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in a Probabilistic Voting Model**

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Campaign Spending and Rents in a Probabilistic Voting Model

Simone Righi^{*†}

Abstract

How the levels of corruption and embezzlement of a political system are influenced by electoral campaigns? How rent extraction can be reduced with anti-corruption policies? We answer these questions in the context of a probabilistic voting model characterized by the absence of political pressure groups and by the presence of ideological voters whose preferences can be manipulated by political candidates through campaign spending. Our main innovation is the introduction of an analysis of candidates' campaign choices in the literature on the agency costs of political delegation. Moreover, we contribute to the literature establishing a direct link between campaign expenditures and the utility of the voters. We find that campaigning choices are orthogonal to decisions about rent extractions and that candidates always invest a significative amount of their resources of their expected rents in advertisements. As the electoral competition itself does not suffices to reach an efficient outcome, we then study how welfare policies can reduce the inefficiencies of the electoral competition. We show that limitations of campaign expenditures are, in absence of lobbies, always welfare decreasing for voters. Indeed, our main policy suggestion is to introduce an anti-corruption, i.e. a policy that reduces the ability of candidates to extract rents by abating the incentives to rent accumulation. We show that the introduction of such tax can make the citizens better off. Surprisingly, it may also make the candidates better off if the policy is not sufficiently funded. Finally, we establish the conditions under which a policy of this kind can achieve the popular support required for an effective implementation and we show that these conditions are difficult to achieve in countries with large income inequalities.

Keywords: Probabilistic voting, electoral campaign, procedural concerns.

JEL Codes: P16, D72, D73, D60

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1 Introduction

How are the levels of corruption and embezzlement of a political system influenced by electoral campaigns? How rent extraction can be reduced with anti-corruption policies? We answer these questions with a model characterized by the absence of political pressure groups and by the presence of ideological voters whose preferences can be manipulated, by political candidates, through campaign spending. With respect to the present literature, we introduce an important innovation in our model, allowing the voters to directly gain (dis-)utility from the electoral campaign expenditures of the candidates through "participation excitement" (or "disenfranchisement feeling" if the utility is negative).

The problem we study contributes to the analysis of the agency costs of political delegation, addressed mainly by the literature on electoral competition with opportunistic (or rent-seeking) candidates. The debate on this issue has, until now, neglected the study of the effects of campaigns on voters. Indeed, this strand of literature focuses on how the conflicts of interests among heterogeneous voters (with different preferred policies), on one side, and between candidates (that seek to maximize the rent extracted from office) and voters (which would like to see this rents minimized), on the other side, play out and sometimes allow politicians to overtax citizens to finance their own private consumption. On the subject, two schools of thought exists. According to Wittman (1989, 1995), the forces of electoral competition, creating very strong incentives for the candidates to propose policies that please the voters as much as possible ¹, are enough to reduce rent extraction to zero. However, as noted by Polo (1998), the efficient outcome strongly depends on the efficiency of the electoral competition, which in turn, is deeply influenced by the type of the information candidates have about the voters' preferences. When this knowledge is not perfect (i.e., in the presence of information asymmetries), rent extraction is possible. Another channel through which political rents can emerge, studied by Persson and Tabellini (1999), is the presence of ideology in voters preferences. Indeed, ideology makes elections more certain, reducing voters elasticity to the quality of party platforms (i.e., increased rent extraction). We build on the setups of Polo and Persson-Tabellini, introducing the possibility for the candidates to do a costly electoral campaign, to analyze how this affects the rent extraction behaviour of the politicians. We use the ideology of voters to introduce an heterogeneity in the effect that

¹This is true, in particular, when the electoral competition is tough, for example when voting happens through a majority rule and the winner does not have to share the power with the loser (winner-take-all).

the electoral campaign of the candidates has on voters with different political views.

The empirical literature (Kaid, 1987 and Johnson-Cartee, 1989) suggests that campaign spending influences the political bias of the voters thus providing an incentive, for candidates, to use their resources in order to increase the probability of being elected. In this paper, we consider two channels through which expenditures affects voters' choices. First, following the findings of Palda and Palda (1998), the popularity of the candidate that spends more is increased. Second, the campaign affects each single voter utility function. Indeed, following Freie (1997) who observes that an active campaign - in contested and democratic elections - leads to an increased feeling of integration of voters in the political community to which they belong, we consider this second effect a consequence of the presence of "procedural concerns" in the voters. Moreover, in accordance with Matthews (1998) which claims that voters care about the source of campaign expenditures that they observe, our voters will integrate (in their utility functions) more the expenditures of the candidate they favor than those of the one they oppose. While we mainly consider the case in which they enjoy the electoral campaign, our model easily accommodates situations in which voters dislike the campaign spending. In this case, the electoral campaigns bring the voters a disutility which represents the process of disenfranchisement of the electoral body in modern democracies.

Our setup is rather simple. Two rent-seeking candidates decide on binding platforms which are composed of public goods, rent extraction and investments in an electoral campaign. On the base of these platforms the voters, influenced by the electoral campaign, decide rationally which candidate to elect. The latter will then enforce his platform as promised.

Our main finding is that, surprisingly, the electoral campaign does not affect the amount of rent that is ex-ante announced by the candidates (i.e., the gross rent). However, the investment of resources implied by the campaign reduces the amount of rent available, ex-post, for the candidate elected (i.e., the net rent, which is what is left of the gross rent after the electoral campaign has been paid for). Moreover, the political campaign does not influence the ex-post probability of being elected (confirming the stylized fact observed by Levitt, 1994).

The presence of an element of excitement of the electoral body, as a result of the electoral campaign, implies that our model predicts that the expenditures in political advertisement should be higher than in the absence of such element.

Since positive net rents can be observed in our model, we then study which kind of policies

can be implemented in order to reduce or eliminate them. Our main policy suggestion is to implement an additional tax aimed at reducing the incentives to rent extraction of the candidate. We find that such tax can, under some conditions, improve the welfare of the voters. Nevertheless, if the tax is too small then it reduces the incentives to campaign, making both candidates better off. Finally, we observe that such a policy is difficult to implement in countries with high income inequalities. On this regard we produce a testable prediction: in the presence of high levels of corruption or high income inequalities, the anti-corruption policies implemented by local politicians will be ineffective or too costly to gain popular support.

Given our assumptions, our analysis applies to democratic countries where, compared to other sources of campaign finance (such as corruption, donations from single citizens or public funding), the money that special interest groups donate (or are allowed to donate) to political parties and candidates is limited. Moreover, concerning corruption it is clear that the empirical predictions and the policy suggestions of this paper are more relevant for countries where this phenomenon is endemic. Finally, for the part relative to the presence of "campaign excitement", the attention should be focused on those countries where the voters have a relatively positive view of politics ². In Figure 1 we propose a map of the countries where these conditions apply.

While it is difficult to gather internationally comparable systematic data on the main sources of campaign finance, a study of the electoral laws (we use the *Political Finance Database 2012*, published by I.D.E.A. [35] as proxy for the limitation of the lobbies' role), together with the data on corruption perception (we use the *Corruption Perception Index 2010*, published by Transparency International [36] as proxy for the level of corruption in a country) in the world allows us to select the approximate set of countries to which our model applies. Some of the most fitting examples of this kind of countries are: the new democratic Egypt (a country where surely people are still excited about politics), Russia, Thailand and most of South America (see Figure 1).

Given that we assume that the voting takes place with the majority rule, the primary interest of this paper are those counties where the political competition is between two parties. However, the main results hold, with minor modifications, if applied to political

²One should not be too restrictive on this issue. Indeed, changing the value of the parameters that measure the effectiveness of campaign spending, we are able to capture results relevant also for countries with a significative level of detachment from politics, or even situations in which political campaign is actively disliked by the voters.

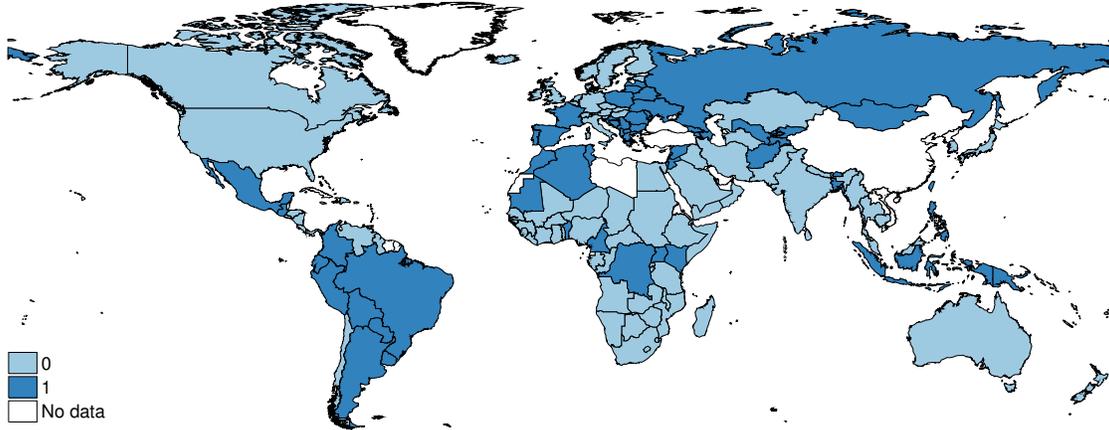


Figure 1: This map gives a graphical representation of the countries to which our setup applies best. The countries colored in the darker blue are those where: the public perception of corruption is medium/high (i.e., the Corruption Perception Index 2010 is below 7) and where the electoral law imposes some type of limitation to contribution that political parties can obtain from lobbies. The countries colored in the lighter blue are those that fail to meet this criteria.

systems with more than two parties, provided that two of them dominate.

For the rest of this paper, we proceed as follows: first we discuss the related literature in Section 2, then, building on the framework of inefficient electoral competition of Polo (1998), Persson and Tabellini (2000) and detailing the new features discussed, we outline the model in its mathematical details (Section 3) and we derive the results (Section 4). Finally, we discuss how some public policies can increase the welfare of the players (Section 5) and we conclude (Section 6). Proofs of the propositions can be found in the Appendix (Section 7).

2 Related Literature

Political competition and more generally representative democracy, where policy choices are delegated to elected officials, is generally considered as an efficient mechanism to aggregate the preferences of large social groups. However, while the possibility of taking policy decisions should be the main reason to run for elective offices, the causality is often reversed: policy announcements are a way to get elected. Several theoretical reasons for this phenomenon have been proposed. In highly competitive elections the satisfaction of the preferences of the median voter (Black, 1948) is required in order to obtain the majority of votes and win the elections (Downs, 1957) so potential candidates with strong policy motivation may opt-out from the political process. Also, candidates could be motivated by the prestigiousness of the

office or by the possibility, once elected, of diverting part of the public resources for private use.

This latter approach is the one adopted by the literature on the agency costs of political delegation. Candidates are considered as rent maximizer leviathans with the only objective of being elected and to divert as much as possible of the public budget for private consumption. This literature, assuming a principal-agent approach, focuses on the conflict of interests that arise between the voters (principals) and the candidates (agents). Indeed, while the formers would like the rents to disappear, the latter try to maximize them. Whether the candidates manage to get away with a positive rent or not depends mainly on the information structure of the political game. Wittman (1989, 1995) suggests that the forces of the electoral competition are sufficient to obtain a socially efficient outcome. He shows that the need to get the majority of votes gives a very strong incentive to politicians to trade lower rents with the possibility of election. However, as noted by Polo (1998), this efficient outcome relies heavily on the assumption that the candidates know perfectly the voters' utility (including the median voter's preferences). When this assumption is relaxed, candidates become uncertain about the voters' evaluation of their characteristics (i.e., about their relative popularity), as observed in Grillo and Polo (1993), Polo (1998) and Myerson (1993)³ and positive rents can emerge in equilibrium. This is because the uncertainty relaxes the competition for the median voter.

Another channel, through which rents can emerge, is the presence of an ideological component in the preferences of the voters. Indeed, if voters have some idiosyncratic inclination for one of the candidates, as in Persson and Tabellini (1999), their elasticity to changes in the platforms of the candidates becomes lower, so that the marginal cost of less attractive policy choices becomes smaller.

With respect to this literature, our paper introduces several innovations. The first is that candidates do not take their relative popularity as given, but they are able to influence it through a costly electoral campaign. Indeed, Palda and Palda (1998), studying empirically the relationship between electoral results and candidates expenditures, noticed that outspending the opponent brings significative advantages in terms of election probability, thus creating a strong incentive to invest in campaign. In our setup, the electoral campaign influences the propensity of the electoral body through a mechanism similar to the one in-

³This issue is also discussed by Svensson (1997), although in his model the rent seekers are bureaucrats which can afterwards be bailed out by politicians.

roduced by Baron (1994) i.e., moving the distribution of the possible popularities in the direction of the candidate that overspend the opponent. The second innovation we introduce is the fact that the electoral campaign also affects the single voter's utility function directly. Freie (1997) shows that the presence of active campaigns, in free and contested elections, induces the citizens to feel more integrated in the political community, thus increasing their utility. This "excitement of participation" does not correspond to a monetary transfer of resources from candidates to voters, and it is inspired by the concept of "procedural utility", introduced by Frey et Al. (2004) and by Frey and Stutzer (2000, 2005)⁴. These authors argue that economic agents do not only care about outcomes, but also about the way in which those outcomes are achieved. A more democratic system, where plenty of occasions to participate to campaign events are offered and more advertisements are shown, makes the voters feel more involved and, as such, is preferred to an apathetical electoral campaign ⁵. However, while the excitement of participation (caused by the expenditures of one candidate) involves all the voters, it is reasonable to assume that the extent to which it is enjoyed depends on their political bias.

A different perspective on the effects of electoral campaign on voters choices is the one of the literature on political advertisements. Most of the contributions deal with the relationship among special interest groups, candidates and voters. They focus on the trade off between the policy cost, imposed by lobbies on citizens as they bias the policy choices of the candidates in their direction, and the informational gains obtained by the voters as a consequence of the interaction between the other two types of agents. Since we neglect the role of lobbies, this trade off does not concern us directly. Nevertheless, this literature is interesting for our scopes since it allows us to gain insights into the channels (other than those discussed) through which electoral campaigns affect voting choices. The papers on the issue can be essentially divided in two classes. Some authors (such as Prat, 2001; Wittman, 2007 and Potters, Sloof and Winden, 1997) assume that voters, knowing that candidates just want to be elected, do not believe in the content of the propaganda, thus these advertisements do not directly modify their behaviour. At the opposite, some other authors (such as Austen-Smith, 1987; Coate, 2004 and Grossman and Helpman, 2001) define the electoral campaign of the candidate as informative for the voters.

⁴Notice that the term *procedural fairness* is also used in welfare economics with another meaning, which is not relevant here.

⁵When given the opportunity, as empirically shown by Wielhouwer and Lockerbie (1994), voters do mobilize and participate more to the political process.

Belonging to the first class is Prat (2001). According to him, the main effect of political advertisements is to allow voters to gain information about the qualities of the candidates. An expensive electoral campaign signals to the voters that the candidate is efficient in obtaining funds indirectly indicating that he is a good administrator. An alternative, but similar, mechanism through which this information can be transmitted is the direct endorsement of candidates by political pressure groups (Wittman, 2007). A common trait of all these studies is that the only way in which a candidate can obtain funds to run advertisements is through contributions from lobbies which are then shown to be pivotal in solving the signaling problem between candidates and voters. This result is driven by the assumption that the quality of the candidates is, *ex-ante*, observable by the political insiders. When this is not the case - as assumed in our paper - the informative gains for the population disappear. Moreover, we abstract from the role of lobbies, focusing on the situations in which their contribution to campaigns are relatively limited when compared with those that the candidate can obtain through other sources. This usually happens, as briefly discussed in the introduction, when the role of special interest groups is legally restricted.

The irrelevance of the pressure groups in a context where these are not more informed about candidates' valences than the rest of the voters extends to the situation in which electors consider the advertisements of the politicians to be informative (i.e., to broadcast contents useful for their decision). However, in this case (studied by Austen-Smith, 1987 and Coate, 2004) another mechanism through which electoral campaigns influence voters' choices emerges. In these models, candidates still try to attract funds from lobbies but they do so in order to reduce the "error" with which the voters perceive the candidate's proposals. This reduces the risk, perceived by the risk-averse voters, that the candidate is poorly qualified. While we do not model voters as explicitly risk-averse or skeptical about the content of the advertisements, our assumption that voters draw direct utility from the electoral campaign can be interpreted to emulate, in other terms, these two links between campaign expenditures and voters' choices. Indeed, they both result in voters preferring the candidate that invests more in electoral campaign.

This paper draws inspiration from some stylized facts, revealed by the empirical and experimental analysis, and with its results contributes to give a theoretical foundation the some other empirical observation. As noticed by Kaid (1987) and Johnson-Cartee (1989) a *campaign influences the political preferences of voters*. These authors, studying in particular

negative campaigning, find that voters recall negative advertisements even if they dislike them. They show that negative advertisements reduce the image evaluation of targeted politician, both for voters with bias toward and against the targeted candidate. As discussed, this stylized fact is integrated here in the way the electoral body is biased in the direction of the candidate that spends more.

Our decision of introducing an heterogeneous reaction of voters to the campaigns of different candidates, is supported by the social psychology literature which presents evidence that *voters do care about the source of the campaign expenditure*. Indeed, Matthews (1998) finds that advertisements have a significative effect on the perception of the member of a group toward the sponsor that paid for it.

Finally, Valentino et al. (2004)'s empirical analysis suggests that, while exposure to political advertisements can be considered informative and may help to reduce informational gaps between informed and uninformed citizens, it *does not produce large shifts in the ranking of the candidates preferred by a given elector*. Similar results are obtained, at a more aggregate level, by Levitt (1994), which confirms that when the candidates spend similar amounts, the absolute level of expenditure has little effect on the probability of election. With the results of our model we reproduce these last two stylized facts thus contributing provide a theoretical justification for them.

3 The model

We assume the existence of two candidates, indexed $J = \{A, B\}$, running for an elective office with a majority voting procedure. Each of the candidates must commit to a binding electoral platform (q_J) composed of three elements: the amount of public goods provided (g_J), the amount of rent extracted from office (r_J) and the amount invested in electoral campaign (Ψ_J). The two candidates are assumed to be equal in terms of their ability to provide public goods, to extract rents and in the efficiency of their electoral campaign. The campaigning costs are assumed quadratic (convex). This reflects that, regardless of the amount invested, the candidate has only a limited amount of energy to spend in the campaign (if we think about television advertisements: it takes time to register television appearances and the time on television is limited while, for political rallies, a candidate can participate only to a limited amount of them). Each candidate is motivated uniquely by the perspective of holding the office and extracting rent from his tenure. The extraction

of monetary rents is subject to a transaction cost $\gamma \in [0, 1]$, which comes as a consequence of the checks and balances characteristic of the political system, and of the fact that the candidates will need to corrupt other members of the administration in order to transform the overtaxation, that they impose on voters, into private consumption. In our specification, the higher is γ , the higher is the efficiency with which the candidate performs this operation. Finally, from the simple fact of holding the office a politician obtains a non-monetary rent R (ego-rent) which is exogenous and depends on how prestigious is the office. Assuming an electoral competition between two politicians, the objective function of the candidates, which they try to maximize, is:

$$\max_{g_J, r_J, \Psi_J} E[v_J] = p_J(g_J, r_J, \Psi_J)(R + \gamma r_J) - \Psi_J^2 \quad (1)$$

where p_J is the probability of election. With respect to Equation 1, it should be noted that, while the rent (r_J) is enjoyed only with probability p_J , the candidate has to pay for his electoral campaign even when he is not elected. For simplicity, we assume that candidates are rich enough to advance the amount Ψ_J or that there is some form of public intervention that lends them, without interests, the money required during the campaign (provided that the expenses do not exceed the expected income).

Moreover, the candidates are characterized by a relative popularity (δ) vis-à-vis the electorate, about which they are uncertain at the moment they announce their platforms. Indeed, δ is composed of two additively separable parts. The first is a random shock $\tilde{\delta}$, common to all voters, assumed to be drawn from a uniform distribution symmetric around zero and with support $[-\frac{1}{2\Omega}, \frac{1}{2\Omega}]$. In this distribution the parameter Ω is the density, which measures the degree of uncertainty of the candidates about the electoral body's propensity toward or against them. Higher values for this parameter correspond to lower levels of uncertainty. The second component of δ is deterministic. Indeed, under the assumption that campaign expenditures are effective in modifying the choices of the electorate, this component shifts the support of the previous distribution in the direction of the candidate that spends more in political advertisements. Joining these two components, the popularity of the candidates will be then extracted from the distribution $\delta = \tilde{\delta} + h(\Psi_B - \Psi_A)$, where h is a parameter that expresses the marginal effect of the difference in advertisements spending on the electoral body's propensity to favour one of the candidates. Indeed, if A outspends B the popularity distribution shifts to the left (the direction that favours A's chances of election) and vice versa if B outspends A.

The candidates are elected by the electoral body I composed of a large number of voters $i \in I$. Each voter is characterized by an income y^i and a political bias σ^i , with the two dimensions assumed to be uncorrelated (or, equivalently, if a correlation exists, candidates are not aware of it). The income determines the preference for the provision of public goods, and it is distributed according to some P.D.F. $F(y_i)$, with full support and of class C^2 . The political bias, σ^i , is the preference of the voter for the non-economic ideologies of the parties that express the candidates. We assume that σ^i is distributed in the population according to a uniform distribution centered in zero and with support $\left[-\frac{1}{2\phi}, \frac{1}{2\phi}\right]$. The parameter ϕ is the degree of political polarization in the society. The political bias can be considered as the degree of similarity between the ideological position of the voter and the one of the parties that express the candidates. Indeed, while the candidates are themselves purely opportunistic, they can only decide the economic policy and they are attached to political parties (which are, formally, the same in our model) which express some well characterized position on non-economic issues (e.g., abortion, gay marriages, immigration etc.). In this sense the voters are distributed according to the degree to which they agree or disagree with party ideologies.

However, the decision of a voter to choose one of the candidates is not purely ideological, but also depends on the platform that the latter announce (q). His income is reduced by τ , the tax levied by the elected candidate and, everything else being equal, his utility becomes smaller when the tax rate increases. The resource gathered with the taxation can be used in two ways: to finance the private consumption of the candidate (r) or to provide public goods (g), thus $\tau = g + r$. All voters agree that r is a bad and all of them prefer platforms which involve less rent extraction. On the contrary, the part of the taxes that goes in the provision of public goods provides a positive utility to voters through a production function $H(g)$. The latter is equal for every voter and assumed to be strictly increasing ($H_g > 0$) and strictly concave ($H_{gg} < 0$).

The campaign expenditures of the candidates (Ψ) influence directly the voters. Specifically, each voter perceives differently the expenditures of the two candidates: he values the expenditures more if they come from his favorite candidate than if they come from the opponent. In our specification the weight assigned by a voter to the investment of a candidate grows linearly with the strength of the bias of the latter toward the former ⁶.

⁶Linearity is assumed, but the results would not change using different (sub linear or super linear) specifications.

The effectiveness of the campaign in generating excitement in the voter ($\zeta \in [-1, 1]$) is assumed to be equal for all voters and candidates. With this specification of ζ we are able to capture both the case in which campaign generates genuine excitement and participation - thus increasing utilities - and the one in which it creates disutility, progressively detaching voters from politics (this second situation is frequently observed in the more advanced democracies, where is sometimes associated to a drop in the turnout).

Finally, in order to simplify the notation, we transform the political bias of the voter in a value on the segment $[0, 1]$. The relative distance of a voter with bias σ^i with respect to the ideological position of the party that candidate A represents is then given by: $d_i^A = \frac{1}{2} + \sigma^i \phi$. The distance from the ideological position of the party of candidate B is then defined by the complement to one of d_i^A , i.e. $d_i^B = 1 - d_i^A$.

With these elements we can now express the utility function of voter i , assumed to be quasi linear and separable in three parts, vis-à-vis the platforms of the candidate J :

$$W_J^i(g_J, r_J, \Psi_J) = (y - g_J - r_J) \frac{y^i}{y} + H(g) + \zeta(1 - d_i^J) \Psi_J \quad (2)$$

Thus, when evaluating the platforms of the two candidates, the voter will compare the following two expressions:

$$W_A^i(g_A, r_A, \Psi_A) = (y - g_A - r_A) \frac{y^i}{y} + H(g) + \zeta(1 - d_i^A) \Psi_A \quad (3)$$

$$W_B^i(g_B, r_B, \Psi_B) = (y - g_B - r_B) \frac{y^i}{y} + H(g) + \zeta d_i^A \Psi_B \quad (4)$$

and will cast his vote for the candidate whose platform gives him the higher utility, given his income, his political bias and the relative popularity of the two candidates. Thus a voter i will choose A if and only if:

$$W^i(g_A, r_A, \Psi_A) > W^i(g_B, r_B, \Psi_B) + \sigma^i + \delta \quad (5)$$

The intuition behind this modeling choice is that voters attribute to each candidate the merit to contribute to the enjoyment of participation (or to the disenchantment) according to the level of electoral campaign made by each of them. However, following the stylized fact discussed, they attribute more weight to the candidate that represent the party with the ideological position nearer to their own than to the opponent.

Since δ is partially stochastic, the result of inequality 5 will be internalized by the candidates in probabilistic terms, leading to a probabilistic voting model.

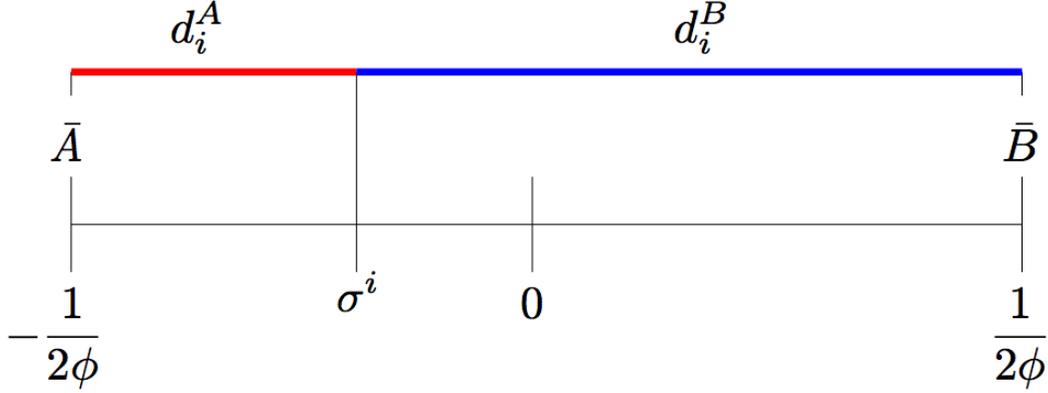


Figure 2: A voter i with income y_i and political bias σ^i obtains, as a consequence of the investments of the two candidates an additional (dis-)utility. The amount of utility that he obtains from each of the candidates depends from the investments of the two candidates and from his relative political bias. The latter is transformed in a value on the segment $[0, 1]$ (thick line) with a linear transformation. The proximity to each of the candidates will then determine how much utility is gained (or lost) by i as a consequence of the investments of that candidate. In this graphical example the voter i , being nearer to candidate A, will obtain more utility ($\zeta d_i^B \Psi_A$) from him than from candidate B ($\zeta d_i^A \Psi_B$).

After the elections, one candidate, J, is elected and implements his platform. A general voter i , with income y_i and with bias σ_i will then obtain the following ex-post utility (see Figure 2 for a graphical representation of how the third addend is formed):

$$W_J^i = (y - g_J - r_J) \frac{y_i}{y} + H(g) + \zeta(\Psi_A - d_i^A(\Psi_A + \Psi_B)) \quad (6)$$

Finally, the timing of the model (summarized in Figure 3) is as follows:

1. The two candidates, simultaneously and non cooperatively, announce **binding** electoral platforms $q_A = \{g_A, r_A, \Psi_A\}$ and $q_B = \{g_B, r_B, \Psi_B\}$ respectively. They make their announcements knowing: the distribution of voters' policy preferences (given by $F(y_i)$), the distribution of voters' idiosyncratic bias σ^i and the natural distribution of popularity $\tilde{\delta}$ (as it would be if uninfluenced by the amount invested in political advertisements);
2. The final distribution of δ is calculated using Ψ_A and Ψ_B decided in Step 1;
3. A value is extracted from δ and all uncertainty is resolved;

4. Elections are held, with voters knowing perfectly the platforms of the candidates and their relative popularity;
5. The elected candidate implements his announced policy platform.

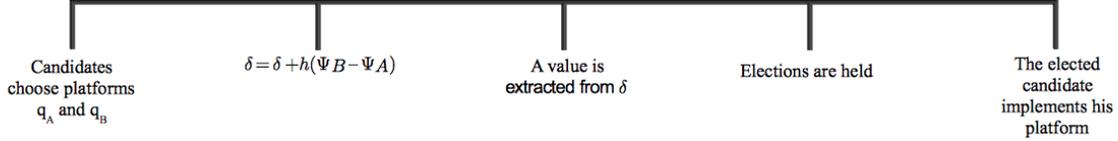


Figure 3: Timing of the model

4 Results

We can now proceed to solve our model by backward induction. To this end, it is useful to define what constitutes an equilibrium in this model.

Definition 1. *An equilibrium is given by: $q_J^* = \{g_J^*, r_J^*, \Psi_J^*\}$ for $J \in \{A, B\}$ such that $\forall J : E[v_J(q_J^*; q_{-J}^*)] \geq E[v_J(q_J; q_{-J}^*)]$ for all feasible q_J and q_{-J} , given voters policy preferences, the distribution of voters' idiosyncratic bias σ^i , the popularity distribution δ and the fact that each voter will vote for the candidate that he likes the most i.e., solving $\operatorname{argmax}_J (W_J | q_A, q_B, \sigma^i, \delta)$ ⁷*

Without loss of generality, we can study the election probability (p_A) for one of the candidates, say A. The results for his opponent will be then given by $1 - p_A$. Since we assume a competition between two candidates, the election probability of candidate A is equal to the probability that the shares of votes (π_A) he gets is bigger than one half. I.e., under our distributional assumptions:

$$p_A = \operatorname{Prob} \left[\pi_A \geq \frac{1}{2} \right] = \operatorname{Prob} [\sigma \geq 0], \quad (7)$$

where σ is the idiosyncratic bias of the swing voter, who is exactly indifferent between the two candidates and for whom Equation 5 holds with equality. Given the informational

⁷In this definition a variable indexed J indicates a choice variable of the candidate which is taking the strategic decision, while a variable indexed $-J$ refers to the choices of his opponent.

structure of our model, the swing voter is not necessarily (and in general he is not) the voter with the median income. His identity is directly (through the utility function) influenced by the platforms (g , r and Ψ) announced by the two candidates and indirectly by the effect of political campaign (Ψ) on the overall distribution of possible popularities of the candidates. Solving Equation 5, with equality, for σ we obtain the bias of the swing voter:

$$\sigma = \frac{2(w_A - w_B) + \zeta(\Psi_A - \Psi_B) - 2\delta}{2(1 + \phi\zeta(\Psi_A - \Psi_B))} \quad (8)$$

where w_A and w_B (small case) are the welfares of the swing voter (as given by Equation 2) net of the direct utility from campaign expenditures. Equation 8, stresses the fact that when ζ is positive, and the campaign generates utility, the identity of the swing voter changes in the direction of the candidate that spends more thus generating more excitation of participation. However, everything else being equal, when voters dislike the campaign, the effect of the expenditures on the utility of voters makes the swing voter identity shift in the direction of the candidate that spends less.

Plugging the utility function of the swing voter in Equation 7, and solving, we obtain the probability of being elected, i.e.:

$$p_A = \frac{1}{2} + \Omega \left[(r_B - r_A) + (g_B - g_A) + (H(g_A) - H(g_B)) - \left(\frac{\zeta}{2} + h \right) (\Psi_B - \Psi_A) \right] \quad (9)$$

Using Equations 1 and 9, we can derive the response functions of the two candidates and the equilibrium ⁸. We will describe in detail the derivations for candidate A, as this gives useful insights in the structure of the model. The same reasoning applies to the other candidate, yielding a symmetric equilibrium.

The first order condition, with respect to g , for the problem of maximization of the candidate A, yields:

$$g_A^* = H_g^{-1} \left(\frac{y}{y} \right) = H_g^{-1}(1) \quad (10)$$

This implies that candidate A will always choose the level of public expenditures preferred by the voter with average income. Given the symmetry of the model, we get the standard result that:

⁸For the problem to be strictly concave (and thus, for the equilibrium to represent a maximum of the candidates' objective function), parameters must satisfy the following condition: for each candidate, it must hold that $(R + \gamma r) > -\frac{\gamma(H_g - 1)^2}{H_{gg}}$. This is always satisfied for a sufficiently prestigious office.

Proposition 2. *The candidates reach full policy convergence to the policy g^* preferred by the voter with average income.*

The candidates are purely opportunistic, so they choose their economic policy simply with the aim of maximizing the probability of election. Not having information on the possible correlation between incomes and political bias of the voters they are unable to target their policy to the effective preference of the median voter, so they choose instead its expected position ⁹. Moreover, when the income distribution is positively skewed (i.e., the society is composed of more poor than rich), Proposition 2 implies that the public good is overproduced with respect to the preferences of the median voter.

The first order conditions with respect to rent extraction and campaign expenditures yield:

$$p_A = \frac{\Omega}{\gamma}(R + \gamma r_A) \quad (11)$$

$$\Psi_A = \frac{\Omega \left(\frac{\zeta}{2} + h\right) (R + \gamma r_A)}{2} \quad (12)$$

Therefore, the probability of being elected is increasing in the total desirability of the office ($R + \gamma r_A$) and in the degree of uncertainty of candidates about their own popularity (Ω). This result match the observation of Polo (1998): uncertainty relaxes the electoral competition so, everything else being equal, it increases the probability of election for any given r_A . Interestingly, p_A is decreasing in the efficiency of transforming rent in utility. Indeed, high γ s create stronger incentives to extract rent from the budget, thus reducing the voters' appreciation of the candidate's platform. Equation 12 shows that the campaign costs that the politician is willing to pay are equal to the desirability of the office, weighted for the marginal benefits of the electoral campaign (on the swing voter, through ζ , and on the whole population through h), and by the level of uncertainty of the political competition. The higher are those three factors, the higher are the expenses that the candidate is willing to sustain to increase his probability of being elected.

Solving Equation 11 for r_A , we obtain $r_A = \frac{1}{\Omega}p_A - \frac{R}{\gamma}$. Thus, the rent extracted depends positively on the probability of being elected, weighted by the degree of uncertainty of the electoral outcome (a high Ω implies the less aggregate uncertainty and thus a more efficient

⁹We explicitly exclude the case in which candidates are able to infer, from the income, the likely bias of a voter, as it seems quite unrealistic.

electoral competition, where the rent extraction is more costly in terms of votes lost). Finally, R acts as a substitute for r_A , whose weight is given by γ : candidates are willing to renounce to some of their rents in order to have access to a more prestigious office. Exactly how much they are willing to give up depends on the efficiency of rent extraction.

Since the campaign expenditures are a function of the probability of being elected only through r_A , we first concentrate on the latter. Making explicit the probability of election of A (from Equation 9) in Equation 11, as a consequence of Proposition 2, we obtain:

$$r_A = \frac{1}{\Omega} \left[\frac{1}{2} + \Omega \left((r_B - r_A) - \left(\frac{\zeta}{2} + h \right) (\Psi_B - \Psi_A) \right) \right] - \frac{R}{\gamma} \quad (13)$$

Equation 13 shows that outspending the adversary increases the rent extractable. Moreover, given the results of Proposition 2 (the policy convergence of the candidates), Equation 13 (together with Equation 12) implies that $r_A(r_B, \Psi_A, \Psi_B)$ - the rent of a candidate depends only on the rent of the opponent and on the expenditures of both contenders - and that $\Psi_A(r_A)$ - the expenditure of a candidate depends, directly, only on his rent. So, for Ψ , the strategic responses to the opponent's decisions act directly through the rent and, only indirectly, through both the expenditures in campaign.

Taking the strategies of B as given, r_A becomes:

$$r_A = \frac{1}{4\Omega} - \frac{R}{2\gamma} + \frac{(2h + \zeta)}{4} (\Psi_A - \Psi_B) + \frac{1}{2} r_B \quad (14)$$

Therefore, the extractable rent is a function of the sum of two components: one, non-strategic, which depends only on the parameters and one which is a function of rent and expenditures of the adversary and of own expenditures. Equation 14 tells us that the candidates' rents are a positive and linear function of each other. Indeed, the more one candidate is planning to divert for private consumption, the more the opponent can extract without reducing his probability of being elected. Moreover, the expected gross rent is a positive function of own campaign expenses and a negative function of those of the opponent. This last relationship uncovers the rationale of rent-seeking candidates for investing in campaign. However, while out of equilibrium the effect of campaign in changing the popularity is twice more important than the effect on the procedural utility of the swing voter, due to the symmetry of the model, under the assumption that $\Psi_A = \Psi_B = \Psi$, there is no equilibrium effect of advertisements on expected rents. This result seems to confirm the empirical observation of Levitt (1994): the absolute level of candidate's expenses has little effect on voter's choices when the two competitors invest similar amounts of resources.

From Equations 12 and 14 we now calculate the reaction functions of candidate A to the strategies of candidate B, taken as given:

$$r_A = +\frac{4}{\Omega K} - \frac{8R}{\gamma K} + \frac{\Omega R(2h + \zeta)^2}{K} + \frac{8}{K}r_B - \frac{4(2h + \zeta)}{K}\Psi_B \quad (15)$$

$$\Psi_A = +\frac{(2h + \zeta)(\gamma + 2\Omega(R + \gamma r_B))}{K} - \frac{\gamma\Omega(2h + \zeta)^2}{K}\Psi_B \quad (16)$$

where $K = [16 - \gamma\Omega(2h + \zeta)^2]$. Assuming enough uncertainty ¹⁰, the candidate's rent is decreasing in the expenditures of the opponent and increasing in his rent. As already pointed out, if a candidate increases the rent that he demands, the opponent can do the same without affecting his election probability. However, when a candidate increases the size of his own electoral campaign, he decreases the probability of the opponent to be elected and, in expected terms, his rent.

Moreover, Equation 16 shows that the expenditures of one candidate are increasing in the rent that the opponent extracts (since an increase in the rent of B allows A to do the same and extract more money proportionally) and decreasing in his expenditures (more expenditures of B means less expected rent for A, and therefore less expenditures).

Knowing that, by the symmetry of the model, $r_A = r_B$ and $\Psi_A = \Psi_B$, we can obtain the equilibrium values of the decision variables:

$$r_A^* = \frac{1}{2\Omega} - \frac{R}{\gamma} \quad (17)$$

$$\Psi_A^* = \frac{\gamma}{8}(2h + \zeta) \quad (18)$$

Therefore, we can conclude that in equilibrium:

Proposition 3. *When the candidates are able to influence the voters with their investments in campaign: $r_A^* = r_B^* = \max\left[0, \frac{1}{2\Omega} - \frac{R}{\gamma}\right]$ and $\Psi_A^* = \Psi_B^* = \max\left[0, \frac{\gamma}{8}(2h + \zeta)\right]$. Thus, on the one side, the extractable rent is increasing and concave in γ , decreasing and convex in Ω and linearly decreasing in R and, on the other side, the equilibrium expenditure is linearly increasing in h and γ and ζ .*

Moreover, r^ is ortogonal to Ψ^* .*

¹⁰I.e., $\Omega < \frac{16}{\gamma(2h + \zeta)^2}$.

Proposition 3 has several implications. The gross rent (r) is not influenced by the possibility of doing an electoral campaign (indeed, it is equal to the one found by Polo, 1998). Thus our model predicts that corruption and campaign expenses, in absence of special interest groups, should be uncorrelated. Empirically, when an increase of the second variable is observed, there should not be a significative effect on the first one.

However, a positive part of the expected rent is, in our model, invested in electoral campaign. The reason for this investment is, on one side, given by the possibility to overspend the adversary, influence the distribution of the voters' bias and therefore increase the chances of being elected and, on the other side, by the attempt of creating enough participation excitation to make some voters change side. In particular, the pressure to do active electoral campaign (and therefore the amount spent) increases when both the channels to influence the outcome are possible (and $\zeta > 0$). Thus, Proposition 3 induces the following corollary.

Corollary 4. *If campaign spending affects positively the utility of the voters ($\zeta > 0$), then the electoral campaign increases in size as a proportion of the amount of resources extracted.*

This is a result of the fact that collective excitation creates an additional incentive to campaign as, to do so, allows to potentiality move more votes. Indeed, under the conditions of Corollary 4, the electoral campaign increases the voters' welfare due to the collective excitation it generates.

Given the orthogonality of rents and campaign expenditures, the investment in the latter effectively transfers some of the extracted rent back to the citizens (at least in a non-monetary sense). Moreover, since both candidates spend an identical amount of money in equilibrium, all the citizens, regardless of their idiosyncratic bias, enjoy the electoral campaign to the same extent (though not all of them will be equally satisfied by the policy g chosen). In this regard, investing in campaign is similar to *pork barrel* spending (a candidate's promise of diverting a - disproportionate - amount of resources in favor of the voters that elect him). However, in this model, since the expenditures in electoral campaign are made before the elections (and not just promised), they are enjoyed by the whole electorate, not just by the voters of the candidate elected.

For candidates, doing an electoral campaign reduces welfare. Both of them would be strictly better off not spending but, in this setting, they are unable to commit themselves to this behavior. Therefore they find themselves in a *Prisoner's dilemma* situation and they

both spend a significant amount of their expected rents in order to try to increase their chances of winning.

How much still remains for the candidates, after the electoral campaigns are paid for, is measured by net rents:

$$r_{net} = \frac{1}{2\Omega} - \frac{R}{\gamma} - \frac{\gamma}{8}(2h + \zeta) \quad (19)$$

As for the gross rent, the size of the net rent is increasing with the uncertainty about the popularity while, clearly, an increase in the marginal effects of expenditures in campaigns decreases the net rent. Finally, a decrease in the transaction cost γ has different effects on the net rent, depending on the values it assumes. Indeed, r_{net} is an increasing function of γ if $\gamma > \sqrt{\frac{8R}{2h+\zeta}}$ and a decreasing one otherwise. In this respect, notice that this threshold moves toward the unity when the office becomes more prestigious. This implies that, for very prestigious offices, a decrease in transaction cost always decreases the net rents (or leave them equal to zero if $r_{gross} \leq \Psi$). An explanation for this phenomenon follows. If R is big, competition is *ceteris-paribus* fierce, leaving little space for rent accumulation. However, this also increases the pressure to maximize the probability of election with more spending. In this condition, a decrease in the transaction cost makes the extraction of those little rent more efficient. However the expenditures grow faster than the gross rent thus decreasing the net rent.

Interestingly, Equation 19 shows that, under the conditions of corollary 4, the modernization and higher penetration of mass media (which make every dollar spent more effective) and better means of transport and campaigning (which allow voters to participate more to campaigns and feel more involved) increases the efficiency of the electoral competition, reducing the net rent of the candidate.

However, empirically this is not always observed. In some countries it has been shown that a lot of additional information discouraged and disenfranchised voters, who feel less and less involved in politics. Coherently, in this case, our model predicts an inverse relationship between disenfranchisement of voters and campaign expenditures:

Corollary 5. *If campaign spending affect negatively the utility of the voters ($\zeta < 0$), candidates reduce campaign expenses.*

Indeed, in this case the rationale for campaign spending is reduced. While spending is still useful to increase the probability of winning (through its effect on the electoral body as

a whole), it also affects negatively the perception of the platform of the candidate.

5 Welfare Analysis

We have shown that while the electoral competition, in the presence of uncertainty, leads to positive gross rents, the candidates renounce to some of their rents in order to increase the chances of winning the elections. Moreover, we have shown that the net rents decrease when citizens utility is positively affected by campaign. However, some inefficiency in the electoral competition remains as net rents can be positive. In this section, we study the possibility of introducing public policies aimed at increasing efficiency.

The channel that has been explored by most of the literature on political advertisement to achieve this objective is the application of expenditure limits. Under this policy, the candidates are forbidden from investing in electoral campaign more than a given amount of resources. This kind of policy can be effective when the funding of campaigns comes from special interest groups but, in our setup such limitations are always welfare decreasing for the voters and welfare increasing for the candidates. The proof is intuitive. When voters enjoy the political campaign, reducing the maximum expenditures limit the amount of rent channelled back to the public in the form of utility of participation, without affecting corruption. Therefore the candidates are better off than in the absence of any limitation, but the voters always have their utility reduced by this kind of policy. This result is clearly driven the nature of our model where the candidates self-finance their own campaigns. Analogously, when voters do not enjoy political campaigns ($\zeta < 0$) spending limitations are useless, as the candidates are already willing to reduce their expenses in order to avoid hurting their electorate.

In a situation characterized by rent seeking candidates and by the absence of lobbies, a better policy is one that reduces their ability to extract rents, fighting the corruption of the political system, by abating the incentives to rent accumulation. Let us now assume that a constitutional level authority, or a international institution (that can impose its decisions on the candidates and the politicians), imposes an additional tax on the citizens (called τ_γ in the following) whose size is fixed exogenously. The revenues of this tax are used in order to reinforce the judiciary and police system and to make it harder, for candidates, to extract rents from the public budget, increasing the transaction cost associated to rent extraction (i.e., reducing γ).

The model is therefore modified, introducing an additional proportional tax on voters' income so that total taxation will now be equal to $\tau = g + r + \tau_\gamma$. Moreover, the expected utility of each of the candidates will be $p_J(R + (1 - \tau_\gamma)\gamma r_J) - \psi_J^2$ ¹¹ With this kind of policy, while the choice of public services (g), remains fixed at the value preferred by the voter with average income, the equilibrium gross rents and the expenditures become:

$$r_{A,B}^{**} = \frac{1}{2\Omega} - \frac{R}{\gamma(1 - \tau_\gamma)} \quad (20)$$

$$\Psi_{A,B}^{**} = \frac{1}{8}\gamma(2h + \zeta)(1 - \tau_\gamma) \quad (21)$$

Given that $0 \leq \tau_\gamma \leq 1$, both the gross rents and the campaign expenditures are reduced by this tax. Whether this policy also increases the efficiency of the political system (reducing net rents), depends on the prestige of the office and on the level of taxation. Indeed:

Proposition 6. *If the office is sufficiently prestigious, i.e. if $R \geq \frac{\gamma^2}{8}(2h + \zeta)$, net rents decrease at any level of taxation on corruption. However, if the office is not sufficiently prestigious, then net rents decrease if $\tau_\gamma \geq 1 - \frac{8R}{\gamma^2(2h + \zeta)}$ and increase otherwise.*

The level of additional taxation required to reduce net rents increases with the effectiveness of campaign and as the transaction costs decrease (since this creates stronger incentives to accumulate rent), and decreases with the prestigiousness of the office. In other words, the prestigiousness of the office acts as a substitute also for taxation on corruption (as discussed in Section 4, R makes the electoral process more efficient in reducing the rent extraction). Proposition 6 reflects the qualitative observation that, in countries where political offices are considered more prestigious (or where the civil servant aspect of a politician's job is more important) the amount of resources (monetary but also in terms of the attention of the public opinion) that needs to be dedicated to effectively fight corruption is more limited than in countries where politicians command little respect.

In order to assess the welfare properties of this policy, we now study the threshold levels of taxation that make each of the agents in this model better or worse off. For candidates,

¹¹This setup is the simplest possible. Indeed, the new tax reduces of $1 - \tau_\gamma$ units the utility obtained from every unit of rent extracted. A richer specification could involve a generalization of this formula in which the effectiveness of τ_γ is an arbitrary function $f(\tau_\gamma)$ such that $f(0) = 1$ and $f(1) = 0$. Furthermore, the setup could be further extended taking into account the total amount of resources gathered, which depends on $\int_i y_i dF(y_i)$. This two additional elements would undoubtedly provide a larger wealth of results than those provided here. However, in the interest of clarity and tractability of the results we leave these extensions for future work.

it can be proven (see appendix 7.1) that, as a consequence of the previous discussion on the net rents, it holds that:

Proposition 7. *A moderate tax, introduced to fight the rent-seeking behavior, can actually increase candidates' utility. This happens when $\tau_\gamma < 2 - \frac{16}{\Omega(2h+\zeta)^2\gamma} \equiv \tau_c$*

This is a consequence of the form of the utility function of the candidates. When the taxation is small, it reduces the incentives to rent extraction linearly, but it also abates the campaign expenditures quadratically (the campaign costs are assumed to be convex). So, while reducing the absolute size of corruption (gross rents), a moderate taxation also abates expenditures, diminishing the competition between the candidates, which is beneficial for the voters. As long as the candidates decide to make an active electoral campaign the trade-off described remains and, only if the campaign disappears, the level of taxation for which the candidates are better off tends to zero. This result could also explain why some countries, with high levels of corruption, engage in actives that pretend to fight the phenomenon. A "cosmetic" anti-corruption policy may indeed help the politicians running for the office to overcome part of the prisoner dilemma that makes them overspend in campaign. While creating a façade of honesty these politicians would be actually working to improve their own welfare. Cases of failed corruption policies are widespread in particular in countries where political offices command little or no prestige (see Riley, 1998). Therefore, a policy maker who wants to adopt a tax of this kind, should take into account that if the office is not very attractive, then a limited amount of taxation could actually increase the amount of money that the candidates are able to extract being, de facto, counterproductive.

Let us now turn our attention to the effects of this tax on a given voter. The imposition of an additional tax has three distinct effects: on one side it diminish the welfare of the citizens, abating available income (y_i) and it reduces (see Equation 21) the opportunities of participation in political activities, on the other side, the elected candidate extracts a smaller rent, increasing the welfare of the voter. The net balance of these variations of welfare depends crucially on the value of the parameters and, in particular, on the gross income of the citizen (y_i). Indeed, it can be shown (see Appendix 7.2) that:

Proposition 8. *When the tax is sufficiently big, $\tau_\gamma > 1 - \frac{4Ry_i}{\gamma(y\zeta\gamma(2h+\zeta)+4y_i)}$, a voter with income y_i is better off as a result of taxation on corruption. However, if the office is not sufficiently prestigious, i.e. $R < (1 - \tau_\gamma)\gamma$, then no voter is better off with the taxation.*

As for every tax, some citizens will be made better off by it, while some other will lose utility. Proposition 8 implies that each voter has a minimal level of taxation, below which the anti-corruption fight worsens his position (see Figure 4).

Given this result, it is clear that not every citizen would be willing to support a costly anti-corruption policy. Thus, also in the light of the result of Proposition 7, these results could be interpreted as a partial solution, offered by politicians to the corruption problem. Since only a part of the population is willing to pay to see corruption reduced, the candidates could use this willingness to introduce ineffective reforms.

The result of Proposition 8 can be generalized to the whole electoral body. The overall effect, on the electorate, of a tax-financed anti-corruption campaign is given by the difference between the population welfare with and without the new tax, i.e.:

$$W_{\tau>0} - W_{\tau=0} = \int_0^1 W_{\tau>0}^i dy_i - \int_0^1 W_{\tau=0}^i dy_i \quad (22)$$

The solution of Equation 22, yields (see Appendix 7.3 for details) the following proposition:

Proposition 9. *The population of voters is overall better off with the introduction of a tax on corruption if $\tau_\gamma > 1 - \frac{2R}{\gamma(\gamma\zeta y(2h+\zeta)+2)} \equiv \tau_v$.*

Everything else being constant, it is clear that an important role is played by y , the average income of the electorate. The higher it is, the higher is the proportional tax rate ¹² required for the population to be better off thanks to corruption-fight. This implies that populations with an positively skewed income distribution will be, in principle, better off at lower levels of taxation than a population with relatively more rich.

Will the median voter be better off with or without the taxes that make the whole population better off? This question is relevant, since in most countries, popular support for a policy that acts against the dominant class (here the political class) needs to be strong to allow its implementation. Income distribution turns out to be pivotal in establishing popular support for such measures. Indeed, it is possible to show (see Appendix 7.4) that:

Proposition 10. *For any symmetric distribution the threshold of taxation on corruption that makes the population better off is just equal to the one that makes the median voter better off.*

¹²Note that we assume the anti-corruption tax to be a proportional tax. Other types of tax schedule could lead to different results

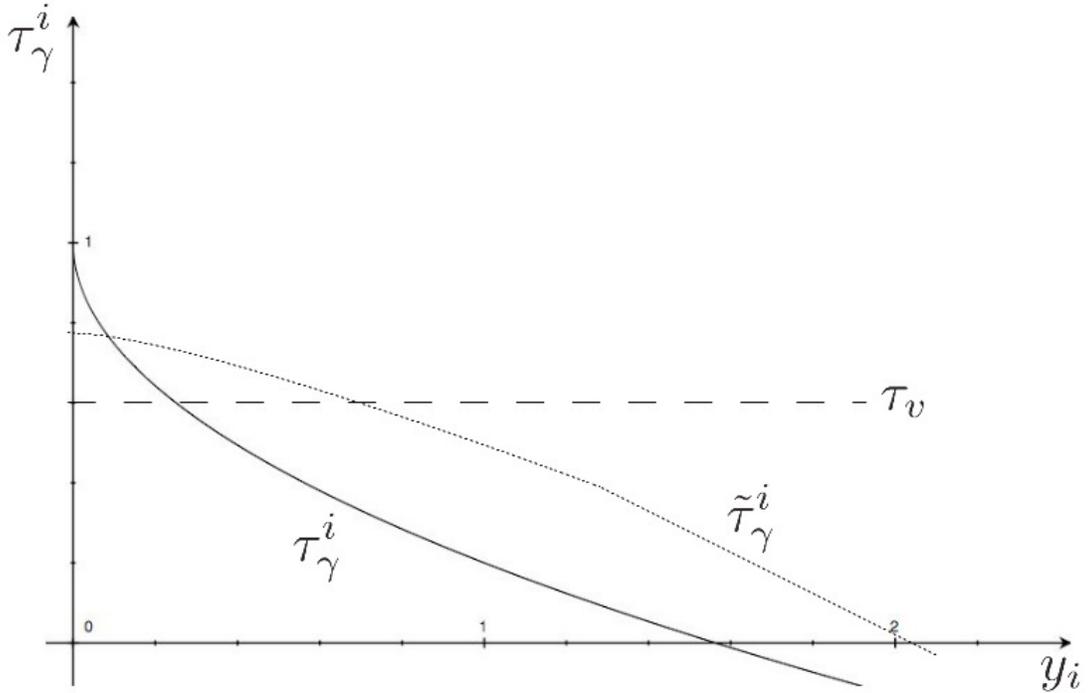


Figure 4: Graphical representation of Proposition 8. The continuous line represents the minimal tax rate necessary for a voter with income y_i to increase his welfare. The dotted line instead represents the tax rate above which the agent is better off without any government. Therefore, the area between the two lines is the set of tax rates that makes the citizen better off with the anti-corruption policy. Finally, the dashed line represents the level of taxation on corruption that makes the population as a whole better off (from Proposition 9). At this level, however, some citizens (the poorer ones) will be worse off with the tax.

For any positively (resp. negatively) skewed distribution, at the threshold above which the population is better off with the taxes, the median voter is worse (resp. better) off with the taxes.

Proposition 10 offers an explanation of why, in countries with comparatively many poor (where the median voter's income is below the mean income), it is difficult to effectively implement anti-corruption policies of the kind proposed here. Indeed, when the median voter is worse off with the policy, this implies that the level of taxation required to increase the population welfare lacks the popular support needed for the implementation (in a democratic country).

Propositions 7 and 9, taken together, indicate that there is a possible conflict of interest between voters and politicians on the strength of the anti-corruption measures to implement. Indeed, putting together the two thresholds we obtain that $\tau_v > \tau_c$ if $0 < \Omega < \frac{64+16y\zeta(2h+\zeta)\gamma}{(2h+\zeta)^2(4R+\gamma(4+y\zeta\gamma(2h+\zeta)))}$. When this condition is satisfied the choice of an amount of taxation between τ_v and τ_c makes both of the sides better off. However when the condition is not satisfied, the choice is between a level of taxation that makes one side worse off and a level that decreases the welfare of both sides.

Finally, imagine that a benevolent social planner, before the game, has to set the optimal rate of corruption-prevention taxation. He will choose τ_γ in order to maximize the electoral body's welfare, i.e.,

$$\max_{\tau_\gamma} \int_0^1 (y - g - r - \tau_\gamma) \frac{y_i}{y} + H(g) + 2\zeta\Psi \, dy_i \quad (23)$$

Plugging in the equilibrium values from Equations 20 and 21 and solving the maximization problem we obtain the equilibrium taxation:

$$\tau_\gamma^* = 1 - \frac{\sqrt{2}R}{\sqrt{R\gamma(2 + y\zeta(2h + \zeta)\gamma)}} \quad (24)$$

The social optimum in Equation 24 is always bigger than the threshold established by Proposition 9, except when the ego-rent associate with the office is particularly low (i.e, if $R < \frac{\gamma}{2} [2 + y\zeta\gamma(2h + \zeta)]$). In this case, as already discussed, the anti-corruption tax is never able to make the population better off, so the social planner chooses $\tau_\gamma^* = 0$. This condition confirms how, in order to have efficient public policies it is pivotal to establish a minimum level of prestige associated to the office to protect from corruption.

Summarizing, we have shown that the introduction of an anti-corruption tax can make the citizens better off. Surprisingly, it may also make the candidates better off when the gross rent that they extract decrease less than the expenditure in electoral campaign. We finally establish the conditions under which a policy of this kind can achieve the popular support required for an effective implementation.

6 Conclusions

Our aim in this paper is to study the relationship between corruption and campaign expenditures in a context characterized by the absence (or the limited relevance) of political lobbies. To this end, we introduce several innovations on the classical framework of the probabilistic voting models (Polo, 1998 and Persson & Tabellini, 2000), with office motivated (rent-seeking) candidates and ideological voters. We explicitly model the campaign spending of the candidates together with the multiple types of influences that it has on the voting decisions of the population. A particular feature of our paper, that distinguishes it from the current literature, is that we establish a direct link between electoral expenditures of candidates and utility of voters. The utility changes (increasing or decreasing depending on which stylized fact we want to capture) if voters observe that candidates are doing an active electoral campaign.

Our main result is that rent extraction and campaign spending are orthogonal variables in equilibrium. This allows us to predict, that in countries where lobbies have a limited role, we should not find a significative relationship between the amount of resources invested in campaign and the scale of corruption of the administration that gets elected. Moreover, we find that in the majority of cases candidates spend a positive part of their expected rent in order to finance their electoral campaign. In itself this result is a qualitative confirmation of the realism of the model. Indeed, very rarely politicians abstain from doing electoral campaign, even when they are forced to self-finance it. On this regard, our model produces a testable prediction: when voters find electoral campaigns exciting, candidates spend more. How to test this prediction? It is difficult to empirically disentangle the difference between h , the effect of advertisement on the general population, and ζ , the effect of campaigning on voter's utility. A possible solution is to consider the level of technology and penetration of mass media as proxies for h and the amount of campaign events in an geographical area as a proxy for ζ . Indeed, mass media advertisements tend to affect a population equally, but

do not lead to significant "psychological gains" (Sanders, 2001) in terms of participation opportunities to the election procedure. On the contrary, political rallies and opportunities of employment in the campaign of a candidate, directly stimulate individual citizens to be involved in the political process. Studying the differences between contested (where usually most of the campaign events are concentrated) and uncontested electoral districts, it could be possible (with an empirical strategy similar to the one proposed by Frey and Stutzer 2000, 2005) to estimate the effect of political campaigns on voters contentment with the political system ¹³. While a large number of socio-economic controls should be added in order to take into account the local specificities, this seems a promising way of testing our results about "campaign excitement".

In this paper, we also study the effects of the introduction of public policies aimed at reducing the inefficiencies of the electoral competition. In this respect, our model predicts that campaign spending limitations are always welfare decreasing for the voters. This policy should therefore be avoided, at least in contexts where special interest groups have a limited importance. Another way of interpreting this result is to advise policy makers to forbid completely contributions from organized groups as, when campaigns create utility, this policy allows the electoral competition to increase the voters' welfare, without the burden of the policy costs implied by lobbies' contributions.

An alternative policy we study is to fight corruption with investments in police and justice financed by an additional tax paid by the electoral body. A policy of this type may reduce the net rents (and therefore the inefficiency of the electoral competition) when the electoral office to protect is highly prestigious. However, when this condition does not hold, this policy can work in favor of corrupt politicians, increasing their utility. This result provides a theoretical explanation for the behavior of many corrupt politicians who, in countries with high levels of public embezzlement, often introduce weak anti-corruption policies, that turn out to help them increasing their rent through a reduction of the positive effects of electoral competition. Some of the most problematic democracies, such as Bolivia, Venezuela, Senegal and Russia, present clear examples where politicians claim to fight corruption but use this policy to create a façade of honesty while still allowing themselves to retain a significant

¹³Evidence of the fact that the opportunity of political participation (i.e. working, without wage, in a candidate's campaign) induces positive changes in voters perceived quality of life, or happiness, has been shown by Weitz-Shapiro & Winters (2008) and by Pacheco & Lange (2010). For our purposes it would be important to demonstrate the existence of an effect of political events, such as campaign rallies, on voter's perception of the political system (rather than simply on those that choose to participate to campaigns).

share of the public budget for private consumption.

The last important result of this paper is that it uncovers a relationship between the tax-level required, in a given population, to achieve welfare improvements through an anti-corruption policy and the level of popular support that this policy requires in order to be implemented in a democratic setup. We show that it is difficult to implement effective policies in countries with large income inequalities, as in this case the majority of voters will oppose the introduction of a (sufficiently effective) anti-corruption law. In these environments, only an non-elective, external body can hope to reestablish efficiency.

While this paper still has some limitations, our setup is very flexible and, at this stage, we are able to envision several ways to extend it. Regarding the effects of political campaign on voters' utility (the main innovation of this paper), with our parametrization, we are able to capture the excitement that can be generated as well as the feeling of disenfranchisement of voters due to excessive quantities of information. However, in this second case, a possible effect of electoral campaign is neglected: as a consequence of too much information some voters could decide not to participate to elections. Making the turnout endogenous, and directly linking the voters' (dis-)utility from campaign with their participation probability could help us capturing an additional trade-off in the decisions of the candidates: the one between the need to campaign in order to get a maximum of the participants' votes and the need to maximize the share of the population that goes to the ballots.

Finally, a more general specification of the anti-corruption tax, could generate richer results in terms of welfare analysis. In this context, the introduction of re-election concerns could create the disciplinary device required to induce politicians to apply effective anti-corruption policies.

7 Appendix

7.1 Proof of Proposition 7

In the case of no tax on corruption the expected value of the candidates' utility is given by Equation 1, while introducing the tax on corruption, it becomes: $p_J(R + (1 - \tau_\gamma)\gamma r_J) - \Psi_J^2$. In equilibrium, given the symmetry of the model, the probability of being elected is always equal to $\frac{1}{2}$. Introducing the relevant equilibrium values for r and Ψ (Equations 17 and 18 for the case without taxes and Equations 20 and 21 for the case with anti-corruption taxes), we

can now calculate the difference between the expected values in the two cases:

$$E(v_j^{\tau > 0}) - E(v_j^{\tau = 0}) = -\frac{\gamma\tau_\gamma(16 - (2h + \zeta)^2\gamma\Omega(2 - \tau_\gamma))}{64\Omega} \quad (25)$$

We are interested to know under which conditions on τ_γ the candidates are better off (when Equation 25 is positive). Requiring this equation to be bigger than zero and solving for τ_γ , we find the result of Proposition 7.

7.2 Proof of Proposition 8

In the absence of anti corruption policies, the welfare of a citizen with income y_i is given by Equation 2 while, with the taxation it becomes: $W_i = (y - g - r - \tau_\gamma) \frac{y_i}{y} + H(g) + \zeta(1 - d_i^J)\Psi_J$. We can introduce the relevant equilibrium values for g , r and Ψ into the equations of welfare and calculate the difference between the two expressions ¹⁴:

$$W_i^{(\tau > 0)} - W_i^{(\tau = 0)} = \frac{y_i}{y} \left(\frac{R}{\gamma} \frac{\tau}{1 - \tau_\gamma} - \tau_\gamma \right) - \frac{1}{4}\zeta\gamma\tau_\gamma(2h + \zeta) \quad (26)$$

In order to compute the conditions for the voter i to be better off with the taxes, we impose that Equation 26 must be bigger than zero, i.e.:

$$\frac{y_i}{y} \frac{R - \gamma(1 - \tau_\gamma)}{\gamma(1 - \tau_\gamma)} > \frac{1}{4}\zeta\gamma(2h + \zeta) \quad (27)$$

It is immediately evident that since the RHS of the last equation is always positive, if $R < \gamma(1 - \tau_\gamma)$ then the inequality is never satisfied. Finally, solving Equation 27 for τ_γ we obtain the other result of Proposition 8.

7.3 Proof of Proposition 9

When no anti-corruption taxes are introduced, the ex-post welfare of the population of voters is given by:

$$W_{\tau=0} = \int_0^1 W_{\tau=0}^i dy_i = \int_0^1 \left(y - g^* - \frac{1}{2\Omega} + \frac{R}{\gamma} \right) \frac{y_i}{y} + H(g^*) + \frac{1}{4}\zeta\gamma(2h + \zeta) dy_i \quad (28)$$

While when these taxes are present, it becomes:

$$W_{\tau > 0} = \int_0^1 W_{\tau > 0}^i dy_i = \int_0^1 \left(y - g^* - \frac{1}{2\Omega} + \frac{R}{(1 - \tau_\gamma)\gamma} - \tau_\gamma \right) \frac{y_i}{y} + H(g^*) + \frac{1}{4}\zeta\gamma(2h + \zeta)(1 - \tau_\gamma) dy_i \quad (29)$$

¹⁴By the symmetry of the model $\Psi_A = \Psi_B$. Moreover, since $d_i^A = 1 - d_i^B$, for every voter i , $d_i^A + d_i^B = 1$

Equations 28 and 29 can be simplified respectively as:

$$W_{\tau=0} = \frac{1}{4} \left(2 + \frac{2R}{y\gamma} + \gamma\zeta(2h + \zeta) - \frac{1}{y\Omega} \right) \quad (30)$$

$$W_{\tau>0} = \frac{2R\Omega + \gamma(\tau_\gamma - 1)(1 + y\Omega(\gamma\zeta(2h + \zeta)(\tau_\gamma - 1) - 2) + 2\tau_\gamma\Omega)}{4y\gamma\Omega(1 - \tau_\gamma)} \quad (31)$$

To establish our result, we need that $W_{\tau>0} - W_{\tau=0} > 0$. Solving this inequality for τ_γ yields the condition summarized in Proposition 9.

7.4 Proof of Proposition 10

Consider a symmetric distribution of income between 0 and 1. By definition $y = y^M = 0.5$. Therefore, the threshold taxation that makes the median voter better off (the one of Proposition 8 with $y_i = y^M = 0.5$) becomes:

$$\tau_\gamma > 1 - \frac{2R}{\gamma(0.5\gamma\zeta(2h + \zeta) + 2)} \quad (32)$$

which, given that $y^M = y$, is equal to the level of taxation that makes the whole population better off (see Proposition 9).

Consider now a positively skewed distribution bounded between zero and one¹⁵. For any such distribution $y^M < y < 0.5$. Proceeding as above we can find the threshold that makes the median voter better off:

$$\tau_\gamma^M > 1 - \frac{4Ry^M}{\gamma(y\gamma\zeta(2h + \zeta) + 4y^M)} \quad (33)$$

From Proposition 9 we know the threshold of the population (let us call it τ_γ^P). We want to show that, at τ_γ^P , the median voter is worse off with the taxes. For this to be true it must hold that his threshold is higher than the one of the population: $\tau_\gamma^M > \tau_\gamma^P$. This inequality is satisfied for $y^M < \frac{1}{2}$. Since we know that for every positively skewed distribution between 0 and 1, $y^M < y < 0.5$, the inequality is always satisfied. In the same way, since for any negatively skewed distribution $y^M > y > 0.5$, we can prove that the median voter is always better off with taxes at the level at which the population is indifferent.

¹⁵The Kumaraswamy Distribution is an example of this kind of distribution.

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