

Empirics of the median voter: democracy, redistribution and the role of the middle class

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Abstract This paper improves the empirical investigation on the effectiveness of the median voter theorem. Using high quality data, it is possible to directly observe individual net cash transfers in several countries and to investigate the effects of taxes and transfers on different social classes and in the aggregate. This allows testing of both the “redistribution hypothesis” (more inequality leads to more redistribution in aggregate) and the “median voter hypothesis” (the middle class plays a special role in policy making). Results suggest acceptance of the former and reject on, or at least questioning, of the latter. Not only are the gains from redistribution negligible for the middle class, but the link between income and redistribution is also lower for it than for any other class of income. Moreover, the strength of the median voter seems to fall over time. Finally, the amount of redistribution targeted to the middle class is lower in more asymmetric societies, a result that contrasts strongly with the median voter theorem.

Keywords Income distribution · Cash redistribution · Political process · Median voter theorem

JEL Classification C23 · D31 · D72 · H24

1 Introduction

The aim of this paper is enhance the analysis regarding the effectiveness of the middle class as a decisive fiscal policy maker. Even though the political economy literature has very often relied on the median voter theorem as the mechanism

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through which the middle class could influence the direction of fiscal policies,¹ the empirical evidence attached to this theorem is very far from being definitive.

With respect to the previous literature, this paper exploits a higher quality income dataset to investigate the size of redistribution relative to different classes of population and which economic and political aspects can influence the redistributive mechanism. By referring to several measures of inequality and investigating the whole range of income classes, this paper can more accurately assess the role of the middle class in the process of political decision making.

The topic is relevant under several perspectives: first, testing the effectiveness of a median voter mechanism is interesting to understand the economic determinants of political outcomes; second, it is relevant since this is a widely used tool to explain other political processes and a rejection of its validity could foster a deeper investigation of the political mechanisms linking inequality and redistribution; third, some interest could be found in the political variables that influence its efficacy, if any.

In spite of its relevance, this topic did not receive much attention, mainly due to the lack of suitable data. In order to link the role of the median voter to the redistribution process, the ideal dataset should include the amount of pre-tax income and redistribution for every individual in the population. Such data is only available for a small number of countries and is harmonized by the Luxembourg Income Study [16], that does not release the micro level dataset for confidentiality reasons. This data was exploited by Milanovic [19] in an innovative paper that, in spite of its approach, suffers from some drawbacks that will be discussed in the next section. Previous empirical papers make use of outdated datasets on inequality that, according to Deininger and Squire [8], contain “low quality” data. The outcome is that results of these papers are very sensitive to the data used and it is difficult to compare the conclusions they reach.

This paper reviews the empirical literature about the median voter theorem, by analyzing, in detail, some influential papers on the topic (Section 2), then describes the several datasets merged together to implement the empirical investigation (Section 3). Section 4 includes both a theoretical description of the models and the results obtained by the data, while Section 5 concludes the investigative study.

2 Review of empirical literature

The seminal paper by Downs [9] applies the Hotelling competition model [14] to political economy, stating that, under some assumptions, the median voter within a distribution is the decisive agent in the democratic process. During the last fifty years, many theorists have questioned his results, developing a wide literature on the voting process and its effects on political mechanisms. In spite of this, however, the median voter theorem remains the most widely used assumption whenever the political process is used to explain an economic issue. In the field of inequality, redistribution, and government expenditure, the influential paper by Meltzer and Richard [18] highlights how more unequal countries experience higher public expenditure because

¹ Among others, Meltzer and Richard [18], Bertola [6], Perotti [22], Alesina and Rodrik [3], Persson and Tabellini [24] are the most frequently quoted.

of the redistributive preferences of a poorer median voter. A decade later, a group of insightful papers by Bertola [6], Perotti [22], Alesina and Rodrik [3], Persson and Tabellini [24] focus on the effects of income inequality to economic growth, keeping the assumption that higher inequality is associated to more redistribution through a median voter political mechanism.

Even if the median voter theorem is a kind of benchmark from the theoretical perspective, the empirical evidence referred to it is restricted to a small number of papers that, in addition, are very far from finding a commonly agreed result. The main reason for this limited investigation is the result of the lack of suitable data on individual preferences, income inequality, and redistribution [8]. In order to review this branch of literature, I will refer to four well known papers [3, 19, 23, 24] that exhaustively summarize all the characteristics, shortcomings, methodologies and results on this topic.

The common feature of these papers is the focus on the effectiveness of the middle class in deciding the level of redistribution. The mechanism investigated is simple: a more unequal income distribution is associated to a poorer median voter, who is able to set a higher amount of redistribution that, in turn, lowers incentives to investments and, ultimately, reduces economic growth. Although they deal with the same issue, the papers differ because of the data sources, usually of “low quality” according to the definition of Deininger and Squire [8], or for the methodologies, and all of them find at least partially different results. Persson and Tabellini [24] run two sets of regressions, one referring to an unbalanced panel of “historical data” including nine countries from 1830 to 1985, the other consisting of a cross-section of 56 countries in the postwar period. Due to the lack of suitable data, only the second model can account, even if indirectly, for the role of the middle class.² The model links economic growth to income inequality, national income, level of education, and the presence of democratic institutions. Inequality is measured as the pretax income of the households in the third quintile of the population, based on data collected by Paukert [21] for a period around 1965. The conclusion of the authors is that since “growth should be inversely related to inequality in a democracy, but not necessarily in a dictatorship” [24, p. 612], sign and significance of the variables related to democratic institutions confirm the effectiveness of the median voter theorem. However, there are two main shortcomings in this model: first, there is not a measure of redistribution and its role in the link between inequality, nor is growth directly tested; second, the model relies on “only” 49 observations that fall to 29 and 20 when splitting the sample between democratic and non-democratic countries.

Alesina and Rodrik [3] test the same result as in Persson and Tabellini [24] using a different inequality variable. The model is substantially the same, since economic growth is assumed to be negatively correlated to income inequality, controlling for national income, primary education, and the level of democracy. Different from the previous case, inequality is measured by Gini indices referring to both ex-post income (from Jain [15] and Fields [11]) and land (from Taylor and Hudson [27]), and include a larger cross section of 70 countries, both developing and already developed. Results are in strong contrast to those obtained by Persson and Tabellini [24]. Indeed, even if the negative relationship between inequality and growth is confirmed,

²I will not consider the sensitivity analysis run on a very small sample, since also the authors admit that “the degrees of freedom are so few that the results are very tentative”.

“the hypothesis that democracies and nondemocracies differ in the relationship between inequality and growth is rejected [...] rais[ing] some question about the generalizability of Persson and Tabellini’s results on this front” [3, pp. 483–484]. One of this paper’s strengths is that it utilizes a larger dataset, but, as a drawback, does not directly focus on the middle class, since it considers only the Gini index as an inequality measure. Finally, like Persson and Tabellini [24], it does not include any measure of redistribution.

Two years later, Perotti [23] more extensively analyzed the link between income inequality, democracy, and growth. Using the same data sources utilized by Persson and Tabellini [24], but a slightly different inequality measure,³ he tests several models, finding results different from all the previous papers. When linking inequality to growth, like Persson and Tabellini [24], the correlation is significantly negative in democratic countries only. Although, similarly to Alesina and Rodrik [3], political variables are not statistically significant. This apparently puzzling result is explained by the fact that, in this sample, democratic countries are also the richest and it is not possible to disentangle the two effects. The real novelty of Perotti [23], however, is that it also splits the process in two stages, focusing on “political mechanism”, which is the impact of inequality on redistribution (proxied by the maximum marginal tax rate) and on the “economic mechanism”, the link between redistribution and growth, in a cross section of 49 countries. Results are unexpected because income inequality is not significantly correlated to redistribution and redistribution is positively correlated to growth. Under the perspective of the role of the middle class, however, the former result is insightful, since it goes in an opposite direction with respect to Persson and Tabellini [24].

Milanovic [19] faced quite a puzzling framework, using data on similar countries and with comparable sample size, Persson and Tabellini [24], Alesina and Rodrik [3] and Perotti [23] all found contrasting results. The novelty of Milanovic [19] consists in using the Luxembourg Income Study dataset that provides the researchers with individual *micro*-data, comparable both across countries and over time. This represents an improvement under three perspectives: first, the sample size increased up to 79 observations; second, it was possible, for the first time, to make use of the panel dimension of the dataset, taking into account the time invariant unobserved heterogeneity; third, it was possible to directly create redistribution measures based on individual data. Contrary to previous literature, Milanovic [19] directly tested how the amount of redistribution targeted to the middle class depends on the share of income it earns. Milanovic [19] results are in line with those found by Perotti [23]: the middle class is always a net loser in the process of redistribution (namely, taxes levied on the third quintile of the distribution are always higher than the transfers to it) and there are no significant relationships between its market income and the level of redistribution targeted to it. In contrast, such a relationship is effective for poorest classes of population because the amount of net redistribution to the poorest half and the poorest quintile are both negatively and strongly significantly correlated to their market income. Moreover, the level of democracy does not affect all of the empirical results.

Despite its innovation, the paper by Milanovic [19] suffers from some inaccuracy. First, the amount of redistribution targeted to the middle class is miscalculated, with

³The share of income belonging to the third *and fourth* quintile, instead of the only third quintile.

the true values being lower;⁴ second, it also includes a bunch of observations for which LIS does not provide *ex-ante* income values.⁵ It is not possible to assess how, if at all, this inclusion drives the results; however, with a larger actual sample size, I am able in the present paper to exclude these observations, obtaining more precise results. Finally, as stated in next section, this paper operates under a more rigorous definition of democracy.

What I intend to do in this paper is to merge together the values of the four “representative” works summarized above and expand upon them in order to shed further light on the still unsolved question of the role of the middle class in determining the level of redistribution.

3 Data description

The political-economic relationship investigated by this paper involves several dimensions and there is no single dataset that includes all the relevant variables. The present section is devoted to describing and analyzing the data sources and variables included in this empirical investigation. The sample size is limited by the availability of data on inequality and redistribution, whose analysis represents a major innovation of the paper, since it exploits the Luxembourg Income Study dataset and overcomes many of the shortcomings mentioned in the previous section. The resulting dataset is an unbalanced panel made up of 24 countries⁶ observed over 40 years, from 1967 to 2006. Table 1 lists the data sources and the variables used in the empirical analysis and their descriptive statistics.

First of all, economic variables come from the very well known Penn World Table (version 6.3) provided by the Center for International Comparisons at University of Pennsylvania [13].⁷ The data set includes long time series on *Per capita* GDP and GDP *growth* rates, both across countries and over time, getting rid of all the comparability issues since they are all computed in US dollars PPP, taking 2005 as a base year.⁸ Second, the variable *Unemployment rate* is taken from the LABORSTA office dataset at International Labour Organization.⁹ Among the several possible sources, the more

⁴Table 7 in the Appendix of his paper contains figures algebraically inconsistent with their definition. The author confirmed that the values in the table are misreported and that, in order to get the true figures, they must be scaled down by a factor of 2.5. This miscalculation, however, does not affect any of the other results in his paper.

⁵Belgium (1985, 1988), Hungary (1991), Italy (1986, 1991, 1995), Luxembourg (1985, 1991, 1994), Poland (1986, 1992, 1995), Russia (1992, 1995), Spain (1980, 1990).

⁶Countries included in the analysis are: Australia, Belgium, Brazil, Canada, Czech Republic, Denmark, Finland, France, Germany, Guatemala, Ireland, Israel, Luxembourg, Netherlands, Norway, Poland, Romania, Slovak Republic, South Korea, Sweden, Switzerland, Taiwan, United Kingdom, United States.

⁷Available at <http://pwt.econ.upenn.edu/index.html>.

⁸As a robustness check, all the results are qualitatively unchanged if the Penn World Table data are replaced by analogous series provided by OECD statistic office (<http://stats.oecd.org/Index.aspx>). Results are not shown in Appendix, but I can provide them on request.

⁹<http://laborsta.ilo.org/>

homogeneous is the set of labor force surveys, considering general unemployment among individuals aged 15 years and over since 1969.¹⁰

Third, political variables are taken from the Database of Political Institutions, edited by the World Bank Development Research Group [4]. Variables *Government center* and *Government left* are two dummies taking value 1 if a country is ruled by a government with a centrist (left) orientation. Right governments are the reference group and the relative dummy is dropped due to perfect collinearity. *Proportional representation* is a dummy indicating whether candidates are elected according to the number of votes obtained by their parties (value 1), versus a plurality system. *Political fragmentation* is the probability that two randomly picked deputies belong to different parties, while *Presidential system* takes value 1 for countries where the system is presidential versus parliamentary (reference group).

Fourth, variables about democracy originate from Polity iv project [17], that classifies all countries on a scale from 0 to 10 (variable *Democracy index*), according to the criteria listed in Marshall and Jaggers [17, p. 12]. From this variable, I generated a dummy (*Democracy dummy*) taking value 1 if *Democracy* is higher than 7, in order to split the sample. Since the majority of observations take value 10, however, the results are robust to different breakpoints. Moreover, results are also robust with respect to the tenure of the system. Considering the persistence of democracy (*Democracy persistence*, taking value 1 if the country is classified as democratic in the last ten years) in the previous decade instead of the contemporaneous level does not affect the results.

Finally, the most innovative and complex data source regards the inequality and redistribution variables. Luxembourg Income Study [16] releases 164 *micro*-level datasets about 36 countries over a time span of 40 years, from 1967 to 2006. Unfortunately, only for a subgroup of these, which is 104 observations, is it possible to compute both gross and net income at the individual level.¹¹

The primary strength of the LIS dataset is that it allows the computation of both *ex-ante* and *ex-post* income at individual level.¹² This enables the direct observation of the amount of cash redistribution implemented toward every single individual in the income distribution and to aggregate them freely.

The first step to undertake before constructing a synthetic inequality index is to accurately state the definitions of income. Analogous to the paper by Milanovic [19, p. 373, footnote 7], I define *market income*, or *ex-ante income*, as the sum of earnings from any source of income and pensions, and *disposable income*, or *ex-post income*,

¹⁰ Apart from one case (Czechoslovakia in 1992, whose data come from official records) the following codes can be used to retrieve data from the LABORSTA dataset: Code Source: BA (Labour force survey); Code Subject: 3A (Unemployment); Code Worker Coverage: 31 (Total unemployment); Code Sex 3R (Rates, total); Code Table: 3A (Unemployment, general level).

¹¹ The detailed list of datasets can be found at <http://www.lisproject.org/techdoc/datasets.htm>. 52 of 164 datasets do not include information on gross income, while 8 observations are dropped because of some problem on the variables generation.

¹² To be precise, the datasets correctly include household incomes. In order to account for individuals, I standardize the variable by dividing household income for the square root of the components. This is a frequent standardization methodology, since households are supposed to experience “scale economies” increasing with the household membership.

as the sum of *market income* plus all the social transfers, minus all income taxes and pension contributions.¹³

With the measures of income defined, I constructed several indices. First, in order to test for the “redistribution hypotheses”, I aggregated market incomes in *ex-ante* or *market Gini* and disposable incomes in *ex-post* or *disposable Gini* (see Table 2). The difference in percentage term is what I call *Redistribution*.¹⁴ Second, to test for the “median voter hypotheses”, I first generate redistribution, or *share gain* at personal levels as the difference between disposable and market income, and then aggregate market income, disposable income, and *share gains* by deciles, ordering individuals according to their market incomes in order to take into account possible re-ranking effects. Resulting values are always measured as shares of GDP. Moreover, building on the ten deciles, I define market and disposable incomes and share gains for the median voter as the sum of deciles 5 and 6 (that is the third quintile, analogous to the definition of Persson and Tabellini [24] and Milanovic [19]) and for the poorer voter as the sum of the first two deciles. Finally, as a measure of polarization, I created two ratios: tenth decile over third quintile and tenth decile over first quintile, in order to get the distance between the richest individuals and the median voter or very poor, respectively. Summary statistics for all the variables are included in Table 1.

4 Empirical analysis

The present section is devoted to describing the empirical strategy adopted to test the two hypotheses described above, given the availability of data analyzed in the previous section. In general, what the following models test is the connection between an inequality index and the relative redistribution measure. With respect to econometric methodology, the panel nature of the sample would suggest to implement a “time invariant unobserved heterogeneity” model, following Milanovic [19], that allows the study to deal with unobservable institutional and political characteristics of every single country. However, the relative small number of observations and the very unbalanced path of the sample, could raise doubt regarding the results. The alternative model is an OLS, implemented by all the literature prior to Milanovic [19]. This model disregards all the panel dimension of the sample by treating the observations as if they originate from different countries. In the following, I report and comment only on results from the more theoretically appropriate “time invariant unobserved heterogeneity”, or FE model. However, results from OLS are perfectly analogous and available on request.

A second issue regards the missing values. By adding the set of controls described above, the number of observations is reduced to 79 country/years. In order to test if results are somehow driven by observations not included due to a missing value, I run

¹³Using LIS notation in the “Definition of summary income variables”: *market income* = MI + PRIVATEI + v19, analogous to *factor P income* in Milanovic [19], *disposable income* = MI + PRIVATEI + SOCTRANS – PAYROLL – v11, where v11 are income taxes.

¹⁴The exact definition of redistribution is

$$\text{Redistribution} = -\Delta\% \text{Gini} = -\frac{\text{Gini}_{\text{ex-post}} - \text{Gini}_{\text{ex-ante}}}{\text{Gini}_{\text{ex-ante}}} \quad (1)$$

that is therefore always positive, since *Gini ex-post* is always lower than respective *Gini ex-ante*.

analogous regressions considering only inequality and redistribution measures from the complete sample of LIS data. Also in this case, there are no significant differences from the fe model with controls, but I report the results for comparability purpose to Milanovic [19], which includes the same specification without controls.

4.1 Empirical strategy

The models tested in this paper can be generically summarized by the following:

$$R_{it} = \alpha + \beta I_{it} + \gamma C_{it} + \delta T_i + u_i + \epsilon_{it} \quad (2)$$

where R is a measure of redistribution, I is an inequality index, C is a set of economic and political controls, T are the seven time dummies, considering periods after 1973,¹⁵ and u_i is the time invariant heterogeneity term. In the following I consider several specifications of the general model above, each one focusing on a different aspect of the problem.

The first relates overall inequality and overall redistribution, disregarding the middle class, testing the “redistribution hypothesis” [20]. Opposite to Persson and Tabellini [24] and Alesina and Rodrik [3], the present model includes a measure for redistribution, which is the relative change of the Gini index after the fiscal transfers and it can directly investigate the nexus between inequality and redistribution:

$$\text{Redistribution}_{it} = \alpha + \beta \text{Gini}_{ex-ante,it} + \gamma C_{it} + \delta T_i + u_i + \epsilon_{it} \quad (3)$$

The expected sign for β is positive, as suggested by virtually all the known literature.

The second set of models aims at testing the role of the median voter in the redistributive process (“median voter hypothesis”). Like Persson and Tabellini [24], the dependent variable is the amount of net transfers received by the middle class; the regressor is the amount of market income earned by the middle class, as introduced by Milanovic [19]. According to the median voter theorem, the expected sign is negative, suggesting that a poorer median voter should receive a higher amount of transfers—or pay a lower amount of taxes. In addition to the middle class, I tested the same relationship also for other classes of income, focusing on the poorest quintile in order to compare the redistributive propensity of policy makers to classes different from the median voter. For the same comparative reasons, I also ran the same regressions for every decile in the population. The models can be all summarized as:

$$\text{ShareGain}_{d,it} = \alpha + \beta \text{Income}_{d,it} + \gamma C_{it} + \delta T_i + u_i + \epsilon_{it} \quad (4)$$

where d is referred to several classes of population: every decile from 1 to 10, the first quintile and the third quintile (“middle class”, or “median voter”).

The third class of models aims at testing the asymmetry of political power as a consequence of asymmetry of income distribution. The link between the two

¹⁵Because of the small number of observations, many yearly dummies would have a too low variability, or even be constant. The sign of these dummies would not be driven by the genuine “time effect”, but by some unobserved feature of the countries that happened to be observed in that specific year. By aggregating time dummies in seven periods (1973–1977 to 2003–2007) it is possible to consider the time effects without generating such meaningless variables.

asymmetries is treated by several papers, either as an assumption (see Bourguignon and Verdier [7]) or as a result of a political-economic process [26]. From an empirical perspective, this strategy consists of adding a decile ratio as the regressor, with the distance between the top decile and the middle class, or the poorest quintile, as a good proxy for the asymmetry of income distribution. The expected sign of its coefficient depends on the theoretical model being used. Under the median voter theorem perspective, the distance between the rich tail of the distribution and the median voter should increase the redistribution toward the median voter, since she is more willing to expropriate a very rich minority. On the other side, if we assume that political power is biased toward the richer classes, the power of the median voter is reduced and the redistribution she gets is unaffected by her relative position, or even negative. Analogous relationships can be assumed for poorer classes. The only modification with respect to the previous model is highlighted in the following:

$$\text{ShareGain}_{q,it} = \alpha + \beta \text{Income}_{q,it} + \zeta \text{Ratio}_{90/q,it} + \gamma C_{it} + \delta T_i + u_i + \epsilon_{it} \quad (5)$$

where $\text{Ratio}_{90/q,it}$ is a polarization term and q is either the third or the first quintile of the population. In addition to regressions analogous to Milanovic [19], Tables 6 and 7 show one model including only the polarization index, one also including the income level.¹⁶

4.2 Results

This section is devoted to the presentation and comments on the results of the regressions. In the following I refer to models described in the previous sections, while all the tables are included in [Appendix](#). The relationship between overall pre-tax inequality and overall redistribution is positive and significant in all formulations (Table 3). Redistribution hypothesis seems to be confirmed and there is evidence of the positive relationship predicted by the literature. This relationship, however, does not give any indication on the shape of the distribution, the position of the median voter, or on the recipients of fiscal redistribution. What we can infer from this is that the more unequal countries (according to the definition of Gini) implement a relatively higher reduction of inequality through cash redistribution. With respect to the controls, the only significant coefficients are the dummies for the proportional representation and presidential system. According to the literature, proportional rules and parliamentary systems give an incentive to the creation and proliferation of political parties that can influence the bargaining power of ethnic/local/minorities interests. Finally, there are no significant time trends, being that all the period dummies are not significant.

Tables 4 and 5 show regressions linking market income to redistribution for two classes of individuals, the middle class and poorest quintile of population. At a first glance, regressions relative to the middle class (Table 4) seem to support the median voter theorem, since coefficients of interest are always negative and significant. The only comparable result in the literature is Milanovic [19], which reaches the

¹⁶I was advised by an anonymous referee to include also the interacted term $\text{Income}_{q,it} * \text{Ratio}_{90/q,it}$ to control for different effects of polarization at different levels of median voter's income. However, since it is poorly significant possibly due to high correlation to other variables, it is not shown in the results.

conclusions that coefficients are higher in absolute value, but the model is not significant, leading the author to conclude that “the middle classes’ gain or loss in redistribution is independent of the initial “factor” distribution. This is explained by the fact that middle classes receive little in the form of non-pension cash transfers such as unemployment benefits, social assistance and even family allowances. Thus, the median voter hypothesis fails when we focus on the truly redistributive transfers only.” [19, p. 394].

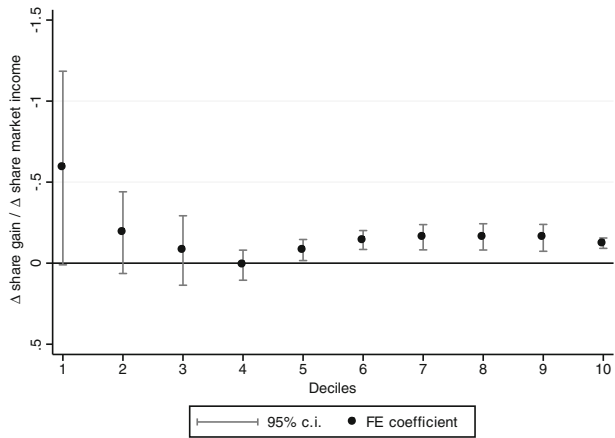
Regressions from the improved dataset I use in this paper lead to opposite results which show that even if the effect is weaker, the amount of market income is significant in explaining the level of cash redistribution to the middle class, both with and without controls. Moreover, time trends show a clear and steady reduction in the level of redistribution to the median voter. Differing from the conclusions reached by Persson and Tabellini [24], the dummy *democracy* is never significant and there is no difference between the whole sample and the group of democratic countries.¹⁷ On the one side, the pure effect of income on redistribution supports the “median voter hypothesis”, since poorer middle classes receive more cash transfers. However, democracy effects are never significant while, according to the theory, there should be some effect since the median voter theorem should apply only in democracies. The time trend is significant, suggesting a kind of declining power of the middle class, with the net transfers to the middle class being negative in 16 cases over 104, meaning that the median voter is a net loser from redistribution process in almost 15% of the cases. Moreover, the average gain of the middle class is .59% of total income and 3.86% of their market income. The same figures for the poorest half of the population are 6.49 and 32.21%.

In order to investigate whether and how middle class is different from other classes, I focus on the poorest tail of the population (Table 5). Results are much more similar to those by Milanovic [19], as the coefficients are negatively significant and higher (in absolute values) than those relative to the middle class. Opposite to the middle class, however, there are no significant time trends. Comparing results from these two classes of population, we find that the relationship between income and redistribution is much stronger for poorest classes of income rather than for the median voter. Moreover, while the “strength” of the middle class reduced over time, poorest classes did not experience a similar reduction. None of the regressions show significant changes between democratic and non democratic countries, and the *democracy* dummy is never significant. Therefore, the arguments that could lead us to support the effectiveness of the median voter theorem also apply entirely for classes of income different than just the middle one.

To summarize, Fig. 1 plots the coefficients of regressions linking market income of every single decile of population to the associated amount of redistribution. What emerges is that the effects of income on redistribution are somewhat u-shaped, being higher (but more variable) for the poorest classes and increasing from the fourth to the ninth decile. The most unexpected result is the weaker effect in correspondence of the poor and middle class, between the third and fifth deciles. This result is puzzling in the perspective of the median voter theories because not only does the

¹⁷Notice that the sample of non-democracies is made up by only 14 observations. Even though these are comparable to the 20 observations in Persson and Tabellini [24], they represent less than 15% of my sample, indicating to treat these differences with caution.

Fig. 1 Effects of market income on redistribution by decile. Of course, every decile can be on average either net transfer recipient or net tax payer, but lower income is always associated to more favorable tax schemes



middle class benefit the least from the reduction of income, but the amount of net transfers they get is on average independent of the income they get.

The last class of models I test in this paper refers to the level of income asymmetry, in order to shed some light on the possible reasons why the effectiveness of the median voter is not confirmed by empirical estimates. Income polarization can foster two phenomena: first, it can amplify the distance between the preferences of the top class with respect to other individuals and second, it could cause a more asymmetric political power, as theoretically modeled by many scholars, among which Bénabou [5], Bourguignon and Verdier [7], Acemoglu and Robinson [2], Scervini [26], in contrast to the median voter theorem.¹⁸ If these two hypotheses are true, we should expect that if rich tails of distribution are very far from the middle or poorest classes in terms of income, and that this can increase their *de facto* political power, then more polarized societies should experience a lower level of redistribution toward poorer classes. Results are shown in Tables 6 and 7. Models are identical to the previous ones, apart from a term that captures the ratio between the share of income of the top decile to the share of income for the middle class and the poorest quintile.

Results are, again, in strong contrast to the predictions of the median voter theorem. Indeed, the effect of the distance between rich and middle classes on redistribution targeted to the middle classes is *negative*, meaning that, keeping fixed the share of income, the further the median voter is from the richest individuals, the lower redistribution she gets. This result is very difficult to explain in a classical median voter theorem, but much easier to reconcile under the perspective of asymmetry of political power. Whatever the reason, richest individuals hold more power relatively to other classes and, therefore, can set a tax scheme targeted more for their own interests. The wider the distance between them and the middle class, the more different their preferences, and the less redistribution the middle class receives.

¹⁸Models that refer to the middle class as a decisive agent in the political process predict that the richer are richest classes with respect to the middle class, the stronger are the incentives for it to “expropriate” the very rich individuals through a tax scheme very biases in their favor.

This argument does not seem to apply for the poorest individuals in the population, however. In this case, the distance between the two tails of the population is not significant in explaining the amount of redistribution the poorest individuals receive. Opposite to the previous case, this can be explained by referring to several models. First, Galor and Zeira [12] and Saint-Paul and Verdier [25] give some incentives to rich individuals to redistribute in favor of the poorest individuals, in order to make the whole economy grow faster. Second, Acemoglu and Robinson [1] state that the richest classes could implement a method of redistribution in order to avoid threats of revolutions and social conflicts. Third, there could be ethic reasons driving redistributive choices in favor of the very low income individuals. What is relevant for this paper, however, is that once again the median voter seems not to play any special role in the redistribution setting. Summarizing, the redistribution hypothesis is confirmed by the data, while median voter hypothesis seems much more questionable when tested under our terms.

5 Conclusions

This paper builds on existing research to investigate the role of the median voter in the redistribution process. With respect to the previous literature, it uses a larger, high-quality dataset to test models including appropriate variables (market and disposable income shares and Gini indices, detailed redistribution measures, deciles, and quintiles ratios) and a set of political and economic controls.

The results are twofold: firstly, the paper confirms the positive relation between inequality and redistribution. Secondly, focusing on the median voter, there are several reasons that lead us to reject, or at least question, its role in the redistributive decision process. First, the amount of cash transfers the median voter receives decreases steadily over time, while poorer classes do not experience a similar decline in cash transfers. Second, the level of democracy is not significant in explaining the amount of redistribution and there are no relevant differences if we only consider the sub sample of democratic countries. Third, the quantitative effect of income on redistribution relative to the middle class is lower than that referred to not only the poorer individuals, but also to the richer ones. Indeed, the lowest coefficients are for poor/middle deciles (third to fifth). Fourth, the farther is the middle class from the richest group, the less redistribution it gets, opposite to the incentives to redistribution, or “expropriation”, that the middle class is expected to practice.

To summarize, if one is ready to assume that a negative relation between inequality and redistribution is sufficient evidence in support of the median voter theorem, then it is confirmed. However, if one analyzes in more detail the characteristics of the middle class and its difference with respect to the rest of the population, the role of the median voter is much more questionable. Although some results could give evidence of an influential role of the middle class, many others go in the opposite direction, suggesting that mechanisms different from those envisaged by the median voter theorem are effective in explaining the amount of redistribution and its recipients.

Even if this paper represents an improvement on the previous empirical literature, a lot of issues remain open and require further investigations, particularly an investigation regarding non-cash redistribution. It is possible that redistribution takes the form of in-kind public provision (see for instance Epple and Romano [10]). In

this case, the amount of redistribution is underestimated, not only in the present paper, but by virtually all of the cross country comparisons. Indeed, if it is sometimes possible to account for in-kind redistribution for a single country case study, it is a very hard task to compare how different classes of income, in different countries, are affected by different in-kind redistributive schemes. A second issue in the investigations is the low sample size. The quality of LIS data is much higher than any other dataset, but unfortunately only a relatively small number of countries participate in that project, and there is very little variability in their economic and political development level. Examining this aspect could also help clarify the effects of the political framework on the level of redistribution, possibly increasing the significance of the political related variables.

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Appendix: Tables

Table 1 Summary statistics

Variable	Mean	Std. dev.	Min.	Max.	N
Penn world table					
Per capita GDP (PPP, US \$, 2005)	23568.026	8948.653	5894.314	68390.357	104
GDP growth	2.344	2.828	-8.973	10.164	104
International Labour Organization (LABORSTA)					
Unemployment rate	6.437	3.410	1.36	19	88
Polity IV					
Democracy index	9.433	1.717	0	10	104
Democracy dummy	0.952	0.215	0	1	104
Democracy index (10 years lag)	8.721	3.000	0	10	104
Democracy persistence (10 years)	0.865	0.343	0	1	104
World Bank database of political institution					
Proportional representation	0.734	0.444	0	1	94
Political fragmentation	0.670	0.158	0	0.884	96
Government right	0.442	0.499	0	1	104
Government left	0.356	0.481	0	1	104
Government center	0.058	0.234	0	1	104
Presidential system	0.177	0.384	0	1	96
Elaborations from Luxembourg income study					
Gini index (market income)	0.391	0.056	0.28	0.561	104
Gini index (disposable income)	0.304	0.052	0.203	0.541	104
Gini redistribution	0.219	0.098	0.019	0.441	104
Factor income, decile 1	0.009	0.01	0	0.039	104
Factor income, decile 2	0.03	0.012	0.002	0.061	104
Factor income, decile 3	0.046	0.011	0.009	0.074	104

Table 1 (continued)

Variable	Mean	Std. Dev.	Min.	Max.	N
Factor income, decile 4	0.061	0.01	0.025	0.081	104
Factor income, decile 5	0.077	0.009	0.036	0.094	104
Factor income, decile 6	0.091	0.01	0.045	0.109	104
Factor income, decile 7	0.109	0.011	0.054	0.126	104
Factor income, decile 8	0.13	0.014	0.062	0.152	104
Factor income, decile 9	0.161	0.015	0.08	0.202	104
Factor income, decile 10	0.286	0.07	0.194	0.692	104
Disposable income, decile 1	0.035	0.013	0.004	0.089	104
Disposable income, decile 2	0.045	0.011	0.016	0.071	104
Disposable income, decile 3	0.057	0.009	0.032	0.079	104
Disposable income, decile 4	0.069	0.009	0.038	0.085	104
Disposable income, decile 5	0.081	0.008	0.042	0.096	104
Disposable income, decile 6	0.092	0.009	0.049	0.111	104
Disposable income, decile 7	0.106	0.009	0.056	0.121	104
Disposable income, decile 8	0.123	0.011	0.061	0.146	104
Disposable income, decile 9	0.147	0.012	0.076	0.172	104
Disposable income, decile 10	0.243	0.06	0.163	0.599	104
Share gain, decile 1	0.026	0.016	0.001	0.089	104
Share gain, decile 2	0.015	0.009	0.001	0.036	104
Share gain, decile 3	0.011	0.006	0	0.031	104
Share gain, decile 4	0.008	0.004	0	0.019	104
Share gain, decile 5	0.005	0.003	-0.005	0.015	104
Share gain, decile 6	0.001	0.004	-0.008	0.011	104
Share gain, decile 7	-0.003	0.005	-0.015	0.007	104
Share gain, decile 8	-0.007	0.006	-0.022	0.006	104
Share gain, decile 9	-0.014	0.008	-0.032	0.005	104
Share gain, decile 10	-0.042	0.02	-0.098	-0.004	104
Factor inc., q3 (middle class)	0.168	0.019	0.081	0.199	104
Factor inc., q1 (poorest quintile)	0.039	0.021	-0.003	0.094	104
Factor inc., d10/q3 ratio	1.792	0.899	0.991	8.584	104
Factor inc., d10/q1 ratio	9.960	7.874	2.414	55.923	104
Share gain, q3 (middle class)	0.006	0.006	-0.013	0.026	104
Share gain, q1 (poorest quintile)	0.041	0.024	0.002	0.108	104

Table 2 Gini indices

	Country	Year	Market income Gini index	Disposable income Gini index
1	Taiwan	1981	28.02	27.48
2	Taiwan	1986	28.77	28.02
3	Taiwan	1991	29.75	28.82
4	Czech Republic	1992	29.86	22.04
5	Slovak Republic	1992	30.26	20.25
6	Switzerland	2004	30.32	28.34
7	Switzerland	2002	30.49	28.44
8	Taiwan	1995	31.05	29.52
9	Switzerland	2000	31.45	29.86
10	Romania	1997	31.63	28.56
11	Sweden	1981	31.65	21.10

Table 2 (continued)

	Country	Year	Market income Gini index	Disposable income Gini index
12	Taiwan	1997	32.18	30.52
13	Finland	1987	32.48	23.16
14	Romania	1995	32.65	29.28
15	Finland	1991	32.76	23.51
16	Sweden	1987	32.81	25.02
17	Germany	1981	33.00	25.78
18	Taiwan	2000	33.07	31.00
19	Taiwan	2005	33.07	31.00
20	Germany	1983	33.23	28.01
21	Germany	1978	33.36	28.33
22	United Kingdom	1974	33.47	29.14
23	United Kingdom	1969	34.33	29.07
24	Sweden	1975	34.46	24.13
25	Norway	1991	34.55	25.46
26	Netherlands	1999	34.60	24.47
27	Germany	1989	35.26	27.56
28	Czech Republic	1996	35.41	27.16
29	South Korea	2006	35.83	33.95
30	Switzerland	1992	36.12	33.76
31	Luxembourg	2004	36.12	27.79
32	Belgium	1992	36.49	24.39
33	Sweden	1992	36.50	25.65
34	Canada	1981	37.05	30.84
35	Norway	1995	37.10	26.64
36	Canada	1987	37.19	29.90
37	United Kingdom	1979	37.19	28.72
38	Germany	1984	37.34	29.67
39	Poland	1999	37.50	29.67
40	Switzerland	1982	37.72	34.16
41	France	1979	38.00	30.73
42	Sweden	2005	38.15	25.38
43	France	1984	38.26	30.67
44	Germany	1994	38.27	28.95
45	Canada	1975	38.30	32.17
46	Finland	1995	38.34	23.76
47	Norway	2000	38.63	27.99
48	Denmark	2000	38.69	24.76
49	Canada	1991	38.75	29.63
50	Netherlands	1991	38.79	29.10
51	Australia	1981	38.97	29.94
52	United States	1969	39.00	37.55
53	Sweden	1995	39.08	24.74
54	Denmark	2004	39.09	25.09
55	Denmark	1995	39.33	24.24
56	Belgium	1997	39.38	26.71
57	Germany	2000	39.40	29.34
58	Canada	1997	39.44	30.66
59	United States	1974	39.52	33.78
60	Poland	2004	39.55	32.51
61	Canada	1994	39.65	29.91

Table 2 (continued)

	Country	Year	Market income Gini index	Disposable income Gini index
62	Denmark	1987	39.75	28.81
63	United States	1979	39.81	32.09
64	Netherlands	1994	39.85	29.15
65	Sweden	2000	40.21	27.35
66	Israel	1979	40.30	32.40
67	Australia	1985	40.87	31.08
68	Finland	2000	40.98	26.96
69	United States	1986	41.14	34.69
70	Finland	2004	41.33	28.36
71	Canada	1971	41.37	36.07
72	Canada	2004	41.38	33.44
73	Canada	2000	41.48	33.25
74	United States	1991	41.72	35.20
75	Israel	1986	41.85	31.75
76	Denmark	1992	42.07	26.89
77	Netherlands	1983	42.26	28.59
78	Norway	2004	42.37	30.12
79	Germany	1973	42.51	28.99
80	Sweden	1967	42.82	36.27
81	Canada	1998	42.98	33.44
82	Norway	1986	43.03	25.79
83	Israel	1992	43.03	32.43
84	Australia	1989	43.06	32.25
85	Netherlands	1987	43.20	26.66
86	United Kingdom	1986	44.61	31.58
87	United States	1996	44.99	38.33
88	Norway	1979	45.15	25.25
89	United States	2000	45.58	38.25
90	United Kingdom	1991	45.87	34.52
91	Australia	2003	46.15	33.87
92	United States	2004	46.51	39.21
93	Australia	1995	46.70	33.66
94	Israel	1997	46.77	35.68
95	Australia	2001	46.90	34.01
96	Israel	2005	47.08	37.90
97	United Kingdom	2004	47.56	36.81
98	United Kingdom	1995	47.62	34.90
99	United Kingdom	1999	48.30	37.28
100	United Kingdom	1994	48.34	35.83
101	Israel	2001	48.42	36.19
102	Ireland	1987	51.69	35.00
103	Brazil	2006	54.52	50.65
104	Guatemala	2006	56.10	54.15

Table 3 Dep.var.: redistribution

	All countries		Democracies	
	(1)	(2)	(3)	(4)
Market income	0.585***	0.790***	0.601***	0.833***
Gini index	(0.164)	(0.260)	(0.171)	(0.258)
Per capita GDP		-0.000		-0.000
		(0.000)		(0.000)
GDP growth		-0.001		-0.002
		(0.001)		(0.001)
Unemployment rate		0.004		0.004
		(0.003)		(0.004)
Democracy dummy		0.018		-
		(0.017)		-
Government center		0.017		0.014
		(0.019)		(0.021)
Government left		0.005		0.003
		(0.009)		(0.009)
Proportional representation		0.129*		-
		(0.063)		-
Political fragmentation		-0.116		-0.069
		(0.096)		(0.105)
Presidential system		-0.028**		-0.046***
		(0.013)		(0.014)
1978–1982		0.016		0.013
		(0.011)		(0.011)
1983–1987		-0.002		0.001
		(0.021)		(0.022)
1988–1992		-0.003		-0.004
		(0.019)		(0.021)
1993–1997		0.005		0.015
		(0.023)		(0.026)
1998–2002		0.022		0.029
		(0.031)		(0.035)
2003–2007		0.012		0.023
		(0.037)		(0.039)
Constant	-0.010	-0.062	-0.006	0.052
	(0.064)	(0.080)	(0.069)	(0.115)
F-test	12.722***	10.549***	12.371***	26.364***
R-squared	0.210	0.559	0.216	0.592
Obs.	104	83	90	72

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Country-level clustered standard errors in parenthesis

Table 4 Dep.var.: fiscal gain (median voter)

	All countries		Democracies	
	(1)	(2)	(3)	(4)
Market income (median voter)	-0.121*** (0.038)	-0.117*** (0.019)	-0.124*** (0.040)	-0.119*** (0.020)
Per capita GDP		0.000 (0.000)		0.000 (0.000)
GDP growth		-0.000 (0.000)		-0.000 (0.000)
Unemployment rate		-0.000 (0.000)		-0.000 (0.000)
Democracy dummy		-0.001 (0.001)		- -
Government center		0.002 (0.003)		0.002 (0.003)
Government left		0.000 (0.001)		0.000 (0.001)
Proportional representation		-0.011** (0.004)		- -
Political fragmentation		0.011 (0.007)		0.015 (0.008)
Presidential system		0.000 (0.001)		-0.000 (0.002)
1978–1982		-0.019*** (0.001)		-0.019*** (0.001)
1983–1987		-0.018*** (0.001)		-0.018*** (0.002)
1988–1992		-0.018*** (0.002)		-0.018*** (0.002)
1993–1997		-0.018*** (0.003)		-0.017*** (0.004)
1998–2002		-0.019*** (0.004)		-0.019*** (0.005)
2003–2007		-0.022*** (0.005)		-0.021*** (0.006)
Constant	0.026*** (0.006)	0.040*** (0.005)	0.027*** (0.007)	0.030** (0.011)
F-test	10.003***	14.175***	9.614***	11.324***
R-squared	0.105	0.624	0.109	0.635
Obs.	104	83	90	72

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Country-level clustered standard errors in parenthesis

The hypothesis that period dummies are jointly equal is rejected at 5% level

Table 5 Dep.var.: fiscal gain (poorest quintile)

	All countries		Democracies	
	(1)	(2)	(3)	(4)
Market income (poorest quintile)	-0.636*** (0.198)	-0.571* (0.297)	-0.664*** (0.214)	-0.568* (0.315)
Per capita GDP		0.000** (0.000)		0.000** (0.000)
GDP growth		-0.001 (0.001)		-0.001 (0.001)
Unemployment rate		0.002* (0.001)		0.003* (0.001)
Democracy dummy		-0.004 (0.004)		- -
Government center		0.008 (0.006)		0.008 (0.006)
Government left		0.001 (0.003)		0.001 (0.004)
Proportional representation		0.022 (0.013)		- -
Political fragmentation		-0.055* (0.027)		-0.059 (0.036)
Presidential system		-0.001 (0.003)		-0.001 (0.006)
1978-1982		0.010*** (0.002)		0.010*** (0.002)
1983-1987		0.003 (0.007)		0.002 (0.007)
1988-1992		-0.006 (0.007)		-0.007 (0.007)
1993-1997		-0.006 (0.009)		-0.008 (0.010)
1998-2002		-0.011 (0.009)		-0.014 (0.011)
2003-2007		-0.017 (0.011)		-0.019 (0.012)
Constant	0.066*** (0.008)	0.032 (0.025)	0.067*** (0.007)	0.038 (0.036)
F-test	10.384***	73.112***	9.625***	17.613***
R-squared	0.318	0.421	0.317	0.435
Obs.	104	83	90	72

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Country-level clustered standard errors in parenthesis

Table 6 Dep.var.: Fiscal Gain (Median voter)

	All countries			Democracies		
	(1)	(2)	(3)	(4)	(5)	(6)
Ratio very rich/ median voter	-0.300 (0.198)	0.157*** (0.032)	-0.195*** (0.050)	-0.311 (0.205)	0.163*** (0.035)	-0.214*** (0.060)
Market income (median voter)	-0.284* (0.144)		-0.229*** (0.040)	-0.294* (0.150)		-0.243*** (0.042)
Per capita GDP		0.000 (0.000)	0.000 (0.000)		0.000 (0.000)	-0.000 (0.000)
GDP growth		-0.000 (0.000)	-0.000 (0.000)		0.000 (0.000)	-0.000 (0.000)
Unemployment rate		-0.000 (0.000)	-0.000 (0.000)		-0.000 (0.000)	-0.000 (0.000)
Democracy dummy		-0.002 (0.002)	-0.001 (0.001)		- -	- -
Government center		0.003 (0.003)	0.001 (0.002)		0.003 (0.003)	0.001 (0.002)
Government left		0.001 (0.001)	0.000 (0.001)		0.001 (0.001)	-0.000 (0.001)
Proportional representation		-0.014*** (0.004)	-0.006* (0.004)		- -	- -
Political fragmentation		0.016** (0.007)	0.005 (0.007)		0.021** (0.008)	0.007 (0.008)
Presidential system		0.000 (0.001)	0.000 (0.001)		0.000 (0.002)	-0.000 (0.002)
Constant	0.059** (0.028)	0.015* (0.007)	0.066*** (0.008)	0.062** (0.029)	-0.001 (0.014)	0.065*** (0.016)
Time dummies	No	Yes	Yes	No	Yes	Yes
R-squared	0.158	0.582	0.639	0.164	0.594	0.651
F-test	8.539***	9.572***	97.095***	9.234***	8.700***	61.103***
Obs.	104	83	83	90	72	72

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Country-level clustered standard errors in parenthesis

Table 7 Dep.var.: fiscal gain (poorest quintile)

	All countries			Democracies		
	(1)	(2)	(3)	(4)	(5)	(6)
Ratio very rich/ poorest quintile	0.003* (0.002)	-0.001 (0.002)	0.001 (0.003)	0.003* (0.002)	-0.001 (0.002)	0.001 (0.003)
Market income (poorest quintile)	-0.638*** (0.199)		-0.575* (0.314)	-0.666*** (0.216)		-0.572 (0.331)
Per capita GDP		0.000 (0.000)	0.000** (0.000)		0.000 (0.000)	0.000** (0.000)
GDP growth		-0.001 (0.001)	-0.001 (0.001)		-0.001 (0.001)	-0.001 (0.001)
Unemployment rate		0.002 (0.002)	0.002* (0.001)		0.003 (0.002)	0.003* (0.001)
Democracy dummy		0.000 (0.007)	-0.004 (0.004)		- -	- -
Government center		0.001 (0.002)	0.008 (0.006)		-0.000 (0.002)	0.008 (0.006)
Government left		-0.002 (0.005)	0.001 (0.003)		-0.001 (0.005)	0.001 (0.003)
Proportional representation		0.032** (0.015)	0.023 (0.014)		- -	- -
Political fragmentation		-0.046* (0.026)	-0.056* (0.029)		-0.055 (0.036)	-0.060 (0.040)
Presidential system		-0.002 (0.003)	-0.001 (0.003)		-0.004 (0.005)	-0.001 (0.006)
Constant	0.066*** (0.008)	0.017 (0.029)	0.033 (0.028)	0.067*** (0.007)	0.050 (0.055)	0.040 (0.043)
Time dummies	No	Yes	Yes	No	Yes	Yes
R-squared	0.322	0.290	0.422	0.322	0.306	0.435
F-test	5.539**	6.696***	120.111***	5.122**	10.654***	16.131***
Obs.	104	83	83	90	72	72

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Country-level clustered standard errors in parenthesis

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