Special Interest Politics and the Quality of Governance*

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Abstract

We develop a simple model to study the impact of special interest politics (SIP) on the quality of politicians. The basic setting is a citizen-candidate model in which, following the election, the chosen official interacts with lobby groups. Citizens differ along two dimensions of unobservable *character*: public spirit and honesty. Public spirit measures how much an agent cares about citizens' welfare, whereas honesty measures the disutility an agent suffers from selling out to SIP. We show that in addition to affecting the ex-post behavior of an elected official, SIP induces important ex-ante *selection* effects. In some cases, SIP attracts less honest citizens to politics, as one would expect. In other cases, however, selection can favor *more* honest candidates for any given level of public spiritedness. We also show that SIP affects the distribution of public spiritedness among candidates (even though no correlation between honesty and public spiritedness is assumed). We examine the effects of SIP on both the mean an variability of candidate quality. Notably, when the stakes of SIP are high, the distribution of public spiritedness among candidates is bimodal, with density concentrated at the lower and upper bounds of the population distribution. We also study a dynamic model that yields insights into reelection of a known incumbent (as well as the preference for a "known crook" over an "unknown crook"), and we show that term limits can have counterproductive selection effects.

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"Ninety-eight percent of the adults in this country are decent, hard-working, honest Americans. It's the other lousy two percent that get all the publicity. But then, we elected them." — Lily Tomlin

1 Introduction

According to one long-standing and widespread view, representative democracies suffer from a debilitating adverse selection problem: the citizens who are best suited to govern — those with the greatest integrity, concern for the public good, and ability — are least likely to seek office. As the political scientist V.O. Key (1966) noted, "If the people can only choose among rascals, they are certain to choose a rascal." The causes of this phenomenon are much debated. Some attribute it to special interest politics (SIP) which, they argue, sully the political process, thereby attracting rascals and repelling those with conscience.

The object of this paper is to study theoretically the influence of special interest politics on the (initially unobservable) characteristics of the citizens who choose to run for office. We focus on two dimensions of character: honesty and public spirit. By "honesty," we mean a trait that makes an official less susceptible to corruption (that is, personal reward from SIP influence activities). By "public spirit," we mean a characteristic that causes an official to place weight on the well-being of the typical citizen.

Our model has the following simple structure. Citizens care about the consumption of two goods, one private and one public. They also care to varying degrees about the well-being of other citizens. The level of provision for the public good depends only on the effort of a public official (whose utility declines with the level of effort). The official can also implement projects that benefit narrow interest groups at a cost to the general population. Those interest groups have conflicting objectives, and can attempt to influence the official's decisions through conditional payments (or bribes). The official suffers a utility penalty for accepting such payments; the size of the penalty varies according to the official's degree of honesty. The official is chosen from a set of candidates in a general election, and a representative subset of citizens can choose whether to become candidates at some (vanishingly) small cost. Our critical assumption is that a candidate's character — his public spirit and honesty pair

— is (at least initially) *private information*. As a result, the probability of election is uniform overall all candidates who run for office (other than known incumbents).

We show that in addition to affecting the ex-post behavior of an elected official, SIP induces important ex-ante *selection* effects. In some instances, SIP attracts less honest citizens to politics, as one would expect. In other cases, however, selection can favor *more* honest candidates for any given level of public spiritedness. We also show that SIP affects the distribution of public spiritedness among candidates. Somewhat surprisingly, the latter selection effect emerges even though the projects that benefit the special interests are unrelated to the production of the public good, and despite the fact that we make no assumption concerning the correlation between honesty and public-spiritedness. (The form of the joint distribution of a citizen's characteristics is irrelevant, as long as it has full support over a sufficiently inclusive set of potential types.)

We first study a one period model with no incumbent. Stark results emerge for the two extreme cases: that of *high stakes SIP* and that of *low stakes SIP*. When SIP stakes are high, interest groups benefit greatly when their projects are enacted, whereas under low stakes, their benefits are small. We show that there is a unique limiting equilibrium in our model (as the cost of candidacy approaches zero) when SIP stakes are high. The equilibrium involves a large number of candidates running for office, all of whom are maximally dishonest, and each of whom is either maximally or minimally public spirited. Thus, the political process selects for dishonesty (as one would expect), and the distribution of public spiritedness among candidates is bimodal, with density concentrated at the lower and upper bounds of the population distribution. As a result, SIP leads to substantial *variability* in the quality of governance.

In contrast, when the stakes of SIP are low, the model has multiple equilibria, all of which involve only a single candidate. In this case, the elected official need not be maximally dishonest, and may even be resistant to special interest influence. Indeed, for each level of public-spritedness, there is a *lower* bound on a candidate's honesty, rather than an upper bound. In that sense, SIP leads to equilibria which select for candidates with greater honesty. More generally, the set of equilibria estalishes a lower bound on the overall quality of the candidate, but no upper bound. Thus, when single-candidate equilibria exist, there is always an equilibrium in which a single, maximally honest and maximally public spirited candidate runs for office and is elected.

After characterizing the set of equilibria for various parameters, we prove that among the set of equilibria where more than one candidate runs for office — which are the only kind of equilibria when SIP stakes are not too low — an increase in the stakes of SIP leads to a weakly (strictly if the stakes are not too high) lower level of candidate quality. Surprising, higher special interest stakes can improve candidate quality among single-candidate equilibria (which exist if and only if stakes are sufficiently low).

Armed with the one-period analysis, we extend the model to two periods, on the assumption that an incumbent's characteristics are necessarily revealed while in office. (This assumption eliminates signaling motives while in office). This setting permits us to study the reelection prospects of known incumbents. When stakes are high, the equilibrium continues to have the property that candidates are maximally dishonest, and either maximally or minimally public spirited. Obviously, a maximally dishonest, minimally public spirited official is never reelected. However, a maximally dishonest, maximally public spirited official is reelected with probability one, bearing out the adage that voters prefer a known crook to an unknown crook.

Using the two-period model, we also analyze the impact of term limits. Preventing the reelection of incumbents reduces the quality of governance in two separate ways. The first effect is direct: term limits deprive citizens of the ability to elect an incumbent who is known to be better-than-average. The second effect is indirect: the possibility of reelection improves the average quality of the initial candidate pool.

The rest of this paper is structured as follows. In Section 2, we discuss the related literature. Section 3 lays out the basic model. Section 4 contains some preliminary analysis. We analyze outcomes of the one-period game in Section 5, followed by the two-period model in Section 6. In Section 7, we discuss some extensions and other issues. Section 8 concludes. All proofs of formal results appear in the Appendix.

2 Related Literature

We draw primarily on two strands of literature: the citizen-candidate models of representative democracy due to Besley and Coate (1997) and Osborne and Slivinski

(1996), and the menu-auction models of lobbying due to Bernheim and Whinston (1986) and Grossman and Helpman (1994). Citizen-candidate models permit analysis of who decides to run for office, while the menu auctions approach allows us to study how the interaction of multiple interest groups with conflicting agendas influences the behavior of a single office-holder.

Previous work focuses primarily on the endogenous determination of candidates' *policy preferences* and/or *competence*. In contrast, this paper abstracts entirely from those issues, and focuses on the *character* of candidates — specifically, honest and public spirit. Moreover, unlike most of the existing literature, it investigates the impact of special interest politics on the characteristics of self-selected candidates.[1]

The endogenous determination of the quality of politicians has recently been explored by Caselli and Morelli (2004), Messner and Polborn (2004), and Poutvaara and Takalo (2007). Their work differs from ours however in that they focus on the competence or ability of politicians rather than public spirit and honesty. In addition, they do not model SIP. Nonetheless, all three of those papers show that there can be adverse self-selection among those who choose to run for office, which is also the underlying theme in our work.

Dal Bó et al. (2006) study how SIP can affect the quality of politicians. Their main interest, however, is on the impact of allowing lobbies to use a combination of violence and bribes as instruments of influence (following Dal Bó and Di Tella, 2003), and in common with the aforementioned papers, they do not model heterogeneity of public spirit.[2]

Smart and Sturm (2006) analyze the impact of term limits in a setting where politicians can be public spirited or selfish and potentially choose to signal this characteristic through their actions in office. Their main result is that term limits can be beneficial because they reduce the incentives for selfish politicians to mimic public spirited ones (in order to win reelection), thus providing the electorate with greater ability to identify the type of an incumbent politician.

[1]Besley and Coate (2001) bring together the citizen-candidate and menu-auction lobbying approaches for a related purpose, but study candidate self-selection along the dimension of policy preferences rather than character.

[2]Moreover, their model has a single pressure group rather than multiple groups with conflicting interests, and their comparative static results concern the variations in the cost of the instruments of influence, which differs from our focus.

At a more general level, our object is to understand which agents will secure public office when information concerning candidates' characteristics is incomplete. One can decompose issue this into two components: the effectiveness of an imperfectly informed electorate in selecting among a set of candidates, and the endogenous determination of the set of candidates for office. There is by now a well-developed literature on the former topic;[3] we are accordingly concerned with the latter.

3 Model

We consider a society consisting of a continuum of citizens. Each citizen consumes two goods, a public good x and a private good r. For convenience, we normalize each citizen's endowment of the private good to zero. Citizens differ with respect to two preference parameters: a public spirit parameter $a \in [0,1]$, and an honesty parameter $h \in [0,1]$. The public spirit parameter measures the degree to which a citizen cares about the well-being of other citizens. The honesty parameter will come into play only if a citizen holds office; it determines the size of a utility penalty that the individual absorbs if he accepts payments from special interests. We often refer to the pair (a, h) as a citizen's *character*.

Citizens who choose to run for office incur a personal campaign cost, k, which involves units of the private good. As in much of the literature that employs the citizen-candidate model, we will generally focus on cases in which k is small. The purpose of considering a vanishingly small personal cost of candidacy, rather than zero cost, is to assure that the number of candidates is finite. Otherwise, with a continuum of candidates, a citizen might have no incentive to run for office even if she would strongly prefer to hold office, simply because the probability of winning is zero. Critically, we will assume that the character of any given citizen (the values of a and h) is unknown to others when she first runs for office.

One citizen eventually becomes the governor through an electoral process that we discuss in the next subsection. The governor exerts effort $e \geq 0$ to produce $f(e) \geq 0$ units of the public good, at a personal cost $c(e)$, with $c' > 0$ and $c'' > 0$. He cannot commit to a level of effort before taking office. Effort has positive but

[3] Arguably the best known are the information aggregation papers of Feddersen and Pesendorfer (1996, 1997).

declining marginal returns, so that $f' > 0 > f''$. We assume $f'(0) > c'(0)$ so that at least some effort is beneficial. For simplicity, the governor's effort is the only input required to make the public good (it does not require the private good).

The governor must also decide whether to undertake two projects, A and B; that is, he chooses a policy $p \in \{\phi, A, B, AB\}$, where ϕ denotes undertaking no project, A and B denote undertaking the respective single project, and AB denotes undertaking both projects. If a project is implemented, it is funded by a per-capita lump-sum tax, q, levied on all citizens (including the governor). Neither project creates any benefits for the typical citizen. Rather, they provide highly concentrated benefits for special interest groups.

There are two lobbies or special interest groups, also denoted A and B. If only project A is enacted, A's payoff is v and B's is 0; if only project B is enacted, B's payoff is βv (with $\beta > 1$) and A's is 0. If both projects are enacted, A's payoff is $(1-\alpha)v$ and B's is $(1-\alpha)\beta v$, with $\alpha \in [0,1]$. Thus, the parameter v measures the *stakes* in lobbying, and the paramater α measures the *conflict*. As in the menu-auction literature, the lobbies can attempt to influence the governor's decisions by promising contingent payments. We denote lobby l's payment or transfer schedule as $t_l(p) \geq 0$, and the total payment received by the governor as $t(p) \geq 0$. The governor can either accept these payments or refuse them. Accepting a payment from the lobbies imposes a personal utility penalty of $g(h)$ where g is smooth, and $g' > 0$. Furthermore, $g(0) = 0$, so that a perfectly dishonest person experiences no disutility when accepting payments, and $\lim_{h \nearrow 1} g(h) = \infty$, so that a perfectly honest individual will never accept payments. To keep matters relatively simple, we will assume that the lobbies learn the governor's true character (his values of a and h) by interacting with him after he takes office, but prior to offering their contingent payments. A lobby's net payoff is simply its gross payoff (described above) minus its payment, if any, to the governor.

Let $w(x, r_i)$ denote the direct utility that citizen i receives from consumption of the public and private good, and let $\overline{r}$ denote the level of private good consumption for the typical non-candidate citizen. Then preferences over the elements x, r_i, and $\overline{r}$ will be given by the function

$$U(x, r_i, \overline{r}) = w(x, r_i) + aw(x, \overline{r}),$$

which captures the notion that each individual values her personal wellbeing and the wellbeing of the average citizen, where the latter is weighted by one's public spiritedness level, a.[4] For simplicity, we will assume that

$$w(x,r) = x + r,$$

which of course implies that

$$U(x, r_i, \overline{r}) = (x + r_i) + a(x + \overline{r}).$$

If i is a non-candidate citizen and n projects are undertaken ($n \in \{0,1,2\}$), then $r_i = \overline{r} = -nq$ (recall that we normalized private good endowment to 0), so

$$U(x, r_i, \overline{r}) = (1 + a)(x - nq).$$

If i is a losing candidate and n projects are undertaken, then $r_i = \overline{r} - k = -nq - k$, so

$$U(x, r_i, \overline{r}) = (1 + a)(x - nq) - k.$$

Let us index the governor by G. If the governor does not accept payments from special interests, his payoff takes the same form as that of a losing candidate, except that he also incurs the disutility of effort in producing the public good:

$$U_G^0(x, r_G, \overline{r}, e) = (1 + a)(x - nq) - k - c(e).$$

Alternatively, if the governor accepts payments totalling t from special interests, then $r_i = \overline{r} - k + t = -nq - k + t$, and he incurs a utility penalty $g(h^G)$, so:

$$U_G^1(x, r_G, \overline{r}, e) = (1 + a)(x - nq) - k + t - c(e) - g(h^G).$$

Throughout, we will make the following assumption concerning the population distribution of citizens' characteristics:

Assumption 1. *The distribution of character* (a, h) *has full support on* $[0,1] \times [0,1]$.

[4] Notice that the payoffs of candidates and the governor do not show up in the utility function of the typical citizen. That is because those individuals will be of measure zero.

This simply requires that the population includes citizens of all character types. Notice, in particular, that we make no assumption concerning the aggregate correlation between honesty and public spirit. All that matters for our analysis is full support; the relative masses of citizens of various character does not matter.

In the analysis that follows, four "corner" types of citizens turn out to be most important: those with maximal public spirit and maximal honesty, $a = h = 1$ (*Saints*); those with minimal public spirit and minimal honesty, $a = h = 0$ (*Scoundrels*); those with maximal public spirit and minimal honesty (*Paines*), and those with minimal public spirit and maximal honesty (*Rands*).[5]

Elections

We assume that only a relatively small set of *eligible* citizens can run for office. The set of eligible citizens is representative of the population and has full support on the character space, $[0,1] \times [0,1]$. Because the mass of eligible citizens is small, the election is effectively determined by the behavior of ineligible citizens, who share the objective of maximizing $x + \bar{r}$. To keep formalities as simple as possible, we abstract from some of the strategic issues that can arise in voting games, and instead make the following reasonable assumption concerning the electoral process, which we henceforth treat as a "black box":

Assumption 2. *If no incumbent is running for reelection, then every candidate for office wins the election with equal probability. If an incumbent is running for reelection, then the incumbent wins with probability 1 if she will deliver an outcome that is weakly better than the average expected outcome for the new candidates; otherwise, the incumbent wins with probability 0, and every other candidate wins with equal probability.*

This assumption has three main components. First, every new candidate has an equal probability of winning election. This is reasonable because the character

[5]Our nomenclature is intended to be evocative, if somewhat whimsical. The meanings of the terms Saints and Scoundrels are obvious. We label those of maximal public spirit and minimal honesty as *Paines* after a character in the 1939 movie *Mr. Smith Goes to Washington*. In the movie, Joseph Paine is a senior senator who has sold out but views his concessions to special interests as part of the process that allows him to do good. Our choice of *Rand* for maximally honest but minimally public spirited if after philosopher/author Ayn Rand. Rand is commonly regarded as decrying the need for altruism or public spirit, while upholding high standards of honesty and personal integrity.

of each candidate is not yet known; they are *ex ante* indistinguishable.[6] Second, the electorate necessarily knows the character of the incumbent governor (so that they compare the outcome she *will* deliver to the expected outcome for a rival). Implicitly, her character is revealed by her actions in office. We thereby abstract from any signaling in office from an incumbent (cf. Smart and Sturm, 2006); our assumption starkly captures a notion that the truth eventually surfaces even if the governor attempts to dissemble. Third, the electorate breaks ties in favor of the current governor: this reflects a small incumbent advantage.

Since we treat the election phase mechanically rather than strategically, ineligible citizens are not strategic players. Therefore, from this point forward, we will use the term 'citizen' to refer to an eligible citizen unless we explicitly specify otherwise. Moreover, because the character of the governor is revealed once she is in office (before other decisions are made), the subgame between the governor and the lobbyists involves complete information. Though there is technically incomplete information between eligible citizens when they decide whether or not to run for office, the associated informational asymmetries are of no real consequence because those decisions are simultaneous.

Sequence of Events and Notion of Equilibrium

We will study both one-period and two-period versions of the model. Each period has the following 4 stages:

1. Citizens decide whether to run for office.
2. The governor is elected, and her character becomes observable.
3. Lobbies make contingent offers to the governor.
4. The governor chooses effort e and a policy p (along with any necessary taxes).[7]

[6] In keeping with the citizen-candidate approach, we assume that candidates cannot commit to either effort or project choices before they take office, and cannot signal their character during the electoral process. In a somewhat different model, Kartik and McAfee (2007) study the policy consequences of a fixed set of candidates trying to signal character through their platforms.

[7] If no citizen runs for office, then $x = -\infty$, $p = 0$.

Our solution concept throughout is that of *Subgame Perfect Equilibrium* with restriction to *Pure Entry Strategies*, meaning that a citizen either runs for office with probability 1 or 0. We impose the further restriction that in the lobbying sub-game, the governor and lobbies play a *truthful equilibrium* of the menu-auction game.[8]

4 Preliminaries

In this section, we begin by characterizing the equilibrium of the post-election phase of our model, including the effort choice of the governor and the interaction between the governor and the lobbyists. Then, we consider two benchmarks against which our main results can be compared, one with no lobbies, the other with observable character.

4.1 Effort Choice

The governor's choice of effort is determined solely by his public spirit, and does not depend on his honesty level or transfers from lobbies. The optimal choice of effort, $e^*(a)$, is given by the first order condition

$$(1+a) f'(e^*(a)) = c'(e^*(a)).$$

Plainly, $e^*(a)$ is strictly increasing in a. For every citizen j, let $e^j \equiv e^*(a^j)$ and $x^j \equiv f(e^j)$. That is, e^j is the effort that citizen j will exert if elected and x^j is the level of public good he would produce as governor. For convenience, we also denote $x^{\max} \equiv f(e^*(1)); x^{\min} \equiv f(e^*(0)); c^{\max} \equiv c(e^*(1));$ and $c^{\min} \equiv c(e^*(0))$. These are the public good production and effort costs for the most and least public spirited citizens if elected.

Ignoring SIP altogether, the indirect utility function for an office holder (ignore campaign costs) is therefore

$$\pi(a) \equiv (1+a) f(e^*(a)) - c(e^*(a)).$$

[8] See Bernheim and Whinston (1986) for a precise definition of a truthful equilibrium of a menu-auction game, as well as a demonstration that the set of truthful equilibrium outcomes coincides exactly with the set of coalition-proof Nash equilibrium outcomes.

By the envelope theorem, $\pi'(a) = f(e^*(a))$. That is, compared to a citizen with public spirit a, a marginally more public spirited citizen receives $f(e^*(a))$ more utility from holding office. Given the form of the utility function and the utility scale that we've selected, "utils" measures units of the private good. Therefore, $\pi'(a) > 0$ implies that the monetary equivalent of office-holding is increasing in public-spiritedness. Notice further that $\pi''(a) = f'(e^*(a))\frac{de^*(a)}{da} > 0$. In other words, the monetary equivalent of office-holding is a *convex function* of the public spirit parameter, a.[9] This convexity property will play a critical role in one of our main results.

4.2 Lobbying Stage

In this section, we will employ a slight abuse of notation by using h and a to refer to the characteristics of individual G, the governor in office. The following table summarizes the payoffs to the lobby groups and the governor, gross of influence payments, for each policy p.

	value to A	value to B	value to G	Total Surplus
A	v	0	$-(1+a)q - g(h)$	$v - (1+a)q - g(h)$
B	0	βv	$-(1+a)q - g(h)$	$\beta v - (1+a)q - g(h)$
AB	$(1-\alpha)v$	$(1-\alpha)\beta v$	$-2(1+a)q - g(h)$	$(1-\alpha)(1+\beta)v$ $-2(1+a)q - g(h)$
ϕ	0	0	0	0

We will focus on cases with *high conflict*, for which α is large:

Assumption 3. ***(High Conflict)*** $\alpha \geq \dfrac{v-q}{v(1+\beta)}$

This assumption ensures that the policy that is jointly efficient for the participants in the lobbying game (i.e. the choice that maximizes the total surplus of the politician and the lobbies) is either B or ϕ.

Lemma 1. *If $g(h) > \beta v - (1+a)q$, then $p^* = \phi$, else $p^* = B$.*

[9]Notice that since this convexity property concerns the monetary equivalent of office-holding, it involves an ordinal aspect of preferences, and not a cardinal property of utility. Similarly, the parameter a has an ordinal interpretation: it determines the marginal rate of substitution between an individual's own consumption of the private good and that of the typical citizen.

Let $\bar{h}(a)$ be the unique solution to $g(h) = \beta v - (1+a)q$ if it exists; otherwise $\bar{h}(a) = -\infty$. We'll refer to politicians with $h > \bar{h}(a)$ as "moral" because they do not sell out to special interests, and to those with $h \leq \bar{h}(a)$ as "corrupt" because they accept payments from special interests. Note that these terms are defined with respect to a particular level of public spirit.

Next we compute the rents to a politician from holding office.

Lemma 2. *Ignoring the costs of running for office, the governor receives a net payoff*

$$\pi(a) + \begin{cases} v - (1+a)q - g(h) & \text{if } v > (1+a)q + g(h) \\ 0 & \text{otherwise.} \end{cases}$$

The intuition is straightforward. Trivially a governor who doesn't sell out to SIP receives no rents from the presence of SIP. Consider a politician who does sell out, i.e. $\beta v \geq g(h) + (1+a)q$. Can he extract rents from lobby B? In equilibrium lobby B will pays the governor just enough to deter him from selling out to lobby A or implementing $p = \phi$. Since A can pay no more than v, B pays $\max\{(1+a)q+g(h), v\}$. Given the disutility of selling out, $(1+a)q + g(h)$, the politician extracts either no rents, or rents of $v - (1+a)q - g(h)$.

In the following sections, it will be useful to have formulas for the lobbying rents earned by two particular types of governors. Lemma 2 implies that the net payoff to a Paine (a person with $a = 1$ and $h = 0$) will be $\pi(a) + \max\{0, v - 2q\}$. Similarly, the net payoff to a Scoundrel (one with $a = h = 0$) will be $\pi(a) + \max\{0, v - q\}$. Thus, the governor's surplus from the lobbying game is $\max\{0, v - 2q\}$ in the case of a Paine, and $\max\{0, v - q\}$ in the case of a Scoundrel. It follows that Scoundrels earn positive rents from lobbying when $v > q$, and Paines earn positive rents from lobbying when $v > 2q$. As we will see, the overall equilibrium of the game will differ according to whether either or both of these inequalities are satisfied.

Define $\underline{h}(a)$ as the unique solution to $g(h) = v - (1+a)q$ if it exists, otherwise set $\underline{h}(a) = -\infty$. By their definitions, $\overline{h}(a) \geq \underline{h}(a)$. Governors with $h < \underline{h}(a)$ sell out to lobby B and earn positive surplus. Governors with $\underline{h}(a) < h < \overline{h}(a)$ sell out to lobby B but earn no surplus. Governors with $h > \overline{h}(a)$ do not sell out. (Those on the boundaries between two regions are indifferent between the choices that are optimal within each.) Figure 1 below summarizes.

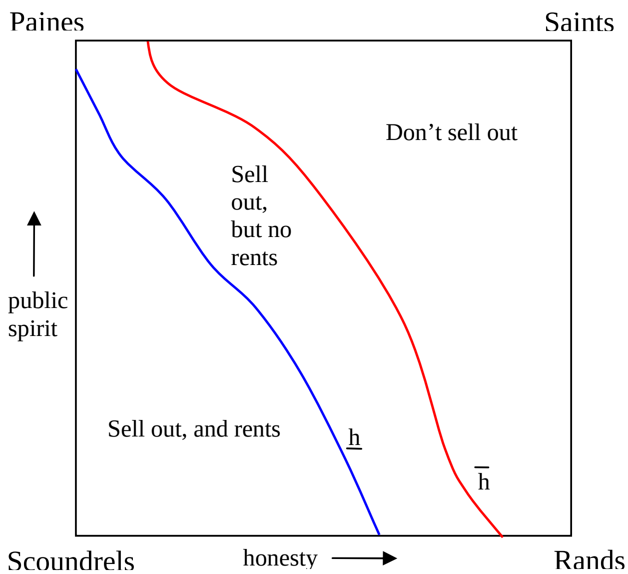

Figure 1: SIP impact on the Governor

Remark 1. *For a given level of public spirit, a, all politicians with $h \geq \underline{h}(a)$ receive the same net payoff ($\pi(a)$), even though some are corrupt and implement $p = B$ (when $h \in \left[\underline{h}(a), \bar{h}(a)\right]$) whereas others are moral and implement $p = \phi$ (when $h > \bar{h}(a)$).*

Remark 2. *Both $\underline{h}$ and $\bar{h}$ are decreasing functions, as one would expect: holding constant honesty, a more public spirited governor has higher disutility from enacting projects.*

We thus have a complete characterization of the ex-post outcomes given the governor's character.

4.3 No Lobbies

Without lobbies, only one candidate runs for office in any equilibrium. This conclusion follows from the fact that citizens have the same preferences, and every citizen has an incentive to free-ride off more those who are willing to run: the (weakly) least public spirited candidate will always prefer to lose to a rival, and will therefore drop out of the election. The following result (which holds both as k approaches zero and in the limit for $k = 0$) establishes a lower bound on the level of public spirit in equilibrium. (In our model, honesty is irrelevant without lobbies.)

Proposition 1. *Assume there are no lobbies. Then every equilibrium involves only one candidate for office. There exists $a_{NL} < 1$ such that*

1. *there is no equilibrium with a candidate i for whom $a^i < a_{NL}$;*

2. *for every i with $a^i \geq a_{NL}$, there is an equilibrium where i is the unique candidate.*

The logic of this result is straightforward. Suppose the single candidate is G, and consider the incentives for some other citizen, $i \neq G$. If $a^i \leq a^G$, then i has no incentive to enter the election (since the office-holder bears the cost of effort). By continuity, even if a^i is slightly larger than a^G, i still prefers not to run against G. Thus, i has an incentive to enter the election only if a^i is sufficiently larger than a^G. The lower bound on candidate public spirit is determined by finding the smallest a^G such that a citizen with the highest level of public spirit ($a^i = 1$) has no incentive to run.[10]

4.4 Observable Character

Now suppose that lobbies are present, but that all voters (in particular, *ineligible citizens*) can observe candidates' character. In that case, we would replace Assumption 2 with the assumption that the voters will elect a candidate who will implement the most desirable outcome, and each such candidate has an equal probability of winning. The following result characterizes the equilibria that emerge:

[10]Precisely, a_{NL} is the solution to $2x^{\max} - c^{\max} = 2f(e^*(a_{NL}))$ if one exists, and $a_{NL} = 0$ otherwise.

Proposition 2. *Assume that character is observable.*

1. *If $v \leq 2q$ then every equilibrium involves only one candidate for office.*

2. *If $v > 2q$, then for all $\varepsilon > 0$ and $N > 1$, if k is small enough, then every equilibrium has either just one candidate, or at least N candidates all with $a = 1$ and $h < \varepsilon$.*

3. *There exists $a_{OC} \in [a_{NL}, 1)$ such that*

   (a) *if k small enough, there is no equilibrium with a single candidate i for whom $a^i < a_{OC}$ and $h^i = 1$;*

   (b) *for every i with $a^i \geq a_{OC}$ and $h^i = 1$, there is an equilibrium in which i is the only candidate.*

The intuition behind the Proposition is as follows: under observable character, there is always an equilibrium with a single candidate who is moral and sufficiently public spirited, for similar reasons to Proposition 1. Multiple candidates will run for office only if there are lobby rents to be had from holding office. Since the most dishonest citizens have the most to gain from the influence of special interests, and the most public spirited citizens will be elected from the set of candidates who run (all of whom must be corrupt since they anticipate rents), any multi-candidate pool must consist entirely of citizen who are almost Paines ($a = 1, h = 0$). But this can be an an equilibrium only if lobby stakes are sufficiently enough ($v > 2q$), since otherwise there are no rents to be had for Paines.

An immediate consequence of Propositions 1 and 2 is that in either benchmark case, the first-best outcome — having a Saint as governor — is attainable.

Corollary 1. *If either there are no lobbies or citizens' character is observable, then there is an equilibrium in which a single Saint runs for office.*

5 The One-Period Game

We solve the model by backward induction. Having presented the solution of the post-election game in sections 4.1 and 4.2, we can move directly to the question of who runs for office.

5.1 Who Runs for Office?

We look now for a Nash equilibrium of the entry-game, given the continuation payoffs described above. Some additional notation will prove useful: let $u^G(a,h)$ be the net payoff for the governor with type (a,h) ignoring entry cost k; let $u(a,h;\tilde{a})$ be the utility for a non-candidate citizen with type $\tilde{a}$ when the governor has type (a,h). That is,

$$\begin{aligned} u^G(a,h) &= (1+a) f(e^*(a)) - c(e^*(a)) + \max\{v - (1+a) q - g(h), 0\} \\ u(a,h;\hat{a}) &= (1+\hat{a}) \left[f(e^*(a)) - \mathbf{1}_{h \le \bar{h}(a)} q \right]. \end{aligned}$$

Denote the set of candidates as $\mathcal{N}$, with cardinality N. Since we restrict attention to *pure entry strategy equilibria*, an equilibrium is essentially specified by $\mathcal{N}$. Two conditions must hold for an equilibrium:

$$\forall i \in \mathcal{N}: \quad \frac{1}{N}\left[u^G\left(a^i,h^i\right) - \mathbb{E}_{j\in\mathcal{N}\setminus i} u\left(a^j,h^j;a^i\right)\right] \ge k \tag{1}$$

$$\forall i \notin \mathcal{N}: \quad \frac{1}{N+1}\left[u^G\left(a^i,h^i\right) - \mathbb{E}_{j\in\mathcal{N}} u\left(a^j,h^j;a^i\right)\right] \le k. \tag{2}$$

Inequality (1) requires that a candidate prefers to enter rather than stay out, whereas inequality (2) requires that non-candidate prefers to stay out rather than enter. Given a citizen j and a set of citizens $\mathcal{J}$, let

$$\begin{aligned} z^j &\equiv \begin{cases} q & \text{if } h^j \le \bar{h}(a^j) \\ 0 & \text{otherwise} \end{cases} \\ x^{\mathcal{J}} &\equiv \frac{1}{|\mathcal{J}|}\sum_{j\in\mathcal{J}} x^j \\ z^{\mathcal{J}} &\equiv \frac{1}{|\mathcal{J}|}\sum_{j\in\mathcal{J}} z^j. \end{aligned}$$

Insofar as society's welfare is concerned, we are only concerned about the level of public good and taxation. To almost all citizens, what matters about a candidate is only his public spirit and whether he sells out to SIP or not; beyond these considerations, his level of honesty is irrelevant. This observation motivates the following definitions.

Definition 1. *The quality of a candidate, i, is $y^i \equiv x^i - z^i$. Average candidate quality in an equilibrium, $\mathcal{N}$, is $y^{\mathcal{N}} \equiv x^{\mathcal{N}} - z^{\mathcal{N}}$.*

Observe that y^i is the public good production of individual i (x^i) less the tax he would imposed if elected; $y^{\mathcal{N}}$ is the corresponding average amongst the set of candidates $\mathcal{N}$.

5.1.1 Single Candidate Equilibria

We first consider equilibria in which only a single candidate runs for office. These turn out to exist if and only if SIP stakes are not too high. Define

$$\bar{v} \equiv x^{\max} - \left(x^{\min} - c^{\min} - q\right).$$

The utility a Scoundrel receives when a Saint is in office is simply $x^{\max}$; whereas $x^{min} - c^{\min} + \max\{v - q, 0\}$ is the utility a Scoundrel receives from holding office. Therefore, $\bar{v}$ is the minimal SIP stakes such that a Scoundrel prefers himself as governor over a Saint (ignoring running cost). Clearly, $\bar{v} > q$.

To see when single candidate equilibria (SCE) exist and which citizens run for office, first observe that if there is any such equilibrium, then there is also one in which the single candidate is a Saint. By the definition of $\bar{v}$, when $v > \bar{v}$, a Scoundrel has an incentive to run against a single Saint if running costs are small enough. Thus a single candidate equilibrium (for arbitrarily small k) requires $v \leq \bar{v}$. Now assume this condition holds. If a candidate G is running unopposed, it must be that no other citizen prefers holding office over having G as governor — otherwise for small enough running cost, they would enter the election. A Paine strictly prefers holding office over G if and only if $2x^{\max} - c^{\max} + \max\{0, v - 2q\} > 2(x^G - z^G)$; whereas a Scoundrel prefers holding office over G if and only if $x^{\min} - c^{\min} + \max\{(v - q), 0\} > x^G - z^G$. Together, these inequalities provide a lower bound value of $x^G - z^G$ for any equilibrium in which G runs unopposed. Our next theorem establishes that these conditions are also sufficient for the existence of such an equilibrium.

Theorem 1. ***(SCE)*** *Single candidate equilibria do not exist if $v > \bar{v}$ and k is small enough. If $v \leq \bar{v}$, then*

1. for every citizen i such that

$$y^i \geq \max\left\{x^{\min} - c^{\min} + (v - q), x^{\max} - \frac{c^{\max}}{2} + \max\left\{0, \frac{v}{2} - q\right\}\right\}, \quad (3)$$

there is an equilibrium where the only candidate is i.

2. for any citizen i such that (3) does not hold, there exists $\tilde{k}(i) > 0$ such that when $k < \tilde{k}(i)$, there is no SCE with i as the candidate.

Hence, if SIP stakes are not too high, there is an equilibrium that produces the first-best results, just as in the benchmark cases.

Corollary 2. *If $v \leq \bar{v}$, there is an equilibrium in which a single Saint runs for office.*

Theorem 1 has a surprising implication: given the set of SCE, for each level of public-spritedness, there is a *lower* bound on a candidate's honesty, rather than an upper bound. In particular, there may be a range of values for a such that a candidate's quality exceeds the threshold listed in Theorem 1 if $h > \overline{h}(a)$ (so that the candidate refuses special interest payments), and is below that threshold if $h < \overline{h}(a)$ (so that the candidate accepts special interest payments). In that sense, SIP leads to equilibria which select for candidates with greater honesty.

5.1.2 Multiple Candidate Equilibria

There are two key steps to characterizing equilibria with more than one candidate. The first is to observe that as running costs shrink to 0, the number of candidates in any multi-candidate equilibrium (MCE) must increase without bound. The intuition behind this result is that in an equilibrium with $N > 1$ candidates (for some running cost), every candidate prefers to run rather than drop out, but no non-candidate of an identical type prefers to join the race. This must be because the number of candidates is large relative to the running cost so that the probability of winning if a non-candidate were to run would not be large enough to compensate for the running cost. But then, if the running cost becomes small enough, the equilibrium is broken.

Lemma 3. *For every $N > 1$, there exists $\hat{k}(N)$ such that for all $k < \hat{k}(N)$, every multi-candidate equilibrium has at least N candidates.*

The second key step in solving for multi-candidate equilibria is to determine which type(s) of citizens have the greatest incentives to run for office. Given a set of candidates, $\mathcal{N}$, the potential gains from entry for a citizen $i \notin \mathcal{N}$ is the difference between the [expected] utility received holding office, and not running for office.[11]

To analyze the potential gains from holding office, it is useful to begin by ignoring the incentives created by special interest politics. Suppose the level of the public good is x. Then the potential gains for a maximally public spirited citizen are $2x^{\max} - c^{\max} - 2x$, while the gains from a minimally public spirited citizen are $x^{\min} - c^{\min} - x$. Consequently, the level of the public good, $\overline{x}$, that would equate the gains for these two types, is given by

$$\bar{x} \equiv 2x^{\max} - c^{\max} - \left(x^{\min} - c^{\min}\right).$$

Because $x^{\max} - c^{\max} < x^{\min} - c^{\min}$ by the definition of $e^*(0)$ and $2x^{\max} - c^{\max} > 2x^{\min} - c^{\min}$ by the definition of $e^*(1)$, we know that $\bar{x} \in \left(x^{\min}, x^{\max}\right)$. As we will see, this proves to be an important threshold.

Our next result identifies the types of citizens with the greatest potential gains from holding office, including the incentives created by special interest politics.

Lemma 4. *Given a set $\mathcal{N}$ of candidates, the gains from entry are highest for either Paines or Scoundrels (or both) and strictly lower for any citizen i with $a^i \in (0,1)$. The gains are highest for*

1. *Paines if and only if*

$$y^{\mathcal{N}} \leq \bar{x} + \max\{v - 2q, 0\} - \max\{v - q, 0\}.$$

2. *Scoundrels if and only if*

$$y^{\mathcal{N}} \geq \bar{x} + \max\{v - 2q, 0\} - \max\{v - q, 0\}.$$

Moreover, the gains for for Scoundrels exceed those for all other types with $a = 0$ if $v > q$, and are the same for all types with $a = 0$ if $v \leq q$. Also, the gains Paines

[11] For the moment, we can ignore the probability of winning for citizen i because all potential gains will be weighted by the same probability of victory.

exceed those for all other types with $a = 1$ if $v > 2q$, and are the same for all types with $a = 1$ if $v \leq 2q$.

The result is easiest to understand when SIP stakes are high, in particular $v > 2q$ (so that any governor with $h = 0$ would earn positive rents from lobbying). Then clearly for any level of public spirit, those with $h = 0$ earn strictly larger rents from holding office than those with $h > 0$. With small personal campaign costs, we can therefore restrict attention to candidates with $h = 0$. As a function of the public spirit parameter a (with $h = 0$), a candidate's potential gain from holding office is

$$[(1 + a)f(e^*(a)) - c^*(a) - (1 + a)q + v] - (1 + a)(x^N - q).$$

Applying the envelope theorem, we see that the derivative of the gain with respect to a is

$$f(e^*(a)) - x^{\mathcal{N}}.$$

It follows that the gain from entry is decreasing for values of a such that $f(e^*(a)) < x^{\mathcal{N}}$, and increasing for values of a such that $f(e^*(a)) > x^{\mathcal{N}}$. The potenital gains from holding office are therefore maximized at either $a = 0$ or $a = 1$, that is, for either a Scoundrel or a Paine. This finding reflects the convexity property noted in section 4.1: the second derivative of the potential gains from holding office is $f'(e^*(a))\frac{de^*(a)}{da} > 0$.

The same basic logic applies even when $v \leq 2q$. The analysis is slightly more complicated however, because one can no longer guarantee that only the most dishonest types of agents run for office.

Together, the two Lemmas imply that as the running cost approach zero, equilibrium conditions severely constrain the character of candidates in equilibrium. Specifically, the character of every candidate must be very close to that of the type that has the greatest potential gain from holding office. To understand why, suppose there is a candidate n whose character isn't close to that of a non-candidate i with maximal potential gains from holding office. Then i could enter with approximately the same chance as winning that n has when i does not enter (since the number of candidates is large). Since n's expected gains from entering are positive, i's must be positive as well. But that conclusion violates the incentive constraints, which tell us that n must prefer not to run.

Our next result identifies specific implications for the characteristics of the candidates who run for office in an MCE.

Theorem 2. ***(MCE Candidate Character)*** *For all $\varepsilon > 0$,*

1. *There exists $\hat{k}(\varepsilon) > 0$ such that when $k < \hat{k}(\varepsilon)$, no multi-candidate equilibrium, $\mathcal{N}$, includes an $n \in \mathcal{N}$ with $x^n \in \left(x^{\min} + \varepsilon, x^{\max} - \varepsilon\right)$.*

2. *If $v > 2q$, there exists $k'(\varepsilon) > 0$ such that when $k < k'(\varepsilon)$, no multi-candidate equilibrium, $\mathcal{N}$, includes an $n \in \mathcal{N}$ with $z^n = 0$.*

3. *If $v > q$, there exists $k''(\varepsilon) > 0$ such that when $k < k''(\varepsilon)$, no multi-candidate equilibrium, $\mathcal{N}$, includes an $n \in \mathcal{N}$ with $z^n = 0$ and $x^n < x^{\min} + \varepsilon$.*[12]

The Theorem implies that when running costs are small, any individual candidate's quality in a MCE is restricted to being close to: with high SIP stakes, $v > 2q$, either that of a Scoundrel or a Paine; with moderate SIP stakes, $v \in (q, 2q]$, either that of a Scoundrel, or any type of citizen with $a = 1$; with low SIP stakes, $v \leq q$, either any type of citizen with $a = 0$ or any type of citizen with $a = 1$.

Having determined characteristics of the individual candidates, we are ready to characterize the average candidate quality in a MCE. Using Lemma 4, we define $\overline{y}$ as the average quality level for the candidate pool at which both Paines and Scoundrels have the greatest potential gains from holding office:

$$\bar{y} \equiv \bar{x} + \max\{v - 2q, 0\} - \max\{v - q, 0\}.$$

Note that $\bar{y} \in \{\bar{x} - q, \bar{x} - (v - q), \bar{x}\}$.

To simplify some of the exposition below, we make the following assumption on parameters, which guarantees that $\bar{y} < x^{\max} - q$.

Assumption 4. $\bar{x} + q < x^{\max}$

Using the definition of $\overline{x}$, one can verify that this assumption is equivalent to the statement that $(x^{\min} - c^{\min}) - (x^{\max} - c^{\max}) > q$. Thus, it implies that a reward of q is insufficient to induce a low public spirited agent to produce $x^{\max}$ of the public

[12] Strictly speaking, this statement only applies for ε not too large, but that's the case of interest.

good, rather than $x^{\min}$. This assumption is satisfied whenever the per capita tax required to finance the special interest project is not too large.

We are now prepared to state our result concerning average candidate quality in a multiple-candidate equilibrium:

Theorem 3. ***(MCE Average Candidate Quality)*** *A multiple-candidate equilibrium does not exist if $v \leq q$ and k is small enough. One exists if $v \geq \bar{v}$ and k is small enough. For all $\varepsilon > 0$,*

1. *There exists $\hat{k}(\varepsilon)$ small enough such that when $k < \hat{k}(\varepsilon)$, no multi-candidate equilibrium, $\mathcal{N}$, has $y^{\mathcal{N}} > \bar{y} + \varepsilon$.*
2. *There exists $k'(\varepsilon)$ small enough such that when $k < k'(\varepsilon)$, no multi-candidate equilibrium, $\mathcal{N}$, has $y^{\mathcal{N}} < \bar{y} - \varepsilon$.*[13]

That is, when costs of running are small, every MCE has an average candidate quality of approximately $\bar{y}$. This is most easily seen in the case of $v > \max\{\bar{v}, 2q\}$. By Theorem 2, $v > 2q$ implies that an MCE consists of some mixture of Scoundrels and Paines, all of whom sell out to special interests. The mixture cannot consist entirely of Paines, because then $y^{\mathcal{N}} = x^{\max} - q > \bar{x} - q = \bar{y}$ and Scoundrels would uniquely have the greatest potential gains from holding office (Lemma 4). Conversely, the mixture cannot consist entirely of Scoundrels, because then Paines uniquely would uniquely have the greatest potential gains from holding office. Therefore, the mixture must be non-degenerate, requiring that both Paines and Scoundrels both share the highest potential gain from holding office. By Lemma 4, that requirement implies that the average candidate quality is $\bar{y}$. One must also verify that when the average candidate quality is $\bar{y}$, Scoundrels and Paines have an incentive to run for office. That is the case when $v > \bar{v}$.

It is also worth noting that there is an open set of parameters for which both SCE and MCE exist: although Theorem 3 only asserts existence of MCE for $v \geq \bar{v}$, one can check from the proof that there is an open interval below $\bar{v}$ for which an MCE exists as well.[14]

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[13]It is this statement that is simplified by Assumption 4. Without it, the statement would have to read "... no MCE has $y^{\mathcal{N}} < \min\{\bar{y}, x^{\max} - q\} - \varepsilon$".

[14]Specifically, an MCE exists so long as $v > \max\{\bar{v} - \frac{c^{\max}}{2}, \bar{v} - q\}$.

Theorem 3 has a surprising and important implication: special interest politics increase the *variability* of the quality of governance. Though all candidates are dishonest, they vary widely in public spirit. An given election can yield a governor with either extremely high or extremely low public spirit, and hence either the maximum or minimum level of the public good.

When SIP stakes are sufficiently high, the distribution of candidate character in equilibrium is essentially unique. This observation will prove useful when we compare equilibria for the single-period and multiple-period models in the section 6. Define

$$\gamma^* \equiv \frac{\bar{x} - x^{\min}}{x^{\max} - x^{\min}}.$$

Proposition 3. *Assume $v > \max\{2q, \bar{v}\}$. For all $\varepsilon > 0$, there exists $\hat{k}(\varepsilon)$ such that when $k < \hat{k}(\varepsilon)$, in any equilibrium the fraction of candidates who are approximately Paines lies in $(\gamma^* - \varepsilon, \gamma^* + \varepsilon)$ and the fraction of candidates who are approximately Scoundrels lies in $(1 - \gamma^* - \varepsilon, 1 - \gamma^* + \varepsilon)$.*

The rationale is simple: when $v > \max\{2q, \bar{v}\}$ and k is small, every equilibrium is a MCE with essentially only Scoundrels and Paines, all of whom sell out to special interests. The average quality must converge (as k shrinks to 0) to $\bar{x} - q$. That is, we must have

$$\gamma^* x^{\max} + (1 - \gamma^*) x^{\min} = \bar{x},$$

the solution to which is given above.

5.2 How Stakes in SIP Affect the Quality of Governance

Next we investigate the relationship between the quality of government and the stakes of special interest politics. First consider MCE. From Theorem 3 and the definition of $\overline{y}$, it is clear that an increase in the stakes in SIP leads to a (weak) decline in average candidate quality, and to a strictly decline when the stakes are moderate.

Corollary 3. *When personal campaign costs are small, the (approximate) average candidate quality in any multiple-candidate equilibrium is strictly decreasing over the range $v \in (q, 2q]$ and constant above $2q$. Specifically, average candidate quality is* *approximately*

$$\bar{y} = \begin{cases} \bar{x} - (v - q) & \textit{if } v \in (q, 2q] \\ \bar{x} - q & \textit{if } v > 2q. \end{cases}$$

The effect of varying the stakes of SIP is quite different for SCE. Because of the ambiguities associated with non-uniqueness of SCE, we we focus on the "best" and "worst" SCE for any v — that is, the SCE with highest and lowest candidate quality. The candidate with the highest quality among all SCEs is always a Saint; consequently, the best outcome does not vary with v. In contrast, the lowest candidate quality can improve as v increases. The reason for this counter-intuitive result is that inefficient SCE are sustained because citizens — in particular, Paines — free-ride off lower quality officeholders. An increase in SIP stakes can increase rents from holding office, thus mitigating this free-rider problem.

Corollary 4. *The candidate quality in the best single-candidate equilibrium does not change over $v \in [0, \bar{v}]$. There exists some $\hat{v} \in (0, \bar{v})$ such that when running costs are small, the candidate quality in the worst single-candidate equilibrium does not change over $v \in [0, \hat{v}]$, but strictly increases over $v \in [\hat{v}, \bar{v}]$.*

It is also worth noting that an increase in the stakes of SIP can shift the equilibrium from an SCE to an MCE. Clearly the best SCE is strictly better for society than any MCE. The worst SCE can be better or worse than the MCE, depending on parameters.

6 Multi-Period Game

We now extend the basic setting to a two-period game. The sequence of events in each period is exactly as in the one-period game. Two points to note: first, in period 2, the incumbent's character is public knowledge, and he can choose whether or not to run again; second, by assumption, we abstract from the possibility that the governor elected in period 1 (the incumbent in period 2) might attempt to disguise his type through his choice of actions. In short, we rule out signaling motives; the governor's character becomes public knowledge regardless of what he does. Total utility for each citizen is simply the discounted sum of his payoffs using a discount factor δ. An equilibrium now consists of a set of entrants in period 1, as well as a mapping from the character of the incumbent to a set of entrants for period 2.

6.1 Equilibrium with High Stakes

We start the analysis in period 2, with the character of the incumbent fixed. First observe that the incumbent only runs if there are no challengers, since otherwise the incumbent either wins with probability 1 — in which case the challengers would drop out — or wins with probability 0 — in which case she would drop out. If the incumbent does not run, the equilibrium set of entrants must be the same as for the one-period model discussed in the previous section. Thus, the average candidate quality will be approximately $\bar{y}$, or equivalently $\bar{x} - q$. Thus, one can prove:

Lemma 5. *Assume $v > \max\{\bar{v}, 2q\}$. Then for all $\varepsilon > 0$, there exists $\hat{k}(\varepsilon)$ such that for all $k < \hat{k}(\varepsilon)$, the following holds for every period 2 continuation equilibrium: if the incumbent, I, has quality $y^I \geq \bar{x} - q + \varepsilon$ then the incumbent runs unopposed. Otherwise, the incumbent does not run, and the average new candidate quality lies in $(\bar{x} - q - \varepsilon, \bar{x} - q + \varepsilon)$.*

In particular, if a Paine is elected in period 1, he runs unopposed in period 2; whereas if a Scoundrel is elected in period 1, he does not run again in period 2.

The possibility that some types will be re-elected and some types will not introduces potentially complicated discontinuities into the function describing the gains from entering the the period 1 election. To keep things simple, we focus on the case where SIP stakes are sufficiently high:[15]

Lemma 6. *If v is sufficiently large, then given any set of period 1 candidates, the gains for entry are highest for either Paines or Scoundrels (or both) and strictly lower for all other types.*

In light of this lemma, logic similar to that used in our analysis of the one-period game implies that when k is small, only (approximate) Paines and Scoundrels run for

[15]For example, the lemma follows if $v > \max\{\bar{x} + 2q + c^{\max}, \bar{v}\}$.

office in period 1. Define γ_1^* as follows:

$$\gamma_1^* = \begin{cases} 1 & \text{if } (1-\delta)\left(x^{\max} - \bar{x}\right) \leq \delta\left[v - c^{\max}\right] \\ 0 & \text{if } (1-\delta)\left(x^{\min} - \bar{x}\right) \geq \delta\left[v - c^{\min}\right] \\ \frac{\delta\left(v - c^{\min}\right) + (1-\delta)\left(\bar{x} - x^{\min}\right)}{\delta\left(c^{\max} - c^{\min}\right) + (1-\delta)\left(x^{\max} - x^{\min}\right)} & \text{otherwise.} \end{cases}$$

Theorem 4. *Assume v is sufficiently large. For all $\varepsilon > 0$, there exists $\hat{k}(\varepsilon)$ such that when $k < \hat{k}(\varepsilon)$, in any equilibrium, in period 1, the fraction of candidates who are approximately Paines lies in $(\gamma_1^* - \varepsilon, \gamma_1^* + \varepsilon)$ and the fraction of candidates who are approximately Scoundrels lies in $(1 - \gamma_1^* - \varepsilon, 1 - \gamma_1^* + \varepsilon)$.*

It is instructive to compare the proportions implied by Theorem 4 with the (unique) fractions of Paines and Scoundrels in a one period game when SIP stakes are very large. By Proposition 3, the fraction of Paines there is γ^*. Observe that $\gamma^* = \gamma_1^*$ when $\delta = 0$, as one would expect. When $\delta > 0$ and v is sufficiently large, it is clear that $\gamma^* < \gamma_1^*$. That is, more Paines run for office in the first period of the two-period game than in the one-period game. The intuition is simple: in a two-period game, Paines reap the benefits of holding office for two periods if they are elected in period 1, whereas a Scoundrel knows he will not hold office for more than one period. This increases the gains from entry for Paines relative to Scoundrels in the two period game.

6.2 Term Limits

What is the effect of imposing a *term limit* in the two-period game? With a term limit, no citizen can hold office for more than one period. The previous discussion shows that when SIP stakes are very high, citizens are strictly worse off with term limits.

Corollary 5. *If v is sufficiently large then term limits reduce the quality of governance.*

We have derived this result purely from *selection* effects: term limits reduce the incentives for good quality citizens to run for office in the first place. There are added benefits from eschewing term limits: citizens can retain a better-than-average quality incumbent, leading to higher quality of governance in the second period.[16]

7 Discussion

It is sometimes argued that desirable leaders stay out of politics because holding office pays very poorly, at least relative to the outside options of those same individuals. If so, increasing pay for public officials may improve the pool of candidates. When public spirit is an important dimension of character, our model suggests that the effects of compensation can be more subtle.

Suppose the governor in our model were paid a fixed wage, w. If an SCE prevails, the introduction of the wage could indeed lead to a better equilibrium, since the worst SCE potentially improves. On the other hand, if $v > \bar{v}$, then equilibrium without the wage is a MCE, and average candidate quality does not change when the wage is introduced. That is because all citizens value the wage equally; what determines average quality in an MCE are the *relative* gains from seeking office for citizens of different character. Wages could reduce welfare however if they change the setting from one in which an SCE exists to one in which no SCE exists. In particular, suppose $w > \bar{v} > q > v$. Then without the wage, equilibrium consists of a single candidate, whose quality could exceed $\overline{x}$ (e.g., he could be a Saint). Once the wage is introduced, there is no longer a SCE, and any MCE has average candidate quality no greater than $\overline{x}$.

8 Concluding Remarks

In this paper, we have studied the impact of special interest politics on the self-selected character of politicians, including honesty and public spirit. We show that there is a unique limiting equilibrium in our model (as the cost of candidacy approaches zero) when SIP stakes are high. The equilibrium involves a large number of

[16] Smart and Sturm (2006) point out that term limits can be beneficial because it can impact politicians' behavior in ways that allow the electorate to discriminate between good and bad politicians more effectively. Since we have abstracted from signalling behavior thus far, we cannot capture this effect. We plan to extend our analysis in this direction.

candidates running for office, all of whom are maximally dishonest, and each of whom is either maximally or minimally public spirited. Thus, the political process selects for dishonesty (as would would expect), and distribution of public spiritedness among candidates is bimodal, with density concentrated at the lower and upper bounds of the population distribution. As a result, SIP leads to substantial *variability* in the quality of governance. In contrast, when the stakes of SIP are low, the model has multiple equilibria, all of which involve only a single candidate. The elected official need not be maximally dishonest, and may even be resistant to special interest influence. Indeed, for each level of public-spritedness, there is a *lower* bound on a candidate's honesty, rather than an upper bound. In that sense, SIP leads to equilibria which select for candidates with greater honesty. When single-candidate equilibria exist, there is always an equilibrium in which a single, maximally honest and maximally public spirited candidate runs for office and is elected. Other results concern the effects of variations in the stakes of special interest politics, and the consequences of term limits in a multiple-period setting.

In ongoing work, we are examining several extensions of the theory. One natural extension concerns the study of policy instruments that mitigate the selection problem when SIP stakes are high. Another involves the incorporations of other dimensions of character, such as *competence*; for example, the possibility that two candidates with different levels of competence might produce different amounts of the public good even if they exert the same effort. A third extension involves further development of the multi-period analysis, including the cases in which the character of an incumbent is not fully observed, so that signaling motives influence the actions of elected officials.

9 Appendix: Proofs

Proof of Proposition 1. When there are no lobbies, there are no rents from holding office. Hence, any candidate whose public spirit is weakly less than the average public spirit among the other candidates will strictly prefer to not run (since he can save on the cost of effort if elected, and attains, on expectation, the same level of public good as he would provide). This implies that there cannot be more than one candidate in equilibrium. Define a_{NL} as the solution to $2x^{\max} - c^{\max} = 2f(e^*(a_{NL}))$ if one exists, and $a_{NL} = 0$ otherwise. Since $x^{max} = f(e^*(1))$, it is clear that $a_{NL} < 1$. It is routine to check that when k is sufficiently small, there is no equilibrium where the only candidate is some i with $a^i < a_{NL}$, because a Saint would strictly prefer to enter and win with probability 1/2. Conversely, pick any i with $a^i \geq a_{NL}$; simple algebra verifies that a Saint prefers (weakly if $k = 0$ and $a^i = a_{NL}$, strictly otherwise) not to run when i is the sole candidate. Because $(1 + a)\left(f(e^*(a)) - f(e^*(a^i))\right) - c(e^*(a))$ is strictly increasing in a, Saints have the biggest incentive to challenge the single candidate i. Therefore, i being the sole candidate is an equilibrium (for any k). □

Proof of Proposition 2. In this proof, let y^i denote x^i if i is moral and $x^i - q$ if i is corrupt. That is, y^i refers to public good production of i less any taxes he would impose when elected. Our electoral assumption under observability of character implies that only citizens with the highest y amongst the candidates for office can win with any probability. Obviously then, all candidates must have the same y, since otherwise one can profitably drop out and save on running cost.

1. ($v \leq 2q$.) Suppose by way of contradiction that there are two (or more) candidates; pick any one of them and denote him by i. Candidate i cannot be moral, since a moral candidate gets no rents from office, and would be strictly better off not running (given that all candidates have the same y). So i is corrupt, and since i is an arbitrary candidate, all the candidates are corrupt, and consequently, all have the same public spirit. For running to be profitable for i, he must get some lobby rents if elected, i.e. $v > (1 + a^i)q + g(h^i)$, which requires $a^i < 1$. But then a non-candidate citizen j with $h^j = 0$ and $a^j > a^i$ can profitably enter the election, since he would win for sure and has strictly more to gain from holding office than i $((1 + a)(f(e^*(a)) - f(e^*(a^i))) - c(e^*(a))$

is strictly increasing on the domain $a \geq a^i$).

2. ($v > 2q$.) By the logic above, we cannot have multiple candidates if they are not all maximally public spirited, corrupt, and get rents from holding office. This implies that all candidates have the same probability of winning. Consequently, as $k \to 0$, the probability that any one candidate wins in a multi-candidate equilibrium must get arbitrarily close to 0, for otherwise, a non-candidate Paine would strictly prefer to run for office for small enough k. In turn, this requires that the number of candidates in any multi-candidate equilibrium increases unboundedly as $k \to 0$.[17] Finally, for any $\varepsilon > 0$, there cannot be multi-candidate equilibrium featuring a candidate i with $h^i > \varepsilon$ once k is small enough, because a non-candidate Paine would have a strict incentive to enter (since he gets strictly positive more lobby rents from office than this i).

3. The existence of a threshold $a_{OC} \in [0, 1)$ satisfying the statements (a) and (b) follows from a similar argument to that of Proposition 1. That $a_{OC} \geq a_{NL}$ follows from the fact that under observable character, a Saint who challenges a candidate i with $a^i < 1$ and $h = 1$ is guaranteed to win, whereas when character is not observable, the Saint has only probability 1/2 of winning. □

Proof of Lemma 1. In any truthful equilibrium, the action must be efficient. This rules out $p = A$. Some algebra shows that $p = B$ yields higher surplus than $p = AB$ if and only if

$$\alpha \geq \frac{v - (1 + a)\, q}{v\,(1 + \beta)},$$

which is guaranteed by the High Conflict assumption. Finally, when $g(h) > \beta v - (1 + a)\, q$ the surplus from ϕ is higher than from B, and conversely in the other case. □

Proof of Lemma 2. When the politician is moral, the equilibrium project is ϕ. The

[17] See also the proof of Lemma 3, which applies whether character is observable or not.

truthful strategies relative to this action are

	t_A	t_B
A	v	0
B	0	βv
AB	$(1-\alpha)\,v$	$(1-\alpha)\,\beta v$
ϕ	0	0

That the moral politician's payoff is $\pi(a)$ immediately follows.

When the politician is corrupt, the equilibrium action is $p = B$. Since A's value from this project is 0, it follows that his only truthful strategy is the same as if he were moral. To derive B's strategy, first notice that truthfulness requires $t_B(A) = 0$ and $t_B(\phi) = 0$. Next, equilibrium requires minimization of $t_B(B)$ subject to the following constraints:

$$\begin{aligned} t_B(B) &\geq (1+a)\,q + g(h) \\ t_B(B) &\geq v \\ t_B(B) - t_B(AB) &\geq (1-\alpha)\,v - (1+a)\,q. \end{aligned}$$

The first comes from the incentive constraint for the politician implementing $p = B$ rather than $p = \phi$, the second with respect to $p = A$, and the third from $p = AB$. We can now break the analysis into two cases.

Case 1: $v \geq (1+a)\,q + g(h)$. We must have $t_B(B) = v$. Hence $u_B^* = (\beta - 1)\,v$. Truthfulness implies either (i) $u_B(AB) = (\beta-1)\,v$, which simplifies to $t_B(B) = v(1-\alpha\beta)$. This is fine when $\alpha\beta \geq 1$. Alternatively, (ii) $t_B(AB) = 0$ and $u_B(B) \leq u_B(B)$. This is true when $\alpha\beta \geq 1$. To summarize, we have

$$\begin{aligned} t_B(B) &= v \\ t_B(AB) &= \max\{v(1-\alpha\beta), 0\}. \end{aligned}$$

Case 2: $v < (1+a)\,q + g(h)$. It follows then $(1+a)\,q + g(h) > (1-\alpha)\,v - (1+a)\,q$, and hence $t_B(B) = (1+a)\,q + g(h)$. Truthfulness then implies either (i) $u_B(B) = \beta v - (1+a)\,q - g(h)$, which solves for $t_B(AB) = (1+a)\,q + g(h) - \alpha\beta v$, which is ok iff $(1+a)\,q + g(h) \geq \alpha\beta v$. Alternatively, (ii) $t_B(AB) = 0$ and $u_B(AB) \leq$

$u_B(B)$, which holds iff $\alpha\beta v \geq (1+a)\,q + g(h)$. To summarize,

$$\begin{aligned} t_B(B) &= (1+a)\,q + g(h) \\ t_B(AB) &= \max\{(1+a)\,q + g(h) - \alpha\beta v, 0\} \end{aligned}$$

The proof is completed by noting that a corrupt politician's payoff is $\pi(a) + t_B(B) - (1+a)\,q - g(h)$. $\square$

Proof of Theorem 1. If any SCE exists, there is one where only a single Saint runs. By the definition of $\bar{v}$, a Scoundrel has an incentive to run against a single Saint if $v > \bar{v}$ and k is small enough. This proves that there is no SCE when $v > \bar{v}$ and k is small enough.

Now suppose $v \leq \bar{v}$. We argue that if

$$y^i \geq \max\left\{x^{\min} - c^{\min} + (v-q)\,, x^{\max} - \frac{c^{\max}}{2} + \max\left\{0, \frac{v}{2} - q\right\}\right\}, \tag{4}$$

then there is a SCE (for any k) where only i runs. As proved in Lemma 4, the biggest incentive to run against i is for Scoundrels if $y^i \geq \bar{y}$, and for Paines if $y^i < \bar{y}$. Consider $y^i \geq \bar{y}$. The gain from entry for a Scoundrel is no greater than $x^{\min} - c^{\min} + (v-q) - y^i \leq 0$, so indeed he has no incentive to run. Consider now $y^i < \bar{y}$. The gain from entry for a Paine is no greater than $2x^{\max} - c^{\max} + (v-2q) - 2y^i = 2\left[x^{\max} - \frac{c^{\max}}{2} + \left(\frac{v}{2} - q\right) - y^i\right] \leq 0$, so indeed he has no incentive to run.

Next, we argue that if y^i does not satisfy (4), some citizen has an incentive to run against just i if k is small enough. Consider $y^i \geq \bar{y}$. For a Scoundrel not to have an incentive to run against i for small enough k,it has to be that $y^i \geq x^{\min} - c^{\min} + \max\{v-q, 0\}$. That is, we need

$$y^i \geq \max\left\{\bar{y}, x^{\min} - c^{\min} + \max\{v-q, 0\}\right\}. \tag{5}$$

Alternatively, $y^i < \bar{y}$, and then for a Paine not to have an incentive to run against i for small enough k, it must be that $2y^i > 2x^{\max} - c^{\max} + \max\{v-2q, 0\}$. That is, we need

$$y^i \in \left(x^{\max} - \frac{c^{\max}}{2} + \max\left\{\frac{v}{2} - q, 0\right\}, \bar{y}\right]. \tag{6}$$

The proof is completed by showing that the union of the set of y^i that satisfies (5) and the set that satisfies (6) is the same as the set that satisfies (4).

Case 1: $v \leq q$. Then $\bar{y} = \bar{x} > x^{\max} - \frac{c^{\max}}{2} > x^{\min} - c^{\min}$.

Case 2: $v \in (q, 2q]$. Then $\bar{y} = \bar{x} - (v - q)$. One can verify that

$$\begin{array}{rcl} x^{\max} - \dfrac{c^{\max}}{2} & \leq & \bar{x} - (v - q) \\ & \Updownarrow & \\ x^{\min} - c^{\min} + v - q & \leq & \bar{x} - (v - q) \\ & \Updownarrow & \\ x^{\min} - c^{\min} + (v - q) & \leq & x^{\max} - \dfrac{c^{\max}}{2}. \end{array}$$

Case 3: $v > 2q$. Then $\bar{y} = \bar{x} - q$. One can verify that

$$\begin{array}{rcl} x^{\max} - \dfrac{c^{\max}}{2} + \dfrac{v}{2} - q & \leq & 2(\bar{x} - q) \\ & \Updownarrow & \\ x^{\min} - c^{\min} + (v - q) & \leq & x^{\max} - \dfrac{c^{\max}}{2} + \dfrac{v}{2} - q \\ & \Updownarrow & \\ x^{\min} - c^{\min} + v - q & \leq & \bar{x} - q. \end{array}$$

$\square$

Proof of Lemma 3. Consider a set of entrants, $\mathcal{N}$, with $N \geq 2$. It is sufficient to argue that this cannot be an equilibrium when k is sufficiently small. Pick a candidate $n \in \mathcal{N}$ such that

$$n \in \min_{j \in \mathcal{N}} \left\{ x^j - z^j \right\}.$$

It follows that $\mathbb{E}_{j \in \mathcal{N} \setminus n} u(a^j, h^j; a^n) \geq \mathbb{E}_{j \in \mathcal{N}} u(a^j, h^j; a^i)$. Now pick an $i \notin \mathcal{N}$ with $a^i = a^n$ and $h^i = h^n$. Equilibrium incentive compatibility requires

$$\begin{array}{rcl} (N+1)k & \geq & u^G(a^n, h^n) - \mathbb{E}_{j \in \mathcal{N} \setminus n} u\left(a^j, h^j; a^n\right) \\ & \geq & u^G\left(a^i, h^i\right) - \mathbb{E}_{j \in \mathcal{N}} u\left(a^j, h^j; a^i\right) \geq Nk > 0. \end{array}$$

Clearly, when k is sufficiently small, the first inequality fails. $\square$

Proof of Lemma 4. We start by observing that Scoundrels get strictly higher utility from office than Rands (and hence have strictly higher gains from entry) if and only if $v > q$; otherwise gains are the same for both types. Similarly, Paines have strictly higher gains than Saints if and only if $v > 2q$; otherwise gains are the same for both.

Define the gains from entry given a set of candidates, $\mathcal{N}$, by

$$\begin{aligned}\Delta\left(a^i, h^i; \mathcal{N}\right) &\equiv \left(1+a^i\right)\left(f\left(e^*\left(a^i\right)\right) - \left(x^{\mathcal{N}} - z^{\mathcal{N}}\right)\right) - c\left(e^*\left(a^i\right)\right) \\ &\quad + \max\left\{0, v - \left(1+a^i\right)q - g\left(h^i\right)\right\}.\end{aligned}$$

Clearly Δ is weakly decreasing in h^i, hence the biggest incentive to enter is for an agent with $h^i = 0$, and we can restrict attention to

$$\Delta\left(a^i; \mathcal{N}\right) = \left(1+a^i\right)\left(f\left(e^*\left(a^i\right)\right) - \left(x^{\mathcal{N}} - z^{\mathcal{N}}\right)\right) - c\left(e^*\left(a^i\right)\right) + \max\left\{0, v - \left(1+a^i\right)q\right\}.$$

Note that Δ is continuous in a^i and a.e. differentiable. At all a^i such that $\left(1+a^i\right)q \neq v$, we have

$$\begin{aligned}\Delta'\left(a^i; \mathcal{N}\right) &= \left(f\left(e^*\left(a^i\right)\right) - \left(x^{\mathcal{N}} - z^{\mathcal{N}}\right)\right) + \left(1+a^i\right)f'\left(e^*\left(a^i\right)\right)\frac{de^*}{da}\left(a^i\right) \\ &\quad - c'\left(e^*\left(a^i\right)\right)\frac{de^*}{da}\left(a^i\right) - q\mathbf{1}_{0<\underline{h}(a^i)} \\ &= f\left(e^*\left(a^i\right)\right) - \left(x^{\mathcal{N}} - z^{\mathcal{N}}\right) - q\mathbf{1}_{0<\underline{h}(a^i)}.\end{aligned}$$

Hence there exists some $\hat{a}$ such that Δ is strictly decreasing below $\hat{a}$ and strictly increasing above it. It follows that Δ is maximized at either $a = 1$ or $a = 0$ and nowhere else. The proof is completed by noting that

$$\begin{aligned}\Delta(1; \mathcal{N}) - \Delta(0; \mathcal{N}) &= 2x^{\max} - c^{\max} + \max\{v - 2q, 0\} - 2\left(x^{\mathcal{N}} - z^{\mathcal{N}}\right) \\ &\quad - \left[x^{\min} - c^{\min} + \max\{v - q, 0\} - \left(x^{\mathcal{N}} - z^{\mathcal{N}}\right)\right] \\ &= \bar{x} + \max\{v - 2q, 0\} - \max\{v - q, 0\} - \left(x^{\mathcal{N}} - z^{\mathcal{N}}\right).\end{aligned}$$

□

Proof of Theorem 2. The incentive constraints (1) and (2) imply that for $n \in \mathcal{N}$ and

$i \notin \mathcal{N}$

$$k \geq \Delta\left(a^{i}, h^{i}; \mathcal{N}\right) - \Delta\left(a^{n}, h^{n}; \mathcal{N}\backslash n\right).$$

Picking $h^{i} = 0$ and noting that when k is small, N is arbitrarily large in any multi-candidate equilibrium, hence $\Delta\left(a^{n}, h^{n}; \mathcal{N}\backslash n\right) \leq \Delta\left(a^{n}; \mathcal{N}\backslash n\right) \simeq \Delta\left(a^{n}; \mathcal{N}\right)$, we have

$$k \geq \Delta\left(a^{i}; \mathcal{N}\right) - \Delta\left(a^{n}; \mathcal{N}\right). \tag{7}$$

1. Since $\Delta\left(a^{i}; \mathcal{N}\right)$ is maximized at either $a^{i} = 1$ or $a^{i} = 0$, this implies that for k small enough, $a^{n} \simeq 1$ or $a^{n} \simeq 0$.

2. If $v > 2q$, then $\Delta\left(a, h = 0; \mathcal{N}\right) > \Delta\left(a, h > 0; \mathcal{N}\right)$, hence for small enough k, all $n \in \mathcal{N}$ must have $h^{n} \simeq 0 < \underline{h}\left(a^{n}\right)$, implying $z^{n} = q$.

3. If $v > q$, then the above applies for all $a^{n} \simeq 0$.

$\square$

Proof of Theorem 3. **Step 1:** First we prove that when k is small, average candidate quality in an MCE must be arbitrarily close to $\bar{y}$.

1. Suppose there is a an equilibrium with $y^{\mathcal{N}} > \bar{y}$. It is sufficient to argue to a contradiction when k is small enough. By the definition of $\bar{y}$, $\Delta\left(0, \mathcal{N}\right) > \Delta\left(1, \mathcal{N}\right)$. For any $\varepsilon > 0$, when k is sufficiently small, all $n \in \mathcal{N}$ must have $a^{n} \leq \varepsilon$. Two cases: (a) if $v \leq q$, we can find an $\varepsilon > 0$ small such that for small enough k, $y^{\mathcal{N}} < x^{\min} + \varepsilon < \bar{x} = \bar{y}$ (b) if $v > q$, they by Theorem 2, we can find a small ε such that for k small enough, $y^{\mathcal{N}} < x^{\min} - q + \varepsilon < \bar{x} - q \leq \bar{y}$.

2. Suppose there is a an equilibrium with $y^{\mathcal{N}} < \min\left\{\bar{y}, x^{\max} - q\right\} - \delta$, where $\delta > 0$. It is sufficient to argue to a contradiction when k is small enough. By the definition of $\bar{y}$, $\Delta\left(0, \mathcal{N}\right) < \Delta\left(1, \mathcal{N}\right)$. So for any $\varepsilon > 0$, when k is sufficiently small, all $n \in \mathcal{N}$ must have $a^{n} \geq 1 - \varepsilon$. Hence for small enough $\varepsilon > 0$, and for small enough k, $y^{\mathcal{N}} > x^{\max} - q - \varepsilon \geq \min\left\{\bar{y}, x^{\max} - q\right\} - \delta$, a contradiction.

Step 2: Now we prove that there is no MCE when k is small enough and $v \leq q$. By the previous step, if there is an MCE, $\mathcal{N}$, we have $y^{\mathcal{N}} \simeq \bar{y} = \bar{x}$. [In what follows, we ignore/suppress approximations.] By Theorem 2, $\mathcal{N}$ contains only maximal or minimal public spirited citizens. Observe that there must be minimal public spirited candidates, for otherwise $\mathcal{N} \geq x^{\max} - q \geq \bar{x}$. The gains from entry for a minimal public spirit citizen is

$$\Delta(0; \mathcal{N}) = x^{\min} - \bar{x} - c^{\min} < 0,$$

violating the incentive constraint for entry. Contradiction.

Step 3: Now we prove that there is a MCE when k is small and $v \geq \bar{v}$.

Step 3a: We show that when the average candidate quality is $\bar{y}$, Scoundrels (and thus Paines by Theorem 4) have positive gains from entry.

First suppose $v \leq 2q$. Then $\bar{y} = \bar{x} - (v - q)$. The gains from entry are positive if and only if

$$x^{\min} - (\bar{x} - v + q) - c^{\min} + v - q > 0.$$

Some algebra shows that this is true if and only if $v > \bar{v} - \frac{c^{\max}}{2}$, which obviously holds since $v \geq \bar{v}$.

Now consider $v > 2q$. Then $\bar{y} = \bar{x} - q$. The gains from entry are positive if and only if

$$x^{\min} - (\bar{x} - q) - c^{\min} + v - q > 0.$$

Some algebra show shows that this is true if and only if

$$v > \bar{v} - q - [x^{\min} - c^{\min} - (x^{\max} - c^{\max})],$$

which holds when $v \geq \bar{v}$.

Step 3b: We construct a MCE for the case $\bar{v} \leq v \leq 2q < \beta v$; the procedure is similar for other cases. We ignore the integer problem for the number of candidates. The MCE we construct involves only Paines and Scoundrels running for office.

Accordingly, we need to find N and $L(\leq N)$ such that

$$\begin{aligned}
2\left(x^{\max}-\left(\frac{N}{N-1}\hat{x}-\frac{x^{\max}}{N-1}-q\right)\right)-c^{\max} &\geq Nk \\
x^{\min}-\left(\frac{N}{N-1}\hat{x}-\frac{x^{\min}}{N-1}-q\right)-c^{\min}+v-q &\geq Nk \\
v+x^{\min}-\hat{x}-c^{\min} &\leq (N+1)\,k \\
2\left(x^{\max}-(\hat{x}-q)\right)-c^{\max} &\leq (N+1)\,k \\
Lx^{\max}+(N-L)\,x^{\min} &= N\hat{x}.
\end{aligned}$$

These are necessary and sufficient incentive constraints for an equilibrium where L Paines and $N-L$ Scoundrels run. Note that $\hat{x}$ is the average level of public good production amongst the candidates. The first IC above is for those Paines who are candidates. The second IC is for those Scoundrels who are candidates. The third IC is for Paines who not candidates; and the fourth is for Scoundrels who are not candidates. Finally, the fifth constraint defines $\hat{x}$. Define α by

$$\alpha x^{\max}+(1-\alpha)\,x^{\min}-q=\bar{y}.$$

One can verify that $\alpha\in(0,1)$. As $k\to 0$, the fraction of Paines must approach α (by Theorem 3). Accordingly set $L=\alpha N$. Then $\hat{x}=\bar{y}+q=\bar{x}+2q-v$, and we rewrite and combine all the constraints to the following:

$$\begin{aligned}
&\min\left\{\begin{array}{c} v-q+x^{\min}-c^{\min}-\bar{y}-\left(\frac{\bar{x}+2q-v-x^{\min}}{N-1}\right), \\ 2x^{\max}-c^{\max}-2\bar{y}+2\left(\frac{x^{\max}-(\bar{x}+2q-v)}{N-1}\right) \end{array}\right\} \\
\geq\;& Nk \\
\geq\;& \max\left\{v-q+x^{\min}-c^{\min}-\bar{y},2x^{\max}-c^{\max}-2\bar{y}\right\}-k.
\end{aligned}$$

Lemma 4 implies that

$$2x^{\max}-c^{\max}-2\bar{y}=v-q+x^{\min}-c^{\min}-\bar{y},$$

and we note that $v\in[\bar{v},2q]$ ensures that $\bar{x}+2q-v\geq x^{\min}$ and $x^{\max}-(\bar{x}+2q-v)>$

0. Hence the problem is simplified to finding an N such that

$$v - q + x^{\min} - c^{\min} - \bar{y} - \left(\frac{\bar{x} + 2q - v - x^{\min}}{N-1}\right) \geq Nk \geq 2x^{\max} - c^{\max} - 2\bar{y} - k,$$

or equivalently, an N such that

$$N \in \left[\frac{2x^{\max} - c^{\max} - 2\bar{y}}{k} - 1, \frac{v - q + x^{\min} - c^{\min} - \bar{y}}{k} - \frac{\bar{x} + 2q - v - x^{\min}}{k\,(N-1)}\right].$$

Note that by Step 3a, $v - q + x^{\min} - c^{\min} - \bar{y} > 0$. We claim that the following choice of N is valid

$$N = \frac{v - q + x^{\min} - c^{\min} - \bar{y}}{k}.$$

Obviously when k is small, N is large. This is a valid choice if and only if $\frac{\bar{x}+2q-v-x^{\min}}{k(N-1)} < 1$, or equivalently,

$$\bar{x} + 2q - v - x^{\min} < v - q + x^{\min} - c^{\min} - (\bar{x} + 2q - v - q) - k.$$

Since $v \geq \bar{v}$, this will hold so long as

$$\bar{x} + 2q - v - x^{\min} < \bar{v} - q + x^{\min} - c^{\min} - (\bar{x} + 2q - v - q) - k.$$

which can be simplified after some algebra to

$$q < x^{\min} + c^{\max} - (x^{\max} - c^{\max}).$$

This is true because

$$\begin{aligned} x^{\min} + c^{\max} - (x^{\max} - c^{\max}) &> x^{\max} - \left[2x^{\max} - c^{\max} - \left(x^{\min} - c^{\min}\right)\right] \\ &= x^{\max} - \bar{x} \\ &> q. \end{aligned}$$

$\square$

Proof of Corollary 4. The worst SCE has candidate quality

$$\max\left\{x^{\min} - c^{\min} + (v-q), x^{\max} - \frac{c^{\max}}{2} + \max\left\{0, \frac{v}{2} - q\right\}\right\}.$$

Since $x^{\max} - \frac{c^{\max}}{2} > x^{\min} - c^{\min}$, we see that when v is sufficiently small, the candidate quality in the worst SCE is $x^{\max} - \frac{c^{\max}}{2}$, which is independent of v. To see that the quality is strictly increasing in v when v is close to $\bar{v}$, note first that this is obvious if $\bar{v} > 2q$. So suppose $\bar{v} \leq 2q$. Then

$$\begin{aligned} 2x^{\min} - 2c^{\min} + 2\bar{v} - 2q &= 2x^{\min} - 2c^{\min} + 2\left[x^{\max} - x^{\min} + c^{\min} + q\right] - 2q \\ &= 2x^{\max} \\ &> 2x^{\max} - c^{\max}. \end{aligned}$$

Hence when v is sufficiently close to $\bar{v}$, quality in the worst SCE is $x^{\min} - c^{\min} + (v-q)$, which is indeed strictly increasing in v. □

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