-.045 (.65)	.10 (.69)
Constant	-3.99 (4.66)	-8.077 (6.063)	-7.44 (5.49)	-12.44** (5.05)
Sargan Test for Overqualifying restrictions	0.79	0.49	0.85	0.68
Hansen Test for Overqualifying restrictions	0.76	0.64	0.28	0.38
Number of Observations	136	127	127	112
Number of Instruments	43	43	43	36
Number of Groups	48	45	45	44

Notes: All models are estimated with system GMM estimation results applied to 5 year averaged data for the variables in the model; in addition, the reported standard errors are robust standard erros. *** signficant at 1 percent level of signficance, ** signficant at 5 percent level of significance, * signficant at 10 percent level of signficance. Instruments used in the difference portion of the system GMM (lgini, oresmet, oil and gas). Instruments used in levels portion of the system GMM (dummies for British, French, Germanic and Scandinavian legal origins and latitude).

We also reconfirm our findings that industrialization decreases inequality. In our Model 1, industry value added is significant at 1 percent and negative clearly suggesting that industrialization decreases inequality. In Model 2 and Model 3, we obtain the same result, with only difference that industrialization is significant at 5 percent level of significance.

We also reconfirm our findings that credit to private sector increases inequality (with 5 percent level of significance and in Model 1, Model 2 and Model 3 and with 1 percent level of significance in Model 4). However, we do not find evidence that openness to trade has any impact on inequality. Further to this finding, we do not find evidence that GDP growth has any impact on inequality.

Finally, our communist dummy appears as insignificant in all four specifications.

We then proceed with using a different measure for the level of democracy namely the transformed Polity IV index, *ceteris paribus*. The results that we obtain with this estimation are presented in Table 5 below.

The results that we obtain reconfirm the established evidence in our first set of models. Firstly, we find strong evidence of a dynamic model. In our Model 1, lagged transformed Gini is positive and significant at 5 percent significance. In Model 2, Model 3 and Model 4 it is significant at 1 percent.

We reconfirm our established evidence that natural resources are associated with an increase inequality. In Model 1 and Model 2, ores and metal exports are significant and positive.

We however, do not find evidence that *democracy*, measured with Polity IV index has any impact on the inequality. We still reconfirm that industrialization is associated with decreases in inequality. In our Model 1, Model 2 and Model 3, industrialization enters the equation as negative and statistically significant at 1 percent significance. Just as in the previous robustness check, here as well Model 1 provides evidence that trade openness is associated with decreases in inequality and that credit to the private sector is associated with increases in inequality, which is consistent with our findings in our main models as well as with our previous robustness check.

In this robustness check, as in the previous one, we do not find evidence that economic growth is associated with lower inequality. In fact, economic growth appears insignificant. We also find evidence (which is overwhelming in Model 4) for our hypothesis that log of GDP per capita is associated with increases in inequality in the short run, while it is associated with decreases in the levels of inequality in the long run.

As in the previous cases, here we do not find evidence that size of the country or the population size has any impact on the overall inequality. The communist dummy while with expected sign appears as insignificant.

Table 5 - System GMM Estimation Results for dependent variable: Polity IV and a Communist dummy

Variable	Model 1	Model 2	Model 3	Model 4
Lagged transformed Gini	.30** (.12)	.43*** (.10)	.38*** (.10)	.44*** (.13)
POLITY	-.003 (.010)	-.009 (.007)	-.011 (.008)	-.008 (.009)
Ores and Metals exports	.008** (.003)	.007* (.004)	.007 (.004)	.007 (.005)
Oil and Gas production	.017 (.013)	.013 (.009)	.012 (.008)	.015* (.009)
Log GDP per capita	1.48 (.99)	2.03* (1.08)	1.67 (1.04)	2.44*** (.97)
Log GDP per capita squared	-.10* (.056)	-.12** (.06)	-.10* (.06)	-.14*** (.051)
Industry value added	-.037*** (.013)	-.030*** (.010)	-.020*** (.010)	-.017 (.015)
Agriculture Value added	-.013 (.032)	.004 (.03)	.015 (.034)	.037 (.038)
GDP growth	-.010 (.010)	-.015 (.017)	-.015 (.016)	-.014 (.014)
Credit to private sector	.004** (.002)	.003** (.001)	.003* (.001)	.003** (.001)
Trade openness	-.004* (.002)	-.003 (.002)	-.002 (.002)	-.001 (.002)
Government Expenditure	-.005 (.013)	-.005 (.012)	-.011 (.012)	
Surface	-9.99e-09 (2.65e-08)	-2.10 e-09 (1.93e-08)		
Log Population			.040 (.057)	.047 (.062)
Inflation		-.0007 (.007)	-.001 (.001)	-.002 (.001)
Military Government Expenditure				-.052 (.066)
Non-Military Government Expenditure				.004 (.014)
Communist	-.75 (.50)	-.14 (.50)	-.37 (.52)	-.21 (.59)
Constant	-3.83 (4.66)	-7.5 (5.05)	-6.51 (4.84)	-10.85* (5.19)
Sargan Test for Overqualifying restrictions	0.79	0.9	0.87	0.47
Hansen Test for Overqualifying restrictions	0.71	0.45	0.29	0.42
Number of Observations	136	127	127	112
Number of Instruments	43	43	43	36
Number of Groups	48	45	45	44

Notes: All models are estimated with system GMM estimation results applied to 5 year averaged data for the variables in the model; in addition, the reported standard errors are robust standard erros. *** signficant at 1 percent level of signficance, ** signficant at 5 percent level of significance, * signficant at 10 percent level of signficance. Instruments used in the difference portion of the system GMM (lgini, oresmet, oil and gas). Instruments used in levels portion of the system GMM (dummies for British, French, Germanic and Scandinavian legal origins and latitude).

We finalize our robustness check with introducing an interactive term between democracy (measured as Polity IV) and oil and gas production, *ceteris paribus*. The results that we obtained are illustrated in Table 6. We still find strong evidence for a dynamic relationship in the inequality equation. In our Model 1 the untransformed Gini enters the equation with 5 percents level of significance while in Model 2, Model 3 and Model 4 it is positive and significant at 1 percent level of significance.

We however do not find evidence that natural resource abundance is associated with higher income inequality. In all four specifications ores and metals and oil and gas are insignificant.

As in the previous robustness checks, here as well, we find evidence that industrialization is associated with decreases in inequality. In Model 1 and Model 2, industry value added is negative and significant at 1 percent level of significance, while in Model 3, it is significant at 5 percent level of significance. In Model 1 and Model 2 we also reconfirm our evidence that credit to the private sector is associated with increases, while we also reconfirm the notion that trade openness is associated with decreases in the levels of inequality.

As in the previous case, in Model 4, we find weak evidence for the existence of the Kuznets curve. We however do not find evidence that GDP growth has any impact on income inequality.

Our interactive term is significant only in Model 1 (at 5 percent level of significance), which does not come as a surprise given that natural resource abundance is associate with higher levels of inequality.

Table 6 - System GMM Estimation Results for dependent variable: Polity IV and a Communist dummy

Variable	Model 1	Model 2	Model 3	Model 4
Lagged transformed Gini	.27** (.12)	.43*** (.11)	.41*** (.11)	.45*** (.14)
POLITY	-.014 (.010)	-.014 (.009)	-.017 (.011)	-.015 (.013)
Ores and Metals exports	.005 (.005)	.006 (.004)	.005 (.005)	.005 (.006)
Oil and Gas production	-.024 (.017)	-.008 (.020)	-.017 (.020)	-.014 (.031)
Log GDP per capita	1.46 (.93)	2.05* (1.07)	1.62 (1.23)	2.24** (1.03)
Log GDP per capita squared	-.10* (.052)	-.12** (.062)	-.10 (.072)	-.13** (.06)
Industry value added	-.035*** (.009)	-.031*** (.009)	-.031*** (.009)	-.020 (.014)
Agriculture Value added	-.011 (.028)	-.001 (.021)	.002 (.021)	.026 (.022)
GDP growth	-.008 (.013)	-.013 (.017)	-.013 (.016)	-.010 (.015)
Credit to private sector	.003* (.002)	.003** (.001)	.002 (.002)	.002 (.001)
Trade openness	-.005* (.002)	-.003 (.002)	-.003 (.002)	-.001 (.002)
Government Expenditure	-.009 (.012)	-.004 (.013)	-.007 (.013)	
Surface	-6.94e-09 (2.26e-08)	-1.51e-09 (1.78e-08)		
Log Population			.041 (.055)	.053 (.056)
Inflation		-.0002 (.001)	-.0004 (.010)	-.001 (.001)
Military Government Expenditure				-.039 (.065)
Non-Military Government Expenditure				.003 (.016)
Oil and Gas production X Polity	.002** (.001)	.001 (.001)	.001 (.001)	.001 (.001)
Constant	-3.56 (4.57)	-6.96 (4.85)	-5.80 (5.25)	-9.64* (4.95)
Sargan Test for Overqualifying restrictions	0.79	0.92	0.94	0.52
Hansen Test for Overqualifying restrictions	0.66	0.71	0.66	0.38
Number of Observations	136	127	127	112
Number of Instruments	43	43	43	36
Number of Groups	48	45	45	44

Notes: All models are estimated with system GMM estimation results applied to 5 year averaged data for the variables in the model; in addition, the reported standard errors are robust standard erros. *** signficant at 1 percent level of signficance, ** signficant at 5 percent level of significance, * signficant at 10 percent level of signficance. Instruments used in the difference portion of the system GMM (lgini, oresmet, oil and gas). Instruments used in levels portion of the system GMM (dummies for British, French, Germanic and Scandinavian legal origins and latitude).

6. CONCLUSION

In this paper we analyzed and empirically tested the relationship between inequality and its political and economic determinants. By using system GMM methods, we did not find evidence that democracy increases or decreases inequality. We did however find strong statistical evidence that natural resource abundance (measured through the oil and gas production as well as ores and metal exports) is associated with increase inequality. There was also strong statistical evidence that industrialization and economic growth are associated with lower inequality.

We also find some weak evidence for the existence of the Kuznets curve. In our model 4 in most of the cases, we find evidence that GDP per capita in short run increases the level of inequality, while it decreases it in long run. Contrary to the established notion about the relationship between financial sector development and inequality, we establish a positive relationship between inequality and financial sector development. In addition, we find evidence that trade openness is associated with lower inequality.

There are a few relevant policy conclusions that could be drawn from our study. First and foremost, it emerges as an empirical regularity that economic determinants of income inequality carry more weight than the political ones. Hence, when addressing income inequality, heavier accent should be put on policy measures that influence the economic determinants of inequality. In that respect, promoting measures for labour-based economic growth and diversifying the production process could have a tremendous effect on decreasing inequality in the long run. Moreover, these measures of economic growth would spur growth of the GDP per capita, which, as established in our paper is associated with lower levels of inequality in the longer run.

However further study of some of the determinants of inequality is obviously needed. While we found a clear and strong positive association between financial sector development and inequality, our results stand in stark contrast with the established notion that financial sector development decreases inequality. There are a few reasons why our results may be conflicting with the already established causal mechanism. This could be due to the existence of additional channels through which financial sector development and inequality are associated (the existence of financial nomenklatura); or there may be an inverted U shaped association between financial sector development and inequality, where the relationship between the two variables is still negative, albeit in the longer run. However, needless to say, a further exploitation of the topic could be beneficial in understanding the links and causal mechanisms between financial sector development and inequality.

Finally, given the complexity of the notion of democracy, some testing of our model with additional (or combined) measures for democracy could help us reconfirm our established notion that democracy (political regimes) does not have an impact on the levels of inequality.

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Annex 1. Instruments for democracy

One of the most difficult tasks in empirical research in the social sciences is to diminish the erroneous effect of having an endogenous variable. One way of achieving this is by finding good instruments (variables that are highly correlated with the endogenous variable being instrumented but are uncorrelated with the error term). The dangers of having democracy as an endogenous variable have been emphasized numerous times and hence researches have resorted to using methods other than simple OLS (mainly 2SLS or GMM) in order to deal with this issue[9].

Analyzing the effect of democracy on education, Bobba and Coviello (2007) use system and difference GMM and find that there is a positive and statistically strong relationship between changes in past levels of education and levels and changes in democracy. Milanovic (2005) uses an instrumental variable approach to address the impact of democracy, colonialism and war on economic growth. Tavares and Wacziarg (2001) employ a novel method of seemingly unrelated regressions in order to disentangle the impact of democracy on growth. By using the method above, they find that democracy

[9] There are though notable exceptions to this rule. Plumper and Martin (2003), by using OLS, find a u-shaped relationship between political participation and government spending on economic performance in more democratic countries. By the same token, Fidrumc (2001) uses OLS in order to address the impact of democratization on the level of economic growth in the countries of Central and Eastern Europe and the former Soviet Union. He concludes that democratization in the initial years decreases the level of growth, while in the long run it promotes economic liberalization, which in turn promotes economic development.

increases human capital accumulation and decreases physical investment rates, however, the impact of democracy on growth through the inequality channel is much less robust. Finally, Gerrig, Bond, Barndt and Moreno (2005) specify a system of simultaneous equations in which democracy is estimated by using fixed effects as well as lagged values of itself as instruments and discover that the relationship between democracy and growth is stronger when democracy is seen as a cumulative variable. In other words, democratic experience seems to matter, regardless of whether or not such experience was interrupted by an authoritarian interlude (p.352).

In order to mitigate the negative impacts of democracy as an endogenous variable, researchers have come up with different instrumental variables. Most of them use the type or timing of colonial rule as an instrument for democracy (Weiner (1987), Lipset, Seong and Torres (1993), Barro (1999)[10] and Fish (2002)). Olson (2007) also looks at the issue of colonialism, though he argues that what matters the most is the timing of the colonization (mercantilist vs. imperialist) rather then the nature and the type of the colonizers. In that token, according to him, the fact that most of the former British colonies are more democratic has to do less with the nature and more with the timing of the colonization (i.e. most of them were colonized during the imperial colonization period). Angeles (2007) uses the percentage of original European settler population as an instrument for democracy and income inequality. Quite closely connected with the issue of colonialism is the issue of democracy, strength of the rule of law and the type of law in the colonizers. La Porta et al (2008) find a strong correlation between the common law and institutional development (and therefore growth) in the former colonies. In addition, some research such as Callego (2003) finds a positive link between the type of the colonizer and the quality of schooling.

Another group of researchers argues for using cultural specificities of different societies as instruments for democracy. Huntington (1984) for example argues that the cultural foundations of some societies made them more compatible and conducive to developing democracies than others. Furthermore he argues (1996) that there are some religions that are good or bad for democracy. This notion that democracy is highly correlated with religion is present in a few other studies such as Kedourie (1992), who argues that democracy is alien to the mind-set of Islam and also Voight (2005) as well as the statistical studies of Barro (1999) and Fish (2002) who argue that in terms of democracy, the Muslim countries around the world have been systematic underachievers (p.4)[11].

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[10] Although it should perhaps be noted that Barro uses colonial rule as an instrument for the process of democratization rather than as an instrument in the level of democracy.

[11] The fact that some most of the Muslim countries are located in areas rich with natural resources may lead to erroneous conclusion that democracy does not work in Muslim countries. As I have previously argued, the low levels of democracy in Muslim and Arab countries may have come about through different channels (democracy is less likely in countries that are rich with natural resources as elites are prone to opposing it and to establishing authoritarian rules and institutions that would be suitable to this type of regime. In addition, in countries which depend on natural resources the levels of urbanization is quite low, which as it was shown my previous empirical evidence is prerequisite for democratization). This argumentation may render this type of instrument useless for my analysis.

There are additional variables that could be used as instruments for democracy. As argued by Cleague, Cleason and Knack (2001), divisions within society based on ethnicity, language and religion have important effects on political outcomes, including the emergence and maintenance of democratic political institutions. As these divisions are more prevalent in the lesser developed countries, they tend to act as obstacles in bringing about and maintaining democracy in third world countries (p.6). Noland (2005) argues that status of women could be used as a good instrument for democracy. Keefer (2008) suggest that the lack of credible commitment could be used as an instrument not only of bad government but also as an instrument for probability of civil conflict. Djankov at al. (2003) argue that the strength of the state could be used as a good determinant of the quality of property rights (we may extend this to rule of law and democracy) and thus it can range from disorder to dictatorship.

Yet another strand of literature looks at the strength of the state as possible instrument for the level of democracy. Rueschemeyer, Stephens and Stephens (1992) add another factor in the process of democratization – the state and to what extent it aids the transformation towards democracy. According to them, some autonomy of the state from the dominant classes, from the bourgeoisie and especially – where it still exists – from the landlord class, is a necessary condition for democracy to be possible and meaningful. If the state is simply a tool of the dominant classes, democracy is unlikely to meaningfully take a root. Such autonomy of the state is in fact but one aspect of the differentiation between political collective decision making and the wider structures of inequality (p.65-66). They then continue by saying that, taken together with the previous point, these considerations suggest that while state autonomy vis-à-vis the dominant classes is a necessary condition for effective democracy, the same state strength that contributes to this outcome may enable the state to overpower the pro-democratic forces in the rest of the society (p.66).

In the case of authoritarian societies with rich land-owning elites, the state could usually be used as a tool of the elites to stay in power and to oppress the poorer classes. It could be argued that a special alliance maybe developed between the rich landowning elite and the state apparatus (the military or the police), the final result of which is militarization of the country (a glance of the countries that are ranked lowest in the Freedom House index on the level of freedom and democracy would reveal that almost all of them are: (i) controlled by the military and (ii) are mostly agrarian, sometimes completely closed, or if they are included in the international trading system, most of their exports consist of agricultural products or commodities). Djankov et al. (2003) also suggest that the strength of the state could be used as a good proxy for the level of democracy.

Annex 2. Defining and Measuring Democracy

Michael Saward (1994) defines democracy in terms of the existing of a rule. In that respect, he claims that this rule can be reformulated by altering slightly the similar defining rule as set out by May: there should be necessary correspondence between acts of governments and the equally weighted express wishes of citizens with respect to those acts (p.13). May refers to this as a "responsive rule" – something that Saward borrows in his own definition of democracy (p.14). Furthermore, his arguments focus on what are logically necessary, rather than empirically necessary conditions for democracy. In that respect, the conditions that he presents largely refer to rights, freedoms and decision mechanisms (his definition and measurement of democracy is thus very close to what the Freedom House indicators capture). Saward groups his sub-indices of democracy in four main groups (basic freedoms – corresponding to the Civil liberties in the Freedom House index, citizenship and participation – this could be closely linked to the political rights part of the Freedom House index; the third and the fourth index – administrative codes and publicity are not implicitly included in the Freedom House index nor the Polity IV index, but they deal with issues such as accountability and transparency of the executive bodies).

David Beetham (1994) has a similar definition of democracy. In his view, democracy is a political concept, concerning the collectively binding decisions about the rules and policies of a group, association or society (p.28). In other words, democracy embraces the principles of popular control and political equality. In Beethams' words, in small scale and simple associations, people can control collective decision-making directly, through equal rights to vote on law and policy in person (p.29). In large and complex associations, they typically do so indirectly, for example through appointing representatives to act for them. Similarly, political equality, rather than being realized in an equal say in decision-making directly, is realized to the extent that there exists an equality of votes between electors, an equal right to stand for public office, an equality in the conditions for making ones' voice heard and in treatment at the hands of legislators and so on. He then goes on to separate the process of popular control over government into four distinct dimensions. The first dimension is the popular election of the parliament or legislature and the head of government. The second dimension for analysis concerns what is known as an "open and accountable government". Underlying these two dimensions is a third dimension, which encompasses guaranteed civil and political rights or liberties (which closely corresponds to the civil liberties component of the Freedom House index). Finally the fourth dimension of democracy is called a civil society: the nexus of associations through which people organize themselves independently to manage their own affairs, and which can also act as a channel of influence upon government and a check on its powers. In his words, this is a more contestable dimension of democracy, not only because the criteria for its assessment are much less well formed than for the other three areas, but also because there is room for disagreement as to whether it should be seen as a necessary condition for democracy, or as an essential part of it. He then goes on to develop thirty indices of democracy (p.30).
Parry and Moyser (1994) take a similar route. They posit that political participation is an indicator of democracy, however, as they further continue, participation is only one

indicator of democracy, which is not paramount (p.45). They complement the political participation with several others – the competitiveness of the elites, the representativeness of representative power, the control of the bureaucracy, the independence of the judiciary and freedoms of various kinds.

In a similar fashion, Dahl (1971) in his famous Polyarchy talks about two different, though related, indices of democracy. One is participation – measured by the right to take part in elections or in office (this again is very similar to the political rights portion of the Freedom House index), and the other one was "public contestation" (competition for office and political support, which is often taken as a measurement of liberalization (p.1-9). Furthermore, Dahl suggests that each element is possible in the absence of the other, although the outcome of the final game may not necessarily be a fully fledged democracy. For example, political contestation may increase without a corresponding increase in participation, thereby creating competitive oligarchies such as the ones that existed in Western Europe in the nineteenth century. In the same spirit, participation in elections may be provided without increasing political choice. However, it is only when liberalization occurs in tandem with participation that one can speak of democratization (p.10).

Another group of authors defines democracy through the use of repression by the state and the elites. A prominent representative in this group is Hendersson (1995). For him, political repression is the use of threat or coercion in varying degrees applied by government against opponents or potential opponents to weaken their resistance to the will of the authorities (p.121). Repression can take a few forms but certainly this policy can include arbitrary arrests, disappearance, detention, torture or political killings. His main hypothesis is that the more democratic a regime is, the less it will be prone to repress. Similarly to Acemoglu and Robinson, Hendersson (1995) argues that democracy should not be viewed as an idealistic process, but as a realistic way to accommodate demands with a minimum of conflict (p.124). This however goes counter to what Fein (1995) claims in her paper. She found a non-linear and more importantly an inverted U-shaped relationship between regime type and repression. Using the Polity IV data and data from the US State Department on human rights violation, she argues that the most repressive regimes are the ones that are in between non-democratic and democratic ones.

Henderson's third hypothesis relates to the relationship between inequality and repression. He argues that the more unequal the society is, the more likely the government will use repression. In most countries, an equal division of goods would condemn all to a life of poverty, so elites further impoverish the masses in order to live well (Ophus, 1977). In other words, they use the state to guarantee that their economic interests are met. A similar notion is present in the works of other authors like Gurr (1985) who argues that under conditions of widespread poverty, the elites are much more willing to hold onto their privileges by coercion. Authors such as Sloan, Howard and Donnelly, Sterling, Stavianos and Wesson follow similar arguments.

Huntington (1996) views democracy through the process of electoral participation, however he says that there are several other dimensions that one needs to pay attention to.

First, the definition of democracy in terms of elections and electoral participation is a minimal definition (p. 9). Elections, open, free and fair are the essence of democracy, the inescapable sine qua non. Second, conceivably a society could choose its political leaders through democratic means, but these political leaders might not exercise real power. They may be simply fronts or puppets of some other group. To the extent that the most powerful collective decision makers are not chosen through elections, the political system is not democratic. Implicit in the concept of democracy, however are limitations to power (this could be related to the variable "constraints on the executive" that is one of the variables of Polity IV index). In democracies, elected decision makers do not exercise total power (p.10). A third issue concerns the fragility or stability of a democratic political system. One could incorporate into a definition of democracy a concept of stability or institutionalization. This usually refers to the degree to which the political system may be expected to remain in existence. Stability is a central dimension in the analysis of any political system (this is important while modelling, i.e. durability of a democratic system ought to be taken into consideration). As Huntington points out, a system may be democratic or non-democratic but what is equally important is not only whether or not a system is democratic or not, but also how durable it is. The stability of a system thus is important and it differs from the nature of the system (p.11).

His fourth issue, the nature of democracy variable (dichotomous or continuous) is an on-going debate in the recent history of political science dealing with the issue of regime types and regime changes. Huntington prefers democracy as a dichotomous variable, as it depicts clearly the purpose of his study – transition from a non-democratic to a democratic regime (p.11). He then goes on by claiming that if we were to observe variations in democracy then a gradual approach to measuring democracy should be adopted (p.12) This conceptualization of democracy in the process of transition is also visible in the work of O'Donnell and Schmitter (1986), who define transition "as the interval between one political regime and another". Although Huntington prefers a dichotomous measure of democracy, in a more recent article (1996), he notes: "as formal democratic institutions are adopted by more and more diverse societies, democracy itself becomes more and more differentiated". He therefore sees a need to focus on a "democratic-non-democratic continuum" with most of the countries distributed somewhere in the middle (Huntington, 1996). Diamond follows a similar approach and he shows that the number of these intermediate cases (countries that fall in the middle of the democracy-non-democracy continuum) has doubled between 1990 and 1997 (Diamond 1999).

Collier and Adcock (1999) take the middle road and argue that generic claims that the concept of democracy should be inherently treated as dichotomous or graded are incomplete. The burden of demonstration should be instead linked to the purpose of the research (p.537).

Among the authors who have advocated an approach based on grading and ranking, Bollen & Jackman (1989) argue that democracy is always a matter of degree and that treating it as dichotomous is a flawed practice (p.612 - 618). They have developed graded measures that treat democracy as a property that regimes display in varying degrees.

They then incorporate gradations into their definition, defining democracy as “the extent to which the power of the political elite is minimized and that of the non-elite is maximized” (this is very similar to what Acemoglu and Robinson have been arguing and also very close to the “constraints on the executive” variable of the Polity IV dataset). Furthermore, Bollen asserts that the concept of democracy is a “continuous one” so it is unnecessary to compromise it by considering it a dichotomous phenomenon.

A graded perspective is likewise adopted by Dahl, using the term polyarchy (p. 2-8). He argues that countries differ greatly in the extent to which their governments meet the criteria of democratic process. Following a similar approach, Coppedge & Reinicke (1990) have employed Guttman scale analysis to operationalize a graded treatment of democracy.

By contrast, Sartori finds that treating the distinction between democracy and non-democracy in graded terms is an analytically “stultifying” exercise in degreeism, which misses the basic fact that political systems are bounded wholes (p.184). Sartori claims: “What is completely missed by this degreeism, or continuum, is that political systems are systems, that is, bounded wholes characterized by constitutive mechanisms and principles that are either present (albeit imperfectly) or absent (albeit imperfectly)” (p.200). In that respect, Sartori does not rule out the usage of gradation, though he mentions that this should be used only if one was to compare the degree of democracy across democracies: “what makes democracy possible should not be mixed up with what makes democracy more democratic”.

Other scholars who have adopted a dichotomous approach include Linz (1975) (p.184 - 185), Huntington (as mentioned above), and Geddes (1999). Przeworski and collaborators have specifically rejected Bollen & Jackman’s argument as confused because it does not recognize that regimes cannot be half-democratic: there is a natural zero point. (Alvarez et al, p.21). Przeworski, Alvarez, Cheibub and Limongi’s (1996) argument for dichotomy is based on a more generic term of how democracy should be conceptualized as well as on a more specific claim about measurement and empirical distribution of cases. Their definition of democracy requires the selection of the chief executive and legislature through contested elections, the presence of more than one party, and the actual rotation of incumbents out of office after a reasonable time interval. Hence, they think that the graded approach is flawed because a system where the executives are not selected though a competitive and fair elections, should not be considered as democratic to any degree. Similarly to Sartori, they do not rule out the concept of using gradations, though they argue that this concept should be used only to determine the extent to which a democracy is democratic, but not to distinguish between democracies and non-democracies.

From the previous discussion and from the paper offered by Collier and Adcock, we argue that it would be more appropriate to use a gradation approach towards conceptualizing and measuring democracy. As there are differences even between the intermediary cases (ones that are placed in between democracies and non-democracies in

the democracy-non-democracy continuum), one should not assume the democracy-non-democracy concept as strictly dichotomous.

Polity IV consists of six component measures that record key qualities of executive recruitment, constraints on the executive authority and political competition. It also records changes in the institutionalized qualities of governing authority. As such it produces a gradient approach of measuring democracy, ranging from -10 (perfect autocracy) to +10 (perfect democracy). In addition, the political break in the series (civil wars etc.) are denoted by -88, -77 and -66.

On the other hand, the Freedom House Index consists of two sub-components: political rights and civil liberties. Both of them are measured on a scale from 1 to 7, 1 being a score that corresponds with a perfectly free country and 7 being a score that corresponds with a perfectly not free country. Both, political rights and civil liberties are derived by combining series of sub-indices corresponding to political rights and civil liberties, respectively.

Annex 3. Dataset of countries for which data was used in the empirical part of the paper

Appendix Table. Countries in dataset on income inequality

ARGENTINA	GERMANY	NIGERIA
ARMENIA	GREECE	NORWAY
AUSTRALIA	GUATEMALA	PANAMA
AUSTRIA	HONDURAS	PARAGUAY
BARBADOS	HUNGARY	PERU
BELARUS	ICELAND	POLAND
BELGIUM	INDIA	PORTUGAL
BOLIVIA	IRELAND	ROMANIA
BOTSWANA	ISRAEL	RUSSIAN FEDERATION
BULGARIA	ITALY	SERBIA AND MONTENEGRO
CANADA	JAPAN	SLOVAK REPUBLIC
CHILE	KAZAKHSTAN	SLOVENIA
CHINA	KENYA	SOMALIA
COLOMBIA	KYRGYZSTAN	SOUTH AFRICA
COSTA RICA	LATVIA	SOUTH KOREA
CROATIA	LESOTHO	SPAIN
CYPRUS	LITHUANIA	SWEDEN
CZECH REPUBLIC	LUXEMBOURG	SWITZERLAND
DENMARK	MACEDONIA	TAJIKISTAN
DOMINICAN REPUBLIC	MALTA	TANZANIA
ECUADOR	MAURITIUS	TURKEY
EL SALVADOR	MEXICO	UKRAINE
ESTONIA	MOLDOVA	UNITED KINGDOM
FINLAND	NEPAL	UNITED STATES OF AMERICA
FRANCE	NETHERLANDS	UZBEKISTAN
GABON	NEW ZEALAND	VENEZUELA
GEORGIA	NICARAGUA	ZAMBIA