Economic inequality, political polarization and voter turnout*

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Abstract

Rising economic inequality has often been associated to either increasing political polarization or decreasing voter turnout. In this paper, I provide a unified explanation for these associations, by accounting for the interconnection between polarization and turnout. By combining group-based ethical voting and spatial political competition, I propose a theoretical model in which both candidates' platforms and voter turnout are endogenous. I show that the direct effect of inequality on turnout is not straightforward. When candidates' polarization is initially low, rising inequality tends to decrease turnout, while the opposite is true for initially high polarization. Moreover, higher inequality also induces candidates to adapt their platforms, increasing polarization, which has an indirect effect on turnout. Finally, although inequality increases the voters' demand for redistribution, if polarization is too high, it may provide an advantage to the candidate who proposes less redistribution. Using data on the United States, I provide anecdotal evidence consistent with these theoretical predictions.

Keywords: Voting behavior, turnout, political polarization, economic inequality

JEL Codes: D72, D78, C72

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1 Introduction

Rising income inequality has often been associated to either increasing political polarization or decreasing voter turnout. The first link has strong empirical support (Duca and Saving 2016; Garand 2010; Gelman et al. 2010; McCarty et al. 2006; Voorheis et al. 2015), while for the second one the evidence is mixed (Gallego 2015; Geys 2006; Guvercin 2018; Oliver 2001; Schäfer and Schwander 2019). The main contribution of this paper is to show that these trends can be explained by studying economic inequality, political polarization and voter turnout together, and accounting for the deep interconnections among them.

I provide a simple theoretical framework which allows to understand the evolution of these three variables together. This framework relies on two key ideas: the first one is that rising income inequality changes the distribution of voters' preferences, the second is that voters' turnout decisions and candidates' policy choices are strongly interdependent. Building on these two ideas, this framework can explain why higher inequality produces higher political polarization, and, at the same time, why the link with electoral participation is not straightforward. Moreover, this unified approach for the analysis of economic inequality, political polarization and voter turnout also provides a possible explanation for another related empirical puzzle: why increased income inequality has not been associated with higher tax rates (Bonica et al. 2013; de Mello and Tiongson 2006; Lindert 2004).

The first pillar of this framework is that rising income inequality affects voters' preferences for redistribution, which in turn shape their voting behavior. This requires that voters care about the economy for their voting and turnout decisions, and that income matters to determine their economic preferences. First, economic issues such as welfare redistribution, taxation and government intervention, have always been central to political competition in advanced democracies, and remain important today, despite the recent rise in the importance of other dimensions of the political debate. For instance, a survey conducted by the Pew research center showed that the economy was the most important issue for American voters in the 2020 U.S. elections[1]. Second, although other individual characteristics matter as well, individual income is certainly a key determinant of voters' preferences for redistribution (Alesina and Giuliano 2011). In particular, the idea that voters' preferred tax rates are inversely related to individual income has its theoretical foundation in the work of Roberts (1977) and Meltzer and Richard (1981)[2], and also finds some empirical support in the data (Perotti 1996; Alesina and Giuliano 2011). A natural consequence of this negative association between income and voters' preferences is that any change in the distribution of the former is necessarily reflected on the distribution of

[1] Pew Research Center, August, 2020, "Election 2020: Voters Are Highly Engaged, but Nearly Half Expect To Have Difficulties Voting".

[2] In the classical literature initiated by Roberts (1977) and Meltzer and Richard (1981), voters differ in their level of income and trade off private and public consumption. Their ideal tax rate is the one that maximizes their utility. In these models, the political equilibrium is extremely simple: the equilibrium tax rate is the one preferred by the median voter, who is the voter with median productivity.

the latter. This paper builds on this result.

The second pillar of the framework that I propose in this paper is that voters' turnout decisions and candidates' policy choices are strongly interdependent. The key idea is that the change in the distribution of voters' preferences induced by rising income inequality produces both a direct effect on turnout, and an indirect one through political platforms polarization. Indeed, such change simultaneously affects the voters' willingness to vote and the competition among political candidates. The initial level of polarization and the way the candidates react to the increase in inequality determine whether electoral participation increases or decreases. Finally, the combination of changing platforms and changing turnout determines the equilibrium tax rate.

In order to formalize this mechanism, I propose a theoretical model of political competition between two candidates, in which both voter turnout and political platforms are endogenous outcomes. To endogenize turnout, I draw on models of ethical voting (Feddersen and Sandroni 2006; Coate and Conlin 2004), in which, even though it is costly, voters vote out of a sense of ethical obligation towards the party they belong to. Formally, voters are assumed to be "rule-utilitarian": all voters belonging to the same party follow the voting rule that, if followed by everyone else, would maximize the collective benefit, net of the total cost incurred by the party to mobilize its members. As a consequence, members of the same party act as one cohesive group. When more party members turn out, both the probability of winning and the total mobilization cost increase. Such group behavior produces endogenous uncertainty about actual turnout.

To endogenize the candidates' policies, I embed the ethical voting model into a spatial competition framework (Downs 1957; Wittman 1973, 1977, 1983). I consider two ideologically polarized candidates, who have both office and policy motivations, and I focus on the trade-off between their relatively extreme policy preferences and their probability of winning. First, the combination of the spatial competition between two ideological candidates and the uncertainty about actual turnout, which arises endogenously in the ethical voting framework, makes policy polarization possible. Second, the degree of policy polarization depends on the trade-off between the candidates' polarized ideology and their probability of winning, which, in turn, depends on the distribution of voters' preferences.

Indeed, within the spatial framework, parties are not homogeneous groups, as it is usually assumed in standard ethical voting models. Instead, voters have heterogeneous policy preferences and, hence, they have different propensities to vote. This implies that changing their policies, the candidates are able to attract different sets of voters, who then turn out with different probabilities. This generates the link between the distribution of voters' preferences and the candidates' trade-off, and is particularly relevant if candidates have a limited ability to attract voters.

The limited attractiveness of the candidates is introduced through the inclusion of a simple argument of voters' rational preferences: the mismatch cost of a voter having to vote for a candidate that does not perfectly share his views. More precisely, I assume that the absolute distance between the voter's ideal policy and the candidate's position in the policy space represents a mismatch cost for the voter, which he incurs whenever he decides to vote for a candidate, irrespectively of the policy proposed by the other candidate and of the election outcome. This assumption formalizes the idea that, although voters are more likely to prefer a candidate whose policy position is closer to their own, a voter's incentive to turn out might decrease when even the closest alternative gets farther away from his ideal. Empirical analysis of voting behavior in United States, supports the notion that voters are not motivated to vote when they do not find any candidate appealing[3] (Adams et al. 2006; Plane and Gershtenson 2004; Poole and Rosenthal 1984; Zipp 1985).

From the introduction of the mismatch cost follows that both voter turnout and candidates' policy proposals crucially depend on the distribution of voters' ideal policies. Indeed, since candidates have a limited ability to attract voters, in order to win the election they must find a policy which minimizes the mismatch cost for a large enough share of the electorate. The shape of the distribution of voters' preferences determines where this policy is. In particular, if the share of moderate voters is large, the candidates are pushed towards more moderate policies, and away from their own extreme preferences. The more the candidates care about winning, the more they converge.

How does rising economic inequality affect all this? By changing the distribution of voters' preferences, rising inequality affects the trade-off between candidates' preferences and their probability of winning, by making it less costly for the candidates to propose more extreme policies. Therefore, an increase in economic inequality always increases policy polarization. However, the effect of rising economic inequality on turnout is ambiguous. This derives from the fact that inequality has a double effect on turnout: a direct one, and an indirect one through the increase in polarization. I show that these two effects tend to counteract each other.

When candidates are weakly ideological, so that initial polarization is low, rising inequality decreases the support for the initial policies, by an increase of the mismatch cost for most voters. On the contrary, when candidates are highly ideological, so that initial polarization is already high, rising inequality tends to increase support. In the first case, the increase in polarization induced by the change in inequality has a positive effect on turnout. In some sense, rising inequality pushes voters' preferences and candidates' policies in the same direction and increases the responsiveness of candidates to the preferences of the electorate. In the second case, the further increase in polarization has a negative effect on turnout. Although inequality increases the polarization of voters preferences, it also pushes the candidates to polarize too much. This suggests that the effect of polarization on turnout might be nonlinear.

Using data on the United States, I provide evidence suggesting that this might indeed

[3] This is what the literature refers to as alienation-based abstention.

be the case. More broadly, the anecdotal evidence that I present is consistent with the predictions of the theoretical model. While inequality is always positively related to polarization, considering the level and the change of polarization is important to understand the association between inequality and turnout.

Finally, I show that taking into account the interactions between turnout and polarization may be the key to understand why increased income inequality has not been associated with higher tax rates. Indeed, a result of the model presented here is that, although the demand for redistribution increases as a consequence of rising inequality, due to excessive polarization, this may actually end up penalizing the candidate who is proposing higher taxes. This is due to the fact that increased inequality pushes the left-wing candidate to revise his trade-off by adopting a more extreme platform at the expense of a lower probability of winning. As a result, the probability that the right-wing party wins, and, therefore, that the implemented policy is more right-wing, increases.

Related literature

This paper makes several contributions to the literature. First of all, most of the previous political economy literature has focused either on endogenous turnout or on political competition with endogenous platforms. Bierbrauer et al. (2022) endogenize both turnout and platforms by combining an ethical voting model with a probabilistic voting one, in which candidates face a trade-off between maximizing their base and getting their supporters out to vote. In equilibrium, both parties propose the same policy. Instead, I consider the combination of ethical voting with a spatial framework, in which the candidates' policy choice affects the parties' mobilization strategies indirectly, by affecting the structure of the cost incurred by the party to mobilize its members. Here, since candidates are ideologically polarized, they face a trade-off between their ideology and their probability of winning, and propose polarized policies at equilibrium. Moreover, embedding the ethical voting model into a spatial voting framework and introducing the mismatch cost, makes the structure of the voting costs crucial to determining the equilibrium level of turnout.

In this regard, the model I propose is close to the model of turnout with peer punishment developed by Levine and Mattozzi (2020). Indeed, participation is modeled in a similar manner, and in both papers turnout depends on the structure of the aggregate cost borne by the parties. In the model developed by Levine and Mattozzi (2020), in addition to the mobilization cost due to the individual voting cost, the parties bare an additional cost for monitoring the voters. If monitoring is relatively easy, even a smaller party may have an electoral advantage over a larger one. This can never happen here, as the structure of the mobilization cost considered here leads to the larger party always being advantaged. In fact, the aggregate cost is uniquely determined by the individual costs of voting. However, since these costs correspond to the mismatch between voters' ideal policies and candidates proposals, the aggregate mobilization cost and the relative size of the two parties depend on the shape of the distribution of voters' preferences, as well as on the candidates' policy choice.

This paper contributes to the theoretical literature on the relationship between inequality and turnout. From a theoretical viewpoint it is not clear whether economic inequality should increase or decrease electoral turnout (see Galbraith and Hale 2008; Solt 2008, 2010). Inequality may have a negative effect on political participation for several reasons. For instance, it could negatively shape people's attitudes towards their own lives and the institutional setting that surrounds them, which would bring about political disengagement, and decrease electoral turnout (Putnam 2000; Rosenstone 1982; Widestrom 2008). Moreover, inequality in economic resources could translate into inequality of political resources: politicians would only be responsive to the richer voters, and overall turnout would fall due to higher abstention among the poor (Goodin and Dryzek 1980). On the other hand, higher economic inequality could potentially increase participation by exacerbating the conflict between the poor and the rich (Brady 2004; Matsubayashi and Sakaiya 2021). Theoretical studies investigating the relationship between inequality and turnout explore the channels mentioned above, and focus exclusively on the direct effect of inequality on voter's attitudes and their participation decisions. This paper contributes to this literature by taking into account the role of candidates' competition, and showing that considering also the reaction of candidates to an increase in inequality, or the lack thereof, is crucial to understand changes in voters' behavior.

This paper also contributes to the literature on the relationship between inequality and redistribution. Classical Downsian models à la Roberts (1977) and Meltzer and Richard (1981) predict that increased inequality, by making median income fall relative to average income, leads the median voter to demand more redistribution. Since policy is responsive to the preferences of the median voter, redistribution should increase. There exists an extensive body of literature trying to explain why this is not the case.

First, redistribution is limited by the fact that higher rates of taxation may reduce labor supply Meltzer and Richard (1981), or by the existence of deadweight loss in taxation (Bolton and Roland 1997). These models assume full and equal participation. Other scholars have considered more complex and realistic environments where theory does not provide clear predictions. For instance, Benabou (2000) shows that in economies where there are efficiency gains to redistribution, the support for redistribution does not linearly increase with the level of inequality. Roemer (1998) suggests that the salience of another dimension of political competition (such as religion) may be the reason why even left-wing parties do not propose high levels of redistribution, regardless of the level of inequality[4]. More recently, Bonomi et al. (2021) and Shayo (2020) have proposed explanations based on identity theory, claiming that cultural changes and economic shocks induce voters to

[4]Gallice and Grillo (2020) and Naess (2021) also propose explanations based on the existence of a second dimension of concern for voters. The former consider this second dimension as social status, while the latter introduces voter's preferences for a populist cultural policy.

identify along the cultural rather than the economic dimension. As a result, the salience of class conflict decreases, as well as voters' demand for redistribution. Similar views on social identification and policy change are offered by Grossman and Helpman (2021) and Mukand and Rodrik (2018).

In the specific case of the U.S., Bonica et al. (2013) explore several possible reasons why the political system has failed to counterbalance rising inequality. These include distortions of the political process such as gerrymandering, the unequal power to influence the electoral process through, for instance, campaign contributions and lobbying, the ideological shift of political parties and increased polarization, and electoral participation. Larcinese (2007) advocates for the importance of considering turnout, and turnout is also the reason why in the paper by Bierbrauer et al. (2022) even left-leaning parties may not propose high taxes on the rich.

I propose an explanation in which turnout plays indeed a crucial role, but the overall effect of inequality on the policy outcome is the result of the interaction between decreasing turnout and increasing polarization, which are both induced by higher economic inequality. Indeed, this model suggests that taking into account turnout and polarization together may be the key to understand why and under which conditions an increase in income inequality may not induce more redistributive policies to be implemented.

Finally, this paper contributes to the ongoing discussion about the consequences of political polarization. On the one hand, some scholars suggest that polarization is harmful for democracy. They argue that polarization causes legislative gridlock (Jones 2001), and decreases trust in government (Fiorina et al. 2005) and satisfaction with democracy (Ezrow and Xezonakis 2011), reduces turnout by alienating the moderate voters (Degan 2006), and exacerbates political conflict and instability (Lijphart 1984; Powell 1982). On the other hand, others claim that polarization can boost the participation of more extreme voters (Hetherington 2008), increase political engagement (Abramowitz 2010; Dodson 2010) and policy representation by improving citizens' ability to distinguish between candidates' positions and thus to cast better-informed and policy-oriented ballots (Levendusky 2010; Wang 2014). By establishing that polarization has a non-linear effect on turnout, this paper provides support for both sets of arguments. In line with the positive view, I show that moderate levels of polarization increase voters' participation. However, I also show that when polarization is too high the effect on turnout is reversed, which, instead, is in line with the view that polarization is harmful.

In this respect, I also show that, in a context of rising economic inequality, high polarization may reduce turnout among left-wing voters, thus weakening policy responsiveness to rising economic inequality. This result is also in line with the literature on the electoral effects of voter turnout suggesting that lower levels of turnout typically imply an electoral disadvantage of the left-wing party and benefit the right (Bechtel et al. 2016; Citrin et al. 2003; Fowler 2013; Hansford and Gomez 2010).

Outline

Section 2 presents the theoretical framework and highlights the key mechanisms. Section 3 describes the theoretical model and section 4 applies the model to the study of the relationship between inequality, polarization and turnout. Section 5 discusses the link between rising inequality and demand for redistribution. Section 6 presents some anecdotal evidence consistent with the prediction of the theoretical model. Section 7 concludes.

2 Economic inequality, political polarization and voter turnout

There is a growing consensus that over the past three or four decades income and wealth inequality have increased in many countries around the world (Gradín and Oppel 2021). This is true especially in the United States and United Kingdom, and to a lesser extent in a number of European countries. Over the same period, electoral participation has declined, while political polarization has been increasing. Figure 1 reports national trends for the United States over the period 2006-2016.

Figure 1: Inequality, polarization and turnout in the U.S. 2006-2016

(a) Gini (b) MDMI

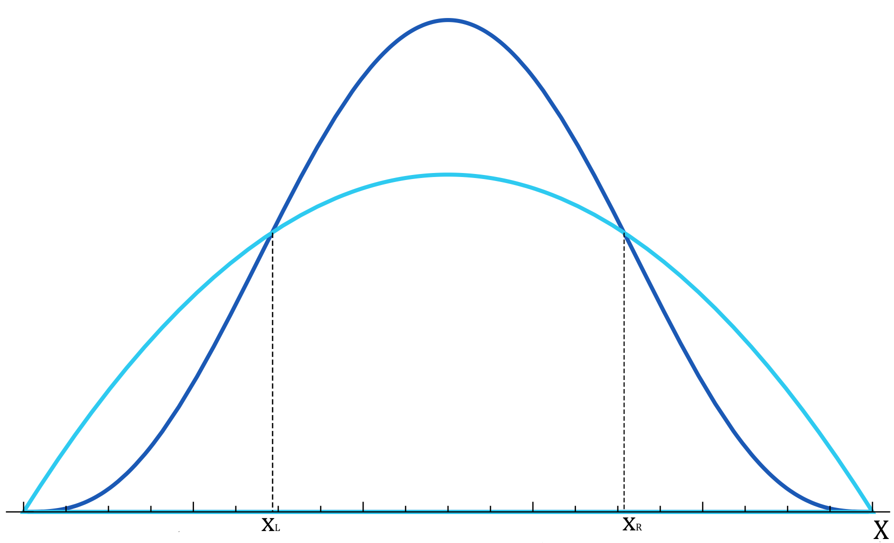
(c) Turnout (d) Polarization

Notes. Panel (a) and (b) report the trends for income inequality, as measured respectively by the Gini coefficient and by the mean distance from the median income (MDMI). Both measures are constructed using individual-level income data from the American Community Survey. Panel (c) reports the trend for electoral participation, as measured by the voting eligible population turnout rate at Presidential and Mid-Term Congressional elections. In order to make the two sets of elections comparable, turnout rates are normalized by subtracting from Presidential elections turnout rates the average difference between Presidential and Congressional rates. Panel (d) reports the trends for polarization both in the House of Representatives and in the Senate. Polarization is measured using DW-Nominate scores (Autor et al. 2020; McCarty et al. 2006; Voorheis et al. 2015), as the national-level difference between the median ideal points of representatives and senators the Democratic and of the Republican party. More information about the data sources is provided in section 7.

While the previous literature has failed to provide a theory that connects all three variables, this paper proposes a unified explanation for these trends. The argument is simple. Rising inequality changes the distribution of voters' preferences, and this simultaneously affects both the voters' willingness to vote and the candidates' policy choice. Therefore, the interaction between voters' and candidates' decisions determines how turnout and polarization change after an increase in inequality. In particular, the initial level of polarization and the way candidates react to the increase in inequality determine whether electoral participation increases or decreases. Why does polarization matter?

Consider the following example. We can think of an increase in inequality, which produces a mean preserving spread of the initial distribution of voters' preferences. This is, for instance, a case in which the relatively poor become poorer while the rich become even richer. This leads to growing class conflict, such that both the share of voters who ask for very high redistribution and the share of those asking for very small redistribution experience a similar increase, at the expenses of a decreasing share of moderate voters. Figure 2 depicts such an change in voters' preferences.

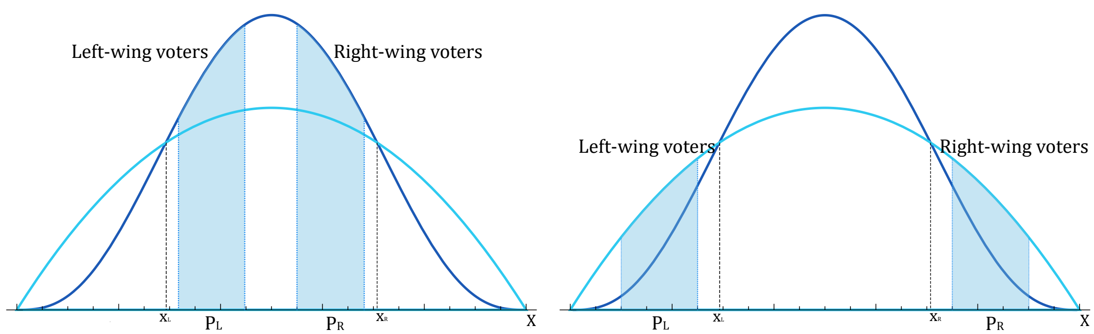
Figure 2: An example of rising inequality and changing preferences



The policy space X represents voters' preferences, ranging from higher to lower levels of redistribution going from left to right. Due to the increase in inequality (i.e. changing from the dark blue to the light blue density), the mass of voters supporting moderate levels for redistribution (i.e. those with preferences within the range x_L and x_R) decreases, while the shares of extreme left-wing and right-wing voters increase.

If candidates have a limited ability to attract voters, this change in preferences affects the candidates' support. In particular, a candidate who is targeting the moderate voters loses support, while one targeting the extreme voters gains from this change in preferences. In other terms, if the polarization between two candidates is low, so that both of them propose relatively moderate policies (i.e. within the range x_L and x_R), the change in voters' preferences decreases turnout. If, instead, polarization is high, because both candidates propose extreme policies (i.e. respectively on the left of x_L and on the right of x_R), turnout increases due to the change in voters' preferences. These two different cases are shown in Figure 3.

Figure 3: The political effects of rising inequality



(a) Low polarization (b) High polarization

This represents the direct effect of inequality on turnout. However, after the change in voters' preferences, the candidates might also decide to adapt their policies. In particular, since the share of extreme voters increases, the candidates might want to propose more extreme policies. In fact, when candidates' policies are between x_L and x_R (Figure 3, Panel a), the change in voters' preferences decreases the marginal loss in support associated to polarization more than it decreases the marginal gain. Similarly, when candidates' policies are more extreme than x_L and x_R (Panel b of Figure 3), the change in voters' preferences increases the marginal gain in support associated to polarization more than it increases the marginal loss. Therefore, in both cases polarization increases.

So what happens to turnout if polarization increases? Consider again Figure 3. When the initial level of polarization is low (Panel a), polarization has a positive effect on turnout. When candidates' policies are between x_L and x_R, the increase in polarization allows the candidates to regain some of the support that would otherwise be lost. Instead, when initial polarization is already high (Panel b), the further increase in polarization has a negative effect on turnout, suggesting that the effect of polarization on turnout might be nonlinear. This is the indirect effect of inequality on turnout, through the increase in polarization.

Decomposing the effect of inequality on turnout into its direct and indirect component is essential in order to understand how voter participation changes after an increase in inequality. Moreover, the fact that these two effects always go in opposite directions might explain why it has been so hard to find clear empirical evidence on the link between these two variables.

3 The Model

In order to formalize the mechanisms described in the previous section, I propose a theoretical model of spatial competition between two political candidates with both office and policy motivations (Downs 1957; Wittman 1973, 1977, 1983, 1990), in which turnout is endogenized by means of a group-based ethical voting model à la Feddersen and Sandroni (2006).

There is a continuum of voters of mass 1, with single-peaked preferences over a unidimensional policy space $X = [0, 1]$, where higher values of x represent a lower preference for redistribution. Voters' ideal policies are distributed over X according to the density function $f(x)$, with associated c.d.f. $F(x)$. I assume that the distribution of voters' ideal policies $f(x)$ is single-peaked and, in particular, that it has an interior single peak[5]. This assumption is consistent with empirical evidence showing that voters' views on several issues are mostly single-peaked, especially for economic ones. For instance, using data from the U.S. National Election and the General Social Survey, Ansolabehere et al. (2006) show that this is the case for the distribution of American voters' preferences on a set of economic and moral issues as of the 1990s.

There are two political candidates, a left-wing candidate denoted by L and a right-wing one denoted by R, who compete in election by proposing policies, respectively denoted by P_L and P_R, such that $P_L \leq P_R$. Given the proposed policies, turnout is determined in two steps. First, voters choose whether to abstain or to join the group (i.e. the party) of voters that support one of the two candidates. This determines the potential support for the candidates. Then, once the parties are formed, each party decides on a mobilization rule determining how many members should actually vote in order to win the election and maximize the welfare of the party. This transforms potential support into actual support, and determines the actual turnout rate.

[5]To study how both voters and candidates react to changes in the distribution of ideal policies induced by an increase in inequality, the minimum constraint that I must impose on such distribution is single-peakedness, thus excluding the case of non unimodal distributions, which would typically lead to multiplicity of equilibria.

The timing of the game is as follows:

1. Candidates choose economic policies P_L and P_R;
2. Voters form parties, parties mobilize voters;
3. Elections take place and winner implements policy.

3.1 Party formation

A voter' decision to join the group of voters supporting one of the candidates, $j = L, R$, is based on his private return from voting:

$$R_j(x) = D - c_j(x) ,$$

where D is the expressive benefit that voters derive from fulfilling their civic duty (i.e. following the mobilization rule chosen by the group), x is the voter's ideal policy and $c_j(x) = |x - P_j|$ represents his mismatch cost of supporting candidate j.

The introduction of the mismatch cost of voting formalizes the idea that voters make considerations about the extent to which candidates' interests are aligned to their own, irrespectively of the policy proposed by the other candidates and of the election outcome. In fact, since there is a mismatch between the voters' interests and the candidates' proposals, voting requires voters to compromise between what they ideally would like and what they actually can obtain.

A voter only considers joining the party supporting candidate j if P_j is closer to his ideal policy than P_{-j} is. Moreover, he only joins if his return from voting is nonnegative. The conditions for a voter to join group j are the following:

$$\begin{cases} |x - P_j| < |x - P_{-j}| \\ R_j(x) = D - c_j(i) \geq 0. \end{cases} \tag{1}$$

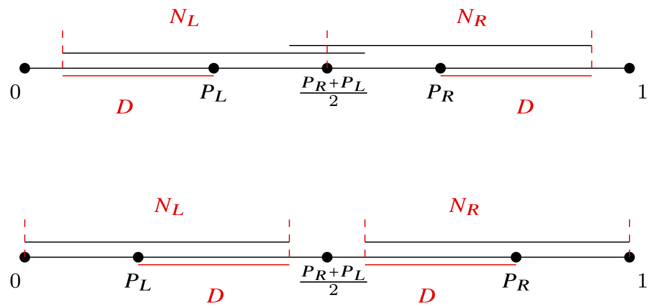
As a result, the party supporting candidate L and R are respectively formed by those voters whose ideal policies are such that:

$$\max\{0; P_L - D\} \leq x \leq \min\left\{P_L + D; \frac{P_R + P_L}{2}\right\}$$

$$\max\left\{\frac{P_R + P_L}{2}; P_R - D\right\} \leq x \leq \min\{P_R + D; 1\} .$$

Figure 4 below represents how the two parties of potential voters are located on the policy space depending on the position of the policy proposals, P_L and P_R.

Figure 4: Parties and potential voters



Given the policies proposed by the two candidates, P_L and P_R, the size of the two parties, denoted by N_L and N_R respectively, are determined as follows:

$$N_L = \int_{max\{0, P_L - D\}}^{min\left\{P_L + D, \frac{P_R+P_L}{2}\right\}} f(x)dx$$

$$N_R = \int_{max\left\{\frac{P_R+P_L}{2}, P_R - D\right\}}^{min\{P_R + D, 1\}} f(x)dx$$

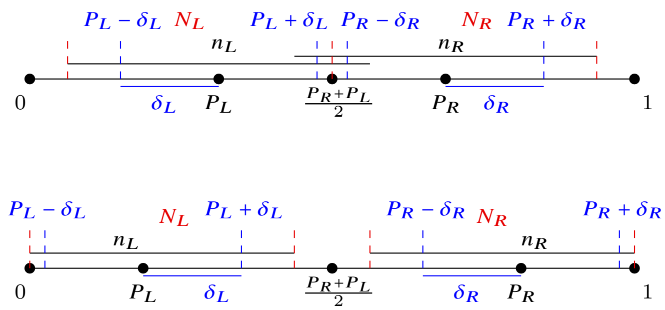
The party sizes N_L and N_R depend on the value of D. In particular, the larger the value of D the larger the parties. More interestingly, for any value of D, the distribution of voter's ideal policies $f(x)$ is crucial to determine how many potential voters join each party, and at which cost.

Notice that, since $N_L + N_R \leq 1$, the joining decision represents the first source of abstention in this model. There is a fraction of the population equal to $1 - (N_L + N_R)$ who does not feel close enough to any of the two candidates and decides to abstain by not joining any of the two parties.

3.2 Mobilization and turnout

When the two parties are formed, each group j chooses a mobilization rule, denoted by n_j, which specifies the share of voters who should actually participate in the election. The rule n_j implies a threshold $\delta_j \leq D$, such that all the party members whose mismatch cost is lower than δ_j should vote (Figure 5).

Figure 5: Actual voters and mobilization



Only the n_j voters closer to P_j actually turn out and cast a useful vote in favor of candidate j. In fact, these are the voters who are more easily mobilized, as their ideal policy is closer to the policy proposed by the supported candidate. The farther their ideal policy from the proposed one, the harder and more costly it is to mobilize voters.

The threshold δ_j is non-decreasing in the mobilization rule n_j. Moreover, given the candidates' policies P_L and P_R, for any rule n_j, δ_j is determined as follows:

$$n_L = \int_{max\{0, P_L - \delta_L\}}^{min\left\{P_L + \delta_L, \frac{P_R + P_L}{2}\right\}} f(x)dx$$

$$n_R = \int_{max\left\{\frac{P_R + P_L}{2}, P_R - \delta_R\right\}}^{min\{P_R + \delta_R, 1\}} f(x)dx$$

3.2.1 Optimal mobilization rule

The mobilization rule is chosen to maximize the net benefit for the party, W_j:

$$W_j(n_j, n_{-j}) = \pi_j(n_j, n_{-j})\ V - C_j(n_j)\ , \tag{2}$$

where V represents the value of the election, $C_j(n_j)$ is the party's aggregate mobilization cost, and $\pi_j(n_j, n_{-j})$ is the probability that candidate j wins the election:

$$\pi_j(n_j, n_{-j}) = \begin{cases} 0 & \text{for} \quad n_j < n_{-j} \\ 1/2 & \text{for} \quad n_j = n_{-j} \\ 1 & \text{for} \quad n_j > n_{-j} \end{cases}$$

The party's expected cost of mobilization $C_j(n_j)$ corresponds to the total mismatch cost of all the party members who are mobilized. This cost is increasing in the share of mobilized voters n_j and convex, that is, $C_j'(n_j) \geq 0$, $C_j''(n_j) \geq 0$. In particular,

$$C_L(n_L) = \int_{max\{0, P_L - \delta_L\}}^{min\left\{P_L + \delta_L, \frac{P_R + P_L}{2}\right\}} c_L(x) f(x) dx$$
$$C_R(n_R) = \int_{max\left\{\frac{P_R + P_L}{2}, P_R - \delta_R\right\}}^{min\{P_R + \delta_R, 1\}} c_R(x) f(x) dx$$

Concerning the value of the election, I impose the following restriction:

Assumption 1 *The election is sufficiently important:* $V \geq 2$.

Assumption 1 implies that the value of the election V is large enough to cover for the cost that the party would incur if all the members voted, even if this resulted in a tie between the two candidates, that is, $V/2 \geq C_j(N_j)\ \forall\ j = L, R$. This assumption guarantees that $W_j(n_j, n_{-j}) \geq 0$, $\forall n_j \geq n_{-j}$, meaning that a tie between the candidates always provides each party with a payoff which is at least as large as the payoff they would get by not competing at all (i.e. mobilize 0 voters).

Definition 1 *Given the distribution of voters' preferences over the policy space* X, $f(x)$, *and given the policies proposed by the candidates,* P_L *and* P_R, *the voters' equilibrium is a pair of mobilization rules* (n_L^*, n_R^*) *such that* $W_j(n_j^*, n_{-j}^*) \geq W_j(n_j, n_{-j}^*)\ \forall n_j \neq n_j^*,\ \forall j$.

At equilibrium the two groups maximize their expected benefit, taking into account that both the probability that the supported candidate wins and the total mobilization cost increase in the number of potential voters that are actually voting.

3.2.2 Party size and mobilization equilibrium

The mobilization equilibrium depends crucially on the relative size of the two parties. In particular, what is key is whether the parties have equal or different size. In the latter case, there exist a majority and a minority party.

Definition 2 *The majority party, denoted by* M, *is the party with the largest size, while the minority party, denoted by* m, *is the party with the smallest size.*

Let us denote by N_m the size of the minority party and by N_M the size of the majority party. If D is not too large, because of the first source of abstention in this model, we know that $0 < N_m < N_N < 1$.

Proposition 1 characterizes the mobilization equilibrium.

Proposition 1 *If parties have equal size, there is a unique mobilization equilibrium in which both parties use a pure strategy such that all party members vote.*

If parties have different sizes, there is a unique mobilization equilibrium in which both parties use mixed strategies. The equilibrium strategies are such that party j's mobilization rule is the realization of a distribution with c.d.f. $G_j(n)$, which is continuous on the interval $[0, N_m]$. In particular:

$$G_m(n) = 1 - \frac{C_M(N_m) - C_M(n)}{V}, \quad \textit{with an atom } G_m^o(0) = 1 - \frac{C_M(N_m)}{V} \tag{3}$$

$$G_M(n) = \frac{C_m(n)}{V}, \quad \textit{with an atom } G_M^o(N_m) = 1 - \frac{C_m(N_m)}{V} \tag{4}$$

A complete proof of all propositions is provided in the Appendix. Two things should be noticed. First, Proposition 1 clearly shows the importance of the relative size of the two parties. Moreover, it also shows that, whenever the parties have different sizes, the relevant size to determine the equilibrium strategies is the one of the minority party. Indeed, even the majority party never mobilizes more that N_m voters.

Second, the mobilization strategies described in Proposition 1 reflect the fact that the majority party is advantaged. Indeed, under Assumption 1, the majority party is always advantaged because, being larger, it can always outperform the minority party by mobilizing more voters. Moreover, under the assumption that the distribution of voters' ideal policies is single-peaked, for any rule n, the mobilization cost of the majority and minority parties have the following characteristics:

$$C_m(n) \geq C_M(n)$$
$$C'_m(n) \geq C'_M(n)$$

First, mobilizing any share of party members is at least as costly for the minority party as it is for the majority party. Second, mobilizing an additional voter is also more costly for the minority party.

A consequence of the advantage of the majority party is that, with positive probability, the minority party does not mobilize any of its members. In turn, this has consequences in terms of the expected vote shares and of the probability of winning of the supported candidates. These results are exposed in the next two propositions.

Finally, another interesting consequence of the mobilization equilibrium is that different voters are mobilized with different probability depending on their mismatch cost. The determination of the individual probability of mobilization is discussed in the Appendix.

3.3 Expected vote shares and winning probabilities

The voters' behavior described in Proposition 1 affects the parties' vote shares, the total turnout rate, and ultimately the candidates' winning probabilities.

First of all, the expected vote share of the candidate supported by party j is given by:

$$E(n_M) = Prob(n_M \in [0, N_m])E(n_M | n_M \in [0, N_m])$$

Given the equilibrium mobilization strategies, the expected vote share for the majority and the minority parties are respectively:

$$\begin{aligned}
E(n_M) &= \frac{C_m(N_m)}{V}\frac{V}{C_m(N_m)}\int_0^{N_m} n_M \frac{C'_m(n_M)}{V} dn_M + (1 - \frac{C_m(N_m)}{V})N_m \\
&= \int_0^{N_m} n_M \frac{C'_m(n_M)}{V} dn_M + (1 - \frac{C_m(N_m)}{V})N_m \\
E(n_m) &= \frac{C_M(N_m)}{V}\frac{V}{C_M(N_m)}\int_0^{N_m} n_m \frac{C'_M(n_m)}{V} dn_m \\
&= \int_0^{N_m} n_m \frac{C'_M(n_m)}{V} dn_m
\end{aligned}$$

The vote share difference $E(n_M) - E(n_m)$ can be written as follows:

$$\begin{aligned}
E(n_M) - E(n_m) = &\int_0^{N_m} n_M \frac{C'_m(n_M)}{V} dn_M + (1 - \frac{C_m(N_m)}{V})N_m \\
&- \int_0^{N_m} n_m \frac{C'_M(n_m)}{V} dn_m \\
= &\int_0^{N_m} n(\frac{C'_m(n)}{V} - \frac{C'_M(n)}{V})dn + (1 - \frac{C_m(N_m)}{V})N_m > 0
\end{aligned}$$

Assumption 1 guarantees that the first term is always positive. Moreover, by definition of majority and minority parties, $C'_m(n) > C'_M(n)$ holds $\forall n$. Therefore, also the first term is positive. As a result, the expected vote share of the majority party is larger than the expected vote share of the minority party, that is, $E(n_M) > E(n_m)$.

Given the expected vote shares of the two parties, expected turnout is determined by:

$$E(T) = E(n_M) + E(n_m) = \int_0^{N_m} n(\frac{C'_m(n)}{V} + \frac{C'_M(n)}{V})dn + (1 - \frac{C_m(N_m)}{V})N_m \tag{5}$$

Furthermore, the party's vote share determine the probability that the supported candidate wins the election. Indeed, the expected probability of winning of each candidate corresponds to the probability that his supporting party succeeds in mobilizing more voters than the other party. Formally, the expected probability of winning of the candidate supported by the majority party and by the minority party are obtained as follows:

$$
\begin{aligned}
\pi_M &= \int_0^{N_m} g_M(n)\left[G_m^o(0) + \int_0^n g_m(n_m)dn_m\right] dn + G_M^o(N_m) \\
&= \int_0^{N_m} g_M(n)\left[G_m(n)\right] dn + G_M^o(N_m) \\
\pi_m &= \int_0^{N_m} g_m(n)\left[\int_0^n g_M(n_M)dn_M\right] dn \\
&= \int_0^{N_m} g_m(n)G_M(n)dn
\end{aligned}
$$

Proposition 2 *The candidate supported by the majority party is more likely to win, yet the candidate supported by the minority party has a positive probability of winning.*

$$0 < \pi_m(n_m, n_M) < \pi_M(n_m, n_M) < 1$$

Proposition 2 implies that, no matter how small their party is, the voters of the minority party always have a chance at electing their supported candidate. This result lays foundation for the equilibrium of the candidates' competition by guaranteeing that any policy, even a very extreme or unpopular one, has a positive probability of winning.

Finally, the next proposition summarizes the key characteristics of the winning probabilities, which are crucial to the determination of the policy equilibrium. In particular, it explains how the winning probabilities depend on the distribution of voters' ideal policies, through the determination of the party sizes and of the distribution of mobilization costs within the parties.

Proposition 3 *The probability that the minority candidate wins the election increases in the size of the party supporting him, i.e. π_m increases in N_m. The probability that the majority candidate wins the election decreases in the dispersion of the ideal policies of its voters around his proposed policy P_M. In other terms, provided that $N_M > N_m$, π_M decreases in $C'_M(n)$.*

3.4 Candidates' policy choice

Anticipating the behavior of voters and parties, the two candidates L and R compete by proposing policies P_L and P_R respectively.

I assume that the candidates have preferences over the policies. In particular, each candidate j has an ideal economic policy denoted by $\tilde{P}_j$, such that the left-wing candidate prefers a higher level of redistribution than the right-wing candidate does, that is: $\tilde{P}_L<$

$\tilde{P_R}$. Therefore, when the candidates choose their platforms, they do not only consider the probability of winning the election, but also the policy that is implemented. The objective function of candidate j is:

$$U_j(P_j, P_{-j}) = \pi_j \left(\gamma + (1-\gamma)u_j(P_j)\right) + (1-\pi_j)(1-\gamma)u_j(P_{-j}) \tag{6}$$

where candidate j' utility function $u_j(P_k)$ is decreasing in the distance between the implemented policy and his ideal level of redistribution. In particular, $u_j(P_k)$ is defined as follows:

$$u_j(P_k) = -|\tilde{P_j} - P_k|, \tag{7}$$

The parameter γ in the candidate's objective function in equation 6 represents the importance of holding office, and determines trade-off between the candidate's office motivation and the policy motivation. Indeed, this objective function encompasses two models of candidate behavior. If $\gamma = 1$, candidates are purely office motivated. This corresponds to the "Downsian model" of political competition, where candidates only strive for election and do not care about policy per se (Downs, 1957). In this case the candidates' objective function is $U_j(P_j, P_{-j}) = \pi_j$. If, instead, $\gamma = 0$, candidates are policy motivated. This corresponds to the "Wittman model" of political competition, in which candidates care about the policy, but acknowledge that they need to be elected in order to implement their policy (Wittman, 1977). In this case the candidates' objective function is $U_j(P_j, P_{-j}) = \pi_j u_j(P_j) + (1-\pi_j)u_j(P_{-j})$.

Given the mobilization equilibrium strategies of voters and parties, the winning probability of each candidate j can be defined as follows:

$$\pi_j = \begin{cases} \pi_m = \int_0^{N_j} \frac{C'_{-j}(n)}{V} \frac{C_j(n)}{V} dn & \text{for} \quad N_j < N_{-j} \\ 1/2 & \text{for} \quad N_j = N_{-j} \\ \pi_M = 1 - \frac{C_j(N_{-j})}{V} \frac{C_{-j}(N_{-j})}{V} + \int_0^{N_{-j}} \frac{C'_{-j}(n)}{V} \frac{C_j(n)}{V} dn & \text{for} \quad N_j > N_{-j} \end{cases}$$

Under Assumption 2, and by exploiting the properties of the voters equilibrium described in Proposition 3, it is possible to determine the candidates' policy equilibrium. In particular, the candidates' equilibrium is a pair of policies (P_L^*, P_R^*) such that:

- $U(P_j^*, P_{-j}^*) \geq U(P_j, P_{-j}^*) \; \forall P_j \neq P_j^*, \; \forall j$
- and either
  (i) $\pi_L = \pi_R = \frac{1}{2}$ and $N_L = N_R = \bar{N}$, or
  (ii) $\pi_M > \pi_m > 0$ and $N_M > N_m$.

If candidates' only objective is to win the election, only the first type of equilibrium (i) is possible. On the contrary, if the candidates are also policy-motivated and have differentiated policy preferences, at equilibrium they propose divergent policies, and the candidate whose is able to attract a larger group of potential voters has a higher probability of winning the election (ii).

3.4.1 Office motivation

I first consider the case in which candidates are only interested in winning the election, that is, $\gamma = 1$. In this case, the equilibrium is always symmetric, regardless of the distribution of voters' ideal policies: the parties that form around the candidates' policies have the same size and the two candidates have equal probability of winning. Moreover, the candidates propose the same policy. The next proposition summarizes these results.

Proposition 4 *If candidates are purely office-motivated (i.e. $\gamma = 1$), the two parties have the same size regardless of the distribution of ideal policies. Therefore, the equilibrium is such that:*

$$\pi_L = \pi_R = \frac{1}{2}$$
$$N_L = N_R = N$$

Moreover, if the distribution of voters' ideal policies is single-peaked, candidates propose the same policy and the equilibrium is such that:

$$P_L^* = P_R^* = P_C$$

where P_C is the policy preferred by the central voter[6]*, as it is defined by Llavador (2000).*

3.4.2 Policy motivation

If the candidates are not only interested in winning the election, and also care about policy per se, that is, $\gamma < 1$, at equilibrium they adopt divergent policies. As a result, one of the groups of potential voters will be larger in size and the candidates they support will have a greater probability of winning the election. Moreover, the position of P_L^* and P_R^* depends on the candidates' policy preferences. In particular, the policy proposals are determined by the relative position of the candidates' ideals with respect to the policy that maximizes the probability of winning, that is P_C. Overall, three configurations are

[6] In Llavador (2000), given a single-peaked distribution $f(x)$, with associated c.d.f. $F(x)$, and a real number d, the central voter policy P_C is such that:

$$F(P_C) - F(P_C - d) = F(P_C + d) - F(P_C).$$

possible: $P_C \leq \tilde{P_L} < \tilde{P_R}$, $\tilde{P_L} < \tilde{P_R} \leq P_C$, or $\tilde{P_L} < P_C < \tilde{P_R}$. The first two cases represent situations in which candidates have relatively similar policy preferences, both on the same side of the policy space. In these cases, polarization is small and the equilibrium policies reflect candidates' preferences: in the first case, $P_C \leq P_L^* < P_R^* < \tilde{P_R}$, and in the second, $\tilde{P_L} < P_L * < P_R^* \leq P_C$. The third case (i.e. $\tilde{P_L} < P_C < \tilde{P_R}$) is the most interesting one, in which the candidates have significantly different policy preferences, laying on the opposite sides of the policy space. I focus on this case.

Assumption 2 *Candidates have significantly different policy preferences:* $\tilde{P_L} < P_C < \tilde{P_R}$.

Proposition 5 characterizes the candidates' equilibrium of this model with policy motivated candidates under Assumption 2.

Proposition 5 *If candidates care about the implemented policy (i.e.* $\gamma > 1$*), then they do not converge at equilibrium, i.e.* $P_L^* \neq P_R^*$. *Moreover, each candidate compromises between his ideal policy and the policy that maximizes the probability of winning (i.e.* P_C*). In particular, under Assumption 2, candidates propose policies:*

$$\tilde{P_L} < P_L^* < P_C < P_R^* < \tilde{P_R}. \tag{8}$$

The result of Proposition 5 is in line with the general result for the equilibrium of spatial voting models with policy motivated candidates and aggregate uncertainty as discussed, for instance, by Roemer (2001). What is interesting is that here aggregate uncertainty is not assumed. Instead, it arises endogenously due to the way turnout is modeled. Indeed, because of the parties mobilization strategies, when they choose their policy proposals, candidates only know the deterministic party size but there is uncertainty concerning actual turnout. This implies that even extreme policies have a chance of winning the election, which makes polarization possible.

The next proposition describes how policy polarization is determined.

Proposition 6 *The extent of policy polarization depends on the probability cost of proposing a policy that the candidates prefer, which must be the same for the two candidates, and on the importance of holding office, i.e. the value of* γ.

$$P_R^* - P_L^* = \frac{\pi_L}{|\frac{\partial \pi_L}{\partial P_L}|} - \frac{\gamma}{(1-\gamma)} = \frac{\pi_R}{|\frac{\partial \pi_R}{\partial P_R}|} - \frac{\gamma}{(1-\gamma)} \tag{9}$$

The condition above implies that the degree of policy polarization depends on two elements: the marginal probability gain/loss associated with a policy, and relative the importance of winning the election.

The first element is the marginal gain in probability that each candidate would incur if he proposed a slightly more moderate policy (i.e. closer to P_C), or, alternatively, the marginal loss in probability that he would incur if he adopted a slightly preferred policy. This marginal loss represents how much each candidate is willing to give up, in terms of winning probability, in order to be able to implement a policy which is closer to his ideal policy, and it constitutes a "probability cost" for the candidates.

This probability cost is determined by the attractiveness of the party (i.e. the size of D) and by the distribution of voters' ideal policies, $f(x)$. In particular, it depends on the slope of $f(x)$ at P_j^* as well as on $f(P_j^*+D)$ and $f(P_j^*-D)$. Indeed, Proposition 3 established that the probability that a candidate wins the election depends not only on the size of the group of voters who support him, but also on how cohesive this group is. This means that a candidate has a higher probability of winning if he proposes a policy that is close enough to the interests of a great number of voters, that is a policy located in an area of the policy space with more density. As a result, $\frac{\partial \pi_j(P_j)}{\partial P_j}$, as well as $\pi_j(P_j)$, is determined by $f(P_j^* + D)$ and $f(P_j^* - D)$.

At equilibrium, this probability cost must be equal for both candidates. However, this does not necessarily imply that the equilibrium policies are symmetric. Whether this is the case depends on whether $f(x)$ itself is symmetric. Indeed, if $f(x)$ is asymmetric, the equilibrium will be such that the proposed policies will not be symmetric and one candidate will be supported by a larger party and will be more likely to win. Nonetheless, both candidates will have the same probability cost by marginally moving closer to their ideal policy. Moreover, from the condition above it follows that the candidate who has a higher probability of winning must be proposing a policy located af a point if which the density is higher. From this, we can deduce that higher polarization is typically associated with higher asymmetry between the candidates, or that, in other terms, there is less polarization in closer elections.

Finally, the second element that determines the extent of policy polarization is the importance of holding office, i.e. the value of γ. More precisely, $\frac{\gamma}{(1-\gamma)}$ represents how much candidates care about winning the election relative to how much they care about the policy per se. As γ decreases, candidates become more ideological and the degree of polarization increases. If, instead, candidates care relatively more about winning the election, there will be less polarization at equilibrium. As established in Proposition 4, at the limit, if candidates only care about office ($\gamma = 1$), candidates converge to the same policy and polarization is zero.

4 The effect of rising economic inequality

In the model presented in the previous section both voters' participation and candidates' policies crucially depend on the distribution of voters' preferences. Therefore, changes in such distribution necessarily affect the interaction between candidates' and voters' decisions and the interplay between voter turnout and policy polarization.

What happens when economic inequality increases? There are potentially many ways in which rising inequality may affect the distribution of voters' preferences. I focus here on increasing preference dispersion, which might be induced by two different types of increase in inequality.

First, I consider a symmetric increase in inequality, which produces a mean preserving spread of the initial distribution. In this case, the increase in the dispersion of the distribution of ideal policies does not the mean, median and mode of such distribution, and consequently without changing the position of the central voter policy, P_C. This type of change can be thought of as a case of growing class conflict and disappearing middle-class, such that the share of extreme left-wing voters and the share of extreme right-wing voters experience a similar increase, at the expenses of a decreasing share of moderate voters.

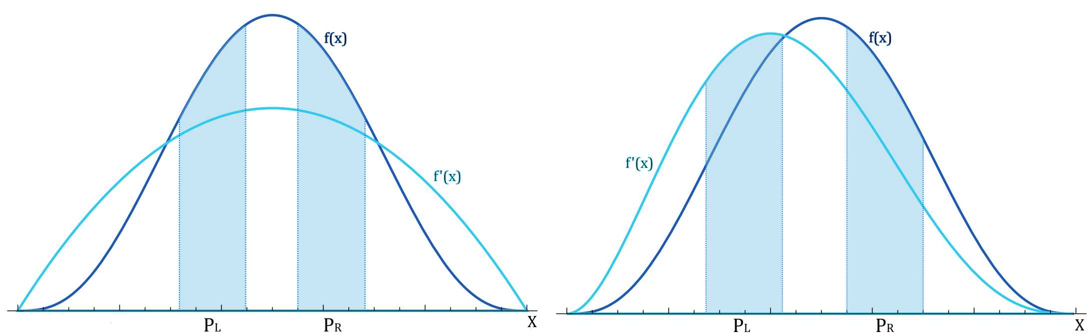
Second, I consider an asymmetric increase in income inequality. This corresponds to the situation in which the distance between the mean and the median income increases. In such case, the increase in the dispersion of the distribution of voters' preferences is associated with an increase in its skewness, and the central voter policy shifts towards the left of the policy space. This change is representative of a situation in which a few rich voters becomes even richer (moving towards more extreme right positions), while the majority of the electorate becomes poorer. In this case, the increase in inequality is associated with a greater demand for redistribution in the electorate (i.e. the central voter becomes relatively poorer).

Under the assumption that candidates are purely office-motivated, that is $\gamma = 1$, their policy choice is responsive to the preferences of the central voter: by Proposition 4, the political equilibrium is such that candidates converge towards the same policy, P_C. While the location of such policy on the ideological space depends on the distribution of voters' ideal policies, $f(x)$, the convergence result does not. In this particular case, a change in the distribution of voters' ideal policies has no effect on the lack of polarization between the candidates. Indeed, with office-motivated candidates, for a given value of the participation benefit D, turnout is defined as $T = F(P_C + D) - F(P_C - D)$. Since the central voter policy is close to the mode of the distribution, when the dispersion increases, the density around the mode is reduced in favor of a higher density at the extremes of the distribution. This implies that, if the candidates are only interested in winning the election, when $f(x)$ becomes more dispersed turnout decreases.

A more interesting case is when the candidates care both about the probability of winning the election and about the policy that is implemented, that is $\gamma < 1$. In fact, in this case candidates adopt differentiated policies in equilibrium (Proposition 5) and the degree of polarization depends on the distribution of voters' preferences (Proposition 6). In this case, the effect of an increase in inequality on turnout depends on how candidates react to such increase, as well as on the intensity of candidates' ideology. The latter is determined by the relative importance of office versus policy, i.e. γ.

As mentioned, I distinguish between a symmetric and an asymmetric increase in inequality. Figure 6 illustrates these two types of increase for the case of weakly ideological candidates, i.e high value of γ. In such case, initial polarization is low. When inequality increases symmetrically (Panel a), the direct effect of inequality on turnout is straightforward: the size of both groups of potential voters decreases, as well as total turnout. When the increase in inequality is asymmetric (Panel b), the two groups are affected differently. While the group supporting the right-wing candidate gets smaller, the share of supporters of the left-wing candidate increases. However, the effect on turnout is negative also in this case. Indeed, by Proposition 1 we know that even the largest party never mobilizes a share of members larger than the size of the smallest party. Therefore, even if only one party becomes smaller, expected turnout cannot increase.

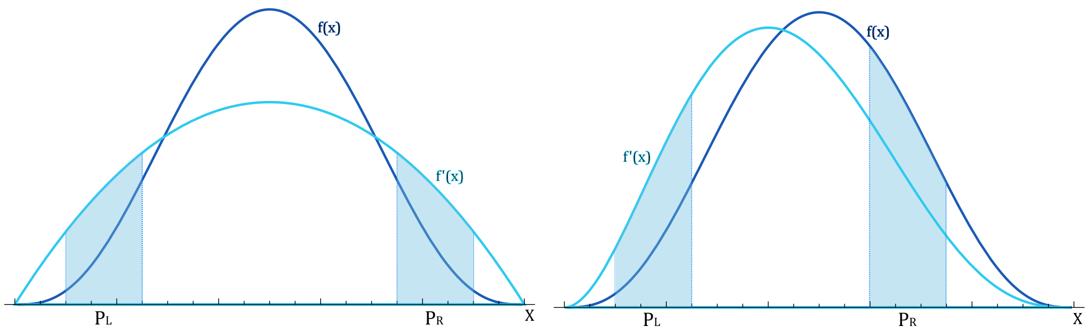
Figure 6: Weakly ideological candidates (high γ)



(a) Symmetric increase (b) Asymmetric increase

Figure 7 illustrates the symmetric (Panel a) and asymmetric (Panel b) increases in inequality for the case of strongly ideological candidates (i.e. low γ). In this case, initial polarization is high. The direct effect of inequality on turnout tends to be positive, especially if the considered increase in inequality is symmetric. If the increase is asymmetric, the same reasoning as before applies, and the effect on turnout can be negative.

Figure 7: Weakly ideological candidates (high γ)



(a) Symmetric increase (b) Asymmetric increase

However, when candidates care about the policies, their decision concerning their policy proposals is also affected by changes in the distribution of voters' ideal policies induced by an increase in inequality. Consider the left-wing candidate L. When the distribution becomes more dispersed due to a symmetric increase in inequality, $f(P_L - D)$ increases and $f(P_L + D)$ decreases, which implies that $|\frac{\partial \pi_L(P_L)}{\partial P_L}|$ also increases. If this is the case, proposing something closer to his preferred policy becomes less costly, and proposing something far away from it becomes less rewarding in terms of winning probability. This holds for both candidates. Therefore, candidates' proposals will get closer to their ideals and polarization will increase. The more so, the lower the value of γ.

When the change in voters' preferences is asymmetric, polarization increases as well, but the reasoning is slightly different. After the change, N_L increase while N_R decreases, therefore $f(P_L - D)$ increases and $f(P_L + D)$ decreases, which implies that π_L increases, while π_R decreases. Moreover, while $f(\tilde{P_L})$ increases, $f(\tilde{P_R})$ decreases. Therefore, the candidates' trade-offs are affected differently: for the left-wing candidate ideology becomes relatively more important, while the right-wing candidate cares more about his probability of winning. For different reasons, both candidates shift towards the left, but since the left-wing candidates moves more that the right-wing candidate, polarization increases.

The effect of this increase in polarization on turnout is not linear. For lower values of initial polarization (or higher values of γ), this allows candidates to regain some of the votes that would have been lost due to the increase in the mismatch cost of the voters whose preferences have become more extreme. As a result, turnout decreases less than in the case of office-motivated candidates, and it may even increase if the polarization increases enough to regain more votes that those that were lost in the first place. On the contrary, for higher levels of initial polarization (or lower values of γ), the additional increase in polarization induced by rising inequality may have a negative effect on voter participation. Indeed, candidates' proposals may become too extreme and discourage a larger share of moderate voters than the share of extreme voters that are attracted by the new policies.

The following table summarizes the results of this section.

With weakly ideological candidates (i.e. initial polarization is low):

$$\uparrow \textit{Inequality} \rightarrow \Delta \ \textit{preferences} \rightarrow \begin{cases} \downarrow \textit{turnout} \\ \uparrow \textit{polarization} \ \ \rightarrow \uparrow \textit{turnout} \end{cases}$$

With strongly ideological candidates (i.e. initial polarization is high):

$$\uparrow \textit{Inequality} \rightarrow \Delta \ \textit{preferences} \rightarrow \begin{cases} \uparrow \textit{turnout} \\ \uparrow \textit{polarization} \ \ \rightarrow \downarrow \textit{turnout} \end{cases}$$

Numerical simulations

In order to better illustrate these results, I perform a series of numerical simulations. I consider that voters preferences are distributed according to a Beta distribution and check how turnout changes with the value of the distribution parameters. In particular, I fix the initial distribution of voters preferences to be a symmetric Beta, and consider both symmetric and asymmetric increases in inequality as studied above.

The two tables below summarize the results of the simulations. Overall, higher dispersion of the distribution of voters' ideal policies is always associated with higher candidates polarization, as measured by the distance between the policies they propose. Moreover, although turnout decreases in most of the cases, it may sometimes increase.

Each table reports the equilibrium policies, the size of the two parties, the level of polarization and the turnout rate for different distributions of voters' preferences. Taking the Beta(4,4) as the initial distribution, the other two correspond to an asymmetric (Beta(3,4)) and a symmetric (Beta(3,3)) increase in inequality. The last three columns of each table report the party sizes and turnout rates that would correspond to each distribution if the policies were fixed at the initial level (i.e. at the equilibrium level for the Beta(4,4)). Fixing the policies allows to isolate the direct effect of inequality on turnout, in the absence of any policy adjustment.

Table 1 depicts the case of weakly ideological candidates (i.e. $\gamma = 0.5$). In this case, polarization is always very low. Nonetheless, it is increasing in the dispersion of the distribution. By looking at the turnout rate without policy adjustment, we see that the direct effect of inequality on participation is always negative. However, the increase in polarization that is induced by the increase in inequality increases turnout, and the final effect on participation is positive.

Table 1: Weakly ideological candidates ($\gamma = 0.5$)

D = 0.2	Var	P_L	P_R	N_L	N_R	**Pol**	**T**
Beta(4,4)	0.028	0.49	0.51	0.389	0.389	**0.02**	**0.78**
				No Policy adjustment			
Beta(3,4)	0.031	0.49	0.51	0.418	0.281	0.02	**0.56**
Beta(3,3)	0.036	0.49	0.51	0.349	0.349	0.02	**0.70**
				Policy adjustment			
Beta(3,4)	0.031	0.39	0.45	0.404	0.389	**0.06**	**0.78**
Beta(3,3)	0.036	0.44	0.56	0.409	0.409	**0.12**	**0.82**

Table 2 depicts the case of strongly ideological candidates (i.e. $\gamma = 0$). Polarization is higher, and so is initial turnout. Contrary to the previous case, the direct effect of inequality on participation can be positive. Moreover, by comparing the turnout rate with and without policy adjustment, we see that the increase in polarization depresses turnout. The final effect on participation is negative, and it is mainly driven by the negative indirect effect through polarization.

Table 2: Strongly ideological candidates ($\gamma = 0$)

D = 0.2	σ^2	P_L	P_R	N_L	N_R	**Pol**	**T**
Beta(4,4)	0.028	0.26	0.74	0.422	0.422	**0.48**	**0.84**
				No Policy adjustment			
Beta(3,4)	0.031	0.26	0.74	0.575	0.272	0.48	**0.54**
Beta(3,3)	0.036	0.26	0.74	0.423	0.423	0.48	**0.85**
				Policy adjustment			
Beta(3,4)	0.031	0.10	0.64	0.261	0.456	**0.53**	**0.52**
Beta(3,3)	0.036	0.22	0.78	0.346	0.346	**0.56**	**0.69**

5 Rising inequality and demand for redistribution

If politics is majoritarian, equal and with full participation, then democracy should be able to correct inequality, at least partially. Classical Downsian models à la Roberts (1977) and Meltzer and Richard (1981) predict that increased inequality, by making median income fall relative to average income, leads the median voter to demand more redistribution. However, especially in recent years, increasing inequality is not necessarily associated with higher support for redistribution and implementation of more redistributive politics.

In this paper, I propose a novel explanation for this empirical puzzle. The key idea is that the overall effect of inequality on the policy outcome is the result of the interaction between decreasing turnout and increasing polarization, which are both induced by higher economic inequality. The results presented in the previous section show how a change in voters' preferences due to an increase in economic inequality may affect both political polarization and voter turnout. This has two implications. The polices proposed by the political candidates are themselves affected by inequality. The fact that increasing inequality affects both how many people vote, and also who votes, influences the winning probabilities of the two candidates.

When inequality increases in such a way that the median voter in the new distribution is on the left of the median voter in the old distribution (i.e. the asymmetric type of change represented in Panel b of Figures 6 and 7), then we can say that the demand for redistribution in the electorate increases. In particular, there is now a larger share of voters asking for very high levels of redistribution.

When this type of change in voters' preferences occurs, the left-wing candidate sees the opportunity for moving closer to his ideal policy at a relatively low cost. In fact, the small loss in terms of reduced probability of winning is more than compensated by a large increase in utility due to the fact that, if he wins, the candidate is now able to implement a policy that he likes better. The higher the increase in inequality, the greater the mass of voters moving to the left part of the policy space, and the stronger to push towards a more extreme policy. However, when the left-wing policy becomes too extreme, the relative turnout rate of left-wing voters decreases.

On the contrary, the right-wing candidates experiences a decrease in potential support, which means that marginally adjusting his policy has a huge impact on his probability of winning. Moreover, with the opponent proposing a more extreme (left wing) policy, the disutility he gets from losing the elections increases. This implies that for the right-wing candidate it is now more important to focus on increasing his winning probability and prevent the other candidate from implementing a very extreme policy. As a result, this candidate also has incentive to shift more to the left, but just slightly. Indeed, by proposing a slightly more moderate policy he is able to gather the votes of both the right-wing and the moderate voters, and in doing so he may overturn the result of the election.

Table 3 reports the results of the simulations for $\gamma = 0$, and shows how strongly ideological candidates' vote shares change as a result of increasing inequality. Indeed, unlike the symmetric one, the asymmetric change in inequality induces both candidates to propose more leftist policies. As a result, the vote share for the left-wing candidate decreases, while the vote share of the right-wing candidate increases.

Table 3: Inequality and candidates' vote shares

D = 0.2	Var	P_L	P_R	$\mathbf{N_L}$	$\mathbf{N_R}$	Pol	T
Beta(4,4)	0.028	0.26	0.74	**0.42**	**0.42**	0.5	0.84
Beta(3,4)	0.031	**0.13**	**0.64**	**0.26**	**0.46**	**0.51**	**0.52**
Beta(3,3)	0.036	0.22	0.78	0.34	0.34	0.56	0.68

This result provides a novel explanation for why increases in inequality are not associated with more redistributive policies, contrary to what is predicted by classical Downsian models à la Roberts (1977) and Meltzer and Richard (1981). While authors like Roemer (1998) and Bierbrauer et al. (2022) focus on understanding why left-wing parties do not propose high levels of redistribution, I address a different yet complementary issue: why even when they do propose high taxes, left-wing parties might not gain the support of a poorer electorate. Therefore, the model proposed here might explain why even when the demand for redistribution in the electorate increases, this may actually decrease the probability that left-wing parties win the election. Overall, this model suggests that taking into account both turnout and polarization together may be the key to understand why and under which conditions an increase in income inequality may or may not induce more redistributive policies to be implemented.

6 Some anecdotal evidence

The theoretical model presented in this paper formalizes a unified theory of the links between economic inequality, political polarization and voter turnout. First, income inequality is expected to increase polarization. Second, the theory predicts that the effect of inequality on turnout depends on the level of polarization. In particular, if candidates are weakly ideological, so that initial polarization is low, rising inequality tends to decrease turnout, while polarization has a positive effect on it. The converse is true if candidates are strongly ideological and, thus, initial polarization is high: inequality has a direct positive effect on turnout, while polarization has a negative effect on it.

In this section, using data on the United States, I present some anecdotal evidence showing that empirical correlations support the predictions of the theory. I use a panel of 407 counties across 41 U.S. states in the Census and the American Community Survey

(ACS) from the Integrated Public Use Microsamples (IPUMS) database[7]. The sample includes 13 per cent of the total number of US counties and county equivalents,[8] nonetheless it accounts for 66 per cent of the total US population. For the year 2000, and the for every year from 2006 to 2016,[9] I estimate the county-level distribution of income[10] and I compute distributional measures, such as the Gini coefficient, the mean distance from the median income (MDMI)[11], also decomposed by considering only incomes above (or below) the median, and the 80–20 percentile ratio. As my main measure of income inequality I use the MDMI, which is the most suitable indicator to capture the idea of rising dispersion of the distribution. Indeed, unlike other macro-level indicators like the Gini coefficient, the MDMI is able to capture the relationship between measured inequality and the density of the tails of the income distribution. More precisely, using this measure we can directly see that larger inequalities (i.e. larger average distances to the median income) are matched to larger densities at the tails of the income distribution. Several studies validate this measurement by comparing it to the Gini coefficient and to percentile ratios (Lancee and Van de Werfhorst 2012). Table 8 in the Appendix shows the correlation between the MDMI and other measures of income inequality. Moreover, the results of all the analyses are consistent to the use of different measures of inequality (see Appendix).

To measure turnout, I use county-level participation rates at Presidential and Congressional mid-term Elections from the Dave Leip's Atlas of U.S. Elections. In order to make the two sets of elections comparable, turnout rates are normalized by subtracting from Presidential elections turnout rates the average difference between Presidential and Congressional rates. Finally, I identify changes in state-level political polarization by measuring the variation in the political orientation of Congress representatives. Boris Shor[12] provides estimates for almost all legislators who held office between 1993 and 2016. These

[7]Ruggles, S., Flood, S., Goeken, R., Grover, J., Meyer, E., Pacas, J. and M. Sobek. 2019. IPUMS USA: Version 9.0 [dataset]. Minneapolis, MN: IPUMS. Available at: https://doi.org/10.18128/D010.V9.0.

[8]Since counties are not identified in public-use microdata, IPUMS identifies counties, where possible, from other low-level geographic identifiers such as the Public Use Microdata Areas (PUMA). This imposes a limitation to the number of counties that I can use for the analysis. No data is available for US territories and the District of Columbia, while no county or county equivalent is identified for Alaska, South Dakota, Vermont, West Virginia, Wyoming. Moreover, I exclude from the sample the states for which only one county is identified.

[9]Data is available for the period 2000-2016. However, county identifiers are not available between 2001 and 2005. I use 2000 as a base year, and I perform all the analysis for the period 2006-2016

[10]The distribution of income is estimated over a sample including individuals aged over 18, and all income measures are converted to real 2000 dollars using the Consumer Price Index (CPI). I also restrict the sample to individuals with nonnegative income.

[11]The Mean Distance to the Median Income (MDMI) is a macro indicator that reflects the mean distance of an individual income relative to the median individual income in a country (Lancee and Van de Werfhorst 2012). The overall MDMI ignores whether the distance is above or below the median income. In addition, this indicator can be decomposed by computing distances separately for incomes above and below the national median income.

[12]Shor, Boris, 2020, "Aggregate State Legislator Shor-McCarty Ideology Data, July 2020 update", https://doi.org/10.7910/DVN/AP54NE.
Shor, Boris, 2020, "Individual State Legislator Shor-McCarty Ideology Data, July 2020 update", https://doi.org/10.7910/DVN/GZJOT3.

are based on the Poole-Rosenthal DW-Nominate scores (Poole and Rosenthal 1985, 1997, 2007), which use roll-call votes in the U.S. House of Representatives and the U.S. Senate to categorize elected officials on an ideological scale from liberal to conservative. Consistently with the literature using DW-Nominate scores (McCarty et al. 2006; Voorheis et al. 2015; Autor et al. 2020), I measure polarization as the state-level difference between the median ideal points of legislators belonging to the Democratic and to the Republican party. I focus on polarization in the House of Representatives, but the measure for polarization in the Senate follows a similar trend, as it is also shown in Figure 1. Table 7 in the Appendix reports summary statistics for the main variables.

The first theoretical prediction concerns the association between economic inequality and political polarization. In order to assess this, one should estimate the following equation:

$$Pol_{it} = \zeta_1 Ineq_{it} + \gamma X_{it} + \alpha_i + \alpha_t + \epsilon_{it} \tag{10}$$

where $Ineq_{it}$ is a measure of income inequality (i.e. the MDMI) in county i at time t and Pol_{it} is a measure of polarization in county i at time t, α_i is the county fixed effect, α_t the year-fixed effect and ϵ_{it} a is the error term. X_{it} is a vector of county-level controls.

I control for economic conditions by including measures of income per capita, as well as poverty, measured as the percentage of the population under the poverty line,[13] and unemployment rate. In addition, I consider the median house value in the county and the percentage of the population receiving welfare income. To account for the level of education, I compute the percentage of the population with at least a college degree. In order to account for the potentially non-linear effect of the age structure, I include mean age as well as mean age squared, and I account for race composition by including the percentage of Hispanic and black population in the county.

Since measures of polarization are not available at the county level, I perform the analysis in two different ways. First, I estimate the regression at the county level (as specified in equation 10), using as dependent variable a measure of polarization in the state that each county belongs to. The issue with this approach is that the dependent variable is not varying across counties within a state, while the independent variable is. This means that we are basically trying to explain something invariant by something that is variant. Therefore, in addition to this county-level analysis, I also estimate a similar regression at the state level, including state-level controls and state fixed effects.

Finally, in order to account for the different population sizes and the related proportional imprecision in the measurement, all the county-level regressions are weighted by the log of the county population in the year 2000. Similarly, state-level regressions are weighted by the log of the state population in 2000. Standard errors are clustered

[13]Poverty data in the IPUMS are based on a definition established by the Social Security Administration in 1964 and subsequently modified by Federal interagency committees in 1969 and 1980. The Office of Management and Budget's (OMB) Directive 14 prescribes this definition as the official poverty measure for federal agencies to use in their statistical work.

respectively at the county and state level.

The estimates in Table 4 below show a positive and significant correlation between income inequality and political polarization. This is true for all the specifications, both at the county and at the state level.

Table 4: Inequality and Polarization

	(1)	(2)	(3)	(4)	(5)
			I. County level		
Inequality (MDMI)	0.853***	0.302***	0.124***	0.0903**	0.0915***
	(0.0464)	(0.0477)	(0.0437)	(0.0408)	(0.0416)
Observations	2651	2651	2651	2651	2651
R^2	0.241	0.525	0.588	0.592	0.590
			II. State level		
Inequality (MDMI)	1.165***	0.937***	0.500*	0.556**	0.585**
	(0.188)	(0.250)	(0.290)	(0.262)	(0.267)
Observations	257	257	257	257	257
R^2	0.433	0.609	0.639	0.643	0.640
Controls		✓	✓	✓	✓
Time FE			✓	✓	✓
County/State FE				✓	✓
County/State weights					✓

Notes. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the county level in panel I, and at the state level in panel II. The dependent variable is the state-level ideological polarization in the House of Representative, measured as the difference between the median ideal points of House representative of the Democratic and of the Republican party. Controls in columns 2 to 5 comprise income per capita, poverty and unemployment rates, the share of the population receiving welfare income, the median house value, and the log population. Demographic controls include the mean age and mean age squared, and the population shares that are college-educated, black, and Hispanic. All controls, fixed effects and weights are at the county level in panel I, and at the state level in panel II.

The second prediction of the theoretical model concerns the association between economic inequality and turnout, taking into account the non-linear effect of political polarization. Intuitively, in order to assess the impact of economic inequality and political polarization on voter turnout, one should estimate an equation of the form:

$$
\begin{aligned}
Turnout_{it} = & \beta_1 Ineq_{it} + \beta_2 Pol_{it} + \beta_3 Pol_{it}^2 \\
& + \beta_4 Ineq_{it} \times (Pol_{it} + Pol_{it}^2) + \gamma X_{it} + \alpha_i + \alpha_t + \epsilon_{it}
\end{aligned} \tag{11}
$$

where, as before, $Ineq_{it}$ is a measure of income inequality in county i at time t, and Pol_{it} is a measure of polarization at time t in the state which county i belongs to. The interaction term β_4 captures differences in the effect of inequality for different levels of polarization. α_i is the county fixed effect, α_t the year-fixed effect and ϵ_{it} a is the error term. X_{it} is the same vector of county-level controls. As before, regressions are weighted by the log county population in the year 2000.

The specification in equation 11 might exhibit time-varying endogeneity and reverse causality between inequality and turnout. For instance, if lower turnout corresponds to unequal participation, low turnout might influence inequality through redistributive policies implemented by elected politicians (e.g. policy changes in favor of specific interest/income groups increasing/decreasing inequality). Further, polarization is endogenous, i.e. inequality affects polarization through changes in voters' preferences induced by rising inequality[14]. Finally, measurement errors could be present due to survey data as source of income and employment data. In light of this discussion concerning the potential bias of the previous specification, I do not claim that any causal interpretation is possible. Nonetheless, estimating the model specified in equation 11 is interesting for the purpose of exploring the direction of the correlations.

The estimates in Table 5 are consistent with the theoretical predictions about the interconnections between inequality, polarization and turnout.

[14] Although inequality and polarization are indeed correlated, their raw correlation coefficient is 0.29 (the Spearman correlation is 0.21).

Table 5: Inequality, Polarization and Turnout

	(1)	(2)	(3)	(4)
Inequality (MDMI)	-0.0535***	-0.0492**	0.0077	0.290**
	(0.0204)	(0.0210)	(0.0400)	(0.113)
Polarization	0.0034	0.0851**	0.0430	0.519***
	(0.0132)	(0.0329)	(0.0301)	(0.156)
Polarization^2		-0.0205***		-0.125***
		(0.0073)		(0.0380)
Inequality × Polarization			-0.0311	-0.377***
			(0.0206)	(0.127)
Inequality × Polarization^2				0.0896***
				(0.0304)
Observations	2651	2651	2651	2651
R^2	0.194	0.197	0.195	0.202
Controls	✓	✓	✓	✓

Notes. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parenthesis are clustered at the county level. All specifications include time and county fixed effects. The dependent variable is the county turnout rate at presidential and mid-term elections. Controls comprise income per capita, poverty and unemployment rates, the share of the population receiving welfare income, the median house value, and the log population size, as well as the mean age and mean age squared, and the population shares that are college-educated, black, and Hispanic. All regressions are weighted by the log county population in 2000. The specification in column 2 accounts for the non-linear effect of polarization. The one in column 3 included only the liner interaction between inequality and polarization. Finally, in column 4, coefficients are estimated using equation 11.

First of all, economic inequality, as measured by the mean distance from the median income (MDMI), is negatively correlated with turnout. Second, the effect of polarization on turnout seems to be non-linear. Indeed, in the theoretical model the effect of polarization is expected to be positive for small values of polarization and to become negative as polarization increases further. This pattern seems to be confirmed by the correlations in the data (column 2). Column 3 includes the interaction between inequality and polarization,[15] while column 4 shows the result of the main regression, which considers the interaction between inequality and polarization, also accounting for the non-linear effect of polarization on turnout. Both columns 3 and 4 suggest that the direct effect of inequality on turnout is positive, while the indirect effect through polarization is negative. This is consistent with the theory if we consider that the U.S. are a context in which ideological polarization is already very high. Using the terminology of the theoretical model, this is the case of strongly ideological candidates. Moreover, the overall association between inequality and turnout is positive when polarization is either very small or very high, and it is negative for intermediate levels of polarization. Empirically, the indirect effect of inequality through polarization seem to almost always dominate the direct one.

The last theoretical result, presented in section 5, concerns the effect of economic inequality and political polarization on the support for the left-wing candidate. The idea is that, although inequality increases the support for left-wing policies, the increase in polarization induced by rising inequality counteracts this effect. In particular, if the left-wing candidate proposes a policy which is too extreme, relative turnout among the left-wing voters decreases, and the right-wing candidate has a higher probability of winning the election.

Table 6 reports estimates for the correlation between inequality, polarization and the support for the Democratic party, as measured by the vote share of the Democratic party at the elections for the House of Representatives. First, I consider the association between inequality and the support for the Democratic party (column 1), then I also introduce polarization (column 2). Finally, in column 3, I decompose the measure of polarization by accounting separately for the ideology of representatives from the Democratic and from the Republican party. In particular, Dem_H_median measures the median ideology of Democrat representatives of a given state, and smaller negative values of Dem_H_median indicate a more extreme left-wing position of Democrat representatives. Similarly, Rep_H_median measures the median ideology of a state's Republican representatives, and larger positive values of Rep_H_median indicate a more extreme right-wing position[16]. This decomposition is useful to check how the support for the Democratic party is affected by increasing ideological extremism of Democrat and of Republican legislators separately. Indeed, the theoretical model predicts that the negative association between polarization and support for the left-wing candidates derives from the negative effect of rising left-wing extremism.

Consistently with the theoretical model, the vote share for the Democratic party is positively correlated with economic inequality, and negatively with polarization, although the latter is not significant. Moreover, by decomposing polarization we can see that shifts in the median ideologies of Democrat and Republican legislators affect the vote share for

[15] Although the coefficients are not individually significant, they are jointly significant in all specifications.

[16] Note that the main measure of polarization is obtained by computing the difference between Rep_H_median and Dem_H_median.

the Democratic party differently. In particular, as shown in column 3, the support for the Democratic party is higher when the ideological position of the median Democrat is more moderate,[17] and the one of the Republican party is more extreme. This is consistent with the theoretical prediction that the left-wing candidate loses support by proposing a more extreme policy when inequality increases.

Table 6: Inequality, Polarization and support for Democratic Party

	(1)	(2)	(3)
Inequality (MDMI)	0.0387**	0.0412**	0.0327*
	(0.0179)	(0.0174)	(0.0167)
Polarization		-0.0159	
		(0.0131)	
Dem_H_median			0.0436***
			(0.0111)
Rep_H_median			0.0363
			(0.0385)
Observations	2651	2651	2651
R^2	0.428	0.433	0.438
Controls	✓	✓	✓

Notes. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the county level. All specifications include time and county fixed effects. The dependent variable is the vote share of the Democratic party. Controls comprise income per capita, poverty and unemployment rates, the share of the population receiving welfare income, the median house value, and the log population size, as well as the mean age and mean age squared, and the population shares that are college-educated, black, and Hispanic. All regressions are weighted by the log county population in 2000.

[17] Note that higher values of *Dem_median* correspond to less extreme ideological positions for Democrat representatives.

7 Conclusion

This paper provides a simple theoretical framework which allows to understand the recent evolution of economic inequality, political polarization and voter turnout, by accounting for the deep interconnections among them. The key mechanism is the following. Rising income inequality changes the distribution of voters' preferences. This change, in turn, produces both a direct effect on turnout, and an indirect one through political platforms polarization. Indeed, a change in voters' preferences simultaneously affects the voters' willingness to vote and the competition among political candidates. The initial level of polarization and the way the candidates react to the increase in inequality determine whether electoral participation increases or decreases. Finally, the combination of changing platforms and changing turnout determines the equilibrium tax rate.

This framework can explain why higher inequality produces higher political polarization, and at the same time why the link with electoral participation is not straightforward. Moreover, this unified approach for the analysis of economic inequality, political polarization, voter turnout also provides a possible explanation for another related empirical puzzle: why increased income inequality has not been associated with more redistribution.

First, I confirm the positive association between inequality and polarization (McCarty et al. 2006; Voorheis et al. 2015) and provide a theoretical explanation for it. The idea is that economic inequality increases the dispersion of the distribution of voters' ideal policies, which affects the trade-off that candidates face between a more extreme policy, which they prefer, and a more moderate one, which provides a higher probability of winning the election. With a more dispersed distribution of voters' preferences, it becomes less costly to propose a more extreme policy, and polarization increases. This result is consistent with the findings of Ezrow (2007), who suggests that changes in the variance of voters' policy preferences are associated with corresponding changes in the variance of policy choices. Furthermore, this result is also consistent with evidence that the district median preference is a better predictor of legislator behavior in homogeneous districts than in heterogeneous districts. Indeed, Gerber and Lewis (2004) find that legislators take policy positions that are close to their district's median when many constituents share these preferences, while they diverge substantially from the median voter in more heterogeneous districts. In other terms, when the voters' preference are more dispersed, politicians polarize more.

Second, I show that the overall effect of economic inequality on turnout is ambiguous, and that it depends on the level and on the change of policy polarization. This provides a theoretical explanation for the mixed evidence on the link between inequality and turnout (see, for instance, Geys 2006), and is consistent with recent evidence showing that there exists threshold level of inequality where the relation between voter turnout and inequality flips from negative to positive (Guvercin 2018). The key idea is that inequality has a double effect on turnout: a direct one, and an indirect one through the increase in polarization.

Moreover, these two effects always have opposite directions, and their exact sign depends on the initial level of polarization. This result suggests that the relationship between economic inequality and voter turnout is highly context-specific, and the overall association depends on which of the two effects prevails. The two effects may even offset one another.

Consistently with the prediction of the theoretical model, I provide some anecdotal evidence suggesting that in the United States, a context where polarization is very high, the negative correlation between inequality and electoral participation is mostly driven by the negative indirect effect of rising polarization on turnout.

This paper also provides a novel explanation for the empirical observation that rising inequality is not necessarily associated with the implementation of more redistributive policies. In particular, I suggest that taking into account both turnout and polarization together may be the key to understand why, and under which conditions, an increase in income inequality may or may not increase the support for more redistributive policies, and promote their implementation. The idea is that the extreme policy polarization induced by the increase in inequality decreases turnout, especially among left-wing voters. This implies an electoral disadvantage for the left-wing party and reduces policy responsiveness to the increase in inequality.

Finally, this paper sheds lights on some of the consequences of political polarization. Whether polarization is harmful for democracy, or whether, instead, it may have positive consequences on the degree of political engagement and policy representation, is highly debated. The non-linear effect of polarization on voters' participation, which is established in this paper, may provide a connection between these two opposite views. In particular, this paper suggests that, while a moderate level of polarization may be beneficial because it increases voters' participation, when polarization is too high the effect on turnout is reversed. Moreover, extreme polarization is found to be a reason for the reduced policy responsiveness to the increase in inequality.

Overall, this paper suggests that the analysis of the political consequences of rising economic inequality must take into account the strong interconnections between political polarization and electoral participation. However, this study is based on the premise that the relevant, and unique, policy dimension is the economic one. Instead, some scholars suggest that, in response to rising economic inequality, voters might shift their focus to non-economic issues (Bonomi et al. 2021; Grossman and Helpman 2021), while political parties may have incentives to adopt issue-specific strategies (see, for instance, Tavits and Potter (2015)). Inequality may then lead to convergence on some policy dimensions, and polarization in others. The issue of the interplay between polarization and turnout in a multidimensional political space is an important issue to explore in future research.

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Appendix A

Proof of Proposition 1

Proof. Let us begin by noticing that the parties can only mobilize citizens who are members of the party. This implies that $n_j \in \left[0, N_j\right]$.

If $N_j = N_{-j} = \bar{N}$, both parties can mobilize up to $\bar{N}$ voters. In this case, for any mobilization rule $n_{-j} < \bar{N}$, it is optimal for party j to mobilize a share of voters equal to $n_{-j} + \epsilon$ and guarantee that the supported candidate wins the election for sure. This implies there is an upward pressure to mobilize more and more voters, up to $\bar{N}$, when none of the parties can outperform the other. When both parties mobilize all voters, that is, $n_j = n_{-j} = \bar{N}$, both candidates have equal probability of winning the election and the welfare if party j is equal to $V/2 - C_j(\bar{N}) > 0$. Since, under assumption 1, $V/2 - C_j(\bar{N}) > 0$ for both parties, $n_j = n_{-j} = \bar{N}$ is the unique pure strategy equilibrium.

If $N_m < N_M$, the mobilization rule of the parties must be such that $n_m \in [0, N_m]$ and $n_M \in [0, N_M]$.

First, notice that the minority party can mobilize up to N_m voters. Since $n_m \leq N_m$, it is not optimal for the majority party to mobilize a share of voters larger than N_m. Indeed, doing so would not increase the probability that the supported candidate wins but it would increase the total mobilization cost. Therefore, $n_m \in [0, N_m]$ and $n_M \in [0, N_m]$.

As in the previous case, there is an upward pressure that pushes parties to mobilize more and more voters. Indeed, for any rule $n_{-j} < N_m$, it is optimal for party j to mobilize a share of voters equal to $n_{-j} + \epsilon$. Moreover, since the majority party is able to outperform the minority party when $n_m = N_m$, in such case the best response of the minority party would be to abstain, that is, $n_m = 0$. As a consequence no pure strategy equilibrium can exist.

Moreover, the upward pressure on the best response strategies has two immediate consequences. First, there cannot be any open interval with zero probability within the interval $[0, N_m]$. Second, there cannot be any atom inside the interval $[0, N_m]$.

As a result, the mixed strategy equilibrium must be such that party j's mobilization rule is the realization of a distribution with c.d.f. $G_j(n)$, which is continuous on the interval $[0, N_m]$.

Let us now focus on finding $G_m(n)$ and $G_M(n)$. For any mobilization rule n, the expected welfare of each party is the following:

$$W_j(n, n_{-j}) = Prob(n > n_{-j})\ (V - C_j(n)) + Prob(n < n_{-j})\ (-C_j(n)).$$

In particular, the welfare of the minority party is:

$$\begin{aligned} W_m(n, G_M) &= G_M(n)\ (V - C_m(n)) + (1 - G_M(n))\ (V - C_m(n)) \\ &= G_M(n)\ V - C_m(n) \end{aligned}$$

And the welfare of the Majority party is:

$$\begin{aligned} W_M(G_m, n) &= G_m(n)\ (V - C_M(n)) + (1 - G_m(n))\ (V - C_M(n)) \\ &= G_m(n)\ V - C_M(n) \end{aligned}$$

Since the majority party is able to outperform the minority party when $n_m = N_m$, the equilibrium expected utility of the minority party must be equal to 0, while the equilibrium expected utility of the Majority party must be at least $V - C_M(N_m)$. The following equations uniquely define the c.d.f. for each party in $[0, N_m]$:

$$\begin{aligned} W_m(n, G_M) &= G_M(n)\ V - C_m(n) = 0 \\ W_M(G_m, n) &= G_m(n)\ V - C_M(n) = V - C_M(N_m) \end{aligned}$$

From this we get:

$$G_m(n) = 1 - \frac{C_M(N_m) - C_M(n)}{V} \tag{12}$$

$$G_M(n) = \frac{C_m(n)}{V} \tag{13}$$

with associated p.d.f

$$g_m(n) = \frac{C'_M(n)}{V} \tag{14}$$

$$g_M(n) = \frac{C'_m(n)}{V} \tag{15}$$

By evaluating $G_M(n)$ and $G_m(n)$ at 0 and at N_m we find that the only atom for the majority party is $G^o_M(N_m) = 1 - \frac{C_m(N_m)}{V}$, while the only atom for the minority party is $G^o_m(0) = 1 - \frac{C_M(N_m)}{V}$. ■

Proof of Proposition 2

Proof. First of all, let us rewrite the winning probabilities of the majority and minority parties as follows:

$$\begin{aligned}
\pi_M &= \int_0^{N_m} g_M(n)G_m(n)dn + G^o_M(N_m) \\
&= \int_0^{N_m} \frac{C'_m(n)}{V}\left[1 - \frac{C_M(N_m) - C_M(n)}{V}\right] dn + 1 - \frac{C_m(N_m)}{V} \\
&= \left[1 - \frac{C_M(N_m)}{V}\right] \int_0^{N_m} \frac{C'_m(n)}{V} dn + \int_0^{N_m} \frac{C'_m(n)}{V}\frac{C_M(n)}{V} dn + 1 - \frac{C_m(N_m)}{V} \\
&= \left[1 - \frac{C_M(N_m)}{V}\right] \frac{C_m(N_m)}{V} + \int_0^{N_m} \frac{C'_m(n)}{V}\frac{C_M(n)}{V} dn + 1 - \frac{C_m(N_m)}{V} \\
\pi_m &= \int_0^{N_m} g_m(n)G_M(n)dn \\
&= \int_0^{N_m} \frac{C'_M(n)}{V}\frac{C_m(n)}{V} dn
\end{aligned}$$

Then, the difference in probability is:

$$
\begin{aligned}
\pi_M - \pi_m =& \\
&= \left[1 - \frac{C_M(N_m)}{V}\right]\frac{C_m(N_m)}{V} + \int_0^{N_m} \frac{C'_m(n)}{V}\frac{C_M(n)}{V}dn + 1 - \frac{C_m(N_m)}{V} - \int_0^{N_m} \frac{C'_M(n)}{V}\frac{C_m(n)}{V}dn \\
&= \left[1 - \frac{C_M(N_m)}{V}\right]\frac{C_m(N_m)}{V} + \int_0^{N_m} \frac{C'_m(n)}{V}\frac{C_M(n)}{V}dn + 1 - \frac{C_m(N_m)}{V} \\
&\quad - \frac{C_M(N_m)}{V}\frac{C_m(N_m)}{V} + \int_0^{N_m} \frac{C'_m(n)}{V}\frac{C_M(n)}{V}dn \\
&= \frac{C_m(N_m)}{V} - \frac{C_M(N_m)}{V}\frac{C_m(N_M)}{V} + \int_0^{N_m} \frac{C'_m(n)}{V}\frac{C_M(n)}{V}dn + 1 - \frac{C_m(N_m)}{V} \\
&\quad - \frac{C_M(N_m)}{V}\frac{C_m(N_m)}{V} + \int_0^{N_m} \frac{C'_m(n)}{V}\frac{C_M(n)}{V}dn \\
&= 1 - 2\frac{C_M(N_m)}{V}\frac{C_m(N_m)}{V} + 2\int_0^{N_m} \frac{C'_m(n)}{V}\frac{C_M(n)}{V}dn > 0
\end{aligned}
$$

Let us notice that the integral $\int_0^{N_m} \frac{C'_m(n)}{V}\frac{C_M(n)}{V}dn$ is always nonnegative. Let us then consider $1 - 2\frac{C_M(N_m)}{V}\frac{C_m(N_m)}{V}$ and rewrite it as follows:

$$
\frac{1}{2} - \frac{C_M(N_m)}{V}\frac{C_m(N_m)}{V}
$$

We need to show that the expression above is greater than 0. By Assumption 1, we know that $\frac{C_m(N_m)}{V} < \frac{1}{2}$ and $\frac{C_M(N_M)}{V} < \frac{1}{2}$. Therefore, $\frac{C_M(N_m)}{V} \leq \frac{C_M(N_M)}{V} < \frac{1}{2}$. Moreover, we know that $\frac{C_M(N_m)}{V} \leq \frac{C_m(N_M)}{V}$, so $\frac{C_M(N_m)}{V}\frac{C_m(N_m)}{V} \leq \frac{C_m(N_m)}{V}\frac{C_m(N_m)}{V}$.

$$
\begin{aligned}
\frac{1}{2} - \frac{C_M(N_m)}{V}\frac{C_m(N_m)}{V} &\geq \frac{1}{2} - \frac{C_m(N_m)}{V}\frac{C_m(N_m)}{V} \\
&> \frac{1}{4} - \frac{C_m(N_m)}{V}\frac{C_m(N_m)}{V} \\
&> \left[\frac{1}{2} - \frac{C_m(N_m)}{V}\right]\left[\frac{1}{2} + \frac{C_m(N_m)}{V}\right] > 0
\end{aligned}
$$

■

Proof of Proposition 3

Proof. Notice that the probability that the minority candidate m wins the election can be written as follows:

$$
\pi_m = \int_0^{N_m} \frac{C'_M(n)}{V}\frac{C_m(n)}{V}dn
$$

This is clearly increasing in N_m.

Moreover, the probability that the majority candidate M wins can be written as follows:

$$
\begin{aligned}
\pi_M &= 1 - \frac{C_M(N_m)}{V}\frac{C_m(N_m)}{V} + \int_0^{N_m} \frac{C'_m(n)}{V}\frac{C_M(n)}{V}dn \\
&= 1 - \int_0^{N_m} \frac{C'_M(n)}{V}\frac{C_m(n)}{V}dn
\end{aligned}
$$

This does not depend on N_M, and is decreasing in $\int_0^{N_m} \frac{C'_M(n)}{V}dn$, and thus in C'_M. ■

Proof of Proposition 4

Proof. (i) First of all, we must recognize that $\pi^R(P_L, P_R) = 1 - \pi^L(P_L, P_R)\ \forall P_L, P_R \in X$. Then assume by contradiction that $\pi^L(P^*_L, P^*_R) > \frac{1}{2}$, which means that candidate A wins the election. Therefore it must be that $\pi^R(P^*_L, P^*_R) < \frac{1}{2}$, but then choosing P^*_R cannot be optimal for candidate R. Indeed, he could always choose $P_R = P^*_L$ and raise its probability of winning. But the fact that R has incentive to deviate from P^*_R contradicts (P^*_L, P^*_R) being an equilibrium. A symmetric reasoning applies to $\pi^R(P^*_L, P^*_R) > \frac{1}{2}$.

(ii) First of all we need to prove that $P^*_L = P^*_R$. We have already shown that at equilibrium $\pi_L = \pi_R = \frac{1}{2}$ and consequently $N_L = N_R = N$. Assume there exist two distinguished policies $P^*_L \neq P^*_R$ such that the condition above hold. I show that at least one of the candidates has incentive to change his policy. Let us assume w.l.o.g. that $P^*_L < P^*_R$. Since $N_L = N_R = N$ it must be the case that either

$$
F(P^*_L + D) - F(P^*_L - D) = F(P^*_R + D) - F(P^*_R - D) \quad \text{if} \quad P^*_L + D < \frac{P^*_L + P^*_R}{2} < P^*_R - D,
$$

or

$$
F(\frac{P^*_L + P^*_R}{2}) - F(P^*_L - D) = F(P^*_R + D) - F(\frac{P^*_L + P^*_R}{2}) \quad \text{if} \quad P^*_R - D \leq \frac{P^*_L + P^*_R}{2} \leq P^*_L + D.
$$

Since $f(x)$ is single-peaked, for these conditions to hold it must be the case that the mode of the distribution (denoted by P_M) is somewhere between P^*_L and P^*_R.

Let us consider the first case, $P^*_L + D < \frac{P^*_L + P^*_R}{2} < P^*_R - D$. Candidate L (the same applies for candidate R) would have incentive to change policy if by doing so he could increase the size of his party, compared to the size of the other one, thus increasing his probability of winning. In particular, proposing $P'_L > P^*_L$ is a profitable deviation if $\frac{\partial(N_L - N_R)}{\partial P_L} > 0$, that is:

$$\frac{\partial(N_L - N_R)}{\partial P_L} = \frac{\partial}{\partial P_L} F(P_L^* + D) - F(P_L^* - D) - [F(P_R^* + D) - F(P_R^* - D)] > 0$$
$$= f(P_L^* + D) - f(P_L^* - D) > 0.$$

As shown above, given the single-peakedness of $f(x)$, the fact that the groups have the same size at equilibrium, that is $N_L = N_R$, implies that $P_L^* < P_M < P_R^*$. Consequently, it must be that $f(P_L^* + D) - f(P_L^* - D) > 0$ is always satisfied. Suppose this is not the case. Under the assumption that $P_L^* + D < \frac{P_L^* + P_R^*}{2} < P_R^* - D$, this would imply that $P_L^* - D < P_M < P_L^* + D < P_R^* - D < P_R^* + D$, and that $f(P_L^* - D) > f(P_L^* + D) > f(P_R^* - D) > f(P_R^* + D)$. Finally, this would necessarily imply that $N_L > N_R$.

Let us now consider the second case, $P_R^* - D \leq \frac{P_L^* + P_R^*}{2} \leq P_L^* + D$.

$$\frac{\partial(N_L - N_R)}{\partial P_L} = \frac{\partial}{\partial P_L} F(\frac{P_L^* + P_R^*}{2}) - F(P_L^* - D) - [F(P_R^* + D) - F(\frac{P_L^* + P_R^*}{2})] > 0$$
$$= f(\frac{P_L^* + P_R^*}{2}) - f(P_L^* - D) > 0,$$

which is always true. Indeed, since $N_L = N_R$ at equilibrium, from the single-peakedness of $F(x)$ it follows that $f(\frac{P_L^* + P_R^*}{2}) \geq \max\{f(P_L^*), f(P_R^*)\}$. Therefore, it also holds that $f(\frac{P_L^* + P_R^*}{2}) - f(P_L^* - D) > 0$.

To conclude, it is not possible to find two distinguished policies $P_L^* \neq P_R^*$ such that $\pi_L = \pi_R = \frac{1}{2}$ and $N_L = N_R = N$ for which none of the candidates has incentive to deviate. Therefore, an equilibrium must be such that $P_L^* = P_R^* = P^*$.

What us left to prove is that $P^* = P_C$.

By definition, if (P^*, P^*) is an equilibrium, candidates must not have incentive to deviate from it. This means that none of the two can increase the probability of winning the elections by moving away from P^*. Indeed, it must hold:

$$N_L(P', P^*) - N_R(P', P^*) \leq 0 \quad \forall P' \neq P*$$
$$N_R(P^*, P') - N_L(P^*, P') \leq 0 \quad \forall P' \neq P*$$

In particular, take $\varepsilon > 0$ and consider the case that R proposes P^* and L decides to deviate and chooses $P' = P^* - \varepsilon$. Then, it must hold:

$$\begin{aligned}
&\lim_{\varepsilon\to 0} N_L(P^* - \varepsilon, P^*) - N_R(P^* - \varepsilon, P^*) \le 0 \\
&\lim_{\varepsilon\to 0} 2F(P^* - \frac{\varepsilon}{2}) - F(P^* - \varepsilon - D) - F(P^* + D) \le 0 \\
&= 2F(P^*) - F(P^* - \bar{d}) - F(P^* + \bar{d}) \le 0
\end{aligned}$$

Consider instead the case that L proposes P^* and R decides to deviate and chooses $P' = P^* + \varepsilon$. Then, it must hold:

$$\begin{aligned}
&\lim_{\varepsilon\to 0} N_R(P^*, P^* + \varepsilon) - N_L(P^*, P^* + \varepsilon) \le 0 \\
&\lim_{\varepsilon\to 0} F(P^* + D + \varepsilon) - 2F(P^* + \frac{\varepsilon}{2}) - F(P^* - D) \le 0 \\
&= 2F(P^*) - F(P^* - \bar{d}) - F(P^* + \bar{d}) \ge 0
\end{aligned}$$

Combining the two conditions, we get that P^* must be such that:

$$2F(P^*) - F(P^* - \bar{d}) - F(P^* + \bar{d}) = 0$$

which is exactly the definition of the central voter policy. Therefore, at equilibrium both candidates propose the central voter policy, that is, the candidates' equilibrium is (P_C, P_C).
■

Proof of Proposition 5

Proof. At equilibrium, the candidates maximize their expected utility and the following condition must hold for both of them: $\frac{\partial U_j(P_j^*, P_{-j}^*)}{\partial P_j} = 0$.

First of all, let us rewrite the candidate j's payoff as follows:

$$\begin{aligned}
U_j(P_j, P_{-j}) &= \pi_j \left(\gamma + (1-\gamma)u_j(P_j)\right) + (1-\pi_j)(1-\gamma)u_j(P_j) \\
&= \gamma\pi_j + (1-\gamma)\left[\pi_j(u_j(P_j^*) - u_j(P_{-j}^*)) + u_j(P_{-j}^*)\right]
\end{aligned}$$

At equilibrium it must hold that:

$$\begin{aligned}
\frac{\partial U_j(P_j^*, P_{-j}^*)}{\partial P_j} &= \frac{\partial[\gamma\pi_j + (1-\gamma)\left[\pi_j(u_j(P_j^*) - u_j(P_{-j}^*)) + u_j(P_{-j}^*)\right]]}{\partial P_j} \\
&= \gamma\frac{\partial \pi_j}{\partial P_j} + (1-\gamma)\frac{\partial \pi_j}{\partial P_j}(u_j(P_j^*) - u_j(P_{-j}^*)) + \frac{\partial u_j(P_j^*)}{\partial P_j}\pi_j = 0 \\
&= \pi_j(1-\gamma)\frac{\partial u_j(P_j^*)}{\partial P_j} + \frac{\partial \pi_j}{\partial P_j}\left[\gamma + (1-\gamma)(u_j(P_j^*) - u_j(P_{-j}^*))\right] = 0 \qquad (16)
\end{aligned}$$

We must show that under Assumption 2 candidates propose differentiated policies at equilibrium, i.e. $P_L^* \neq P_R^*$.

Suppose that $P_L^* = P_R^*$. Whenever this is the case, then $\pi_L = \pi_R = \frac{1}{2}$. Moreover, $(u_j(P_j^*) - u_j(P_{-j}^*)) = 0$ for both $j = L, R$. Hence P_j^* must solve:

$$\begin{aligned}
\frac{\partial U_j(P_j^*, P_{-j}^*)}{\partial P_j} &= \pi_j(1-\gamma)\frac{\partial u_j(P_j^*)}{\partial P_j} + \frac{\partial \pi_j}{\partial P_j}\gamma = 0 \\
&= \frac{1}{2}(1-\gamma)\frac{\partial u_j(P_j^*)}{\partial P_j} + \frac{\partial \pi_j}{\partial P_j}\gamma = 0
\end{aligned}$$

This can only be true if either (i) $\frac{\partial u_j(P_j^*)}{\partial P_j} = 0$ and $\frac{\partial \pi_j}{\partial P_j} = 0$, (ii) $\frac{\partial u_j(P_j^*)}{\partial P_j} > 0$ and $\frac{\partial \pi_j}{\partial P_j} < 0$, or (iii) $\frac{\partial u_j(P_j^*)}{\partial P_j} < 0$ and $\frac{\partial \pi_j}{\partial P_j} > 0$.

Consider candidate L. In order for the first condition (i) to hold it must be that $P_L^* = \tilde{P_L}$ so that $\frac{\partial u_L(P_L^*)}{\partial P_L} = 0$ and $P_L^* = P_C$ so that $\frac{\partial \pi_L}{\partial P_L} = 0$, which implies $\tilde{P_L} = P_C$. This contradicts the assumption that $\tilde{P_L} < P_C$. Moreover, if $P_L^* = P_R^*$, then it must be that $P_R^* = P_C$, which implies that $\frac{\partial \pi_R}{\partial P_R} = 0$. But this implies that also $\frac{\partial u_R(P_R^*)}{\partial P_R} = 0$ must hold, and so $P_R^* = \tilde{P_R}$. This cannot be because it contradicts the assumption that candidates have differentiated policy preferences.

In order for the second condition (ii) to hold it must be that $P_L^* < \tilde{P_L}$ so that $\frac{\partial u_L(P_L^*)}{\partial P_L} > 0$ and $P_L^* > P_C$ so that $\frac{\partial \pi_L}{\partial P_L} < 0$. But this cannot be because it would imply that $P_C < \tilde{P_L}$. Finally, in order for the third condition (iii) to hold it must be that $P_L^* > \tilde{P_L}$ so that $\frac{\partial u_L(P_L^*)}{\partial P_L} < 0$ and $P_L^* < P_C$ so that $\frac{\partial \pi_L}{\partial P_L} > 0$. This implies that $\tilde{P_L} < P_C$.

Let us now consider candidate R. It has already been shown that condition (i) cannot hold. In order for condition (ii) to hold, it must be that $P_R^* < \tilde{P_R}$ so that $\frac{\partial u_R(P_R^*)}{\partial P_R} > 0$ and $P_R^* > P_C$ so that $\frac{\partial \pi_R}{\partial P_R} < 0$. This implies that $P_C < \tilde{P_R}$. Finally, in order for the third condition (iii) to hold it must be that $P_R^* > \tilde{P_R}$, so that $\frac{\partial u_R(P_R^*)}{\partial P_R} < 0$ and $P_R^* < P_C$ so that $\frac{\partial \pi_R}{\partial P_R} > 0$. But this cannot be because it would imply that $\tilde{P_R} < P_C$.

From the above, we get that at equilibrium it must hold that $\tilde{P_L} < P_L^* < P_C$ and $P_C < P_R^* < \tilde{P_R}$, and so $P_L^* < P_R^*$, which contradicts $P_L^* = P_R^*$.

Let us now show that $\tilde{P_L} < P_L^* < P_C < P_R^* < \tilde{P_R}$.

First of all, let us recall that the candidates payoff functions are the following:

$$U_L(P_L, P_R) = \gamma\pi_L + (1-\gamma)\left[\pi_L(u_L(P_L^*) - u_L(P_R^*)) + u_L(P_R^*)\right]$$
$$U_R(P_L, P_R) = \gamma\pi_R + (1-\gamma)\left[\pi_R(u_R(P_R^*) - u_R(P_L^*)) + u_R(P_L^*)\right]$$

Consider candidate L. Any strategy $P_L < \tilde{P_L}$ is strictly dominated by $P_L' = \tilde{P_L}$. Indeed, $u_L(\tilde{P_L}) > u_L(P_L)$. Moreover, since $\tilde{P_L} < P_C$, $\pi_L(\tilde{P_L}) > \pi_L(P_L)$. Therefore $U_L(\tilde{P_L}, P_R) > U_L(P_L, P_R)$ for any $P_L < \tilde{P_L}$.

A similar reasoning applies for any strategy $P_L > P_C$, which is strictly dominated by $P_L' = P_C$. Indeed, $\pi_L(P_C) > \pi_L(P_L)$. Moreover, since $\tilde{P_L} < P_C$, $u_L(P_C) > u_L(P_L)$. Therefore $U_L(P_C, P_R) > U_L(P_L, P_R)$ for any $P_L > P_C$. As a result, it must be that $\tilde{P_L} < P_L^* < P_C$. Similarly for candidate R we get that $P_C < P_R^* < \tilde{P_R}$.

For each candidate $j = L, R$, the equilibrium condition is the following:

$$\frac{\partial U_j(P_j^*, P_{-j}^*)}{\partial P_j} = \pi_j(1-\gamma)\frac{\partial u_j(P_j^*)}{\partial P_j} + \frac{\partial \pi_j}{\partial P_j}\left[\gamma + (1-\gamma)(u_j(P_j^*) - u_j(P_{-j}^*))\right] = 0$$

Given that $\tilde{P_L} < P_L^* < P_C$ and $P_C < P_R^* < \tilde{P_R}$, it must be that $(u_j(P_j^*) - u_j(P_{-j}^*)) > 0$ holds for both candidates j.

Since $\left[\gamma + (1-\gamma)(u_j(P_j^*) - u_j(P_{-j}^*))\right] > 0$ and $\pi_j(1-\gamma) > 0$, then it must be that either (i) $\frac{\partial u_j(P_j^*)}{\partial P_j} = 0$ and $\frac{\partial \pi_j}{\partial P_j} = 0$, (ii) $\frac{\partial u_j(P_j^*)}{\partial P_j} > 0$ and $\frac{\partial \pi_j}{\partial P_j} < 0$, or (iii) $\frac{\partial u_j(P_j^*)}{\partial P_j} < 0$ and $\frac{\partial \pi_j}{\partial P_j} > 0$.

We have already shown that (i) cannot hold for any of the candidate. Instead, (ii) needs to hold for candidate R, while (iii) must hold for candidate L. This proves that $\tilde{P_L} < P_L^* < P_C < P_R^* < \tilde{P_R}$. ■

Proof of Proposition 6

Proof. Let us recall the equilibrium condition.

$$\frac{\partial U_j(P_j^*, P_{-j}^*)}{\partial P_j} = \pi_j(1-\gamma)\frac{\partial u_j(P_j^*)}{\partial P_j} + \frac{\partial \pi_j}{\partial P_j}\left[\gamma + (1-\gamma)(u_j(P_j^*) - u_j(P_{-j}^*))\right] = 0$$

Since $u_j(P_k) = -|\tilde{P_j} - P_k|$, $u_j(P_j^*) - u_j(P_{-j}^*) = -|\tilde{P_j} - P_j^*| + -|\tilde{P_j} - P_{-j}^*|$. Since $\tilde{P_L} < P_L^* < P_R^*$ and $P_L^* < P_R^* < \tilde{P_R}$, then for both candidates $u_j(P_j^*) - u_j(P_{-j}^*) = P_R^* - P_L^*$.

Moreover, we know that $\frac{\partial u_L(P_L^*)}{\partial P_L} < 0$ and $\frac{\partial \pi_L}{\partial P_L} > 0$, while $\frac{\partial u_R(P_R^*)}{\partial P_R} > 0$ and $\frac{\partial \pi_R}{\partial P_R} < 0$. Since $u_j(P_k) = -|\tilde{P_j} - P_k|$, $\frac{\partial u_L(P_L^*)}{\partial P_L} < 0$ implies $\frac{\partial u_L(P_L^*)}{\partial P_L} = -1$ and $\frac{\partial u_R(P_R^*)}{\partial P_R} > 0$ implies $\frac{\partial u_R(P_R^*)}{\partial P_R} = +1$.

Therefore we can rewrite the equilibrium conditions as follows:

$$\frac{\partial U_L(P_L^*, P_R^*)}{\partial P_L} = -\pi_L(1-\gamma) + |\frac{\partial \pi_L}{\partial P_L}| \left[\gamma + (1-\gamma)(P_R^* - P_L^*)\right] = 0$$
$$\frac{\partial U_R(P_L^*, P_R^*)}{\partial P_R} = \pi_R(1-\gamma) - |\frac{\partial \pi_R}{\partial P_R}| \left[\gamma + (1-\gamma)(P_R^* - P_L^*)\right] = 0$$

From this we get the following conditions for the equilibrium level of polarization:

$$P_R^* - P_L^* = \frac{\pi_L}{|\frac{\partial \pi_L}{\partial P_L}|} - \frac{\gamma}{(1-\gamma)} = \frac{\pi_R}{|\frac{\partial \pi_R}{\partial P_R}|} - \frac{\gamma}{(1-\gamma)}$$

■

Individual probability of mobilization

An interesting consequence of the mobilization equilibrium is that the probability of being mobilized is different across voters and depends on their mismatch cost. Indeed, as we have already established, the party rule n_j implies a threshold δ_j such that all the party members whose mismatch cost is lower than δ_j should vote. This means that the voters that are mobilized first are the ones whose ideal policy is closer to the policy proposed by the supported candidates For each member x of party j it is possible to identify the share of members $\phi_j(x)$ that will be mobilized before him. This represents the minimum share of voters that should be mobilized by the party j to guarantee that voter $\bar{x}$ actually turns out. Voter $\bar{x}$'s individual mobilization threshold in party j, i.e. $\phi_j(\bar{x})$, is defined as follows:

$$\begin{aligned}\phi_j(\bar{x}) &= \int_{P_j - c_j(\bar{x})}^{P_j + c_j(\bar{x})} f(x)dx \\ &= F(P_j + c_j(\bar{x})) - F(P_j - c_j(\bar{x}))\end{aligned}$$

Therefore, the probability that member $\bar{x}$ of party j is mobilized is given by $Pr(n_j \geq \phi(\bar{x}))$. In particular, for any member of the minority party $\bar{x} \leq N_m$:

$$\begin{aligned}Pr(n_m \geq \phi_m(\bar{x})) &= \int_{\phi_m(\bar{x})}^{N_m} g_m(n)dn \\ &= G_m(N_m) - G_m(\phi_m(\bar{x})) \\ &= 1 - G_m(\phi_m(\bar{x})) \\ &= \frac{C_M(N_m) - C_M(\phi_m(\bar{x}))}{V}\end{aligned}$$

Instead, in the majority party, for all members such that $N_m < \bar{x} \leq N_M$, $Pr(n_M \geq \phi_M(\bar{x})) =$

0, while for any member $\bar{x} \leq N_m$ the probability of being mobilized is:

$$\begin{aligned} Pr(n_M \geq \phi_M(\bar{x})) &= \int_{\phi_M(\bar{x})}^{N_m} g_M(n)dn + G_M^o(N_m) \\ &= G_M(N_m) - G_M(\phi_M(\bar{x})) + 1 - G_M(N_m) \\ &= 1 - G_M(\phi_M(\bar{x})) \\ &= 1 - \frac{C_m(\phi_M(\bar{x}))}{V} \end{aligned}$$

Clearly, a voter' probability of being mobilized decreases with its mismatch cost. Indeed, $Pr(n_j \geq \phi(\bar{x}))$ is decreasing in the individual mobilization threshold $\phi_j(\bar{x})$, which is increasing in the mismatch cost of the voters.

Moreover, with the same individual mobilization threshold, a voter has a higher probability of being mobilized in the Majority party than in the minority party.

Appendix B

Table 7: Summary statistics

	mean	sd	min	max
Turnout	.4456157	.1073952	.0123539	.7590516
MDMI	1.116788	.1874642	.6842306	2.333166
MDMI_{above}	1.630795	.3504793	.8329602	3.794351
MDMI_{below}	.60252	.0352709	.5019912	.8719807
Gini	.5452935	.0367994	.4183738	.6892697
L80/20	4.136698	.8582518	2.794585	17.37043
L90/50	2.664174	.2566255	1.863728	4.497693
Polarization	1.704259	.5695925	.468	3.192
$\text{Polarization}_{Senate}$	1.676687	.5562378	.299	3.138
Dem_H_median	-.933267	.3811346	-1.737	.244
Rep_H_median	.7709917	.4068562	-.134	1.541
Dem_H_share	.4940807	.0980437	.1277264	.8915535
Rep_H_share	.5059193	.0980437	.1084465	.8722736
Perc_black	.1056029	.1143342	0	.6707423
Perc_white	.7901274	.14284	.2126076	.9868132
Perc_hispanic	.0017243	.0052503	.0000107	.2089799
Mean_age	39.36589	3.310183	27.36	57.15087
Perc_high_educ	.2108426	.0782608	.0582184	.6232282
Perc_unemp	.0684406	.027646	.0136519	.1871816
Perc_poverty	.1237056	.0526438	.0245178	.3686337
Perc_welfare	.1963418	.0322372	.0722543	.3294857
Log_med_house_value	11.84589	.4851276	10.71442	13.63255
Log_pc_income	10.22258	.2267264	9.603808	10.98909
Population	474946.3	742881.3	17740	1.01e+07
Log_population	12.60121	.8610527	9.783577	16.13179
Observations	2651			

Table 8: Correlation between MDMI and other measures of inequality

	MDMI_{above}	MDMI_{below}	Gini	L80/20	L90/50
MDMI	0.998^{***}	0.730^{***}	0.973^{***}	0.707^{***}	0.981^{***}
Observations	2651	2651	2651	2651	2651

Notes. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Inequality and Polarization: alternative measures

	MDMI	MDMI_{above}	MDMI_{below}	Gini
		I. County level		
Inequality	0.915^{***}	0.0406^{*}	0.489^{***}	0.392^{*}
	(0.0416)	(0.0209)	(0.182)	(0.216)
Observations	2651	2651	2651	2651
R^2	0.590	0.590	0.591	0.590
		II. State level		
Inequality	0.615^{**}	0.290^{**}	2.003	2.454^{**}
	(0.267)	(0.133)	(1.237)	(1.196)
Observations	257	257	257	257
R^2	0.641	0.639	0.639	0.638

Notes. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the county level in panel I, and at the state level in panel II. The dependent variable is the state-level ideological polarization in the House of Representative, measured as the difference between the median ideal points of House representative of the Democratic and of the Republican party. Controls comprise income per capita, poverty and unemployment rates, the share of the population receiving welfare income, the median house value, and the log population. Demographic controls include the mean age and mean age squared, and the population shares that are college-educated, black, and Hispanic. All controls, fixed effects and weights are at the county level in panel I, and at the state level in panel II. Time fixed effects are also included.

Table 10: Inequality, Polarization, Turnout: alternative measures

	MDMI	MDMI_{above}	MDMI_{below}	Gini
Inequality	0.29^{**}	0.0664^{**}	0.853^{*}	1.434^{**}
	(0.113)	(0.0303)	(0.455)	(0.538)
Polarization	0.519^{***}	0.218^{***}	0.611^{**}	0.912^{***}
	(0.156)	(0.0542)	(0.294)	(0.333)
Polarization^2	-0.125^{***}	-0.0288^{**}	-0.0672^{***}	-0.0953^{**}
	(0.0380)	(0.0086)	(0.0298)	(0.0411)
Inequality × Pol	-0.377^{***}	-0.089^{***}	-0.892^{*}	-1.547^{***}
	(0.127)	(0.0281)	(0.487)	(0.590)
Inequality × Pol^2	0.0896^{***}	0.0044^{***}	0.137^{*}	0.267^{**}
	(0.0304)	(0.0013)	(0.0796)	(0.123)
Observations	2651	2651	2651	2651
R^2	0.202	0.201	0.197	0.201

Notes. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the county level in panel I, and at the state level in panel II. The dependent variable is the county-level turnout rate at presidential and mid-term elections. Controls comprise income per capita, poverty and unemployment rates, the share of the population receiving welfare income, the median house value, and the log population. Demographic controls include the mean age and mean age squared, and the population shares that are college-educated, black, and Hispanic. Time and county fixed effects are included. All regressions are weighted by the log county population in 2000.

Table 11: Inequality, Polarization, support for Democratic Party: alternative measures

	MDMI	MDMI_{above}	MDMI_{below}	Gini
Inequality	0.0327*	0.0133	0.242***	0.146
	(0.0167)	(0.00851)	(0.0655)	(0.100)
Dem_H_median	0.0436***	0.0438***	0.0430***	0.0436***
	(0.0111)	(0.0111)	(0.0110)	(0.0111)
Rep_H_median	0.0363	0.0377	0.0309	0.0372
	(0.0385)	(0.0385)	(0.0386)	(0.0385)
Observations	2651	2651	2651	2651
R^2	0.438	0.438	0.442	0.438

Notes. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the county level. All specifications include time and county fixed effects. The dependent variable is the vote share of the Democratic party. Controls comprise income per capita, poverty and unemployment rates, the share of the population receiving welfare income, the median house value, and the log population size, as well as the mean age and mean age squared, and the population shares that are college-educated, black, and Hispanic. All regressions are weighted by the log county population in 2000.