

[Zlatko Nikoloski](#)

Democracy and income inequality: revisiting the long and short-term relationship

**Article (Published version)
(Refereed)**

Original citation:

Nikoloski, Zlatko (2015) *Democracy and income inequality: revisiting the long and short-term relationship*. [Review of Economics and Institutions](#), 6 (2). pp. 1-24. ISSN 2038-1344

DOI: [10.5202/rei.v6i2.138](https://doi.org/10.5202/rei.v6i2.138)

© 2015 [University of Perugia Electronic Press](#)

This version available at: <http://eprints.lse.ac.uk/60562/>

Available in LSE Research Online: November 2016

LSE has developed LSE Research Online so that users may access research output of the School. Copyright © and Moral Rights for the papers on this site are retained by the individual authors and/or other copyright owners. Users may download and/or print one copy of any article(s) in LSE Research Online to facilitate their private study or for non-commercial research. You may not engage in further distribution of the material or use it for any profit-making activities or any commercial gain. You may freely distribute the URL (<http://eprints.lse.ac.uk>) of the LSE Research Online website.



Democracy and Income Inequality: Revisiting the Long- and Short-Term Relationship

Zlatko Nikoloski[✉]
London School of Economics

Abstract: This paper studies the relationship between democracy and income inequality in long- and short/medium-run. Using appropriate econometric techniques on both, averaged and panel data for the period 1962-2006, we find no evidence that democracy is associated with tighter income distribution. Our results are robust to different specification techniques, to exclusion of developed as well as the transition countries. We speculate that different (and opposing) transmission mechanisms, as well as the nature and the definition of the democracy variable (both Polity IV and Freedom House) influence our results. Improvement of conceptualization and measurement of democracy could shed further light onto the democracy-inequality nexus.

JEL classification: O15; O43; F54; F63; O47

Keywords: Democracy; Income inequality; Political economy; Economic development; developing countries; World

Address: Houghton Street, London WC2A 2AE, United Kingdom (Phone: +44 (0)20 7955 7397; Email: z.nikoloski@lse.ac.uk).

Recommended Citation

Nikoloski, Z. (2015). Democracy and Income Inequality: Revisiting the Long- and Short-Term Relationship. *Review of Economics and Institutions*, 6(2), Article 2. doi: 10.5202/rei.v6i2.138. Retrieved from <http://www.rei.unipg.it/rei/article/view/138>

1 Introduction

The recent global recession has renewed the interest in studying the link between macroeconomic vulnerability and inequality (Piketty and Saez, 2013). The study finds that top income shares in the US have sharply rebounded (following the initial fall of the 2008/09 recession), ultimately resulting with worsening income inequality. In the rest of the world, the resurgence of populist authoritarian regimes (not least in Russia and Turkey) marked by increased redistribution (especially towards the poor and the vulnerable) challenge the established notion that democracies are associated with more egalitarian income distribution and call for a much better understanding of the political regime/income inequality nexus. Whilst the number of democracies in the world has been rising (Cole, 2011), it is the populist regimes mentioned above the capture the newspapers frontlines as a panacea to improving the lives of the poor and vulnerable. Against this background, a better understanding of the link between democracy and inequality is needed and this paper is hence an attempt to provide a further analysis in that direction. The issue of how institutions and types of political regimes influence the levels of inequality has received some research attention in the last couple of decades. Democracy is the main focus of research for Bollen and Jackman (1985), Lee (2005), Rodrik (1999) and Reuveny and Li (2003). The majority of these works claim that democracies tend to redistribute more towards the poor, consistent with the median voter model by Meltzer and Richard (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; Sokoloff and Engerman, 2000; Chong and Gradstein, 2007). Finally, some of the extant research attempted to disentangle the impact of ideology on inequality (Gradstein et al. 2001) and the impact of corruption on inequality and poverty (Gupta et al. 2002). Thus, the academic quest for unearthing the political 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 types of regimes 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 which are used to measure the quality of institutions. For example, the coefficient of correlation between inequality (Gini coefficient) and regime type (mea-

sured through the Freedom House Index¹) is 0.4163. These simple statistics however, reveal but a little of the intricate relationship between inequality and regime types. 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 and its economic and political agents. This in itself can be expected to have a profound and, potentially, conflicting impact on the level of inequality. Starting from the premise that the issue at hand is an empirical one, this paper analyzes the relationship between democracy and inequality in medium/short and long run. In that respect, we do not find evidence that democracy is associated with more equal distribution of income. Our findings hold for both, long and medium/short term. This paper adds to the existing knowledge in several important ways. First and crucially in view of the complexities hinted at above, it employs IV regressions when estimating the long term impact of democracy on inequality and system GMM techniques when estimating the short/medium term effect. By adopting this approach we deal with some of the recurrent problems in social science analysis, such as unobserved heterogeneity and endogeneity of the regressors. Second, in employing this approach, it introduces exogenous instruments for democracy to the system GMM and IV estimates. Third, it analyzes a comprehensive set of theoretically motivated channels through which regime types impact the level of inequality. The paper itself is organized as follows: Section 2 presents the causal mechanisms through which democracy impacts inequality. Section 3 describes the data and the basic empirical links, while Section 4 outlines the empirical framework used in the paper. Section 5 presents the empirical results, Section 6 offers the discussion and Section 7 concludes.

2 Causal Mechanisms of the Democracy-inequality Nexus

Reuveny and Li (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 as-

¹ 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.

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 (Meltzer and Richard, 1981). According to them, 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. 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 acquired from redistribution are higher than the costs associated with higher taxation. To date, robust empirical evidence that would support the median voter hypothesis is lacking. Milanovic (1999) found that there is indeed more redistribution going towards the poorer segments of the society, though not necessarily through the median voter mechanism. He speculates that there are three reasons for his findings: (i) level of the decisive voter, in the income distribution, is much lower than the median, which apparently is contrary to the latest findings (Bassett et al. 1999); (ii) 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); (iii) another mechanism through which the redistribution takes place may have to be defined. Stemming from results of the study by Milanovic (1999), 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). On the other hand, while the assumption that middle classes prefer higher redistribution could be valid (Reuveny and Li, 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 et al. (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 redistribution². This hypothesis is supported by the works of Rueschemeyer et al. (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. These types of alliances emerged in some European countries, such as for example Switzerland, towards the end of the nineteenth century. The middle class realized that the poor is small and fragmented and hence it would not require much redistribution. Hence, the middle class was more amenable to accommodate the demands of the poorer segments while pursuing its own goals of economic development and further economic and political power. Given the variety of often opposing transmission mechanisms presented above, the question on the impact of democracy on inequality becomes an empirical one and we address it in the subsequent sections.

3 Data and Basic Empirical Links

This section describes our indicators and data for democracy and income inequality as well as a set of conditioning information³. The income

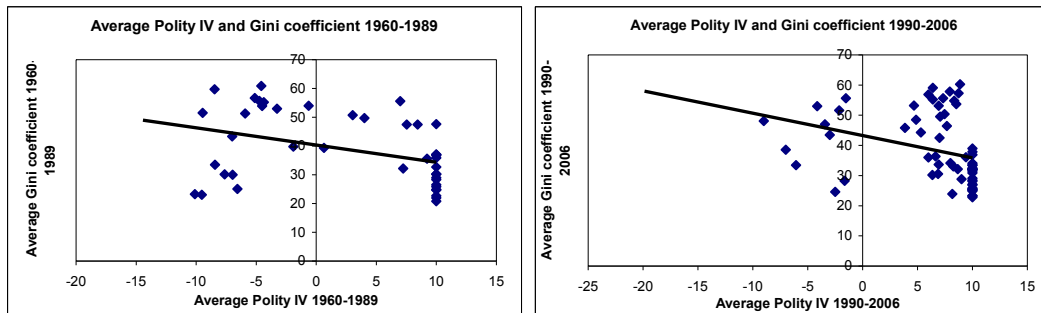
² Similar argument could be found, most recently, in a work by Acemoglu et al. (2013).

³ The following countries were included in the dataset for the analysis: Argentina, Armenia, Australia, Austria, Barbados, Belarus, Belgium, Bolivia, Botswana, Bulgaria, Canada,

inequality data comes from the UN WIDER dataset. It is the most comprehensive dataset of inequality data, which also contains data based on variety of measures (consumption and income), levels of aggregation (urban, rural, regional) and different characteristics of the labour force (working age, employed, unemployed). 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 above⁴. In addition we have conducted a secondary transformation of the Gini data, as described in Reuveny and Li (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 $lGini = \log(Gini/(100 - Gini))$. The extant literature on the relationship between democracy and economic growth has used several proxies for democracy. 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. Nevertheless, 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 lib-

Chile, China, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, El Salvador, Estonia, Finland, France, Gabon, Georgia, Germany, Greece, Guatemala, Honduras, Hungary, Ireland, Israel, Italy, Japan, Kazakhstan, Kenya, Kyrgyzstan, Latvia, Lesotho, Lithuania, Luxembourg, Macedonia, Malta, Mauritius, Mexico, Moldova, Nepal, Netherlands, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Poland, Portugal, Romania, Russia, Serbia and Montenegro, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Tajikistan, Turkey, Ukraine, United Kingdom, United States, Uzbekistan, Venezuela and Zambia.

⁴ We believe that this method of purging the data is much more superior than the one suggested by Deininger and Squire (2000), who include both income and expenditure based inequality data and adjust the data by adding 6.6 points to the expenditure based data.

Figure 1: Average Polity IV and Average Gini coefficient

erties 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. Given that in this study we analyze the long and short term effects of democracy on inequality, we apply a gradient approach towards measuring democracy and use Polity IV - one of the most widely used datasets on democracy⁵. Polity IV 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). 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)⁶.

Plotting the logarithm of the Gini coefficient against the measure of democracy suggests a strong negative relationship between the two variables (Figure 1). In order to isolate the effect of communism we split the time period in two - one from 1960 until 1989 and the second one from 1990 until 2006. However the graph does not control for additional explanations for level of income inequality, such as economic growth and development, for example, and this is where we turn to the deeper analysis of the issue.

⁵ Although in our robustness checks we do also experiment with using Electoral Democracy from Freedom House as a proxy for democracy.

⁶ However, we do check the robustness of our results by using alternative measures for institutions, namely Freedom House Political Rights and Civil Liberties index. It assigns the countries a specific score corresponding to their level of political rights and civil liberties (1 being most democratic and 7 being most authoritarian). We also transform the Polity IV variable by adding 10 to the main score, thus arriving at a gradient measure which ranges from 0 to 20 (0 being perfectly autocratic and 20 being perfectly democratic).

4 Empirical Framework

To further explore the relationship between democracy and income inequality, we estimate the following relationship:

$$lGini = \alpha + \beta lGini(t - 1) + \gamma Democracy + \delta X + \epsilon$$

In the panel data analysis we also include a lagged dependent variable as a regressor in order to account for the persistence of inequality. This strategy is obviously not applicable to the analysis of the long-term relationship. As discussed above, the democracy index as per Polity IV is used as a main independent variable in the model. While we are primarily interested in estimating the linear relationship between the two variables, we also test for possible non-linearities in the relationship between democracy and inequality. X represents a battery of control variables. We include several variables to control for other factors that might affect inequality. Specifically, we include linear and squared term of the log of (initial) real GDP per capita to control for a direct “Kuznets effect” of economic development on income inequality that is independent of the occurrence of democracy. Once controlling for initial GDP, the democracy variable captures the effect on steady-state inequality. However, if the real data do not reflect steady-state situations, initial GDP would capture whatever has been achieved by force of convergence. We also control for the natural resources dependence (sum of oil, gas and metals and ores as percent of GDP), conjecturing that reliance on natural resources is prone to rent creation (further captured by the ruling elites), which in turn exacerbates inequality (Auty, 1994; Boix and Garicano, 2001; Isham et al. 2003). Additionally, we include measures for industry value added (in percent of GDP), credit to the private sector, trade openness and government consumption. Kuznets (1955) suggests that income inequality might depend on the sectoral structure of the economy. Hence, we include a variable representing the share of value added accounted for by industry. We expect that industry value added is negatively associated with levels of inequality. This notion has been conjectured numerous times in the theoretical literature and in addition many researchers have found evidence for the negative link between the two variables. The theoretically stipulated impact of financial sector development on inequality is ambiguous. Galor and Zeira (1993) and Banerjee and Newman (1993) argue that the development of financial sector could allow the lower socio-economic strata to borrow funds and invest them into human capital development or entrepreneurial activities, which in turn would tighten the income distribution. The second strand of literature is represented by Greenwood and Jovanovic (1990), who posit an inverted U-curve relationship between the financial sector and inequality. They examine the growth-inequality dynamic in a model where finance affects dynastic access to higher expected return projects. In the early stages of development, financial markets are virtually

Table 1: Basic Descriptive Statistics

Variable	Number of observations	Mean	Standard Deviation	Minimum	Maximum
Gini coefficient	285	35.84	11.21	18.43	62.50
log of GDP per capita (in 2000 US dollars, PPP)	423	9.05	1.06	6.28	11.11
Average of Freedom House Political Rights and Civil liberties	477	2.73	1.75	1.00	7.00
Polity IV	563	4.43	6.72	-9.80	10.00
Industry Value Added (in percent of GDP)	531	32.38	9.68	4.75	62.54
Private Credits (in percent of GDP)	540	47.60	39.00	1.53	218.00
Trade Openness (in percent of GDP)	573	69.74	39.69	5.55	281.16
Natural Resources abundance (in percent of GDP)	322	10.64	15.46	0.06	84.61
Government Expenditure (in percent of GDP)	567	15.81	5.46	4.00	39.34

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

non-existent and the economy grows slowly. With time, a financial superstructure begins to form, but given the high fixed costs of joining the financial intermediaries, it is the rich who exclusively benefit from joining them. When the economy reaches the intermediate stage of the growth cycle, savings rates and income inequality both increase. As the economy transitions towards maturity, more and more people join the financial intermediaries, hence increasing growth and reducing inequality. In the final stage of development, the distribution of income across agents stabilizes, the savings rate falls and the economy's growth rate converges. A similar argument is put forth by Townsend and Ueda (2006). Finally, the last strand of literature posits a positive linear link between the two variables. Rajan and Zingales (2003), conjectured that, in the absence of well-developed institutions, it may only be the rich who may benefit from the development of the financial sector. Even when the financial sector becomes more developed, the rich may still prevent firms from getting access to credit, and they may still encourage the financial sector to channel funds towards the rich, further increasing the gap between the rich and the poor. The impact of trade openness is also ambiguous. While some theoretical models stipulate that factor endowments (labour capital) would determine whether income distribution would improve or worsen after trade opening, further complications of the model (by dividing the labour onto low-skilled and high-skilled) do not allow for a clear cut theoretical prediction of the impact of trade openness onto inequality. It is equally less clear whether more government consumption will increase or decrease income inequality. For example, if redistribution through the tax system is toward low-income groups, government consumption may result in greater equality. However, it could also have the opposite effect if rich households use their political power to exploit the poor. Summary of the variables used in our analysis is presented in Table 1.

Table 2 gives a snapshot of the pairwise correlations between the variables used in the model.

We conduct the analysis in two ways: a pure cross-sectional analysis using averaged data over the entire period (1962-2006), and a panel data analysis using five-year averages. The cross-sectional analysis may capture

Table 2: Basic Correlations among the Variables in the Model

	Gini coefficient	Average of Freedom House Political Rights and Civil liberties	Polity IV	Natural Resources abundance (in percent of GDP)	log of GDP per capita (in 2000 US dollars, PPP)	Industry Value Added (in percent of GDP)	Private Credits (in percent of GDP)	Trade Openness (in percent of GDP)	Government Expenditure (in percent of GDP)
Gini coefficient	1								
Average of Freedom House Political Rights and Civil liberties	0.4882	1							
Polity IV	-0.3728	-0.8981	1						
Natural Resources abundance (in percent of GDP)	0.3266	0.3223	-0.2799	1					
log of GDP per capita (in 2000 US dollars, PPP)	-0.5876	-0.7182	0.5982	-0.2094	1				
Industry Value Added (in percent of GDP)	-0.1371	0.1397	-0.0205	0.4152	0.0844	1			
Private Credits (in percent of GDP)	-0.3657	-0.4875	0.4005	-0.2631	0.6256	-0.0213	1		
Trade Openness (in percent of GDP)	-0.1608	-0.15	0.1271	-0.1747	0.1591	0.0149	0.0761	1	
Government Expenditure (in percent of GDP)	-0.5277	-0.289	0.3008	-0.2299	0.379	0.1121	0.2926	0.2806	1

the long-term relationship between democracy and inequality. As argued by Gradstain and Milanovic (2004), the democratic rule needs to be consolidated before any effects of democracy vis-à-vis inequality are felt. In contrast, the panel analysis may examine the process of co-movement between levels of democracy and inequality⁷. Following the convention of most-cross country empirical panel studies, the panel analysis splits the sample period 1962 to 2006 into 9 non-overlapping 5-year periods. We do this in order to, inter alia, minimize the number of instruments used in the system-GMM analysis. Another rationale for using 5-year averages is to compress the dataset and make it more evenly distributed (given the gaps in the availability of Gini coefficient data). Estimating our main equation using ordinary least squares (OLS) estimation might introduce bias because OLS does not allow for the possibility of reverse causality - something that is already suggested in the theoretical models⁸. Hence, we resort to using Instrumental Variable (IV) approach, adopting instruments for democracy which correspond to the legal origin/colonial past of a country. The instruments represent a set of dummy variables as proposed by La Porta et al. (1999) that identify country's legal system/colonial heritage. There are a few reasons for selecting this set of variables as instruments for political system. First, there is a strong correlation between democracy indices and the set of legal system/colonial heritage dummy variables (the correlation coefficient between Polity IV and the four different types of colonial/legal origins ranges from 0.3 to 0.4). Additionally, anecdotal evidence suggests that certain colonial heritage was conducive to development of more democratic political systems. For instance, it has been argued that former British colonies were better poised to develop democratic institutions than, for instance, the former French colonies. In addition, we have considered selection of a few

⁷ This second approach could be better in testing for possible non-linearities in the relationship between democracy and inequality.

⁸ See, for example, Savoia et al. (2010) for a more detailed analysis.

additional variables as potential instruments for democracy (to be used in the empirical analysis; see for instance Annex 1), however, our final set of instruments also closely corresponds to the instruments most widely used in the literature. Moreover, and in the empirical analysis, we examine the validity of instruments using the Hansen test for over-identifying restrictions (and the equivalent test in the system GMM). In addition, we couple the standard test for validity of instruments with a diagnostic test proposed by Stock and Yogo (2005) which helps in the identification of weak instruments. There may be some criticism about the usage of these variables as instruments for democracy (for example Engermann and Sokoloff (1997) argue that colonial types had direct impact on initial inequality). However, it should be stressed that the impact of the colonial origins on the initial inequality is contingent upon the abundance of the colonies with natural resource (Acemoglu, 2001). Finally, Easterly (2007) finds very little correlation between initial inequality and the type of legal/colonial origin, which further gives evidence for the assumption that, in the long run, the impact of the type of legal/colonial origin is mostly through the institutional/political system. *Vis-à-vis* the panel data analysis, a first question that arises is whether the model should be estimated using random or fixed effects or whether some more sophisticated econometric technique should be used. Given the problems of endogeneity, omitted variable and reverse causality (all hinted at above), system GMM is a good candidate to be used as an alternative to random and fixed effects. As noted by Roodman (2006), there are several advantages associated with system GMM, especially when the researcher is faced with the following issues: (i) small T, large N panels; (ii) a linear functional relationship; (iii) a single left-hand side variable that is dynamic; (iv) independent variables that are not strictly exogenous; (v) fixed individual (country) effects; (vi) heteroskedasticity and autocorrelation within individuals but not across them (Arellano and Bover, 1995; Blundell and Bond, 1998; Bond, 2002). However, this is not to say that the GMM estimates are perfect and they don't come without potential pitfalls. Indeed, as evidenced by Bazzi and Clemens (2013), there are some potential problems when employing usage of instruments in a standard system-GMM setting. As the authors show, a plausibly valid instrument used in one setting could be proven to be an invalid instrument used in an additional setting. Moreover, the authors show that the unacknowledged weak instruments may generate spurious finding in applications such as the system GMM. Similar findings stem from research by Roodman (2008) who discusses the problems of too many instruments (i.e. when the number of instruments exceeds the number of groups in the GMM estimates). Hence, he cautions that the issue of a large number of instruments could result in not expunging the endogenous effect of the right-hand side variables. Against this background, the authors suggest a few ways forward when tackling the instrumentation problem in system-GMM: (i) generalization of the theoret-

Table 3: OLS Regression Results - (Transformed Gini Dependent Variable)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7 - excluding the transition countries	Model 8 - excluding developed countries
Polity IV								
Polity IV squared								
Freedom House								
Electoral democracy								
Transformed Polity IV								
Transformed Polity IV squared								
Natural resources								
Log of initial GDP per capita								
Log of initial GDP per capita (squared)								
Industry value added								
Credit to the private sector								
Trade Openness								
Government expenditure								
Constant								
Number of observations	71	71	75	75	71	71	51	49
R squared	0.6276	0.6725	0.631	0.6315	0.6258	0.6261	0.7379	0.5452

All models estimated with Ordinary Least Squares (OLS). *** denotes significance at 1 percent level of significance, ** denotes significance at 5 percent level of significance, * denotes significance at 10 percent level of significance. All models estimated with robust standard errors (reported in parentheses).

ical underpinnings of an instrument to account for other published results with the same instruments; (ii) deploy the latest tool for probing the validity of the instruments; and (iii) open the GMM black box (and use the available diagnostic tests) in order to test for the validity of the instruments.

5 Empirical Results

5.1 Long-Term Relationship from Cross-Sectional Samples

To test the long-term relationship between democracy and inequality, we regress the transformed Gini variable on the measures of democracy (Polity IV) and control variables. The results obtained while using OLS are presented in Table 3. There are several empirical regularities that emerge from the table. First, we do find some evidence (albeit at 10 percent level of significance) for the existence of a non-linear relationship between democracy and inequality. We do not, however, find evidence for a simple linear relationship between the two variables, regardless of the measure of democracy that is used in the analysis. The results are consistent whenever we drop the transition countries from the sample, or when we drop the developed countries from the sample (Models 7 and 8). Vis-à-vis the control variables, the results support the established empirical knowledge. Across all of the models, we find strong and robust evidence that the abundance of natural resources is associated with higher inequality. In addition, we do find some (albeit weak) evidence for the existence of the Kuznets curve. Moreover, according to our estimates, the turning point of the Kuznets curve occurs at a GDP per capita roughly equal to 3,251 USD. Finally, we do find some evidence that government spending is associated with lower inequality.

Given the bias in the OLS results when some of the regressors are endogenous, we resort to using instrumental variable (IV) approach in order

Table 4: IV Regression Results - (Transformed Gini Dependent Variable)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7 - excluding the transition countries	Model 8 - excluding developed countries
Polity IV	.073 (.080)	-.051 (.135)					.062(.274)	.255(.451)
Polity IV squared		.015 (.015)					-.028 (.053)	-.002 (.031)
Freedom House			-.210 (.137)					
Electoral democracy				1.222 (1.101)				
Transformed Polity IV					.063 (.043)	.649 (.422)		
Transformed Polity IV squared						-.021 (.015)		
Natural resources	.028** (.012)	.021* (.011)	.027*** (.007)	.035** (.014)	.028*** (.009)	.037** (.015)	.009 (.014)	.034** (.017)
Log of initial GDP per capita	3.206** (1.33)	7.354* (4.244)	3.142*** (1.160)	1.61 (1.54)	2.73** (1.14)	-2.310 (4.202)	2.842** (.940)	2.62 (2.41)
Log of initial GDP per capita (squared)	-.217*** (.080)	-.455* (.248)	-.210** (.070)	-.119 (.084)	-.186** (.067)	-.109 (.247)	-.169** (.064)	-.185 (.140)
Industry value added	-.023*** (.0006)	-.031** (.011)	-.019** (.007)	-.022** (.008)	-.021*** (.007)	-.013 (.013)	-.0004 (.012)	-.029*** (.009)
Credit to the private sector	.002 (.002)	.002 (.002)	.0003 (.002)	-.0002 (.002)	.0009 (.002)	.002 (.002)	-.001 (.003)	.005 (.005)
Trade Openness	-.0006 (.002)	-.004 (.003)	-.001 (.001)	-.0008 (.001)	-.001 (.002)	.001 (.002)	-.0003 (.003)	-.0004 (.005)
Government expenditure	-.032 (.031)	-.013 (.023)	-.018* (.010)	-.007 (.015)	-.023 (.015)	-.024 (.023)	.02 (.030)	-.026 (.049)
Constant	-10.777 (5.851)	-28.661 (17.975)	-10.058** (4.77)	-5.507 (6.412)	-9.878 (4.806)	7.420 (15.024)	-11.683** (3.716)	-8.244 (10.607)
Number of observations	71	71	75	75	71	71	51	49
R squared	0.2404	0.476	0.5579	0.3911	0.4693	0.4011	0.586	0.6797
Hansen's J-test (significance level)	0.572	0.305	0.161	0.164	0.205	0.231	0.1067	0.1843

All models estimated with two-step instrumental variable approach. Dummy variables capturing legal origin/colonial past are used as instruments for democracy. *** denotes significance at 1 percent level of significance, ** denotes significance at 5 percent level of significance, * denotes significance at 10 percent level of significance. All models estimated with robust standard errors (reported in parentheses). Hansen J's test null hypothesis stipulates that the instruments are not correlated with the error term.

to estimate the long-run impact of democracy upon inequality. The results are presented in the Table 4. The models are analogous to the ones used in the OLS estimates. As mentioned previously, we use colonial/legal origins as instruments for democracy and their validity is confirmed by the Hansen J test. The results obtained from this analysis confirm our previous findings - that the link between democracy and inequality is elusive. As in the previous models, here as well, we do not find evidence for the simple linear negative nor for the inverted U curve relationship between the two variables. Even when using different proxy variables for democracy and even when restricting the size of the sample to include only the developing and developed countries and developing and transition countries, respectively, the results are not affected. The control variables confirm the theoretical predictions, i.e. we find overwhelming evidence that natural resource abundance is associated with higher inequality. Also, we find some evidence for the existence of the Kuznets curve and some scant evidence that higher government consumption is associated with lower inequality. Our results stand in quite contrast to Chong (2004), who finds a non-linear relationship between the two variables. However his results could be criticized on a few of grounds. Most importantly, while in his analysis he uses data from early 1960s until mid 1990s in order to argue for the existence of an inverted U curve relationship, most of the democratizations in present-day mature democracies included in his dataset occurred in the mid-19th century.

5.2 Short and Medium Term Impact of Democracy Upon Inequality

In addition to providing a useful robustness test, using panel data analysis might also provide better information on the short- and medium-term relationship between democracy and inequality. Initially, we treat democ-

racy as an exogenous variable and only provide an OLS (random effects) and fixed effects estimation. Table 5 gives the basic results in estimating the impact of democracy upon inequality. We use Polity IV as a measure of democracy across all of the models. There are a few results that emerge from the analysis. First, the autoregressive term is positive and highly significant, suggesting that there is a strong persistence effect of inequality. Democracy although positive is statistically not significant from zero. Furthermore, we find some evidence for the existence of the Kuznets curve and also some positive and significant association between financial sector development and inequality. We also find evidence that natural resources are associated with higher inequality, while government spending is associated with lower inequality. Similar results could be observed when fixed effects are used. The results from using system GMM are included in the last three columns in Table 5. We use lags of the independent variables as instruments for themselves and in addition, we couple the usage of the standard instruments for democracy with dummies for legal origin. There are a few interesting results that emerge from our GMM analysis. First, the autoregressive term is positive and significant. Its value lies between the autoregressive terms obtained by fixed effects (which provides the lower bound) and OLS (which provides the upper bound) for the autoregressive term obtained by GMM estimates. Likewise, we find some strong and robust evidence for the existence of the Kuznets curve (as in the previous models). Finally, as in the previous models we find that financial sector development is associated with higher inequality, while the government spending is associated with lower inequality. So far, we have concentrated on determining which variables are significant and whether they fit the theoretical predictions, without mentioning anything about the size of the coefficients. The coefficients' sizes, however, cannot be interpreted linearly because the dependent variable is a non-linear transformation of the Gini. To assess the size of the coefficients, we first compute the baseline Gini by setting all variables in model 1 of Table 5 to their respective means. In order to assess the impact of the natural resources in income inequality, for instance, we raise the natural resource wealth variable by one standard deviation and we compute the Gini coefficient again. The results suggest that an increase in the abundance of natural resources by one standard deviation, is associated with an increase in the Gini by 0.679 points in the shorter run. Table 5 provides two additional specifications, whose results do not significantly change. Model 4 uses our basic model but it is conducted on a smaller sample that excludes the transition countries. When the transition countries are excluded, the results hold broadly, while the control variables behave in the usual way. Finally, Model 5 excludes the developed countries - the premise here is that since we start our analysis from mid 1960 and given that democracy has been established in the developed countries already, the effect of democracy through the redistributive channel would have happened already. The

Table 5: GMM Regression Results - (Transformed Gini Dependent Variable)

Variable	Model 1 OLS	Model 2 FE	Model 3 GMM	Model 4 GMM (excluding transition countries)	Model 5 GMM (excluding developed countries)
Lgini (lagged)	.692*** (.056)	.130 (.921)	.458*** (.131)	.342** (.139)	.517*** (.124)
Polity IV	.002 (.003)	-.004 (.005)	.008 (.007)	.005 (.007)	.009 (.008)
Polity IV squared	-.001 (.005)	.007 (.007)	.0008 (.001)	-.002 (.009)	.001 (.001)
Natural resources	.003** (.001)	.010* (.006)	.014 (.010)	.012* (.005)	.015* (.008)
Log of GDP per capita	1.120** (.371)	1.67*** (.431)	1.56 (1.09)	2.37*** (.910)	3.200*** (.703)
Log of GDP per capita (squared)	-.067*** (.021)	-.086*** (.025)	-.099* (.059)	-.142*** (.051)	-.196*** (.043)
Industry value added	-.006** (.002)	-.014** (.005)	-.013 (.008)	-.017*** (.005)	-.001 (.011)
Credit to the private sector	.001*** (.0004)	.0003 (.0007)	.002** (.001)	.002** (.0006)	.005*** (.001)
Trade Openness	-.0003 (.0003)	.001 (.001)	-.0007 (.001)	.001 (.001)	.002 (.002)
Government expenditure	-.007* (.004)	.002 (.009)	-.021 (.015)	-.021** (.010)	-.021 (.016)
Constant	-4.446*** (1.612)	-8.557*** (1.828)	-5.783*** (5.325)	-9.095*** (4.058)	-13.36*** (3.077)
Number of observations	151	151	151	119	68
Number of groups	54	54	54	36	33
Number of instruments			29	29	28
Hansen test			0.157	0.271	0.149
AR(1)			0.079	0.243	0.067
AR(2)			0.542	0.722	0.501
R squared	0.9142	0.065			
Unidentification test (Kleibergen Paap rk LM statistic; p value)			0.009	0.0015	0.0028
Cragg-Donald Wald F statistic			12.918	44.03	6.513
Critical value (r = 0.15) for the Cragg-Donald Wald F statistic			8.180	8.18	4.58
Critical value (r = 0.25) for the Cragg-Donald Wald F statistic			5.450	5.45	3.63

All models estimated with system GMM. Lagged values of the endogenous dependent variables are used as instruments for themselves. In addition, dummy variables denoting legal origin/colonial past are used as instruments for the democracy variable. The specifications include the usage of two lags. The same set of instruments are used in the levels as well as the differences equations. The standard two-step procedure is used. The sign, magnitude and the significance of the control variables correspond to the ones used in the empirical literature. *** denotes significance at 1 percent level of significance, ** denotes significance at 5 percent level of significance, * denotes significance at 10 percent level of significance. All models estimated with robust standard errors (reported in parentheses).

results obtained by Model 5 are not much different than the ones obtained with the analyses before.

Table 6 introduces some robustness checks where we explore additional hypotheses on the relationship between the two variables. Hence, Model 1 tests the inverted U curve relationship between the two variables, however finds no statistically significant impact of democracy upon levels of inequality. Model 2 introduces an alternative measure of democracy - Freedom House, while Model 3 introduces a similar though narrower measure of democracy based on electoral participation. Given that Polity IV is a variable ranging from -10 to 10, squaring it will complicate the results as it will be impossible to decipher the impact of democracy upon inequality from the impact of autocracy on inequality. Hence, we transform the variable (by adding 10 to the original data) and Model 4 runs the inverted U curve relationship hypothesis on this newly created variable. The results obtained from these additional estimations do not impact upon the overall conclusion that the link between democracy and inequality is elusive.

6 Discussions

There are a few reasons why the impact of democracy on inequality may be mute. The first reason is the various and often opposing channels through which democracy may impact upon inequality. The net effect of these transmission mechanisms may well at the end be neutral. Studies that use objective measures of democracy (that is attributes not performance)

Table 6: GMM Regression Results - (Transformed Gini Dependent Variable)

Variable	Model 1 - GMM	Model 2 - GMM	Model 3 - GMM	Model 4 - GMM
Lgini (lagged)	.458*** (.156)	.392*** (.152)	.427*** (.116)	.459*** (.128)
Polity IV	.008 (.007)			
Polity IV squared	.0008 (.001)			
Freedom House		.035 (.083)		
Electoral democracy			.115 (.166)	
Lag value of Electoral democracy				
Transformed Polity IV				-.005 (.022)
Transformed Polity IV squared				.007 (.001)
Natural resources	.014 (.010)	.031** (.016)	.015* (.008)	.016* (.009)
Log of GDP per capita	1.567 (1.096)	2.269** (.913)	-.301 (1.241)	1.723** (.842)
Log of GDP per capita (squared)	-.099* (.059)	-.136** (.051)	.0000 (1.000)	-.107** (.045)
Industry value added	-.013 (.008)	-.017 (.014)	-.012 (.010)	-.012 (.008)
Credit to the private sector	.002** (.001)	.004* (.002)	.002** (.001)	.003** (.001)
Trade Openness	-.0007 (.001)	.0008 (.001)	-.0008 (.001)	-.00105 (.001)
Government expenditure	-.021 (.015)	-.018 (.017)	-.018 (.013)	-.020 (.015)
Constant	-5.783 (5.325)	-9.346** (4.283)	2.881 (5.876)	-6.554 (4.104)
Number of observations	151	153	137	151
Number of groups	54	55	54	54
Number of instruments	29	26	26	29
Hansen test	0.157	0.065	0.03	0.142
AR(1)	0.079	0.226	0.105	0.078
AR(2)	0.542	0.562	0.097	0.548
Unidentification test (Kleibergen Paap rk LM statistic; p value)	0.009	0.0000	0.0179	0.003
Cragg-Donald Wald F statistic	12.918	55.525	41.475	77.098
Critical value (r = 0.15) for the Cragg-Donald Wald F statistic	8.180	12.83	12.83	8.18
Critical value (r = 0.25) for the Cragg-Donald Wald F statistic	5.450	7.8	7.8	5.45

All models estimated with system GMM. Lagged values of the endogenous dependent variables are used as instruments for themselves. In addition, dummy variables denoting legal origin/colonial past are used as instruments for the democracy variable. Two lags of the endogenous variables are used in the model specifications. The specifications include the same set of instruments in the level and the difference equations. The models rests on employing the standard two-step GMM estimator. The sign, magnitude and the significance of the control variables correspond to the ones used in the empirical literature. *** denotes significance at 1 percent level of significance, ** denotes significance at 5 percent level of significance, * denotes significance at 10 percent level of significance. All models estimated with robust standard errors (reported in parentheses).

tend to find inconclusive results because democracy, acting through various channels, may have both negative and positive implications for inequality. The inconclusive results could also be attributed to the nature of the institutional variables. Aron (2000), for example, states that many of the institutional variables are ordinal indexes and as such they simply award a country with a rank position, without specifying the difference between countries. This shortcoming has been addressed by Barro (1996) who transformed the ordinal indices into a cardinal index (which is the index where the degree of difference matters). According to him, there is no reason to pre-suppose that the transformation from an ordinal to a cardinal index should be one-for-one: for instance, the difference in the quality of the judiciary in the US and South Africa may be much smaller than that between South Africa and Zaire, even though the same differential is measured on an ordinal scale of 1 to 10. We do check our results by using an alternative measure for democracy (a binary one) however our results appear not to be affected. Further criticism has been addressed at the often-arbitrary aggregation of different components of some of the indices. Typically, components are simply added or averaged with the same weights. When there are many components, factor analysis – a technique that aggregates components with unknown weights – is a convenient and superior alternative. However, even this kind of analysis has not yielded robust evidence in the

democracy-growth research efforts (Aron, 2000). The inconclusiveness of results may also be caused by the way the current democracy indices are measured. The current practice consists of using indices of democracy and autocracy on a 10 point scale, or just a binary one, based on procedures and laws. Explicitly avoiding any outcome dimensions such as “accountability”, “responsiveness”, “representation”, “equality”, or “civil rights”, or any social and economic sources of political privilege has kept this narrow procedural definition innocent of letting economic success define democracy. The resulting analysis soundly shows that this narrow definition truly has little or no effect on economic variables, within the confines of the chosen models or datasets. Hence, Lindert (2002) suggests that what is needed is a more comprehensive definition that would include measures of equality of political voice in practice, and of its time-path over many decades or centuries. He also points out to the need of accounting the number of people who really have a voice in any regime. A more holistic and comprehensive approach in measuring democracy is therefore needed. Our study shows that 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 (Stevens, 2003; Auty, 1994; Sarraf and Jiwanj, 2001; McKay et al. 2003). 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 (1994). 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. Second, 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).

7 Conclusion

In this paper we analysed and empirically tested the relationship between inequality and democracy in short, medium and long run. While using a variety of appropriate econometric techniques and a plethora of institutional measures that capture what we could call a democracy, we do not find evidence that democracy is associated with lower inequality. What we do find, however, is that some of the purely economic determinants of inequality i.e. natural resources, the sector composition of the economy are the ones that carry more weight as determinants of income inequality. There are a few relevant policy conclusions that could be drawn from our study. First and foremost, 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. What remains important as a next step forward is to consider improving the institutional measures by addressing some of the issues above would render some of the current analysis more credible. Creating a more credible democracy index which would be based on a more holistic definition of democracy could be a reasonable way forward.

References

- Acemoglu, D., Robinson, J.A. 2006. *Economic Origins of Dictatorship and Democracy*, New York: Cambridge University Press. doi:10.1017/CBO9780511510809
- Arellano, M. Bond, S. 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies* 58, 277-297. doi:10.2307/2297968
- Arellano, M. Bover, O. 1995. Another Look at the Instrumental Variable Estimation of Error-Components Models. *Journal of Econometrics* 68, 29-52. doi:304-4076(94)01642-D
- Auty, R. 1994. The resource curse thesis: minerals in Bolivian development, 1970-1990. *Singapore Journal of Tropical Geography* 15, XXX
- Banerjee, A., Newman, A. 1993. Occupational Choice and the Process of Development. *Journal of Political Economy* 101, 274-298. doi:10.1086/261876
- Bassett, W., Burkett, J., Putterman, L. 1999. Income Distribution, Government Transfers and the Problem of Unequal Influence. *European Journal of Political Economy* 15, 207-228. doi:10.1016/S0176-2680(99)00004-X
- Bazzi, S. Clemens, M. 2013. Blunt instruments: avoiding common pitfalls in identifying the causes of economic growth. *American Economic Journal: Macroeconomics* 5, 152-186. doi:10.1257/mac.5.2.152
- Beck, T., Demigurc-Kunt, A., Levine, R. 2007. Finance, poverty and income inequality: Cross-country evidence. NBER Working paper series paper 10979 doi:10.3386/w10979
- Benabou, R. 2000. Unequal societies: income distribution and the social contract, *The American Economic review* 90, 96-129. doi:10.1257/aer.90.1.96
- Blundell, R., Bond, S. 1998. Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics* 87, 115-143. doi:10.1016/S0304-4076(98)00009-8
- Birdsall, N. 1998. Life is unfair: Inequality in the world. *Foreign Policy* 112, 76-83. doi:10.2307/1149380
- Boix, C., Garicano L., 2001. Democracy, Inequality and Country-Specific Wealth. Unpublished manuscript
- Bollen, K.A. Jackman, R.W.1985. Political Democracy and the size distribution of income. *American Sociological Review* 50, 438-457. doi:10.2307/2095432
- Bond, S. 2002. Dynamic Panel Data Models: A Guide to Micro Data Methods and Practice. *Portuguese Economic Journal* 1, 141-162. doi:10.1007/s10258-002-0009-9

- Bonica, A., McCarty, N., Poole, K., and Rosenthal, H., 2013. Why hasn't democracy slowed rising inequality. *Journal of Economic Perspectives* 27, 103-123. doi:10.1257/jep.27.3.103
- Calderon, C., Chong, A., 2001. External sector and income inequality in interdependent economies using a dynamic panel data approach. *Economic letters* 71, 225-231. doi:10.1016/S0165-1765(01)00374-3
- Clarke, G., Xu, L.C. Zhou, H. 2003. Finance and Income inequality: test of alternative theories. World Bank Policy Research Working Paper 2984. doi:10.2139/ssrn.364160
- Chong, A. 2004. Inequality, democracy and persistence: is there a political Kuznets curve?. *Economics and Politics* 16, 189-212. doi:10.1111/j.1468-0343.2004.00137.x
- Chong, A., Gradstein, M. 2007. Inequality and Institutions. *The Review of Economics and Statistics* 89, 454-465. doi:10.1162/rest.89.3.454
- De Mello, L. Tiongson. E. 2006. Income inequality and redistributive government spending. *Public Finance Review* 34, 282-305. doi:10.1177/1091142105284894
- Deininger, K., Squire, L. 1996. A New data set measuring income inequality. *The World Bank Economic Review* 10, 565-591. doi:/10.1093/wber/10.3.56
- Di John, J. 2006. *The Political Economy of Taxation and Tax Reform in Developing countries*. Working Paper: Helsinki: Anthem Press and World Institute for Development Economics Research.
- Easterly, W. 2007. Inequality does cause underdevelopment: Evidence from a new instrument. *Journal of Development Economics* 84, doi:10.1016/j.jdeveco.2006.11.002
- Engerman, S.L., Sokoloff, K. 1997. Factor endowments, institutions, and differential paths of growth among new world economies: A view from economic historians of the United States. In: Haber, Stephen (Ed.), *How Latin America Fell Behind*. Stanford University Press, Stanford CA, 1997.
- Engerman, S.L., Sokoloff, K.L. 2005. The evolution of suffrage institutions in the Americas. *Journal of Economic History* 65, 891-921. doi:10.1017/S0022050705000343
- Fors, H., Olsson, O. 2007. Endogenous institutional change after independence, *European Economic Review* 51, 1896-1921. doi:10.1016/j.eurocorev.2007.01.010
- Galor, O., Zeira, J. 1993. Income Distribution and Macroeconomics. *Review of Economic Studies* 60, 35-52 doi:10.2307/2297811
- Gerry, C., Mickiewicz, T., (2008). Inequality, Democracy and Taxation: Lessons from the Post-Communist Transition. *Europe-Asia studies*, 60, 89-111. doi:10.1080/09668130701760356

- Gerry, C., Li, J.K., Mickiewicz, T. 2008. Macroeconomic stability, Governance and Growth: Empirical Lessons from the post-communist transition. Center for Study of Economic and Social Change of Europe: Working Paper No.89.
- Gradstein, M., Milanovic, B. 2004. Does Liberte=Egalite? A survey of the empirical links between democracy and inequality with some evidence on the transition economies. *Journal of Economic Surveys* 18, 515-537. doi:0.1111/j.0950-0804.2004.00229.x
- Gradstein, M., Milanovic, B., Ying, Y. 2001. Democracy and income inequality: an empirical analysis. The World Bank, Development and Research Group, Poverty and Human Resources.
- Greenwood, J., Jovanovic, B. 1990. Financial Development, Growth, and the Distribution of Income. *Journal of Political Economy* 98, 1076-1107. doi:10.1086/261720
- Gupta, S., Davoodi, H., Alonso-Terme, R. 2002. Does corruption affect income inequality and poverty?. *Economics of Governance* 3, 23-45. doi:10.5089/9781451849844.001
- Lee, C.S. 2005. Income Inequality, Democracy and Public Sector Size. *American Sociological review* 70.
- Levine, R. 2005. Law, endowments and property rights, *Journal of Economic Perspectives*. 19, 61-88.
- Li, H. Zou, H.F. 1998. Income inequality is not harmful for growth: theory and evidence, *Review of Development Economics* 2, 318-334.
- Lindert, P. 2002. Voice and Growth: Was Churchill right? Agricultural History Center, UC Davis, USA.
- Marshall, M. Cole, B. 2011. Global report 2011: Conflict, governance and state fragility. Centre for Systemic peace Working Paper.
- McKay, A. 2003. Inequality in middle income countries: Key conceptual issues, Overseas Development Institute occasional paper. XXX
- Meltzer A. Richard, S. 1981. A rational theory of the size of government. *Public Choice* 41, 403-418.
- Milanovic, B. 1999. Do more unequal countries redistribute more? Does the median voter hypothesis hold? The World Bank Policy Research Working Paper No. 2264.
- Munck, G., Verkuilen, J. 2002. Conceptualizing and measuring democracy: Evaluating alternative indices, *Comparative Political Studies* 35, 5-34.
- Piketty, T., Saez, E. 2013. Top Incomes and the great recession: recent evolutions and policy implications, *IMF Economic Review* 61, XXX.
- Ranjan, P. 2001. Dynamic Evolution of income distribution and credit-constrained human capital investment in open economies. *Journal of International Economics* 55, 329-358.

- Reuveny, Rafael and Quan Li, (2003) Economic Openness, Democracy and Income Inequality: An Empirical Analysis, *Comparative Political Studies* 36, 575-XXX
- Ringen, S. 2007. *What democracy is for: on freedom and moral government*, Princeton University Press, Princeton, NJ, USA.
- Rodriguez, F. 2004. Inequality, Redistribution and Rent-Seeking, *Economics and Politics* 16, 287-320.
- Rodrik, D. 1999. Where did all the growth go? External shocks, social conflict and growth collapses, *Journal of Economic Growth* 4, 385-412.
- Roodman, D. 2006. How to do xtabond2: An introduction to Difference and System GMM in Stata. Center for Global Development Working Paper Number 103.
- Roodman, D. 2008 A note on the theme of too many instruments, Center for Global Development, Working Paper No. 125, Washington DC.
- Rueschemeyer, Stephens and Stephens 1992. *Capitalism development and democracy*, University of Chicago Press, Chicago, Illinois, USA. XXX
- Sala-i-Martin, X. 1996. A positive theory of social security. *Journal of Economic Growth* 1, 277-304.
- Saraf, M., Jiwani, M. 2001. *Beating the Resource Curse: The Case of Botswana*. Washington DC.: The World Bank.
- Savoia, A., Easaw, J. McKay, A. 2010. Inequality, Democracy and Institutions: A Critical Review of Recent Research. *World Development* 3 142-154.
- Segura-Ubiergo, A. 2007. *The political economy of the welfare state in Latin America*, Cambridge University Press.
- Stevens, L. 2003. Chronic poverty in urban informal settlements in South Africa: Combining quantitative and qualitative data to monitor the impact of interventions. XXX
- Stock, J., Yogo, M. 2005. Testing for weak instruments in linear IV regressions, in *Identification and inference for econometric models: essays in honor of Thomas Rothenberg*, edited by Donald W.K. Andrews and James Stock, 80-109, NY: Cambridge University Press.

8 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. Up to date, researchers have put forth a set of various instrumental variables when instrumenting for the effect of democracy. One set of researchers, for instance, have focused on the cultural dimension, arguing that certain religions are more conducive to building democratic societies than others. A notable examples include, inter alia, Huntington (1984), Kedourie (1992) as well as Voight (2005) and Fish (2002). Similarly, another set of researches have focused on the divisions within societies based on ethnicity, language and religion, as potential instruments for democracy. According to this group of researchers, 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. Notable examples from this strand of the literature include, inter alia, Cleague et al. (2001), Noland (2005) and Keefer (2008). Finally, a third group of researchers argues that the strength of the state could be used as a potentially useful instrument for democracy. According to the researchers of this group, some autonomy of the state from the dominant classes is 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. Example of work conducted in this area include, inter alia, Rueschemeyer et al. (1992), as well as Djankov et al. (2003). However, it transpires that most of the researchers have, in fact, used some variation of the colonial origin/rule as an instrument for democracy. Most notable representatives from this group include: Weiner (1987), Lipset et al. (1993), Barro (1999) 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 than 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), although, it has to be noted that there exist an overlap between the type of colonizer and the period of colonization. In addition, Angeles (2007) uses the percentage of original European settler population as an instrument for democracy and income inequality. Finally, 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.

Table A1: OLS Regression Results - (Transformed Gini Dependent Variable)

Table A1. OLS regression results - (transformed Gini dependent variable)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7 - excluding the transition countries	Model 8 - excluding developed countries
Initial transformed gini	.792*** (.057)	.772*** (.054)	.799*** (.056)	.798*** (.054)	.792*** (.057)	.795*** (.058)	.854*** (.068)	.829*** (.061)
Polity IV	-.0003 (.0003)	-.007* (.004)					-.025 (.019)	-.014 (.026)
Polity IV squared		.001** (.0007)					0.0007 (0.0007)	.00005 (.001)
Freedom House			-.001 (.016)					
Electoral democracy				.060 (.057)				
Transformed Polity IV					-.0006 (.017)	-.016 (.025)		
Transformed Polity IV squared						.0006 (.0009)		
Natural resources	.003 (.002)	.003 (.002)	.003 (.002)	.003* (.002)	.003 (.002)	.002 (.002)	.002 (.002)	.003 (.002)
Log of initial GDP per capita	.572* (.322)	1.07*** (.336)	.511 (.312)	.452 (.312)	.573** (.320)	.703* (.418)	.695* (.358)	.372 (.477)
Log of initial GDP per capita (squared)	-.037* (.019)	-.068*** (.020)	-.033* (.019)	-.030 (.018)	-.037* (.019)	-.045* (.025)	-.044** (.021)	-.023 (.021)
Industry value added	-.0003 (.003)	-.001 (.003)	-.001 (.003)	-.0009 (.003)	-.0003 (.0003)	-.0005 (.003)	-.0002 (.003)	-.002 (.004)
Credit to the private sector	.0004 (.007)	.0006 (.007)	.0003 (.007)	.0002 (.007)	.0004 (.007)	.0004 (.007)	.0008 (.008)	.0008 (.001)
Trade Openness	.0002 (.006)	-.0002 (.007)	.0003 (.004)	.0003 (.004)	.0002 (.006)	.0002 (.007)	.0007 (.007)	.003 (.0008)
Government expenditure	-.009* (.004)	-.009* (.004)	-.010* (.004)	-.009** (.004)	-.009* (.004)	-.010* (.004)	-.010* (.004)	-.003 (.008)
Constant	-2.075 (1.279)	-4.103*** (1.335)	-1.809 (1.248)	-1.58 (1.25)	-2.077 (1.28)	-2.51 (1.61)	-2.45* (1.39)	-1.300 (1.828)
Number of observations	71	71	75	75	71	71	51	49
R squared	0.944	0.948	0.945	0.946	0.944	0.944	0.957	0.95

All models estimated with Ordinary Least Squares (OLS). *** denotes significance at 1 percent level of significance, ** denotes significance at 5 percent level of significance, * denotes significance at 10 percent level of significance. All models estimated with robust standard errors (reported in parentheses).

Table A2: IV Regression Results - (Transformed Gini Dependent Variable)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7 - excluding the transition countries	Model 8 - excluding developed countries
Initial transformed gini	.793*** (.063)	.957*** (.167)	.795*** (.057)	.799*** (.059)	.786*** (.061)	.793*** (.063)	.922*** (.145)	.821*** (.096)
Polity IV	.007 (.023)	.097 (.137)					.031 (.60)	.0255 (.451)
Polity IV squared		-.012 (.018)					-.002 (.007)	.002 (.003)
Freedom House			-.031 (.045)					
Electoral democracy				-.064 (.354)				
Transformed Polity IV					.007 (.014)	.896 (2.179)		
Transformed Polity IV squared						-.032 (.078)		
Natural resources	.004 (.003)	.004 (.008)	.004 (.002)	.002 (.004)	.004 (.003)	.024 (.056)	.004 (.007)	.007 (.005)
Log of initial GDP per capita	.606 (.382)	-3.307 (5.727)	.572 (.354)	.568 (.477)	.577 (.352)	-6.43 (16.82)	-.28 (2.34)	.719 (1.63)
Log of initial GDP per capita (squared)	-.041* (.024)	.188 (.337)	-.039* (.022)	-.036 (.026)	-.039* (.021)	-.36 (.972)	.010 (.139)	-.049 (.098)
Industry value added	-.0004 (.003)	.010 (.015)	-.00045 (.003)	-.001 (.003)	-.0005 (.003)	.006 (.0017)	.001 (.010)	-.005 (.006)
Credit to the private sector	.0006 (.0008)	.0001 (.0001)	.0002 (.0007)	.0003 (.0007)	.0004 (.0007)	.002 (.005)	.0008 (.001)	.002 (.002)
Trade Openness	.004 (.0008)	.003 (.0004)	.003 (.0005)	.0002 (.0004)	.0003 (.0007)	.003 (.005)	.001 (.002)	.0001 (.001)
Government expenditure	-.012 (.08)	-.023 (.024)	-.010* (.04)	-.010* (.05)	-.011* (.005)	-.016 (.027)	-.018 (.17)	-.009 (.016)
Constant	-2.103 (1.49)	14.26 (23.89)	-1.842 (1.362)	-2.044 (1.874)	-2.07 (1.35)	21.73 (57.46)	1.73 (9.63)	-2.46 (6.73)
Number of observations	71	71	75	75	71	71	51	49
R squared	0.939	0.95	0.943	0.943	0.941	0.939	0.899	0.862
Hansen's J-test (significance level)	0.249	0.4588	0.329	0.027	0.249	0.659	0.736	0.572

All models estimated with two-step instrumental variable approach. Dummy variables capturing legal origin/colonial past are used as instruments for democracy. *** denotes significance at 1 percent level of significance, ** denotes significance at 5 percent level of significance, * denotes significance at 10 percent level of significance. All models estimated with robust standard errors (reported in parentheses). Hansen J's test null hypothesis stipulates that the instruments are not correlated with the error term.

La Porta et al. (2008) find a strong correlation between the common law and institutional development (and therefore growth) in the former colonies. The rule of law as instrument is often coupled with using lagged values of the democracy variable as instruments for itself. Gerring et al. (2005), for instance, 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.