

**Economic Inequality and Electoral Participation. A Cross-Country  
Evaluation**

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Paper prepared for the Comparative Study of the Electoral Systems (CSES) Conference  
Toronto, ON, Canada. September 6, 2009

- DRAFT VERSION -

**Abstract:** Empirical research has shown that electoral engagement is positively correlated with income at the individual level. At the same time, the aggregate relationship between income inequality and electoral turnout is still unclear. While most studies show a negative impact of inequality over turnout, some others have found no relationship at all, and some others even suggest a positive impact. In this paper I argue that more fine-grained research is needed to understand this relationship. Firstly, standard measures of inequality, such as the Gini index, do not seem to be adequate to study the effect of inequality over turnout, given that changes in the Gini index may reflect either a change at the top or at the bottom of the income ladder. For that reason, alternative measures, such as the income ratio between quintiles, need to be tested. Secondly, differences in electoral engagement by income may be affected by the set of political alternatives available in each country. I hypothesize that when the polarization between parties on economic and social issues is high, that will induce a higher electoral turnout, given that voters will be highly motivated to avoid the undesired outcome. In order to test these hypotheses, I use data from CSES (Module 2) as well as aggregate data. Multilevel analysis is used to these hypotheses. Results are also compared with estimated dependent variable (EDV) techniques. Findings show that different measures of income inequality may change the relationship between inequality and electoral turnout. On the other hand, party polarization seems to be correlated with differences in turnout.

**Keywords:** electoral participation; inequality; income; polarization.

## 1. Introduction

Empirical research has shown that electoral engagement is positively correlated with income at the individual level (Blais, 2000, Norris, 2002). At the same time, the aggregate relationship between income inequality and electoral turnout is still unclear. While most studies show a negative impact of inequality over turnout (Solt, 2008), some others have not found a clear relationship (Geys, 2006), and some others even suggest a positive impact (Oliver, 2001). These contradictory empirical findings correlate with different theories making different predictions about the relationship between inequality and turnout. While the relative power theory predicts that inequality will depress turnout (Goodin and Dryzek, 1980), conflict theories (Meltzer and Richard, 1981; Brady, 2004) predict the opposite. Therefore, more research is needed to understand the link between the macro patterns and the mechanisms that may operate at the individual level. This paper addresses three related questions in order to understand how individuals react to inequality and how this can affect electoral turnout. First, how changes in inequality may affect to different income groups' turnout? Second, what measure of inequality is 'best' to predict electoral turnout by income group? And third, how political polarization may affect the relationship between inequality and turnout? While only a few studies have addressed the impact of inequality over electoral turnout by income groups (Solt, 2008), the two other questions have not yet been addressed by previous research.

I will argue that inequality will affect in different ways to different income groups. However, conversely to what is usually expected, inequality has a bigger impact over electoral turnout among the rich groups. On the other hand, standard measures of inequality, such as the Gini index, do not seem to be adequate to study the effect of inequality over turnout, given that changes in the Gini index may reflect either a change at the top or at the bottom of the income ladder. This will have important implications for a model of electoral turnout, since we might expect that voters react in different ways to an increase in inequality between the middle classes and the elite than between the middle classes and the very poor. For that reason, alternative measures of inequality, such as the income ratio between quintiles, need to be tested. Finally, differences in electoral engagement by income may be affected by the set of political alternatives available in each

country. I hypothesize that when the polarization between parties on economic and social issues is high, that will induce a higher electoral turnout, given that voters will be highly motivated to avoid the undesired outcome, though an alternative hypothesis will be tested also. Multilevel analysis and estimated dependent variable (EDV) techniques will be used to test these hypotheses.

The rest of the paper is organized as it follows. In the next section I present an overview of the literature about the relationship between inequality and electoral turnout. In the third section I will discuss some empirical facts about this relationship and propose some hypothesis. In the fourth section, I will explain the data and the method used to test the hypotheses. The fifth section is devoted to discuss the main findings. Finally, there is a closing section of conclusions and main implications of this research.

## **2. Overview of the literature**

Blais (2006) point out that political scientists have paid more attention to the effect of institutions over turnout than to the impact of socio-economic factors, although few institutional patterns have been reported consistently. Some research has been done also about the relationship between inequality and electoral turnout, though results are not conclusive. Goodin and Dryzek (1980), and Boix (2003) more recently, have found that inequality depresses turnout, while Oliver (2001) find a positive relationship between municipal income inequality and political engagement in the US. In an extensive review of the aggregate factors determining turnout, Geys (2006) cited 13 studies in which not relationship at all have been found, 13 in which the correlation is negative and 6 in which the correlation is positive. Solt (2008), in the most extensive study to the date, uses a cross-country multilevel research and find that political engagement broadly speaking (and electoral turnout in particular) is negatively correlated with income inequality. On the other hand, Solt (2008) concludes that the negative effect of inequality over political engagement is even stronger for the low income groups, though the interaction term is not significant for electoral turnout. In a similar vein, Mahler (2008) reports that electoral turnout correlates positively with the extent of government redistribution in developed democracies, though in this paper the effect of redistribution is assumed to be fixed for all the income groups.

Besides the empirical facts, three competing theories make different predictions about the relationship between inequality and political engagement at the aggregate level (Solt, 2008). Relative power theory predicts a negative relationship between inequality and turnout. The less well-off citizens will refrain from voting since they already know they have a very low probability of influencing the political process. On the contrary, conflict theory predicts that high inequality will increase conflicts among the rich and the poor. As a consequence, both the rich and the poor will engage in politics to influence the course of policy. Therefore, higher inequality will cause higher voter turnout. Resource theory contends that political participation is not the consequence of one's relative position on the income ladder. Instead of that, individuals get involved in politics as they have resources to devote to politics in the same vein they devote resources to consume other goods. Higher inequality means that the rich will have more resources to get involved while the poor will have less. Therefore, an increase in inequality does not increase or decrease the overall turnout by itself, but it will have a different impact over different incomes groups.

Relative power theory argues that political inequality is a consequence of economic inequality. As wealth is more concentrated, political influence will be more concentrated too. In a classical work, Goodin and Dryzek (1980) argued that it is rational for the poor to abstain from voting, since they already know they will not have a real chance to influence the political process. According to Goodin and Dryzek (1980) and Pateman (1971), the low participation of the poor is grounded in their own experiences and perceptions about the functioning of the political process. The large power imbalance shapes the political landscape as the rich have more opportunities to express their views through different media and condition political agendas. Class issues and conflictive matters, such as redistributive policies, are prevented to appear in the public debate, which is crowded by political demands of the wealthy elite. No coordination is needed for that to occur, since many different wealthy individuals acting in their own interest will produce that outcome (Solt, 2008). Moreover, the poor will learn it is very difficult to get their preferences represented in politics, so they will abandon preferences that they already know will not prevail (Lukes, 2005). Confronted with these experiences, poor citizens, acting rationally, will renounce to use political means as the best way to pursue their own interest. They will lose interest in politics and refrain from participating.

On the contrary, conflict theories assume that all the individuals have the same political skills. What differentiates one individual from another is their own interest, and individual interest depends on one's position on the income ladder. According to the well known Meltzer and Richard (1981) model, the poor will want to redistribute wealth while the rich will not. Differently from market outcomes, which are the product of ability and effort in the Meltzer-Richard model, political outcomes are the product of the majority, since every vote has the same value in democracy. Consequently, the model predicts that the extent of redistribution depends on the median voter's preference, which is the decisive voter. If inequality increases, the conflict between the preferences of the rich and the poor will increase. This in turn will increase the demands on government fostering political engagement. Conversely, inequality reduction will produce consensus over the policy preferences, since more equal individuals will have more equal preferences (Brady, 2004).

Finally, resource theory assumes that there is a relationship between economic and political inequality, given that we need to have resources (money and political skills) to participate in politics (Verba, Shlozman and Brady, 1995). However, changes in inequality do not necessarily have to affect the overall turnout. If one individual get poorer and the other richer, the former will have less resources to get involved in politics, while the last will have more. In the end, higher inequality means that the rich will participate more in politics while the poor will become even less engaged in politics. Note also that turnout may increase even after an increase in inequality. If all the income groups are getting richer in absolute terms, they will have more resources to participate, even if the poorest are getting poorer in relative terms.

All the three previous theories can be used to derive testable predictions about the relationship between economic inequality and electoral turnout. However, there are still some unclear aspects. While relative power theory would explain how the poor may react to an increase in inequality it does not tell very much about how the rich will react. At the same time, conflict theory predicts a symmetric increase in turnout, assuming that both the poor and the rich will react in the same way. On the other hand, neither the relative power theory nor the conflict theory take into account the party system and the set of political alternatives available. For the relative power theory, it is assumed that parties only represent the views of the wealthy voters, while the conflict theory assumes that all the

alternatives are available as long as they represent the preferences of the electorate. However, these are rather simplistic assumptions, as they ignore that party systems vary across political systems. I will come back on these issues in the next section, after reviewing some empirical facts that cannot be easily explained by any of these theories.

### **3. Economic inequality and electoral participation**

It is well known that electoral participation largely varies across countries and income groups. However, we have to take into account at least two important methodological issues. First, different measures of turnout can be defined. While most studies use the ratio of voters over the voting age population (VAP), some others use the ratio of voters over the number of people registered to vote. Choosing one or another is not neutral and it affects the ranking of turnout by countries (for instance, differences between the two ratios are over ten points for France, Australia or Hungary). Although it is difficult to say which operationalisation of turnout is best (Geys, 2006), leaving aside those who do not register may bias turnout toward the wealthier, since they register in higher proportion than the poor do. That is the reason why I measure aggregate turnout as the percentage of the VAP. Secondly, while we have data on aggregate turnout at the national level, it is difficult to know the exact figures for income groups. While studies across countries reveal a constant tendency to over-report turnout in surveys, we do not have any alternative measure to know electoral participation by income groups. According to the data, it seems that the difference between real and declared turnout is higher when the electoral turnout is lower (the difference between real turnout as the percentage of the VAP and declared turnout is 36.7 % for Switzerland for instance, while differences for countries like Iceland and Denmark are about 10 %). It seems also that turnout is over-reported among all the income groups in all the countries under analysis. Nevertheless, we cannot know for sure whether over-reporting turnout is associated with income or not and therefore it may obscure (or amplify) differences by group. Since we do not have any alternative measure of turnout by income groups, we have to rely on survey data to analyze the relationship between income and electoral participation.

Turning out to the aggregate turnout, we observe big differences across countries in table 1. Switzerland (2002) has the lowest turnout ratio, where only 37.3 % of the VAP

attended to the polls, followed by Mexico (2003), France (2002) and Poland (2001), where less than a half of the population went to the polls. At the top of electoral turnout we find Iceland (2003), where 89.1 % have voted, followed by Denmark (2001) and Australia (2002). In all these countries, at least eight out of ten voters casted a ballot at their respective elections. While there are some specific factors that may affect turnout at one particular election, differences between countries seem to remain in the long run.

[TABLE 1 HERE]

The analysis of electoral turnout by income groups reveals a clear pattern across countries as reported in previous research (Solt, 2008). The rich tend to vote more than the poor do, although differences between income groups largely vary across countries. The difference between turnout among the poorest and the richest quintiles is 25.9 % in the USA, 23.2% in Finland and 22.4 % in Hungary, while this difference is below 5 % in countries like Iceland, Denmark, or Germany or even negative in New Zealand and Ireland<sup>1</sup>. Therefore, the relevant question is why differences in turnout between the rich and the poor vary across countries. One possible answer is that these differences may be related to the extent of inequality (Goodin and Dryzek, 1980; Solt, 2008). To test this hypothesis some other methodological questions arise. On the one hand, it is well known to social scientists that high quality and strictly comparable inequality measures are rather difficult to find. Nevertheless, in recent times the Luxembourg Income Study (LIS) and the OECD have produced high quality cross-country comparable measures of income inequality. Taking into account the range of countries covered by each of these sources and the countries surveyed by the CSES, I decided to use the OECD database, since it allows to expand the number of countries under the analysis.

A more fundamental question is how to measure inequality. First, we need to decide whether we measure between-individuals inequality or between-households inequality. Furthermore, we have to decide whether we measure market inequality (before taxes and

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<sup>1</sup> Note that while the distribution of the samples in the CSES surveys do not contain the exact percentage of population in each income group, all the income groups are well represented in national samples. Hence, variations in turnout by income groups cannot be explained by scarce samples of any particular income group, which is a typical problem in many surveys.

public transfers) or post-tax inequality (after paying taxes and receiving transfers). Second, and even more important, is the measure of inequality to be computed. Several indices of inequality have been proposed by social scientists (for a review see Allison, 1978). However, the Gini index is perhaps the most widely used and all the studies about the relationship between inequality and turnout rely on this particular index. The Gini index<sup>2</sup> can be thought as the relative difference between the line of equality (in which each individual within society share the same amount of income) and the Lorenz curve (which maps individuals and their real income in ascending order of income).

As compared to other inequality indices, the Gini index has many advantages to describe overall inequality within a particular society and even to compare different societies. Nevertheless, two societies with similar Gini coefficients can still have very different income distributions. This is because the Lorenz curves can have different shapes and yield the same Gini index. In practical terms, that means that two similar Gini coefficients may reflect either inequality between the top and the middle of the income ladder or inequality between the middle and the bottom. This is particularly important when we deal with political processes in which rational models use to assume that the median voter is the decisive one. We might expect that the median voter is more worried about differences between the middle and the top than about differences between the middle and the bottom. For instance, the Director's Lax suggests that redistribution will not take place from the rich to the poor, but to the middle classes, given the decisive role of the median voter (Stigler, 1970). And this will have very different implications for a model of voter turnout at the individual level. This is the reason why this paper does not focus on the impact of overall inequality over turnout, but on the impact of two different sources of inequality: inequality between the median voter and the top of the income ladder and inequality between the median voter and the bottom.

In order to measure both sources of inequality income ratios between deciles can be used. In particular, two widely used measures of inequality are the P90/P50 and the P50/P10 ratios. The P90/P50 ratio is the ratio between the income of the richest decile and the intermediate decile, while the P50/P10 is the ratio between the income of the

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<sup>2</sup> More formally, the Gini index for the typical country  $j$  can be defined as:  $GI_j = 1 - 2 \int_0^1 L(Y) dY$ , where  $L(Y)$  is the Lorenz curve or the cumulative distribution function of income  $Y$ .

intermediate decile and the poorest decile. That is, the P90/P50 ratio is a measure of the inequality within the top half of the income ladder, while the P50/P10 ratio is a measure of the inequality within the bottom half. Note also, that both ratios refer to the median position in the income ladder, that is, the income of the median voter. In table 2, I report the Gini index, inequality ratios and other economic variables for the countries under analysis. All data refer to the election year for each country, except inequality measures, which refer to mid-2000, given the availability of data (see below). Since inequality measures are relatively stable in the short run, data sources seem to be adequate to the time in which elections were conducted in all the countries under study. GDP per capita is measured in US dollars, at current prices and power purchasing parities (PPP) for the year of reference.

The sample includes a variety of developed countries in which GDP per capita ranges from US\$ 10,879 in México (2003) to US\$ 39,609 in United States (2004), followed by the Nordic countries. Different welfare state regimes and inequality levels are also represented. The Gini index ranges from 0.23 in Denmark (2001) and Sweden (2002) to 0.47 in México (2003). As the Gini index is the product of the inequality at both the top and the bottom halves of the income ladder, a higher Gini index implies also higher ratios of inequality. Nevertheless, similar Gini index may tell some different histories. Inequality between the median voter and the top is the lowest in the Nordic countries (the P90/P50 ratio is below 1.8 for Denmark, Norway, Sweden and Netherlands). However, inequality between the median voter and the bottom is lower in the Czech Republic than in Denmark. We can see also that in middle inequality countries, such as Germany, Canada or Japan, P90/50 ratio increases to the range 1.8-2.1, but the P50/P10 sharply increases to the range 2.1-2.5. Finally, in the high unequal countries, like Mexico, Portugal, USA and Poland both ratios dramatically increase. Nevertheless, while in Poland both income ratios are similar in the USA the P50/P10 is 0.5 higher than the P90/50 ratio.

A bivariate analysis suggests that the aggregate turnout is positively correlated with economic development and social spending within the sample of countries under analysis, though correlations are weak and not significant. At the same time, economic inequality is negatively correlated with aggregate turnout. However, the magnitude of the correlation is not the same for all the measures of economic inequality. The strongest correlation is with the P90/P50 ratio (-0.460 and significant at  $p < 0.05$ ), followed by correlation with the Gini

index (-0.423), while the correlation with the P50/P10 ratio (-0.351 and nearly significant at  $p < 0.10$ ) is considerably weaker. That suggests that while inequality matter for electoral turnout, the most important factor affecting turnout is the difference between the richest groups within society.

When we look at the correlations between electoral turnout of each income group and aggregate variables, the overall pattern of negative association between inequality and turnout still remains. That is, both the poor and rich seem to vote less in unequal societies as the relative power theory suggest (Goodin and Dryzek, 1980). However, the correlation between inequality and turnout is stronger when we move from the low income groups to the most affluent ones. Thus correlation between the Gini index and turnout among the poorest quintile is only -0.355 and only significant at  $p < 0.10$ , while the same correlation becomes -0.542 for the fourth decile and -0.536 for the richest quintile (both significant at  $p < 0.01$ ). Interestingly also, correlation between turnout and the P90/P50 ratio is stronger than correlation between turnout and the Gini index and the P50/P10 ratio for all the income groups. For instance, for the fourth quintile these correlations are -0.624, -0.542, and -0.354, respectively, while the correlation between turnout and the P50/P10 ratio is only -0.177 and far from significant for the poorest quintile.

[TABLE 2 HERE]

Putting these results together an intriguing pattern seems to emerge. Firstly, while inequality depress turnout for all the income groups, those who are better off are the more affected ones. That means that the low turnout we observe in more unequal societies is mainly driven by a decline in electoral turnout among the rich voters. At the same time, the best individual predictor of turnout is not overall inequality, but inequality between the richest decile and the median income earner, while inequality between the median and the poorest decile seem to have a very modest impact over turnout. In the light of these findings, what can be said about the relationship between economic inequality and political inequality? On the other hand, how can we reconcile these facts with theory? The point of departure of this paper is that different sources of inequality will have a different impact over turnout across different income groups. While conflict theories fail to explain why an

increase in turnout depress turnout, the relative power theory fails to explain why the richest voters are the most affected ones by an increase in inequality. Therefore, a somewhat more complex model is needed to account for the previous findings. I hypothesize that inequality will have a negative impact over turnout, though different causal mechanisms may operate at the same time. To show how that will happen, we have to take into account the distributive coalitions among groups, as well as the set of political alternatives available in the political debate.

Firstly, I consider the role of distributive coalitions in two different settings: high and low inequality. According to the literature on redistribution, two political coalitions may emerge in class politics: poor-middle class coalition and rich-middle class coalition (Iversen, 2005). This is because the middle classes (that are in between) need to ally either with the poor (to distribute from the rich) or with the rich (to maintain their relative position). Let us start with the high inequality setting. In that setting economic power is heavily concentrated in the hands of the wealthy groups. According to the relative power theory, this implies a high imbalance of power in favor of the rich. The middle classes know that a coalition with the poor will have very low chances to succeed against the rich because of the high power imbalance. For that reason the middle classes will prefer to ally with the rich in order to maintain their relative position. While this is rational according to Goodin and Dryzek (1980) this in turn will increase inequality, since the political process will be biased in favor of the rich. That makes easier for the rich group to rule, even if participation of the rich group is low. Therefore there is a low incentive to participate for the rich and they will abstain also. As the poor get poorer, they are still less able to participate and the incentive of the rich to participate becomes even lower. This is a self-enforcing equilibrium in which low turnout reinforces inequality and vice versa. In the low inequality setting, the power imbalance is lower, so the middle classes may prefer a coalition with the poor to redistribute from the rich. That in turn increases the participation of the rich because they feel endangered by the high turnout of the poor and the middle classes. This is also a self-enforcing equilibrium in which higher turnout produces lower inequality and vice versa. Note that in this process, both the relative power theory and the conflict theory mechanisms are operating at the same time. While the poor and the middle

classes are acting as predicted by the relative power theory, the rich are acting as predicted by the conflict theory.

The key feature of inequality that affects turnout in that process is the inequality between the rich and the middle classes, since a reduction in the inequality between the middle classes and the rich will increase the expectation of a winning coalition with the poor for the middle classes. This would explain also why the rich over react when there is a change in inequality. Given that reducing inequality will produce a coalition of the middle classes with the poor, the rich need to increase turnout to maintain their relative position against the poor-middle class coalition. Conversely, when inequality is low, the rich can reduce turnout because they have the vote of the middle classes after coalition. Three main hypotheses derive from this process:

*H1.1. Electoral turnout is positively correlated with income.*

*H1.2. As inequality between the middle classes and the rich increases electoral turnout will decrease across all the income groups.*

*H1.3. Changes in inequality will affect more to the high income group than to the middle classes and low income groups.*

Secondly, we also need to take into account the set of political alternatives available to understand electoral turnout. According to conflict theories, an increase in inequality increases conflict between the rich and the poor, assuming that all the preferences are equally represented in the political debate, although this has not to be the case. We might expect that when electors face a small set of political alternatives, the relationship between economic inequality and electoral turnout will be weak. Only if electors have meaningful choices they will be motivated to vote. However, the extent of alternatives available cannot be measured by the number of parties in the political system, because even a big number of parties does not guarantee that voters' views are well represented in the political process. Instead of that, the degree political polarization reflects well the availability of political options. A higher polarization means that a large extent of ideological options is available to the voters. It is expected that when polarization is high, voters of all income groups will

be highly motivated to avoid the undesired outcome, so turnout will be higher in that case. Thus the base hypothesis will be:

*H2.1. As polarization increases electoral turnout will increase across all the income groups.*

However, there is another possibility in which political polarization will depress turnout. The following mechanism would explain that. As polarization increases, the possibility of redistributive coalitions decreases. Middle class and poor's parties will not be able to coordinate against the rich and that will reduce turnout across all the income groups, though for different reasons. The poor and the median group may abstain from voting since they know they cannot achieve the desired outcome. Conversely, the rich will not have an incentive to vote if the poor and the middle classes fail to coordinate, because they can still rule even at a low turnout ratio. Therefore, the alternative hypothesis regarding political polarization will be:

*H2.2. As polarization increases electoral turnout will decrease across all the income groups.*

#### **4. Data and methods**

As argued previously, electoral participation is shaped by relative income (the position on the income ladder) at the individual level and inequality and political polarization at the aggregate level. Two different sources of data have been used to define the variables. Survey data come from the Comparative Study of Electoral Systems (CSES), Module 2, while inequality measures have been computed using data from the OECD database (2009).

##### *Data and variables*

The dependent variable is casting a ballot in the last parliamentary election at the individual level. Responses are coded as 0 (“No”) and 1 (“Yes”). Two types of explanatory variables are included in the analysis: individual attributes and national variables. Individual attributes are income and a set of individual controls. In the CSES database income is measured in relative terms. That is, each individual is assigned to one income quintile according to the household net income. For the purpose of this analysis, three dummy variables have been defined to measure relative income (-1 = “First and second quintile”, 0 = “Third quintile”, and 1 = “Fourth and fifth quintile”). Therefore, the first group includes those who are poorer than the median voter, while the third group includes those who are richer than the median voter. The second group (third quintile) is taken as the reference category, since this is the median voter’s income group.

Individual controls include those that reflect differences in socio-economic status and sources of income, according to the literature on social inequality<sup>3</sup>: gender (0 = “Female”, and 1 = “Male”), age and age squared, marital status (0 = “Widowed, divorced or separated and single”, and 1 = “Married or living together as married”), education level<sup>4</sup> (0 = “No formal education”, 1 = “Primary School”, 2 = “Secondary School”, and 3 = “University”), living in rural areas (0 = “Small or middle-sized town, suburbs of large town or city, large town or city”, and 1 = “Rural area or village”), and union membership (0 = “No member”, and 1 = “Member”).

[TABLE 3 HERE]

National variables include income inequality, political polarization and compulsory voting. Inequality measures include the Gini index and two interdecile income ratios (as computed in the OECD database, 2009). P90/P50 is the ratio between the income earned by

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<sup>3</sup> Unfortunately, the CSES database does not contain measures of some important socio-economic variables for some countries, such as socio-economic status (missing for France and Switzerland) and current employment status (missing for Denmark), so I decided to omit these variables in order to keep all the possible countries in the analysis. For the same reason, Belgium cannot be included in the analysis, since we do not have income data for this country in the CSES database.

<sup>4</sup> This variable has been recoded from original values. No formal education category includes those who have no education and those who have not finished primary education. In the same way, primary education includes those who have completed primary education and those who have not completed secondary education. Secondary education includes also post-secondary trade and vocational school and incomplete studies at University. University includes those who have completed degrees at the University.

the richest decile and the income earned by the fifth decile, P50/P10 is the ratio between the fifth decile and the poorest decile. Data refer to the income earned in 2004 in all countries except Australia and New Zealand (2003/04); Hungary and the United Kingdom (2004/05); Switzerland (2004-2005); Canada, Denmark, the Netherlands, and the United States (2005); and Korea (2006). Income data refer to the total disposable income net of taxes. Inequality is computed between individuals, according to the total household income. That means that the same income is imputed to all individuals within the same household after dividing the total net household income by the number of persons living in the household. In fact, total household income is divided by the modified OECD scale which assigns a weight of 1.0 to the first household member aged 14 or over, 0.5 to each additional member aged 14 or more and 0.3 to each member under 14 years old.

Political polarization is measured as a weighted ideological difference between all the parties running the election. Ideological position for each party is taken from the CSES database, in which national investigation teams have assigned an ideological position to each party, according to objective codification rules. Using this data, a weighted political polarization measure  $P_j$  for country  $j$  is defined as<sup>5</sup>:

$$P_j = \sum_k \sum_{m \neq k} w_k w_m |I_k - I_m|$$

where  $I_i$  is the ideological position of party  $i$  over a ten points ideological scale and  $w_i$  is the proportion of vote of party  $i$  in last election. Compulsory voting is measured through a dummy variable. It takes value 1 when voting is enforced by a national law and it takes value 0 otherwise. A descriptive analysis of these variables is reported in Table 3.

Given the data available at the individual and the national level, the following countries (and election years) have been included in the analysis: Australia (2004); Canada (2004); Czech Republic (2002); Denmark (2001); Finland (2003); France (2002); Germany (2002); Hungary (2002); Iceland (2003); Ireland (2002); Japan (2004); South Korea (2004); Mexico (2003); Netherlands (2002); New Zealand (2002); Norway (2001); Poland (2001); Portugal (2002); Spain (2004); Sweden (2002); Switzerland (2003); United Kingdom

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<sup>5</sup> Note that this weighted polarization measure is a particular case of Esteban and Ray's polarization measure in which  $\sigma = 0$  (Esteban and Ray, 1994).

(2005) and United States (2004). The list includes a good representation of different political systems and inequality structures in well-developed countries. Since national variables do not vary too much between elections within the same country, only one election for each country is analyzed.

### *Statistical methodology*

Given that the dependent variable is categorical, logistic regression has been used to estimate the effect of explanatory variables. However, as previously argued, individuals are nested within countries, so multilevel procedures have to be used to estimate logistic regression coefficients (Goldstein, 2003; Rabe-Hesketh, Skrondal and Pickles, 2005; Raudenbush and Bryk, 2002). For a binomial variable like casting a ballot, we have the following model at the individual level:

$$\eta_{ij} = \ln \left( \frac{\pi_{ij}}{1 - \pi_{ij}} \right) = \beta_{0j} + \sum_{q=1}^Q \beta_{qj} X_{qij} + \varepsilon_{ij} \quad (1)$$

Where  $\eta_{ij}$  represents the odds ratio of casting a ballot for individual  $i$  within country  $j$ , which is a function of the  $Q$  individual level predictors  $X_{qij}$ .  $\beta_{qj}$  denotes the effect of predictor  $q$  over the odds ratio and  $\varepsilon_{ij}$  denotes the error term for individual  $i$  within country  $j$ .

As individuals are nested within groups (countries in that case),  $\beta_{qj}$  may vary across groups. Therefore, we can rewrite coefficients  $\beta_{qj}$  as a function of an error term  $U_{qj}$  (the random effect) and  $S$  national level predictors  $Z_{sj}$ . Therefore,  $\beta_{qj}$  can be written as:

$$\beta_{qj} = \gamma_{0q} + \sum_{s=1}^S \gamma_{qs} Z_{sj} + U_{qj} \quad (2)$$

The full multilevel model includes both fixed and random effects. In this particular case, it is assumed that the effect for each individual and national variable is fixed across countries, but there is a random effect accounting for variance of responses across countries. That implies that errors are constant within countries but not between countries. At the same time, we are also assuming that errors are not correlated across countries. Taking together equations (1) and (2) and rearranging the right hand term, we can write the full model as:

$$\eta_{ij} = \ln \left( \frac{\pi_{ij}}{1 - \pi_{ij}} \right) = \gamma_{00} + \sum_{q=1}^Q \gamma_{0q} X_{qij} + \sum_{s=1}^S \gamma_{0s} Z_{sj} + U_{0j} + \varepsilon_{ij} \quad (3)$$

Maximum-likelihood (ML) estimation of multilevel models with categorical outcomes involves important computational problems due to multidimensional numerical integration, given the high dimensionality of the likelihood function. There are two main approaches to deal with this issue in the literature: the quasi-likelihood methods (PQL and MQL) and the approximation of the likelihood function by some numerical method of integration. While quasi-likelihood methods are less computationally demanding they do not directly involve likelihood, as they use a linear Taylor expansion of the inverse link function around current estimates of fixed and random effects. At the same time, QL estimates are negatively biased if large variance components are present or the distribution of the response variable departs from normality (as it is the case in this model). For these reasons, I have used the Adaptive Gaussian Quadrature approximation of the maximum likelihood, as proposed by Rabe-Hesketh, Skrondal and Pickles (2005), which scales and translates the quadrature points taking into account the properties of the integrand. Newton-Raphson algorithm was subsequently used to maximize the likelihood function. Calculations have been done using the GLAMM routine.

As an alternative approach, estimated dependent variable (EDV) techniques have been used to test if the magnitude of the effect of income over electoral participation at the individual level depends on economic inequality at the national level. EDV techniques proceed as a two-step approach. At the first step, a logistic regression is run for each country, in which the dependent variable is casting a ballot and the independent variables

are all the individual attributes previously discussed. At the second step, estimated coefficients for the variable of interest (relative income in that particular case) are regressed against a set of national variables (economic inequality and political polarization). At the second step, the Huber/White/sandwich estimator of variance (or robust errors) is used to compute standard errors (Lewis and Linzer, 2005). EDV will provide additional evidence about the relationship between the effect of income over electoral participation and economic inequality and political polarization.

## **5. Findings and discussion**

Five different models have estimated and reported in table 4. Column 1 contains the baseline model in which only individual variables are included plus a random error term at the national level. In column 2 a set of national variables has been added: Gini index, political polarization and compulsory voting. In column 3 two interaction terms have been defined for the Gini index and the income group in order to test for differences between the effects of inequality for each income group. In column 4 the Gini index has been substituted by two different measures of inequality: the P90/P50 and the P50/P10 ratios. Finally, in column 5 two interaction terms have been created between the P90/P50 ratio and the income group. Although not reported in table 4, similar analyses were conducted using the original five income groups classification in the CSES database, yielding similar results with respect to the direction and magnitude of coefficients.

[TABLE 4 HERE]

Results show that income affects turnout as predicted by hypothesis H1.1. The median voter participates more than the low income group and less than the high income group. Other socio-economic attributes of the voter also have a significant impact over turnout. The more educated participate more than the less educated, while being married and union member increase also the probability of voting as Radcliff and Davis (2000) have found previously. Age has an inverted U-shaped relationship with turnout, since the coefficient of age is positive and the coefficient of age squared is negative. And somewhat surprisingly, living in rural areas has a positive impact over turnout. Finally, the magnitude

of the effect of individual level predictors does not seem to change across the different models specified and reported in table 4.

After adding the Gini index in column 2 in table 4, overall inequality has a negative impact over turnout. In column 4 we can see that when we decompose overall inequality into inequality between the median voter and the top and the bottom of the income ladder, only the first one has a significant and negative impact over turnout, confirming hypothesis H1.2. Comparing the effect of inequality over income groups in columns 3 and 5 (where an interaction term for inequality and income group has been added), results show that inequality affect the most to the high income group, since the coefficients for the interaction terms High income and the Gini index and High income and the P90/P50 ratio are both negative and significant. That will confirm hypothesis H1.3.

Regarding the effect of political polarization, this variable has a negative and significant impact in all the models reported in table 4. That contradicts hypothesis H2.1, confirming instead hypothesis H2.2. According to the explanation proposed here, higher polarization means that it is more difficult to form electoral coalitions. That will depress turnout among the poor and the middle classes because power will be more concentrated in the hand of the wealthiest. At the same electoral participation among the rich will decline because they already know that the middle class and the poor will not be able to form a winning coalition to gain power.

A set of additional models has been specified adding one economic or institutional variable at a time in order to test for possible misspecification problems, though results are not reported in table 4 for the shake of brevity. These controls include most of the institutional variables proposed by Solt (2008) at the national level and a new one: the natural logarithm of GDP per capita, social spending as percentage of the GDP, electoral disproportionality<sup>6</sup>, Presidential vs. Parliamentary<sup>7</sup> political systems, Unicameral vs. Bicameral parliamentary systems, and Federal vs. Unitary administrative systems.

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<sup>6</sup> Electoral disproportionality is measured using the Gallagher index:  $G_j = \sqrt{\frac{1}{2} \sum_k (V_k - S_k)^2}$ , where  $V_k$  denotes the proportion of vote for party  $k$ , and  $S_k$  denotes the proportion of seats won by party  $k$ . The index is referred to the typical country  $j$ .

<sup>7</sup> Following Lijphart (1999), presidential systems are those in which the President is elected by popular vote and he has real political power. That means he can either introduce legislation or appoint ministers and dissolve legislature.

According to resource theory, higher GDP per capita implies that more resources could be devoted to politics among other things (Solt, 2008), while social spending may enhance the civic capabilities of the less well-off (Kumlin and Rothstein, 2005; Lister, 2009). At the same time, electoral disproportionality may disincentive the vote of minorities. And institutional variables may affect turnout in different ways that have been already discussed in the literature (see for instance, Blais, 2006; Lijphart, 1999). However, none of these controls seem to have a significant impact over electoral participation at the individual level; neither have they significantly affected the magnitude of the reported coefficients. Therefore, previous results hold in the presence of additional controls.

EDV techniques have been used to analyze how the differences in electoral participation by income group depend on economic inequality and political polarization. For that purpose, 23 national logistic regressions have been estimated. The poorest group (first and second quintile) is taken as the reference group in that case. Therefore, 46 coefficients for the effect of income are obtained (2 income groups times 23 countries). At the second step, coefficients for the effect of income are regressed against the Gini index and the interdecile ratios, as well as the political polarization measure and electoral disproportionality. A dummy variable is included in the two-step regression taking value 1 for estimates of the richest group in each country and 0 otherwise, since we need to control for the differences in electoral participation between the median income group and the richest group. Results, including robust standard errors for the two step regression, are reported in table 5.

[TABLE 5 HERE]

Results are in line with those of the multilevel analysis. Overall inequality as measured by the Gini index has a negative impact on the magnitude of the coefficients. That implies that the differences in electoral turnout by income groups decrease as inequality increases. In columns 2 and 4 we can see that the effect of inequality between the median voter and the top of the income ladder has a negative and significant impact, while the effect of inequality between the median voter and the bottom is far from significant. In columns 3 and 4, political polarization has a negative impact over the differences in turnout

by income group, while disproportionality does not seem to have a significant impact. That suggests that the effect of the electoral system over differences in turnout is relatively modest as compared with political polarization among parties.

## **6. Conclusions**

The conclusion of this paper is twofold. First, I have found that inequality has a different impact on turnout among different income groups. Turnout among the rich is the most affected by changes in inequality. This is because of redistributive coalitions that may emerge in different settings. When inequality is high, the imbalance of power prevents the middle class from allying with the poor, since they cannot get enough resources to influence the political process. In that case, the middle classes will prefer to ally with the rich to maintain their relative position. However, when inequality is low enough and the power is less concentrated in the hands of the wealthy citizens, the middle classes will ally with the poor to pursue more redistributive policies. These are self-enforcing equilibria, in which high inequality will produce low turnout which in turn reinforces high inequality, and low inequality will produce a high turnout which maintain low inequality also. These findings are in line with theoretical models by Benabou (2000) and Benabou and Tirole (2006) in which, redistributive policies and low inequalities are self-enforcing equilibria because of different beliefs about the origin of social inequality. Furthermore, I have shown that different inequality measures yield different results. It has been proved that the inequality between the middle classes and the top of the income ladder is the best predictor of electoral turnout. Second, polarization has a negative impact over electoral turnout for all the income groups. This finding suggests that when polarization is high it is difficult to form winning coalitions and hence turnout will decline, as the expectation of getting the desired outcome reduces. Both multilevel analysis and EDV techniques confirm these findings.

Empirical results suggest also that more research is needed to understand the relationship between economic inequality and electoral turnout. While results seem to hold under a variety of economic and institutional controls, we will need to have available data for a wider sample of countries. Different measures of inequality need to be tested also to understand how different sources of inequality may explain electoral turnout in different

ways. Some more complex issues involve longitudinal data to investigate how changes in inequality within the same country may have an impact over electoral turnout across income groups in the long run. On the other hand, more research is needed to bring together the research about electoral turnout and distributive coalitions. Finally, it is very important to understand the implications for democratic theory of this pattern of unequal participation by income groups (Dahl, 2006).

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## TABLES AND FIGURES

**Table 1:** Electoral Turnout by Income Groups

|                       | Poorest Quintile | Quintile 2 | Quintile 3 | Quintile 4 | Richest Quintile | Total Turnout |
|-----------------------|------------------|------------|------------|------------|------------------|---------------|
| Australia (2004)      | 97.6             | 98.0       | 98.6       | 98.8       | 98.6             | 82.4          |
| Canada (2004)         | 85.3             | 90.1       | 93.0       | 93.3       | 94.5             | 55.3          |
| Czech Republic (2002) | 65.2             | 75.4       | 78.5       | 75.0       | 83.6             | 59.0          |
| Denmark (2001)        | 94.2             | 94.7       | 96.5       | 96.7       | 98.9             | 84.3          |
| Finland (2003)        | 65.3             | 77.9       | 80.6       | 88.5       | 88.6             | 70.0          |
| France (2002)         | 75.9             | 76.7       | 77.2       | 82.5       | 85.5             | 47.2          |
| Germany (2002)        | 90.0             | 91.8       | 93.8       | 96.4       | 94.7             | 73.5          |
| Hungary (2002)        | 70.2             | 77.8       | 83.6       | 84.2       | 92.6             | 55.8          |
| Iceland (2003)        | 94.8             | 93.6       | 97.0       | 96.7       | 98.3             | 89.1          |
| Ireland (2002)        | 86.0             | 84.9       | 86.1       | 86.9       | 82.3             | 67.0          |
| Japan (2004)          | 86.1             | 88.4       | 86.1       | 89.6       | 93.2             | 59.1          |
| Korea, South (2004)   | 80.4             | 76.3       | 80.9       | 81.2       | 87.5             | 59.5          |
| Mexico (2003)         | 71.0             | 68.7       | 70.6       | 71.4       | 79.0             | 43.4          |
| Netherlands (2002)    | 93.6             | 96.4       | 99.4       | 98.3       | 98.6             | 76.8          |
| New Zealand (2002)    | 83.0             | 86.1       | 83.9       | 85.7       | 75.8             | 72.5          |
| Norway (2001)         | 71.7             | 82.1       | 84.6       | 92.5       | 88.9             | 73.1          |
| Poland (2001)         | 50.5             | 60.6       | 56.8       | 68.0       | 65.4             | 47.6          |
| Portugal (2002)       | 74.7             | 73.4       | 76.8       | 79.2       | 85.0             | 68.6          |
| Spain (2004)          | 87.5             | 89.2       | 88.8       | 91.5       | 86.7             | 79.8          |
| Sweden (2002)         | 84.2             | 85.2       | 85.9       | 90.8       | 96.5             | 78.0          |
| Switzerland (2002)    | 66.2             | 69.2       | 76.1       | 79.7       | 78.7             | 37.3          |
| United Kingdom (2005) | 60.4             | 75.2       | 74.0       | 77.2       | 75.0             | 58.3          |
| United States (2004)  | 62.8             | 73.1       | 82.8       | 89.0       | 88.7             | 56.7          |

Notes: Electoral turnout by income groups from survey data. Aggregate total turnout as the percentage of the voting age population (VAP).

Source: CSES (2007) Module 2 and IDEA (2006) database.

**Table 2:** Economic Inequality and Other Indicators by Country

|                       | Gini index | P90/P50<br>ratio | P50/P10<br>ratio | GDP per<br>capita | Social<br>spending |
|-----------------------|------------|------------------|------------------|-------------------|--------------------|
| Australia (2004)      | 0.30       | 1.89             | 2.09             | 32429             | 17.68              |
| Canada (2004)         | 0.32       | 1.93             | 2.14             | 32811             | 16.57              |
| Czech Republic (2002) | 0.27       | 1.84             | 1.74             | 16872             | 20.58              |
| Denmark (2001)        | 0.23       | 1.55             | 1.75             | 29445             | 26.07              |
| Finland (2003)        | 0.27       | 1.73             | 1.86             | 27703             | 25.83              |
| France (2002)         | 0.28       | 1.86             | 1.82             | 27772             | 28.56              |
| Germany (2002)        | 0.30       | 1.91             | 2.08             | 27587             | 26.96              |
| Hungary (2002)        | 0.29       | 1.89             | 1.78             | 14694             | 21.39              |
| Iceland (2003)        | 0.28       | 1.76             | 1.76             | 30787             | 18.22              |
| Ireland (2002)        | 0.33       | 1.93             | 2.29             | 33030             | 15.33              |
| Japan (2004)          | 0.32       | 1.96             | 2.43             | 29039             | 18.22              |
| Korea, South (2004)   | 0.31       | 1.89             | 2.50             | 20426             | 6.34               |
| Mexico (2003)         | 0.47       | 2.98             | 2.86             | 10879             | 7.32               |
| Netherlands (2002)    | 0.27       | 1.74             | 1.86             | 31943             | 20.46              |
| New Zealand (2002)    | 0.34       | 2.07             | 2.06             | 22622             | 18.66              |
| Norway (2001)         | 0.28       | 1.60             | 1.77             | 37101             | 22.21              |
| Poland (2001)         | 0.37       | 2.33             | 2.42             | 10953             | 21.94              |
| Portugal (2002)       | 0.42       | 2.57             | 2.35             | 18447             | 21.26              |
| Spain (2004)          | 0.32       | 1.98             | 2.32             | 25968             | 21.15              |
| Sweden (2002)         | 0.23       | 1.62             | 1.72             | 29004             | 29.54              |
| Switzerland (2002)    | 0.28       | 1.80             | 1.83             | 33696             | 20.29              |
| United Kingdom (2005) | 0.34       | 2.12             | 1.99             | 32695             | 21.29              |
| United States (2004)  | 0.38       | 2.20             | 2.69             | 39609             | 16.06              |

Notes: GDP per capita in US \$, at current prices and PPP for the year of reference. Measures of economic inequality refer to net household income after taxes. Income data refer to mid-2000.

Source: OECD (2009) database.

**Table 3: Descriptive Statistics**

| Variable               | Mean     | Std. Dev. | Min.  | Max.  |
|------------------------|----------|-----------|-------|-------|
| Vote                   | 0.840    | 0.367     | 0     | 1     |
| Income group           | 1.939    | 0.879     | 1     | 3     |
| Male                   | 0.477    | 0.499     | 0     | 1     |
| Age                    | 47.386   | 16.921    | 16    | 101   |
| Age squared            | 2531.782 | 1687.152  | 256   | 10201 |
| Married                | 0.646    | 0.478     | 0     | 1     |
| Education level        | 1.773    | 0.795     | 0     | 3     |
| Rural area             | 0.257    | 0.437     | 0     | 1     |
| Union member           | 0.263    | 0.440     | 0     | 1     |
| Gini index             | 0.315    | 0.056     | 0.23  | 0.47  |
| P90/P50 ratio          | 1.966    | 0.330     | 1.554 | 2.983 |
| P50/P10 ratio          | 2.114    | 0.323     | 1.720 | 2.860 |
| Political polarization | 1.102    | 0.572     | 0.522 | 3.226 |
| Compulsory voting      | 0.132    | 0.338     | 0     | 1     |

Source: CSES (2007) Module 2 and OECD (2009) database.

**Table 4:** Electoral Turnout. Multilevel Logistic Regression

|                             | Model 1               | Model 2               | Model 3               | Model 4               | Model 5               |
|-----------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <b>Fixed Part</b>           |                       |                       |                       |                       |                       |
| <i>Individual Variables</i> |                       |                       |                       |                       |                       |
| Low income                  | -0.185***<br>(0.047)  | -0.185***<br>(0.047)  | -0.372<br>(0.243)     | -0.185***<br>(0.047)  | -0.457*<br>(0.251)    |
| High income                 | 0.201***<br>(0.050)   | 0.202***<br>(0.050)   | 0.723***<br>(0.263)   | 0.202***<br>(0.050)   | 0.647**<br>(0.269)    |
| Low income X Gini index     |                       |                       | 0.566<br>(0.732)      |                       |                       |
| High income X Gini index    |                       |                       | -1.589**<br>(0.789)   |                       |                       |
| Low income X P90/P50 ratio  |                       |                       |                       |                       | 0.133<br>(0.121)      |
| High income X P90/P50 ratio |                       |                       |                       |                       | -0.217*<br>(0.129)    |
| Male                        | 0.051<br>(0.035)      | 0.051<br>(0.035)      | 0.050<br>(0.035)      | 0.051<br>(0.035)      | 0.051<br>(0.035)      |
| Age                         | 0.072***<br>(0.006)   | 0.072***<br>(0.006)   | 0.071***<br>(0.006)   | 0.072***<br>(0.006)   | 0.071***<br>(0.006)   |
| Age squared                 | -0.001***<br>(<0.001) | -0.001***<br>(<0.001) | -0.001***<br>(<0.001) | -0.001***<br>(<0.001) | -0.001***<br>(<0.001) |
| Married                     | 0.238***<br>(0.040)   | 0.238***<br>(0.040)   | 0.230***<br>(0.040)   | 0.238***<br>(0.040)   | 0.229***<br>(0.040)   |
| Primary education           | 0.407***<br>(0.085)   | 0.406***<br>(0.085)   | 0.445***<br>(0.086)   | 0.405***<br>(0.085)   | 0.449***<br>(0.086)   |
| Secondary education         | 0.782***<br>(0.089)   | 0.777***<br>(0.089)   | 0.822***<br>(0.089)   | 0.776***<br>(0.089)   | 0.826***<br>(0.090)   |
| University                  | 1.188***<br>(0.102)   | 1.184***<br>(0.102)   | 1.225***<br>(0.102)   | 1.182***<br>(0.102)   | 1.227***<br>(0.102)   |
| Rural area                  | 0.078*<br>(0.043)     | 0.078*<br>(0.043)     | 0.073*<br>(0.043)     | 0.078*<br>(0.043)     | 0.072*<br>(0.043)     |
| Union member                | 0.224***<br>(0.049)   | 0.222***<br>(0.049)   | 0.221***<br>(0.049)   | 0.223***<br>(0.049)   | 0.221***<br>(0.049)   |
| Constant                    | -1.275***<br>(0.243)  | 1.492*<br>(0.902)     | 1.415<br>(0.919)      | 1.583<br>(1.044)      | 1.558<br>(1.062)      |
| <i>National Variables</i>   |                       |                       |                       |                       |                       |
| Gini index                  |                       | -6.721**<br>(2.708)   | -6.507**<br>(2.762)   |                       |                       |
| P90/P50 ratio               |                       |                       |                       | -1.431*<br>(0.791)    | -1.427*<br>(0.797)    |
| P50/P10 ratio               |                       |                       |                       | 0.246<br>(0.720)      | 0.250<br>(0.722)      |
| Political polarization      |                       | -0.642**<br>(0.269)   | -0.643**<br>(0.270)   | -0.572**<br>(0.274)   | -0.572**<br>(0.275)   |
| Compulsory voting           |                       | 0.445<br>(0.463)      | 0.456<br>(0.464)      | 0.609<br>(0.488)      | 0.620<br>(0.489)      |
| <b>Random Part</b>          |                       |                       |                       |                       |                       |

|                                |         |         |         |         |         |
|--------------------------------|---------|---------|---------|---------|---------|
| Level 2 Variance ( $U_{0j}$ )  | -0.141  | -0.379  | -0.377  | -0.379  | -0.376  |
|                                | (0.152) | (0.153) | (0.153) | (0.153) | (0.153) |
| No. Obs. Level 1 (Individuals) | 27610   | 27610   | 27610   | 27610   | 27610   |
| No. Obs. Level 2 (Countries)   | 23      | 23      | 23      | 23      | 23      |

Notes: \*\*\*, \*\*, and \* indicate significance level at 1%, 5%, and 10%, respectively. Standard errors in brackets.

Source: CSES (2007) Module 2 and OECD (2009) database.

**Table 5:** Effect of Income over Electoral Turnout. Estimated Dependent Variable

|                              | Model 1 | Model 2 | Model 3  | Model 4  |
|------------------------------|---------|---------|----------|----------|
| Gini index                   | -1.730* |         | -1.547*  |          |
|                              | (0.945) |         | (0.838)  |          |
| P90/P50 ratio                |         | -0.436* |          | -0.352*  |
|                              |         | (0.225) |          | (0.196)  |
| P50/P10 ratio                |         | 0.146   |          | 0.109    |
|                              |         | (0.263) |          | (0.239)  |
| Political polarization       |         |         | -0.227** | -0.215** |
|                              |         |         | (0.096)  | (0.095)  |
| Electoral disproportionality |         |         | -0.014   | -0.014   |
|                              |         |         | (0.011)  | (0.011)  |
| High income                  | 0.142   | 0.142   | 0.142    | 0.142    |
|                              | (0.138) | (0.139) | (0.134)  | (0.136)  |
| Constant                     | 0.896** | 0.905** | 1.187*** | 1.152**  |
|                              | (0.366) | (0.414) | (0.439)  | (0.465)  |
| Observations                 | 46      | 46      | 46       | 46       |
| R-squared                    | 0.065   | 0.072   | 0.157    | 0.157    |

Notes: \*\*\*, \*\*, and \* indicate significance level at 1%, 5%, and 10%, respectively. Robust standard errors in brackets.

Source: CSES (2007) Module 2 and OECD (2009) database.