

Redistribution in a Model of Voting and Campaign Contributions*

Filipe R. Campante[†]
Harvard University

Abstract

I propose a framework in which individual political participation is endogenous and can take two distinct forms, voting and contributing resources to campaigns, in a context in which the negligible impact of any individual's actions on aggregate outcomes is fully recognized by all agents. I then use the framework to reassess the relationship between inequality and redistribution. The model shows that, even though each contribution has a negligible impact, the interaction between contributions and voting leads to an endogenous wealth bias in the political process, as the advantage of wealthier individuals in providing contributions encourages parties to move their platforms closer to those individuals' preferred positions. This mechanism can in turn explain why the standard median-voter-based prediction, that more inequality produces more redistribution, has received little empirical support: Higher inequality endogenously shifts the political system further in favor of the rich. In equilibrium, there is a non-monotonic relationship in which redistribution is initially increasing but eventually decreasing in inequality. The model also delivers a number of testable predictions on how inequality will affect political participation. I present empirical evidence supporting those predictions, and hence the mechanism proposed, using data on campaign contributions and voting from US presidential elections. In particular, inequality increases total contributions, and this effect goes only through contributions to the Republican Party; inequality also increases the share of contributions coming from relatively wealthy individuals.

Keywords: Inequality, Redistribution, Political Participation, Voting, Elections, Campaign Contributions, Wealth Bias.

JEL Classification: D31, D72, D78.

*I owe special thanks to Alberto Alesina, Andrei Shleifer, and Philippe Aghion for their many suggestions and overall guidance in this project. I also thank Jim Alt, Daniel Carvalho, Raj Chetty, Davin Chor, Alexandre Debs, Quoc-Anh Do, James Foster, Jeffrey Frieden, Bard Harstad, Navin Kartik, Michael Katz, Torsten Persson, Kartini Shastry, Kenneth Shepsle, and especially Alessandro Lizzeri for useful comments. Helpful comments from seminar participants at the NBER Political Economy Program meeting, the Economics and Government departments and the Kennedy School of Government at Harvard, EPGE-FGV, IIES, London Business School, PUC-Rio, Singapore Management University, UC Santa Cruz, UC San Diego, UW Madison, and Vanderbilt are also gratefully acknowledged. Last but not least, I thank Reza Baqir for kindly providing part of the data, and Jim Davis, from the Boston Census Research Data Center, for invaluable help with the data analysis. Needless to say, all remaining errors are my own.

[†]Contact: Harvard Kennedy School, Harvard University, 79 JFK St., Cambridge, MA 02138; email: filipe_campante@harvard.edu

1 Introduction

This paper proposes a model of politics based on two key elements: (i) Individuals' decisions on political participation are *endogenous*, and (ii) Their participation can take different forms, namely *voting* and *contributing* money to campaigns. Individual campaign contributions indisputably play a very important role in the political process – particularly in the US, where they make up 80 percent of campaign money – but the data reveal that the typical contribution is very small, around \$115. It is thus very unlikely that any contribution will be pivotal for the outcome, and as a result it is hardly appealing to think of individual contributions as buying favorable policies.¹ Based on this empirical observation, I start from the idea that individuals rationally recognize that both their individual vote and donation will almost certainly not be decisive. As a result, voting and contribution decisions are treated symmetrically, both being essentially driven by consumption motives. Contributions cannot influence outcomes directly; in the model, as in reality, votes are what wins elections. Contributions, as in reality, can be used to influence voting behavior, by paying for things that increase the likelihood that one's supporters will outnumber those of competitors in the polls – “get out the vote” operations, registration drives, advertisements (Rosenstone and Hansen 1996).

I build the framework by adding these cornerstones to a model in the spirit of Meltzer and Richard (1981), where individuals differ in their levels of initial wealth, and where redistribution is determined as the outcome of an electoral political process. Quite importantly, no inherent distinction in terms of political behavior is assumed to separate individuals with different wealth levels. My model nests the standard median-voter framework as a special case, in which contributions do not affect voters' turnout. In the general case, however, the presence of campaign contributions leads to an *endogenous* “wealth bias” in the political process, as the decisive agent whose preferences will prevail in equilibrium will be wealthier than the median. When contributions are important, parties are either forced or allowed (depending on the extent of office-seeking or ideological motives) to adopt platforms to attract the wealthy, in order to generate more contributions that can then be used to increase the turnout of the party's supporters relative to its opponent's. The presence of individual contributions thus endogenously shifts the political system in favor of the rich, even though such contributions are not pivotal and do not affect policy or electoral outcomes directly.

Focusing on a decision on redistribution enables me to apply the model to the particularly interesting question of the relationship between inequality and redistribution, which has presented an important and long-standing puzzle. The standard answer from the theoretical

¹See Ansolabehere, Figueiredo and Snyder (2003), and also the discussion in Section 2.

literature dealing with the topic, provided precisely by Meltzer and Richard (1981), predicts a positive effect of inequality on the level of redistribution in equilibrium.² This answer builds on a median-voter framework, in which higher levels of inequality – typically measured by the difference between mean and median income – translate into a poorer decisive agent in the political arena, who will then demand more redistribution. In light of its elegance and intuitive appeal, this result has been widely used in the literature ever since.³ Nevertheless, the basic message that has emerged from the empirical literature on the topic is that “it has been hard to find compelling empirical evidence supporting the predictions” of the standard framework linking inequality and redistribution (Persson and Tabellini, 2000, p. 52).⁴

My model is able to make sense of this puzzle, while maintaining the tractability that is a major strength of the median-voter framework. An increase in inequality will enhance the advantage of the rich in providing contributions, by shifting resources in their favor, and this will in turn lead the parties to move their platforms further closer to the preferred positions of wealthier individuals. As a result, the decisive agent will now be someone at a higher percentile in the wealth distribution: More inequality will have an effect of strengthening the wealth bias in the political system. In the context of redistribution, this will work in the opposite direction of the usual median voter effect that was highlighted above. When this new “endogenous decisive voter” effect is taken into account, a non-monotonic relationship emerges in equilibrium: Redistribution will be decreasing in inequality when inequality is high, and increasing in inequality at the opposite end of the spectrum.

The model also delivers a number of testable predictions on the mechanism through which inequality affects the political system when campaign contributions are important: Inequality increases the total amount of contributions, and the amount contributed by the rich relative to that of the poor; it has a positive impact on contributions amassed by the relatively anti-redistribution party, and a negative impact on those gathered by the relatively pro-redistribution party; and it reduces the turnout of the poor relative to that of the rich. The focus on individual campaign contributions in turn enables me to take advantage of the rich data available on such contributions in the US to test these specific predictions. I identify the impact of inequality off cross-county variation in the context of the 2000 US presidential election – under the assumption that, controlling for mean income, higher inequality in a county means that there are more resources in the hands of relatively wealthy individuals –

²Romer (1975) and Roberts (1977) contain some of the earlier insights within this approach.

³E.g. Alesina and Rodrik 1994, Persson and Tabellini 1994, Bolton and Roland 1997; see Persson and Tabellini 2000, ch. 6, for other examples.

⁴This is what is summarized, for instance, by Bénabou’s (1996) or Perotti’s (1996) surveys of the cross-country evidence on the relationship between inequality and redistribution. For some studies providing favorable evidence, see for instance Meltzer and Richard (1983) or Milanovic (2000).

and the predictions are indeed supported by the evidence. In particular, inequality increases total contributions, and this effect goes only through contributions to the Republican Party; inequality also increases the share of contributions coming from relatively wealthy individuals.

Since this paper focuses on endogenous political participation, it relates directly to the literature on the rational determinants of the decision to vote, although that literature has typically left aside the issue of contributions.⁵ Within the classification proposed by Blais (2000), my model combines the “citizen duty” approach (Riker and Ordeshook 1968), which emphasizes the utility value of the act of voting, and the “mobilization” approach (Aldrich 1993, Rosenstone and Hansen 1996), which focuses on politicians’ efforts to influence turnout.

This paper is also related to the literature on campaign contributions, which has pointed out that they can lead to departures from the median voter’s preferred policies, and from those of non-contributors to the benefit of contributors (e.g. Austen-Smith 1987, Grossman and Helpman 1996, Prat 2002, Coate 2004, Roemer 2006). While this literature focuses on campaign contributions by interest groups, modeled as an investment in “buying policy” or influencing outcomes, my model focuses on individual campaign contributions, which the data reveal to be far too small to be driven by a political *quid pro quo* involving the policy outcome, or by a calculation of their impact on that outcome. My model thus reconciles the existence of a wealth bias with this more realistic context in which individual contributions, in symmetry with voting, are not pivotal. Finally, this literature has not focused directly on the puzzle regarding the link between inequality and redistribution. On the empirical side of the literature, this paper is closely related to Gimpel, Lee and Kaminski (2006), who analyze contribution patterns to Republicans and Democrats across space. They do not focus on inequality, but their findings on how contributions to both parties are affected by the share of relatively wealthy households in the population are eminently consistent with my findings.

Another direct connection of the paper is to the large literature attempting to deal with this puzzle. The first explanation, in that literature, is to consider the very natural possibility that political influence is related to economic resources: inequality could fail to lead to more redistribution because the rich are disproportionately influential in the political arena.⁶ Many papers thus assume that the decisive agent is someone wealthier than the median, in light of the evidence that political participation is positively correlated with wealth and income,

⁵A long line of inquiry has dealt with rational voting – from Downs (1957) and Riker and Ordeshook (1968), through papers such as Ledyard (1984) and up to recent contributions such as Feddersen and Sandroni (2006) and Abrams, Iversen and Soskice (2006). For an overview, see Blais (2000) or Feddersen (2004).

⁶Glaeser (2005) also raises the possibility that reverse causality may be behind the empirical observation, as redistribution may reduce inequality. Bénabou (2000) explores the possibility of multiple equilibria raised by the interaction of these two avenues of causality. The identification issue raised will be addressed later in the empirical section of the paper.

which could easily lead to a reversion of the standard prediction (e.g. Bénabou 2000). In fact, a literature in political science has also stressed the relationship between inequality and political participation (e.g. Rosenstone and Hansen 1996, Lijphart 1997), and pointed out that this link could help reconcile the evidence on inequality and redistribution (Solt 2005, McCarty, Poole and Rosenthal 2006, Pontusson and Rueda 2006), although without providing a formal model of how this relationship would emerge.⁷ My model goes beyond this approach by proposing a clear mechanism through which economic resources translate into political influence – namely individual campaign contributions and their impact on voting – and thus generating that positive relationship endogenously, instead of assuming it in reduced form.⁸

A second approach linking economic resources and political influence has made a more direct connection with lobbying and campaign contributions, as in models such as Rodríguez (2004), where the lobbying power of the rich keeps redistribution in check by allowing them the possibility of buying political favors. It shares with the literature on contributions the difficulty in providing an empirical counterpart and in dealing with the non-pivotal nature of individual contributions. Others have tried to deal with the empirical difficulties of the standard model by departing more sharply from it. A non-exhaustive list of important examples involves multidimensional policy (Roemer 1998), the role of social mobility (Piketty 1995, Bénabou and Ok 2001), preferences over labor market regimes (Lee and Roemer 2005), the interaction of policy uncertainty and unequal access to insurance markets (Mattozzi 2005), information acquisition (Larcinese 2005), and multidimensional redistribution and differences between electoral systems (Iversen and Soskice 2006).⁹ Unlike this paper, none of these contributions focuses on endogenous political participation or on campaign contributions, and precisely due to their being starker departures, they are not able to keep the tractability and the intuitive appeal that are major strengths of the standard framework.

The remainder of the paper is organized as follows: Section 2 presents some background on campaign contributions, especially in the context of US politics; Section 3 introduces the model; Section 4 contains the empirical analysis; and Section 5 concludes.

⁷While the evidence linking income and different forms of political participation in the US is well established (Lijphart 1997), the American Political Science Association (APSA) Task Force on Inequality and American Democracy points out that “we know little about the connections between changing economic inequality and changes in political behavior.” (APSA, 2004, p. 661) McCarty, Poole and Rosenthal (2006) propose an informal explanation, for the specific case of the US, based on immigration – since immigrants are typically poorer and barred from many forms of political participation. While I do not focus on this issue, this mechanism can certainly be viewed as complementary to the one highlighted in the paper.

⁸In fact, a closer look at the data reveals that simply assuming that the rich participate in politics more than the poor is not satisfactory: There is a lot of cross-country variation in the relationship between income and participation, particularly voting, and in some countries such relationship is even negative (Verba, Nie and Kim 1978).

⁹For a recent survey, see Lind (2005).

2 Some Background on Campaign Contributions

I start by describing characteristics of campaign contributions and the existing literature on the topic. These characteristics help determine certain modeling decisions, and also provide some background for the empirical analysis that follows.

First, my analysis will focus on campaign contributions *by individuals*. In their survey on the role of money in US politics, Ansolabehere, Figueiredo and Snyder (2003) emphasize that such individual contributions are the most important kind of political contributions in the US, and hence should be the focus of research on the topic. Such contributions account for most of the money raised by parties and candidates, adding up to roughly 80 percent of the total of nearly \$3 billion raised in the 1999-2000 election cycle. They also correspond to the “marginal” dollar, in the sense that whenever candidates face the greatest need to increase their funds, they tend to pursue individual contributions disproportionately. In addition, as argued by McCarty, Poole and Rosenthal (2006, ch. 5), the relative importance of individual contributions has increased over time, since donations by political action committees (PACs) have been increasingly restricted.¹⁰

These contributions are typically very small, well below the legally imposed limits. My sample on individual contributions to candidates and national party committees in the 2000 US presidential elections has a median contribution of \$500 for candidate committees, where the legal limit was \$1,000, and \$300 for party committees, on which limits were \$20,000.¹¹ It is thus very unlikely that an individual contribution will affect outcomes. As a result, strategic motives for contributing, as in “buying policy”, are probably not the most appropriate way to think about these contributions. Besides the logical difficulty of explaining such small contributions as an investment, their very size is also a puzzle in this context: if so much is at stake in terms of the value of government policies, why are contributions so small?¹²

The political science literature has recognized this feature, which is akin to the well-known difficulties in explaining “rational” turnout (Aldrich 1993, Blais 2000). As a result, authors such as Ansolabehere, Figueiredo and Snyder (2003) or Poiré (2006) explicitly advocate an approach that recognizes that contributions should not be viewed as an investment only, but

¹⁰Limits on donations by PACs have been constant, even without inflation adjustment, since 1974 (McCarty, Poole and Rosenthal 2006, p. 145).

¹¹These numbers exclude the so-called “soft money”, which was still allowed in the 2000 election, and was not subject to any limit. Including “soft money”, the overall median is still \$500. More on these definitions will come later, in the data description.

¹²This is precisely the point Ansolabehere, Figueiredo and Snyder (2003) emphasize, turning popular perception on its head: why is there so *little* money in US politics? In addition, they show that other empirical predictions of such an approach – e.g., contributions should grow as the role of government in the economy expands – are not borne out by the data.

rather as a form of political participation which, just as most other forms (including voting), are largely driven by consumption motives. They also highlight the importance of individual income as a predictor of the likelihood and size of contributions. In addition, the evidence clearly suggests that contributions are mostly given by individuals who are particularly motivated with respect to politics. For instance, it is well understood that people who contribute money to politics are disproportionately likely to vote, and vice versa.¹³

Apart from the determinants and motivations behind individual contributions, a second question regards their uses: how do they influence outcomes? One possibility is that they are used to influence potential voters' opinions. Contributions could be used to fund political advertising that would convince some individuals to vote for a given party, when they would otherwise have voted for other parties. While this may well be part of the story, it is certainly not the only one, and quite possibly not the main one. Some argue that parties, "like political scientists, know that mobilization can increase participation, but it rarely changes preferences." (Rosenstone and Hansen 1996, p. 163)¹⁴ Whichever is the most important, the indisputable fact is that parties focus a lot of their resources on making sure that voters who are likely to support them actually turn out to vote, via get-out-the-vote operations, registration drives, and related efforts.¹⁵ Such efforts do so, in sum, "because they offset some of the costs of participation and exploit social relationships to create social rewards for participation." (Rosenstone and Hansen, 1996, p. 8) Campaign contributions matter to a large extent because they are used by parties to increase the likelihood of turnout by their supporters.

In sum, a few distinctive features seem to characterize political contributions by individuals in practice: (i) They are typically very small, and unlikely to make a difference in outcomes; (ii) They are strongly related with personal income; (iii) They are positively associated with other forms of political participation, such as turnout; (iv) Parties use them largely to increase the turnout of potential supporters. These features will inform my model of endogenous voting and contributing behavior, to which I now turn.

¹³See Ansolabehere, Figueiredo and Snyder (2003), Rosenstone and Hansen (1996), and Verba, Schlozman and Brady (1995).

¹⁴Kramer (1970) provides a classic empirical comparison between the "turnout" and "preference" effects of parties' mobilization efforts, concluding that the former is actually more important.

¹⁵The idea that getting likely supporters to the polls is a central objective of political campaigns is widespread in anecdotal accounts of US politics. (See for instance *Time Magazine*, Oct. 9th 2006.) Ansolabehere and Snyder (2000) provide an empirical assessment of the relationship between party resources, their mobilization efforts, and voter turnout: Parties spend around 40 percent of their total resources on this mobilization, which is a very large share of available resources, once administrative costs are accounted for. For an evaluation of such efforts, see Bergan et al (2004).

3 Inequality, Campaign Contributions and Voting Behavior: A Model

3.1 Basic Setup

Let us consider the interaction between inequality, different forms of political participation, and redistribution outcomes in a simple model where political participation is endogenous. I start with a population of individuals (potential voters) in a continuum of length 1. These individuals are identical, except for their initial wealth level, denoted by w_i , which is distributed according to some distribution $F(w)$. The only crucial assumption is that the distribution be skewed to the right, so that median wealth is smaller than mean wealth – which is also a crucial condition in the standard median-voter framework, and a well-established feature of existing wealth distributions.¹⁶ However, for ease of exposition, I will assume a Pareto distribution.¹⁷ (See Appendix B for the results with a generic $F(w)$.) The cdf of the wealth distribution is thus given by:

$$F(w) = 1 - \left(\frac{w_{\min}}{w}\right)^{\frac{1}{\sigma}} \quad (1)$$

where w_{\min} is the location parameter (minimum level of wealth in the distribution) and $\sigma \in (0, 1)$ is the shape parameter that parameterizes inequality: an increase in inequality is simply an increase in σ . (Since I am interested in changes in inequality keeping average income constant, and since the mean level of wealth, \bar{w} , is given by $\frac{1}{1-\sigma}w_{\min}$, changes in σ will be accompanied by changes in w_{\min} such that \bar{w} remains constant. In other words, I set $w_{\min} = (1 - \sigma)\bar{w}$.) Note, in particular, that the limit case $\sigma = 0$ corresponds to a situation of “perfect equality”, where all individuals have the same wealth, and the other limit case $\sigma = 1$ corresponds to the polar opposite in which a single individual (of measure zero) holds all the wealth in the economy.

In addition to the individuals, there are two parties competing in an election where the crucial decision is on redistribution. Each party will propose a given redistribution rate as its campaign platform and, in keeping with the Downsian tradition (Downs 1957), they are able to commit to defending their proposed rate after the election. There are two forms of political participation that individuals can undertake, namely voting and contributing resources to the

¹⁶In fact, the crucial element could be more precisely defined as skewness, rather than inequality, but I will adopt the usual terminology in the literature.

¹⁷The Pareto distribution yields a convenient parametrization of changes in inequality, with a one-to-one correspondence with the Gini coefficient that will be used in the empirical analysis and to other measures of inequality such as the difference between mean and median. This parametrization is useful because in this context one needs to specify more precisely what is meant by changes in inequality – unlike in the standard median-voter framework, the relative wealth of the median individual will no longer be sufficient.

parties. Votes decide the political outcome, but parties can use campaign contributions in order to boost the turnout of their own supporters.¹⁸ This is summarized by the timeline in Figure 1.

[FIGURE 1 HERE]

Individuals will thus make their decisions taking platforms as given, and parties will have chosen their platforms in anticipation of individuals' behavior and the resulting equilibrium.

3.2 Individuals

Individuals in the model have to decide whether to vote or not, how much to contribute, and, conditional on those decisions, which party to support. I will consider these decisions in turn.

3.2.1 Voting

I start with a very simple model of endogenous rational turnout. Consider rational individuals who recognize that the impact of his vote or contribution in final outcomes is negligible, but who also derive some “individual utility” from voting, which could be related to some personal satisfaction or sense of duty.¹⁹ I also assume that this individual utility has two components. The first component, denoted by δ_i , corresponds to an “intrinsic” *motivation* that varies idiosyncratically across individuals: some people are more motivated towards political participation than others. The second component, denoted by γ_i , differs because it can be affected by the actions of political parties: this is a *mobilization* component. I assume that both components are orthogonal to the distribution of wealth, so that it is not imposed exogenously that richer individuals have an inherent tendency to vote relatively more than poorer individuals. I further assume for simplicity that this individual motivation δ_i is uniformly distributed over the interval $[0, 1]$. The mobilization component also varies within the same range, $\gamma_i \in [0, 1]$, though its precise value depends on parties' actions, as will be described below. Finally, I assume that an individual i will choose to vote if and only if her overall utility, motivation and mobilization comprised, is above a certain threshold, which I normalize to 1: $\delta_i + \gamma_i > 1$.²⁰

¹⁸For simplicity, I will not consider the possibility that parties use their resources to create obstacles to the turnout of their opponent's supporters. This will not affect the main results, but I will point out the instances where the assumption plays a significant role.

¹⁹This model thus essentially adapts the classic formulation by Riker and Ordeshook (1968), by including the idea that the probability of an individual vote affecting the outcome is negligible. See Abrams, Iversen and Soskice (2005).

²⁰This formulation can easily encompass considerations about the cost of voting or gathering relevant information, which could be brought into both δ_i and γ_i .

3.2.2 Contributions

I assume that only the more politically motivated individuals, as measured by the same parameter δ_i , will choose to contribute: an individual will contribute if and only if $\delta_i > \bar{\delta}$, where $\bar{\delta}$ is an exogenous threshold. This assumption is consistent with the stylized fact, described in the previous section, that individuals who are more likely to contribute are also more likely to vote. Note in particular that the willingness to contribute depends only on the motivation component of political participation, δ_i , and not on the mobilization component γ_i that is affected by political parties; this essentially implies that parties' ability to obtain resources are not dependent on their pre-existing resources.²¹ In addition, every individual understands that her own contribution is too small to make a difference in the outcome of the election. In light of that, individuals contribute because they derive utility from doing so, just as in the case of voting. On the other hand, resources devoted to contributions are made unavailable for consumption, and individuals thus face a trade-off between these two competing uses.

I combine these two elements with a very simple assumption that individuals derive utility from contributions and consumption according to a Cobb-Douglas specification:²²

$$\begin{aligned} u(z_i, x_i) &= z_i^{\lambda_i} x_i^{1-\lambda_i} & (2) \\ \text{s.t. } z_i + x_i &\leq w_i \end{aligned}$$

where $\lambda_i \equiv \max\{0, \delta_i - \bar{\delta}\}$, z_i is the individual contribution, and x_i is consumption. This formulation naturally leads to a result where those individuals who contribute will donate a fixed fraction of their wealth:

$$z_i = \lambda_i w_i \quad (3)$$

Note that the fraction of wealth devoted to contributions depends positively on their political motivation, but is independent of the individual's position in the wealth distribution, since I have assumed motivation and wealth to be uncorrelated.

While this basic formulation helps clarify what drives the main results, I will later extend the model to consider the more realistic possibility that contributions are a luxury good.²³

²¹This assumption, ruling out the “it takes money to make money” feedback, is an obvious simplification of what goes on in reality, but it is for the most part innocuous; it will be pointed out when it makes a difference.

²²The Cobb-Douglas assumption is immaterial for the results of the paper. All I need is that contributions are a normal good.

²³Note also that I assume that the decisions on whether to vote or to contribute are independent of party platforms. This is done partly to keep consistency with the fact that individuals recognize the irrelevance of their decisions on outcomes, but also to keep analytical simplicity. I will later discuss the consequences of relaxing this assumption in some directions.

3.2.3 Preferences over Redistribution

Once an individual i has decided to vote and/or contribute, she will favor the party whose platform is closer to her preferred rate, denoted τ_i . I thus maintain the assumption that individuals vote and contribute according to their economic interests, as in the standard median voter framework, and one needs to specify the individual's preferred redistribution rate.²⁴ To keep the model as close as possible to that framework, as described for example in Persson and Tabellini (2000), redistribution is described by a linear tax on wealth, at rate τ , with lump-sum transfers to all individuals and a convex cost of taxation, $\phi(\tau)$ – assumed to be quadratic for analytical simplicity, as in Bolton and Roland (1997): $\phi(\tau) = \frac{\tau^2}{2}\bar{w}$. Each individual will have a preferred tax rate, depending on his or her position on the wealth distribution.²⁵ In sum, an individual will want to maximize his disposable wealth, $w_i^d = (1 - \tau)w_i + T$, with $T = \tau\bar{w} - \phi(\tau)$. Individual i 's preferred tax rate is thus:²⁶

$$\tau_i = \begin{cases} 1 - \frac{w_i}{\bar{w}} & , \text{ if } w_i < \bar{w} \\ 0 & , \text{ otherwise} \end{cases} \quad (4)$$

The result is quite intuitive: wealthier individuals will prefer lower tax rates, implying less redistribution. In particular, anyone whose wealth is above the mean level will prefer that there be no redistribution whatsoever.

3.3 Parties

The next step is to describe the positions of the parties with respect to redistribution, and their use of campaign money.

3.3.1 Choosing a Platform

Just as in the Downsian framework from which the standard median voter predictions emerge, I assume that parties care about being in power. However, in order to generate the different preferences over redistribution, I assume that parties care about the equilibrium level of redistribution as well. Following Alesina and Rosenthal (1995), I introduce these features

²⁴Further discussion on this assumption will come in the context of the empirical analysis.

²⁵I also assume, for simplicity, that the preferred tax rate does not take into account political contributions. This does not interfere with any of my comparative statics results. Suppose an individual computes her preferred tax rate taking into account her wealth after contributions. Considering that the probability of contributing is independent of wealth, the individual's "expected" wealth after contributions is given by $[1 - (1 - \delta)\lambda_i]w_i$. It is straightforward to check that this will lead to the same result as in (4), only multiplied by this constant $[1 - (1 - \delta)\lambda_i]$. This will leave the comparative statics unaffected.

²⁶One could assume in principle that wealthier individuals would be in favor of a negative tax rate, i.e. a linear income subsidy financed by a lump-sum tax. I believe this possibility is not very interesting empirically, so I leave it out in what follows.

by choosing a utility function where Party j derives some utility \widehat{v} from winning the election, and that also increases as equilibrium redistribution approaches the party's ideal rate:

$$V_j = (1 - \theta)v(\tau, \widehat{\tau}_j) + \theta\widehat{v}I(\pi_j \geq \pi_{-j}) \quad (5)$$

where τ is equilibrium redistribution, $\widehat{\tau}_j$ is Party j 's ideal rate of redistribution, I is the indicator function, π_j is the number of votes obtained by Party j , and $\theta \in [0, 1]$.²⁷ The maintained assumptions are that $v(\cdot)$ is decreasing in the absolute value of $\tau - \widehat{\tau}_j$, and concave. I also set $\widehat{\tau}_R = 0$ and $\widehat{\tau}_D = 1$: Party R wants as little redistribution as possible, while Party D wants as much of it as it can get away with.²⁸ Finally, θ measures the degree to which parties are motivated by getting to office, i.e. how close to the Downsian framework the model is.

3.3.2 Campaign Spending

Once parties announce their platforms, each individual who decides to vote and/or to contribute will do so, in equilibrium, for the party whose platform is closest to his or her preferred rate of redistribution. Each party will in turn direct its resources to “mobilize its base” and thus increase the turnout of its potential supporters.²⁹ (I assume that parties are able to discern who their likely supporters are, since the individuals' preferences over the two parties depend only on their wealth, which is observable.³⁰) Formally, I assume that the mobilization component of the individual's utility from political participation is a function of the amount of contributions collected by the party that targets the group of which the individual is a member: $\gamma_i = \gamma(Z_j)$, where Z_j denotes that total amount, and $\gamma'(\cdot) > 0$.³¹ This means that if a party spends more money, its potential supporters will be more mobilized, and hence more likely to turn out to vote. I also assume that $\gamma''(\cdot) < 0$, implying that there are decreasing returns to the investment of campaign resources, and denote $\lim_{Z \rightarrow 0} \gamma(Z) = \epsilon > 0$.

²⁷The results of the model are all maintained, with very little change in the proofs, if the office-seeking component is smoothly increasing in the number of votes, as opposed to the assumption of a discontinuity at the point where a party gets 50% of the votes cast.

²⁸The specific values of 0 and 1 are immaterial for the results, and are assumed to keep notation simple.

²⁹Other approaches to contributions in the literature focus on its role in providing information or pure advertisement, which would affect individuals' preferences over candidates. See for instance Austen-Smith (1987), Grossman and Helpman (1996), Prat (2002), Coate (2004).

³⁰The assumption that parties are able to target their potential supporters is crucial for our results, although the particular feature that they can do so perfectly can be removed and is added just for simplicity. For evidence on how parties and politicians target their campaign spending, see for instance the survey by Gerber (2004).

³¹At this point it becomes clear why abstracting from the possibility that contributions are used to interfere with the turnout of the opponent's supporters is innocuous: Given the parties' preferences, increasing the turnout of one's supporters and decreasing that of the opponent's are equivalent from the parties' standpoint.

3.4 Equilibrium

Having described the behavior of individuals and parties, one can now characterize the equilibrium. I draw upon Alesina and Rosenthal (1995) in postulating the following “non-majoritarian” approach for equilibrium redistribution:

$$\tau = \frac{\pi_D \tau_D + \pi_R \tau_R}{\pi_D + \pi_R} \quad (6)$$

where τ_j is the rate proposed by Party j . In words, equilibrium redistribution is given by a convex combination of the preferred rates of each party, where the weights are given by the number of votes the party obtains: each party influences equilibrium policy according to its electoral strength. This assumption rules out the discontinuities that emerge from a “winner-take-all” setup in which the party that gets the most votes manages to impose its preferred policies, thus keeping the model analytically simple without otherwise affecting the results.³² This formulation is also consistent with the idea that it is optimal for individual i to vote for Party j if and only if $|\tau_i - \tau_j| < |\tau_i - \tau_{-j}|$. We can thus define:

Definition 1 *An equilibrium is defined by $(\Omega_D^T, \Omega_R^T, \Omega_D^Z, \Omega_R^Z, \tau_D, \tau_R, Z_D, Z_R)$ such that:*

1. $\Omega_D^T = \{i | \delta_i + \gamma(Z_D) > 1 \text{ and } |\tau_i - \tau_D| < |\tau_i - \tau_R|\}$, and
 $\Omega_R^T = \{i | \delta_i + \gamma(Z_R) > 1 \text{ and } |\tau_i - \tau_R| < |\tau_i - \tau_D|\}$.
2. $\Omega_D^Z = \{i | \delta_i > \bar{\delta} \text{ and } |\tau_i - \tau_D| < |\tau_i - \tau_R|\}$, and
 $\Omega_R^Z = \{i | \delta_i > \bar{\delta} \text{ and } |\tau_i - \tau_R| < |\tau_i - \tau_D|\}$
3. $\tau_j \in \arg \max_{\tau} \{V_j\}$, $j = D, R$, and V described by (5).
4. $Z_j = \int_{i \in \Omega_j^Z} z_i$, $j = D, R$, and z_i described by (3).
5. τ is described by (6).

In words, the equilibrium is defined as follows: Let Party j propose a redistribution platform τ_j , then the set Ω_j^Z defines the set of individuals who contribute to Party j , respectively.

³²More precisely, as discussed in Alesina and Rosenthal (1995, p. 27), a “winner-take-all” assumption would generate policy convergence, since we are in a setup without uncertainty about voters’ preferences. This would be unappealing in a context where I want to be able to differentiate between parties. It is nevertheless possible to extend the model to consider the “winner-takes-all” case in the context of a probabilistic voting setup. (An extension in this direction is available upon request.) The basic results still hold, provided that parties are able to target their campaign spending, at least to some extent, on individuals that are more likely to support them; otherwise, there would be no point in spending at all (since in our model spending is all about mobilization, and not about changing voters’ preferences). Later in the paper, as the results are presented, I will return to the intuition behind such extension.

This is the set of individuals whose preferred redistribution rate – which depends on the individual’s wealth according to (4) – is closer to the platform τ_j than to the other party’s platform, and such that their political motivation δ_i is sufficiently strong to get them to spend money in politics (Part 2). Given this set of individuals, Party j ’s volume of resources (Part 4) is able to induce a given level of turnout among their possible supporters. This level of turnout translates into the set Ω_j^T (Part 1), which comprises the individuals who vote for Party j , and the number of votes each party obtains will in turn determine the equilibrium τ , as described by (6) (Part 5). Finally, equilibrium requires that, taking into account the redistribution rate that will emerge from this political process, the platforms that the parties had proposed to begin with are optimal for them, given their utility function (5) (Part 3).

I can now start characterizing equilibrium more precisely through a series of lemmas:

Lemma 1 *In equilibrium, it must be the case that $\tau_D \geq \tau_R$.*

Proof. *All proofs are in the Appendix A. ■*

The interpretation of this lemma is very simple: in equilibrium, the party that likes redistribution will propose a higher rate than the party that dislikes it. Given this lemma, the Pareto distribution of wealth, and the uniform distribution of δ_i , we also have the following:

Lemma 2 *In equilibrium, it must be the case that:*

1. $\Omega_D^T, \Omega_D^Z \subset [0, p^*]$, and $\Omega_R^T, \Omega_R^Z \subset (p^*, 1]$.

where $p^* = 1 - \left[\frac{2(1-\sigma)}{2-(\tau_D+\tau_R)} \right]^{\frac{1}{\sigma}}$ is the “decisive” percentile – the one at which an individual is indifferent between Party D and Party R.

2. The total contributions gathered by Party D and Party R are given by:

$$Z_D = \frac{(1 - \bar{\delta})^2}{2} (1 - (1 - p^*)^{1-\sigma}) \bar{w} \quad (7)$$

$$Z_R = \frac{(1 - \bar{\delta})^2}{2} (1 - p^*)^{1-\sigma} \bar{w} \quad (8)$$

Proof. *See Appendix A. ■*

The first part of this lemma follows immediately from Lemma 1. The supporters of Party D will be poorer than those of Party R, since the former pushes for more redistribution; as a result, Parts 1 and 2 of Definition 1 can be summarized, for our purposes, by a single number p^* – the decisive percentile in equilibrium. The second part holds because the total amount of

contributions gathered by Party j is a share $\frac{(1-\bar{\delta})^2}{2}$ of the total wealth held by the population of its potential supporters.³³ Given these contribution totals, we have the following values for the number of votes each party obtains, once again using the uniformity of δ_i :

$$\pi_D = \left(\gamma \left(\frac{(1-\bar{\delta})^2}{2} (1 - (1-p^*)^{1-\sigma}) \bar{w} \right) \right) p^* \quad (9)$$

$$\pi_R = \left(\gamma \left(\frac{(1-\bar{\delta})^2}{2} (1-\bar{\delta}) (1-p^*)^{1-\sigma} \bar{w} \right) \right) (1-p^*) \quad (10)$$

Finally, it is possible to state the following:

Lemma 3 *For any $\theta \in [0, 1]$, in equilibrium $\pi_D = \pi_R$: Parties obtain the same number of votes.*

Proof. See Appendix A. ■

This follows the same logic of the median voter theorem: parties will split the distribution of actual voters right down the middle – otherwise one of the parties could improve its position. The key difference is that here the median *voter* is not necessarily the median *agent*, but rather the agent at the p^* percentile, and this p^* will be determined endogenously. Note that this result is valid for any value of θ , which means that it holds regardless of whether there is policy convergence (in the sense of $\tau_D = \tau_R$).

Using these lemmas, plus (9) and (10), I can now characterize the equilibrium of the model:

Proposition 1 (Equilibrium) *An equilibrium exists, and it will be characterized by a unique (p^*, τ) such that:*

$$p^* = \frac{(\gamma(Z_R))}{(\gamma(Z_R)) + (\gamma(Z_D))} \equiv \Omega(p^*) \quad (11)$$

$$\tau = \max\{1 - (1-\sigma)(1-p^*)^{-\sigma}, 0\} \quad (12)$$

Proof. See Appendix A. ■

Proposition 1 can be understood with the help of Figure 2, which plots the function $\Omega(p^*)$, corresponding to the RHS of equation (11). This function describes Party R 's relative ability

³³The share $\frac{(1-\bar{\delta})^2}{2}$ comes from the following: since the individual political motivation is unrelated to wealth, a fraction $(1-\bar{\delta})$ of Party j 's supporters will contribute. Each contributor will donate a share $(1-\delta_i)$ of her wealth, and on average this will yield a $\frac{(1-\bar{\delta})}{2}$ share.

to get a given set of potential supporters to actually turn out and vote. On the other hand, p^* is the relative size of Party D 's base of potential supporters. In equilibrium, these two have to exactly balance each other out, so the equilibrium p^* is given by a fixed point of $\Omega(\cdot)$. Proposition 1 establishes that this fixed point exists, due to continuity, and is unique, due to monotonicity, which in turn is guaranteed because an increase in p^* means that the number of potential supporters (and thus contributors) of Party R gets smaller; for a given wealth distribution, this means fewer resources, and a reduced ability to turn out the vote.³⁴

[FIGURE 2 HERE]

Equation (12) then describes the equilibrium redistribution rate that corresponds to this p^* . Note in particular, from (4), that this rate is precisely the one that is desired by the p^* agent in the distribution, which justifies its designation as the “decisive” agent in the political process. If the value of p^* yielded by (11) happens to be at or above the percentile at which an individual holds exactly \bar{w} , which is defined as $\bar{p}(\sigma) \equiv 1 - (1 - \sigma)^{\frac{1}{\sigma}}$, then the equilibrium tax rate will be equal to zero, since negative tax rates have been ruled out.

3.5 The Effects of Inequality

Now it is possible to analyze the impact of inequality on the endogenous variables, namely turnout, contributions, and redistribution. The first crucial result can be stated as:

Proposition 2 (*Median voter*) *If $\gamma'(\cdot) = 0$, that is contributions do not affect turnout, then:*

1. $p^* = \frac{1}{2}$: *The “decisive” percentile is the median.*
2. $\frac{\partial \tau}{\partial \sigma} > 0$: *Equilibrium redistribution increases with inequality.*

Proof. *See Appendix A.* ■

This proposition spells out the standard median-voter-based result as a special case of my model. If the channel through which contributions affect turnout is shut down, then the

³⁴The uniqueness of the equilibrium hinges on the assumption that λ_i is constant with respect to the announced platform. If instead we have a situation where, for instance, a contributor will donate a greater share of her income if the party's position is closer to her preferred policy, the possibility of multiple equilibria arises. (These results are available upon request.) The intuition is that, under such circumstances, increasing its pool of potential supporters may not be in a party's interest, as the policy change required for that may alienate its core supporters so much that it ends up depressing the party's total contributions and turnout. If λ_i is not too sensitive, we still have uniqueness, and the results follow through.

standard logic goes through. When contributions do affect turnout, however, another channel opens up through which inequality can affect the political process. The first consequence of this can be stated as follows:

Proposition 3 (*Wealth bias*) *If $\gamma'(\cdot) > 0$, then $p^* > \frac{1}{2}$: The decisive agent is wealthier than the median agent.*

Proof. *See Appendix A. ■*

This proposition establishes that introducing a link between campaign contributions and turnout *endogenously* generates a wealth bias in the political process: the decisive agent will be wealthier than the median.³⁵ The intuition behind this result is quite transparent: once there is inequality in the distribution of wealth, the need for obtaining campaign resources to enhance their likelihood of reaching office leads the parties to move their platforms closer to the preferences of wealthier individuals, who can provide them with more of these resources. By the same token, the advantage of wealthier individuals in providing contributions enables Party *R* to move its platform closer to its bliss point, since the contributions allow it to obtain a relatively higher turnout despite the smaller base of potential supporters. Conversely, Party *D* has to follow the move to the right so as to compensate its disadvantage in gathering campaign resources with a larger number of potential supporters. In sum, both office-seeking and ideological motives pull in the same direction, leading to a wealth bias in the political system.³⁶ Quite importantly, this bias does *not* require any inherent link between wealth and one’s propensity to participate in politics.

This result leads us into the following:

Proposition 4 (*Median voter revisited: Non-monotonicity*) *If $\gamma'(\cdot) > 0$, $\lim_{Z \rightarrow \infty} (Z\gamma'(Z)) = \infty$ (i.e. the marginal effect of campaign spending does not vanish too rapidly), and ϵ is small (i.e. mobilization is small in the absence of campaign spending), then there exists $\bar{\sigma} > 0$ such that $\sigma < \bar{\sigma} \implies \frac{\partial \tau}{\partial \sigma} > 0$ and $\sigma > \bar{\sigma} \implies \frac{\partial \tau}{\partial \sigma} < 0$: Equilibrium redistribution increases with inequality if inequality is relatively small, and it decreases with inequality if inequality is relatively large.*

Proof. *See Appendix A. ■*

³⁵This wealth bias is similar to that in Roemer (2006).

³⁶Here it is possible to see why the model’s results still hold if we replace (6) by a “winner-take-all”, probabilistic voting specification. In the basic probabilistic voting model (e.g. Persson and Tabellini 2000, p. 34), when parties choose their platforms they will give more weight to more “responsive” individuals, i.e. those who are more likely to reward a given change in platform. As we introduce campaign contributions, wealthier individuals will endogenously emerge as more responsive, since their support is amplified by their ability to contribute resources.

The impact of inequality on redistribution is driven by the interaction of two effects. First, we have what can be termed a “*decisive voter’s preference*” effect, corresponding to the direct effect of σ in (12), keeping p^* constant. This is the impact of inequality on the level of redistribution desired by a *given* decisive agent. Appendix A shows that this effect is proportional to $(1 + (1 - \sigma) \log(1 - p^*))$, and from this expression we can see that the effect, which is behind Proposition 2, is now more subtle precisely because of the endogenous wealth bias uncovered by Proposition 3: If p^* is sufficiently large, it could be the case that the effect is negative. In words, the decisive agent now may be wealthy enough that an increase in inequality can lead her to desire less redistribution.

Second, we also have an “*endogenous decisive voter*” effect, which stems from the fact that the identity of the decisive agent is now endogenous and varies with inequality. Appendix A shows that this effect is captured by $-\frac{(1-\sigma)\sigma}{(1-p^*)} \frac{\partial p^*}{\partial \sigma}$, which is negative because $\frac{\partial p^*}{\partial \sigma} > 0$: An increase in inequality moves the decisive vote to a higher percentile. (This can be seen graphically in Figure 3.) The intuition is simple: Higher inequality means that relatively rich individuals become richer, and relatively poor individuals become poorer. This amplifies the advantage of wealthier individuals in generating contribution revenues that can be translated into more votes, and increases the wealth bias identified in Proposition 3.

[FIGURE 3 HERE]

Put together, the “endogenous decisive voter” effect and the possibility of changing the direction of the “decisive voter’s preference” effect can lead to the standard prediction being turned on its head: Higher inequality may lead to *less* redistribution.

The proposition also elaborates on this possibility more precisely, by showing that in equilibrium there will be a non-monotonic relationship between inequality and redistribution. In order to understand the intuition behind this result, consider a situation of perfect equality ($\sigma = 0$), in which all agents possess the same wealth. In such a situation, the decisive agent is the median, since there is no incentive for the parties to deviate from this position so as to increase their level of contributions, and redistribution is obviously a moot point. A small increase in inequality from this initial point creates a large mass of individuals who are poorer than the mean, and hence in favor of redistribution, and they have almost the same wealth (and hence ability to contribute) as those few individuals who are now wealthier. This will surely lead to an equilibrium with more redistribution.

As inequality increases, however, the relatively wealthy start having a large advantage in providing parties with resources, strengthening the parties’ incentive to move their platform away from redistribution. At some point, additional increases in inequality will lead to the

decisive agent being one who is wealthy enough to actually demand less redistribution, reverting the standard prediction. That this has to be the case can be seen by considering the situation of perfect inequality ($\sigma = 1$), where all the wealth in the economy belongs to a single individual (of measure zero). Such an individual concentrates in essence all the political power, since the turnout of the relatively poor will be tiny, and she wants no redistribution at all; any decrease in inequality will shift some political power to relatively poorer agents, who will definitely want some redistribution. As a result, the standard prediction will hold when inequality is relatively low, but will be reversed when inequality is sufficiently high.³⁷ (Note that this non-monotonicity result will hold if the effect of obtaining additional contributions does not vanish too rapidly. If it does, contributions quickly cease to matter, and Proposition 2 shows that the standard result will thus prevail.)

The mechanism that the model highlights also translates into a specific prediction concerning the behavior of the amounts of contributions gathered by Party *D* and Party *R*. This can be summarized in the following:

Corollary 1 *Under the same conditions of Proposition 4, $\frac{\partial Z_R}{\partial \sigma} > 0$ and $\frac{\partial Z_D}{\partial \sigma} < 0$: Inequality increases the amount of contributions collected by Party *R*, and decreases the amount collected by Party *D*.*

Proof. *See Appendix A. ■*

This is a central prediction of this framework. It is crucial for the results that changes in inequality affect the amount that is contributed by the relatively poor and the relatively wealthy, and that this effect alters the incentives of parties in seeking contributions. In equilibrium, it has to be the case that an increase in inequality will increase the contributions gathered by the anti-redistribution party and decrease the resources available to the pro-redistribution party, even though the number of potential supporters goes down for the former and up for the latter.

³⁷This non-monotonicity result is the mirror image of what is obtained by Bénabou (2000): In his framework, support for redistribution decreases with inequality for low levels of the latter, and eventually increases. The key differences are that, in that paper, a wealth bias in the political process is exogenously assumed, and redistribution also helps to pay for efficiency-enhancing expenditures. This is what lies behind his non-monotonicity result. However, this model shows that the conclusions are very different when the decisive agent in the political process is endogenously determined. Non-monotonicity results in a spirit similar to mine are in Mattozzi (2005)– through a very different mechanism, linked to the interaction between policy uncertainty and unequal access to insurance markets – and Acemoglu and Robinson (2005) – in the context of the relationship between inequality and democratization and without a specific model of the political process.

3.6 Extension: Contributions as a Luxury

As discussed in the previous section, it might be natural to assume that contributions are a luxury good, in the sense that wealthier individuals tend to spend relatively more on contributions than poorer ones. I introduce this possibility by positing a simple form of Stone-Geary preferences, whereby the utility of an individual who is sufficiently motivated to contribute is given by:

$$\begin{aligned} u(z_i, x_i) &= z_i^{\lambda_i} (x_i - x_{\min})^{1-\lambda_i} \\ \text{s.t. } z_i + x_i &\leq w_i \end{aligned} \tag{13}$$

where λ_i , z_i , and x_i are defined as previously, and $x_{\min} \geq 0$ is a minimum “subsistence” level of consumption. It is easy to show that the individual will contribute a share λ_i of his wealth in excess of the subsistence level of consumption, which means in particular that the rich will indeed contribute a larger share of their wealth.

The solution developed so far is now simply a special case where $x_{\min} = 0$. How are the results affected when one considers cases where $x_{\min} > 0$? It can be shown that the results in Propositions 2 and 4 still hold:³⁸ the endogenous wealth bias and the non-monotonicity of equilibrium redistribution with respect to changes in inequality all apply to the more realistic case where contributions are a luxury good. Furthermore, an interesting new prediction emerges, which I present in the following:

Corollary 2 *If $x_{\min} > w_{\min}$, the total amount of contributions increases with inequality.*

Proof. *See Appendix A.* ■

Inequality now unambiguously increases the level of contributions, as it pushes more resources toward wealthier individuals, who contribute disproportionately more. When $x_{\min} < w_{\min}$, in contrast, inequality has no effect on total contributions, which are then a fixed share of income.

³⁸The proof is available upon request. In particular, Proposition 4 holds provided that x_{\min} is sufficiently small or sufficiently large. That is because, if contributions are a luxury good three “classes” of individuals arise in equilibrium: those individuals who support Party *D*, but are too poor to contribute; those who support Party *D*, and may also contribute; and those who support Party *R*. An increase in inequality, while further dispossessing the first group, might disproportionately favor the second group relative to the third one. This could act to make the decisive position in the political process move to a relatively less wealthy individual. In other words, the fact that contributions are a luxury good creates a political “middle class”, which can be large if x_{\min} is in an intermediate range. This adds nuance to the comparative statics, since increases in inequality may disproportionately benefit this middle class.

3.7 Summary

I have shown how a model of the political economy of redistribution that takes into account two important features – that political participation is endogenous, and that it can take different forms (e.g. voting and contributing to campaigns) that interact with each other and react differently to changes in inequality – is able to generalize the traditional median voter framework, and derive circumstances under which a wealth bias will endogenously emerge, and the predictions of the latter will fail to hold. Quite importantly, this model makes explicit the mechanism through which it operates, with clear empirical implications. These implications can be summarized as:

1. Inequality reduces the amount of contributions made by relatively poor individuals, and increases the amount of contributions made by the relatively rich;
2. Inequality reduces the amount of contributions gathered by the pro-redistribution party, and increases the amount of contributions amassed by the anti-redistribution party;
3. Increased inequality will lead to a greater total amount of contributions, if campaign contributions are a luxury good;
4. Inequality reduces the turnout of the poor relatively to the turnout of the rich;³⁹
5. Increased inequality will lead to *less* redistribution, unlike in the standard median voter framework, whenever inequality is sufficiently high and turnout is sufficiently sensitive to campaign spending.

The next section presents evidence in support of this mechanism.

4 Inequality, Campaign Contributions and Voting Behavior: Empirical Analysis

4.1 Empirical Strategy

I analyze the interaction between inequality, individual campaign contributions, and voter turnout in the setting of the US presidential election of 2000. The reason why I focus on the

³⁹It can be shown that the prediction of the baseline model regarding total turnout is that it *increases* with inequality. However, this prediction is *not* robust to the possibility that campaign spending be used to interfere with the other party's supporters' turnout. The only robust prediction is that, if one splits the population along the wealth distribution at any percentile p , the ratio of the turnout of those below p and the turnout of those above p will decrease.

2000 election cycle is that the independent variables I use come mostly from the Census, and a Census year such as 2000 thus provides a more appropriate match between the different variables along the time dimension. In terms of the model in the preceding section, I take the Republican Party to be the empirical correspondent of Party *R*, and the Democratic Party as the empirical correspondent of Party *D*, as the very choice of labels would have hinted. It is rather clear that the latter is typically in favor of more redistribution, so the comparison between the two parties should reveal how the political outcomes are likely to respond in regard to redistribution.

The theory also takes as a premise that political preferences are determined (or at least strongly influenced) by income. As shown by McCarty, Poole and Rosenthal (2006, ch. 3), income is a foremost determinant of party allegiance in the US, with wealthier individuals being significantly more likely to vote Republican, and this association has indeed increased in recent decades. Nevertheless, the emergence of the so-called “value voters” in popular perception, especially after the 2004 election, has led many to conclude that this income effect has become less important (e.g. Frank 2004). Typically, many pundits argue that social conservative voters systematically vote against their economic interests, while others note the fact that many of the “blue” Democratic states in recent elections are relatively high-income states. While these may be important factors, they are also easily reconciled with the evidence on the strength of the income effect. Even among social conservatives and evangelicals, there is a strong relationship between income and propensity to vote Republican, as is the case within states (McCarty, Poole and Rosenthal 2006, ch. 3).⁴⁰ Gelman et al. (2007) provide further help in reconciling the evidence with those perceptions, showing that the link between income and partisan identification is much stronger in the South than in the rest of the country, and that it is also stronger in poorer states. In any event, our mechanism does rely on that assumption, and should be present to the extent that income is indeed influencing partisan preferences.⁴¹

My empirical strategy is to identify the effects of inequality on overall voting and contribution patterns, and also on party-specific patterns, using variation across counties in the US. The fact that I use variation at the county level within the context of a national election warrants some comments. First of all, this means that the empirical analysis will leave the

⁴⁰See also Ansolabehere, Rodden and Snyder (2006), for more evidence on how economic issues have more weight on voters’ behavior than moral issues have. On the other hand, in contrast with McCarty et al., they also argue that the link between income and preferences on economic issues, while certainly present, is not that strong.

⁴¹In that regard, it is quite interesting to note that, consistently with Gelman et al.’s evidence, all of the empirical results that follow are strongest in the South, and to a larger extent in the Midwest; the West and Northeast display very weak patterns. The results by Census region are available upon request.

redistribution policy outcomes aside, since the model clearly implies that to understand such outcomes one must consider how parties react to the link between inequality and political participation in setting their platforms. This would in turn require that the source of variation and the level at which policy is chosen were the same, which is not the case with the available data.

As a result of this feature of the data, what I am able to test is a stripped-down version of the model in which party optimization is abstracted away, and the existence of two parties with different platforms regarding redistribution is instead assumed. In such a model, because platforms are exogenously fixed, the impact of an increase in inequality through changes in individual's preferences is zero. However, such an increase changes the amount of resources each individual has, and thus how much she is willing to contribute to campaigns: the rich will contribute more, the poor will contribute less. In other words, if we compare two counties, controlling for a number of characteristics that should affect the amount of contributions and the party they tend to favor – income and education levels, racial and religious composition, political factors – one would expect that, in the more unequal one, relatively rich individuals will hold relatively more of the wealth. As a result, there should be a higher level of contributions, disproportionately going to the party less favorable to redistribution, and disproportionately coming from relatively wealthy individuals. In sum, the predictions of this stripped-down model regarding *the effects of inequality on political behavior* will be exactly the same as in the richer model from the previous section.⁴²

While the effect of inequality via the individual's preferences regarding redistribution cannot be measured in this empirical setting – since they should not be affected by the income distribution at the county level – its other effect, through the amount of resources each one is willing to contribute for given preferences, can be identified in a particularly clean fashion. This is because concerns with reverse causality are greatly attenuated: the possibility that redistribution set at the national level will affect inequality in a given county is less problematic than would be the case if inequality and redistribution platforms were being studied at the same level of aggregation.⁴³ I believe this is a helpful strategy in addressing the identification of the mechanism linking inequality and redistribution, which is a question that the empirical literature on the topic has somewhat overlooked.⁴⁴

⁴²This stripped-down model is available upon request. It is worth noting that the predictions on the effect of inequality on redistribution outcomes would be different in this case – more inequality would lead to *less* redistribution – because the traditional “decisive voter's preference” effect would be entirely shut down.

⁴³In effect, many other levels of aggregation would be equivalent from the standpoint of the empirical strategy being used. The advantages of using counties are that it yields a reasonably large sample, and that it lends itself to a smooth merging of the Census data from which many of the variables come.

⁴⁴For an example of a paper that addresses this identification issue, using an instrumental variables approach

Another note on the implications of this source of variation concerns turnout. The impact of inequality on turnout in the model comes in essence from the effect of contributions, but contributions that are raised in a given county need not be used in that same county. As a result, what happens to turnout in the data does not correspond exactly to what the theory focuses on in that respect, and some caution is necessary when it comes to interpreting the results on voting. As will be seen, the results can be nevertheless illuminating.

4.2 Data Description

I use data on individual campaign contributions in the United States, from the Federal Election Commission (FEC). Each individual donation over \$200 has to be registered with the FEC, and there is publicly available information on the individual donor (name, occupation, zipcode, city, state), the amount given, and the committee to which it was directed. These data are available for all 50 states (and the District of Columbia), which is where my analysis focuses on, plus donations made from Puerto Rico, Guam, U.S. Virgin Islands, and abroad. These committees can then be matched with the campaign they are associated with, which includes information on the kind of election, the name and party of the candidate. Since the focus is on presidential campaigns, I limit my attention to contributions to presidential candidate committees and national party committees.⁴⁵ I aggregate the information at the zipcode level, which then enables me to consolidate the data by county, in order to merge with the other data. This leaves me with data on the total number and amount of contributions directed to the Democratic Party, the Republican Party, and to other parties. Some contributions could not be matched with the data on committees, so they are left as unidentified.

Table A-1 presents some descriptive statistics on the amount of contributions. This table splits the sample between contributions directed to presidential candidate committees and those given to party committees. The columns labeled “Direct Contributions” correspond to donations from individuals directly to the committee, while the columns labeled “Total” add those contributions that are intermediated by other committees. The main difference between these two types is that contributions of the former type were subject to legal limits – which at the time were set at \$1,000 for candidates, and \$20,000 to party committees – , while the latter type includes the so-called “soft money”, not subject to those limits.⁴⁶

on historical US data, see Ramcharan (2007). He finds evidence of a negative relationship between inequality and redistribution.

⁴⁵I include party committees under the presumption that these are also ways in which individuals can express support for presidential candidates.

⁴⁶Campaign contribution amounts in the US have been subject to legal limits since the enactment of the Federal Election Campaign Act (FECA), which was originally passed in 1971, and amended in 1974 to set limits on contributions. The Supreme Court, in *Buckley v Valeo* (1976), upheld the limits on individual

One important message from Table A-1 is that these individual contributions are typically fairly small. The median direct contribution is \$500, and less than five percent of them are above \$2,000; the mean is around \$800. When all contributions are considered, the median is still \$500, and the 95th percentile is \$5,000 with the mean hovering around \$1,700. These amounts are hardly decisive in the context of a presidential election. (In fact, even these numbers are overestimates, since the data are restricted to contributions above \$200.) Quite interestingly, the table also reveals that total contributions are well below the individual contribution limits, suggesting that such limits were typically not binding. In addition, since the 2000 election preceded the McCain-Feingold Bill, “soft money” could still be used by corporate or union donors essentially without limits. This is precisely in line with the discussion in Section 2 and the theoretical setup outlined.

Note that the number of individuals contributing is not large, when compared with the total number of potential voters – a situation that could be expressed, in terms of the model, by a high value of $\bar{\delta}$. Proposition 4 reveals, however, that the value of $\bar{\delta}$ in itself does not matter for the strength of the mechanism highlighted, but rather whether the amount of resources generated by contributions is important enough in its impact on turnout. Table A-1 shows that those small contributions, when put together, amount to a very significant figure, in excess of \$1 billion when total contributions are considered. This suggests that the mechanism highlighted by the model is potentially very important.⁴⁷

Finally, Table A-1 splits the different types of contributions according to the party to which they were directed. A few things are of note in that regard: First, with the exception of a large amount of non-direct contributions that remain unidentified, the vast majority of contributions goes either to the Republican Party or to the Democratic Party. This is hardly surprising. In addition, it can be seen that Republicans vastly outdid Democrats in terms of obtaining individual contributions – by a factor of two when all individual contributions are considered.⁴⁸ This is also consistent with the theory, which implies that Party R will collect more resources than Party D .

contributions, but struck down several other limitations. As a result, FECA was amended in 1979 to allow parties to collect and spend unlimited amounts in their activities during election campaigns. This loophole gave rise to the so-called “soft money” – roughly speaking, money not donated directly to a candidate’s campaign but that could be used for campaign purposes –, which was not subject to the FECA-imposed limits. This situation prevailed until the enactment of the 2002 Bipartisan Campaign Reform Act, also known as the “McCain-Feingold Bill”, which banned “soft money” while increasing the individual contribution limits to \$2,000. These limits are raised for every election cycle, in order to keep up with inflation. These numbers are available on the FEC website: <http://www.fec.gov>

⁴⁷In addition, once very small contributions are taken into account, survey data suggests that around 10% of the US population over 18 years old contributed to campaigns in the 1999-2000 election cycle (Ansolabehere, Figueiredo and Snyder 2003).

⁴⁸Note that this refers to data on *individual* contributions, not to the total fund-raising of either party.

One limitation of the FEC data is that they do not allow us to match individual contributions to individual characteristics beyond location and occupation (which typically registers the name of the individual’s employer). Our theory, however, makes explicit predictions about how inequality will affect contributions from individuals in different parts of the income distribution. In light of that, I supplement the FEC data with information from the 2006 Cooperative Congressional Election Survey (CCES) (Ansolabehere 2007). This survey asks a large sample of individuals (36,500 in total) whether they have contributed money to politics, and how much.⁴⁹ Although the information refers to 2005/06, the main advantage is that we can match the contribution to individual characteristics, particularly income. In addition, while it is far from the entire universe of contributions, on the other hand it also enables us to consider those amounts below the \$200 threshold, which are not covered at all by the otherwise more comprehensive FEC data.

Finally, I also use data on the electoral results by county for all states except for Alaska (where the results are only available at the state level) and for DC, from the Atlas of U.S. Presidential Elections website. A description of all variables, plus their sources, is in the Data Appendix, and the descriptive statistics at the county level is in Table A-2.

4.3 Results and Discussion

Table 1 shows the results when the contribution data are pooled, with Republicans, Democrats, other parties, and unidentified recipients in the same sample. Columns (1)-(2) have (the log of) total contribution amounts as the dependent variable, normalized by total voting age population (over 18 years old).⁵⁰ One can immediately see that richer and more educated counties contribute more, and that total contributions also increase with how lopsided the county is in terms of contributions, which stands as a proxy for how competitive the election was at the local level. This seems to suggest that contributions are lower in more “disputed” counties, which suggests that the effect of higher awareness brought about by more tightly disputed races is not felt in the level of contributions, or at least that the county level is not where such effects are strongest. (Note that all regressions include state fixed effects, which are important to control for a host of factors such as how competitive the election was (e.g. “swing” vs. “safe” states), regional preferences, etc.) I am mostly interested, however, in the impact of

⁴⁹The question is: “During the past year did you donate money to any candidates for office or to political party committees?” To the 30% of the sample who answered affirmatively, the survey then asks the amount contributed. Note in particular that this includes contributions for all kinds of campaigns, and not only at the presidential and national party levels.

⁵⁰More precisely, I consider the log of one plus the amount of contributions, so that zero values are left in the sample. The results are qualitatively unchanged if such values are left out.

inequality at the county level on political behavior.

[TABLE 1 HERE]

Column (2) introduces the income inequality variable into the analysis.⁵¹ It has a significant positive effect on the amount of contributions, exactly in line with the prediction of the model when contributions are modeled as a luxury good, even when controlling for other types of heterogeneity (race and religion). Importantly, the effect of inequality is also quantitatively important:⁵² using the point estimate, an increase in inequality of one standard deviation leads to a seven-percent increase in the amount contributed per person of voting age.

Columns (3)-(4) put the result under an interesting light, highlighting the distinctive effect of inequality: income inequality displays a clear negative effect on the number of people contributing (per 1,000 people of voting age). In other words, inequality is associated with fewer people contributing, but contributing a greater amount. This is a first piece of evidence that is clearly consistent with the idea that the rich are contributing more, while the poor reduce their contributions, as a result of greater inequality, as predicted by my model.⁵³

Some additional insight can be gained from Columns (5)-(6), where the dependent variable is voter turnout, measured by total votes as a share of voting-age population.⁵⁴ Here the effect of inequality (and racial heterogeneity) is clearly negative, which is consistent with the evidence from the literature that has explored the correlation between heterogeneity and turnout (e.g. Mahler 2002). More generally, this evidence reinforces one of the model's cornerstones, namely that contributing to campaigns is a distinct form of political participation. In addition, the fact that contributions and turnout move in opposite directions in response to changes in heterogeneity also helps us rule out the possibility that the effect on contributions is a spurious one.

The model clearly predicts differences in the behavior of individuals according to their wealth or income. In particular, it predicts that increased inequality reduces the amount of contributions provided by poor individuals relative to wealthy ones. The FEC data do not

⁵¹The 2000 Census does not make individual data available at the county or census block level. This prevents me from computing individual income inequality. As an alternative, I get data aggregated at the census block level, and compute inequality between those blocks (weighted by population). While this underestimates individual inequality, it should still be a good proxy for income heterogeneity, to the extent that incomes sort into neighborhoods.

⁵²Note also that this is likely to underestimate the effect of inequality as predicted by the model, since the nature of the data implies that only one channel is fully captured in the analysis, as previously discussed.

⁵³Note that the interpretation of the "number" variable has to be tempered by the fact that the dataset does not contain information on contributions below \$200. In any case, a lower number of contributions of at least \$200 still suggests that the relatively poor are reducing their contributions.

⁵⁴I define turnout with respect to total voting-age population, as opposed to total registered voters, because the decision to register is part of the decision to vote as conceptualized in the theory.

allow us to test this directly, since they do not distinguish individuals by income; I thus resort to the CCES data, which records information on the individual’s family income. I compute the share of total contributions recorded in that data set for each county that were provided by individuals in each (roughly defined) quartile of the income distribution in the sample.⁵⁵ The theory predicts that more inequality within a county will lead to a greater share of contributions coming from the top parts of the distribution, and this is exactly what we see in Table 2. Columns (1)-(3) show that the share of contributions coming from the bottom two quartiles is significantly lower in higher-inequality counties, and Column (4) confirms this point for when the distribution is split in two halves. The significance of these results is magnified when we note that the number of counties in the sample is significantly smaller than in the FEC universe, both because not all counties are present in the CCES sample and because we focus our attention on those that have sufficient observations so as to generate meaningful numbers of individuals in each income category.⁵⁶ In sum, the evidence suggests that greater inequality indeed leads to more contributions coming from wealthy individuals, relative to those coming from poorer ones, just as the theory predicts.

[TABLE 2 HERE]

Another testable prediction has to do with the distinction between the two main parties. This is what we look at in Table 3. The comparison between Columns (1) and (4) displays the main result: While inequality has a strong positive effect on the amount of contributions directed to the Republican Party, it has a (weak) negative effect on the contributions raised by the Democratic Party.⁵⁷ This is exactly in line with what is suggested by my theory: The party that favors less redistribution amasses more contributions with increased inequality, in contrast with what happens to the other party. In addition, the negative effect of inequality on the number of contributors is also more pronounced for the Democrats – in terms of

⁵⁵Because income is recorded in discrete categories, these “quartiles” are actually just approximations. What I call “1st quartile” actually corresponds to 20% of the sample, with the 2nd, 3rd and 4th representing 33%, 27%, and 20% respectively. (The procedure is described in the Data Appendix.) Note also that individuals who chose not to respond to the income question in the survey were dropped from the sample; to the extent that the likelihood of refusing to provide income information rises with income and with local income inequality, which seem to be reasonable assumptions, this biases the sample against finding support for my prediction.

⁵⁶Table 3 presents the results using counties with at least 10 total observations. The results are robust to using much larger thresholds – they are significant at the 5% level even if we restrict the sample to counties with at least 46 observations, which leaves us with a mere 153 counties, and the sign is robust for every threshold.

⁵⁷Note also that Republicans and Democrats are affected differently by changes in racial and religious heterogeneity. The former seem to benefit from religious heterogeneity, whereas the latter seem to profit from racial fragmentation.

statistical significance, if not in terms of coefficient size.⁵⁸ Note also that the effect of income on contributions is significantly higher for the Republican Party: Wealthier counties contribute disproportionately more to the Republicans. This is also consistent with the mechanism highlighted by the theory.

[TABLE 3 HERE]

In sum, the evidence shows that campaign contributions constitute a distinct form of political participation, which reacts to heterogeneity differently than other more widely studied forms, such as voting, do. More specifically, with respect to income inequality, the picture that emerges is one in which an increase in inequality raises the amount of contributions by the rich relative to those by the poor, and shifts contributions from the relatively pro-redistribution party to the anti-redistribution one. This could very well shift the political system towards the preferences of the relatively wealthy, as suggested by the theory.⁵⁹

5 Concluding Remarks

I have proposed a framework where political participation is endogenously determined and takes two distinct forms – voting and contributing resources to campaigns – in a context in which individuals recognize that their decisions are not pivotal for aggregate outcomes. In spite of this non-pivotal nature, and endogenous wealth bias emerges in the political process, as a result of the interaction between contributions and voting decisions. When applied to the context of the relationship between inequality and redistribution, the framework shows that such relationship becomes much more subtle than the simple logic of the standard median voter framework would suggest. In equilibrium, redistribution is non-monotonic in inequality, increasing at first but eventually decreasing. In addition, the mechanism behind this interaction translates into specific empirical predictions, and US data on campaign contributions and voting behavior suggests that this mechanism has substantial explanatory power.

This framework also sheds light on a host of issues that, while outside the direct scope of this paper, still relate to its building blocks. One such issue has to do with the consequences of

⁵⁸Columns (3) and (6) seem to suggest that the impact of inequality on turnout is stronger for Republicans. Here, however, even more caution should be exercised: besides the aforementioned fact that the connection between contributions and voting is not at the local level, in the data, here turnout is defined with respect to total population, not population by group as in the theory.

⁵⁹The results are also robust to a number of checks: they hold when election data from the 2004 cycle is used, and when the analysis is restricted to direct contributions (which are the ones subject to legal limits). Robustness is also verified for specifications with the Gini coefficient computed at the household level (available only for 1990) and with median household income as a control, instead of mean household income. All these results are available upon request.

alternative forms of campaign funding.⁶⁰ For instance, in the very active debate on campaign finance reform in the US, it is often mentioned that public funding would curtail the disproportionate influence of wealthier individuals and pressure groups on the electoral process. My model suggests that this would indeed be the case, but only if a total ban, or at least very stringent limits, on individual contributions were introduced as well.⁶¹ In fact, I can show that, unsurprisingly, the central results concerning the effect of inequality on redistribution are maintained as long as the contribution limits are not too restrictive.⁶² In particular, what matters is not the limit in absolute terms, but rather in comparison with the share of income that individuals would be willing to contribute in the absence of limits. Since the latter is likely to be quite small – Ansolabehere, Figueiredo and Snyder (2003) quote the figure of 0.04 percent of national income devoted to political campaigns in the US in 2000 – the limits would probably have to be very stringent indeed.

More generally, the framework can be used to analyze other implications of this mechanism beyond the ones addressed in the paper. Any policy choice over which preferences vary systematically with individual wealth or income – say, if wealthier individuals have a stronger preference for protecting the environment, or for financing tertiary over primary education – can also be studied taking into account the role of contributions and the endogeneity of participation. In particular, the endogenous wealth bias should still be present in these other contexts. Topics on comparative politics, such as the redistributive consequences of majoritarian and proportional systems, can also be reassessed under these lenses, as their possibly different implications regarding the role of campaign contributions could translate into different policy outcomes. These are some issues I intend to consider in future work.

On the empirical side, one would like to bring policy outcomes into the picture, which, as stressed before, would require data on inequality, political variables, and policy outcomes to be obtained from the same level – local, state, or country. One could then test for many other predictions generated by the framework: how much of the cross-country differences in terms of inequality and redistribution can be explained, or if a greater role of campaign contributions is in fact associated with a stronger “right-wing” bias and with a stronger link between personal income and turnout. At a sub-national level, this raises issues of data availability, such as obtaining information on redistribution outcomes; at the cross-country level, it would require a careful consideration of institutional differences. These are also issues for future research.

⁶⁰See Roemer (2006) for a theoretical discussion on the welfare consequences of different forms of campaign finance.

⁶¹This has been the subject of a heated debate in which the Supreme Court has been called to intervene many times since the 1970s, as briefly alluded to in the discussion of the data. On this debate on campaign finance reform and the history of legal decisions on the topic, see Corrado et al (2005).

⁶²These results are also available upon request.

References

- [1] Abrams, Samuel, Torben Iversen, and David Soskice (2005), “Interests, Parties, and Social Embeddedness: Why Rational People Vote”, Harvard University mimeo.
- [2] Acemoglu, Daron and James Robinson (2005), *Economic Origins of Dictatorship and Democracy*, Cambridge, UK: Cambridge University Press.
- [3] Aldrich, John H. (1993), “Rational Choice and Turnout”, *American Journal of Political Science* 37: 246-278.
- [4] Alesina, Alberto, Reza Baqir, and Caroline Hoxby (2004), “Political Jurisdictions in Heterogeneous Communities”, *Journal of Political Economy* 112: 348-396.
- [5] Alesina, Alberto and Edward L. Glaeser (2004), *Fighting Poverty in the US and Europe: A World of Difference*. Oxford, UK: Oxford University Press.
- [6] Alesina, Alberto and Dani Rodrik (1994), “Distributive Politics and Economic Growth”, *Quarterly Journal of Economics* 109: 465-490.
- [7] Alesina, Alberto and Howard Rosenthal (1995), *Partisan Politics, Divided Government and the Economy*, Cambridge, UK: Cambridge University Press.
- [8] Ansolabehere, Stephen (2007), “Cooperative Congressional Election Study, 2006: Common Content. Release 2: November 14, 2007.” Cambridge, MA: M.I.T. Available on: <http://web.mit.edu/polisci/portl/cces/commoncontent.html>.
- [9] Ansolabehere, Stephen, John M. de Figueiredo, and James M. Snyder, Jr. (2003), “Why is There so Little Money in U.S. Politics?”, *Journal of Economic Perspectives* 17: 105-130.
- [10] Ansolabehere, Stephen, Jonathan Rodden, and James M. Snyder, Jr. (2006), “Purple America”, *Journal of Economic Perspectives* 20: 97-118.
- [11] Ansolabehere, Stephen and James M. Snyder, Jr. (2000), “Soft Money, Hard Money, Strong Parties”, *Columbia Law Review* 100: 598-619.
- [12] APSA Task Force on Inequality and American Democracy (2004), “American Democracy in an Age of Rising Inequality”, *Perspectives on Politics* 2: 651-670.
- [13] Austen-Smith, David (1987), “Interest Groups, Campaign Contributions, and Probabilistic Voting”, *Public Choice* 54: 123-139.
- [14] Bénabou, Roland (1996), “Inequality and Growth”, in Ben Bernanke and Julio Rotemberg (eds.), *NBER Macroeconomics Annual 1996*, Cambridge, MA: MIT Press.
- [15] Bénabou, Roland (2000), “Unequal Societies: Income Distribution and the Social Contract”, *American Economic Review* 90: 96-129.
- [16] Bénabou, Roland and Efe Ok (2001), “Social Mobility and the Demand for Redistribution: The POUM Hypothesis”, *Quarterly Journal of Economics* 116: 447-487.
- [17] Bergan, Daniel E., Alan S. Gerber, Donald P. Green, and Costas Panagopoulos (2005), “Grassroots Mobilization and Voter Turnout in 2004”, *Public Opinion Quarterly* 69: 760-777.
- [18] Blais, André (2000), *To Vote or Not to Vote: The Merits and Limits of Rational Choice Theory*, Pittsburgh, PA: University of Pittsburgh Press.

- [19] Bolton, Patrick and Gerard Roland (1997), "The Breakup of Nations", *Quarterly Journal of Economics* 112: 1057-1090.
- [20] Coate, Stephen (2004), "Political Competition with Campaign Contributions and Informative Advertising", *Journal of the European Economic Association* 2: 772-804.
- [21] Corrado, Anthony, Thomas E. Mann, Daniel R. Ortiz, and Trevor Potter (2005), *The New Campaign Finance Sourcebook*, Washington, DC: Brookings Institution Press.
- [22] Downs, Anthony (1957), *An Economic Theory of Democracy*, New York: Harper and Row.
- [23] Feddersen, Timothy J. (2004), "Rational Choice Theory and the Paradox of Not Voting", *Journal of Economic Perspectives* 18: 99-112.
- [24] Feddersen, Timothy J. and Alvaro Sandroni (2006), "A Theory of Participation in Elections", *American Economic Review* (forthcoming).
- [25] Frank, Thomas (2004), *What's the Matter with Kansas: How Conservatives Won the Heart of America*, New York: Metropolitan Books.
- [26] Gelman, Andrew, Boris Shor, Joseph Bafumi, and David Park (2007), "Rich State, Poor State, Red State, Blue State: What's the Matter with Connecticut?", *Quarterly Journal of Political Science* 2: 345-367.
- [27] Gerber, Alan S. (2004), "Does Campaign Spending Work? Field Experiments Provide Evidence and Suggest New Theory", *American Behavioral Scientist* 47: 541-574.
- [28] Gerber, Alan S. and Donald P. Green (2000), "The Effect of a Non-Partisan Get-Out-the-Vote Drive: An Experimental Study", *Journal of Politics* 63: 846-857.
- [29] Gimpel, James G., Frances E. Lee, and Joshua Kaminski (2006), "The Political Geography of Campaign Contributions in American Politics", *Journal of Politics* 68: 626-639.
- [30] Glaeser, Edward L. (2005), "Inequality", Harvard University mimeo.
- [31] Grossman, Gene M. and Elhanan Helpman (1996), "Electoral Competition and Special Interest Policies", *Review of Economic Studies* 63: 265-286.
- [32] Iversen, Torben and David Soskice (2006), "Electoral Institutions and the Politics of Coalitions: Why Some Democracies Redistribute More Than Others", *American Political Science Review* 100: 165-181.
- [33] Kramer, Gerald H. (1970), "The Effects of Precinct-Level Canvassing on Voter Behavior", *Public Opinion Quarterly* 34: 560-572.
- [34] Larcinese, Valentino (2005), "Electoral Competition and Redistribution with Rationally Informed Voters," *Contributions to Economic Analysis and Policy* 4 : Iss. 1, Article 4.
- [35] Ledyard, John (1984), "The Pure Theory of Large Two-Candidate Elections", *Public Choice* 44:7-41.
- [36] Lee, Woojin and John E. Roemer (2005), "The Rise and Fall of Unionised Labour Markets: A Political Economy Approach", *Economic Journal* 115: 1-40.
- [37] Lijphart, Arend (1997), "Unequal Participation: Democracy's Unresolved Dilemma", *American Political Science Review* 91: 1-14.

- [38] Lind, Jo Thori (2005), “Why Is There So Little Redistribution?”, University of Oslo mimeo.
- [39] Mahler, Vincent A. (2002), “Exploring the Subnational Dimension of Income Inequality: An Analysis of the Relationship between Inequality and Electoral Turnout in the Developed Countries”, *International Studies Quarterly* 46: 117-142.
- [40] Mattozzi, Andrea (2005), “Policy Uncertainty, Electoral Securities and Redistribution”, Caltech Social Science WP 1229, July 2005.
- [41] McCarty, Nolan, Keith T. Poole and Howard Rosenthal (2006), *Polarized America: The Dance of Ideology and Unequal Riches*, Cambridge, MA: MIT Press.
- [42] Meltzer, Allan H. and Scott F. Richard (1981), “A Rational Theory of the Size of Government”, *Journal of Political Economy* 89: 914-927.
- [43] Meltzer, Allan H. and Scott F. Richard (1983), “Tests of a Rational Theory of the Size of Government”, *Public Choice* 41: 403-418.
- [44] Milanovic, Branko (2000), “The Median-Voter Hypothesis, Income Inequality, and Income Redistribution: An Empirical Test with the Required Data”, *European Journal of Political Economy* 16: 367-410.
- [45] Perotti, Roberto (1996), “Inequality, Redistribution and Growth: What the Data Say”, *Journal of Economic Growth* 1: 755-776.
- [46] Persson, Torsten and Guido Tabellini (1994), “Is Inequality Harmful for Growth?”, *American Economic Review* 84: 600-621.
- [47] Persson, Torsten and Guido Tabellini (2000), *Political Economics*, Cambridge, MA: MIT Press.
- [48] Piketty, Thomas (1995), “Social Mobility and Redistributive Politics”, *Quarterly Journal of Economics* 110: 551-584.
- [49] Poiré, Alejandro (2006), “Elements for a Theory of Political Finance”, Harvard University John F. Kennedy School of Government Faculty Research WP 06-014.
- [50] Pontusson, Jonas and David Rueda (2006), “Inequality, Median Voters and Partisan Politics in Industrialized Democracies”, Princeton University mimeo.
- [51] Prat, Andrea (2002), “Campaign Spending with Office-Seeking Politicians, Rational Voters, and Multiple Lobbies”, *Journal of Economic Theory* 103: 162-189.
- [52] Ramcharan, Rodney (2007), “Inequality and Redistribution: Evidence from US States and Counties, 1890-1930.” International Monetary Fund mimeo.
- [53] Riker, William and Peter Ordeshook (1968), “A Theory of the Calculus of Voting”, *American Political Science Review* 62: 25-42.
- [54] Roberts, Kevin (1977), “Voting over Income Tax Schedules”, *Journal of Public Economics* 8: 329-340.
- [55] Rodríguez, Francisco (2004), “Inequality, Redistribution, and Rent-Seeking”, *Economics & Politics* 16: 287-320.
- [56] Roemer, John E. (1998), “Why the Poor Do Not Expropriate the Rich: An Old Argument in a New Garb”, *Journal of Public Economics* 70: 399-424.

- [57] Roemer, John E. (2006), “Party Competition under Private and Public Financing: A Comparison of Institutions”, *Advances in Theoretical Economics* 6: No. 1, Article 2.
- [58] Romer, Thomas (1975), “Individual Welfare, Majority Voting and the Properties of a Linear Income Tax”, *Journal of Public Economics* 7: 163-185.
- [59] Rosenstone, Steven J. and John Mark Hansen (1996), *Mobilization, Participation, and Democracy in America*, New York: Longman (1st ed. 1993).
- [60] Solt, Frederick (2005), “Economic Inequality and Democratic Political Engagement”, Southern Illinois University mimeo.
- [61] *Time Magazine* (2006), “The GOP’s Secret Weapon”, October 9th issue.
- [62] Verba, Sidney, Kay Lehman Schlozman, and Henry E. Brady (1995), *Voice and Equality: Civic Voluntarism and American Politics*, Cambridge, MA: Harvard University Press.
- [63] Verba, Sidney, Norman H. Nie, and Jae-On Kim (1978), *Participation and Political Equality: A Seven-Nation Comparison*, Cambridge, UK: Cambridge University Press.

6 Appendix A: Proofs

Proof. Lemma 1:

Denote by p^* the percentile of the distribution at which, given the parties' platforms, an individual is indifferent between Parties D and R . One can characterize the wealth level of an individual at p^* by:

$$(1 - \tau_D) w_{p^*} + \tau_D \bar{w} - \frac{\tau_D^2}{2} \bar{w} = (1 - \tau_R) w_{p^*} + \tau_R \bar{w} - \frac{\tau_R^2}{2} \bar{w} \implies w_{p^*} = \bar{w} \left(1 - \frac{\tau_D + \tau_R}{2} \right)$$

Given the cdf of the wealth distribution, given by (1), it follows that any percentile p of the distribution will have wealth w_p described by:

$$p = 1 - \left(\frac{w_{\min}}{w_p} \right)^{\frac{1}{\sigma}} \implies w_p = w_{\min} (1 - p)^{-\sigma} \implies w_p = (1 - \sigma) \bar{w} (1 - p)^{-\sigma} \quad (14)$$

Putting these two together yields:

$$\begin{aligned} (1 - \sigma) \bar{w} (1 - p^*)^{-\frac{1}{\sigma}} &= \bar{w} \left(1 - \frac{\tau_D + \tau_R}{2} \right) \implies (1 - p^*)^\sigma = \frac{2(1 - \sigma)}{2 - (\tau_D + \tau_R)} \implies \\ \implies p^* &= 1 - \left[\frac{2(1 - \sigma)}{2 - (\tau_D + \tau_R)} \right]^{\frac{1}{\sigma}} \end{aligned} \quad (15)$$

(More precisely, p^* equals the maximum of (15) and zero, but $p^* = 0$ cannot be an equilibrium, since the more redistributive party would then obtain no contribution at all.) From this it immediately follows that $\frac{\partial p^*}{\partial \tau_j} < 0$. Since relatively poor individuals will vote for the party that proposes higher levels of redistribution, p^* represents the share of the population that supports the more redistributive party; we thus have that if either party increases its proposed redistribution, this will decrease the potential support of the more redistributive party.

Now suppose, by way of contradiction, that $\tau_D < \tau_R$. It follows that the relatively poor will prefer Party R over Party D . It then follows that, by reducing τ_R , Party R can both decrease the overall tax rate and increase its own share of votes, since $\frac{\partial p^*}{\partial \tau_j} < 0$. This will obviously increase the party's utility. Similarly, Party D can unambiguously increase its utility by increasing τ_D . This situation cannot be an equilibrium. One thus concludes that, in equilibrium, we must have $\tau_D \geq \tau_R$. ■

Proof. Lemma 2:

Part 1 follows immediately from Lemma 1: Relatively poor individuals, if they vote and/or contribute, will do so for Party D . Hence the population of potential supporters of Party D is those individuals below the p^* percentile.

We can use this and (14), plus (3) and the uniform distribution of δ_i (which is uncorrelated with wealth), to compute the total contributions obtained by Party D :

$$\begin{aligned} Z_D &= \int_0^{p^*} \int_{\bar{\delta}}^1 (\delta - \bar{\delta}) (1 - \sigma) \bar{w} (1 - p)^{-\sigma} d\delta dp = \int_0^{p^*} (1 - \sigma) \bar{w} (1 - p)^{-\sigma} \left(\int_{\bar{\delta}}^1 (\delta - \bar{\delta}) d\delta \right) dp = \\ &= \frac{(1 - \bar{\delta})^2}{2} \int_0^{p^*} (1 - \sigma) \bar{w} (1 - p)^{-\sigma} dp = \frac{(1 - \bar{\delta})^2}{2} [-\bar{w} (1 - p)^{1-\sigma}]_0^{p^*} = \frac{(1 - \bar{\delta})^2}{2} (1 - (1 - p^*)^{1-\sigma}) \end{aligned}$$

A similar reasoning yields $Z_R = \frac{(1 - \bar{\delta})^2}{2} (1 - p^*)^{1-\sigma} \bar{w}$. ■

Proof. Lemma 3:

Let us start by considering $\theta \in [0, 1)$. Suppose, by the way of contradiction and without loss of generality, that we have $\pi_D > \pi_R$. Differentiating (5) with respect to τ_j , in such a situation, yields:

$$\frac{\partial V_j}{\partial \tau_j} = (1 - \theta) \frac{\partial v(\tau, \hat{\tau}_j)}{\partial \tau} \frac{\partial \tau}{\partial \tau_j} \quad (16)$$

which follows from the step-function nature of the “office-seeking” term in the utility function. From (6), it follows that:

$$\frac{\partial \tau}{\partial \tau_D} = \frac{\pi_D}{\pi_D + \pi_R} + \frac{(\tau_D - \tau_R) \left(\pi_R \frac{\partial \pi_D}{\partial \tau_D} - \pi_D \frac{\partial \pi_R}{\partial \tau_D} \right)}{(\pi_D + \pi_R)^2} \quad (17)$$

$$\frac{\partial \tau}{\partial \tau_R} = \frac{\pi_R}{\pi_D + \pi_R} + \frac{(\tau_D - \tau_R) \left(\pi_R \frac{\partial \pi_D}{\partial \tau_R} - \pi_D \frac{\partial \pi_R}{\partial \tau_R} \right)}{(\pi_D + \pi_R)^2} \quad (18)$$

Note also that, given (9) and (10), we have:

$$\frac{\partial \pi_D}{\partial \tau_D} = \frac{\partial \pi_D}{\partial \tau_R} = \frac{\partial p^*}{\partial \tau_D} [\gamma(Z_D) + \gamma'(Z_D) \lambda (1 - \bar{\delta}) \bar{w} (1 - \sigma) (1 - p^*)^{-\sigma} p^*] < 0 \quad (19)$$

$$\frac{\partial \pi_R}{\partial \tau_R} = \frac{\partial \pi_R}{\partial \tau_D} = -\frac{\partial p^*}{\partial \tau_R} [\gamma(Z_R) + \gamma'(Z_R) \lambda (1 - \bar{\delta}) \bar{w} (1 - \sigma) (1 - p^*)^{1-\sigma}] > 0 \quad (20)$$

Putting these together, it follows that, if $\pi_D > \pi_R$ in equilibrium, we must have:

$$\frac{\partial \tau}{\partial \tau_D} = \frac{\partial \tau}{\partial \tau_R} = 0$$

However, combining (17), (18), (19) and (20) also reveals that $\frac{\partial \tau}{\partial \tau_D} = \frac{\partial \tau}{\partial \tau_R}$ implies $\pi_D = \pi_R$. This contradiction establishes the result.

Now consider the case where $\theta = 1$ (parties are pure office-seekers). If $\pi_D > \pi_R$, then it must be that $\tau_D \neq \tau_R$, and Party R will have an incentive to adopt τ_D as a platform instead, thus splitting the vote and getting a positive probability of winning office. The converse would be true for Party D if $\pi_D < \pi_R$. Equilibrium would thus require $\pi_D = \pi_R$. ■

Proof. Proposition 1:

Lemma 3 and (6) imply that in equilibrium we have $\tau = \frac{\tau_D + \tau_R}{2}$. Using this in (15) immediately implies that p^* and τ are linked by equation (12): To any p^* corresponds a unique τ . In addition, Lemma 3 and equations (9) and (10) imply that:

$$\begin{aligned} \gamma \left(\frac{(1-\bar{\delta})^2}{2} (1-p^*)^{1-\sigma} \bar{w} \right) (1-p^*) &= \gamma \left(\frac{(1-\bar{\delta})^2}{2} (1-(1-p^*)^{1-\sigma}) \bar{w} \right) p^* \implies \\ \implies p^* &= \frac{\gamma \left(\frac{(1-\bar{\delta})^2}{2} (1-p^*)^{1-\sigma} \bar{w} \right)}{\gamma \left(\frac{(1-\bar{\delta})^2}{2} (1-p^*)^{1-\sigma} \bar{w} \right) + \gamma \left(\frac{(1-\bar{\delta})^2}{2} (1-(1-p^*)^{1-\sigma}) \bar{w} \right)} \equiv \Omega(p^*) \end{aligned}$$

Note that $\Omega(p^*) \in [0, 1]$, and also that it is a continuous function of p^* . It follows from Brouwer's fixed point theorem that $\Omega(p^*)$ has a fixed point, which characterizes the equilibrium. Note also that:

$$\begin{aligned} \Omega'(p^*) &= \frac{\gamma'(Z_R) \frac{\partial Z_R}{\partial p^*} (\gamma(Z_R) + \gamma(Z_D)) - \gamma \left(\gamma'(Z_R) \frac{\partial Z_R}{\partial p^*} + \gamma'(Z_D) \frac{\partial Z_D}{\partial p^*} \right)}{[\gamma(Z_R) + \gamma(Z_D)]^2} \\ &\propto \gamma(Z_D) \gamma'(Z_R) \frac{\partial Z_R}{\partial p^*} - \gamma(Z_R) \gamma'(Z_D) \frac{\partial Z_D}{\partial p^*} = \\ &= -[\gamma(Z_D) \gamma'(Z_R) + \gamma(Z_R) \gamma'(Z_D)] (1-\sigma) \frac{(1-\bar{\delta})^2}{2} (1-p^*)^{-\sigma} \bar{w} < 0 \end{aligned}$$

It thus follows that this fixed point is unique. ■

Proof. Proposition 2:

1. If $\gamma'(\cdot) = 0$ everywhere, meaning that contributions do not affect turnout, then (11) will imply that:

$$p^* = \frac{\gamma}{\gamma + \gamma} = \frac{1}{2}$$

2. Using (12), one can compute:

$$\begin{aligned} \frac{\partial \tau}{\partial \sigma} &= \left[(1-p^*)^{-\sigma} + (1-\sigma) (1-p^*)^{-\sigma} \left(\log(1-p^*) - \sigma \frac{\frac{\partial p^*}{\partial \sigma}}{1-p^*} \right) \right] = \\ &= (1-p^*)^{-\sigma} \left[(1 + (1-\sigma) \log(1-p^*)) - \frac{(1-\sigma) \sigma \frac{\partial p^*}{\partial \sigma}}{(1-p^*)} \right] \end{aligned} \quad (21)$$

The last term in square brackets is obviously equal to zero, given part (i) above. The term $(1 + (1-\sigma) \log(1-p^*))$ is equal to $1 - (1-\sigma) \log 2 > 0$, hence $\frac{\partial \tau}{\partial \sigma} > 0$.

■

Proof. Proposition 3:

Suppose $p^* \leq \frac{1}{2}$. It follows from (11) and $\gamma'(\cdot) > 0$ that $Z_R \leq Z_D$. This in turn requires:

$$(1 - p^*)^{1-\sigma} \leq \frac{1}{2} \implies p^* \geq 1 - \left(\frac{1}{2}\right)^{\frac{1}{1-\sigma}} > \frac{1}{2}$$

where the last inequality follows from the fact that $1 - \left(\frac{1}{2}\right)^{\frac{1}{1-\sigma}}$ is monotonically increasing in σ , and $\lim_{\sigma \rightarrow 0} 1 - \left(\frac{1}{2}\right)^{\frac{1}{1-\sigma}} = \frac{1}{2}$. This contradiction establishes the result. ■

Proof. Proposition 4:

Consider (21), as we momentarily disregard the possibility of a corner solution in which $p^* > \bar{p}(\sigma) \equiv 1 - (1 - \sigma)^{\frac{1}{\sigma}}$ and $\tau = 0$. One needs to sign $\frac{\partial p^*}{\partial \sigma}$ in order to figure out the behavior of $\frac{\partial \tau}{\partial \sigma}$. Given (11), and using the implicit function theorem, it follows that:

$$\frac{\partial p^*}{\partial \sigma} = \frac{-\frac{(1-\delta)^2}{2} \bar{w} (1-p^*)^{1-\sigma} \log(1-p^*) [\gamma'(Z_R)(1-p^*) + \gamma'(Z_D)p^*]}{\gamma(Z_R) + \gamma(Z_D) + \frac{(1-\delta)^2}{2} \bar{w} (1-\sigma) (1-p^*)^{-\sigma} [\gamma'(Z_R)(1-p^*) + \gamma'(Z_D)p^*]} \quad (22)$$

The key term is the one in square brackets, which is clearly negative. This means that the numerator is positive, since $\log(1-p^*) < 0$. Similarly, one can conclude that the denominator is positive. As a result, we have $\frac{\partial p^*}{\partial \sigma} > 0$: an increase in inequality unambiguously leads to the decisive agent being at a higher position in the wealth distribution. We can also rewrite:

$$\frac{\partial p^*}{\partial \sigma} = \frac{-(1-p^*) \log(1-p^*) A}{(1-\sigma) A + B}$$

where $A \equiv \frac{(1-\delta)^2}{2} \bar{w} (1-p^*)^{-\sigma} [\gamma'(Z_R)(1-p^*) + \gamma'(Z_D)p^*]$, and $B \equiv \gamma(Z_R) + \gamma(Z_D)$.

We can now use this back in (21). There are two terms in square brackets, which correspond to two separate effects: the term $(1 + (1 - \sigma) \log(1 - p^*))$ corresponds to the change in the preferred rate of the decisive agent, *keeping the identity of this agent fixed*. This could be called a “decisive voter’s preference effect”: Inequality affects the desire for redistribution of any given decisive agent. Note that this term will be positive if p^* is sufficiently small: A sufficiently poor agent will always have her desire for redistribution increased by inequality. (In particular, this will always be the case for the median agent, as shown in Proposition 2.) However, it can be negative if p^* is sufficiently large. The second term, $-\frac{(1-\sigma)\sigma}{(1-p^*)} \frac{\partial p^*}{\partial \sigma}$, will be negative, as argued above. This corresponds to an “endogenous turnout” effect, given by the effect of inequality, by increasing the amount of contributions from the rich relative to those

from the poor, in leading to the decisive agent being an individual at a higher percentile, who is thus less keen on redistribution. Combining the endogenous turnout effect and the possibility that the decisive voter effect be negative, it is possible that $\frac{\partial \tau}{\partial \sigma}$ be negative.

To see how (21) will behave when both the “decisive voter’s preference” and the “endogenous decisive voter” effects interact, note that we can rewrite it as:

$$\begin{aligned} \frac{\partial \tau}{\partial \sigma} &= (1 - p^*)^{-\sigma} \left[(1 + (1 - \sigma) \log(1 - p^*)) + \frac{(1 - \sigma) \sigma (1 - p^*) \log(1 - p^*) A}{(1 - p^*) (1 - \sigma) A + B} \right] = \\ &= (1 - p^*)^{-\sigma} \left[1 + (1 - \sigma) \log(1 - p^*) \left(1 + \frac{\sigma A}{(1 - \sigma) A + B} \right) \right] = \\ &= (1 - p^*)^{-\sigma} \left[1 + (1 - \sigma) \log(1 - p^*) \frac{A + B}{(1 - \sigma) A + B} \right] \end{aligned}$$

If we let $A \rightarrow \infty$, the term in square brackets will converge to $1 + \log(1 - p^*)$. Using Z_R as described by (8), we can rewrite $A = \frac{1}{(1 - p^*)} Z_R [\gamma'(Z_R)(1 - p^*) + \gamma'(Z_D)p^*]$; if $\lim_{Z \rightarrow \infty} (Z\gamma'(Z)) = \infty$ - i.e. if $\gamma'(Z)$ goes to zero sufficiently slowly, we can let A grow without bound by increasing \bar{w} . (Note that, by choosing units, we are essentially free to increase \bar{w} arbitrarily.) Under such conditions, the behavior of $\frac{\partial \tau}{\partial \sigma}$ will be determined by the behavior of $1 + \log(1 - p^*)$.

Now consider the situation in which $\sigma \rightarrow 1$. This is a situation of “perfect inequality”, where all wealth is held by a single (zero-measure) individual who obviously favors Party R against redistribution. In fact, $\sigma \rightarrow 1$ implies $Z_D \rightarrow 0$ and $Z_R \rightarrow \frac{(1 - \delta)^2}{2} \bar{w}$; since we denote $\lim_{Z \rightarrow 0} \gamma(Z) = \epsilon$, it follows that $\lim_{\sigma \rightarrow 1} p^* = \frac{\gamma\left(\frac{(1 - \delta)^2}{2} \bar{w}\right)}{\gamma\left(\frac{(1 - \delta)^2}{2} \bar{w}\right) + \epsilon}$, which gets arbitrarily close to 1 as ϵ gets arbitrarily small. It is also straightforward to see that $\lim_{\sigma \rightarrow 0} p^* = \frac{1}{2}$, since when all individuals are equal there is no incentive to deviate from the median to obtain contributions. It suffices to note that $\sigma \rightarrow 0$ implies $Z_D \rightarrow p^* \frac{(1 - \delta)^2}{2} \bar{w}$ and $Z_R \rightarrow (1 - p^*) \frac{(1 - \delta)^2}{2} \bar{w}$, and that with those values it will be the case that $p^* = \frac{1}{2}$ will satisfy the equilibrium condition. In addition, we have shown that $\frac{\partial p^*}{\partial \sigma} > 0$. Putting all of this together, we conclude that $\lim_{\sigma \rightarrow 0} \frac{\partial \tau}{\partial \sigma} \propto 1 - \log(2) > 0$, $\lim_{\sigma \rightarrow 1} \frac{\partial \tau}{\partial \sigma} < 0$, and $\frac{\partial^2 \tau}{\partial \sigma^2} < 0$ for all $\sigma \in (0, 1)$. This in turn means that there exists a $\bar{\sigma}$ such that $\frac{\partial \tau}{\partial \sigma} > 0$ if and only if $\sigma < \bar{\sigma}$. Finally, note that, from (12), we have $\lim_{\sigma \rightarrow 0} \tau = \lim_{\sigma \rightarrow 1} \tau = 0$. Given the results above concerning the behavior of $\lim_{\sigma \rightarrow 0} \frac{\partial \tau}{\partial \sigma}$, $\lim_{\sigma \rightarrow 1} \frac{\partial \tau}{\partial \sigma}$, and $\frac{\partial^2 \tau}{\partial \sigma^2}$, these imply that $\tau > 0$ for all $\sigma \in (0, 1)$. In other words, we have $p^* < \bar{p}(\sigma)$ for all $\sigma \in (0, 1)$, and there is no corner solution in this case. This completes the proof. ■

Proof. Corollary 1:

Totally differentiating (11) with respect to σ we obtain:

$$-\gamma(Z_R) \frac{\partial p^*}{\partial \sigma} + (1 - p^*) \gamma'(Z_R) \frac{\partial Z_R}{\partial \sigma} = \gamma(Z_D) \frac{\partial p^*}{\partial \sigma} + p^* \gamma'(Z_D) \frac{\partial Z_D}{\partial \sigma}$$

From (7) and (8), it is easy to see that $\frac{\partial Z_R}{\partial \sigma} = -\frac{\partial Z_D}{\partial \sigma}$, hence:

$$(\gamma(Z_D) + \gamma(Z_R)) \frac{\partial p^*}{\partial \sigma} = [(1 - p^*) \gamma'(Z_R) + p^* \gamma'(Z_D)] \frac{\partial Z_R}{\partial \sigma}$$

It follows that the sign of $\frac{\partial Z_R}{\partial \sigma}$ will be the same as that of $\frac{\partial p^*}{\partial \sigma}$, while the opposite holds for $\frac{\partial Z_D}{\partial \sigma}$. Since under the conditions of Proposition 4 we have $\frac{\partial p^*}{\partial \sigma} > 0$, the result immediately follows. ■

Proof. Corollary 2:

It can be shown that in this model we have:

$$Z = \frac{(1 - \bar{\delta})^2}{2} \bar{w} (1 - p_{\min})^{(1-\sigma)} - \frac{(1 - \bar{\delta})^2}{2} (1 - p_{\min}) x_{\min}$$

It follows that:

$$\frac{\partial Z}{\partial \sigma} \propto -\bar{w} (1 - p_{\min})^{(1-\sigma)} \log(1 - p_{\min}) - [\bar{w} (1 - \sigma) (1 - p_{\min})^{-\sigma} - x_{\min}] \frac{\partial p_{\min}}{\partial \sigma}$$

The first term, which is positive, corresponds to the fact that an increase in inequality shifts wealth to relatively wealthy individuals, who are above the contribution threshold. The second term corresponds to the effect of inequality through a change in the percentile at which individuals start to contribute – i.e. the percentile at which the level of wealth x_{\min} is attained. We can immediately note, from (14), that the term in square brackets is actually identical to zero: The change in p_{\min} has no effect, since an individual at that percentile contributes an amount of zero. It follows that:

$$\frac{\partial Z}{\partial \sigma} \propto -\bar{w} (1 - p_{\min})^{(1-\sigma)} \log(1 - p_{\min}) > 0$$

as long as $p_{\min} > 0$, which will be the case if $x_{\min} > w_{\min}$. In words, increases in inequality lead to larger amounts of contributions in equilibrium. ■

7 Appendix B: Generic Wealth Distribution

Now let us consider the case where the wealth distribution is given by some generic distribution function F defined over $[0, \infty)$. The only assumptions I will impose are that F is differentiable (and with full support, such that $F'(w) > 0$ for all $w > 0$), that it has a finite expected value, which I will denote \bar{w} , and that it is right-skewed, such that $w_{med} < \bar{w}$, where $F(w_{med}) = \frac{1}{2}$.

The main difficulty with a “generic” distribution is to conceptualize inequality. First of all, keeping in line with the standard median voter framework, I will impose that changes in inequality will increase the distance between median and mean income: $\frac{\partial w_{med}}{\partial \Delta} < 0$. For simplicity, I will consider that the “inequality” of F is measured by a parameter Δ ; in order to fix ideas, I will consider $\Delta \in [0, 1]$, and think of it as the Gini coefficient: $\Delta = 0$ is a situation of perfect equality, where every individual has the same wealth \bar{w} , while $\Delta = 1$ is the limit situation where all the wealth in the economy is held by a single individual of measure zero. This difficulty will nevertheless restrict us to heuristic proofs in a few cases, which can be made more rigorous and precise by using specific functional form assumptions, as shown in the main text.

I will now show how each of the proofs can be adapted for this general case:

- **Lemma 1:**

If the cdf of the wealth distribution is given by F , it follows that the percentile p^* of the distribution will be characterized by:

$$p^* = F(w_{p^*}) = F\left(\bar{w}\left(1 - \frac{\tau_D + \tau_R}{2}\right)\right) \quad (23)$$

From this we get that $\frac{\partial p^*}{\partial \tau_j} < 0$, since F is increasing. The lemma thus follows as before.

- **Lemma 2:**

The total wealth held by the individuals below p^* is now $\int_0^{p^*} F^{-1}(p) dp$, where F^{-1} denotes the inverse function – which exists, since we have $F'(w) > 0$. It follows that:

$$Z_D = \frac{(1 - \bar{\delta})^2}{2} \int_0^{p^*} F^{-1}(p) dp \quad (24)$$

$$Z_R = \frac{(1 - \bar{\delta})^2}{2} \int_{p^*}^1 F^{-1}(p) dp = \lambda(1 - \bar{\delta})\bar{w} - Z_D \quad (25)$$

For future reference, we note that:

$$\frac{\partial Z_D}{\partial p^*} = \frac{(1-\bar{\delta})^2}{2} F^{-1}(p^*) > 0 \quad (26)$$

$$\frac{\partial Z_R}{\partial p^*} = -\frac{\partial Z_D}{\partial p^*} < 0 \quad (27)$$

• **Lemma 3:**

Given the new version of Lemma 2, and the corresponding signs from (26) and (27), we get:

$$\frac{\partial \pi_D}{\partial \tau_D} = \frac{\partial \pi_D}{\partial \tau_R} = \frac{\partial p^*}{\partial \tau_D} \left[\gamma(Z_D) + \gamma'(Z_D) \frac{\partial Z_D}{\partial p^*} p^* \right] < 0 \quad (28)$$

$$\frac{\partial \pi_R}{\partial \tau_R} = \frac{\partial \pi_R}{\partial \tau_D} = -\frac{\partial p^*}{\partial \tau_R} \left[\gamma(Z_R) - \gamma'(Z_R) \frac{\partial Z_R}{\partial p^*} (1-p^*) \right] > 0 \quad (29)$$

The lemma thus follows as before.

• **Proposition 1:**

Now we have

$$p^* = \frac{\gamma \left(\frac{(1-\bar{\delta})^2}{2} \int_{p^*}^1 F^{-1}(p) dp \right)}{\gamma \left(\frac{(1-\bar{\delta})^2}{2} \int_{p^*}^1 F^{-1}(p) dp \right) + \gamma \left(\frac{(1-\bar{\delta})^2}{2} \int_0^{p^*} F^{-1}(p) dp \right)} \equiv \Omega(p^*)$$

Note that we still have that $\Omega(p^*) \in [0, 1]$, and also that it is a continuous function of p^* .

Note also that:

$$\begin{aligned} \Omega'(p^*) &= \frac{\gamma'(Z_R) \frac{\partial Z_R}{\partial p^*} (\gamma(Z_R) + \gamma(Z_D)) - \gamma(Z_R) \left(\gamma'(Z_R) \frac{\partial Z_R}{\partial p^*} + \gamma'(Z_D) \frac{\partial Z_D}{\partial p^*} \right)}{[\gamma(Z_R) + \gamma(Z_D)]^2} \\ &\propto \gamma(Z_D) \gamma'(Z_R) \frac{\partial Z_R}{\partial p^*} - \gamma(Z_R) \gamma'(Z_D) \frac{\partial Z_D}{\partial p^*} = \\ &= -[\gamma(Z_D) \gamma'(Z_R) + \gamma(Z_R) \gamma'(Z_D)] \lambda (1-\bar{\delta}) F^{-1}(p^*) < 0 \end{aligned}$$

It thus follows that there exists a unique fixed point, and the proposition follows. The equilibrium tax rate is now given by:

$$\tau = 1 - \frac{F^{-1}(p^*)}{\bar{w}} \quad (30)$$

• **Proposition 2:**

1. Same as before.
2. Using (30) one can compute:

$$\frac{\partial \tau}{\partial \Delta} = -\frac{1}{\bar{w}} \frac{\partial w_{p^*}}{\partial \Delta} - \frac{1}{\bar{w}} \frac{1}{F'(w_{p^*})} \frac{\partial p^*}{\partial \Delta} \quad (31)$$

where the last term uses the inverse function theorem. The last term in square brackets is obviously equal to zero, given part (1) above. The term $-\frac{1}{\bar{w}} \frac{\partial w_{p^*}}{\partial \Delta}$ here captures the change in the wealth of the median agent, relative to mean income, that is brought about by a change in inequality. Since $\frac{\partial w_{med}}{\partial \Delta} < 0$ by assumption, it follows that $\frac{\partial \tau}{\partial \Delta} > 0$.

• **Proposition 3:**

Again, suppose $p^* \leq \frac{1}{2}$. It still follows from (11) and $c'(\cdot)$ that $Z_R \leq Z_D$. This in turn requires:

$$\lambda(1 - \bar{\delta})\bar{w} - Z_D \leq Z_D \implies Z_D \geq \frac{(1-\bar{\delta})^2 \bar{w}}{2} \implies \int_0^{p^*} F^{-1}(p) dp \geq \frac{\int_0^1 F^{-1}(p) dp}{2}$$

Now note that $p^* \leq \frac{1}{2}$ also implies that:

$$\frac{w_{med}}{2} = \int_0^{\frac{1}{2}} w_{med} dp \geq \int_0^{p^*} F^{-1}(p) dp$$

Putting these two together, we get:

$$\frac{w_{med}}{2} \geq \frac{\int_0^1 F^{-1}(p) dp}{2} = \frac{\bar{w}}{2} \implies w_{med} \geq \bar{w}$$

which is in contradiction with the assumption of right-skewness of the distribution F . This contradiction establishes the result.

• **Proposition 4 (Heuristic):**

We cannot establish the non-monotonic property as rigorously as was the case with the Pareto distribution, since one needs to specify what exactly do changes inequality mean, and this requires more structure on the family of distributions being considered – as was done by assuming the Pareto distribution. We can still offer, however, some characterization of the possible results, especially for limit cases of perfect (in)equality.

To see this, let us start by noting that the expression that corresponds to (22) is now:

$$\frac{\partial p^*}{\partial \Delta} = \frac{-[\gamma'(Z_R)(1-p^*) + \gamma'(Z_D)p^*] \frac{(1-\bar{\delta})^2}{2} \int_0^{p^*} \frac{\partial w_p}{\partial \Delta} dp}{\gamma(Z_R) + \gamma(Z_D) + \frac{(1-\bar{\delta})^2}{2} w_{p^*} [\gamma'(Z_R)(1-p^*) + \gamma'(Z_D)p^*]} \quad (32)$$

The term in square brackets and the denominator are the same as before – hence they are negative and positive, respectively. The numerator is likely to be positive, to the extent that an increase in inequality will decrease the wealth of the relatively poor individuals, so that $\int_0^{p^*} \frac{\partial w_p}{\partial \Delta} dp$ would likely be negative. There is thus a tendency towards having $\frac{\partial p^*}{\partial \Delta} > 0$: an increase in inequality leads to the decisive agent being at a higher position in the wealth distribution.

We can use this back in (31). The “decisive voter” effect is captured by the term $-\frac{1}{\bar{w}} \frac{\partial w_{p^*}}{\partial \Delta}$. Note that this term will be positive if p^* is sufficiently close to $\frac{1}{2}$, given our assumption on the effect of an increase in inequality on the median agent: A sufficiently poor agent will always have her desire for redistribution increased by inequality. However, it can be negative if p^* is sufficiently large. The “endogenous turnout” effect is captured by the second term, $-\frac{1}{\bar{w}} \frac{1}{F'(w_{p^*})} \frac{\partial p^*}{\partial \Delta}$, which will likely be negative, as argued above. Combining the “endogenous decisive voter” effect and the possibility that the “decisive voter’s preference” effect be negative, it is possible that $\frac{\partial \tau}{\partial \Delta}$ be negative. We cannot be sure about that, though, without imposing more structure on the distribution function.

Even without imposing additional structure, we can substitute (32) into (31), in order to gauge at the behavior of equilibrium redistribution in response to changes in inequality when both effects are taken into account. This substitution yields:

$$\frac{\partial \tau}{\partial \Delta} = -\frac{1}{\bar{w}} \frac{\partial w_{p^*}}{\partial \Delta} + \frac{1}{\bar{w}} \frac{1}{F'(w_{p^*})} \frac{[\gamma'(Z_R)(1-p^*) + \gamma'(Z_D)p^*] \frac{(1-\bar{\delta})^2}{2} \int_0^{p^*} \frac{\partial w_p}{\partial \Delta} dp}{\gamma(Z_R) + \gamma(Z_D) + \frac{(1-\bar{\delta})^2}{2} w_{p^*} [\gamma'(Z_R)(1-p^*) + \gamma'(Z_D)p^*]} \quad (33)$$

Let us consider the limit cases of $\Delta \rightarrow 0$ (all individuals have the same wealth, \bar{w}) and $\Delta \rightarrow 1$ (all the wealth in the economy is held by a single individual), thinking of Δ as being the Gini coefficient. Since $\lim_{Z \rightarrow 0} \gamma(Z) = \epsilon$, it is easy to see that we still have, when $\Delta \rightarrow 1$, p^* arbitrarily approaching 1 as ϵ gets arbitrarily small, and $\lim_{\Delta \rightarrow 0} p^* = \frac{1}{2}$, for the same reasons as in the Pareto case. Now note that, given our definitions for the limit cases, it follows that when $\Delta \rightarrow 0$ and $p^* \rightarrow \frac{1}{2}$, we have $F'(w_{p^*}) \rightarrow \infty$; similarly, when $\Delta \rightarrow 1$ and $p^* \rightarrow 1$, we have $F'(w_{p^*}) \rightarrow 0$. (See Figures 4 and 5.) This seems to indicate that the “decisive voter’s preference” effect should prevail when inequality is low – and it will then be positive, as stressed before – while the “endogenous decisive voter” effect will be stronger when inequality is high. This indicates the distinct possibility of a non-monotonic relationship between inequality and

redistribution. That will depend, however, on the behavior of $\frac{\partial w_p}{\partial \Delta}$ along the distribution, and understanding this requires more specific assumptions on what this distribution is like.

[FIGURES 4 AND 5 HERE]

• **Corollary 1:**

Totally differentiating (11) with respect to Δ we obtain:

$$-\gamma(Z_R) \frac{\partial p^*}{\partial \Delta} + (1 - p^*) \gamma'(Z_R) \frac{\partial Z_R}{\partial \Delta} = \gamma(Z_D) \frac{\partial p^*}{\partial \Delta} + p^* \gamma'(Z_D) \frac{\partial Z_D}{\partial \Delta}$$

It is easy to see that $\frac{\partial Z_R}{\partial \Delta} = -\frac{\partial Z_D}{\partial \Delta}$, hence:

$$[\gamma(Z_D) + \gamma(Z_R)] \frac{\partial p^*}{\partial \Delta} = [(1 - p^*) \gamma'(Z_R) + p^* \gamma'(Z_D)] \frac{\partial Z_R}{\partial \Delta}$$

It follows that the sign of $\frac{\partial Z_R}{\partial \Delta}$ will be the same as that of $\frac{\partial p^*}{\partial \Delta}$, while the opposite holds for $\frac{\partial Z_D}{\partial \Delta}$, just as before. To the extent that we have $\frac{\partial p^*}{\partial \Delta} > 0$, the result immediately follows.

8 Data Appendix

The variables used in the empirical analysis are defined as follows, all at the county level:

1. **Contributions:** Individual contributions are obtained from the file “indiv00.do”, available on www.fec.gov/finance/disclosure/ftpdet.shtml#1999_2000, which are then merged with data on committees from the file “cm00.do”, available on the same URL. I limit the analysis to contributions to presidential candidates (filer type “P” in the committee file) and party committees (filer types “X”(Non-Qualified Party, meaning party committees not qualified as multi-candidate) , “Y”(Qualified Party), and “Z”(National Party Organizations)). (The procedure is analogous for gathering data for the 2003/2004 election cycle.) “Direct contributions” refer to transaction type “15” in the “indiv00.do” file.
 - (a) **Amount:** Log of one plus total amount of contributions (in the two-year election cycle) divided by population over 18 years old (so that zeros are kept in sample).
 - (b) **Number:** Number of individual contributions (in the two-year election cycle) divided by population over 18 years old, multiplied by 1000.
 - (c) **Contribution Margin:** Absolute value of the difference between contributions to Democrats and Republicans divided by total contributions to both parties (in the two-year election cycle).
 - (d) **Share of Contributions by Individuals in Different Parts of the Income Distribution:** From the CCES (Ansolabehere 2007), I add up within each county all contributions made by individuals within each income category, from 1 (less than \$ 10000) to 14 (\$ 150000 or more), then aggregate into “quartiles” – which are not exactly quartiles because of the discrete income categories, then divide by the total contributions in each county. The 1st “quartile” of the distribution comprises (roughly) 1 through 5 (\$ 25000-\$ 29999), which actually corresponds to 20% of individuals responding to the income question; the 2nd “quartile” (actually, 33%), 6 through 8 (\$ 50000 - \$59999); the 3rd “quartile” (27%), 9 through 11 (\$ 80000 - \$ 99999); and the 4th “quartile” (20%), 12 through 14. Individuals who did not respond to the income question were dropped from the sample.
2. **Voting:** Data on votes is obtained from the Atlas of U.S. Presidential Elections, on <http://www.uselectionatlas.org>
 - (a) **Turnout:** Total number of votes in the election divided by population over 18 years old.

- (b) **Vote Margin:** Margin of victory of winning candidate, in percentage points.
- (c) **Bush Win:** Dummy for counties won by George W. Bush.

3. Other Variables:

- (a) **Income:** Sum of median household income per census block, weighted by population, divided by total county population. (Counties with a single census block are excluded.). Computed from Summary File 3 of the 2000 Census.
- (b) **Education:** % of population with at least college degree. Computed from 5-Percent Public Use Microdata Sample (PUMS) files of the 2000 Census.
- (c) **Racial Heterogeneity:** Herfindahl index of racial heterogeneity. The races are defined by combining the definitions of “race” and “Hispanic origin” in the 2000 Census: My categories are “White”, “Black or African American”, “American Indian and Alaska Native”, “Asian”, “Native Hawaiian and Other Pacific Islander”, “Other” – all of these restricted to “Non-Hispanic” origin – and “Hispanic”. Computed from 5-Percent Public Use Microdata Sample (PUMS) files of the 2000 Census.
- (d) **Religious Heterogeneity:** Herfindahl index of religious heterogeneity, from a variety of sources obtained for around 1990. These data come from Alesina, Baqir and Hoxby (2004).
- (e) **Income Inequality:** Gini coefficient between census blocks within a county, weighted by population. Computed from Summary File 3 of the 2000 Census.

Table 1. 2000 Elections: Full Sample

	(1)	(2)	(3)	(4)	(5)	(6)
	Amount	Amount	Number	Number	Turnout	Turnout
Log Income	0.343 [0.064]***	0.353 [0.063]***	0.742 [0.194]***	0.722 [0.191]***	0.058 [0.008]***	0.052 [0.008]***
Education	0.045 [0.003]***	0.036 [0.003]***	0.139 [0.013]***	0.142 [0.015]***	0 [0.000]	0.003 [0.000]***
Contribution Margin	0.084 [0.030]***	0.086 [0.029]***	0.372 [0.088]***	0.368 [0.089]***		
Vote Margin					0.096 [0.011]***	0.035 [0.010]***
Bush Win	-0.085 [0.026]***	-0.034 [0.026]	-0.148 [0.077]*	-0.138 [0.083]*	0.005 [0.004]	-0.012 [0.003]***
Racial Heterogeneity		0.243 [0.083]***		0.427 [0.307]		-0.162 [0.013]***
Religious Heterogeneity		0.031 [0.078]		0.505 [0.263]*		-0.005 [0.011]
Income Inequality		1.301 [0.275]***		-3.333 [1.388]**		-0.43 [0.037]***
Observations	2915	2880	2914	2880	2935	2900
R-squared	0.373	0.377	0.315	0.305	0.507	0.610

Notes: OLS regressions with state fixed effects; robust standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%

For the definitions of the variables, see Data Appendix.

Table 2. Share of Contributions Made by Individuals in Different Parts of Income Distribution

	(1) 1 st Quartile	(2) 2 nd Quartile	(3) 3 rd Quartile	(4) Bottom Half
Log Income	-0.0866 [0.053]	-0.221** [0.090]	0.119 [0.087]	-0.308*** [0.098]
Education	-0.00043 [0.0015]	-0.00139 [0.0027]	-0.00131 [0.0028]	-0.00182 [0.0030]
Contribution Margin	-0.0414 [0.043]	-0.0133 [0.074]	0.023 [0.067]	-0.0547 [0.079]
Bush Win	0.000264 [0.022]	0.0271 [0.036]	-0.014 [0.033]	0.0274 [0.039]
Racial Heterogeneity	-0.0721 [0.066]	-0.0841 [0.12]	0.255* [0.13]	-0.156 [0.14]
Religious Heterogeneity	-0.116 [0.16]	0.384* [0.22]	-0.0643 [0.22]	0.269 [0.23]
Income Inequality	-0.517** [0.26]	-0.671* [0.39]	0.127 [0.46]	-1.188*** [0.44]
Observations	437	437	437	437
R-squared	0.151	0.117	0.153	0.184

Notes: OLS regressions with state fixed effects; robust standard errors in brackets. Sample limited to counties with at least ten individual observations in 2006 Cooperative Congressional Election Survey.

* significant at 10%; ** significant at 5%; *** significant at 1%

For the definitions of the variables, see Data Appendix.

Table 3. 2000 Elections: Democrats and Republicans

	(1) Amount	(2) Number	(3) Turnout	(4) Amount	(5) Number	(6) Turnout
	Democrats			Republicans		
Log Income	0.124 [0.025]***	0.143 [0.071]**	-0.037 [0.008]***	0.263 [0.042]***	0.579 [0.153]***	0.089 [0.008]***
Education	0.014 [0.002]***	0.044 [0.007]***	0.002 [0.000]***	0.025 [0.002]***	0.097 [0.010]***	0 [0.000]
Contribution Margin	-0.212 [0.013]***	-0.365 [0.043]***		0.245 [0.018]***	0.734 [0.068]***	
Vote Margin			-0.175 [0.010]***			0.219 [0.012]***
Bush Win	-0.068 [0.013]***	-0.178 [0.048]***		0.004 [0.016]	0.041 [0.053]	
Racial Heterogeneity	0.112 [0.036]***	0.223 [0.140]	0.009 [0.010]	0.05 [0.057]	0.203 [0.241]	-0.146 [0.012]***
Religious Heterogeneity	-0.006 [0.034]	-0.009 [0.092]	-0.029 [0.008]***	0.1 [0.058]*	0.514 [0.227]**	0.017 [0.009]*
Income Inequality	-0.103 [0.135]	-1.688 [0.539]***	-0.001 [0.028]	0.603 [0.204]***	-1.645 [1.131]	-0.38 [0.034]***
Observations	2880	2880	2900	2880	2880	2900
R-squared	0.442	0.285	0.550	0.387	0.275	0.669

Notes: OLS regressions with state fixed effects; robust standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%

All variables are defined as in the Data Appendix, except that votes and contributions are restricted to those for the corresponding party.

Figure 1. Timeline



Figure 2. Equilibrium p^*

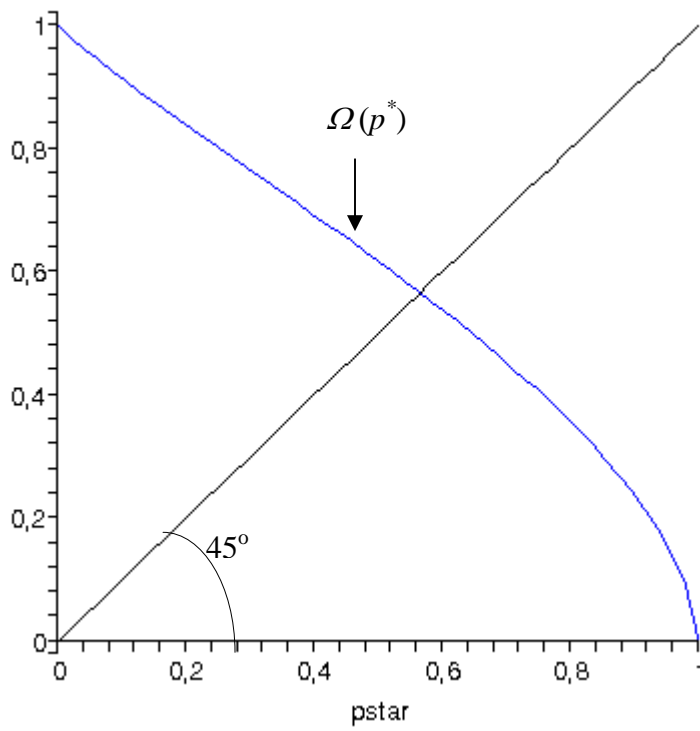


Figure 3. “Endogenous Turnout”

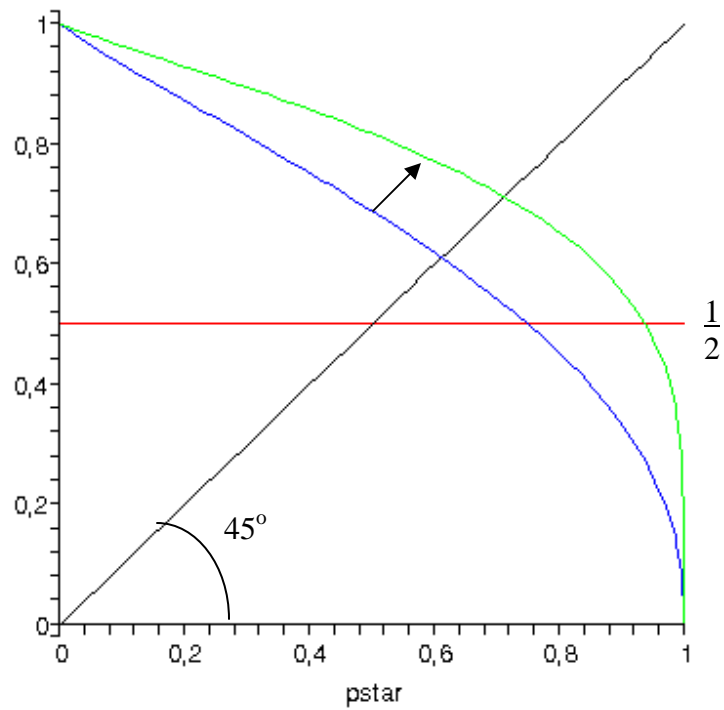


Figure 4. Perfect inequality: $\Delta \rightarrow 1$

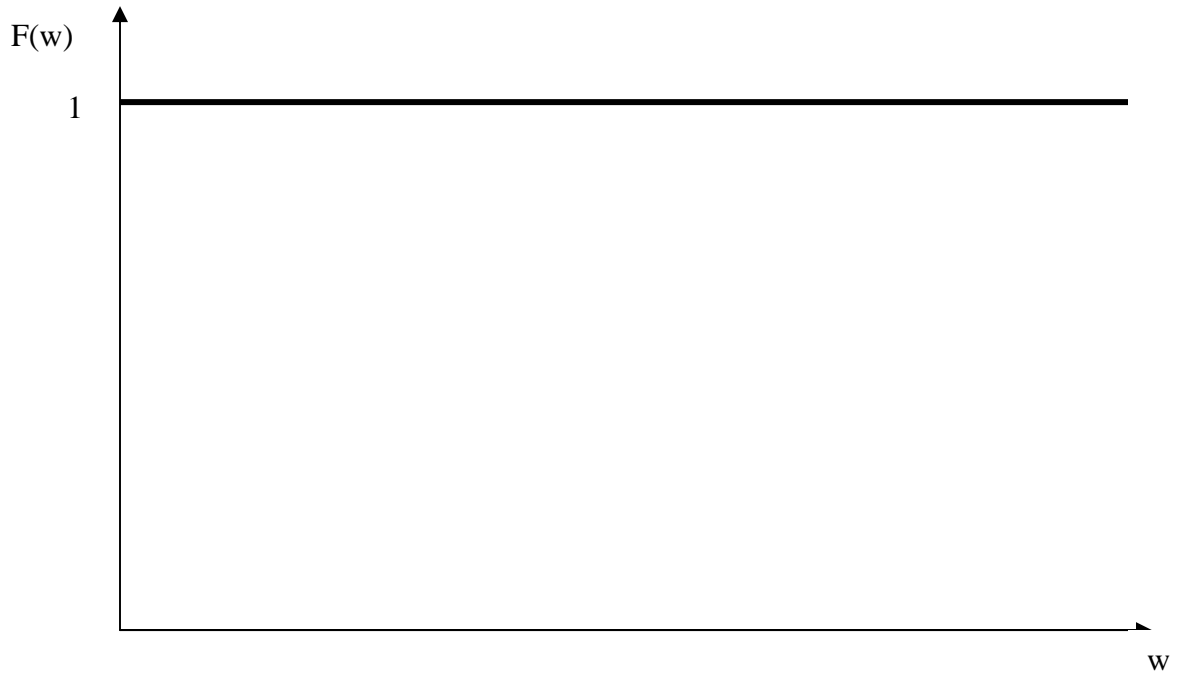


Figure 5. Perfect equality: $\Delta \rightarrow 0$

