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Candidate Quality

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CANDIDATE QUALITY

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CANDIDATE QUALITY

Abstract

We analyze the topical question of how the compensation of elected politicians affects the set of citizens choosing to run. To this end, we develop a sparse and tractable citizen-candidate model of representative democracy with ability differences, informative campaigning and political parties. Our results suggest that primaries, campaign costs and rewards have previously overlooked interactions that should be studied in a unified framework. Surprisingly, increasing the reward may lower the average candidate quality when the campaigning costs are sufficiently high. The model accommodates a variety of extensions of which we study costly primaries, two-stage signalling, and ideological differences.

JEL Classification: D70, D72, D79.

Keywords: politicians' competence, career concerns, campaigning costs, rewards for elected officials; citizen-candidate models.

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"Government represents about a third of our gross national product. That is a lot of our national income to waste by discouraging the best young people from entry."

Joseph S. Nye Jr., Dean of Harvard's John F. Kennedy School of Government

1 Introduction

People talk about the quality of politicians as much as the quality of their policy. This is not surprising, because the quality of politicians profoundly affects the quality of their policy. More surprisingly, politicians' quality is often ignored in the economic analysis, although the quality of their policy is carefully scrutinized. By politicians' quality we simply mean their ability to maximize welfare by making and carrying out decisions on behalf of the rest of society. Such skills are in scarce supply in society. Voters would like to elect competent citizens as their representatives but, typically, these also fare well outside politics. There is also concern that the attraction of governmental posts has been eroding. For example, the Dean of Harvard's John F. Kennedy School of Government Joseph S. Nye Jr. (2001) reports that while in 1980 three-quarters of American graduates from his school went to work for the government, the share has dropped in two decades to one third. This would suggest that making a career in government attractive for the most able would call for considerable wage increases. It has indeed often been argued - especially by politicians themselves - that the reward for holding public office should be increased to improve the candidate quality.[1] There is, however, an elementary property of politics that may render such an action inefficient at best and detrimental at worst. Increasing the reward level may make politics more lucrative not only to high-ability citizens but also to low-ability citizens, who also have a chance in elections due to electoral uncertainty. The purpose of this study is to provide a stylized framework to examine when the candidate quality increases with the reward level, and when it does not.

Because the citizen-candidate models of representative democracy, pioneered by Osborne and Slivinski (1996) and Besley and Coate (1997), render the set of candidates endogenous, they provide a natural framework for our study of the candidate quality. In an archetypal citizen-candidate model any citizen may enter electoral competition at a cost, and then all citizens elect politicians from the group of self-declared candidates. Such a simple description of democracy involves many attractive properties, but it renders political parties redundant, which contrasts with their prominent gategeeping role in modern elections. Often only citizens nominated as candidates of a major party stand a realistic chance, especially in national elections. We extend the citizen-candidate approach by adding two parties, and assume that the parties select candidates for the general election from the citizens who would like to become candidates. The citizens differ in their earning potential outside politics and in their competence in the office but, for each citizen, the earning potential and competence are

[1] For example, the argument has been put forward to justify the proposed wage increases for the members of the European and Swedish Parliaments. It was one of the main justifications for the 35% increase in the salaries of the members of the Finnish Parliament in 2000.

positively correlated. Voters would like to have competent office holders, but the candidates have private information about their ability. Campaigning creates a noisy signal of the ability of citizens entering politics. To capture the inherent random factors of political life, we assume that candidates know only their probability of emitting a good signal. Citizens contemplating candidacy have to weigh the expected payoff from winning an election against campaigning costs and income available outside politics.

Our analysis reveals that the effects of the reward for office holders and campaigning costs are not straightforward. Although our model predicts that the candidate quality is increasing in the reward for low campaigning costs, the prediction is reversed for sufficiently high campaigning costs. The finding has far reaching implications. In designing the optimal rewards for the elected officials, the campaigning costs should be given proper attention. It may be possible to design rewards to screen the best candidates, but only when the campaigning costs are high. When they are low, there is no way to deter low-ability citizens from running for office.

We build on strong foundations. There is an extensive literature in which representative democracy is regarded as a principal-agent relationship where voters delegate political power to selected candidates.[2] Such delegation of decisions leads to well-known problems of moral hazard and adverse selection. Moral hazard problem arises, as politicians need not act in the interest of their voters. Different aspects of moral hazard are studied in an extensive literature emerging from influential contributions by Barro (1973) and Ferejohn (1986). Since it is difficult to provide formal incentives in politics, implicit incentives in the form of career concerns may mitigate the moral hazard problem (Holmström, 1982, and Persson and Tabellini, 2000). Adverse selection problem results from asymmetric information concerning the quality of candidates or platforms, as well as from the fact that voters can select politicians only from those citizens who run for the office. Rogoff and Sibert (1988) and Rogoff (1990) show that when incumbent politicians have private information on their competence, career concerns may lead to political budget cycles.[3]

Recent research has raised some fresh issues concerning the quality of politicians. Our aim is closely related to the intriguing papers by Caselli and Morelli (2002), Messner and Polborn (2003), and Besley (2003) who also emphasize the payoff from winning an election and the opportunity cost of candidacy in determining the quality of politicians.[4] There is, however, a number of major differences between our work and theirs. For example, Caselli and Morelli (2002) assume that candidates know in advance whether they can convince the electorate of their quality and Messner and Polborn (2003) assume that the abilities of candidates are observable to voters, but their opportunity costs are private information. Besley (2003)

[2]For excellent surveys, see Drazen (2000) and Persson and Tabellini (2000).

[3]More specifically, the principal-agent relationship in our model as well as in Rogoff and Sibert (1988) and Rogoff (1990) involves asymmetric information about the quality of the agent, whereas Holmström's (1982) original career concern model and its extension to politics by Persson and Tabellini (2000) invoke on the assumption of imperfect but symmetric information about the quality of the agent.

[4]We became aware of contributions by Besley (2003) and Messner and Polborn (2003) after having completed our study independently.

focuses on the agency problem of incumbents subject to a two-period limit, assuming a random selection of politicians and abstracting from campaigning costs. There is also a quite close link to Carrillo and Mariotti (2001) who, like us, analyze the quality of candidates in a two-party system where electoral campaign provides voters with information on candidates. Their focus is, however, on the effects of electoral competition on the turnover of candidates and their model is not based on the citizen-candidate tradition. In drawing attention to the role of political parties, we are influenced by Caillaud and Tirole (2002) who argue that parties act as intermediaries making up voters' informational deficit by designing and endorsing platforms and regulating competition among like-minded politicians. Although they analyze a richer spectrum of intra-party competition than we do, they also take the identity and competence of the two competing politicians or factions as given. In contrast, we emphasize the role of party primaries as screening device to select candidates for the general election, analyzing both primaries with and without informational signals.

In the next section we present our model. It has only three parameters: the reward for office holders, campaigning costs, and the citizens' ability level. The values of the parameters specify the choice between politics and a private career. In section 3, we characterize the political equilibria. There turns out to be a unique equilibrium set of candidates for a given campaigning cost and a given reward. We show how the level of campaigning costs determines whether an increase in the reward for office holders increases or decreases the candidate quality. The political system that screens the best candidates is assessed in section 4. Although the focus of this paper is on the effects of the reward for office holders and campaigning costs on candidate quality, our model is sparse and tractable enough to accommodate a variety of extensions. In section 5 we consider campaigning costs in both primary and general elections, introduce ideological dimension into political competition, and raise the question of whether the primaries of established parties can work as screening device. Other plausible extensions, like campaign contributions, lobbying, incumbent advantage, and corruption, are left for future research. Ways to pursue them are briefly discussed in the concluding section (section 6).

2 The Model

The polity consists of a continuum of citizens who can be identified by their abilities.[5] Citizen i's ability is denoted by a_i and, for simplicity, the ability level is assumed to be uniformly distributed on a unit interval, i.e., $a_i \in [0, 1]$. As we will explain in detail below, the ability has a dual role in our model: both the citizen's reservation wage outside politics and the probability of electoral success depend on it. We do not explicitly model the role of policymakers, but simply assume that representative officials are needed to make decisions on

[5]The assumption that there is a continuum of citizens is adopted for notational convenience (cf. also Besley, 2003). Strictly speaking, the standard Nash equilibrium test of one deviating citizen is rather weak with infinite number of citizens, but we construct equilibria as if there were a finite but large number of citizens who are indexed according to their ability.

behalf of the rest of society. The higher are the representatives' abilities, the better they can serve the interests of society. The representatives are selected in an election.

We study a two-party system where there are twice as many candidates as seats. The constitution specifies that all citizens, including the candidates, have one vote, which is valid only if cast for an official candidate. The official candidates are nominated by the parties, who select their candidates from the citizens standing for party primaries. All citizens may present themselves as potential candidates in party primaries. The candidate receiving the majority of votes in the general election is elected. In the event of a tie, the winner is selected by a lottery.

The decision whether to enter politics or not is based on the maximization of the expected utility. Unsuccessful candidates and the citizens abstaining from the political campaigning collect their reservation wages. The citizens' reservation wages depend on their abilities. Without loss of generality, we assume that citizen i earns a_i outside politics.[6] Each candidate incurs a private campaigning cost, e, regardless of the eventual outcome of the election. A successful candidate, an elected official, is rewarded by π. For the moment, we take e and π as exogenous but, in section 4, we seek the values of e and π that maximize the candidate quality. Note that e and π need not to be monetary. For example, campaigning may involve psychological costs such as losing privacy and being subject to searching journalism. Being elected, on the other hand, may give ego rents as discussed, e.g., in Rogoff (1990).

Voters do not know the candidates' abilities, but the campaigning effort creates a noisy signal $s \in \{L, H\}$ of the ability level where the signal can take only two values, high (H) and low (L). We assume that the probability of signal H is increasing in the candidate's ability. More specifically, the probability that candidate i emits signal H is given by

$$\Pr(s_i = H \mid a_i) = a_i. \tag{1}$$

The complementary probability, i.e., the probability that candidate i signals L, is then

$$\Pr(s_i = L \mid a_i) = 1 - \Pr(s_i = H \mid a_i) = 1 - a_i. \tag{2}$$

In other words, the higher is the citizen's ability, the more competent is the citizen both in politics and in private sector.

The electoral game in our model has three stages. The first stage is the *entry stage*, where each citizen decides whether to stand for an election or not. In the second stage the parties select their candidates from the set of the citizens who express an interest in candidacy in the first stage. We thus call the second stage the *primary stage.* The third is the *voting stage,* where the citizens vote for one of the candidates. The timing of events is summarized in Figure 1.

We construct political equilibria of the model by using the concept of a perfect Bayesian equilibrium. Such equilibria consist of three components: 1) Citizens' candidacy strategies,

[6] Regarding the reservation wage as $c + ba_i$, where c and b are positive constants, would not qualitatively change the analysis.

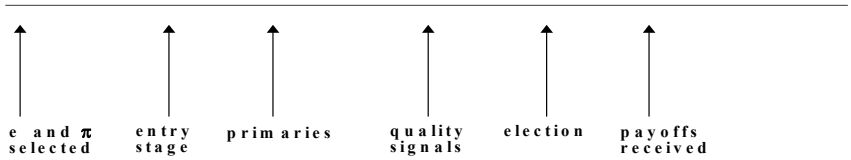

Figure 1: Electoral Game

i.e., decisions whether to enter primary elections. Let $I_i \in \{0, 1\}$ denote citizen i's entry decision where $I_i = 1$ if the citizen enters the primaries and $I_i = 0$ if he or she does not. 2) Citizens' voting behavior describes how the citizens vote as a function of the information they have received in the campaign. To reduce the number of equilibria, we assume that all vote, all voters prefer the candidate with higher expected ability, and all vote as if they were pivotal. 3) Voters' belief function describes a common assessment that candidate i is of higher expected ability than candidate j conditional on the variables that voters observe. In other words, given I_i, I_j, s_i, and s_j, voters can share one of three alternative beliefs. We denote the belief that $E(a_i) > E(a_j)$ by 1, the belief that $E(a_i) < E(a_j)$ by -1, and the belief that $E(a_i) = E(a_j)$ by 0. Let $\mu(I_i, I_j, s_i, s_j) \in \{1, -1, 0\}$ denote the voters' belief given the candidates' entry decisions and the signals they have emitted. As shown in the Appendix, Bayes' rule implies that $\mu(1, 1, H, L) = 1$, $\mu(1, 1, L, H) = -1$, $\mu(1, 1, H, H) = 0$, and $\mu(1, 1, L, L) = 0$.

For most part of the paper we focus on symmetric political equilibria where voters favor neither party ex ante and, consequently, the abilities of the candidates of the two parties follow the same distribution. There are two alternative mechanisms through which this may arise. In the absence of ideological motivations, we assume that citizens interested in candidacy either randomly choose in which party to run, or that citizens are randomly assigned to the two parties before deciding whether they want to run. In section 5.2 we consider ideologically minded voters while maintaining the assumption on the symmetric ability distribution of the parties' potential candidates. We briefly discuss such asymmetric political equilibria where the abilities of the parties' candidates come from different distributions in the following section.

2.1 Voting Stage

Given the belief μ and our assumptions on voting behavior, a candidate signalling H wins the election with a probability of one, when the opponent signals L. If both candidates send the same signal, each candidate wins with a probability of one-half. In sum, if candidates i and j run for an office, candidate i wins with a probability of $p(w \mid a_i, a_j)$, which is given by:

$$\begin{gathered} p(w \mid a_i, a_j) = \Pr(s_i = H \mid a_i) \Pr(s_j = L \mid a_j) + \\ \tfrac{1}{2} \left[\Pr(s_i = H \mid a_i) \Pr(s_j = H \mid a_j) + \Pr(s_i = L \mid a_i) \Pr(s_j = L \mid a_j) \right]. \end{gathered} \tag{3}$$

Substituting (1) and (2) for (3) and simplifying, (3) can be expressed as:

$$p(w \mid a_i, a_j) = \frac{1 + a_i - a_j}{2}. \tag{4}$$

Equation (4) captures the inherent uncertainty of democratic elections. While the probability of being elected is increasing in candidate's relative ability, the better candidate cannot be certain of winning the election.

2.2 Primary Stage

The primary stage is rather mechanic. For the moment we assume that the selection process inside the parties is costless, but in section 5, we consider costly primary elections and primary elections with signaling. There is a set of primary election candidates $C(e, \pi)$ who have committed to campaigning if nominated as the official candidate of a party. There are no signals before campaigning and, consequently, the parties select their official candidates from the citizens running for office randomly. In other words, if the set of candidates is non-empty, each party takes an independently and identically distributed draw from the set and nominates the selected citizen as the party's official candidate. The selection process is similar to the selection of new candidates in Carrillo and Mariotti (2001) except that here the set of potential candidates is endogenous. Carrillo and Mariotti (2001) assume that parties choose between retaining the established candidate and selecting a new candidate whose ability is a random draw from an exogenous distribution.

We can now proceed to the first stage where the agents choose whether they pursue a career in politics or remain ordinary citizens.

2.3 Entry Stage

Note that (4) measures the winning probability after both parties have nominated the candidates. When a citizen contemplates candidacy the winning probability should be calculated before the parties select their candidates. Formally, if citizen i decides to run for office, the winning probability is given by:

$$P(w \mid a_i) = \int_{\underline{a}}^{\overline{a}} p(w \mid a_i, x) f(x) dx, \tag{5}$$

where $f(x)$ is the density function of potential candidates' abilities. In (5) $\underline{a}$ and $\overline{a}$ denote the lowest and highest ability of the potential opponent with $0 \leq \underline{a} \leq \overline{a} \leq 1$. The ability thresholds are determined as a part of the equilibrium, but each citizen takes them as given when deciding whether to run for office or not. We proceed under the assumption that the set of those willing to become candidates is a continuum, $C(e, \pi) = [\underline{a}, \overline{a}]$, and then confirm that the assumption is fulfilled in equilibrium.

By using the assumption of a uniform distribution and (4), the probability that citizen i wins an election (5) can be rewritten as

$$P(w \mid a_i) = \frac{1}{2(\overline{a} - \underline{a})} \int_{\underline{a}}^{\overline{a}} (1 + a_i - x)\, dx. \tag{6}$$

Equation (6) is equivalent to:

$$P(w \mid a_i) = \frac{1 + a_i - A}{2}, \tag{7}$$

where $A = \frac{\overline{a}+\underline{a}}{2}$ denotes the average quality of potential candidates. Comparing (7) and (4) clearly shows the difference in the winning probabilities before and after the primary stage. Before the primary stage citizen i contemplating candidacy evaluates the winning probability against the average quality of the other candidates. The citizen however knows that after the primaries, he or she needs to defeat only the candidate of the other party instead of all candidates. Given the campaigning cost, e, the reward for office holders, π, the reservation wage, a_i, the belief, μ, and the voting behavior, citizen i decides to run for office only if:

$$P(w \mid a_i)\pi + (1 - P(w \mid a_i))a_i - e \geq a_i, \tag{8}$$

where the left-hand side and the right-hand side capture the expected payoff of running for office and the outside option. Inserting (7) into (8) and simplifying yields:

$$\frac{1}{2}(1 + a_i - A)(\pi - a_i) - e \geq 0. \tag{9}$$

Equation (9) holds as an equality for the pivotal citizens who are indifferent between a public and private career. Letting (9) be an equality and rearranging gives the condition

$$-a_i^2 + a_i\,(\pi + A - 1) + \pi(1 - A) - 2e = 0. \tag{10}$$

As the left-hand side of (10) is a downward-opening parable, the values of a satisfying (9) are between the values that solve (10). Thus, if a solution exists, it satisfies our hypothesis that all citizens between $\overline{a}$ and $\underline{a}$ are interested in candidacy. However, the solutions of (10) need not to be on the open unit interval. Upon solving (10) for a_i, we can write the ability level of the pivotal citizens as:

$$\underline{a} = \max\left\{0, \frac{1}{2}\left[\pi + A - 1 - \sqrt{(\pi + 1 - A)^2 - 8e}\right]\right\} \tag{11}$$

and

$$\overline{a} = \min\left\{1, \frac{1}{2}\left[\pi + A - 1 + \sqrt{(\pi + 1 - A)^2 - 8e}\right]\right\}. \tag{12}$$

3 Findings

3.1 Political Equilibria

In this section, we determine political equilibria corresponding all non-negative values of the reward for office holders and campaigning costs. It is instructive to divide parameter space $\{e \geq 0; \pi \geq 0\}$ into different regions according to what is the ability range from which citizen-candidates enter politics. It turns out that the equilibria we specify are unique for each combination (e, π). One type of equilibria is a pooling equilibrium where the set of those willing to become candidates $C(e, \pi) = [0, 1]$. We call it *universal democracy.* Then there are potentially three types of semiseparating equilibria, *mediocre candidates* when $C(e, \pi) = [\underline{a}, \overline{a}]$ with $0 < \underline{a} \leq \overline{a} < 1$, *competent candidates* when $C(e, \pi) = [\underline{a}, 1]$ with $\underline{a} > 0$, and *incompetent candidates* when $C(e, \pi) = [0, \overline{a}]$ with $\overline{a} < 1$.[7] Finally, we take that there is a *collapse of democracy* when the parties cannot be certain that they are able to nominate a candidate. Fortunately, it turns out that various political equilibria can be characterized by dividing the campaigning costs into three ranges. We say that campaigning costs are relatively *high* when $e > \overline{e} \equiv \frac{1}{2}$. Accordingly, they are called relatively *low* when $e < \underline{e} \equiv \frac{3}{8}$ and *moderate* when $e \in [\underline{e}, \overline{e}]$.

Using the aforementioned terminology we will first present six Lemmas characterizing the political equilibria. The proofs of Lemmas are relegated to the Appendix. We then invoke on the Lemmas to derive the two main results concerning the impact of π and e on the candidate quality. We first prove:

Lemma 1 *There is no mixed strategy equilibrium where a positive mass of citizens would be indifferent between standing for an election and staying outside politics.*

Proof. See the Appendix ■

Because Lemma 1 means that examining mixed strategy equilibria is inconsequential, in what follows, we focus on equilibria in which citizen-candidates play pure strategies, i.e., they either stand for an election or stay outside politics.

Lemma 2 *Universal democracy exists when campaigning costs are at least moderate and $\pi \geq 4e$ or when campaigning costs are low and $\pi \geq 1 + \frac{4}{3}e$.*

Proof. See the Appendix. ■

Lemma 2 simply says that when the reward for office holders is sufficiently high relative to the costs of campaigning, everyone is willing to gamble and become a candidate.

Lemma 3 *Candidates are mediocre when campaigning costs are moderate and $\pi \in (1 + \sqrt{1 - 2e}, 2 - \sqrt{1 - 2e})$.*

[7] Of course, the average qualities of candidates in various equilibria correspond the names of the equilibria. That is, the highest average quality is in the competent-candidates equilibrium and the lowest in the incompetent-candidates equilibrium, and so on. The calculations proving the point are available from the authors on request.

Proof. See the Appendix. ■

Lemma 3 suggests that mediocrity creates mediocrity. The expected competence of elected politicians is moderate if the reward for office holders and campaigning costs are neither high nor low.

Lemma 4 *Candidates are competent when campaigning costs are high and* $\pi \in [2e+1, 4e)$ *or when campaigning costs are moderate and* $\pi \in [2-\sqrt{1-2e}, 4e)$.

Proof. See the Appendix. ■

There are two requirements for the high expected competence of elected politicians. The campaigning costs should be sufficiently high *and* the reward for office holders sufficiently low to deter low competence citizens from politics. The reward for office holders, however, should not be too low so that it dilutes the high ability citizens' incentives to engage in politics.

Lemma 5 *Candidates are incompetent when campaigning costs are moderate and* $\pi \in \left[2e, 1+\sqrt{1-2e}\right]$ *or when campaigning costs are low and* $\pi \in [2e, 1+\frac{4}{3}e)$.

Proof. See the Appendix. ■

Lemma 5 gives a warning that the expected quality of politicians may be low when the campaigning is cheap. In such a case, especially the low-ability citizens are willing to take the gamble and run for office.

There are also equilibria without a properly working democracy. We take that democracy collapses if there is no symmetric political equilibrium where both parties are certain to nominate a candidate.

Lemma 6 *i) If* $\pi < e$*, neither party is able to nominate a candidate. ii) If* $\pi \in [e, 2e)$*, only one of the parties is able nominate a candidate. iii) If* $\pi \in [2e, 1+2e)$ *and campaigning costs are high, there is no symmetric political equilibrium.*

Proof. See the Appendix ■

The interpretation that democracy collapses is quite appropriate when $\pi < 2e$, i.e., when there are no candidates or only one party has a candidate. We are perhaps taking the interpretation to the limit when we say that democracy will collapse if there is no symmetric political equilibrium. But in so far there is no a priori reason for the potential candidates of the two parties to have different ability distributions, we hope that the interpretation is not completely unwarranted. The explanation why democracy can collapse is straightforward. If the reward from winning an election is smaller than campaigning costs, citizens do not enter politics even if they were certain to win the election. If the reward is low but slightly above the campaigning costs, citizens may stand for an election if they are rather certain of winning it. But if both parties could nominate a candidate, the probability of winning cannot exceed one half for both candidates. This unravels all the symmetric equilibria where both parties nominate a candidate.

We capture the consequences of Lemmas 1-6 in Proposition 1 and Figure 2.

Proposition 1 *i) When campaigning costs are low, there is universal democracy for* $\pi \geq 1 + \frac{4}{3}e$ *and candidates are incompetent for* $\pi \in [2e, 1 + \frac{4}{3}e)$.

ii) When campaigning costs are moderate, there is universal democracy for $\pi \geq 4e$*, candidates are competent for* $\pi \in [2 - \sqrt{1-2e}, 4e)$*, candidates are mediocre for* $\pi \in \left(1 + \sqrt{1-2e}, 2 - \sqrt{1-2e}\right)$*, and candidates are incompetent for* $\pi \in [2e, 1 + \sqrt{1-2e}]$.

iii) When campaigning costs are high, there is universal democracy for $\pi \geq 4e$*, candidates are competent for* $\pi \in [2e+1, 4e)$*, and there is no symmetric political equilibrium for* $\pi \in [2e, 2e+1)$.

iv) If $\pi < 2e$ *one or both parties fail nominate a candidate.*

Proof. Follows directly from Lemmas 1-6. ■

As one would expect, when the payoff from winning an election is sufficiently high, everyone is willing to gamble and run for office. Analogously, when the payoff is sufficiently low, no one is willing to sacrifice the campaigning costs to become a candidate. The findings are somewhat more surprising when they are evaluated against the common view (and the findings in Caselli and Morelli, 2002) that increasing the reward for office holders or decreasing the campaigning costs increases the candidate quality. Proposition 1 suggests that the range of parameters where the common view holds is rather restricted. When the campaigning costs are high, the reward for office holders should be decreased to screen the best candidates. When campaigning is costly, the low ability citizens are reluctant to run for the office, since their prospects to be elected are low. Thus, decreasing the expected returns on campaigning effectively excludes the low-ability citizens from the set of candidates. In contrast, when campaigning is cheap, there is no way to screen the best candidates, because the low ability citizens are eager to run for office even when the payoff from winning is low.

Note that our findings do not hinge on the multiplicity of equilibria.

Proposition 2 *Provided that democracy does not collapse, there is a unique symmetric political equilibrium for a given campaigning cost and a given reward.*

Proof. It directly follows from Lemmas 1-6 and Proposition 1 that there is no range of parameter values where two or more types of equilibria overlap, if democracy does not collapse, i.e., if $\pi \geq 2e$. ■

The messages of Propositions 1 and 2 can be illustrated in the (e, π)-space (Figure 2). Let us first consider the region of low campaigning costs ($e < \underline{e}$). The region is split by two lines, $\pi = 2e$ and $\pi = 1 + \frac{4}{3}e$. Below the lower line ($\pi = 2e$), there is no democracy (N) in the sense that one or both of parties fail to nominate a candidate. Between the lines, candidates are incompetent (I). Above the upper line $\left(\pi = 1 + \frac{4}{3}e\right)$, there is universal democracy (U). Figure 2 also shows the role of campaigning costs. If we exclude them, we will stay on the vertical axis $e = 0$ of Figure 2. In that case, increasing the pay of politicians would increase candidate quality until universal democracy is reached.[8] As can be seen from Figure 2, such a result does not carry over to high or moderate values of campaigning costs.

[8] Indeed, a similar finding emerges from Besley (2003) where there is neither campaigning costs nor signaling.

The region of moderate campaigning costs ($e \in [\underline{e}, \overline{e}]$) is divided into five subareas by two lines, $\pi = 2e$ and $\pi = 4e$, and two curves, $\pi = 2 - \sqrt{1-2e}$ and $\pi = 1 + \sqrt{1-2e}$. As in the case of low campaigning costs, below the lower line ($\pi = 2e$), democracy collapses and, above the upper line ($\pi = 4e$), democracy is universal. Between the lower line ($\pi = 2e$) and the lower curve $\left(\pi = 1 + \sqrt{1-2e}\right)$, candidates are incompetent whereas between the upper curve $\left(\pi = 2 - \sqrt{1-2e}\right)$ and the upper line ($\pi = 4e$), candidates are competent. Finally, between the curves the candidates are mediocre (M).

The region of high campaigning costs ($e > \overline{e}$) is split by three lines, $\pi = 2e$, $\pi = 1+2e$ and $\pi = 4e$. Again, there is no democracy below the lowest line ($\pi = 2e$) and universal democracy prevails above the upper line ($\pi = 4e$). The area between the intermediate and the highest lines constitutes the key difference between the high and low campaigning costs. When the costs are high, candidates are competent (C) before political rewards increase sufficiently to introduce universal democracy. The area between the lowest and the intermediate lines is a grey area of political ambiguity (A), where there is no symmetric political equilibrium.

Even if there is no symmetric political equilibrium, an asymmetric equilibrium typically exists. When the potential candidates of the two parties do not share an identical ability distribution, voters' rational expectations create different beliefs than so far analyzed. One system of beliefs and voting strategies is such that the voters vote for the dominant party's candidate unless he or she signals low and the other party's candidate signals high. In such a dominant party equilibrium, the voters' belief function describes a common assessment that candidate d of the dominant party is of higher expected ability than candidate u of the underdog party also in the case that the two candidates emit the same signal. Given I_d, I_u, s_d, and s_u, the voters can share one of two alternative beliefs. We denote the belief that $E(a_d) > E(a_u)$ by 1 and the belief that $E(a_d) < E(a_u)$ by -1. Let $\mu(I_d, I_u, s_d, s_u) \in \{1, -1\}$ denote the voters' belief given the candidates' entry decisions and the signals they have emitted. The beliefs in the dominant party equilibrium can then be written as $\mu(1, 1, H, L) = 1$, $\mu(1, 1, L, H) = -1$, $\mu(1, 1, H, H) = 1$, and $\mu(1, 1, L, L) = 1$. It is straightforward but somewhat tedious to show that, given these beliefs favoring the dominant party's candidate when the signals are equal, no one is willing to run for the underdog party.[9] This finding hints at strong incumbency advantages in political competition that can lead to path dependence in the quality of governments, as in Caselli and Morelli (2002).

In assessing the reliability of observations here, a caveat should be kept in mind. Models with private information raise the question of how robust are findings with respect to the parameter that is private information. Fortunately, this is not an issue here. On the one hand, our findings are broadly speaking similar to the ones in Messner and Polborn (2003) where the reward from office, $(\pi - e)$, is private information and vary across candidates. On the other hand, letting campaigning costs be private information and vary across candidates would certainly change the findings, but the problem would then be rather uninteresting, since the voters care only about candidates' ability, not their campaigning costs. Such an assumption might be more fruitful in analyzing private provision of a public good in a small

[9] The formal proof is available from the authors on request.

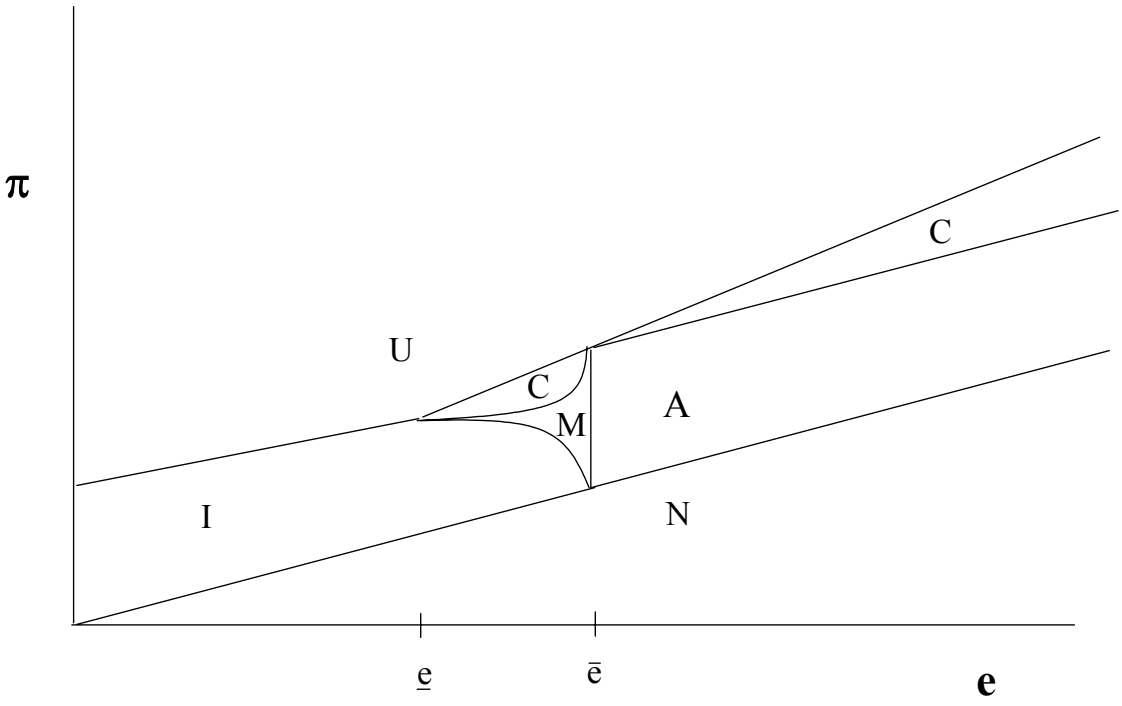

Figure 2: Political Equilibria

group like a university department or a school district, and could result in wars of attrition as suggested by Bliss and Nalebuff (1984) and Bilodeau and Slivinski (1996). Our model predicts that the wars of attrition may emerge in the region of the collapse of democracy, but for a wide range of parameter values becoming a politician is attractive at least for some citizens. Because in almost all elections in large jurisdictions there is more than one candidate, politicians at least in major elections seem to be pleased to be elected rather than reluctantly concede to run.

3.2 Interpretation

As illustrated by Figure 2, political equilibria are complex but unique. The condition for citizen i to enter politics, (8), can be rewritten as

$$(\pi - a_i) \cdot P(w \mid a_i) \geq e. \tag{13}$$

The left-hand side of (13) presents the expected increase in income created by candidacy. It is the product of the net return from winning election, $\pi - a_i$, and the probability of winning, $P(w \mid a_i)$. The right-hand side is the campaigning cost, e, paid with certainty. Equation (13) shows that politics is attractive if the expected increase in income exceeds campaigning costs, and that a change in either π or e has both a direct and an indirect effect on the attractiveness of politics. Keeping $P(w \mid a_i)$ constant, the direct effect of an increase in π or a decrease in e encourages the entry to politics for all ability levels. To arrive at full behavioral responses, we also have to take into account the induced changes in $P(w \mid a_i)$. If the direct effect improves the average quality of candidates, there will be a reduction in $P(w \mid a_i)$. This indirect effect then discourages the entry to politics. Whether there is ultimately an improvement in the candidate quality depends on the relative magnitude of the direct and indirect effects. For example, consider the shift from the area I to area M in Figure 2. The direct effect of an increase in π renders politics lucrative for some high ability citizens. Because new high ability citizens become candidates, $P(w \mid 0)$ decreases. When campaigning costs are moderate, the indirect effect can dominate over the direct effect for low-ability citizens. As a result, the citizens of the lowest abilities leave politics and the average candidate quality improves.

To illustrate the direct and indirect effects, we present in Figure 3 $\underline{a}$ and $\overline{a}$ as a function of π, fixing $e = \frac{4}{9}$. The behavior of $\overline{a}$ is easy to explain: The direct effect of increasing π always dominates for high-ability types, so that increasingly higher ability citizens find politics attractive when the reward for elected politicians rises. The behavior of low-ability citizens is more complicated. Initially an increase in the reward in a case of being elected more than offsets the decrease in the probability of winning caused by the entry of the high-ability citizens, and all low-ability citizens want to become candidates. However, when $\frac{4}{3} \leq \pi < \frac{5}{3}$, the candidates with the lowest ability opt out if the reward rises, because the indirect effect of the decreased $P(w \mid a_i)$ dominates over the direct effect of the increased $\pi - a$. Once $\pi = \frac{5}{3}$ is reached, all high-ability citizens already are candidates. Then a

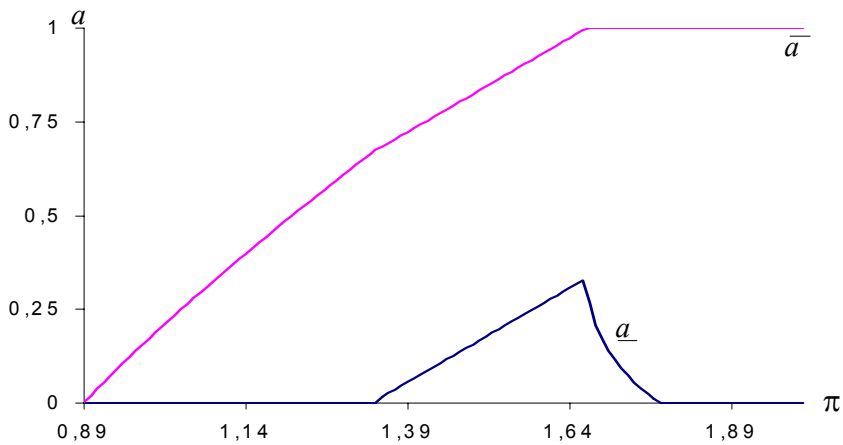

Figure 3: Set of Candidates (e=4/9)

further increase in π no longer dilutes the low-ability citizens' prospects of being elected, thus stimulating them again to participate in politics. Once $\pi \geq \frac{16}{9}$ is reached, universal democracy prevails. As a result, candidates are incompetent when $\frac{8}{9} \leq \pi \leq \frac{4}{3}$, mediocre when $\frac{4}{3} < \pi < \frac{5}{3}$, and competent when $\frac{5}{3} \leq \pi < \frac{16}{9}$. The average quality of candidates first increases from zero until it reaches $\frac{2}{3}$ at $\pi = \frac{5}{3}$, then declines until it stays flat at $\frac{1}{2}$ when $\pi \geq \frac{16}{9}$.

4 Screening the Best Candidates

In the previous section the set of candidates was determined by the model, but the reward for office holders and campaigning costs remained exogenous. This then raises the question of where they come from. Although a thorough exploration on the issue is beyond the scope of this study, we here briefly assess whether it is possible to design rewards and campaigning costs to maximize the candidate quality. Proposition 1 suggests that such a political system is impossible when campaigning is cheap. Neither is it possible to screen the best candidates when campaigning costs are moderate, as the following proposition verifies.

Proposition 3 *If and only if $e \geq 1$ and $\pi = 1 + 2e$, only the citizens with $a = 1$ want to*

become politicians.

Proof. First note from (A7) that $\underline{a}$ is decreasing in π. Together with Lemma 4 this means that the maximum candidate quality occurs for moderate campaigning costs when $\pi = 2 - \sqrt{1-2e}$ and, for high campaigning costs, when $\pi = 1 + 2e$. Substituting first $\pi = 2 - \sqrt{1-2e}$ for (A7) shows that $\underline{a} < \frac{1}{2}$. Substituting then $\pi = 1 + 2e$ for (A7) shows that $\underline{a} = 2e - 1$, when $\frac{1}{2} < e < 1$, and $\underline{a} = 1$, when $e \geq 1$. ■

To put Proposition 3 in the (e, π)-space, the candidate quality obtains its maximum on the line $\pi = 1 + 2e$, which is the middle line in the region of high campaigning costs ($e > \overline{e}$) in Figure 2.

Proposition 3 establishes that by regulating both campaigning costs and the payoff from winning an election, only the highest-ability citizens can be induced to run for office. Moreover, this can be done without giving rents to the candidates. When $e \geq 1$ and $\pi = 1 + 2e$, the highest-ability citizens are indifferent between running for an office and staying outside politics. Proposition 3 also confirms the crucial role of campaigning costs in determining the impact of the reward for office holders on the candidate quality. When the campaigning costs are high or moderate, there is a wide range of parameter values where the candidate quality is decreasing in the reward for office holders.

Note that the findings here do not suggest that it would necessarily be socially desirable to attract the highest-ability citizens to politics. In our model the ability in politics is perfectly correlated with the earning potential in the private sector. The higher the ability of the elected official, the larger is the loss to the private sector. Thus, only if the marginal social benefit of talent in politics exceeds the social loss of it not being employed in the private sector, the most talented citizens should be politicians. Using the scope of an electoral district as a proxy for social benefits from good politics, it seems that the expected quality of politicians should be maximum in national and state-level tasks. In contrast, it may be socially too costly to attract the most talented citizens to politics in small towns and school districts. This may be a reason why the reward typically rises with the scope of an electoral district. In the United States, for example, annual pay for state legislators ranges from \$99,000 plus per diem in California to mere \$200 for two-year term in New Hampshire without per diem (Book of States 2000/2001). Proper evaluation of the relative social benefits from politics and private sector activities would, however, require a general equilibrium environment and is left for future research.

5 Extensions

5.1 Costly Primary Elections

In this section, we drop the assumption that participation in party primaries is costless. Let us assume there may be $n \in \{0, 1, ..., k\}$ candidates in the party primaries where n is an integer and k is the maximum number of candidates in primary election. The parties randomly choose a citizen and offer her or him the possibility to enter the party primaries.

The citizens who accept the offer and enter the party primaries have to pay the cost e_p of campaigning there. The process of randomly offering the chance to participate continues until k citizens have accepted the offer, or all citizens have been asked, whichever occurs first. For brevity, we assume that no information on the candidate quality is revealed in the primaries. Thus, the final candidate of the party is randomly selected amongst the candidates of a party primary and, consequently, the probability of being selected in a primary election is $\frac{1}{n}$. The final candidates of the parties then enter the general election, and pay the campaigning cost e_g, producing the noisy signal of their ability. The rest of the analysis follows the section 2.3 in so far the abilities of the citizens willing to enter the primaries form a continuum. The probability of being selected in the primary election is, with a full slate of candidates, $\frac{1}{k}$. As a result, if a citizen with ability a_i is offered a possibility to participate in a primary election, she or he accepts the offer only if

$$\frac{1}{k}\left[P(w \mid a_i)\pi + (1 - P(w \mid a_i))a_i - e_g - a_i\right] \geq e_p. \tag{14}$$

The term in the brackets in (14) is the expected payoff from running in the general election. Note that equation (5) still defines $P(w \mid a_i)$ with $f(x)$ reinterpreted as the density function of those citizens' abilities who will accept an offer to participate in a party primary. A citizen enters the primary election if the expected payoff multiplied by the probability of being elected in the primary, $\frac{1}{k}$, exceeds the cost of the entry to the primary. Comparing inequalities (8) and (14) shows that if we define $e \equiv e_g + ke_p$, we can directly extend the analysis from section 3 to the costly participation in party primaries. The only differences are in region N (and potentially in region A) in Figure 2, as in the case of costly participation in party primaries a party may end up with a less than full slate of candidates in the primary election.

5.2 Ideological Parties

So far, we have analyzed politics without ideological concerns. However, as the contribution by Wittman (1983) indicates, a complete view of politics calls for incorporating ideological motivations into the model. While some voters simply desire to select the most competent candidate, many other voters deeply care about the ideological content of politics. They may require that the candidate shares their view point on some ideologically charged issues like adopting the Euro, nuclear power, or abortion. Such ideological voters also typically work as volunteers in party organizations or in campaigns of the candidates standing up for what they consider being the just cause. The presence of a polarized ideological issue might constitute a barrier of entry to independent candidates or third parties.

Let us assume that the elected politicians vote either Yes or No in an ideologically charged issue in addition to providing public goods. A share of citizens only care about the candidate quality and vote solely based on signals emitted by candidates, but the remaining are evenly divided in favor of Yes and No in the ideologically charged issue. In the political equilibrium, one party tends to cater to the citizens in favor of Yes and another party to the citizens in

favor of No. Both parties require their candidates to commit to the ideological position of the party. Both candidates have an equal number of secured voters, while the election would finally be decided by mobile voters who make up their mind based on signals emitted during campaigning. In so far as the ability distribution of potential candidates of parties choosing Yes and No are identical, the results derived previously can be directly generalized to a model allowing for ideological concerns.

Moreover, a third party may find it hard to enter the political competition. For instance, suppose that forming a party organization or campaigning requires more than one volunteer from the group of ideological voters. Then, no citizen favoring Yes or No will unilaterally switch to support the third party, even if it adopts the citizen's preferred ideological position. This suggests that the two-party system is maintained as a part of the political equilibrium in the sense of Nash.

5.3 Primary Elections with Signaling

Our results can be generalized to allow candidates to emit a signal in both primary and general elections. We assume that there are no costs of participating in party primary, while the costs of general election are as in section 2. The probability that a primary election candidate i emits a signal H is given by:

$$\Pr(s_i^p = H \mid a_i) = \frac{a_i + \delta}{1 + \delta},$$

where $\delta, \delta > 0$, is the additional noise term capturing the stylized fact that screening of politicians tends to be more accurate in general elections. Therefore, even citizens with $a = 0$ have a positive probability of emitting signal H in the party primary.

Let us next denote the density function of citizens with ability a by $g(a)$, assuming that

$$g(a) = \psi \frac{1 + \delta}{a + \delta},$$

where $\psi > 0$. Our assumption implies that the density function of citizens of ability a is decreasing in ability, reaching $\psi \frac{1+\delta}{\delta}$ with ability of zero and ψ with ability of one. If citizens of ability type a participate in party primary, the density of citizens of that ability type willing to participate in the primary of either party is $\frac{\psi}{2} \frac{1+\delta}{a+\delta}$. The density of primary election candidates emitting a high signal is the density of candidates of that type multiplied by the probability of each candidate signaling H. For all ability types, this is equal to $\frac{\psi}{2}$. As signaling in primary elections is a useful signal of ability and probability of success in the general election, it is in the interest of both parties to select candidates for the general election among those signaling H in the primary election. As there are no other visible differences between primary election candidates except their signal, candidates for general elections are chosen randomly amongst those signaling H in the primary election. Thus, in so far participation in the primary election remains costless all results from section 3 also hold

in a two-stage signaling model, where candidates emit a signal in the primary and general election.

The above example suggests that parties can play an active role in the political process by providing an additional screening stage. Apart from the special case of only citizens of one ability type willing to run, the ability distribution of the candidates in the general election strictly dominates the distribution of those in the primary election. The ability distribution of the general election candidates is in our example uniform (with a single point as a special case), whereas in the primary election the density of potential candidates of a given ability is decreasing in the ability. As the polarized ideological issue analyzed in section 5.2, the screening provided by the two established parties may hinder the entry of new parties or independent candidates.

6 Conclusion and Further Research

We find that the effects of campaigning costs and the reward for office holders on the candidate quality are surprisingly complicated. Depending the level of campaigning costs, an increase in the reward for office holders may increase or decrease the candidate quality. If the costs are high, it may be optimal to decrease the reward to screen the best candidates. When campaigning is cheap, there is no way to screen the best candidates, because the low-ability citizens have a comparative advantage in politics. The findings suggest that it is possible to design a political system to maximize candidate quality but only when private campaigning costs are high.

Our simple and tractable model invites a number of extensions. Because uncovering the crucial role of campaigning costs in determining the quality of politicians is one of our key contributions, future research should in turn devote more attention to the determinants of campaigning costs. For example, one could assume that the level of campaigning costs is a choice variable and that the probability of a high signal conditional on the ability level is increasing in campaigning costs. Another consideration regarding the endogeneity of campaigning costs is the incumbent's advantage in campaigning. In many countries, especially in the US, campaigning costs are typically lower for an incumbent. As briefly discussed in section 3, if incumbency advantage creates asymmetric beliefs, there can be path dependence in the quality of governments as in Caselli and Morelli (2002).

Our model also indicates that corruption and lobbying can have different effects on the politicians' quality, depending on whether they primarily increase the reward for elected office holders or lower the campaigning costs of candidates. If campaigning costs are moderate, bribes to elected politicians can paradoxically deter low-ability citizens from running, moving political equilibrium from incompetent candidates to mediocre or even to competent candidates (see Figure 2). If candidates are initially competent, however, the bribes can trigger the entry of low-ability citizens to politics, diminishing the average candidate quality. This may help to explain why bribery is generally condemned in developed countries with moderate or high levels of campaigning costs and rewards, while being often tolerated in

developing countries. In a developing country where neither campaigning costs nor official rewards are high, bribery can help to attract citizens with higher skills to enter politics, perhaps at the cost of attracting also citizens with questionable ethics. The effect of campaign contributions is similarly ambiguous. If campaigning is relatively expensive, campaign contributions can help to prevent a collapse of democracy, where only one or neither party is able to nominate a candidate. In many countries, notably in the United States, the cost of running a proper campaign can exceed several times the reward for elected officials, suggesting that the contributions are necessary to maintain an active democracy. In a variety of circumstances, however, campaign contributions can also reduce the candidate quality. If campaigning costs are to large extent covered by special interest groups, they will no longer deter low-ability citizens from entering politics. Nonetheless, a thorough analysis of corruption and lobbying would require their careful modelling along the lines of Grossman and Helpman (1994) and Besley and Coate (2001).

Catering to special interest groups in exchange for campaign contributions can also generate an entry barrier to independent candidates or third parties in a similar manner as a polarized ideological issue in section 5.2 or screening through the primaries of established parties in section 5.3. Studying campaign contributions and informative advertising is clearly an area that deserves further research. Combining our framework with the advances by Prat (2002), and Schultz (2002) could turn out to be fruitful in this task. Further insights into equilibrium political structure could be obtained by incorporating some features from Poutvaara (2003) into our model. In his model potential party activists decide whether to join a party based on previous party platforms. Party platforms for the subsequent election are then chosen by median party members. Even with the given party platforms, there is uncertainty of electoral outcome. Assuming that such uncertainty arises from electoral campaigning and differences in candidates' abilities as in this paper, one could let party members choose a candidate with a given ideological preference and an unknown ability. Electoral landscape would then be jointly determined by campaigning costs, political rewards, and ideological distribution of party activists and voters.

Following the citizen-candidate approach developed by Osborne and Slivinski (1996) and Besley and Coate (1997), we have viewed politics as a career choice, motivated by private returns from holding office. However, neither the reward for office holders nor the campaigning costs in our model are necessarily monetary. For example, the reward may include ideological concerns and psychological satisfaction from holding office that may be driven by "selfish" concerns of receiving fame and public recognition. The campaigning costs may also include psychological effects stemming, e.g., from searching journalism and negative campaigning.[10] Therefore, our model suggests that both ideological competition between parties and journalistic practices affect the set of citizens willing to become politicians. Consensus politics together with dull press keep the ideological rewards for office holders and campaigning costs

[10] Such psychological costs can be even more effective than pure monetary costs if the rewards are also mainly psychological and if citizens differ in their private wealth. With diminishing marginal utility of private consumption, politics associated with predominantly monetary campaigning costs would not deter rich citizens with low abilities, but might deter poor citizens with high abilities.

low and, consequently, the high-ability citizens outside politics. Low quality of politicians from established parties may in turn leave the door open for populist movements. This leads to a bold interpretation of our findings: maintaining ideological tension between mainstream parties and providing an appropriate monetary reward for elected politicians together with a vigilant press may be used to attract high-ability candidates from established parties and preempt entry by populist movements.

Appendix.

Voters' beliefs

In this appendix we derive voters' belief from citizens' candidacy strategies. Let $f(a)$ denote the subjective density function that voters attach to a candidate being of ability a before a signal is received, and let $\underline{a}$ and $\overline{a}$ be the lowest and the highest expected ability of a candidate. Furthermore, we assume that citizens rationally anticipate that $f(a) = \frac{1}{\overline{a}-\underline{a}}$, as this turns out to be the case in equilibrium. The expected ability of a randomly selected candidate before a signal is revealed is $E(a) = \int_{\underline{a}}^{\overline{a}} (f(a) \cdot a) da = \frac{\overline{a}+\underline{a}}{2}$. The expected ability subject to signal H is, by Bayes' rule,

$$E(a_i \mid H) = \frac{\int_{\underline{a}}^{\overline{a}} f(a) \cdot a \cdot \Pr(s_i = H \mid a) da}{\Pr(s = H)}.$$

As $\Pr(s_i = H \mid a) = a$ and $\Pr(s = H) = \int_{\underline{a}}^{\overline{a}} f(a) a da = \frac{\overline{a}+\underline{a}}{2}$,

$$E(a_i \mid H) = \frac{\overline{a}^3 - \underline{a}^3}{3(\overline{a} - \underline{a})\frac{(\overline{a}+\underline{a})}{2}} = \frac{2(\overline{a}^2 + \underline{a}\overline{a} + \underline{a}^2)}{3(\overline{a} + \underline{a})}.$$

Correspondingly, the expected ability of candidate j signalling L is

$$E(a_j \mid L) = \frac{\int_{\underline{a}}^{\overline{a}} f(a) \cdot a \cdot \Pr(s_j = L \mid a) da}{\Pr(s = L)}.$$

As $\Pr(s_j = L \mid a) = 1 - a$ and $\Pr(s = L) = 1 - \Pr(s = H) = 1 - \frac{\overline{a}+\underline{a}}{2}$,

$$E(a_j \mid L) = \frac{3\overline{a} + 3\underline{a} - 2\overline{a}^2 - 2\underline{a}^2 - 2\underline{a}\overline{a}}{6 - 3\overline{a} - 3\underline{a}}.$$

The candidate with a high signal is of higher expected quality, if $E(a_i \mid H) > E(a_j \mid L)$. If $\overline{a} > \underline{a}$, this is equivalent to $3(\overline{a}-\underline{a})^2 > 0$. Therefore, we have established that when $\overline{a} > \underline{a}$, the candidate signaling H has a higher expected ability than the candidate signaling L. Because a signal about a citizen's ability is emitted only if the citizen decides to enter primary elections and is selected as the official candidate of a party, voters' belief $\mu(I_i, I_j, s_i, s_j) \in \{1, -1, 0\}$ when $\overline{a} > \underline{a}$ can be described as follows: $\mu(1, 1, H, L) = 1$, $\mu(1, 1, L, H) = -1$, $\mu(1, 1, H, H) = 0$, and $\mu(1, 1, L, L) = 0$. If all candidates are of the same ability ($\overline{a} = \underline{a}$), the signals in principle will lose their informativeness, and we can not use Bayes' rule to

calculate the voters' belief. Because this case is quite immaterial with continuous ability distribution we, for simplicity, assume that when $\overline{a} = \underline{a}$, $\mu(I_i, I_j, s_i, s_j)$ remains unchanged $\forall s_i, s_j$. Such equilibrium where voters pay attention to signals even if $\overline{a} = \underline{a}$ is also the only one that would be included in the set of trembling-hand perfect or sequential equilibria.

Proof of Lemma 1. For citizens willing to run with a probability strictly between zero and one, the left-hand side of (9) would have to equal zero. Otherwise, citizens would find it optimal to play a pure strategy of running with a probability of either zero or one. Differentiating the left-hand side of (9) with respect to a yields $\frac{1}{2}(\pi + A - 1) - a_i$. This is positive (negative) when $\frac{1}{2}(\pi + A - 1) > (<) a_i$. Thus, the left-hand side of (9) is zero in at most two points in the interval $[0, 1]$ and, consequently, the measure of citizens indifferent between running and staying outside politics is zero. ■

Proof of Lemma 2. When all citizens are potential candidates, the average ability of potential candidates A equals $\frac{1}{2}$. After substituting $A = \frac{1}{2}$ for (11) we see that the citizen with the lowest ability ($\underline{a} = 0$) is willing to become a candidate if, and only if,

$$\pi \geq 4e. \tag{A1}$$

Similarly, substituting $A = \frac{1}{2}$ for (12) and simplifying shows that the citizen with the highest ability ($\overline{a} = 1$) is willing to become a candidate if, and only if,

$$\pi \geq 1 + \frac{4}{3}e. \tag{A2}$$

Equations (A1) and (A2) suggest that all citizens are candidates if $\pi \geq \max(4e, 1 + \frac{4}{3}e)$. The proof is completed by noting that the condition $4e \gtreqless 1 + \frac{4}{3}e$ is equivalent to the condition $e \gtreqless \underline{e}$. ■

Proof of Lemma 3. When the citizens with an intermediate ability seek candidacy, the solutions of (10) give the candidates with the highest and lowest ability. From (11) and (12) we then get that $A = \frac{\overline{a}+\underline{a}}{2}$ is equivalent to $A = \frac{\pi+A-1}{2}$. As a result, the average quality of potential candidates reads as

$$A = \pi - 1. \tag{A3}$$

Substituting (A3) for (11) and (12) gives the threshold levels for the candidates' abilities

$$\underline{a} = \pi - 1 - \sqrt{1 - 2e} \tag{A4}$$

and

$$\overline{a} = \pi - 1 + \sqrt{1 - 2e}. \tag{A5}$$

From (A4) and (A5) we see that a necessary condition for the equilibrium is $e \leq \overline{e}$. Equation (A4) shows that $\underline{a} > 0$ only if $\pi > 1 + \sqrt{1 - 2e}$ and (A5) shows that $\overline{a} < 1$ only if $\pi < 2 - \sqrt{1 - 2e}$. On the one hand, the equilibrium may exist only in the region where $e \leq \overline{e}$ and, on the other hand, $2 - \sqrt{1 - 2e} \geq 1 + \sqrt{1 - 2e}$ only if $e \geq \underline{e}$. The equilibrium where the citizens with an intermediate ability become candidates thus exists only if $\pi \in (1 + \sqrt{1 - 2e}, 2 - \sqrt{1 - 2e})$ and $e \in [\underline{e}, \overline{e}]$. ■

Proof of Lemma 4. When the citizens with the lowest ability choose a career in the private sector, the average quality of the candidates is $A = \frac{1+\underline{a}}{2}$. Equation (11) can then be rewritten as

$$\underline{a} = \frac{1}{2}\left[\pi - 1 + \frac{1+\underline{a}}{2} - \sqrt{\left(\pi + 1 - \frac{1+\underline{a}}{2}\right)^2 - 8e}\right].$$

Simplifying yields

$$2\pi - 1 - 3\underline{a} = 2\sqrt{\left(\pi + \frac{1-\underline{a}}{2}\right)^2 - 8e}. \tag{A6}$$

Squaring both sides of (A6) and solving the resulting second-order equation for $\underline{a}$ gives

$$\underline{a} = \frac{1}{2}\left[\pi - 1 \pm \sqrt{(\pi+1)^2 - 16e}\right].$$

The smaller root,

$$\underline{a} = \frac{1}{2}\left[\pi - 1 - \sqrt{(\pi+1)^2 - 16e}\right], \tag{A7}$$

is greater than zero only if $\pi < 4e$. The larger root can be excluded, as it would be positive also when $\pi \geq 4e$. That would violate the condition that the citizen with $a = 0$ is unwilling to be a candidate. By using (A7), we see that the average quality of the potential candidates $A = \frac{1+\underline{a}}{2}$ is given by

$$A = \frac{1}{4}\left[\pi + 1 - \sqrt{(\pi+1)^2 - 16e}\right]. \tag{A8}$$

We next confirm that the citizen with the highest ability is willing to be a candidate, i.e., that $\overline{a} = 1$. From (11) we see that this holds if

$$\frac{1}{2}\left[\pi + A - 1 + \sqrt{(\pi + 1 - A)^2 - 8e}\right] \geq 1. \tag{A9}$$

Upon some manipulation, (A9) can be simplified to

$$(2 - A)(\pi - 1) - 2e \geq 0. \tag{A10}$$

After substituting (A8) for (A10) and some laborious algebra, the condition can be re-expressed as

$$(\pi - 1)^2(\pi - 3) - 2e(\pi - 1)(\pi - 4) - 4e^2 \geq 0. \tag{A11}$$

We can now characterize the equilibria where only the most competent citizens present themselves as candidates. Although (A11) is highly non-linear in π, it is easy to show that it holds only if $\pi \geq 2 + \sqrt{1-2e}$ or when $\pi \in \left[2 - \sqrt{1-2e}, 2e+1\right]$. When $e \leq \overline{e}$, $2 + \sqrt{1-2e} \geq 2e + 1 \geq 4e$. Because, by (A7), $\underline{a} > 0$ only if $\pi < 4e$, the relevant parameter range is $\pi \in [2 - \sqrt{1-2e}, 4e)$ which is a non-empty set only if $e > \underline{e}$. In sum, the equilibrium where $C(e, \pi) = [\underline{a}, 1]$ exists for $e \in [\underline{e}, \overline{e}]$ when $\pi \in [2 - \sqrt{1-2e}, 4e)$. When $e > \overline{e}$, (A11)

has a unique solution, which is $\pi = 2e + 1$ and, accordingly, the equilibrium where $C(e, \pi) = [\underline{a}, 1]$ exists for $e > \overline{e}$ when $\pi \in [2e + 1, 4e)$. ■

Proof of Lemma 5. When the citizens with the highest abilities choose a career in private sector, the average quality of the potential candidates is $A = \frac{\overline{a}}{2}$. Assuming that $\overline{a} < 1$ and substituting $\frac{\overline{a}}{2}$ for A in (12) gives

$$\overline{a} = \frac{1}{2}\left[\pi - 2 \pm \sqrt{(\pi + 2)^2 - 16e}\right]. \tag{A12}$$

Since the smaller root of (A12) is strictly less than (12), we observe that only the larger root is relevant. The larger root of (A12),

$$\overline{a} = \frac{1}{2}\left[\pi - 2 + \sqrt{(\pi + 2)^2 - 16e}\right], \tag{A13}$$

satisfies our assumption that it is less than unity only if $\pi < 1 + \frac{4}{3}e$. We next confirm that the citizen with the lowest ability is also willing to be a candidate, i.e., that $\underline{a} = 0$. From (12) we see that this holds if

$$0 \geq \pi + A - 1 - \sqrt{(\pi + 1 - A)^2 - 8e}.$$

After some algebra, this can be expressed as

$$\pi(1 - A) \geq 2e. \tag{A14}$$

A necessary condition is thus that $\pi \geq 2e$. Substituting $A = \frac{\overline{a}}{2}$ and (A13) into (A14), and simplifying yields, after tedious algebra,

$$(\pi - 2e)(\pi^2 - 2\pi + 2e) \leq 0. \tag{A15}$$

Since $\pi \geq 2e$, (A15) holds when $\pi \in \left[1 - \sqrt{1 - 2e}, 1 + \sqrt{1 - 2e}\right]$, which is non-empty only if $e \leq \overline{e}$. Because $2e \geq 1 - \sqrt{1 - 2e}$ and $\pi \geq 2e$, the relevant range of parameter values is $\pi \in \left[2e, 1 + \sqrt{1 - 2e}\right]$. Because, by (A13), $\overline{a} < 1$ only if $\pi < 1 + \frac{4}{3}e$, we need to check out when $\sqrt{1 - 2e} \leq \frac{4}{3}e$. This occurs when $e \geq \underline{e}$. Thus, the equilibrium where $C(e, \pi) = [0, \overline{a}]$ exists for $e \in [\underline{e}, \overline{e}]$ when $\pi \in \left[2e, 1 + \sqrt{1 - 2e}\right]$, and for $e \leq \underline{e}$ when $\pi \in [2e, 1 + \frac{4}{3}e)$. ■

Proof of Lemma 6. i) If $\pi < e$, no citizen is willing to campaign even if being assured of winning. ii) Let us make the counter-assumption that both parties are able to nominate a candidate in the region $\pi \in [e, 2e)$. Because $\pi < 2e$, the expected payoff from candidacy cannot be positive, even without opportunity costs, unless the expected probability of winning the general election is more than $\frac{1}{2}$. As this cannot hold for candidates of both parties, there is no equilibrium in which citizens would present themselves as candidates of both parties with a positive probability. If only one party is nominating a candidate, $P(w \mid a_i) = 1 \forall a_i$. By (8), politics is then attractive for those with $a_i \leq \pi - e$ so that an equilibrium where only

the other party nominates a candidate exists for $\pi \in [e, 2e)$. iii) Lemmas $2-5$ define the range of parameter values covering the symmetric political equilibria in pure strategies where politics is sufficiently attractive so that both parties are certain to nominate candidates, and parts i) and ii) of this lemma cover the case in which at most one party is able to nominate a candidate. The area $e > \overline{e}$, $\pi \in [2e, 1+2e)$ is not covered by any of these, and so it has no symmetric political equilibrium in pure strategies. Lemma 1 excludes non-degenerate mixed strategy equilibria. What remains to show is that there is no equilibrium where citizens of only one ability would become candidates. Because considering an equilibrium where the set of candidates is of zero measure is rather weak robustness check, we show that there is no equilibrium where a small coalition of citizens would become candidates. To prove this, make the counterassumption that there would be such a coalition $a \in [a^* + \varepsilon\ , a^* - \varepsilon]$ that is willing to become candidates but that no citizen outside the coalition is willing to run. In order to guarantee that citizens with an ability arbitrarily close to $a^* + \varepsilon$ and $a^* - \varepsilon$ do not run, the expected surplus from candidacy must equal zero for the candidates with abilities $a^* + \varepsilon$ and $a^* - \varepsilon$. By (9) and $A = a^*$, this holds only when $\varepsilon \longrightarrow 0$ and $a^* = \pi - 2e$. However, the expected payoff on candidacy of a citizen with $a = \pi - 2e + \upsilon$ is $\frac{\upsilon(2e-1-\upsilon)}{2}$, which is positive with a sufficiently small but positive υ, contradicting the tentative equilibrium where only citizens with $a^* = \pi - 2e$ are willing to run. ■

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