DOCUMENTO DE TRABAJO. S2010 / 01

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S2010/01

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

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Resumen

La investigación empírica ha mostrado que la participación electoral está correlacionada positivamente con los ingresos a nivel individual. Al mismo tiempo, la relación agregada entre desigualdad económica y participación electoral es mucho menos clara. Mientras que la mayoría de los estudios muestran un impacto negativo de la desigualdad sobre la participación, otros no han encontrado ninguna relación, e incluso otros encuentran un impacto positivo. En este trabajo se argumenta que se necesita una investigación más precisa para entender esta relación. En primer lugar, las medidas habituales de desigualdad, como el índice de Gini, no parecen adecuadas para estudiar el efecto de la desigualdad sobre la participación, puesto que cambios en el índice de Gini pueden reflejar un cambio en la cúspide o en la base de la distribución de ingresos. Por este motivo, diferentes medidas, tales como la ratio de ingresos entre quintiles deben ser analizados. En segundo lugar, las diferencias en participación electoral pueden ser afectadas por el conjunto de alternativas políticas disponibles en cada país. Por ello, se analiza la hipótesis de si una alta polarización entre partidos induce una mayor participación electoral, ya que en esta situación los votantes estarían más motivados a evitar un resultado electoral adverso. Los resultados muestran una influencia negativa de la desigualdad sobre la participación electoral, si bien es la participación de los grupos de mayor renta la que se ven más influida por cambios en la desigualdad. Al mismo tiempo, la polarización tiene un efecto negativo sobre la participación.

Palabras clave: participación electoral; desigualdad; ingresos; polarización.

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- A previous version of this paper was presented at the Comparative Study of the Electoral Systems (CSES) Conference held in Toronto (Canada), September 6, 2009. I wish to thank participants for helpful suggestions, especially Pedro Magalha˜es, Ola Pettersson and André Blais. Any errors, however, are mine.

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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 on turnout, others have found no relationship at all, and still others suggest a positive impact. In this paper I argue that more fine-grained research is needed to understand this relationship. First, standard measures of inequality, such as the Gini index, do not seem to be adequate to study the effect of inequality on turnout, since changes in the Gini index may reflect a change at either the top or the bottom of the income ladder. For this reason, alternative measures, such as the income ratio between quintiles, must be tested. Second, differences in electoral engagement by income may be affected by the set of political alternatives available in each country. I hypothesize that high polarization between parties on economic and social issues will induce higher electoral turnout, since voters will be strongly 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 test these hypotheses. Results are also compared to estimated dependent variable (EDV) techniques.

Keywords: electoral participation; inequality; income; polarization

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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 on turnout (Solt, 2008), some have not found a clear relationship (Geys, 2006), and 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 inequality can affect electoral turnout. First, how do changes in inequality affect different income groups' turnout? Second, what measure of inequality is 'best' to predict electoral turnout by income group? And third, how does political polarization affect the relationship between inequality and turnout? Only a few studies have addressed the impact of inequality on electoral turnout by income groups (Solt, 2008), and the other two questions have not been addressed by any previous research.

I will argue that inequality affects different income groups in different ways. Contrary to what is usually expected, inequality has a bigger impact on electoral turnout among the rich groups. In addition, standard measures of inequality, such as the Gini index, do not seem to be adequate to study the effect of inequality on turnout, since changes in the Gini index may reflect a change at either the top or the bottom of the income ladder. This change will have important implications for a model of electoral turnout, since we might expect voters to react in different ways to an increase in inequality between the middle classes and the elite than to an increase in inequality between the middle classes and the very poor. For this reason, alternative measures of inequality, such as the income ratio between quintiles, must 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 high polarization between parties on economic and social issues will induce higher electoral turnout, since voters will be strongly motivated to avoid the undesired outcome. However, an alternative hypothesis will also be tested. Multilevel analysis and estimated dependent variable (EDV) techniques will

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be used to test these hypotheses.

The rest of the paper is organized as 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 hypotheses. In the fourth section, I will explain the data and the method used to test the hypotheses. The fifth section is devoted to discussing the main findings. Finally, there is a closing section addressing the conclusions and main implications of this research.

2 Overview of the literature

Blais (2006) points out that political scientists have paid more attention to the effect of institutions on turnout than to the impact of socio-economic factors, although few institutional patterns have been reported consistently. Some research has also been done on the relationship between inequality and electoral turnout, though results are not conclusive. More recently, Goodin and Dryzek (1980), and Boix (2003) find that inequality depresses turnout, while Oliver (2001) finds 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 no relationship at all was found, 13 in which the correlation is negative and 6 in which the correlation is positive. In the most extensive study to date, Solt (2008) uses cross-country multilevel research and finds that political engagement broadly speaking (and electoral turnout in particular) is negatively correlated with income inequality. Solt (2008) also concludes that the negative effect of inequality on political engagement is even stronger for the low income groups, although 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, although in this paper the effect of redistribution is assumed to be fixed for all of the income groups.

In addition to 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. In contrast, 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

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influence the course of policy. Higher inequality will thus cause higher voter turnout. Resource theory contends that political participation is not the result of one's relative position on the income ladder. Rather, individuals get involved in politics to the extent that they have resources to devote to politics just as they devote resources to consuming 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 alone is not sufficient to increase or decrease the overall turnout, but it will have a different impact on different incomes groups.

Relative power theory argues that political inequality is a consequence of economic inequality. Where wealth is more concentrated, political influence will also be more concentrated. In a classic 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 to determine political agendas. Class issues and conflictive issues, such as redistributive policies, are kept out of the public debate, which is crowded by political demands of the wealthy elite. No coordination is needed for this result to occur, since many different wealthy individuals acting in their own interest will produce this outcome (Solt, 2008). Moreover, because the poor will learn that it is very difficult to get their preferences represented in politics, they abandon preferences that they know will not prevail (Lukes, 2005). Confronted with these experiences, poor citizens, acting rationally, will renounce political means as the best way to pursue their own interests. They will lose interest in politics and refrain from participating.

Conflict theories, in contrast, assume that all individuals have the same political skills. What differentiates one individual from another is his or her own interest, and the individual's interest depends on his or her 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. Unlike market outcomes, which are the product of ability and effort in the Meltzer-Richard model, political outcomes are determined by the majority, since every vote has the same value in a democracy. Consequently, the model predicts that the extent of redistribution depends on the median voter's, or the decisive voter's, preference. If inequality increases, the conflict between the preferences of the rich and the poor will increase. This in turn

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will increase the demands on government, fostering political engagement. Conversely, lowering inequality will produce consensus on 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, since we must have resources (money and political skills) to participate in politics (Verba, Shlozman and Brady, 1995). However, changes in inequality do not necessarily affect the overall turnout. If one individual gets poorer and another richer, the former will have fewer resources to get involved in politics, whereas the latter 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. Note also that turnout may increase even after an increase in inequality. If all 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 three previous theories can be used to derive testable predictions about the relationship between economic inequality and electoral turnout. However, some aspects remain unclear. While relative power theory explains how the poor react to an increase in inequality, it does not say 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 react in the same way. On the other hand, neither relative power theory nor conflict theory takes into account the party system and the set of political alternatives available. The relative power theory assumes that parties only represent the views of wealthy voters, while conflict theory assumes that all of the alternatives are available as long as they represent the preferences of the electorate. However, these are rather simplistic assumptions, as they ignore the fact that party systems vary across political systems. I will return to 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 varies greatly across countries and income groups. However, we must 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 to the voting age population (VAP), some use the ratio of voters to the number of people registered to vote. Choosing one measure or another is not neutral and affects the ranking of turnout by countries. For instance, depending on which ratio is

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used, turnout differs by more than ten points in France, Australia and Hungary. Although it is difficult to say which measure 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 do the poor. I thus measure aggregate turnout as the percentage of VAP. Second, 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 an alternative measure of 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. (For example, the difference between real turnout as a percentage of VAP and declared turnout is 36.7 % for Switzerland, while differences for countries like Iceland and Denmark are about 10 %). It also seems that turnout is over-reported among all income groups in all of the countries under analysis. Nevertheless, we cannot know with certainty whether over-reporting turnout is associated with income or not. It may thus obscure (or amplify) differences by group. Since we do not have any alternative measure of turnout by income groups, we must rely on survey data to analyze the relationship between income and electoral participation.

When we look at the aggregate turnout, we observe large differences across countries in Table 1. Switzerland (2002) has the lowest turnout ratio (only 37.3 % of the VAP went to the polls) followed by Mexico (2003), France (2002) and Poland (2001), where less than half the population voted. At the top of electoral turnout we find Iceland (2003), where 89.1 % voted, followed by Denmark (2001) and Australia (2002). In all of these countries, at least eight out of ten voters cast a ballot at their respective elections. While some specific factors may affect turnout at one particular election, differences between countries seem to remain in the long run.

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, although differences between income groups vary greatly 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 and even negative in New Zealand and Ireland.[1] Therefore, the relevant question is why differences in turnout

[1]Note that, while the distribution of the samples in the CSES surveys does not contain the exact percentage of the population in each income group, all of the income groups

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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.

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 other methodological questions arise. On the one hand, social scientists know well that it is difficult to find high-quality and strictly comparable inequality measures. 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 expansion of the number of countries

are well represented in national samples. Hence, variations in turnout by income groups cannot be explained by scarce samples of any particular income group, a typical problem in many surveys.

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under analysis.

A more fundamental question is how to measure inequality. First, we must decide whether to measure inequality between individuals or between households. Furthermore, we must decide whether we measure market inequality (before taxes and 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[2] can be thought of as the relative difference between the line of equality (in which each individual within society shares the same income) and the Lorenz curve (which maps individuals and their real incomes in ascending order according to income).

As compared to other inequality indices, the Gini index has many advantages in describing overall inequality within a particular society and even in comparing different societies. Nevertheless, two societies with similar Gini coefficients can have very different income distributions. This is because the Lorenz curves can have different shapes and yield the same Gini index. In practical terms, this fact 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 analyses of political processes in which rational models usually assume that the median voter is the decisive one. We might expect the median voter to be more worried about differences between the middle and the top than about differences between the middle and the bottom. For instance, the Director's Law 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). This result will have very different implications for a model of voter turnout at the individual level. Therefore, this paper does not focus on the impact of overall inequality on turnout, but rather on the impact of two different sources of inequality: inequality between the median voter and the top income voter and inequality between the median voter and the bottom voter.

Income ratios between deciles can be used to measure both sources of inequality. In particular, two widely used measures of inequality are the

[2]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.

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$P90/P50$ 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 intermediate decile and the poorest decile. That is, the $P90/P50$ ratio is a measure of 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 on 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 the 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 Mexico (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 also implies higher ratios of inequality. Nevertheless, a similar Gini index may actually reflect some different stories. Inequality between the median voter and the top voter is the lowest in the Nordic countries (the $P90/P50$ ratio is below 1.8 for Denmark, Norway, Sweden and the Netherlands). However, inequality between the median voter and the bottom voter is lower in the Czech Republic than in Denmark. We can see also that in middle inequality countries, such as Germany, Canada or Japan, the P90/50 ratio increases to a range from 1.8-2.1, but the $P50/P10$ sharply increases to a range from 2.1-2.5. Finally, in the highly unequal countries, like Mexico, Portugal, USA and Poland both ratios dramatically increase. Nevertheless, while in Poland both income ratios are similar in to 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 of the measures of economic inequality. The strongest correlation

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is with the $P90/P50$ ratio is (-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. This suggests that, while inequality matters 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 the electoral turnout of each income group and aggregate variables, the overall pattern of negative association between inequality and turnout remains. That is, both the poor and rich seem to vote less in unequal societies, as the relative power theory suggests (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. The 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, the correlation between turnout and the $P90/P50$ ratio is stronger than the correlation between turnout and the Gini index or the $P50/P10$ ratio for all the income groups. For instance, for the forth 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.

If we put these results together, an intriguing pattern seems to emerge. First, while inequality depresses turnout for all the income groups, those who are better off are more strongly affected. That means that the low turnout we observe in more unequal societies is driven mainly 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 seems to have a very modest impact on turnout. In light of these findings, what can be said about the relationship between economic inequality and political inequality? In addition, 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 on turnout across different income groups. While conflict theories fail to explain why an increase in inequality depresses turnout, the relative power theory fails to explain why the richest voters are most affected 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 on turnout, though different causal mechanisms may operate at the same

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Table 2: Economic Inequality and Other Indicators by Country

	Gini index	$P90/P50$ ratio	$P50/P10$ ratio	GDP capita	Social Social 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.

time. To show how that will happen, we must take into account the distributive coalitions among groups, as well as the set of political alternatives available in the political debate.

First, 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: a poor-middle class coalition and a rich-middle class coalition (Iversen, 2005). These coalitions occur because the middle classes (located in between) need to ally either with the poor (in advocating redistribution from the rich) or with the rich (to maintain their relative position). Let us start with the high inequality setting. In this setting, economic power is heavily concentrated in the hands of the wealthy groups. According to the relative power theory, this

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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 of succeeding against the rich because of the high power imbalance. The middle classes will thus prefer to ally with the rich in order to maintain their relative position. While this result is rational according to Goodin and Dryzek (1980), it will in turn increase inequality, since the political process will be biased in favor of the rich. This makes it easier for the rich group to rule, even if its participation is low. The rich will thus have a low incentive to participate and will also abstain. As the poor get poorer, they are even 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 push for redistribution from the rich. This in turn increases the participation of the rich because they feel endangered by the high turnout of the poor and the middle classes. This phenomenon 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 affecting 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 also explain why the rich overreact when there is a change in inequality. Because reducing inequality will produce a coalition of the middle classes with the poor, the rich must increase turnout to maintain their relative position with respect to the poor-middle class coalition. Conversely, when inequality is low, the rich can afford lower turnout because they have the vote of the middle classes due to 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 the high income group more than the middle classes and low income groups.

Second, in order to understand electoral turnout, we must also take into account the set of political alternatives available. According to conflict theories, an increase in inequality increases conflict between the rich and the

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poor, assuming that all preferences are equally represented in the political debate, although this need not be the case. We might expect that when voters face a small set of political alternatives, the relationship between economic inequality and electoral turnout will be weak. Only if voters have meaningful choices will they 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 large number of parties does not guarantee that voters' views are well represented in the political process. Rather, the degree of political polarization reflects well the availability of political options. Higher polarization means that a large range of ideological options is available to voters. It is expected that when polarization is high, voters of all income groups will be highly motivated to avoid undesired outcomes, so turnout will be higher in this case. Thus the base hypothesis will be:

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

However, there is another scenario in which political polarization will depress turnout. The following mechanism would explain this scenario. As polarization increases, the possibility of redistributive coalitions decreases. Parties that support the interest of the middle class and the poor will not be able to coordinate against the rich, a result that will reduce turnout across all of the income groups, although 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 income groups.

4 Data and methods

As argued previously, electoral participation is shaped by relative income (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).

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4.1 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's 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[3]: 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[4] (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 = "Not a member", and 1 = "Member").

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 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

[3]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). I thus decided to omit these variables in order to keep all of the possible countries in the analysis. For the same reason, country-regionplaceBelgium cannot be included in the analysis, since we do not have income data for this country in the CSES database.

[4]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 both those who have completed primary education and those who have not completed secondary education. Secondary education also includes post-secondary trade and vocational school and incomplete studies at University. University includes those who have completed University degrees.

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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.

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 attributed to all individuals in 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 more, 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 in 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 objectifiable codification rules. Using this data, a weighted political polarization measure P_j for country j is defined as[5]:

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

[5]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).

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

Given the data available at the individual and the national levels, 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); the Netherlands (2002); New Zealand (2002); Norway (2001); Poland (2001); Portugal (2002); Spain (2004); Sweden (2002); Switzerland (2003); United Kingdom (2005) and the 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.

4.2 Statistical methodology

Because 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 must 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:

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

where η_{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}. β_{qj} denotes the effect of predictor q on the odds ratio, and ε_{ij} denotes the error term for individual i in country j.

As individuals are nested within groups (in this case, countries), β_{qj} may vary across groups. We can thus rewrite coefficient β_{qj} as a function of an error term U_{qj} (the random effect) and S national level predictors Z_{sj}. Therefore, β_{qj} can be written as:

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

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 assume that errors do not correlate across countries. Taking Equations (1) and (2) together and rearranging the right-hand term, we can write the full model as:

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

Maximum-likelihood (ML) estimation of multilevel models with categorical outcomes involves significant computational problems due to multidimensional numerical integration, given the high dimensionality of the likelihood function. In the literature, there are two main approaches to addressing this issue: 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 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. The Newton-Raphson algorithm was subsequently used to maximize the likelihood function. Calculations have been performed using the GLAMM routine.

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

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the dependent variable is casting a ballot and the independent variables are all of the individual attributes discussed above. In the second step, estimated coefficients for the variable of interest (relative income in this particular case) are regressed against a set of national variables (economic inequality and political polarization). In 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 on electoral participation and economic inequality and political polarization.

5 Findings and discussion

Five different models have been used in the estimation, and the results are 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, we substitute two different measures of inequality for the Gini index: 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 the coefficients.

Table 4: Electoral Turnout. Multilevel Logistic Regression

	Model 1	Model 2	Model 3	Model 4	Model 5
Fixed Part					
Individual Variables					
Low income	-0.185***	-0.185***	-0.372	-0.185***	-0.457*
	(0.047)	(0.047)	(0.243)	(0.047)	(0.251)
High income	0.201***	0.202***	0.723***	0.202***	0.647**
	(0.050)	(0.050)	(0.263)	(0.050)	(0.269)
Low income X Gini index			0.566		
			(0.732)		

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... table 4 continued

	Model 1	Model 2	Model 3	Model 4	Model 5
High income X Gini index			-1.589**		
			(0.789)		
Low income X $P90/P50$ ratio					0.133
					(0.121)
High income X $P90/P50$ ratio					-0.217*
					(0.129)
Male	0.051	0.051	0.05	0.051	0.051
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
Age	0.072***	0.072***	0.071***	0.072***	0.071***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Age squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Married	0.238***	0.238***	0.230***	0.238***	0.229***
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)
Primary education	0.407***	0.406***	0.445***	0.405***	0.449***
	(0.085)	(0.085)	(0.086)	(0.085)	(0.086)
Secondary education	0.782***	0.777***	0.822***	0.776***	0.826***
	(0.089)	(0.089)	(0.089)	(0.089)	(0.090)
University	1.188***	1.184***	1.225***	1.182***	1.227***
	(0.102)	(0.102)	(0.102)	(0.102)	(0.102)
Rural area	0.078*	0.078*	0.073*	0.078*	0.072*
	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)
Union member	0.224***	0.222***	0.221***	0.223***	0.221***
	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)
Constant	-1.275***	1.492*	1.415	1.583	1.558
	(0.243)	(0.902)	(0.919)	(1.044)	(1.062)
National Variables					
Gini index		-6.721**	-6.507**		
		(2.708)	(2.762)		
$P90/P50$ ratio				-1.431*	-1.427*
				(0.791)	(0.797)
$P50/P10$ ratio				0.246	0.25
				(0.720)	(0.722)
Political polarization		-0.642**	-0.643**	-0.572**	-0.572**
		(0.269)	(0.270)	(0.274)	(0.275)
Compulsory voting		0.445	0.456	0.609	0.62

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... table 4 continued

	Model 1	Model 2	Model 3	Model 4	Model 5
		(0.463)	(0.464)	(0.488)	(0.489)
Random Part					
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

Significance levels: $***$ p<0.01, $**$ p<0.05, $*$ p<0.10.

Standard errors in brackets.

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

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 on turnout. The more educated participate more than the less educated, while being married and being a union member also increase the probability of voting, as Radcliff and Davis (2000) 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. Somewhat surprisingly, living in rural areas has a positive impact on 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.

When we add the Gini index in Column 2 in Table 4, overall inequality has a negative impact on turnout. In Column 4, we can see that when we separate overall inequality into inequality between the median voter and the top and the bottom of the income ladder, only the former has a significant and negative impact on turnout, confirming Hypothesis H1.2. When we compare the effect of inequality on income groups in Columns 3 and 5 (where an interaction term for inequality and income group has been added), the results show that inequality affects the high income group the most, 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. This confirms Hypothesis H1.3.

Regarding the effect of political polarization, this variable has a negative and significant impact in all of the models reported in Table 4. This result contradicts Hypothesis H2.1, confirming Hypothesis H2.2 instead. Accord-

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ing 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 hands of the wealthiest. At the same time 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 by adding one economic or institutional variable at a time in order to test for possible misspecification problems, although the results are not reported in Table 4 for the sake 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[6], presidential vs. parliamentary[7] political systems, bicameral vs. bicameral parliamentary systems, and federal vs. unitary administrative systems. According to resource theory, higher GDP per capita implies that more resources could be devoted to politics, among other issues (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 serve as a disincentive to voting for minorities. And institutional variables may affect turnout in the different ways that have already been discussed in the literature (see for instance, Blais, 2006; Lijphart, 1999). However, none of these controls seems to have a significant impact on electoral participation at the individual level; nor have they significantly affected the magnitude of the coefficients reported. Previous results thus 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 this purpose, 23 national logistic regressions have been estimated. The poorest group (first and second quintile) is taken as the reference group in this case. Therefore, 46 coefficients for the effect of income are obtained (2 income groups times 23 countries). In the second step, coefficients for the effect of income are regressed against the Gini index

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

[7]Following Lijphart (1999), presidential systems are those in which the President is elected by popular vote and has real political power, i.e. the president can either introduce legislation or appoint ministers and dissolve the legislature.

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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: Effect of Income on 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

Significance levels: $***$ p<0.01, $**$ p<0.05, $*$ p<0.10. Robust standard errors in brackets. Source: CSES (2007) Module 2 and OECD (2009) database.

The 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. This implies that the differences in electoral turnout by income group decrease as inequality increases. Columns 2 and 4 show that 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 on the differences in turnout by income group, while disproportionality does not seem to have a significant impact. This suggests that the effect of the electoral system

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on differences in turnout is relatively modest as compared with political polarization among parties.

6 Conclusions

The conclusions of this paper are twofold. First, I have found that inequality has a different impact on turnout among different income groups. Turnout among the rich is most affected by changes in inequality. This occurs because different redistributive coalitions may emerge in different settings. When inequality is high, the imbalance of power prevents the middle class from allying with the poor, since the latter cannot obtain enough resources to influence the political process. In this 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 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 high turnout, which maintains low inequality as well. These findings are in line with theoretical models of 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 on electoral turnout for all 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 obtaining the desired outcome are lower. Both multilevel analysis and EDV techniques confirm these findings.

The empirical results also suggest that more research is needed to understand the relationship between economic inequality and electoral turnout. While the results seem to hold under a variety of economic and institutional controls, we would need to have data available for a wider sample of countries. Different measures of inequality also need to be tested to understand how different sources of inequality may explain electoral turnout in different ways. Some more complex issues involve the need for longitudinal data to investigate how changes in inequality within the same country may have an impact on electoral turnout across income groups in the long run. In addition, more research is needed to bring together the research about

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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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