NBER WORKING PAPER SERIES

OF CANDIDATES AND CHARACTER

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Working Paper 16530
http://www.nber.org/papers/w16530

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
November 2010

For useful comments and discussions, we thank Simon Loertscher, Kali P. Rath, and seminar participants at UC Berkeley, UC San Diego, and the 2007 Wallis Institute Conference on Political Economy at the University of Rochester. Bernheim also thanks the National Science Foundation for financial support (grants SES-0137129 and SES-0452300), and Kartik thanks the Institute for Advanced Study at Princeton for hospitality and financial support through the Roger W. Ferguson, Jr. and Annette L. Nazareth membership. Preliminary versions of some of the results in this paper were reported in Kartik's Ph.D. dissertation submitted to Stanford University. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 16530
November 2010
JEL No. D72

ABSTRACT

We study the characteristics of self-selected candidates in corrupt political systems. Potential candidates differ along two dimensions of unobservable character: public spirit (altruism toward others) and honesty (the disutility suffered when selling out to special interests after securing office). Both aspects combine to determine an individual's quality as governor. We characterize properties of equilibrium candidate pools for arbitrary costs of running for office. As the cost of running vanishes, there is an essentially unique candidate pool, which is typically highly asymmetric: it consists of only the most dishonest individuals but a mixture of the most selfish and the most public-spirited ones. We explore how two policy instruments — the governor's compensation and anti-corruption enforcement — affect the expected quality of governance through candidate self-selection. We also examine the effects of incumbency and term limits on self-selection in a dynamic version of the model.

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"Ninety-eight percent of the adults in this country are decent, hardworking, 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 pernicious adverse selection problem: the citizens who are best suited to govern are least likely to seek office. Drawing on the citizen-candidate models of representative democracy due to Besley and Coate (1997) and Osborne and Slivinski (1996), a recent and growing literature has examined the nature of candidate self-selection with respect to ability (or competence).[1] Yet concerns over adverse self-selection extend beyond candidates' abilities, to questions of character. As the political scientist V.O. Key quipped, "If the people can only choose among rascals, they are certain to choose a rascal."(Key, 1966) Some commentators attribute the purported prevalence of rascals among politicians to special interest groups, suggesting that they sully the political process and attract those of low character while discouraging those with conscience.

It is not obvious, however, that one should expect negative rather than positive candidate self-selection along all pertinent dimensions of character. On the one hand, office-holding provides opportunities for personal rent-seeking at the expense of the public good, which are presumably more attractive to selfish than public-spirited citizens. But on the one hand, the opportunities to promote the greater good that accompany office-holding are presumably more attractive to public-spirited citizens than to selfish ones.

The literature on candidate self-selection has largely ignored questions of character.[2] In this paper, we study candidate self-selection with respect to two dimensions of character: *public spirit* (defined as altruism toward other citizens) and *honesty* (defined as susceptibility to corruption). In our model, citizens who run for office may hope to benefit from both legitimate compensation (salary and ego-rents) and illicit compensation (contributions or bribes from interest groups). They bear campaign costs and, if elected, effort costs associated

[1] See, e.g., Caselli and Morelli (2004), Messner and Polborn (2004), Poutvaara and Takalo (2007), Mattozzi and Merlo (2008, 2010), and Dal Bó et al. (2006).

[2] Exceptions include Caselli and Morelli (2001) (the working paper version of Caselli and Morelli (2004)), and Besley (2004), both of which focus on a characteristic that can be interpreted as honesty. Below, we clarify the relationships between those papers and the current analysis.

with producing public goods. Each citizen also recognizes that, if elected, his character will impact the quality of governance and hence general welfare. Character affects the tradeoffs between these costs and benefits. However, a candidate's character is not observed by the electorate (at least not initially). Thus, having a better character than one's opponents does not guarantee election.

A central feature of our model is that, as a consequence of the competing considerations noted in the previous paragraph, the incentive to enter is a U-shaped function of public spirit. Moreover, dishonest citizens extract greater rents from holding office because of special interest politics. As a result, the citizens with the greatest incentive to run for office are those who are maximally dishonest, and either maximally or minimally public-spirited. As we show, this property has important implications for candidate self-selection.

We find that for any given number of candidates, the set of equilibria (if non-empty) is typically characterized by non-trivial lower and upper bounds on the expected quality of governance. Candidates tend to be of intermediate quality: neither too good, because opponents would then drop out, nor too bad, because others would then enter. Thus there tends to be a negative correlation between public-spiritedness and honesty among candidates, even when those characteristics are uncorrelated in the population. Equilibria may be either symmetric (with candidates of identical or similar quality) or asymmetric (with candidates of sharply different quality), but in some cases all equilibria with a given number of candidates are asymmetric. The asymmetry is a direct consequence of the U-shaped entry incentives noted in the previous paragraph. Thus, the model generates endogenous *volatility* in the quality of governance.

We investigate the effects of changes in two public policy instruments: the governor's compensation and the level of anti-corruption enforcement. The effects of these policies on the costs and benefits of holding office depend on a candidate's character; hence, beyond any incentive effects once in office, the policies alter the composition of the self-selected candidate pool. As the set of equilibria for a given number of candidates tends to be large (when it is non-empty), we focus on the comparative statics for the best and worst equilibria. For equilibria with a given number of candidates, the expected quality of governance in the best equilibria rises with the level of the governor's compensation, but does not improve, and may even decline, with the level of anti-corruption enforcement. Subject to some qualifications, the quality of governance in the worst equilibria typically improves when the governor's compensation rises, but declines when anti-corruption enforcement becomes more vigorous.

Thus, if one ignores possible changes in the number of candidates, higher compensation tends to promote good governance, while anti-corruption enforcement is surprisingly counterproductive (and at best ineffective). The latter result holds even though enforcement reduces the degree to which any given governor would make concessions to special interests; it turns out that perverse selection effects overwhelm the beneficial pure incentive effects.

Compensation and anti-corruption policies may also affect the existence of equilibria for any given number of candidates, thereby forcing that number to change. With respect to the quality of governance, selection effects flowing through the number of candidates tend to work in the opposite direction from the effects discussed in the previous paragraph. Thus, the overall effects of the governor's compensation and anti-corruption enforcement on the quality of governance are surprisingly complex.

Fortunately, it is possible to evaluate the overall effects of the policy interventions — flowing through changes in the number of candidates, the composition of the candidate pool for a given number of candidates, and the behavior of a given candidate once in office — when the costs of running for office are vanishingly small (a common assumption in the "citizen-candidate" literature). Multiple-candidate equilibria converge to an essentially unique limiting equilibrium, which we characterize. The equilibrium is typically asymmetric, with a candidate pool consisting of citizens with the greatest incentives to run for office: those who are maximally dishonest, and (due to the U-shaped entry incentives noted above) either maximally or minimally public-spirited. In other words, with small costs of running for office, *only highly asymmetric equilibria survive*. Thus, the model has the strong implication that there is no variability in the predictable (dis)honesty of politicians, but substantial variability in the quality of governance through volatility in the public-spiritedness of the electoral victor.

For the limiting multiple-candidate equilibrium, we show that an increase in anti-corruption enforcement unambiguously improves the quality of governance. While this finding is consistent with simple intuition, the mechanism is surprising: for a wide range of parameter values, anti-corruption enforcement is on balance beneficial only because it reduces the number of candidates in equilibrium, thereby *indirectly* improving selection. In contrast, an increase in the governor's compensation has *no overall effect*, either beneficial or adverse; salary is surprisingly irrelevant.

We study the effects of incumbency and term limits by extending the model to a multi-period setting. Assuming character is at least partially revealed during a governor's first term, reelection opportunities can raise the quality of governance through two channels. The first is mechanical: the electorate gains the opportunity to reelect desirable incumbents. The second operates through selection effects: the benefits of running for office in the first place rise for high-quality candidates (for whom the odds of re-election are high) relative to low-quality candidates (for whom the odds are low). We show that a two-term limit unambiguously improves the quality of governance in *non*-incumbent elections compared to a one-term limit, due to self-selection effects arising from the possibility of re-election. In such settings, re-election patterns can corroborate the adage that voters prefer a known crook to an unknown crook. We also show that a two-term limit can have *adverse* self-selection effects compared to a one-term limit if experience in office sufficiently enhances the ability to extract rents from special interests.

As noted above, we are not the first to study self-selection with respect to any aspect of candidate character (as opposed to competence). Caselli and Morelli (2001) (the working paper version of Caselli and Morelli (2004)) and Besley (2004) consider models in which candidates self-select based on a characteristic which one can interpret as honesty.[3] Neither studies selection with respect to public-spiritedness, which is central to our analysis. Both show that higher compensation improves the quality of the candidate pool, but neither explicitly models special-interest influence activities or studies anti-corruption enforcement. Their analyses of self-selection with respect to honesty also involve very different mechanisms than the one examined here,[4] and these differences account for our contrasting conclusions concerning the effects of compensation.[5]

In studying the effects of special-interest influence activities on candidate self-selection, our work is also related to Dal Bó et al. (2006) and Besley and Coate (2001). However, Dal Bó et al. (2006) focus on candidates' ability rather than character, while Besley and Coate (2001) analyze candidates' policy preferences. Moreover, Dal Bó et al. (2006) are primarily

[3] In Caselli and Morelli (2001), candidates differ in a binary propensity to extract rents from a randomly encountered citizen; in Besley (2004), they are either "congruent" or "dissonant" with the electorate.

[4] Caselli and Morelli assume that a candidate's honesty is observable; dishonest candidates successfully run for office when the supply of honest candidates is insufficient to fill all available positions. Because the quality of governance is assumed to reflect the combined decisions of a continuum of office holders, honest candidates are not motivated by the desire to displace dishonest office holders, as they are in our model. Besley's assumptions concerning candidates' payoffs likewise remove any incentive to displace dissonant office holders. Furthermore, he assumes that the costs of running for office are zero, rather than vanishingly small. As a result, the pool of candidates does not consist of the citizens with the greatest incentives to run for office, as it does in our model.

[5] For example, in Besley's model, if the costs of running for office were vanishingly small rather than zero, all candidates would be dissonants with poor private-sector prospects, and as in our framework, compensation would have no impact on the quality of candidate pool.

concerned with the interest groups' choice between violence and bribes (see also Dal Bó and Di Tella (2003)).

Finally, our analysis of incumbency is related to Smart and Sturm (2006), who study the impact of term limits in a setting where politicians can signal public spiritedness through their actions in office. In their setting, 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 an incumbent's type. We abstract from that mechanism in order to highlight self-selection effects, which are absent in Smart and Sturm (2006).

The next section lays out the basic model. After some preliminary analysis (Section 3), we study outcomes of the one-period and multi-period games in Sections 4 and 5, respectively. Section 6 concludes. All proofs appear in the Appendix, and a supplementary Appendix available at the authors' webpages contains additional material.

2 The 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, a, measures the degree to which a citizen cares about the well-being of other citizens. The honesty parameter, h, will come into play only if a citizen holds office; it determines the size of a utility penalty the individual suffers if he accepts payments from special interests. The magnitude of h could reflect susceptibility to pangs of conscience, aversion to social stigma or penalties, or skill at evading detection. We will refer to the pair (a, h) as a citizen's *character*.

Citizens who choose to run for office incur a personal campaign cost, $k > 0$. As in other citizen-candidate analyses, we sometimes consider cases in which k is vanishingly small. The purpose of considering k small rather than zero is to assure that the expected number of candidates is finite and the probability of winning for any candidate is non-zero.

Governance One citizen eventually becomes governor (as detailed below). The governor receives compensation s, which includes a salary and any ego benefits/costs from holding office. He exerts effort $e \geq 0$ to produce $f(e) \geq 0$ units of the public good at a personal cost $c(e)$, where both $f(\cdot)$ and $c(\cdot)$ are twice-differentiable functions.[6] Effort has positive but declining marginal returns ($f' > 0 > f''$), as well as positive and increasing marginal costs ($c' > 0$ and $c'' > 0$). We also assume $f(0) = c(0) = 0$ and $f'(0) > c'(0)$, so that the governor undertakes some effort regardless of his character. The governor must also decide whether to undertake a special-interest project ($n = 1$ denotes yes, $n = 0$ denotes no), which provides highly concentrated benefits to a special interest group (as described next). If implemented, the project is funded by a per-capita lump-sum tax, $q > 0$, levied on all citizens (including the governor).

Special Interests There is one special interest group or lobby, denoted L, which receives a payoff $v \geq 0$ if $n = 1$, and $v = 0$ if $n = 0$. Afer the governor is elected, v is drawn from a cumulative distribution $\Phi(v)$ with support $[0, \overline{v}]$ and density $\phi(v) > 0$ for $v \in [0, \overline{v}]$. L can attempt to influence the governor by promising him a payment, $t \geq 0$, contingent on $n = 1$. The governor can either accept the payment and choose $n = 1$, or refuse it and choose $n = 0$. Accepting a payment triggers a utility penalty on the governor of $g(h, \sigma) \geq 0$. The penalty depends upon the governor's honesty, h, as well as a policy variable, $\sigma \in [0, \overline{\sigma}]$, which indicates the level of anti-corruption enforcement.[7] We assume g is twice continuously differentiable with $g_h > 0$ and $g_\sigma > 0$, where subscripts denote partial derivatives. Thus, higher levels of honesty and anti-corruption enforcement imply higher personal costs of selling out to special interests.

For simplicity, we assume that prior to offering its contingent payment, L learns not only the stakes (v) but also the governor's true character (a and h), perhaps from their interaction after the governor takes office. We also assume that the contingent tranfer, t, is determined by generalized Nash bargaining between the governor and L: specifically, the governor extracts the fraction $\alpha > 0$ of any surplus from the project.[8]

[6] For simplicity, the governor's effort is the only input for producing public goods.

[7] One can think of $\frac{\partial g}{\partial \sigma}$ as reflecting the impact of anti-corruption enforcement on the likelihood of detection and penalization.

[8] Other models of lobbying yield similar results. In an earlier draft, we assumed that two lobby groups would compete via a menu auction (Bernheim and Whinston, 1986) to implement conflicting special-interest projects.

Net Payoffs Let $\overline{r}$ denote the level of private good consumption for the typical non-candidate citizen. Preferences over the elements x, r_i, and $\overline{r}$ are given by

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

Thus, each individual values her personal well-being and the well-being of the average citizen, where the latter is weighted by her public spiritedness, a.[9] If i is a non-candidate citizen, then $r_i = \overline{r} = -nq$,[10] so

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

whereas if i is a losing candidate, $r_i = -nq - k$ and $\overline{r} = -nq$, so

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

We will use the index G to denote the governor. If G does not accept payments from L (so that $n = 0$), his payoff takes the same form as that of a losing candidate, except that he receives compensation, s, and incurs the disutility of effort, $c(e)$, to produce the public good. If G accepts a payment $t \geq 0$ from L (so that $n = 1$), he also receives t and incurs a utility penalty $g(h^G, \sigma)$. Thus

$$U_G(x, r_G, \overline{r}, e) = (1 + a)(x - nq) - k + s - c(e) + n\left(t - g(h^G, \sigma)\right). \tag{2}$$

Throughout, we will make the following assumption:

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

Candidates of the four extreme types will play significant roles in our analysis: 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 (*Sell-Outs*); and those with minimal public spirit and maximal honesty (*Principled Egoists*).

[9] Even though citizens are altruistic, the payoffs of candidates and the governor do not show up in a typical citizen's utility function, because those individuals are of measure zero. Likewise, we do not include the special interest group's payoff in any citizen's utility, because the interest group is assumed to have constituents of measure zero (and the governor himself is not a constituent).

[10] Recall that we normalized private good endowment to 0 and the project is funded by a per-capita tax of q.

Elections We assume that only *political insiders* have the opportunity to run for office.[11] The distribution of insiders' characteristics is representative of the population and has full support on the character space, $[0,1] \times [0,1]$. The mass of insiders is negligable, so the election is determined by *political outsiders*, who share the objective of maximizing $x + \overline{r}$. For simplicity, we assume that political insiders know each others' characters (implicitly through past dealings and reputation), but no outsider knows the character of any yet-to-be-elected insider. We also abstract from some of the strategic issues that can arise in voting games, and instead make the following reasonable "black box" assumption:

Assumption 2. *Every non-incumbent candidate for office wins the election with equal probability.*[12]

The logic of this assumption is straightforward: because new candidates are *ex-ante* indistinguishable, each must have the same probability of victory.[13] In the one-period model (without incumbents), this assumption turns the election into a simple lottery, so political outsiders are not strategic players. Moreover, because the insiders know each others' characters, and because the character of the governor is revealed before other decisions are made, the one-period game entails complete information.[14]

Sequence of Events In each election cycle, events unfold as follows:

1. Insiders decide whether to run for office.

2. The governor is elected, and her character is observed by the lobby group and political outsiders. If there are no candidates, no governor is elected and the quality of governance is assumed to be very low (as detailed later).

[11]We assume that no insider is a constituent of the special interest group.

[12]Some care must be taken when the set of candidates is countably infinite, because one cannot define a uniform probability measure on a countably infinite space. What is important for our purposes, however, is the probability with which any insider believes he will win the election if he runs, taking as given the set of other candidates. We assume that this probability is zero when there is an infinite number of other candidates. The actual probability measure governing the winner's selection from the infinite number of candidates is inessential.

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

[14]In multiple-period models, elections involving incumbents turn on voters' beliefs about the character of the incumbent and the challengers. Hence, such models cannot be treated as games of complete information unless one makes additional mechanical assumptions about incumbent elections; see Section 5.

3. The magnitude of lobbying stakes, $v \in [0, \overline{v}]$, is realized, and is observed by the governor and the interest group.

4. The lobby makes an offer to the governor, as determined by generalized Nash bargaining.

5. The governor chooses effort, $e \geq 0$, and a project implementation decision, $n \in \{0, 1\}$ (along with any necessary taxes).

We study the subgame perfect Nash equilibria of this game.

3 The Governor's Choices

In this section, we solve for post-election behavior, including the governor's choices of whether to implement special interest project and how much effort to expend toward producing the public good. For notational simplicity, in this section only we will use h and a without a G superscript to denote the characteristics of the governor.

3.1 Effort Choice

The governor's effort is determined solely by his public spirit, and does not depend on his honesty or the special-interest transfer.[15] The optimal effort level, $e^*(a)$, is given by the first order condition $(1 + a) f'(e^*(a)) = c'(e^*(a))$. Since f is strictly concave and c is strictly convex, $e^*(\cdot)$ is strictly increasing. For every citizen j, let $e^j := e^*(a^j)$ and $x^j := f(e^j)$.

The contribution of the public good to the well-being of the governor is given by

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

By the envelope theorem, $\pi'(a) = f(e^*(a)) > 0$. Furthermore, $\pi''(a) = f'(e^*(a))\frac{de^*(a)}{da} > 0$, i.e. the governor's gain from providing the public good (measured as an equivalent variation in units of the private good) is a *convex function* of the public spirit parameter, a. This convexity property will prove important.

[15] This result follows from the assumed separability of utility. Our analysis only requires that the governor's effort is increasing in his public spirit, which would also be the case under less restrictive assumptions.

3.2 The Lobbying Stage

Ignoring any transfer from the interest group, implementing the special-interest project imposes a cost on the governor of

$$v^*(a, h, \sigma) := (1 + a)q + g(h, \sigma). \tag{3}$$

Nash bargaining implies that the project will be implemented if and only if it generates positive surplus for G and L combined, which requires $v - v^*(a, h, \sigma) > 0$.[16] G receives the fraction α of any positive surplus, so $t = \alpha v + (1 - \alpha)v^*(a, h, \sigma)$.

Because $v^*(a, h, \sigma)$ is increasing in each argument, governors who are more public spirited and more honest are less likely to accept special interest payments, and the frequency with which any governor sells out declines with the level of anti-corruption enforcement. Thus, one might expect anti-corruption enforcement to improve the quality of governance; we will see, however, that matters are more complex.

Throughout, we impose the following assumption:

Assumption 3. $v^*(0, 1, 0) > \overline{v} > v^*(1, 0, \overline{\sigma})$.[17]

According to the first inequality, a maximally honest governor never sells out even if he is minimally public spirited (i.e., a Principled Egoist) and anti-corruption policy is lax. According to the second inequality, even with maximal anti-corruption enforcement, a minimally honest but maximally public spirited governor (i.e., a Sell-Out) always sells out if the stakes are sufficiently high. We note that no governor (including a Scoundrel) will sell out when v is sufficiently small, even under minimal anti-corruption policies.

The preceding discussion readily implies:

Lemma 1. *A governor's expected rents from special interest politics, evaluated prior to the realization of v, is $\mathbb{E}_v \max\{\alpha[v - v^*(a, h, \sigma)], 0\}$. The associated impact on the expected payoff of any other citizen with public spiritedness a' is $-(1 + a')q\,[1 - \Phi\,(v^*(a, h, \sigma))]$.*

In what follows, it will be useful to understand how the governor's expected rents from

[16] We assume the project is not implemented when the surplus is zero; this is innocuous because the distribution of v is absolutely continuous.

[17] Recall that $\overline{v}$ is the upper bound on v. Stated in terms of primitives, the assumption requires $g(1, 0) + q > \overline{v} > g(0, \overline{\sigma}) + 2q$.

lobbying vary with his public spiritedness. Differentiation yields

$$\frac{\partial}{\partial a}\mathbb{E}_v \max\{\alpha[v - v^*(a,h,\sigma)], 0\} = -\alpha q(1 - \Phi(v^*(a,h,\sigma))) \leq 0,$$

and

$$\frac{\partial^2}{\partial a^2}\mathbb{E}_v \max\{\alpha[v - v^*(a,h,\sigma)], 0\} = \alpha q^2 \phi\left(v^*(a,h,\sigma)\right) \geq 0,$$

where both inequalities are strict when $\overline{v} > v^*(a,h,\sigma)$. Thus, a higher level of public spiritedness reduces the expected rents for a governor from special interests. Furthermore, the governor's expected payoff from lobbying, like his benefit from providing the public good, $\pi(a)$, is a *convex function* of public spirit. This convexity property will also prove important.

4 The One-Period Game

In this section, we examine insiders' decisions to run for office when there is just one election with no incumbent. Given the continuation payoffs derived in Section 3, the problem reduces to a simultaneous-move entry game. We focus initially on pure strategy Nash equilibria of this game (assuming they exist). In Section 4.4, we assure existence by extending the analysis to randomized entry decisions.

Let $u^G(a,h \mid \sigma, s)$ be the expected payoff (evaluated prior to the realization of lobbying stakes, v) for a governor of type (a,h) ignoring entry cost k, and let $u(a,h \mid a', \sigma)$ be the expected payoff for a non-candidate of type a' when the governor's type is (a,h). From Section 3, we have

$$\begin{aligned} u^G(a,h \mid \sigma, s) &= \pi(a) + \mathbb{E}_v \max\{\alpha[v - v^*(a,h,\sigma)], 0\} + s \\ u(a,h \mid a', \sigma) &= (1 + a')\, Y(a,h|\sigma), \end{aligned}$$

where

$$Y(a,h|\sigma) := f\left(e^*(a)\right) - q\left(1 - \Phi\left(v^*(a,h,\sigma)\right)\right).$$

We will refer to $Y(a,h|\sigma)$ as the *quality of governance* when the governor's characteristics are (a,h), and to $y^i(\sigma) := Y(a^i, h^i|\sigma)$ as the *quality of candidate* i. Note that quality depends on the levels of the public good and expected taxes. Anti-corruption enforcement,

σ, has a direct effect on a candidate's quality (except when h is sufficiently high), but compensation, s, does not. Quality is bounded above by that of a Saint, $y^{\max} := f(e^*(1))$, and below by that of a Scoundrel, $y^{\min}(\sigma) := Y(0, 0|\sigma)$.

In the (a, h)-plane, constant quality curves (defined by the equation $Y(a, h \mid \sigma) = C$ for some constant C) are generally downward sloping, because an increase in public spiritedness is required to offset a decrease in honesty.[18] An increase in σ (weakly) improves the quality of any given candidate, thereby inducing a leftward shift in every such curve.

We now turn to the incentive constraints that govern equilibrium. Denote the set of candidates as $\mathcal{N}$ and let $N := |\mathcal{N}|$. As we restrict attention for the moment to pure entry strategies, $\mathcal{N}$ completely describes an equilibrium and N is necessarily finite. The following two conditions are necessary and sufficient for $\mathcal{N}$ to constitute an equilibrium:

$$\forall i \in \mathcal{N}: \quad \frac{1}{N}\left[u^G\left(a^i, h^i \mid \sigma, s\right) - \mathbb{E}_{j\in\mathcal{N}\setminus i}u\left(a^j, h^j \mid a^i, \sigma\right)\right] \geq k, \tag{4}$$

$$\forall i \notin \mathcal{N}: \quad \frac{1}{N+1}\left[u^G\left(a^i, h^i \mid \sigma, s\right) - \mathbb{E}_{j\in\mathcal{N}}u\left(a^j, h^j \mid a^i, \sigma\right)\right] \leq k. \tag{5}$$

Inequality (4) requires that candidates prefer to enter the campaign rather than stay out,[19] whereas inequality (5) requires that non-candidates prefer to stay out rather than enter.

In an equilibrium with a set of candidates $\mathcal{N}$, the average quality of the candidates is $y^{\mathcal{N}}(\sigma) := \frac{1}{N}\sum_{j\in\mathcal{N}} y^j(\sigma)$. In the following sections, we will study the effects of the policy variables s and σ on the expected quality of governance, primarily by determining their effects on the highest and lowest expected quality achievable in any N-candidate equilibrium, denoted $\overline{y}_N(\sigma, s)$ and $\underline{y}_N(\sigma, s)$, respectively. Note that while σ can have both *incentive and selection effects* — it can affect the post-election behavior of the governor and also affect the composition of the candidate pool — s can matter only through selection effects.

To characterize equilibria, we need to know which types of non-candidate insiders have the greatest incentive to run for office when the quality of governance is y. The expression $u^G(a, h \mid \sigma, s) - (1 + a)y$ captures the magnitude of that incentive.[20] It is straightforward

[18] The "generally" caveat excludes cases where honesty is already so high that the candidate never sells out to the interest group.

[19] If $\mathcal{N}$ is a singleton, then the left hand side of (4) is not well defined. We assume that this entry incentive constraint is always satisfied when $N = 1$ because the consequences of having no governor are sufficiently dire.

[20] For this purpose, we can ignore the probability of winning as well as the cost of running because those factors affect all potential candidates equally. An individual of type (a, h) has a strict incentive to enter if

that the governor's personal benefit from lobbying is weakly decreasing in h. Also, as shown in Sections 3.1 and 3.2, $\pi(a)$ and $\mathbb{E}_v \max\{\alpha[v - v^*(a,h,\sigma)], 0\}$ are both convex in a. Consequently, either Scoundrels or Sell-Outs (or both) have strictly greater incentives to run than all other insiders. Between Scoundrels and Sell-Outs, the type with the greatest incentive depends on y and σ, which differentially affect their gains from holding office. Low (resp. high) y provides relatively greater (resp. lesser) incentives for Sell-Outs due to their greater public spirit.

Formally, defining

$$\begin{aligned}\overline{y}(\sigma) &:= u^G(1,0|\sigma,s) - u^G(0,0|\sigma,s) \\ &= \pi(1) - \pi(0) + \alpha\left(\mathbb{E}_v \max\{v - v^*(1,0,\sigma),0\} - \mathbb{E}_v \max\{v - v^*(0,0,\sigma),0\}\right), \quad (6)\end{aligned}$$

we have:

Lemma 2. *Given any set $\mathcal{N}$ of candidates, the set of non-candidate insider types with the greatest incentive to enter (i.e. that maximize $u^G(a,h \mid \sigma,s) - (1+a)y^{\mathcal{N}}$) consists of Sell-Outs alone if and only if $y^{\mathcal{N}} < \overline{y}(\sigma)$, Scoundrels alone if and only if $y^{\mathcal{N}} > \overline{y}(\sigma)$, and both Sell-Outs and Scoundrels if and only if $y^{\mathcal{N}} = \overline{y}(\sigma)$.*

It follows that (5) is satisfied for all (a^i, h^i) if and only if it is satisfied for Scoundrels ($a^i = h^i = 0$) and Sell-Outs ($a^i = 1$, $h^i = 0$). Accordingly, we can rewrite (5) as follows:

$$y^{\mathcal{N}} \geq y^{\ell}_N(\sigma,s) := \max\left\{\frac{u^G(1,0 \mid \sigma,s) - (N+1)k}{2}, u^G(0,0 \mid \sigma,s) - (N+1)k\right\}, \quad (7)$$

Thus, $y^{\ell}_N(\sigma,s)$ provides a lower bound on average quality in an equilibrium with N candidates.

4.1 Single Candidate Equilibria

We first consider equilibria in which only a single candidate, i, runs for office. In that case, (4) is automatically satisfied (recall fn. 19), while (7) becomes

$$y^i \geq y^{\ell}_1(\sigma,s) = \max\left\{\frac{u^G(1,0 \mid \sigma,s) - 2k}{2}, u^G(0,0 \mid \sigma,s) - 2k\right\}. \quad (8)$$

and only if $u^G(a,h \mid \sigma,s) - (1+a)y > (N+1)k$.

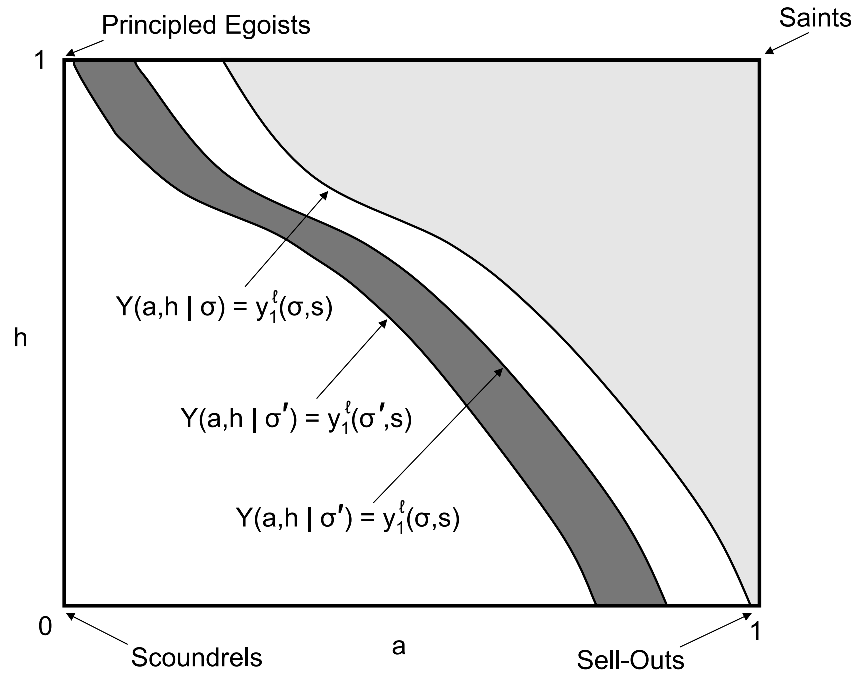

Figure 1: Single-Candidate Equilibria, and the Effect of Anti-Corruption Enforcement

Thus, provided $y^{\max} \geq y_1^\ell(\sigma, s)$, for every insider i with $y^i \in \left[\min\left\{y_1^\ell(\sigma, s), y^{\min}(\sigma)\right\}, y^{\max}\right]$ there is an equilibrium in which i runs unopposed. In this case, $\underline{y}_1(\sigma, s) = \min\left\{y_1^\ell(\sigma, s), y^{\min}(\sigma)\right\}$ and $\overline{y}_1(\sigma, s) = y^{\max}$. As shown in Figure 1, when $y_1^\ell(\sigma, s) > y^{\min}(\sigma)$, the set of potential unopposed candidates corresponds to all insiders with characteristics in the lightly-shaded area above the constant quality curve $Y(a, h \mid \sigma) = y_1^\ell(\sigma, s)$.

Turning to policy analysis, neither s nor σ affects the quality of the best possible candidate, because $\overline{y}_1(\sigma, s) = y^{\max}$ so long as single-candidate equilibria exist. We therefore focus on the quality of the worst possible candidate, $\underline{y}_1(\sigma, s)$.

Consider the effect of varying compensation, s. Trivially, $u^G(1, 0 \mid \sigma, s)$ and $u^G(0, 0 \mid \sigma, s)$ are strictly increasing in s; therefore, so is $y_1^\ell(\sigma, s)$. It follows that an increase in s strictly improves the quality of the worst possible candidate, $\underline{y}_1(\sigma, s)$, when $y_1^\ell(\sigma, s) \geq y^{\min}(\sigma)$; otherwise, it has no effect (because $y^{\min}(\sigma)$ is independent of s). In Figure 1, an increase in s shifts the constant quality curve that bounds the set of potential unopposed candidates to the north-east. Intuitively, when the rewards to office-holding are greater, each insider has more incentive to enter against a candidate of any given quality, so the lower bound on the quality of any unopposed candidate must rise. However, setting s too high would eliminate single-candidate equilibria.

Next consider the effect of varying anti-corruption enforcement, σ. It is easy to check that $u^G(1, 0 \mid \sigma, s)$ and $u^G(0, 0 \mid \sigma, s)$ are strictly decreasing in σ; therefore, so is $y_1^\ell(\sigma, s)$. It follows that if $y_1^\ell(\sigma, s) > y^{\min}(\sigma)$, so that very low quality candidates cannot run unopposed, an increase in anti-corruption enforcement reduces $\underline{y}_1(\sigma, s)$, worsening the least attractive equilibrium. This result is somewhat counterintuitive: after all, the policy has a positive incentive effect of reducing the frequency with which any elected citizen would sell out. However, there is a detrimental selection effect: because the policy reduces the rents to holding office, each insider has less incentive to enter against a candidate of a given quality y; thus, single candidates of lower quality go unchallenged.

Figure 1 illustrates these effects. The curve labeled $Y(a, h \mid \sigma) = y_1^\ell(\sigma, s)$ identifies the lowest quality candidates who can run unopposed with policy (σ, s). When σ increases to σ', the incentive effect causes the quality of any given candidate to rise, hence the constant quality curve for the original level of candidate quality shifts left to $Y(a, h \mid \sigma') = y_1^\ell(\sigma, s)$. However, there is also a selection effect: in the figure, the boundary that defines the set of potential unopposed candidates shifts leftward from $Y(a, h \mid \sigma) = y_1^\ell(\sigma, s)$ to $Y(a, h \mid \sigma') = y_1^\ell(\sigma', s) < y_1^\ell(\sigma, s)$. The quality of governance in an equilibrium under policy σ' with a single candidate whose characteristics lie in the darkly-shaded area is lower than for *any* single-candidate equilibrium with enforcement level $\sigma < \sigma'$.

If, contrary to what we assumed in the last two paragraphs, $y_1^\ell(\sigma, s) < y^{\min}(\sigma)$, then any candidate can run unopposed. An increase in anti-corruption enforcement is then potentially beneficial because there are no selection effect, and it raises $\underline{y}_1(\sigma, s) = y^{\min}(\sigma)$.

Note finally that sufficiently lax anti-corruption enforcement (like sufficiently high compensation) may eliminate all single candidate equilibria. We return to this point shortly.

4.2 Multiple Candidate Equilibria

Next we consider equilibria with more than one candidate. The analysis of the incentive constraint for non-candidate insiders, expression (7), is very similar to the case of single candidate equilibria. Turning to the incentive constraint for candidates, we can rewrite (4) as

$$u^G(a, h \mid \sigma, s) - (1 + a)y \geq Nk, \tag{9}$$

where y is the average quality of the other $(N - 1)$ candidates. Since $u^G(a, h \mid \sigma, s)$ is decreasing in h, if (9) is satisfied for some (a, h), it is also satisfied for (a, h') with $h' < h$.

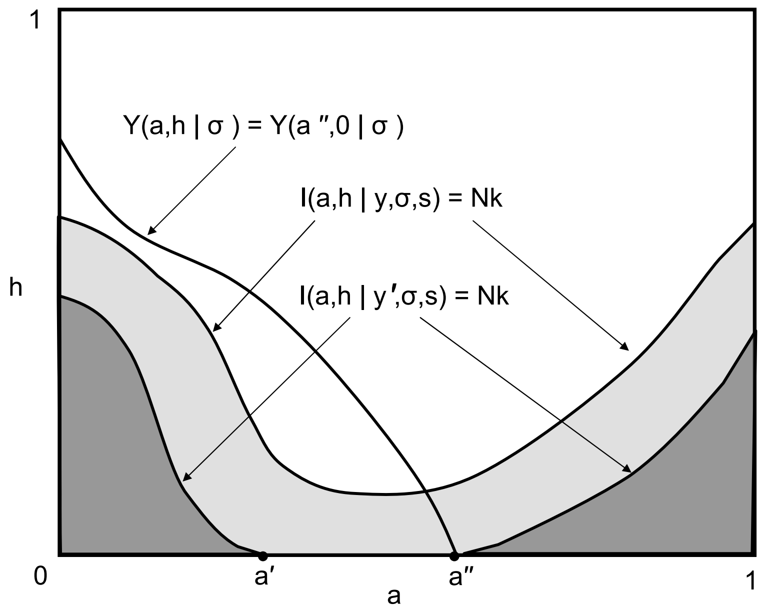

Figure 2: Willing Candidates

Thus, defining $I(a, h \mid y, \sigma, s) := u^G(a, h \mid \sigma, s) - (1 + a)y$, the equation $I(a, h \mid y, \sigma, s) = Nk$ defines the boundary between candidates who are willing and not willing to run for office, given $N - 1$ opponents of average quality y.

Next we determine the shape of the aforementioned boundary. Applying the implicit function theorem to calculate $\frac{dh}{da}$ along the boundary for a point on its interior yields

$$\left.\frac{dh}{da}\right|_{I(a,h|y,\sigma,s)=Nk} = \frac{f(e^*(a)) - q(1 - \Phi\left[v^*(a, h, \sigma)\right]) - y}{g_h(h, \sigma)(1 - \Phi\left[v^*(a, h, \sigma)\right])}. \tag{10}$$

Since $g_h(h, \sigma) > 0$, the sign of (10) is the same as that of the numerator. As the numerator is increasing in both a and h, it follows that if the boundary is upward sloping in a at (a, h), it is upward sloping at all points $(a', h') \geq (a, h)$.[21] Thus, for any given y, the willing-candidate boundary in (a, h)-space is single-troughed. Figure 2 depicts the boundary defined by $I(a, h \mid y, \sigma, s) = Nk$, along with the set of willing candidates (lightly shaded).

To identify equilibria, we translate the problem into quality space by defining a correspondence Ψ that maps the average quality of $N - 1$ opponents into the quality levels of all

[21]Here, $\geq$ is in the usual component-wise vector order.

candidates who are willing to run:

$$\Psi_N(y \mid \sigma, s) = \{y' \mid \exists(a,h) \in [0,1]^2 \text{ with } Y(a,h \mid \sigma) = y' \text{ and } I(a,h \mid y, \sigma, s) \geq Nk\}.$$

It is immediate from (9) that if $y_1 > y_2$, then $\Psi_N(y_1 \mid \sigma, s) \subseteq \Psi_N(y_2 \mid \sigma, s)$ (i.e., if the quality of opponents improves, the set of willing candidates shrinks). It follows that $\max \Psi_N(y \mid \sigma, s)$ is weakly decreasing in y.

If the set of willing candidates given $N-1$ opponents of average quality y, $\{a, h \in [0,1]^2 \mid I(a,h \mid y, \sigma, s) \geq Nk\}$, is path-connected (as it is in Figure 3), then $\Psi_N(y \mid \sigma, s)$ is a convex set.[22] However, the set of willing candidates need not be path-connected for all levels of opponents' quality. An inspection of (9) reveals that when opponents' quality increases, the willing-candidate boundary shifts downward, and more so at higher values of a (i.e., for individuals who attach greater weight to quality). Consequently, for $y' > y$, the willing-candidate boundary can intersect the a-axis twice (as does the boundary defined by $I(a,h \mid y', \sigma, s) = Nk$ in Figure 2), in which case the set of willing candidates (dark shading in Figure 2) is not path-connected, and $\Psi_N(y' \mid \sigma, s)$ may not be convex.[23]

Figure 3 illustrates quality-of-willing-candidate correspondences with two candidates, $\Psi_2(y \mid \sigma, s)$ (for candidate 1, $\Psi_2(y_2 \mid \sigma, s)$ is bounded by the dashed curve, and for candidate 2, $\Psi_2(y_1 \mid \sigma, s)$ is bounded by the solid curve, where y_k denotes the quality of candidate k). We have drawn it as convex-valued for low values of y, but not for moderate values, reflecting the possibilities shown in Figure 2. We have also drawn it as empty for high values of y to illustrate the possibility that there may be no willing candidates in such cases.

Figure 3 also illustrates how to identify two-candidate equilibria. Plainly, both candidates must be willing to run against each other, a property that is only satisfied by points in the light- or dark-shaded areas. The figure also shows the non-candidate incentive constraint, expression (7), which simply requires $\frac{y_1+y_2}{2} \geq y_2^{\ell}(\sigma, s)$. Thus the set of equilibrium quality pairs corresponds to the set of points in the dark-shaded area of the figure.

Two features of Figure 3 merit notice. First, the incentive constraints for candidates bound average quality from above, while the incentive constraints for non-candidates bound

[22] This statement follows from the continuity of $Y(\cdot, \cdot|\sigma)$.

[23] We say "may not be" because $\Psi_N(y' \mid \sigma, s)$ could be convex even if the set of willing candidates is not path-connected. The necessary and sufficient condition for non-convexity of $\Psi_N(y' \mid \sigma, s)$ is that there are two solutions to $I(a, 0 \mid y', \sigma, s) = Nk$, a' and $a'' > a'$, such that the constant quality curve passing through $(a'', 0)$ does not touch the willing-candidate boundary elsewhere, as shown in Figure 4.

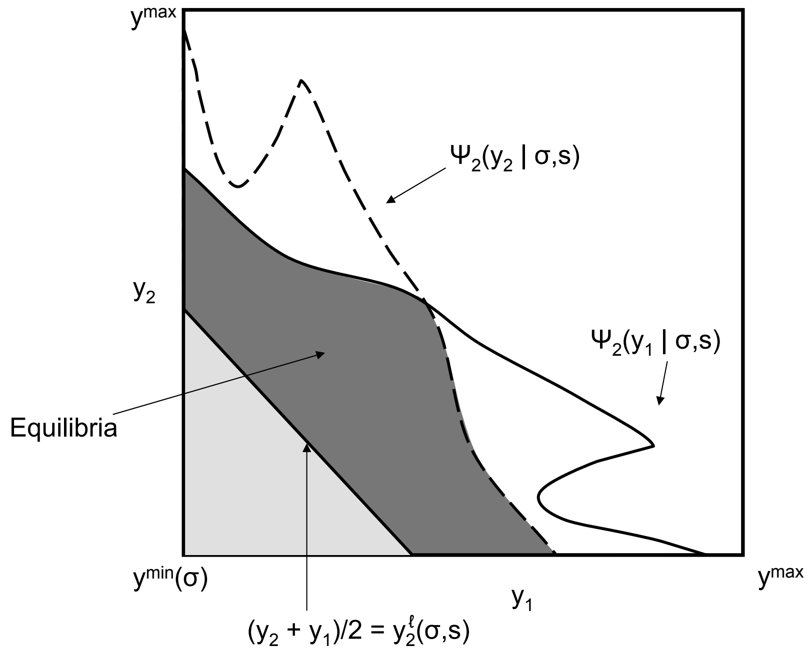

Figure 3: The Willing-Quantity Correspondence and Two-Candidate Equilibria

average quality from below. Thus, in a multi-candidate equilibrium, the candidate pool tends to be of intermediate quality: neither too good (or opponents would drop out) nor too bad (or others would enter). Second, because the upper and lower boundaries on the set of equilibrium quality pairs slope downward, there will tend to be negative correlation between public-spiritedness and honesty among candidates, even if those characteristics are unrelated in the population from which candidates are drawn.

In Figure 3, there are both symmetric and asymmetric equilibria. Figure 4 illustrates a case in which *all* equilibria are asymmetric. In drawing the figure, we have assumed that due to relatively unfavorable entry conditions, there are values of a for which $I(a, 0 \mid y^{\min}(\sigma), \sigma, s) < Nk$, which accounts for the non-convexity of $\Psi_N(y^{\min}(\sigma) \mid \sigma, s)$. Only quality pairs in the darkly-shaded regions are sustainable as equilibria: points in the lightly-shaded region satisfy the candidate incentive constraints, but not the non-candidate incentive constraint.[24] In such cases, equilibria give rise to substantial random variation in the quality

[24]Figure 4 therefore illustrates the possibility that the candidate incentive constraint, rather than the non-candidate incentive constraint, may determine the lower bound on the expected quality of governance. For instance, consider the point A in the figure: since it is above the line $\frac{y_1+y_2}{2} = y_2^l(\sigma, s)$, the non-candidate incentive constraints are satisfied; yet it has a lower expected quality of governance than any of the equilibria. It is not an equilibrium because candidate 2's incentive constraint is not satisfied.

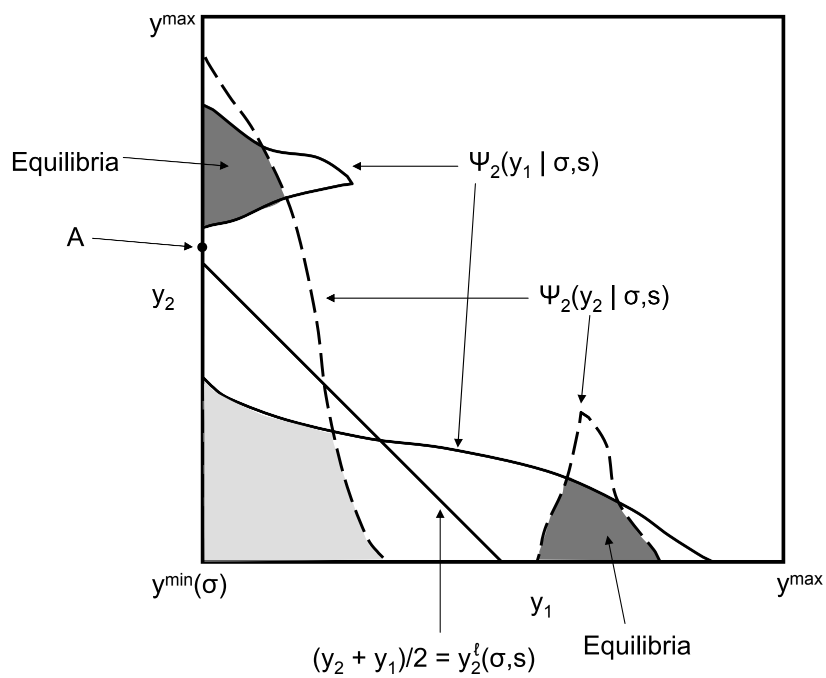

Figure 4: An Example with Only Asymmetric Two-Candidate Equilibria

of governance from election to election. This is not merely a technical curiosity; in Section 4.4, we will see that only analogs of these asymmetric equilibria survive as the costs of running for office become small.

Next we examine the effects of the policy variables s and σ. Analysis of the best equilibria is straightforward because only the candidate incentive constraint (7) can bind. Analysis of the worst equilibria is complex because there are three distinct possibilities: the non-candidate incentive constraint (7) binds, in which case $\underline{y}_N(\sigma, s) = y_N^{\ell}(\sigma, s)$ (as in Figure 3); the candidate incentive constraint (4) binds (as in Figure 4); or neither constraint binds, in which case $\underline{y}_N(\sigma, s) = y^{\min}(\sigma)$. Our key conclusions are summarized as follows:

Theorem 1. *Suppose N-candidate equilibria exist for policies (σ, s), (σ', s), and (σ, s'), where $\sigma < \sigma'$ and $s < s'$ (so that a change from (σ, s) to (σ', s) entails an increase in anti-corruption enforcement, and a change from (σ, s) to (σ, s') entails an increase in the governor's compensation). Then:*

(i) The best N-candidate equilibrium is no better with higher anti-corruption enforcement ($\overline{y}_N(\sigma, s) \geq \overline{y}_N(\sigma', s)$), and is better with higher compensation ($\overline{y}_N(\sigma, s) \leq \overline{y}_N(\sigma, s')$, with strict inequality when $\overline{y}_N(\sigma, s) < y^{\max}$).

(ii) The worst N-candidate equilibrium is:

(ii-a) worse with higher anti-corruption enforcement ($\underline{y}_N(\sigma, s) > \underline{y}_N(\sigma', s)$), and better with higher compensation ($\underline{y}_N(\sigma, s) < \underline{y}_N(\sigma, s')$) if the only binding constraints at the worst equilibria are the non-candidate incentive constraints (7);[25]

(ii-b) better with higher anti-corruption enforcement ($\underline{y}_N(\sigma, s) < \underline{y}_N(\sigma', s)$) and unchanged with higher compensation ($\underline{y}_N(\sigma, s) = \underline{y}_N(\sigma, s')$) if the only binding constraints at the worst equililbria are the minimal quality levels (that of Scoundrels);

(ii-c) no worse with higher anti-corruption enforcement ($\underline{y}_N(\sigma, s) \leq \underline{y}_N(\sigma', s)$) and worse with higher compensation ($\underline{y}_N(\sigma, s) \geq \underline{y}_N(\sigma, s')$, with strict inequality when $\underline{y}_N(\sigma, s) > y^{\min}(\sigma)$) if the only binding constraints at the worst equilibria are the candidate incentive constraints (4), and the changes ($\sigma' - \sigma$ and $s' - s$) are sufficiently small.

Notice that the direction of the effect on the worst equilibria depends on which constraint binds. Focusing on the "typical" case in which the non-candidate incentive constraint binds at the worst equilibria (as in Figure 3), we see that both the best and worst N-candidate equilibria (weakly) worsen with greater anti-corruption enforcement. In contrast, both (weakly) improve with an increase in the governor's compensation. For the other two cases — when either the overall lower bound on quality or the candidate incentive constraint binds at the worst equilibria — the direction of the effects on the worst equilibria reverse (with one exception, where there is no effect). The remainder of this section explains these results.

With respect to the worst equilibria, cases (ii-a) and (ii-b) also arose with single-candidate equilibria, and the results here hold for precisely the same reasons. That leaves part (i) and case (ii-c), both of which are governed by the candidate incentive constraint. Consider first the effects of the governor's compensation, s. Condition (9) implies that that if $s' > s''$, then $\Psi_N(y \mid \sigma, s'') \subseteq \Psi_N(y \mid \sigma, s')$, i.e., the set of willing-candidate quality levels expands with s. Clearly, an expansion of $\Psi_2(y_1 \mid \sigma, s)$ and $\Psi_2(y_2 \mid \sigma, s)$ in Figures 3 or 4 would increase the expected quality of governance in the best equilibrium and (weakly) reduce it in the worst. Next consider anticorruption enforcement, σ. As argued in the next paragraph, if $\sigma' > \sigma''$, then $\Psi_N(y \mid \sigma', s) \subseteq \Psi_N(y \mid \sigma'', s)$, i.e., the set of willing-candidate quality levels contracts with σ. Consequently, the effects of σ are opposite those of s.[26]

[25] To be clear, this statement requires that, both before and after the policy change, the only binding constraints at the worst equilibria are the non-candidate incentive constraints. If the requirement is satisfied for the initial policy, it is always satisfied for the final policy as well if the change is small. A similar clarifying remark applies to parts (ii-b) and (ii-c).

[26] If the set of equilibrium expected quality levels is non-convex, changes in $\underline{y}_N(\sigma, s)$ and $\overline{y}_N(\sigma, s)$ do not

To understand why $\Psi_N(y \mid \sigma', s) \subseteq \Psi_N(y \mid \sigma'', s)$ for $\sigma' > \sigma''$, suppose a candidate with character (a, h') is willing to run against $N-1$ opponents of average quality y when the enforcement level is σ'. Then there is some $h'' > h'$ such that an (a, h'')-candidate's disutility from selling out under policy σ'' is the same as the (a, h')-candidate's disutility from selling out under policy σ' (i.e., $g(h'', \sigma'') = g(h', \sigma')$). Because quality depends on h and σ only through g, the (a, h'')-candidate's quality under policy σ'' is the same as the (a, h')-candidate's quality under policy σ'. Finally, because a candidate's incentive to enter, $I(a, h \mid y, \sigma, s)$, also depends on h and σ only through g, the fact that the (a, h')-candidate's incentive exceeds Nk under policy σ' implies that the (a, h'')-candidate's incentive exceeds Nk under policy σ''.

4.3 Effects on the Number of Candidates

So far, we have focused on policy effects holding fixed the number of candidates, N. Unless a policy change affects the existence of equilibria for some N, the previous section's characterizations of comparative statics for the overall best and worst equilibria continue to apply. However, a policy change may force a change in the number of candidates by altering the set of N for which equilibria exist.

It is easy to check that if $N' > N$, then $y^{\ell}_N(\sigma, s) > y^{\ell}_{N'}(\sigma, s)$ (from the definition in (7)) and $\Psi_{N'}(y \mid \sigma, s) \subseteq \Psi_N(y \mid \sigma, s)$ (since the only change is a lower probability of winning). Also, N does not affect the quality of any given candidate. Thus, the effects of N and s are similar, except that the directions are reversed.[27] Subject to the qualifications noted in our discussion of Theorem 1, an increase in N therefore tends to reduce both the highest and lowest quality achievable in equilibrium (assuming the non-candidate incentive constraint binds).

Intuitively, increases in s make entry more attractive, potentially eliminating equilibria with smaller numbers of candidates, and introducing equilibria with larger numbers of candidates; increases in σ have the opposite effect. It follows that effects on the quality of governance flowing through selection effects that result from changes in N tend to work in

completely characterize the effects of σ on the range of expected governance quality. Suppose the set in question is a sequence of disjoint intervals. In that case, an increase in s (resp. σ) increases (resp. decreases) the upper bound of every interval, and decreases (resp. increases) the lower bound (some of those effects being strict and some weak). Additional intervals may also appear.

[27] In fact, increasing N has the same effect on the non-candidate incentive constraint (7) as reducing s by $(N+1)k$, and it has the same effect on the candidate incentive constraint (4) as reducing s by Nk.

the *opposite* direction from the effects examined in the previous section. Thus, the overall effects of the governor's compensation and anti-corruption enforcement on the quality of governance are surprisingly complex, and subtle technical issues arising from the presence of integer constraints (including implications for existence of equilibria) render them difficult to assess. Fortunately, as we show in the next section, the task of evaluating all the pertinent effects in combination becomes tractable when the costs of running for office are treated as vanishingly small, a common assumption in the citizen-candidate literature.

4.4 Equilibria with Small Entry Costs

We now examine the behavior of the model as k becomes vanishingly small. First we note that the analysis of single-candidate equilibria is essentially unchanged from Section 4.1. From expression (8), an equilibrium with a single candidate of quality y exists for arbitrarily small k if and only if

$$y \geq \max\left\{\frac{u^G\left(1,0 \mid \sigma,s\right)}{2}, u^G(0,0 \mid \sigma,s)\right\} =: \widehat{y}(\sigma,s). \tag{11}$$

It follows that $y^{\max} \geq \widehat{y}(\sigma,s)$ is a necessary and sufficient condition for the existence of single-candidate equilibria in the limit. Moreover, for any candidate with quality in the interval $[\widehat{y}(\sigma,s), y^{\max}]$, there exists such an equilibrium. Thus, small entry costs do not generally resolve the multiplicity issue for single-candidate equilibria.

Next we examine equilibria with more than one candidate. Due to integer constraints, we are unable to derive general conditions that guarantee the existence of pure strategy equilibria. Consequently, we now broaden the scope of our analysis to include mixed strategy equilibria, which allows us to assure existence.

We focus on equilibria in which insiders probabilistically run for office if and only if they belong to a finite or countably infinite set of potential candidates. Formally, a mixed strategy equilibrium consists of a denumerable set $\mathcal{N}$ of dimension $N := |\mathcal{N}| \in \mathbb{N} \cup \{+\infty\}$, plus an N-dimensional vector $\mu = (\mu_i)_{i\in\mathcal{N}}$, where each $\mu_i \in (0,1]$ is the probability of the respective insider running. Insiders not in $\mathcal{N}$ run with zero probability. Note that this formulation subsumes pure strategy equilibria. The probabilities of running translate into probabilities of winning conditional on running for each $i \in \mathcal{N}$, denoted $\rho_i(\mathcal{N},\mu)$.[28] The unconditional probability of i winning in equilibrium is $\mu_i\rho_i(\mathcal{N},\mu)$. In addition, we

[28]The probability of winning for any set of realized candidates remains uniform, but the realized number

use $y_{\text{avg}}(\mathcal{N},\mu) := \sum_{j\in\mathcal{N}} \mu_j \rho_j(\mathcal{N},\mu)\, y^j + [1-\sum_{j\in\mathcal{N}} \mu_j\rho_j(\mathcal{N},\mu)] y_A$ to denote the expected quality of governance when the set $\mathcal{N}$ runs with probabilities μ, where y_A is the quality of governance when there is no governor (which, recall, is assumed to be extremely dire).

Henceforth $\mu(-i)$ will denote the probability vector obtained from μ by deleting the element containing the probability of entry for $i \in \mathcal{N}$. Thus, if $i \in \mathcal{N}$ changes his probability of entry from μ_i to zero, the conditional probability of winning for any $j \in \mathcal{N}\backslash i$ changes to $\rho_j(\mathcal{N}\backslash i, \mu(-i))$. Likewise, $\mu(+i)$ will denote the probability vector obtained from μ by adding an element indicating that $i \notin \mathcal{N}$ enters with probability one. Thus, if $i \notin \mathcal{N}$ changes his probability of entering from zero to one, the conditional probabilities of winning for any $j \in \mathcal{N} \cup i$ is $\rho_j(\mathcal{N}\cup i, \mu(+i))$.

Note that, because all choices and electoral events are independent, the probability of $j \in \mathcal{N}$ winning conditional on the event that $i \in \mathcal{N}$ does not win is equal to the probability of $j \in \mathcal{N}$ winning when i does not run, which is $\mu_j\rho_j(\mathcal{N}\setminus i, \mu(-i))$. This implies in particular that $\mathbb{E}[y \mid (\mathcal{N},\mu), \text{ and } i \in \mathcal{N} \text{ does not win}] = y_{\text{avg}}(\mathcal{N}\backslash i, \mu(-i))$. As a result, for $i \in \mathcal{N}$, we have

$$y_{\text{avg}}(\mathcal{N},\mu) = \rho_i(\mathcal{N},\mu)\, y^i + (1-\rho_i(\mathcal{N},\mu)) y_{\text{avg}}(\mathcal{N}\backslash i, \mu(-i)). \tag{12}$$

The equilibrium conditions for mixed strategies resemble those for pure strategies. Since the expected quality of governance is the same regardless of whether i runs and loses or refrains from running, i's decision is governed by a comparison between k (the cost of running), and the probability of winning multiplied by i's gains conditional on winning. Analogous to (4), the incentive constraint for those who (probabilistically) enter is thus:

$$\forall i \in \mathcal{N}: \quad \rho_i(\mathcal{N},\mu)\left[u^G\left(a^i, h^i \mid \sigma, s\right) - (1+a^i) y_{\text{avg}}(\mathcal{N}\backslash i, \mu(-i))\right] \geq k, \tag{13}$$

with equality when $\mu_i < 1$. For those who do not enter, analogous to (5), the incentive constraint is:

$$\forall i \notin \mathcal{N}: \quad \rho_i(\mathcal{N}\cup i, \mu(+i))\left[u^G\left(a^i, h^i \mid \sigma, s\right) - (1+a^i) y_{\text{avg}}(\mathcal{N},\mu)\right] \leq k. \tag{14}$$

Since $\rho_i(\cdot,\cdot)$ does not depend on a candidate's character, Lemma 2 continues to apply (with the obvious notational changes), so (14) holds if and only if it is satisfied for Sell-Outs and Scoundrels.

of candidates is now stochastic; $\rho_i(\mathcal{N},\mu)$ encompasses both sources of randomness. Note that $\rho_i(\mathcal{N},\mu)$ depends on $(\mu_j)_{j\in\mathcal{N}\backslash i}$ but not on μ_i.

We are not aware of an equilibrium existence result that applies to the current framework.[29] We therefore begin by assuring existence of mixed strategy equilibria (which subsume pure strategy equilibria).

Lemma 3. *For any $k > 0$, a mixed strategy equilibrium exists.*

Recall that single-candidate equilibria do not exist for k sufficiently small if $y^{\max} < \widehat{y}(\sigma, s)$. Consequently, under those conditions all equilibria must involve potential entry by multiple candidates. Henceforth we will refer to any equilibrium $(\mathcal{N}, \mu)$ with $N > 1$ as a *multiple-candidate equilibrium*.

In the remainder of the section we focus on $y^{\max} < \widehat{y}(\sigma, s)$ and explore the properties of multiple-candidate equilibria when the cost of running for office becomes vanishingly small. Our first characterization result establishes that, for each insider who runs for office (with any positive probability), the expected probability of winning conditional on running converges to zero as $k \to 0$. Clearly, this implies in turn that the expected number of candidates must grow without bound as running costs vanish. Formally, we have:

Lemma 4. *For any $\varepsilon > 0$, there exists $\hat{k}(\varepsilon)$ such that for all $k < \hat{k}(\varepsilon)$, every multiple-candidate equilibrium $(\mathcal{N}, \mu)$ satisfies $\rho_i(\mathcal{N}, \mu) < \varepsilon$ for all $i \in \mathcal{N}$.*

The intuition for this result is most transparent when all candidates are of the same character. In that case, the incentive constraint for non-candidates, expression (13), is virtually identical in the limit to the incentive constraint for candidates, expression (14), except that the direction of the inequality is reversed. Thus, if the N-th candidate is willing to run, an identical $(N + 1)$-th candidate would also enter.

In light of Lemmas 2 and 4, intuition suggests that as the cost of running for office approaches zero, the character of every candidate must approach that of either a Scoundrel or a Sell-Out in any multiple-candidate equilibrium. For, if a candidate were of any other type, then with many candidates, an additional candidate — either a Scoundrel or a Sell-Out — would necessarily have an incentive to enter, breaking the equilibrium. Indeed:

Theorem 2. *For any $\varepsilon > 0$, there exists $\hat{k}(\varepsilon) > 0$ such that when $k < \hat{k}(\varepsilon)$, any multiple-candidate equilibrium, $(\mathcal{N}, \mu)$, satisfies: if $n \in \mathcal{N}$, then $(a^n, h^n) \in B_\varepsilon(1, 0) \cup B_\varepsilon(0, 0)$, where $B_\varepsilon(a, h)$ denotes an open ball of radius ε around the point (a, h).*

[29] Following Schmeidler (1973), existence results in games with a continuum of players generally assume that choices by a measure zero set of opponents do not affect a player's payoff. That requirement is obviously not satisfied here: for example, if an insider chooses to run, his (expected) payoff depends on the exact number and identities of opponents.

Having determined that all candidates must be either Sell-Outs or Scoundrels in the limit, we can now characterize the expected quality of governance. Recall from Lemma 2 that $\overline{y}(\sigma)$ is the quality of governance that equalizes the incentives to enter for Sell-Outs and Scoundrels; for $y > \overline{y}(\sigma)$, Scoundrels have greater incentive to enter than Sell-Outs, and vice versa for $y < \overline{y}(\sigma)$. Define

$$\widetilde{y}(\sigma) := \max\left\{y^{\min}(\sigma), \min\{\overline{y}(\sigma), Y(1,0|\sigma)\}\right\}.$$

In other words, $\widetilde{y}(\sigma)$ truncates $\overline{y}(\sigma)$ below at the quality of a Scoundrel, and above at the quality of a Sell-Out.

Theorem 3. *For any $\varepsilon > 0$, there exists $k'(\varepsilon) > 0$ such that when $k < k'(\varepsilon)$, any multiple-candidate equilibrium, $(\mathcal{N}, \mu)$, has $|y_{avg}(\mathcal{N}, \mu) - \widetilde{y}(\sigma)| \leq \varepsilon$.*

Thus, when the costs of running for office are sufficiently small, the expected quality of governance in any multiple-candidate equilibrium is approximately $\widetilde{y}(\sigma)$. To build intuition, suppose that $y^{\min}(\sigma) < \overline{y}(\sigma) < Y(1,0 \mid \sigma)$. We know from Theorem 2 that only Sell-Outs and Scoundrels run for office. Clearly, the equilibrium cannot consist of all Scoundrels, because then we would have $y_{\text{avg}}(\mathcal{N}, \mu) = y^{\min}(\sigma) < \overline{y}(\sigma)$, which implies that Sell-Outs would have greater incentive to enter than Scoundrels (by Lemma 2). Similarly, the equilibrium cannot consist of all Sell-Outs, because then we would have $y_{\text{avg}}(\mathcal{N}, \mu) = Y(1,0|\sigma) > \overline{y}(\sigma)$, which implies that Scoundrels would have greater incentive to enter than Sell-Outs (again by Lemma 2). Thus, the equilibrium must involve a mixture of Scoundrels and Sell-Outs. To preserve a mixture in the limit, Scoundrels and Sell-Outs must have the same incentives to enter, which implies that $y_{\text{avg}}(\mathcal{N}, \mu) = \overline{y}(\sigma)$.

Together, Theorems 2 and 3 have a surprising and important implication: with small entry costs, the quality of governance is highly variable. Though all candidates are maximally dishonest, they vary widely in public spirit. A given election can yield a governor with either extremely high or extremely low public spirit (Sell-Outs or Scoundrels), and hence either the maximum or minimum level of the public good. Thus, analogs of the asymmetric equilibria identified in Section 4.2 turn out to be the only ones that survive in the limit.

We can now readily determine the limiting distribution of candidates' character types. Let γ^* denote the limiting fraction of candidates who are Sell-Outs. Then

$$\widetilde{y}(\sigma) = \gamma^*\left[f(e^*(1)) - q\left(1 - \Phi\left(v^*(1,0,\sigma)\right)\right)\right] + (1-\gamma^*)\left[f(e^*(0)) - q\left(1 - \Phi\left(v^*(0,0,\sigma)\right)\right)\right].$$

Rearranging yields

$$\gamma^*(\sigma) = \frac{\widetilde{y}(\sigma) - [f(e^*(0) - q\,(1 - \Phi\,(v^*(0,0,\sigma)))]}{f(e^*(1)) - f(e^*(0))}. \tag{15}$$

Theorem 3 also allows us to determine the effects of our two public policy instruments, s and σ, on the expected quality of governance in the limit when k becomes small, assuming when $y^{\max} < \widehat{y}(\sigma, s)$.[30] We begin with s, the governor's compensation. Observe that $\widetilde{y}(\sigma)$ is independent of s because $\overline{y}(\sigma)$, $y^{\min}(\sigma)$, and $Y(1, 0 \mid \sigma)$ are all independent of s; hence, in the limit, changes in compensation have *no effect* on the expected quality of governance. The explanation for this finding is clear when the equilibrium consists of all Sell-Outs ($\widetilde{y}(\sigma) = Y(1, 0 \mid \sigma)$) or all Scoundrels ($\widetilde{y}(\sigma) = y^{\min}(\sigma)$): in such cases there are no candidate selection effects, and selection provides the only channel through which compensation can influence the quality of governance. When Sell-Outs and Scoundrels both run for office ($y^{\min}(\sigma) < \overline{y}(\sigma) < Y(1, 0 \mid \sigma)$), selection effects are present but, in the limit, the typically beneficial effects of an increase in s for fixed N exactly offset the typically detrimental effects associated with stimulating additional entry.

Next we consider the effects of σ, the level of anti-corruption enforcement. Plainly, both $y^{\min}(\sigma)$ and $Y(1, 0 \mid \sigma)$ are strictly increasing in σ. Differentiating $\overline{y}(\sigma)$ from (6), we obtain

$$\frac{d\overline{y}}{d\sigma} = \alpha g_\sigma(0, \sigma)\,[\Phi(v^*(1, 0, \sigma)) - \Phi(v^*(0, 0, \sigma))] > 0. \tag{16}$$

It follows that $\widetilde{y}(\sigma)$ is also strictly increasing in σ. Thus, in the limit as the costs of running for office become vanishingly small, an increase in σ unambiguously improves the quality of governance. The explanation is again is clear when the equilibrium consists of all Sell-Outs or all Scoundrels: with no selection effects, an increase in σ must be beneficial because it reduces the influence of special interests on the governor's decisions. When Sell-Outs and Scoundrels both run for office with positive probability, both direct selection effects (fixing N) and indirect selection effects (through changes in N), which here are treated in combination, are also present. If an increase in σ reduced Scoundrels' and Sell-Outs' incentives to run for office by equal amounts, then the same expected quality of governance would continue to equalize those incentives, and the policy change would yield no benefits, despite a reduction in the propensity for any given governor to accommodate special interests (the mix would simply shift toward Scoundrels by an offsetting amount). But in fact, an increase in σ has

[30] Plainly, with small k, if $y^{\max} \geq \widehat{y}(\sigma, s)$ either an increase in s or a decrease in σ can shift the equilibrium from a single candidate to multiple candidates.

a larger effect on the incentives to run for Scoundrels than for Sell-Outs. Thus, higher expected quality is required to restore equal incentives to run for office.

While the direction of this effect is consistent with simple intuition, the mechanism is rather surprising. Recall from Theorem 1 that if the number of candidates is held fixed, the positive influence of anti-corruption enforcement on a governor's incentives are typically more than offset by perverse direct selection effects. Thus, for a wide range of parameter values, anti-corruption enforcement is on balance beneficial only because it also reduces the number of candidates in equilibrium, thereby *indirectly* improving selection.

It is generally ambiguous whether an increase σ on balance raises or lowers γ^*, the ratio of Sell-Outs to Scoundrels among candidates; i.e., whether the indirect selection effects (associated with changes in N) are larger or smaller than the direct selection effects (for a fixed N). We evaluate the combined selection effects by differentiating γ^* with respect to σ (assuming it is interior), using equation (15):[31]

$$\frac{d\gamma^*}{d\sigma} = \frac{g_\sigma(0,\sigma)\left(\alpha\left[\Phi(v^*(1,0,\sigma)) - \Phi(v^*(0,0,\sigma))\right] - q\phi\left(g(0,\sigma)+q\right)\right)}{f(e^*(1)) - f(e^*(0))}. \tag{17}$$

Suppose the density $\phi(v)$ is constant, say equal to $\overline{\phi}$, on $[v^*(0,0,\sigma), v^*(1,0,\sigma)]$. Then (17) reduces to $\frac{d\gamma^*}{d\sigma} = \frac{g_\sigma(0,\sigma)q(\alpha-1)\overline{\phi}}{f(e^*(1))-f(e^*(0))} < 0$, so long as $\alpha < 1$. A fortiori, if the density $\phi(v)$ is non-increasing on $[v^*(0,0,\sigma), v^*(1,0,\sigma)]$, then in the limit as k becomes vanishingly small, raising σ generates an *unfavorable overall* selection effect with respect to public-spiritedness.[32] To reconcile this observation with our preceding discussion, note that even though the overall selection effect is unfavorable, the (beneficial) indirect selection from the reduced number of candidates provides enough of an offset to the (detrimental) direct selection effect so that when combined with the (beneficial) incentive effect on any governor's behavior, the net effect on expected governance quality is positive.

On the other hand, it is evident from (17) that reasonable parameters can also yield $\frac{d\gamma^*}{d\sigma} > 0$, for example if the density $\phi(v)$ is sufficiently increasing on the relevant interval. In these cases, as k becomes vanishingly small, a stronger anti-corruption policy generates a beneficial overall selection effect, because the indirect selection effect dominates the direct selection effect.

[31] The expression below is derived from (15) by noting that an interior γ^* requires $\tilde{y}(\sigma) = \overline{y}(\sigma)$ and then using the derivative computed in (16).

[32] More generally, we see from (17) that for any given distribution $\Phi(v)$, there will be an unfavorable overall selection effect if α, the governor's bargaining power, is sufficiently small.

The following corollary summarizes our policy conclusions:

Corollary 1. *If $y^{\max} < \widehat{y}(\sigma, s)$, then in the limit as the costs of running (k) become vanishingly small (so that only multiple-candidate equilibria exist), an increase in anti-corruption enforcement (σ) strictly increases the expected quality of governance but may increase or decrease the fraction of Sell-Outs relative to Scoundrels, while a change in the governor's compensation (s) has no impact on the expected quality of governance or the composition of the candidate pool.*

4.5 The Roles of Some Key Assumptions

In this section, we clarify the roles of some key assumptions concerning the observability of candidates' characters, the presence of special interest politics, and the effects of public spiritedness.

We have assumed that the electorate cannot observe a non-incumbent candidate's character. In practice, such candidates usually have track records in other positions. Our somewhat stark assumption captures the plausible hypothesis that prior experience does not entirely reveal a candidate's character.[33] Were we to make the opposite extreme assumption that the electorate observes each candidate's character perfectly, our results would change dramatically. In every equilibrium all candidates would necessarily be of the same quality, and there would always be equilibria where only Saints run.

Special interest politics also play a central role. In the absence of the lobby group, only single-candidate equilibria with a lower bound on quality exist when s is not too large. When s becomes large enough, multiple-candidate equilibria emerge; with vanishing running costs, there is an essentially unique equilibrium with a mixture of maximally and minimally public-spirited candidates (depending on parameter values). However, without lobbying, one would not see how special interest politics can distort self-selection incentives toward less public-spirited insiders (and not simply toward less honest ones), who have relatively more to gain from securing office in their presence. Moreover, if there are no influence activities, one cannot investigate the effect of anti-corruption enforcement on the quality of governance.

Heterogeneity with respect to public spiritedness also plays a central role. If all insiders were equally public spirited, selection effects would not be present in the limiting case with

[33] With partial revelation of a candidate's character, the public would naturally prefer candidates of higher expected quality. Thus, successful candidates would be drawn from the still heterogeneous pool of insiders with the highest expected quality.

small entry costs. The candidate pool would be homogeneous (consisting only of maximally dishonest insiders), the effects of anti-corruption enforcement would be confined to incentives, and the variability in the quality of governance would vanish.

5 Incumbency and Term Limits

We now turn to the effects of incumbency on the quality of governance. Assuming character is at least partially revealed during a governor's first term, reelection opportunities can promote better governance through two channels. The first is mechanical: the electorate gains opportunities to reelect desirable incumbents. The second operates through self-selection effects: the benefits of running for office in the first place rise for high-quality candidates (for whom the odds of re-election are high) relative to low-quality candidates (for whom the odds are low). This section explores these effects and also identifies why, perhaps surprisingly, longer term limits can also have adverse selection effects. Throughout this section, to avoid uninteresting cases, we assume that $y^{\max} < \hat{y}(\sigma, s)$ and $y^{\min}(\sigma) < \overline{y}(\sigma) < Y(1, 0 \mid \sigma)$.[34]

5.1 Self-Selection Benefits of Reelection Opportunities

The impact of incumbency on candidate selection is most easily illustrated through a simple "reduced form" extension of our basic model to two periods; subsequently we will discuss how to enrich it. Assume that a governor of quality y is re-elected with an exogenous probability $\Pi(y)$ that is non-decreasing in y, so that higher quality incumbents are re-elected (weakly) more frequently. Further assume that the net gains from holding office for two terms are $\lambda > 1$ times those from holding office for a single term.[35] Thus, when the probability of winning conditional on running is ρ and the alternative quality of governance is y', a candidate with characteristics (a, h) will be willing to run if and only if

$$\rho(1 + \Pi(Y(a, h|\sigma))\lambda) \left[u^G(a, h \mid \sigma, s) - (1 + a)y'\right] \geq k.$$

[34]Recall that these conditions ensure that equilibria of the baseline model with vanishing running costs involve multiple candidates, with the candidate pool consisting of both Sell-Outs and Scoundrels.

[35]Implicitly, we assume that the expected quality of the non-incumbent candidate pool, y', is the same in the first and second periods.

The following result shows that if Sell-Outs are re-elected with strictly higher probability than near-Scoundrels, then for small running costs, the expected quality of governance in the first period of the two-period model is strictly higher than $\overline{y}(\sigma)$, the expected quality of governance in the original model.

Theorem 4. *Suppose* $\Pi\left(Y(1,0 \mid \sigma)\right) > \Pi\left(y\right)$ *for all* y *within some neighborhood of* $y^{\min}(\sigma)$*. Then for some* $\varepsilon > 0$*, there exists* $k' > 0$ *such that when* $k < k'$*, any multi-candidate equilibrium of the extended model,* $(\mathcal{N}, \mu)$*, has* $y_{avg}(\mathcal{N}, \mu) \geq \overline{y}(\sigma) + \varepsilon$*.*

It follows that the ability to re-elect better governors has a beneficial selection effect on the candidate pool in non-incumbent elections, in addition to any direct benefit of re-electing good governors. The logic of this result is straightforward. With $\lambda = 0$ (in effect, the one-period model), the set of insiders with the greatest incentives to run consists of Sell-Outs alone when the average quality of governance, call it y, is less than $\overline{y}(\sigma)$, and both Sell-Outs and Scoundrels when $y = \overline{y}(\sigma)$. Thus, with strictly positive λ and $y \leq \overline{y}(\sigma)$, Sell-Outs have strictly greater incentives to run than any lower quality candidate. Consequently, $y \leq \overline{y}(\sigma)$ rules out the possibility that, with vanishingly small entry costs, any candidate of quality $\overline{y}(\sigma)$ or lower would run. It follows that $y \leq \overline{y}(\sigma)$ is not sustainable in equilibrium.

So far we have imposed transparent but exogenous assumptions concerning re-election bids. That is both a virtue and a limitation. It is not hard, however, to see that similar results hold when the second-period election is modeled explicitly. Assume for simplicity that a governor's character is necessary revealed while in office. Because the second period of the two-period model closely resembles the single-period model, the most natural continuation equilibrium has the property that the average quality of challengers (if any run) is $\overline{y}(\sigma)$; the incumbent runs for re-election if and only if his quality is at least $\overline{y}(\sigma)$, and he wins when he runs.[36] Thus, Π endogenously satisfies the assumption in Theorem 4. Though the benefits from holding office for two terms is not a fixed multiple of the benefits from holding office for a single term,[37] the main insight developed in the context of our simple reduced-form model

[36] To describe an equilibrium, one must specify voters' beliefs about the average quality of non-incumbent candidates for out-of-equilibrium realizations (i.e., ones in which the number of candidates falls outside the support of the equilibrium distribution). Unless one introduces belief restrictions, the set of equilibria is large, and many equilibria have implausible properties. We opted for the simple reduced-form model presented in the text to avoid a lengthy treatment of these technical and ultimately unenlightening complications.

[37] In equilibrium, the expected quality of the non-incumbent candidate pools in the first and second periods will differ, contrary to the simplifying assumption we implicitly made to justify the application of the fixed multiple λ. The simplifying assumption remains reasonable, however, because it is likely to hold in stationary environments where "endgame effects" are not present.

— that re-election opportunities improve expected candidate quality in the first-period non-incumbent election — carries over, for essentially the same reasons. In some cases (e.g., when citizens heavily discount future payoffs), the first-period candidate pool still consists of only Sell-Outs and Scoundrels, but a higher fraction are Sell-Outs than in the one-period model. The fact that Sell-Outs seek and win re-election (whereas Scoundrels do not) bears out the adage that voters prefer a known crook to an unknown crook.

The two-period model is somewhat artificial because a non-incumbent candidate in the second period has no opportunity to seek re-election. This can be remedied by considering an infinite-horizon model but maintaining a two-term limit. Similar equilibria also exist in such a model. However, other types of equilibria also emerge, some with even higher governance quality. In the Supplementary Appendix, we restrict attention to Markovian equilibria (thereby ruling out equilibria that "bootstrap" cooperation through history-dependent strategies), and show that if second-term compensation is sufficiently high, there are equilibria that deliver any quality of governance between $[Y(1, 0 \mid \sigma), y^{\max}]$ in every period.

5.2 Self-Selection Costs of Reelection Opportunities

The possibility of re-election can also have pernicious selection effects if lower-quality candidates benefit more from re-election than higher-quality candidates. Such effects can emerge if, as many have suggested, more senior politicians are able to extract greater pork and/or rents from holding office, e.g. by cultivating relationships with large contributors or obtaining appointments to powerful committees. To capture that possibility, we adopt the same simplifying framework (with exogenous re-election probabilities) and make the same assumptions as in Theorem 4, with the following exception: the fraction of lobbying surplus extracted by an incumbent governor, α_2, exceeds α, the fraction extracted by a first-term governor. With that modification, we obtain:

Theorem 5. *Assume $\alpha_2 > \alpha$. There exist $\varepsilon, \eta > 0$ and $\hat{k} > 0$ such that if $\Pi\left(y^{\min}(\sigma)\right) + \varepsilon > \Pi\left(y^{\max}\right) > 0$ and $k < \hat{k}$, any multi-candidate equilibrium of the extended model, $(\mathcal{N}, \mu)$, has $y_{avg}(\mathcal{N}, \mu) \leq \overline{y}(\sigma) - \eta$.*

Thus, if incumbency confers additional bargaining power with special interests, then unless the electorate can differentiate sufficiently well between governors of good and bad character, the possibility of re-election causes adverse self-selection in non-incumbent elections. Intuitively, an increase in the governor's ability to extract rents from the lobby group resembles a decrease in anti-corruption policy: while it generally increases the benefits to holding office (fixing the quality of opponents), the effect on the entry incentives is greatest for Scoundrels because they accept special interest transfers more often than all other types. Taking the boundary case where $\Pi(\cdot)$ is constant and $\alpha_2 = \alpha$, we know that the set of insiders with the greatest incentives to run consists of Scoundrels alone when the average quality of governance, call it y, is greater than $\overline{y}(\sigma)$, and both Scoundrels and Sell-Outs when $y = \overline{y}(\sigma)$. Thus, with $\alpha_2 > \alpha$ and $y \geq \overline{y}(\sigma)$, Scoundrels have strictly greater incentives to run than any candidate of higher quality. Consequently, $y \geq \overline{y}(\sigma)$ rules out the possibility that, with vanishingly small entry costs, any candidate of quality $\overline{y}(\sigma)$ or higher would run. It follows that $y \geq \overline{y}(\sigma)$ is not sustainable in equilibrium.

6 Concluding Remarks

We have examined the impact of special interest politics on the self-selected character of politicians, including honesty and public spirit. Our analysis emphasizes the role of selection effects in determining the quality of governance. The effects of public policy instruments, such as the level of the governor's compensation or the intensity of anti-corruption enforcement, turn out to be surprisingly complex. Nevertheless, a number of robust (and in some cases unexpected) findings emerge, which we have summarized in Section 1 and hence will not repeat here. We conclude instead by mentioning some interesting avenues for future research.

The analysis in Section 5 illustrated how the possibility of re-election and incumbency can have both beneficial and adverse self-selection effects on the candidate pool, in addition to direct screening benefits. While we focussed for simplicity on making these points by comparing two-term limits with one-term limits, the findings suggest that it may be fruitful to explore more systematically the optimal length of term limits to balance out these opposing effects on self-selection.

We have assumed throughout that insiders differ only with respect to honesty and public-spiritedness. Another potentially interesting dimension along which candidates may differ is the relative weight they attach to monetary payments, public goods, effort, and honesty. To take a simple case, suppose insiders are differentiated by a third characteristic, $m \in [0, 1]$, that acts as a multiplier for all monetary payoffs (larger m indicating greater weight on money relative to other considerations). In multiple-candidate equilibria, elections will tend to attract those with higher values of m. The potential implications for the effects of compensation and anti-corruption enforcement are intriguing. An increase in compensation, s, will tend to attract candidates with higher values of m, which is deleterious insofar as such individuals will more easily succumb to the influence of special interests. Thus, increasing compensation may *reduce* the quality of governance. On the other hand, increasing anti-corruption enforcement, σ, will not have that effect.

Appendix: Proofs

Proof of Lemma 1. The first statement follows from the discussion of the Nash-bargaining outcome prior to the Lemma: if $v < v^*(a,h,\sigma)$, the governor does not implement the project; if $v > v^*(a,h,\sigma)$, he does and receives a transfer t such that $t - v^*(a,h,\sigma) = \alpha(v - v^*(a,h,\sigma))$. For the second statement, note that $1 - \Phi\left(v^*(a,h,\sigma)\right)$ is the probability of project implementation. Whenever the project is implemented, non-governor citizens with public spirit a' suffer a disutility of $(1+a')q$; thus, the citizen's expected cost is $(1+a')q\left[1 - \Phi\left(v^*(a,h,\sigma)\right)\right]$. □

Proof of Lemma 2. Fix the policies (σ, s) and define

$$\begin{aligned}\Delta(a,h,y) \quad &:= \quad u^G(a,h \mid \sigma,s) - (1+a)y \\ &= \quad (1+a)\, f\left(e^*\left(a\right)\right) - c\left(e^*\left(a\right)\right) + \mathbb{E}_v \max\{\alpha(v - g(h,\sigma) - (1+a)q), 0\} + s - (1+a)y.\end{aligned}$$

Fix any y. The goal is to determine which pairs of (a,h) maximize $\Delta(\cdot,\cdot,y)$. Since $g(h,\sigma)$ is strictly increasing in h, $\Delta(a,h,y)$ is weakly decreasing in h; moreover, by Assumption 3, $\Delta(a,h,y)$ is strictly decreasing for h sufficiently small. Thus, for each a, $\Delta(a,h,y)$ is maximized uniquely at $h = 0$, so we can restrict attention to candidates with minimal honesty.

Note next that

$$\frac{\partial}{\partial a}\Delta(a,0,y) = f\left(e^*\left(a\right)\right) - \alpha q\left[1 - \Phi\left(g(0,\sigma) + (1+a)q\right)\right] - y,$$

and

$$\frac{\partial^2}{\partial a^2}\Delta(a,0,y) = f'(e^*(a))\frac{de^*(a)}{da} + \alpha q^2 \phi\left(g(0,\sigma) + (1+a)q\right) > 0.$$

Thus, the function $\Delta(a,0,y)$ is convex in a, hence is maximized only at either $a = 0$ or $a = 1$ (or both). The proof is completed by observing that

$$\Delta\left(1,0,y\right) - \Delta\left(0,0,y\right) = u^G(1,0|\sigma,s) - u^G(0,0|\sigma,s) - y = \overline{y}(\sigma) - y,$$

where the 2nd equality is by the definition in (6). □

Proof of Theorem 1. The proof is via a number of steps.

Step 1: Suppose we have an N-candidate slate $\mathcal{N}'$ that satisfies the candidate incentive constraints with anti-corruption enforcement σ'. Then for $\sigma < \sigma'$ there exists an N-candidate slate $\mathcal{N}$ that satisfies the candidate incentive constraints with anti-corruption enforcement σ, such that $y^{\mathcal{N}}(\sigma) = y^{\mathcal{N}'}(\sigma')$.

For each $i \in \mathcal{N}'$, we claim that there exists some $j(i)$ with $a^{j(i)} = a^i$ such that

$$Y(a^{j(i)}, h^{j(i)} \mid \sigma) = Y(a^i, h^i \mid \sigma'). \tag{18}$$

To see this, note first that if $g(h^i, \sigma') + (1 + a^i)q \geq \overline{v}$, agent i would never implement the special-interest project, hence $Y(a, h \mid \sigma') = f(e^*(a^i))$. We can then take $j(i)$ such that $(a^{j(i)}, h^{(j(i)}) = (a^i, 1)$, since a maximally honest agent never implements special interest projects, no matter the level of anti-corruption enforcement (Assumption 3). So suppose that $g(h^i, \sigma') + (1 + a^i)q < \overline{v}$. Then, because $g(h^i, \sigma) < g(h^i, \sigma')$ while $g(1, \sigma) + (1 + a^i)q > \overline{v}$ (by Assumption 3), the continuity of $g(\cdot, \sigma)$ implies that there is some $h^* \in (h^i, 1)$ such that $g(h^*, \sigma) = g(h^i, \sigma')$. We choose $j(i)$ such that $(a^{j(i)}, h^{j(i)}) = (a^i, h^*)$.

Now we claim that, with anti-corruption enforcement σ, the slate $\mathcal{N} = \{j(1), \ldots, j(N)\}$ satisfies the candidate incentive constraint (4). To see this, observe that since (18) holds for $i = 1, ..., N$, we have that for any $i = 1, \ldots, N$,

$$\mathbb{E}_{k \in \mathcal{N}' \setminus i} u\left(a^k, h^k \mid a^i, \sigma'\right) = \mathbb{E}_{k \in \mathcal{N}' \setminus i} u\left(a^{j(k)}, h^{j(k)} \mid a^{j(i)}, \sigma\right) = \mathbb{E}_{k \in \mathcal{N} \setminus j(i)} u\left(a^k, h^k \mid a^{j(i)}, \sigma\right).$$

In other words, the expected candidate quality is the same if i withdraws from slate $\mathcal{N}'$ under σ', and if $j(i)$ withdraws from slate $\mathcal{N}$ under σ. Next note that for any $i = 1, \ldots, N$, the payoff to holding office, $u^G(a^i, h^i \mid \sigma', s) = u^G(a^{j(i)}, h^{j(i)} \mid \sigma, s)$ because, by construction, either (i) both i and $j(i)$ never accept lobby payments (under σ' and σ respectively), or (ii) $g(h^i, \sigma') = g(h^{j(i)}, \sigma)$. It now follows that the candidate incentive constraint (4) holds for all candidates in $\mathcal{N}$ under σ.

Step 2: Proof of parts (i) and (ii-c), with respect to anti-corruption enforcement.

First we prove the statements concerning the effects of a change in anti-corruption enforcement. Consider a change from (σ', s) to (σ, s) where $\sigma' > \sigma$, and where N-candidate equilibria exist in both cases. By Step 1, there exists an N-candidate slate $\mathcal{N}_A$ that satisfies the candidate incentive constraints under (σ, s) such that $y^{\mathcal{N}_A}(\sigma) = \overline{y}_N(\sigma', s)$, and an N-candidate slate $\mathcal{N}_B$ that satisfies the candidate incentive constraints under (σ, s) such that $y^{\mathcal{N}_B}(\sigma) = \underline{y}_N(\sigma', s) > y_N^{\ell}(\sigma', s)$ (where the inequality holds because the non-candidate incentive constraint is assumed not to bind).

Now consider part (i). Since the non-candidate incentive constraints amount to a lower bound, $y_N^\ell(\sigma, s)$, on equilibrium expected candidate quality under (σ, s), and because N-candidate equilibria are assumed to exist under (σ, s), either $\mathcal{N}_A$ is an equilibrium slate under (σ, s), or there is some other equilibrium slate under (σ, s) for which the expected candidate quality exceeds $y^{\mathcal{N}_A}(\sigma)$, and hence $\overline{y}_N(\sigma', s)$.

Now consider part (ii-c). Since $y_N^\ell(\sigma, s)$ is continuous, we have $y^{\mathcal{N}_B}(\sigma) = \underline{y}_N(\sigma', s) > y_N^\ell(\sigma, s)$ for $\sigma' - \sigma$ sufficiently small. Thus, $\mathcal{N}_B$ is an equilibrium slate under σ, and hence $\underline{y}_N(\sigma, s) \leq \underline{y}_N(\sigma', s)$.

Step 3: Suppose we have an N-candidate slate, $\mathcal{N}$, that satisfies the candidate incentive constraints with compensation s. Then for any $s' > s$, $\mathcal{N}$ satisfies the candidate incentive constraints with strict inequality from inspection of (4) and the observation that $u^G(a, h|\sigma, s\cdot)$ is strictly increasing in s.

Step 4: Proof of parts (i) and (ii-c), with respect to the governor's compensation.

Consider a change from (σ, s) to (σ, s') where $s' > s$, and where N-candidate equilibria exist in both cases. By Step 3, there exists an N-candidate slate $\mathcal{N}_A$ that strictly satisfies the candidate incentive constraints under (σ, s') such that $y^{\mathcal{N}_A}(\sigma) = \overline{y}_N(\sigma, s)$, and an N-candidate slate $\mathcal{N}_B$ that satisfies the candidate incentive constraints under (σ, s') such that $y^{\mathcal{N}_B}(\sigma) = \underline{y}_N(\sigma, s) > y_N^\ell(\sigma, s)$ (where the inequality holds because the non-candidate incentive constraint is assumed not to bind).

Now consider part (i). Assume first that $y_N^\ell(\sigma, s') \leq \overline{y}_N(\sigma, s) = y^{\mathcal{N}_A}(\sigma)$. In that case, $\mathcal{N}_A$ is an equilibrium slate under s'. Now suppose in addition that $\overline{y}_N(\sigma, s) < y^{\max}$. Because the candidate incentive constraints hold with strict inequality, and because u and u^G are continuous in a and h, there exists another slate, $\mathcal{N}_C$, for which $y^{\mathcal{N}_C}(\sigma) > \overline{y}_N(\sigma, s) \geq y_N^\ell(\sigma, s')$, and that satisfies the candidate incentive constraints. Plainly $\mathcal{N}_C$ is an equilibrium slate under s'. Next assume that $y_N^\ell(\sigma, s') > \overline{y}_N(\sigma, s) = y^{\mathcal{N}_A}(\sigma)$. In that case $\mathcal{N}_A$ is not an equilibrium slate under s', but we have assumed that an equilibrium slate, $\mathcal{N}_C$, exists, and it is necessarily the case that $y^{\mathcal{N}_C}(\sigma) \geq y_N^\ell(\sigma, s') > \overline{y}_N(\sigma, s)$.

Now consider part (ii-c). Because $y_N^\ell(\sigma, s)$ is continuous, we have $y^{\mathcal{N}_B}(\sigma) = \underline{y}_N(\sigma, s) > y_N^\ell(\sigma, s')$ for $s' - s$ sufficiently small. Thus, $\mathcal{N}_B$ is an equilibrium slate under σ. Next assume that $\underline{y}_N(\sigma, s) > y^{\min}(\sigma)$. Because the candidate incentive constraints hold with strict inequality, and because u and u^G are continuous in a and h, there exists another slate, $\mathcal{N}_C$, for which $\underline{y}_N(\sigma, s) > y^{\mathcal{N}_C}(\sigma) > y_N^\ell(\sigma, s')$, and that satisfies the candidate incentive constraints. Plainly $\mathcal{N}_C$ is an equilibrium slate under s'.

Step 5: Proofs of parts (ii-a) and (ii-b). For part (ii-a), we are to assume $\underline{y}_N(\sigma, s) = y_N^\ell(\sigma, s)$, $\underline{y}_N(\sigma', s) = y_N^\ell(\sigma', s)$, and $\underline{y}_N(\sigma, s') = y_N^\ell(\sigma, s')$. It is straightforward to check that u^G, and hence $y_N^\ell(\sigma, s)$, are strictly increasing in s and strictly decreasing in σ, from which part (ii-a) follows immediately. For part (ii-b), we are to assume $\underline{y}_N(\sigma, s) = \underline{y}_N(\sigma, s') = y^{\min}(\sigma)$ and $\underline{y}_N(\sigma', s) = y^{\min}(\sigma')$. Trivally, $y^{\min}(\sigma)$ is independent of s. Moreover, it is straightforward to check that $y^{\min}(\sigma)$ is strictly increasing in σ. □

Proof of Lemma 3. Fix any $k > 0$ and consider a sequence of restricted models, indexed by m, such that in model m there are $2m$ insiders, consisting of m Sell-Outs and m Scoundrels. For each restricted model in this sequence, the entry game is finite and hence a mixed-strategy equilibrium exists. Fix any selection of equilibria in the sequence of restricted models.

Case 1: Suppose first that, for some m, the equilibrium has at least one Sell-Out and at least one Scoundrel entering with zero probability. Then (13) is satisfied for all insiders who enter with strictly positive probability, and (14) is satisfied for all insiders who enter with zero probability. This equilibrium remains an equilibrium when any number of Sell-Outs and Scoundrels are added so long as they enter with zero probability: (13) is unaffected and therefore still satisfied for those who enter with positive probability; while (14) is unaffected and therefore still satisfied by the original insiders who enter with zero probability as well as the new insiders. By Lemma 2, it follows that (14) is also satisfied for any new insiders of other character types. Therefore, the equilibrium of model m is also an equilibrium of the unrestricted model, featuring a finite number of candidates.

Case 2: Now suppose that, for all m restricted models, either all Sell-Outs or all Scoundrels (or both) enter with non-zero probability. Let $\widehat{\theta}^m$ be the associated vector of entry probabilities for Sell-Outs, listed in non-increasing order, and let $\widehat{\tau}^m$ denote the associated vector of entry probabilities for Scoundrels, again listed in non-increasing order. Note that (13) implies that there must be strictly positive lower bound on the probability of winning conditional on running, and hence an upper bound, call it $C^{\max}$, on the expected number of candidates. Consequently, $\sum_{i=1}^m \left[\widehat{\theta}_i^m + \widehat{\tau}_i^m\right] \leq C^{\max}$.

For each m, define countably-infinite-dimensional vectors θ^m and τ^m such that $\theta_i^m = \widehat{\theta}_i^m$ and $\tau_i^m = \widehat{\tau}_i^m$ for $i = 1, ..., m$, and $\theta_i^m = \tau_i^m = 0$ for $i > m$. For any m, θ^m and τ^m lie in the space

$$\Theta := \left\{ (\theta_1, \theta_2, ...) \mid \sum_{i=1}^{\infty} \theta_i \le C^{\max},\ \theta_i \ge 0, \text{ and } \theta_i \ge \theta_{i+1} \text{ for } i = 1, 2, ... \right\}.$$

A key property to note is:

$$\text{for any } \theta \in \Theta \text{ and any } i,\ \theta_i \le \frac{C^{\max}}{i}, \tag{19}$$

because the elements are in non-increasing order and $\sum_i \theta_i \le C^{\max}$. Endow Θ with the Chebyshev norm, D, i.e for any $\theta', \theta'' \in \Theta$, $D(\theta', \theta'') := \max_i |\theta'_i - \theta''_i|$.[38] One can verify that Θ (endowed with D) is compact.[39] Thus, there is a subsequence for which θ^m and τ^m converge respectively to limits $\theta^\infty, \tau^\infty \in \Theta$. A fortiori, in this subsequence, for any i, $\theta_i^m \to \theta_i^\infty$ and $\tau_i^m \to \tau_i^\infty$. Also, θ_i^∞ and τ_i^∞ are each non-increasing in i. For the remainder of the proof, restrict attention to the subsequence.

Now consider the unrestricted model, with the continuum of insiders. Let $\mathcal{N}$ be the countable set consisting of N_{so} Sell-Outs and N_{sc} Scoundrels, where $N_{so} := \sup\{i : \theta_i^\infty > 0\}$ and $N_{sc} := \sup\{i : \tau_i^\infty > 0\}$ (either could be infinite). Let μ assign the entry probability θ_i^∞ to the i-th Sell-Out in $\mathcal{N}$, and the probability τ_i^∞ to the i-th Scoundrel in $\mathcal{N}$. We will show that $(\mathcal{N}, \mu)$ is a mixed strategy equilibrium.

We first verify the candidate incentive constraint (13). We provide the argument for any Sell-Outs in $\mathcal{N}$; it is virtual identical for any Scoundrels. Pick any Sell-Out $i \in \mathcal{N}$. Since $\theta_i^m \to \theta_i^\infty > 0$, it must be that $\theta_i^m > 0$ infinitely often in m; focus on these cases. In the equilibrium of the m-th restricted model, $\left(\widehat{\theta}^m, \widehat{\tau}^m\right)$, let ρ_i^m denote the expected probability with which the i-th Sell-Out wins conditional on running, y_{avg}^m denote the expected quality of governance, and $y_{\text{avg}}^m(-i)$ denote the expected quality of governance when i does not run. The candidate incentive constraint for i implies that

$$\rho_i^m \left[u^G (1, 0 \mid \sigma, s) - 2 y_{\text{avg}}^m(-i) \right] \ge k, \tag{20}$$

with equality when $\theta_i^m \in (0, 1)$. One can show that as $m \to \infty$, $\rho_i^m \to \rho_i(\mathcal{N}, \mu)$ and

[38] Because of (19), the max is well defined even though Θ is infinite-dimensional.

[39] To prove compactness, note that (19) implies that for any $\varepsilon > 0$, there is a some i' such that for all $i \ge i'$, any $\theta \in \Theta$ has $\theta_i < \varepsilon$, and hence for any $\theta, \theta' \in \Theta$, $\max_{i<i'} |\theta_i - \theta'_i| < \varepsilon$ implies $D(\theta, \theta') < \varepsilon$. It follows that Θ is totally bounded. It is routine to verify that Θ is complete.

$y_{\text{avg}}^m \to y_{\text{avg}}(\mathcal{N},\mu)$,[40] from which it also follows that $y_{\text{avg}}^m(-i) \to y_{\text{avg}}(\mathcal{N}\backslash i, \mu(-i))$.[41] Thus, passing to limits in (20), we have

$$\rho_i(\mathcal{N},\mu)\left[u^G(1,0 \mid \sigma, s) - 2y_{\text{avg}}(\mathcal{N}\backslash i, \mu(-i))\right] \geq k,$$

with equality whenever $\theta_i^\infty < 1$ (because then we must have $\theta_i^m \in (0,1)$ for all large enough m). We have thus verified that (13) holds any Sell-Out in $\mathcal{N}$.

The proof is completed by showing that the non-candidate incentive constraint (14) holds for any insider $i \notin \mathcal{N}$, no matter his character type. By Lemma 2, it suffices to check incentives for Sell-Outs and Scoundrels. We will provide the argument for Sell-Outs; Scoundrels can be treated *mutatis mutandis*.

We divide the argument into two cases. First suppose there exists a subsequence of the restricted models such that for all large enough m, there is some Sell-Out i^m who does not enter in the equilibrium of the m-th model. Let $\rho^m(+i)$ denote the probability with which an individual i who does not run in the equilibrium of model m would win if he ran. The non-candidate incentive constraint for i^m implies that for any Sell-Out i who does not run in the equilibrium of model m:

$$\rho^m(+i)\left[u^G(1,0 \mid \sigma, s) - 2y_{\text{avg}}^m\right] \leq k. \tag{21}$$

One can show that $\rho^m(+i) \to \rho_i(\mathcal{N}\cup i, \mu(+i))$ as $m \to \infty$.[42] Thus, passing to limits in (21), we have

$$\rho_i(\mathcal{N}\cup i, \mu(+i))\left[u^G(1,0 \mid \sigma, s) - 2y_{\text{avg}}(\mathcal{N},\mu)\right] \leq k,$$

[40] A proof for the convergence of ρ_i^m goes as follows (the argument for convergence of y_{avg}^m is along the same lines): Let $R_i^K(\theta,\tau)$ be i's probability of winning conditional on running when the first K Sell-Outs and Scoundrels running according to the probabilities given in $(\theta,\tau) \in \Theta^2$, while all others run with probability zero. Let B^K be some strict upper bound on the probability that one or more members of $\mathcal{N}$ other than the first K Sell-Outs and Scoundrels runs, given $(\theta^\infty,\tau^\infty)$. Note that (19) implies that by taking K sufficiently large we can make B^K arbitrarily small. Also note that B^K bounds the same probability for (θ^m,τ^m) when m is sufficiently large. It follows that $\left|\rho_i(\mathcal{N},\mu) - R_i^K(\theta^\infty,\tau^\infty)\right| < B^K$ and $\left|\rho_i^m - R_i^K(\theta^m,\tau^m)\right| < B^K$ for large m. Moreover, because the probability of winning conditional on running is continuous in the entry probabilities for any finite set of agents, $R_i^K(\theta^m,\tau^m) \to R_i^K(\theta^\infty,\tau^\infty)$ as $m \to \infty$. Therefore, for any $\varepsilon > 0$, there exists M such that $|\rho_i^m - \rho_i(\mathcal{N},\mu)| < \varepsilon$ for $m > M$.

[41] Note that $y_{\text{avg}}^m(-i) = \frac{y_{\text{avg}}^m - \rho_i^m y^i}{1-\rho_i^m}$. Given the immediately preceding convergence statements, taking limits delivers the desired conclusion.

[42] The argument is analogous to that given in fn. 40.

which establishes that (14) holds for any Sell-Out $i \notin \mathcal{N}$.

Now consider the other possibility: in any subsequence of restricted models, it is infinitely often the case that *all* Sell-Outs enter with positive probability in the model's equilibrium. Then it is possible to find a subsequence of m and a Sell-Out in each model, call him i^m, such that for all large m, $1 > \theta_{i^m}(m) > 0$ and $\lim_{m\to\infty} \theta_{i^m}(m) = 0$ (recall (19)). As $\theta_{i^m} \in (0,1)$, the candidate incentive constraint (13) must hold with equality:

$$\rho^m_{i^m} \left[u^G(1, 0 \mid \sigma, s) - 2y^m_{\text{avg}}(-i^m)\right] = k. \tag{22}$$

Now pick any Sell-Out $i \notin \mathcal{N}$. Observe that the difference between $\rho^m_{i^m}$ and $\rho^m(+i)$ owes only to θ_{i^m}; similarly for the difference between the difference between $y^m_{\text{avg}}(-i^m)$ and y^m_{avg}. Since $\lim_{m\to\infty} \theta_{i^m}(m) = 0$, it follows that $\lim_{m\to\infty} \rho^m_{i^m} = \lim_{m\to\infty} \rho^m(+i)$ and $\lim_{m\to\infty} y^m_{\text{avg}}(-i^m) = \lim_{m\to\infty} y^m_{\text{avg}}$. Thus, passing to limits in (22) yields

$$\begin{aligned} k &= \lim_{m\to\infty} \rho^m_{i^m} \left[u^G(1, 0 \mid \sigma, s) - 2y^m_{\text{avg}}(-i^m)\right] \\ &= \lim_{m\to\infty} \rho^m(+i) \left[u^G(1, 0 \mid \sigma, s) - 2y^m_{\text{avg}}\right] \\ &= \rho_i(\mathcal{N} \cup i, \mu(+i)) \left[u^G(1, 0 \mid \sigma, s) - 2y_{\text{avg}}(\mathcal{N}, \mu)\right], \end{aligned}$$

which establishes that (14) holds (with equality) for any Sell-Out $i \notin \mathcal{N}$. □

Proof of Lemma 4. Suppose the claim is false. Then for some $\varepsilon > 0$ there exists an infinite sequence of positive entry costs $k^m \to 0$, and a sequence of associated equilibria $(\mathcal{N}^m, \mu^m)$ such that each $\mathcal{N}^m$ contains some i^m with $\rho_{i^m}(\mathcal{N}^m, \mu^m) \geq 2\varepsilon$.

Letting $\mathcal{C}$ denote the realized set of candidates and c denote the realized number of candidates, note that

$$\rho_{i^m}(\mathcal{N}^m, \mu^m) = \sum_{c=0}^{|\mathcal{N}^m|} \frac{1}{c+1} P^m(c),$$

where

$$P^m(c) := \Pr\left[|\mathcal{C}| = c \mid (\mathcal{N}^m, \mu^m),\ i^m \notin \mathcal{C}\right]. \tag{23}$$

For any $i \notin \mathcal{N}^m$, we have

$$\begin{aligned}
\rho_i(\mathcal{N}^m \cup i, \mu^m(+i)) &= (1-\mu^m_{i^m})\rho_{i^m}(\mathcal{N}^m, \mu^m) + \mu^m_{i^m} \sum_{c=0}^{|\mathcal{N}^m|} \frac{1}{c+2} P^m(c) \\
&\geq (1-\mu^m_{i^m})\rho_{i^m}(\mathcal{N}^m, \mu^m) + \mu^m_{i^m} \frac{1}{2} \sum_{c=0}^{|\mathcal{N}^m|} \frac{1}{c+1} P^m(c) \\
&= (1-\mu^m_{i^m})\rho_{i^m}(\mathcal{N}^m, \mu^m) + \mu^m_{i^m} \frac{\rho_{i^m}(\mathcal{N}^m, \mu^m)}{2} \\
&\geq \frac{\rho_{i^m}(\mathcal{N}^m, \mu^m)}{2} \geq \varepsilon.
\end{aligned}$$

In other words, any non-candidate who enters would win with expected probability at least ε. For each equilibrium $(\mathcal{N}^m, \mu^m)$, the non-candidate incentive constraint must be satisfied for Sell-Outs and Scoundrels who are not members of $\mathcal{N}^m$:

$$\rho_i\left(\mathcal{N}^m \cup i, \mu^m(+i)\right)\left[u^G\left(0, 0 \mid \sigma, s\right) - y_{\text{avg}}\left(\mathcal{N}^m, \mu^m\right)\right] \leq k^m, \tag{24}$$

and

$$\rho_i\left(\mathcal{N}^m \cup i, \mu^m(+i)\right)\left[u^G\left(1, 0 \mid \sigma, s\right) - 2y_{\text{avg}}\left(\mathcal{N}^m, \mu^m\right)\right] \leq k^m. \tag{25}$$

Given that $\rho_i\left(\mathcal{N}^m \cup i, \mu^m(+i)\right) \geq \varepsilon$ and $y_{\text{avg}}\left(\mathcal{N}^m, \mu^m\right) \leq y^{\max}$, (24) and (25) imply:

$$\max\left\{u^G\left(0, 0 \mid \sigma, s\right) - y^{\max}, u^G\left(1, 0 \mid \sigma, s\right) - 2y^{\max}\right\} \leq \frac{k^m}{\varepsilon}. \tag{26}$$

The left-hand side of (26) is independent of m, and by the hypothesis that $\widehat{y}(\sigma, s) > y^{\max}$, it is also strictly positive. On the other hand, since $\varepsilon > 0$ is a constant and $k^m \to 0$, the right-hand side of (26) converges to zero as $m \to \infty$. Consequently, for m sufficiently large the right-hand side must be less than the left-hand side, a contradiction. □

Proof of Theorem 2. Suppose the theorem does not hold for some $\varepsilon > 0$. Then it must be possible to select a sequence of entry costs $k^m \to 0$ for which there is a corresponding sequence of multi-candidate equilibria, $(\mathcal{N}^m, \mu^m)$ with $|\mathcal{N}^m| = N^m$, such that for each m the set $\mathcal{N}^m$ includes some i^m with $(a^{i^m}, h^{i^m}) \notin B_\varepsilon(1, 0) \cup B_\varepsilon(0, 0)$. The incentive constraints (4) for each i^m and (5) for Sell-Outs and Scoundrels who are not in $\mathcal{N}^m$ imply

$$\begin{aligned} 0 \quad \leq \quad & \Delta\left(a^{i^m}, h^{i^m}, y^e(\mathcal{N}^m \backslash i^m, \mu^m(-i^m)\right) \\ & -R^m \max\left\{\Delta\left(0, 0, y^e(\mathcal{N}^m, \mu^m)\right), \Delta\left(1, 0, y^e(\mathcal{N}^m, \mu^m)\right)\right\}, \end{aligned} \tag{27}$$

where

$$R^m := \frac{\rho_i\left(\mathcal{N}^m \cup i, \mu^m(+i)\right)}{\rho_{i^m}\left(\mathcal{N}^m, \mu^m\right)}. \tag{28}$$

Let $y^* := \lim_{m\to\infty} y_{\text{avg}}(\mathcal{N}^m, \mu^m)$ (if necessary, focus on subsequence that converges, which is assured since $y_{\text{avg}}(\cdot)$ lives in a compact space). The proof now proceeds in three steps.

Step 1: $\lim_{m\to\infty} y_{\text{avg}}(\mathcal{N}^m \backslash i^m, \mu^m(-i^m)) = y^*$.

It follows from (12) that

$$y_{\text{avg}}(\mathcal{N}^m, \mu^m) - y_{\text{avg}}(\mathcal{N}^m \backslash i^m, \mu^m(-i^m)) = \rho_{i^m}\left(\mathcal{N}^m, \mu^m\right)\left[y^{i^m} - y_{\text{avg}}(\mathcal{N}^m \backslash i^m, \mu^m(-i^m))\right].$$

The desired conclusion then follows from the facts that $\rho_{i^m}\left(\mathcal{N}^m, \mu^m\right) \to 0$ (Lemma 4) whereas the quality of governance is bounded.

Step 2: $\lim_{m\to\infty} R^m = 1$.

We will argue that $\lim_{m\to\infty} \frac{1}{R^m} = 1$. Since $\rho_{i^m}\left(\mathcal{N}^m, \mu^m\right) > \rho_i\left(\mathcal{N}^m \cup i, \mu^m(+i)\right)$, it suffices to show that that the limit of $\frac{1}{R^m}$ is no greater than one. We can express

$$\frac{1}{R^m} = \left[\sum_{c=0}^{N^m} \frac{1}{c+1} P^m(c)\right] \times \left[(1-\mu_{i^m}^m) \sum_{c=0}^{N^m} \frac{1}{c+1} P^m(c) + \mu_{i^m}^m \sum_{c=0}^{N^m} \frac{1}{c+2} P^m(c)\right]^{-1},$$

where $P^m(c)$ is given by (23). Now choose any integer $K \geq 1$. Given that all the terms in summations above are non-negative and that the right-hand side is increasing in $\mu_{i^m}^m$, we have

$$\begin{aligned}
\frac{1}{R^m} &\leq \left[\sum_{c=0}^{K}\frac{1}{c+1}P^m(c)+\sum_{c=K}^{N^m}\frac{1}{c+1}P^m(c)\right]\times\left[\sum_{c=0}^{N^m}\frac{1}{c+2}P^m(c)\right]^{-1} \\
&\leq \left[\sum_{c=0}^{K}\frac{1}{c+1}P^m(c)+\sum_{c=K}^{N^m}\frac{1}{c+1}P^m(c)\right]\times\left[\sum_{c=K}^{N^m}\frac{1}{c+2}P^m(c)\right]^{-1} \\
&\leq \left[\sum_{c=0}^{K}\frac{1}{c+1}P^m(c)+\sum_{c=K}^{N^m}\frac{1}{c+1}P^m(c)\right]\times\left[\frac{K+1}{K+2}\sum_{c=K}^{N^m}\frac{1}{c+1}P^m(c)\right]^{-1} \\
&= \left(\frac{K+2}{K+1}\right)\left(1+\left[\sum_{c=0}^{K}\frac{1}{c+1}P^m(c)\right]\times\left[\sum_{c=K}^{N^m}\frac{1}{c+1}P^m(c)\right]^{-1}\right).
\end{aligned}$$

Suppose, as we will prove subsequently, that

$$\forall K\in\mathbb{N}:\quad \lim_{m\to\infty}\left(\left[\sum_{c=0}^{K}\frac{1}{c+1}P^m(c)\right]\times\left[\sum_{c=K}^{N^m}\frac{1}{c+1}P^m(c)\right]^{-1}\right)=0. \tag{29}$$

Then for any $K\in\mathbb{N}$, $\lim_{m\to\infty}\frac{1}{R^m}\leq\frac{K+2}{K+1}$, which implies that $\lim_{m\to\infty}\frac{1}{R^m}\leq 1$, completing the proof of Step 2. Consequently, all that remains is to prove (29).

Observe that for any convergent sequences ζ^m and ψ^m, $\lim_{m\to\infty}\frac{\zeta^m}{\psi^m}=0$ if and only if $\lim_{m\to\infty}\frac{\zeta^m}{\zeta^m+\psi^m}=0$. Thus, (29) holds if and only if for all $K\in\mathbb{N}$,

$$\lim_{m\to\infty}\left(\left[\sum_{c=0}^{K}\frac{1}{c+1}P^m(c)\right]\times\left[\sum_{c=0}^{N^m}\frac{1}{c+1}P^m(c)\right]^{-1}\right)=0 \tag{30}$$

With respect to the denominator in (30), we note that $\frac{1}{c+1}$ is convex and apply Jensen's inequality to get

$$\sum_{c=0}^{N^m}\frac{1}{c+1}P^m(c)=\mathbb{E}^m\left(\frac{1}{c+1}\right)\geq\frac{1}{\mathbb{E}^m\left(c\right)+1}, \tag{31}$$

where $\mathbb{E}^m(\cdot)$ is the expectation using the distribution $P^m(c)$.

With respect to the numerator in (30), we note that

$$\sum_{c=0}^{K} \frac{1}{c+1} P^m(c) \leq \sum_{c=0}^{K} P^m(c). \tag{32}$$

The right-hand side of (32) represents the probability of having no more than K "successes" in $|\mathcal{N}^m \setminus i^m|$ independent trials, where each trial i has a probability of success μ_i^m. There are now two cases to consider.

Case 1: Suppose first that there is some subsequence of m such that $N^m < \infty$ for all m in the subsequence. Then, Theorem 4 of Hoeffding (1956) implies that the right-hand side of (32) is bounded above by the corresponding probability for a binomial distribution with $N^m - 1$ independent trials and a constant success probability $\overline{\mu}^m := \mathbb{E}^m(c)/(N^m - 1)$, provided $K \leq \mathbb{E}^m(c) - 1$. Thus, for m sufficiently large (so that $\mathbb{E}^m(c) > K$, which Lemma 4 guarantees will occur), we have

$$\sum_{c=0}^{K} P^m(c) \leq \sum_{c=0}^{K} \binom{N^m - 1}{c} (\overline{\mu}^m)^c (1 - \overline{\mu}^m)^{N^m - 1 - c}. \tag{33}$$

Since the binomial distribution corresponding to the right-hand side of (33) is single-peaked and has mode no smaller than $\mathbb{E}^m(c) - 1$, for sufficiently large m (so that once again $K < \mathbb{E}^m(c)$), the summand on the right-hand side of (33) is maximized for $c = K$, implying

$$\begin{aligned} \sum_{c=0}^{K} P^m(c) &\leq (K+1) \binom{N^m - 1}{K} (\overline{\mu}^m)^K (1 - \overline{\mu}^m)^{N^m - 1 - K} \\ &\leq (K+1)(N^m - 1)^K (\overline{\mu}^m)^K (1 - \overline{\mu}^m)^{N^m - 1 - K} \\ &= (K+1)(\mathbb{E}^m(c))^K (1 - \overline{\mu}^m)^{\mathbb{E}^m(c)/\overline{\mu}^m - K}. \end{aligned} \tag{34}$$

Combining (31), (32), and (34), we have

$$\begin{aligned} \left[\sum_{c=0}^{K} \frac{1}{c+1} P^m(c)\right] \times \left[\sum_{c=0}^{N^m} \frac{1}{c+1} P^m(c)\right]^{-1} &\leq (\mathbb{E}^m(c) + 1)(K+1)(\mathbb{E}^m(c))^K (1 - \overline{\mu}^m)^{\mathbb{E}^m(c)/\overline{\mu}^m - K} \\ &\leq (K+1)(\mathbb{E}^m(c) + 1)^{K+1} (1 - \overline{\mu}^m)^{\mathbb{E}^m(c)/\overline{\mu}^m - K}. \end{aligned}$$

There are now two possibilities to consider. The first is that there is some $\xi \in (0, 1)$ such that $\overline{\mu}^m > 1-\xi$ for m sufficiently large. In that case, for large enough m,

$$(K+1)\left(\mathbb{E}^m(c)+1\right)^{K+1}\left(1-\overline{\mu}^m\right)^{\mathbb{E}^m(c)/\overline{\mu}^m-K} \leq (K+1)\left(\mathbb{E}^m(c)+1\right)^{K+1}\xi^{\mathbb{E}^m(c)-K}. \tag{35}$$

As $m\to\infty$, $\mathbb{E}^m(c)\to\infty$ and $\xi^{\mathbb{E}^m(c)-K}$ dominates $\left(\mathbb{E}^m(c)+1\right)^{K+1}$, so the expression on right-hand side of (35) converges to zero. Thus, (30) follows immediately for this case.

The second possibility is that there is no such ξ. In that case, we can assume without loss of generality that $\overline{\mu}^m\to 0$ as $m\to\infty$ (if necessary by restricting attention to a convergent subsequence). We then have $\lim_{m\to\infty}\left(1-\overline{\mu}^m\right)^{1/\overline{\mu}^m}=\frac{1}{e}$. So fixing some $\xi\in\left(1-\frac{1}{e},1\right)$, for m sufficiently large we have

$$(K+1)\left(\mathbb{E}^m(c)+1\right)^{K}\left(1-\overline{\mu}^m\right)^{\mathbb{E}^m(c)/\overline{\mu}^m-K} \leq (K+1)\left(\mathbb{E}^m(c)+1\right)^{K}\xi^{\mathbb{E}^m(c)}\left(1-\overline{\mu}^m\right)^{-K}. \tag{36}$$

As $m\to\infty$, $\mathbb{E}^m(c)\to\infty$ and $\xi^{\mathbb{E}^m(c)}$ dominates $\left(\mathbb{E}^m(c)+1\right)^{K}$, while $\left(1-\overline{\mu}^m\right)^{-K}\to 1$, so the expression on the right-hand side of (36) converges to zero. Thus, (30) follows for this case as well.

<u>Case 2</u>: Now suppose that in any subsequence of the original sequence of m, $N^m=\infty$ infinitely often. Pick any subsequence where $N^m=\infty$ for all m. We will use a subscript of n on $\mathbb{E}^m_n(c)$ and P^m_n to denote the respective objects when the set $\mathcal{N}^m$ is restricted to a finite subset of the first n candidates, and let $\overline{\mu}^m_n := \mathbb{E}^m_n(c)/n$. Then, because $\sum_{c=0}^K P^m(c)\leq\sum_{c=0}^K P^m_n(c)$ for any n (adding individuals can only increase the number of realized candidates), the same argument as in Case 1 can now be applied to a large enough subset of $\mathcal{N}^m$, allowing us to conclude that for large enough m and large enough n,

$$\begin{aligned}
\sum_{c=0}^{K}P^m(c) &\leq \sum_{c=0}^{K}\binom{n}{c}\left(\overline{\mu}^m_n\right)^c\left(1-\overline{\mu}^m_n\right)^{n-c}\\
&\leq (K+1)\binom{n}{K}\left(\overline{\mu}^m_n\right)^K\left(1-\overline{\mu}^m_n\right)^{n-K}\\
&\leq (K+1)\,(n)^K\left(\overline{\mu}^m_n\right)^K\left(1-\overline{\mu}^m_n\right)^{n-K}\\
&= (K+1)\left(\mathbb{E}^m_n(c)\right)^K\left[\left(1-\overline{\mu}^m_n\right)^{1/\overline{\mu}^m_n}\right]^{\mathbb{E}^m_n(c)}\left(1-\overline{\mu}^m_n\right)^{-K}.
\end{aligned} \tag{37}$$

For any fixed m, as $n\to\infty$, $\mathbb{E}^m_n(c)\to\mathbb{E}^m(c)<\infty$ (as was discussed in the proof of Lemma 3), hence $\overline{\mu}^m_n\to 0$, which in turn implies that $\left(1-\overline{\mu}^m_n\right)^{1/\overline{\mu}^m_n}\to\frac{1}{e}$ while $\left(1-\overline{\mu}^m_n\right)^{-K}\to$

1. Therefore, taking the limit as $n \to \infty$ in (37) yields

$$\sum_{c=0}^{K} P^m(c) \leq (K+1)\left(\mathbb{E}^m(c)\right)^K e^{-\mathbb{E}^m(c)}. \tag{38}$$

Combining (31), (32), and (38), we get

$$\begin{aligned}\left[\sum_{c=0}^{K} \frac{1}{c+1} P^m(c)\right] \times \left[\sum_{c=0}^{N^m} \frac{1}{c+1} P^m(c)\right]^{-1} &\leq \left(\mathbb{E}^m\left(c\right)+1\right)(K+1)\left(\mathbb{E}^m(c)\right)^K e^{-\mathbb{E}^m(c)} \\ &\leq (K+1)\left(\mathbb{E}^m(c)+1\right)^{K+1} e^{-\mathbb{E}^m(c)}.\end{aligned}$$

As $m \to \infty$, $\mathbb{E}^m(c) \to \infty$ and $e^{-\mathbb{E}^m(c)}$ dominates $(\mathbb{E}^m(c)+1)^{K+1}$, hence the expression on the right-hand side above converges to zero. Thus, (30) follows.

Step 3: Proof of the theorem.

Suppose without loss of generality that the sequence hypothesized at the start of the proof, (a^{i^m}, h^{i^m}), converges to some limit (a^*, h^*), if necessary choosing a subsequence of the original sequence. Since $(a^{i^m}, h^{i^m}) \notin B_\varepsilon(1,0) \cup B_\varepsilon(0,0)$ for any m, it must also be that $(a^*, h^*) \notin B_\varepsilon(1,0) \cup B_\varepsilon(0,0)$. Since (27) holds for all m, it follows that

$$\begin{aligned} 0 &\leq \lim_{m\to\infty} \left[\Delta\left(a^{i^m}, h^{i^m}, y_{\text{avg}}(\mathcal{N}^m \backslash i^m, \mu^m(-i^m)\right)\right. \\ &\quad \left. - R^m \max\left\{\Delta\left(0,0,y_{\text{avg}}(\mathcal{N}^m,\mu^m)\right), \Delta\left(1,0,y_{\text{avg}}(\mathcal{N}^m,\mu^m)\right)\right\}\right] \\ &= \Delta\left(a^*, h^*, y^*\right) - \max\left\{\Delta\left(0,0,y^*\right), \Delta\left(1,0,y^*\right)\right\}, \end{aligned}$$

where the equality uses Steps 1 and 2 and the continuity of $\Delta(\cdot)$. However, Lemma 2 implies that $\max\left\{\Delta\left(0,0,y^*\right), \Delta\left(1,0,y^*\right)\right\} > \Delta\left(a^*, h^*, y^*\right)$ for $(a^*, h^*) \notin B_\varepsilon(1,0) \cup B_\varepsilon(0,0)$, a contradiction. □

Proof of Theorem 3. Suppose the theorem is false for some $\varepsilon > 0$. Then it is possible to select a sequence of entry costs $k^m \to 0$ for which there is a corresponding sequence of multi-candidate equilibria, $(\mathcal{N}^m, \mu^m)$, such that for each m, $|y_{\text{avg}}(\mathcal{N}^m, \mu^m) - \widetilde{y}(\sigma)| > \varepsilon$. Without loss of generality, we can assume that $y_{\text{avg}}(\mathcal{N}^m, \mu^m)$ converges to a limit point y_∞, with either (i) $y_\infty > \widetilde{y}(\sigma) + \varepsilon$ for some $\varepsilon > 0$ and $y_{\text{avg}}(\mathcal{N}^m, \mu^m) > \widetilde{y}(\sigma) + \varepsilon$ for all m, or (ii) $y_\infty < \widetilde{y}(\sigma) - \varepsilon$ for some $\varepsilon > 0$ and $y_{\text{avg}}(\mathcal{N}^m < \widetilde{y}(\sigma) - \varepsilon$ for all m. (If necessary, choose an appropriate subsequence of the original sequence.) We will focus on case (i); the argument for case (ii) is symmetric (replacing Sell-Outs with Scoundrels, and vice versa).

Because $y_{\text{avg}}(\mathcal{N}^m, \mu^m) > \widetilde{y}(\sigma) + \varepsilon$ for all m, Theorem 2 implies that there must be $i^m \in \mathcal{N}^m$ for each m such that $(a^{i^m}, h^{i^m}) \to (1,0)$ (a Sell-Out) as $m \to \infty$. Furthermore, by Lemma 2, Scoundrels have the greatest incentive to run for office. According to (27), equilibrium then requires

$$0 \leq \Delta\left(a^{i^m}, h^{i^m}, y_{\text{avg}}(\mathcal{N}^m \backslash i^m, \mu^m(-i^m))\right) - R^m \Delta\left(0, 0, y_{\text{avg}}(\mathcal{N}^m, \mu^m)\right)$$

where R^m is defined by (28). Taking limits as $m \to \infty$ (and invoking the continuity of $\Delta(\cdot)$, the fact that $|\mathcal{N}^m|$ grows without bound, and Step 2 of the proof of Theorem 2), we have

$$0 \leq \Delta\left(1, 0, y_\infty\right) - \Delta\left(0, 0, y_\infty\right).$$

But with $y_\infty > \widetilde{y}(\sigma)$, the right-hand side above is strictly negative by Lemma 2, a contradiction. □

Proof of Theorem 4. Define

$$\Delta^\Pi(a, h, y) := \left[1 + \lambda \Pi\left(Y\left(a, h \mid \sigma\right)\right)\right] \Delta(a, h, y).$$

From Lemma 2, we know that $\Delta(1, 0, y) \geq \Delta(a, h, y)$ for all $(a, h) \neq (1, 0)$ and $y \leq \overline{y}(\sigma)$, with strict equality except for $(a, h, y) = (0, 0, \overline{y}(\sigma))$. As long as $\Delta(1, 0, y) > 0$, given our assumption on Π, we have $\Delta^\Pi(1, 0, y) > \Delta^\Pi(a, h, y)$ for all $(a, h) \neq (1, 0)$ with $Y(a, h \mid \sigma) \leq Y(1, 0 \mid \sigma)$ and $y \leq \overline{y}(\sigma)$. By continuity of Δ^Π in its third argument, for any $\eta_1 > 0$ and some small $\eta_2 > 0$, the same statement holds for $Y(a, h \mid \sigma) \leq Y(1, 0 \mid \sigma) - \eta_1$ and $y \leq \overline{y}(\sigma) + \eta_2$.

Now assume the theorem is false. Then it must be possible to select some sequence of entry costs $k_m \to 0$ for which there is a corresponding sequence of multi-candidate equilibria, $(\mathcal{N}_m, \mu_m)$ such that $\lim_{m \to \infty} y_{\text{avg}}(\mathcal{N}_m, \mu_m) \leq \overline{y}(\sigma)$. By the argument in the preceding paragraph, for sufficiently large m, Sell-Outs would have strictly greater incentives to enter than any other type (a, h) with $Y(a, h \mid \sigma) \leq Y(1, 0 \mid \sigma) - \eta_1$. Through an argument paralleling the one given in the proof of Theorem 3, one can then show that, in the limit, the quality of the worst candidate must converge to a limit no less than $Y(1, 0 \mid \sigma)$. But that implication contradicts the assumption that average quality converges to a limit no greater than $\overline{y}(\sigma)$. □

Proof of Theorem 5. For this proof we will augment the arguments of Δ to including α, writing $\Delta(a,h,y,\alpha)$. It is easily verified that Δ is weakly decreasing in α, and strictly so for any a,h such that $\overline{v} - v^*(a,h,\sigma) > 0$, which is the case for any a and $h = 0$.

Fix $\alpha_2 > \alpha$. Define

$$\Delta^{\Pi,\alpha_2}(a,h,y) := \Delta(a,h,y,\alpha) + \lambda\Pi(Y(a,h \mid \sigma))\Delta(a,h,y,\alpha_2).$$

Define C to be the set of character types of quality strictly less than $\frac{y^{\min}(\sigma)+\overline{y}(\sigma)}{2}$. From Lemma 2 we know that $\Delta(a,h,y,\alpha) - \Delta(0,0,y,\alpha) \leq 0$ for all $y \geq \overline{y}(\sigma)$ and $(a,h) \neq (0,0)$, with strict inequality when $y > \overline{y}(\sigma)$ or $(a,h) \neq (1,0)$. Thus, if $\Pi(y^{\max}) = \Pi(y^{\min}(\sigma))$, then for all $y \geq \overline{y}(\sigma)$,

$$\sup_{(a,h)\notin C} \left(\Delta^{\Pi,\alpha_2}(a,h,y) - \Delta^{\Pi,\alpha_2}(0,0,y)\right) < 0. \tag{39}$$

By the continuity of Δ, there exist $\varepsilon, \eta > 0$ with $\overline{y}(\sigma) - \eta > \frac{y^{\min}(\sigma)+\overline{y}(\sigma)}{2}$ such that (39) holds for all $y \geq \overline{y}(\sigma) - \eta$ provided $\Pi(y^{\max}) < \Pi(y^{\min}(\sigma)) + \varepsilon$.

We claim that the theorem holds for the ε and η defined in the previous paragraph. Assume not. Then there is some non-decreasing $\Pi(\cdot)$ satisfying $\Pi(y^{\max}) < \Pi(y^{\min}(\sigma))+\varepsilon$ such that it is possible to select a sequence of entry costs $k_m \to 0$ for which there is a corresponding sequence of multi-candidate equilibria, $(\mathcal{N}_m, \mu_m)$, such that $y_{\text{avg}}(\mathcal{N}_m, \mu_m) > \overline{y}(\sigma) - \eta$. From the preceding paragraph, we know that for all m, Scoundrels have a strictly greater incentive to enter than any type with quality exceeding $\frac{y^{\min}(\sigma)+\overline{y}(\sigma)}{2}$. Through an argument paralleling the one given in the proof of Theorem 3, one can then show that, in the limit as $m \to 0$, the quality of the best candidate cannot exceed $\frac{y^{\min}(\sigma)+\overline{y}(\sigma)}{2} < \overline{y}(\sigma) - \eta$. But that contradicts the assumption that $y_{\text{avg}}(\mathcal{N}_m, \mu_m) > \overline{y}(\sigma) - \eta$ for all m. $\square$

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