Candidate Entry and Political Polarization: An Antimedian Voter Theorem

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We study a citizen-candidate-entry model with private information about ideal points. We fully characterize the unique symmetric equilibrium of the entry game and show that only relatively "extreme" citizen types enter the electoral competition as candidates, whereas more "moderate" types never enter. It generally leads to substantial political polarization, even when the electorate is not polarized and citizens understand that they vote for more extreme candidates. We show that polarization increases in the costs of entry and decreases in the benefits from holding office. Moreover, when the number of citizens goes to infinity, only the very most extreme citizens, with ideal points at the boundary of the policy space, become candidates. Finally, our polarization result is robust to changes in the implementation of a default policy if no citizen runs for office and to introducing directional information about candidates' types that is revealed via parties.

We present a theoretical argument that polarization of political candidates relative to the distribution of preferences in the underlying citizenry may be an unavoidable consequence of having open elections—that is, elections where any citizen is eligible to run for office—if there is asymmetric information between candidates and voters about the policy intentions of the candidates they are voting for. Political scientists have known for decades that, despite a barrage of information from the media, many voters are poorly informed about the true preferences of candidates at the time they are running for office or where they sit on an ideological scale (Campbell et al. 1960; Palfrey and Poole 1987; and others). Asymmetry of information would seem to be, if anything, a greater problem the more open is the election. The question we then ask in this article, for open-entry, winner-take-all elections where ideal points are privately known and impossible to credibly reveal, what is the ideological distribution of the entering candidates, and how do equilibrium outcomes depend on the underlying distribution of ideal points? The answer is an antimedian voter theorem. In large elections, only the most extreme citizens will compete for office. The result does not depend on the distribution of voter preferences, and the extreme outcomes correspond to the unique symmetric equilibrium of the entry game. Importantly, political polarization is an equilibrium outcome even if the citizenry is informed about candidates' political leanings "left" or "right" via party nominating conventions (for voters' party identification, see, e.g., Ansolabehere, Rodden, and Snyder 2008).

The stark result of the model suggests that one should expect the distribution of preferences of political elites to be more polarized than the distribution of voter preferences. On the empirical side, there is some evidence suggesting this to be the case in Western democracies

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We thank the National Science Foundation for research support (SES-0962802). We wish to thank Jon Eguia, our discussant at the 2010 Midwest Political Science Association meeting in Chicago, and Salvatore Nunnari, who offered helpful suggestions on earlier drafts. The article has benefited from comments by the referees and the editor. We also are grateful for comments and suggestions from participants of the 2008 BBVA conference on the Political Economy of Democracy at Universitat Autónoma de Barcelona, where we first presented an early, incomplete draft of this article. A short version of that draft, without any proofs, appeared in a collection of the papers presented at the conference.

American Journal of Political Science, Vol. 00, No. 00, xxx 2013, Pp. 1–17

DOI: 10.1111/ajps.12032

with relatively open entry. For example, several political scientists have argued that the currently high polarization of political elites in the United States, especially elected officials (McCarty, Poole, and Rosenthal 2006; Poole and Rosenthal 1984), is not matched by, let alone a result of, a high level of polarization of policy preferences in the underlying citizenry (DiMaggio, Evans, and Bryson 1996; Fiorina and Abrams 2008; Fiorina, Abrams, and Pope 2006). More recently, Bafumi and Herron (2010) report results from an extensive study comparing the preference distribution of voters to the distribution of elected members of the U.S. Congress and show that the distribution of these politicians is much more polarized than the underlying distribution of voter preferences. One possible explanation for these findings is that more extreme members of a polity may have a greater incentive to run for office than more moderate members. The difficulty in answering this question theoretically is that the incentives for entry into politics are determined endogenously, as they depend crucially on the entry strategies of other potential candidates. Thus, one needs to analyze the equilibrium of an entry game. Here we explore a model with asymmetric information, free entry of candidates, and limited ability for voters to control politicians once they are in office and show how the combination of these factors can explain, as an equilibrium phenomenon, the relatively extreme preferences of elected politicians.

We analyze a citizen-candidate model of entry with plurality voting and incomplete information about the ideal points of all other citizens and hence candidates, which is a polar opposite assumption to the complete information used in the seminal citizen-candidate models of Besley and Coate (1997) and Osborne and Slivinski (1996). As a consequence, while asking similar questions, we reach completely different conclusions. What the two seminal models and our model have in common is that they depart from standard spatial models of electoral competition (Downs 1957; Hotelling 1929) by introducing endogenous entry of candidates, or parties, when these have policy preferences of their own.[1] Therefore, the benefits candidates enjoy from winning the elections do not only include direct personal benefits from holding office but also the fact that by winning they can implement their preferred public policy outcomes.

The standard one-dimensional spatial model of citizen-candidate competition with complete information about citizens' ideal points proceeds as follows: A community is electing a leader. In the first stage, each citizen can enter the electoral competition as a candidate, at some commonly known costs, or can choose not to enter. If nobody enters, an exogenously specified default policy is implemented. In the second stage, a plurality (winner-take-all) election takes place. In the third stage, the newly elected leader implements her ideal point as the policy. The two seminal citizen-candidate models differ to some extent. For example, Osborne and Slivinski (1996) assume a continuum of citizens (i.e., potential candidates) and that each votes sincerely for her most preferred candidate. By contrast, Besley and Coate (1997) assume a finite number of citizens and strategic voting (i.e., a Nash equilibrium in undominated strategies for the election stage). The models have some differences in their implications about candidates and outcomes, but they have two important results in common. For most environments: (1) there are multiple equilibria with different numbers of candidates; and (2) these equilibria usually support centrist outcomes in the one-dimensional Downsian spatial model, and special conditions are required to admit outcomes near the extremes of the policy space. Specifically, with strategic voting and an odd number of voters (Besley and Coate 1997), the ideal point of the median voter is always an equilibrium outcome unless entry costs are prohibitively high. Furthermore, with an even number of voters, there always exists a two-party equilibrium with the two most centrist citizens entering.[2] With sincere voting (Osborne and Slivinski 1996) with one or two candidates, there exist equilibrium outcomes that are either exactly at or arbitrarily close to the median voter's ideal point. Moreover, for all one- and two-candidate equilibria with sincere voting—and typically there are a continuum of them—a tight bound exists on the distance between the median voter's and candidates' ideal points. Thus, while exact candidate convergence is not always an equilibrium, extreme outcomes are not a typical feature of these models.[3] The indeterminacy in the form of multiplicity of equilibria is problematic because it limits

[1]The citizen-candidate models have their roots in the earlier work on strategic entry, models related to Duverger's law, and models with policy-motivated candidates. See, for example, Feddersen (1992), Feddersen, Sened, and Wright (1990), Fey (1997, 2007), Osborne (1993), Palfrey (1984, 1989), and Wittman (1983).

[2]Eguia (2007) shows that if there is turnout uncertainty and a large number of citizens, the one-party equilibria no longer exist and centrist two-party equilibria always exist, regardless of whether the number of citizens is odd or even.

[3]More specifically, with sincere voting and a continuum of voters, for all parameter values of the model, either a continuum of one-candidate equilibria or a continuum of two-candidate equilibria exist (or both). The one-candidate entry equilibria arise if the benefits of holding office are low relative to the entry cost, while two-candidate equilibria exist when benefits of holding office are relatively high. There can also be equilibria with more than two candidates entering. With strategic voting and a finite number of citizens (the Besley and Coate model), if citizen ideal points are distinct, convergence of candidate platforms in the two-candidate equilibria is literally impossible by assumption.

the empirical content of the models. On the other hand, to the extent that there is any empirical content of these models in the one-dimensional case, it is the fact that centrist outcomes are nearly always consistent with equilibrium. Thus, a reasonable interpretation of equilibrium in citizen-candidate models with complete information is that they exhibit two key properties that generally hold: indeterminacy and centrality.

If there are no barriers such as political primaries or nominating conventions, and no incumbents or political reputations or future elections, then incomplete information of voters about candidates would be a natural and potentially important component of the model. Moreover, the assumption that all citizens' preferences are common knowledge flies in the face of at least a half-century of accumulated empirical evidence about the very low information levels of voters. In our model, any citizen willing to pay the cost of entry can do so, and the potential entrants are all identical except for their ideal points. The incorporation of the private (incomplete) information about citizens' and candidates' preferences is, therefore, our main point of departure from the seminal citizen-candidate models, and most others that have followed, which assume that the policy preferences of all citizens and hence all candidates are common knowledge. We use the same notion of entry equilibrium: entry strategies must be such that each citizen's entry decision is optimal given the entry strategies of all other citizens. We follow the approach of Besley and Coate (1997) by assuming strategic voting at the election stage. Despite using the citizen-candidate models' general framework, switching from common to, arguably realistic, private information about citizen and candidate preferences leads to dramatically different results in our model. There are three main differences: First, our model does not suffer from multiple-entry equilibria, which often predict very different policy outcomes. We derive a unique equilibrium for our game that provides unique distributional predictions of the candidates' ideal points. Second, in our model, the candidates' ideal points are extreme, while in citizen-candidate models with complete information, they tend to be moderate, though they can also be extreme under special conditions.[4] Third, in very large elections, only the most extreme candidates enter, and this is entirely independent of the underlying distribution of citizen ideal points (in other citizen-candidate models, the policy outcomes depend on this distribution).

Here, we develop a citizen-candidate model with a finite (possibly very large) number of citizens whose ideal points are private information, and iid draws from a continuous distribution on the policy space. As in the seminal models, we look at an equilibrium in multiple stages that satisfies sequential rationality of all voters and candidates. Because we have private information, we look at perfect Bayesian equilibrium. Because our model does not allow any coordination among the voters or candidates, and all citizens are drawn independently from the same distribution of types and have the same payoff functions, we focus on symmetric equilibrium. We prove that a unique symmetric equilibrium exists and provide a full characterization of it.[5] This equilibrium in the entry stage of the game is characterized by a pair of cutpoint policies that determine the entry decisions, one on the left side of the ideological spectrum, and the other on the right side. It has the property that citizens with "moderate" preferences (between the two cutpoints) do not enter; only citizens with ideal points more extreme than one of the two cutpoints enter. A leftist citizen enters if and only if her ideal point is to the left of (or equal to) the left cutpoint, while a rightist citizen enters if and only if her ideal point is to the right of (or equal to) the right cutpoint. Part of the intuition for this polarization result is that because the candidates' winning chances are the same, their payoffs vary only in the difference between ideal points and the implemented policy, where more extreme entrants have more to gain from avoiding others' policy decisions than more moderate entrants. The latter follows from the concavity of utility functions. The equilibrium implies a *unique* probability distribution of the number of candidates, and we derive the following comparative statics results about how this distribution changes with the underlying parameters of the model: If the costs of entry increase or the benefits from holding office decrease, then fewer candidates enter, in the sense of first-order stochastic dominance, and they are more extreme on average. Finally, we derive the expected number of candidates for a very large citizenry and show that in the limit, only the very most extreme possible citizens enter the electoral competition. Thus, in both small and large electorates, the distribution of ideal points of candidates will necessarily be more polarized—by any measure one might use—than the distribution of ideal points in the population they are representing. Moreover, this "political polarization" effect is greater the larger the electorate.

[4]For example, with complete information and sincere voting, if candidates were too extreme, moderates could enter and win, as shown in Brams and Straffin (1982) and Palfrey (1984).

[5]The uniqueness result is both strong and quite surprising in view of the dramatic multiple-equilibrium problem in citizen-candidate models with complete information. See, for example, Dhillon and Lockwood (2002), Eguia (2007), Roemer (2003), and the references they cite.

In very large electorates, outcomes will coincide with the most extreme policies in the policy space, rather than the median ideal point—hence, we call it an "antimedian voter theorem." Thus, our analysis of equilibrium in the citizen-candidate model with private information completely reverses the two key properties of equilibria in the citizen-candidate models with complete information, indeterminacy of equilibrium, and centrality of candidates.

The model extends the analysis of citizen-candidate models in another important direction that is of interest both technically and substantively. As the default policy in case nobody runs for office, previous citizen-candidate models impose an exogenously fixed policy decision, for example, the status quo decision.[6] In contrast, our default policy implements a policy decision as part of the equilibrium; that is, it randomly selects one *actual* citizen as the new leader. Thus, in our model with private information, the equilibrium cutpoints affect voters' beliefs about the distribution of ideal points, conditional on the event of no entry, since that event implies that all citizen ideal points lie between the two cutpoints. For example, consider a community without any reasonable candidate. Under pressure to make important policy decisions, a citizen who has substantial policymaking experience but did not campaign may be convinced to act as the interim leader, irrespective of her ideal point.

At the end of the article, we show that our political polarization result can be extended to other variations on the model, in natural ways. For example, we consider a variety of other default specifications and show that our main results are robust. The equilibrium cutpoints change in minor ways, but the qualitative results are unchanged. In addition to various exogenous specifications, we discuss an alternative endogenous default policy with multiple entry rounds. That is, if nobody runs for office in the initial round, another entry round follows, and this continues until eventually at least one candidate enters.[7] We also consider relaxing the informational asymmetry by assuming that citizens know the politicians' leanings "left" or "right" and that they are represented by two competing parties, and we show that existence of a symmetric entry equilibrium and our comparative statics results continue to hold for the smooth—symmetric and asymmetric—probability distributions of citizen ideal points that we analyze.

[6]Some specification of the zero-entry subgame is needed for the game to be well defined.

[7]While we do not analytically characterize the solution, we can show that it will also lead to political polarization. In fact, the first-round entry cutpoints in the multi-round model are more extreme than in the one-round model. For more details, see the working-paper version of this article (Großer and Palfrey 2011).

Several articles have begun to explore the effects of uncertainty on citizen-candidate equilibria, in several different ways. For example, Eguia (2007) allows for uncertain turnout and shows how this can reduce somewhat the set of equilibria in the model of Besley and Coate (1997). Fey (2007) uses the Poisson game approach to study entry when there is an uncertain number of citizens. Brusco and Roy (2011) add aggregate uncertainty, allowing for shifts in the distribution of ideal points. Casamatta and Sand-Zantman (2005) study a model with private information and three citizen types and analyze the asymmetric equilibria of a coordination game. Moreover, Hamlin and Hjortlund (2000) show that proportional representation can lead to more diverse policy outcomes than plurality voting in the model of Osborne and Slivinski (1996). Finally, although not a citizen-candidate model, Osborne, Rosenthal, and Turner (2000) study a model where extreme types participate in costly meetings and moderate policy outcomes are the result of compromise between left and right extremists.

General Model

A community of $n \geq 2$ citizens is electing a new leader to implement a policy decision. The policy space is represented by the $[-1, 1]$ interval of the real line. Each citizen $i = 1, \ldots, n$ has preferences over policies which are represented by a continuous concave and single-peaked utility function, $-U(x_i, \gamma)$, that is decreasing in the Euclidean distance between her ideal point (or type), $x_i \in [-1, 1] \subset \mathbb{R}$, and the policy decision, $\gamma \in [-1, 1] \subset \mathbb{R}$.

An individual's ideal point is private information; therefore, only citizen i knows x_i. Moreover, the ideal points are distributed according to a cumulative probability distribution function F, and we assume that $F(x), x \in [-1, 1] \subset \mathbb{R}$, is common knowledge. We denote the density function by f and make the following assumptions about F:

- A1: $F(-1)=0$;
- A2: $F(1)=1$;
- A3: F is continuous, strictly increasing, and twice differentiable on $[-1, 1]$.

There are three decision-making stages. In the first stage (*Entry*), all citizens learn their own type and decide simultaneously and independently on whether to run for office, $e_i = 1$, and bear the entry costs, $c > 0$, or not run, $e_i = 0$, and bear no costs. The number of citizen candidates is denoted by $m \equiv \sum_{i=1}^{n} e_i$. In the second stage (*Voting*), if $m > 0$, each citizen i makes a costless decision on whether to vote for one of the candidates, possibly for herself, or to abstain. The new leader is determined by plurality rule, with random tie breaking, and announced publicly. If there is no candidate, $m = 0$, a stochastic default policy, d, takes effect: one citizen i is randomly selected as the new leader with equal probability of $1/n$ for each citizen, and we assume that she bears no entry costs.[8] In the final stage (*Policy decision*), the leader implements a policy γ. Then, ex post, each citizen i's total payoff is given by

$$\pi_i(x_i, \gamma, e_i, w_i) = -U(x_i, \gamma) - ce_i + bw_i, \qquad (1)$$

where $-U$, the utility function from policy deviations from a citizen's ideal point, is a weakly concave decreasing function of $|x_i - \gamma|$. A commonly used example is the quadratic loss function or a linear loss function ("tent" preferences). Let $w_i = 1$ if i is elected or randomly selected as the new leader, in which case she receives private benefits from holding office, $b \geq 0$. If i is not the new leader, then $w_i = 0$. We assume citizens maximize their expected own payoffs. Note that we assumed all citizens have the same entry cost, c, and leadership benefit, b.

Political Equilibrium

A "political equilibrium" is a perfect Bayesian equilibrium of the citizen-candidate model with private information described above. In the characterization of equilibrium, all the action is in the *Entry* stage. Here, we briefly discuss the final two decision-making stages, and analysis of the entry stage is carried out in the next section. In the *Policy decision* stage, the newly elected leader's only credible policy decision is to implement her own ideal point, $\gamma^* = x_i$, a strictly dominant strategy in that stage. In the *Voting* stage, all noncandidate citizens are indifferent between all candidates since the candidates' ideal points are private information (we abstract from any policy promises of the entrants, which would only result in cheap talk because of their incentive to misrepresent ideal points to increase their chance of winning). Hence, we assume each noncandidate either votes for each candidate with equal probability of $1/m$ or abstains. For each candidate, it is a weakly dominant strategy to vote for herself. This is because in case of becoming the new leader, implementing her own ideal point yields her no loss in payoff, compared to a strict loss with probability one if another candidate is elected. Given these vote decisions, each candidate has an equal chance of winning the election.[9]

Symmetric Entry Equilibrium in Cutpoint Strategies

In this article, we focus on symmetric equilibria at the entry stage.[10] We prove two main results. First, a symmetric equilibrium is *always* in cutpoint strategies at the entry stage. A cutpoint strategy is characterized by two critical ideal points, $(\check{x}_l, \check{x}_r)$, where $-1 \leq \check{x}_l \leq \check{x}_r \leq 1$, where the check mark denotes a cutpoint, such that a citizen enters if and only if $x_i \leq \check{x}_l$ or $x_i \geq \check{x}_r$. This is true because the best response strategy of a citizen to any symmetric strategy of the other citizens is always a cutpoint strategy (first subsection), even if the other citizens are not using cutpoint strategies. Second, we show that such an equilibrium is always unique, and we fully characterize it. These results hold for any continuous cumulative probability distribution, $F(x)$, of ideal points $x \in [-1, 1]$ satisfying A1–A3 (second subsection), and for any concave single-peaked utility function of citizens, and a stochastic default policy, d, in which one citizen is randomly selected if no candidate emerges in the entry stage. The rest of the section explores the comparative statics results for these entry equilibria (third subsection) and examines the limiting case of large communities (fourth subsection), and we illustrate these results with an example (fifth subsection).

Cutpoint Strategies and Best Response Condition

Here, we prove our first main result that equilibria are always in cutpoint strategies and that political polarization—i.e., entry from the extremes—is implied

[8]The assumption that a randomly selected leader does not bear any entry costs (e.g., there are no campaign costs) simplifies the analysis but is innocent regarding our equilibrium results derived in the following sections. Other default policies are discussed in more detail later.

[9]We focus on voting equilibria in weakly undominated strategies throughout the article. Moreover, voting equilibria exist in which some candidates have strictly larger probabilities of being elected than others. By assumption, we rule out the possibility of any kind of coordination prior to or after entry decisions are made. Hence, ex ante, each candidate has an equal probability of becoming the new leader. In the section entitled "Extensions," we introduce directional information about the politicians' leanings "left" or "right," which typically yields asymmetric probabilities of being elected between entrants in opposite directions.

[10]This is a common assumption in applied models of simultaneous one-shot games where all players are identical ex ante (e.g., Feddersen and Pesendorfer 1998). The working-paper version of this article analyzes the asymmetric entry equilibria in coordinated type-independent strategies where a subset of citizens always enters, regardless of their ideal point, and the other citizens never enter (Großer and Palfrey 2011).

by these strategies. To build the intuition, we begin with the analysis by showing that best responses to cutpoint strategies are cutpoint strategies. While this analysis does not directly imply that equilibria are always in cutpoint strategies, the analysis is similar to the general case, which is formally stated and proved as Lemma 1 at the end of this subsection.

Consider citizen i. Suppose all citizens $j \neq i$ are using an entry strategy defined by two cutpoints:

$$\check{e}_j = \begin{cases} 0 & \textit{if } x_j \in (\check{x}_l, \check{x}_r) \\ 1 & \textit{if } x_j \in [-1, \check{x}_l] \cup [\check{x}_r, 1], \end{cases} \quad (2)$$

where $(\check{x}_l, \check{x}_r)$ is some pair of ideal points with $-1 \leq \check{x}_l \leq \check{x}_r \leq 1$, and the subscripts denote their relative locations left and right, respectively. In words, the cutpoint strategy $\check{e}$ determines that a citizen with an ideal point equal to or more "extreme" than $\check{x}_l$ or $\check{x}_r$ runs for office, and citizens with ideal points more "moderate" than $\check{x}_l$ and $\check{x}_r$ do not run.

Recall that if neither citizen i nor any other citizen runs for office, $m = 0$, a stochastic default policy, d, takes effect, which randomly selects one of the n citizens as the new leader with equal probability of $1/n$ for each. In this event, it follows from Bayesian updating that $x_j \in (\check{x}_l, \check{x}_r), \forall j \neq i$.

To derive the equilibrium pair of cutpoint policies, or *equilibrium cutpoints*, $(\check{x}_l^*, \check{x}_r^*)$,[11] we must compare citizen i's expected payoffs as both a candidate and a noncandidate, given the equilibrium decisions in subsequent stages (see the section entitled "Political Equilibrium"). Then, $(\check{x}_l^*, \check{x}_r^*)$ is an equilibrium if and only if $\check{e}_i(\check{x}_l^*, \check{x}_r^*)$ is a best response for citizen i when $\check{e}_j(\check{x}_l^*, \check{x}_r^*)$ is the entry strategy of all $j \neq i$.

Citizen i's expected payoff for *entering*, $\check{e}_i = 1$, can be written as

$$E[\pi_i \mid x_i, \check{e}_i = 1] = (1-p)^{n-1} b + \sum_{m=2}^{n} \binom{n-1}{m-1} p^{m-1}(1-p)^{n-m} \times \left[\frac{b}{m} - \frac{m-1}{m} E[U(x_i, \gamma) \mid \gamma \notin (\check{x}_l, \check{x}_r)]\right] - c, \quad (3)$$

where p denotes the probability that a randomly selected $j \neq i$ enters, if each j is using strategy $\check{e}_j(\check{x}_l, \check{x}_r)$.[12] So, $p \equiv p_l + p_r$, with $p_l \equiv \Pr(x_j \leq \check{x}_l) = F(\check{x}_l)$ and $p_r \equiv \Pr(x_j \geq \check{x}_r) = 1 - F(\check{x}_r)$ for our $F(x)$, $x \in [-1, 1] \subset \mathbb{R}$.

Citizen i's expected payoff loss from the policy outcome if some $j \neq i$ is elected (a term inside the summation) equals

$$\begin{aligned} &E[U(x_i, \gamma) \mid \gamma \notin (\check{x}_l, \check{x}_r)] \\ &= \frac{p_l}{p} \frac{\int_{-1}^{\check{x}_l} f(x)U(x_i, x)dx}{p_l} + \frac{p_r}{p} \frac{\int_{\check{x}_r}^{1} f(x)U(x_i, x)dx}{p_r} \\ &= \frac{\int_{-1}^{\check{x}_l} f(x)U(x_i, x)dx + \int_{\check{x}_r}^{1} f(x)U(x_i, x)dx}{p} \\ &\textit{for} \quad \check{x}_l \neq -1 \wedge \check{x}_r \neq 1, \end{aligned} \quad (4)$$

which accounts for the possibility that the policy outcome will be in the left or right direction, γ_l or γ_r, with probability p_l/p and p_r/p, respectively. The first term in expression (3) gives the case where i receives b since she is the only candidate, which occurs with probability $(1-p)^{n-1}$. The second term gives the cases where $m - 1 \geq 1$ candidates enter in addition to herself, which occurs with probability $\binom{n-1}{m-1} p^{m-1}(1-p)^{n-m}$ and yields her expected benefits from holding office of b/m. The summation accounts for all possible $m = 2, \ldots, n$. Moreover, i will not be elected with probability $(m-1)/m$, and her expected loss in payoffs for this event is $E[U(x_i, \gamma) \mid \gamma \notin (\check{x}_l, \check{x}_r)]$, given in expression (4). Finally, i bears the entry costs, c, independent of how many other candidates enter, which gives the third term in expression (3).

By contrast, citizen i's expected payoff for *not entering*, $\check{e}_i = 0$, is

$$\begin{aligned} E[\pi_i \mid x_i, \check{e}_i = 0] &= (1-p)^{n-1} \times \left[\frac{b}{n} - \frac{n-1}{n} E[U(x_i, d) \mid d \in (\check{x}_l, \check{x}_r)]\right] \\ &- \sum_{m=2}^{n} \binom{n-1}{m-1} p^{m-1}(1-p)^{n-m} \\ &\times E[U(x_i, \gamma) \mid \gamma \notin (\check{x}_l, \check{x}_r)]. \end{aligned} \quad (5)$$

The first term corresponds to the event where, like herself, no other citizen enters, which occurs with probability $(1-p)^{n-1}$. In this case, the stochastic default policy, d, takes effect. Then, citizen i's expected benefits from holding office if being randomly selected as the new leader is b/n (we assume that d does not invoke any entry costs in this event), and with probability $(n-1)/n$ she will not be selected, which yields her an expected payoff loss equal to

$$E[U(x_i, d) \mid d \in (\check{x}_l, \check{x}_r)] = \frac{\int_{\check{x}_l}^{\check{x}_r} f(x)\, U(x_i, x)dx}{1-p} \quad \textit{for} \quad \check{x}_l \neq \check{x}_r. \quad (6)$$

[11] For brevity, in the remainder of the article, equilibrium is understood to mean symmetric equilibrium.

[12] Note that since i is entering, the default policy will not take force.

Observe that if $\check{x}_l = \check{x}_r$, the default policy is irrelevant because all citizens enter. The remaining terms in expression (5) correspond to the events where $m - 1 \geq 1$ other citizens choose to enter.

Finally, it is readily verified that relating expressions (3) and (5) and rearranging yields the *best response* entry strategy for a citizen with ideal point x_i, if all citizens $j \neq i$ are using cutpoint strategy $\check{e}_j$, which is to enter if and only if[13]

$$\begin{aligned}
&(1-p)^{n-1}\left(\frac{n-1}{n}\right)[b + E[\,U(x_i, d) \mid d \in (\check{x}_l, \check{x}_r)]] \\
&\quad + \sum_{m=2}^{n}\binom{n-1}{m-1} p^{m-1}(1-p)^{n-m} \\
&\quad \times \frac{1}{m}[b + E[\,U(x_i, \gamma) \mid \gamma \notin (\check{x}_l, \check{x}_r)]] \geq c,
\end{aligned} \tag{7}$$

where the left-hand and right-hand sides (henceforth *LHS* and *RHS*) give citizen i's expected net benefits and costs from running for office, respectively.

The key observation, however, concerns the properties of *LHS*(7). In particular, it is a U-shaped (convex) function in x_i with a unique minimum, labeled $x_{\min}$, strictly between -1 and 1. In fact, the U-shape is not restricted to the case where all other citizens $j \neq i$ are playing a cutpoint entry strategy $\check{e}_j$. Rather, this cutpoint strategy is the unique best response of citizen i best responding to any entry strategy of all other citizens $j \neq i$ (as shown in the proof of Lemma 1 below). For an arbitrary (possibly mixed) entry strategy, $\sigma(x) : [-1, 1] \to [0, 1]$, played by all $j \neq i$, where $\sigma(x)$ denotes the probability of entering for a citizen with ideal point x, the left-hand side of the best response condition (7) can be written more generally as

$$\begin{aligned}
&Q_{ne}(n, q)\int_{-1}^{1} f_{ne}(x|\sigma)\, U(x_i, x)dx \\
&\quad + Q_e(n, q)\int_{-1}^{1} f_e(x|\sigma)\, U(x_i, x)dx \\
&\quad + Q_b(n, q)b \;\geq\; c,
\end{aligned} \tag{8}$$

where $Q_{ne}(n, q) \equiv (1-q)^{n-1}(\frac{n-1}{n})$ corresponds to the case where no $j \neq i$ enters, $Q_e(n, q) \equiv \sum_{m=2}^{n}\binom{n-1}{m-1} q^{m-1}(1-q)^{n-m}\frac{1}{m}$ corresponds to the case where at least one $j \neq i$ enters, and $Q_b(n, q) \equiv Q_{ne}(n, q) + Q_e(n, q)$, and the probability of a randomly selected $j \neq i$ entering is given by $q \equiv \int_{-1}^{1} \sigma(x) f(x)dx$. The conditional distribution of types in the '*ne*' and '*e*' events are given by f_{ne} and f_e, respectively, where, assuming $q \in (0, 1)$:[14]

$$f_{ne}(x|\sigma) = \frac{[1-\sigma(x)]\, f(x)}{1-q} \tag{9}$$

and

$$f_e(x|\sigma) = \frac{\sigma(x)\, f(x)}{q}. \tag{10}$$

The following lemma implies the cutpoint property of best replies:

Lemma 1. *For any symmetric entry strategy,* $\sigma(x) : [-1, 1] \to [0, 1]$, *played by all* $j \neq i$, *where* $\sigma(x)$ *denotes the probability of entering for a citizen with ideal point* x, *the left-hand side of the best response condition* (8) *is a U-shaped function in* $x_i \in [-1, 1]$ *with a unique minimum at* $x_{\min}$ *and two relative maxima at* $x_i = -1$ *and* $x_i = 1$.

Proof. See the online supporting information. ■

The intuition for this result is the following: For a given $\sigma(x)$ played by all $j \neq i$, the probability terms $Q_{ne}(n, q)$, $Q_e(n, q)$, and $Q_b(n, q)$ in condition (8) are constants. Then, i's expected benefits from holding office for entering, $Q_b(n, q)b$, are independent of x_i, and thus differences in expected net benefits for entering only depend on the location of x_i, with more extreme types yielding higher net benefits because the utility function $-U$ is concave (hence, these benefits are U-shaped in x_i). The result that *LHS*(8) is U-shaped in $x_i \in [-1, 1]$ is important, because it implies that citizen i always uses a cutpoint strategy in best responding to any symmetric (type-dependent) entry strategy of all other citizens $j \neq i$. To see this, recall that *RHS*(8) $= c$ is constant, and citizen i enters if and only if *LHS*(8) $\geq$ *RHS*(8). The cutpoint policies are determined by the intersection of both sides, i.e., *LHS*(8) $=$ *RHS*(8), and since *LHS*(8) is U-shaped, the expected net benefits can only be equal to or larger than c in the extreme-entry intervals $x_i \in [-1, \check{x}_l] \cup [\check{x}_r, 1]$, while they are strictly smaller than c in the moderate nonentry interval $x_i \in (\check{x}_l, \check{x}_r)$.

Equilibrium Characterization

In this subsection, we characterize the equilibrium. We do so for any well-behaved continuous cumulative probability distribution of ideal points satisfying A1–A3 in the section entitled "General Model." The proof is presented in the online supporting information. In particular, we show that there always exists a unique

[13]Without loss of generality, we assume that indifferent citizen types choose to enter.

[14]The boundary cases of $q = 0$ and $q = 1$ simply eliminate one of the terms in condition (8).

symmetric equilibrium in cutpoint strategies that uses equilibrium cutpoints, $(\check{x}_l^*, \check{x}_r^*)$, where $\check{x}_l^* \leq \check{x}_{\min}^*(m = n) \leq \check{x}_r^*$ and $\check{x}_{\min}^*$ gives the equilibrium cutpoint for universal entry. For the special case of symmetric distributions (i.e., $f(x) = f(-x), \forall x \in [0, 1]$), $\check{x}_{\min}^*(m = n) = 0$ always and $-\check{x}_l^* = \check{x}_r^*$, and we present concrete equilibrium conditions at the end of this subsection. Our next result characterizes all symmetric entry equilibria:

Proposition 1. *For any continuous cumulative probability distribution, $F(x)$, of ideal points $x \in [-1, 1] \subset \mathbb{R}$ with density $f(x)$, and for a stochastic default policy, d, that randomly selects one citizen as the new leader if nobody runs for office, the political equilibrium is characterized by a unique pair of cutpoints, $(\check{x}_l^*, \check{x}_r^*)$, with $\check{x}_l^* \leq \check{x}_{min}^*(m = n) \leq \check{x}_r^*$, where each citizen i with a more extreme ideal point in the left or right direction (i.e., $x_i \leq \check{x}_l^*$ or $\check{x}_r^* \leq x_i$) enters the electoral competition as a candidate, $\check{e}_i^* = 1$, and each citizen i with a more moderate ideal point, $\check{x}_l^* < x_i < \check{x}_r^*$, does not enter, $\check{e}_i^* = 0$. Four different kinds of entry equilibria can arise: (i) "everybody enters," (ii) "nobody enters," (iii) some citizens with more extreme ideal points in only one direction are expected to enter, and (iv) some citizens with more extreme ideal points in both directions are expected to enter.*

Proof. See the online supporting information. ■

While the proof is tedious, the intuition behind the results of Proposition 1 can be explained as follows. If the costs of entry are very small relative to the expected net benefits (i.e., from holding office and avoiding a payoff loss due to the distance between the preferred and implemented policy), everybody has an incentive to run for office. On the other hand, if the entry costs are sufficiently high relative to the expected net benefits, nobody wants to enter.[15] If the distribution is symmetric, then $LHS(7)$ is symmetric around 0, so if net benefits and costs are in the intermediate range, then the best response condition (7) must hold as equality (i.e., $LHS(7) = c$) for exactly two citizen types $\check{x}_l^*$ and $\check{x}_r^*$ with $-\check{x}_l^* = \check{x}_r^*$. When ideal points are asymmetrically distributed, differences in expected net benefits in both directions must be balanced out by asymmetric cutpoints, $-\check{x}_l^* \neq \check{x}_r^*$. This either results in a pair of interior cutpoints $(\check{x}_l^*, \check{x}_r^*)$ with $-1 < \check{x}_l^* < \check{x}_{\min}^* < \check{x}_r^* < 1$ or possibly a fourth kind of equilibrium where (7) holds with equality for only one ideal point in $(-1, 1)$ and either $LHS(7) < c$ when $x_i = -1$ or $LHS(7) < c$ when $x_i = 1$. In the former case, the left equilibrium cutpoint is $\check{x}_l^* = -1$, and there is only entry by candidates on the right; in the latter case, the right equilibrium cutpoint is $\check{x}_r^* = 1$, and there is entry only by candidates on the left. These are citizen candidates in the opposite direction of where the probability densities amass (i.e., the cutpoints are pulled toward the bulk of density), because these tend to have higher expected net benefits from entering as they have higher expected losses from the distance between the preferred and implemented policy.

Finally, for the special case of symmetric $F(x)$ with density $f(x) = f(-x), \forall x \in [0, 1]$, the unique pair of equilibrium cutpoints $(-\check{x}^*, \check{x}^*)$ with $\check{x}^* \in [0, 1]$ is fully characterized by (i) if $c \leq \underline{c} \equiv \frac{1}{n}[b + \int_{-1}^{1} f(x)U(0, x)dx]$, then $\check{x}^* = 0$ and $\check{e}_i^* = 1, \forall i$ ("everybody enters"); (ii) if $c \geq \overline{c} \equiv \frac{n-1}{n}[b + \int_{-1}^{1} f(x)U(1, x)dx]$, then $\check{x}^* = 1$ and $\check{e}_i^* = 0, \forall i$ ("nobody enters"); and (iii) if $\underline{c} < c < \overline{c}$, then $\check{x}^* \in (0, 1)$ is the unique solution to $(1 - p)^{n-1}(\frac{n-1}{n})[b + \frac{\int_{-\check{x}^*}^{\check{x}^*} f(x)U(\check{x}^*, x)dx}{1-p}] + \sum_{m=2}^{n} \binom{n-1}{m-1} p^{m-1}(1 - p)^{n-m} \times \frac{1}{m}[b + \frac{\int_{-1}^{-\check{x}^*} f(x)U(\check{x}^*, x)dx + \int_{\check{x}^*}^{1} f(x)U(\check{x}^*, x)dx}{p}] = c$, where $p \equiv 2F(-\check{x}^*)$.

In the following subsections, we use Proposition 1 to derive comparative statics results and characterize limit results for large communities.

Comparative Statics

In this subsection, we derive comparative statics results for the unique equilibrium characterized in Proposition 1. To be precise, we analyze the effects of changes in c and b on the equilibrium cutpoints $\check{x}_l^*(\check{x}_r^*, n, c, b)$ and $\check{x}_r^*(\check{x}_l^*, n, c, b)$ for the region of the parameter space where the solution is interior for at least one cutpoint, that is, where $\check{x}_l^* \in (-1, \check{x}_{\min}]$ and/or $\check{x}_r^* \in [\check{x}_{\min}, 1)$ (see Proposition 1 (iii) and (iv)). Thus, we are excluding cases (i) and (ii), where there is either universal entry or no entry, respectively.[16]

Proposition 2 (Comparative statics)**.** *An increase in the costs of entry, c, yields more extreme interior equilibrium cutpoints, $(\check{x}_l^*, \check{x}_r^*)$—i.e., $\check{x}_l^*$ strictly decreases or $\check{x}_r^*$ strictly increases, or both—while an increase in the benefits from holding office, b, yields more moderate cutpoints. A decrease in $\check{x}_l^*$ (increase in $\check{x}_r^*$) implies that candidates and policy*

[15] Both the universal-entry equilibrium and the zero-entry equilibrium are in fact cutpoint equilibria, corresponding to cutpoints $\check{x}_{\min}^* = \check{x}_l^* = \check{x}_r^*$ and $(\check{x}_l^* = -1, \check{x}_r^* = 1)$, respectively. We show in the proof of Proposition 1 that it always holds that $\check{x}_l^* < \check{x}_{\min}^* < \check{x}_r^*$ if $p < 1$.

[16] This is done for convenience and is essentially without loss of generality. For any $c > 0$, case (i) does not apply for sufficiently large n (see our analysis in the proof of Proposition 2). Case (ii) is satisfied for all n unless c is very large.

outcomes in the left (right) direction get more extreme, on average. It also implies a decrease in the expected number of candidates, $E[m] = np$, when c increases or b decreases. Finally, if n gets very large, $\check{x}_l^*$ approaches minus one and $\check{x}_r^*$ approaches one, that is, $\lim_{n\to\infty} \check{x}_l^*(\check{x}_r^*, n) = -1$ *and* $\lim_{n\to\infty}\check{x}_r^*(\check{x}_l^*, n) = 1$.

Proof. See the online supporting information. ■

Except for the limiting result, Proposition 2 does not give comparative statics results for the effect of changes in n on the expected number of candidates, $E[m]$, in equilibrium. The reason is that if c is small enough, then this comparative static can go either way. Specifically, there may be more or fewer candidates if n increases, because there are two effects on entry that result from increasing the community size from n to $n+1$. First, there is the direct effect that the number of *potential* citizen candidates has increased by 1. If the equilibrium cutpoint were to remain unchanged, this effect works to increase the expected number of candidates. The second effect is the indirect equilibrium effect. Because the expected number of candidates would increase if the cutpoint remains unchanged, the probability of winning if one enters is lower, so the incentive to enter is reduced. This effect works in the opposite direction of more extreme cutpoints and a lower expected number of entrants. The total effect is generally going to be ambiguous.

Finally, Proposition 2 shows that $\lim_{n\to\infty} \check{x}_l^*(\check{x}_r^*, n) = -1$ and $\lim_{n\to\infty} \check{x}_r^*(\check{x}_l^*, n) = 1$. That is, in very large communities, only the most extreme citizens throw their hat in the ring. This implies inefficiency, from a welfarist standpoint. Because utility is concave in the distance between the ideal point and implemented policy, the most efficient outcome ex ante will necessarily be a centrist outcome.[17] For example, with quadratic preferences, the efficient outcome is the mean, and with linear preferences, it is the median. In both cases, the least efficient outcome is at either −1 or 1 (or both).

Large Communities

Of course, the fact that the limiting cutpoints are −1 and 1 does not imply there is zero entry in the limit. Here, we use the result of Proposition 2 that $\lim_{n\to\infty} \check{x}_l^*(\check{x}_r^*, n) = -1$ and $\lim_{n\to\infty} \check{x}_r^*(\check{x}_l^*, n) = 1$ to fully characterize the properties of our citizen-candidate equilibria for large communities. Fixing F, c, and b, consider the sequence of equilibria $\{(\check{x}_l^n, \check{x}_r^n)\}_{n=1}^{\infty}$, indexed by the number of citizens, n. We first introduce some notation. Let $v_l \equiv \int_{-1}^{1} f(x)U(-1, x)dx$ and $v_r \equiv \int_{-1}^{1} f(x)U(1, x)dx$ denote the ex ante expected utility from entry of extreme citizens with ideal points at −1 and 1, respectively, which they will receive in the limit in the event nobody else enters. Let $p_l^n = \int_{-1}^{\check{x}_l^n} f(x)dx$ and $p_r^n = \int_{\check{x}_r^n}^{1} f(x)dx$ denote the probability that a randomly selected voter enters as a left candidate or a right candidate, respectively, in the equilibrium with n citizens. Denote $\tau_l \equiv \lim_{n\to\infty} np_l^n$ and $\tau_r \equiv \lim_{n\to\infty} np_r^n$, the limiting expected number of candidates entering from the left extreme and the right extreme, and let $\tau = \tau_l + \tau_r$ denote the expected number of entrants in the limit. This gives:

Proposition 3 (Large communities)**.** *As n approaches infinity, there are three possibilities for the limiting equilibrium: (i) There is zero entry, i.e.,* $\tau_l = \tau_r = 0$, *if and only if*

$$c \geq \max[b + v_l, b + v_r]. \quad (11)$$

(ii) There is entry from both directions, i.e., $\tau_l > 0$ *and* $\tau_r > 0$, *if and only if the following system of two equations has a strictly positive solution for* (τ_l, τ_r)*:*

$$\tau_l = -\tau_r + \frac{1}{c}\Big[\tau e^{-\tau} v_l + \frac{\tau_r}{\tau}\left[1 - (\tau+1)e^{-\tau}\right] U(1, -1) + (1 - e^{-\tau})b\Big]; \quad (12)$$

$$\tau_r = -\tau_l + \frac{1}{c}\Big[\tau e^{-\tau} v_r + \frac{\tau_l}{\tau}\left[1 - (\tau+1)e^{-\tau}\right] U(1, -1) + (1 - e^{-\tau})b\Big]. \quad (13)$$

(iii) There is entry from only one side, i.e., either $\tau_l > 0$ *and* $\tau_r = 0$, *or* $\tau_l = 0$ *and* $\tau_r > 0$, *if and only if* $c < \max[b + v_l, b + v_r]$ *and* (12) *and* (13) *do not have a strictly positive solution for* (τ_l, τ_r). *If* $v_l > v_r$, *then* $\tau_l > 0$ *and* $\tau_r = 0$. *If* $v_r > v_l$, *then* $\tau_r > 0$ *and* $\tau_l = 0$.

Proof. Part (i) of the proposition is immediate. Parts (ii) and (iii) follow from a Poisson approximation argument. A detailed proof is in the online supporting information. A sketch of the proof of (ii) is the following. Denote by π the limiting probability that at least one citizen enters in equilibrium. Denote by P_W the limiting probability a citizen will win if she chooses to enter. For a citizen with ideal point −1, the expected payoff loss of *not entering* in the limit is

$$(1-\pi)v_l + \pi\left[\frac{\tau_l}{\tau}U(-1,-1) + \frac{\tau_r}{\tau}U(-1,1)\right] = (1-\pi)v_l + \pi\frac{\tau_r}{\tau}U(1,-1),$$

[17]This is also true with an ex post utilitarian criterion with equal welfare weights to all citizens or a Rawlsian criterion that ranks outcomes based on the utility of the worst-off citizen.

and, similarly, for a citizen with ideal point 1, the expected payoff loss of not entering in the limit is

$$(1-\pi)v_r + \pi\left[\frac{\tau_l}{\tau}U(1,-1) + \frac{\tau_r}{\tau}U(1,1)\right] = (1-\pi)v_r + \pi\frac{\tau_l}{\tau}U(1,-1),$$

where $U(-1,-1) = U(1,1) = 0$ and $U(-1,1) = U(1,-1)$. The corresponding limiting payoff losses of *entering* for the -1 and 1 citizens are, respectively:

$$c - P_W b + (1-P_W)\frac{\tau_r}{\tau}U(1,-1) \quad \text{for the } -1 \text{ citizen;}$$

$$c - P_W b + (1-P_W)\frac{\tau_l}{\tau}U(1,-1) \quad \text{for the 1 citizen.}$$

In order for there to be entry at both extremes, it must be that τ_l and τ_r are both strictly positive, and both the -1 citizens and the 1 citizens are indifferent between entering and not entering. That is:

$$(1-\pi)v_l + \pi\frac{\tau_r}{\tau}U(1,-1) = c - P_W b + (1-P_W)\frac{\tau_r}{\tau}U(1,-1);$$

$$(1-\pi)v_r + \pi\frac{\tau_l}{\tau}U(1,-1) = c - P_W b + (1-P_W)\frac{\tau_l}{\tau}U(1,-1).$$

Because the limiting distribution of the number of entrants is Poisson with mean τ, one can show that $\pi = 1 - e^{-\tau}$ and $P_W = \frac{1-e^{-\tau}}{\tau}$. Substituting and rearranging terms establishes part (ii) of the proposition. Part (iii) follows a similar argument.

Observe that the "everyone enters" outcome is never an equilibrium in large communities. Equation (12) characterizes the equilibrium entry rates from the left for cases (ii) and (iii), setting $\tau_r = 0$ in the latter case. Similarly, equation (13) characterizes the equilibrium entry rates from the right for cases (ii) and (iii), setting $\tau_l = 0$ in the latter case. Note that if ideal points are symmetrically distributed, we know that $p_l^n = p_r^n$ for all n (since $-\check{x}_l^* = \check{x}_r^*$), and thus, the two equations (12) and (13) collapse to a single equation $\tau = \frac{1}{c}[\tau e^{-\tau}v + \frac{1}{2}[1-(\tau+1)e^{-\tau}]U(1,-1) + (1-e^{-\tau})b]$, which has a unique solution in τ, with $\tau_l = \tau_r = \tau/2$ and $v = v_l = v_r$.

Finally, we can say a bit more about the range of costs where case (iii) holds. Specifically, there will be entry only from the left if $c \in [\widetilde{c}_r, b + v_l)$, with $\widetilde{c}_r$ being the entry cost at which (12) and (13) both hold with equality and $\tau_r = 0$. Similarly, there will be entry only from the right if $c \in [\widetilde{c}_l, b + v_r)$, with $\widetilde{c}_l$ being the entry cost at which (12) and (13) both hold with equality and $\tau_l = 0$.

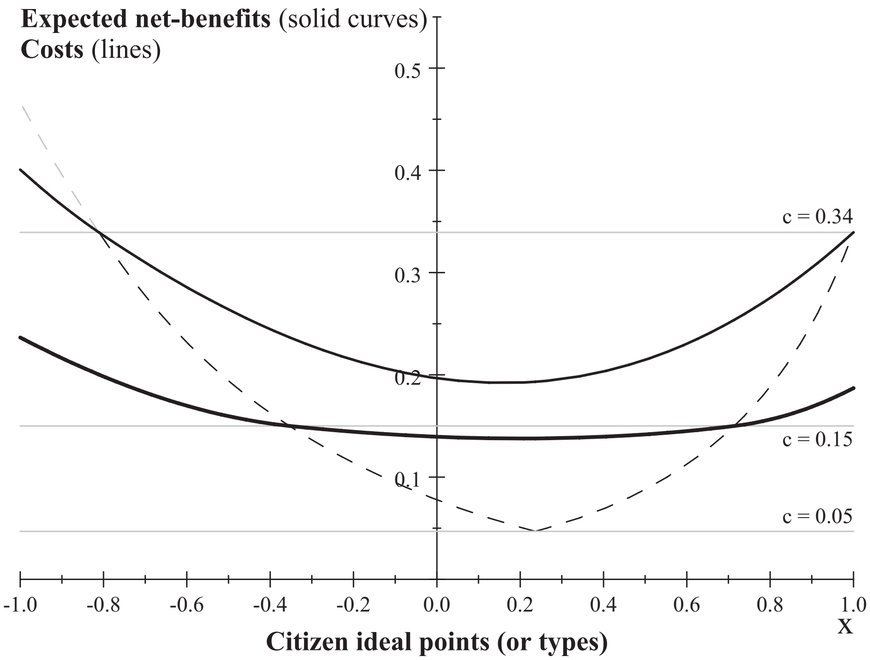
Example: Expected Net Benefits, Entry Costs, and Unique Path of Entry Equilibria

Here, we illustrate the model with a parametric example of entry equilibria using the utility function $-|\frac{1}{2}(x_i - \gamma)|$ and the triangular distribution $F(x) = \frac{1}{8}(x+1)^2 + \frac{1}{4}(x+1)$, $x \in [-1, 1]$, with density $f(x) = \frac{1}{4}(x+1) + \frac{1}{4}$. Thus, we use asymmetrically distributed ideal points that are skewed to the right. Figure 1 illustrates graphically the equilibrium for these parameters, when $n = 5$ and $b = 0$. The policy space, which is also the support of the distribution of citizen ideal points, $x_i \in [-1, 1]$, is represented by the horizontal axis. The vertical axis represents the costs and expected net benefits of entry.

The two cutpoints of an entry equilibrium are determined by the intersections of the respective cost and expected net-benefits curves. Since entry costs do not depend on a citizen's ideal point, the cost curve is simply a horizontal line at $c = 0.15$ (0.34), shown in Figure 1. The *equilibrium* expected net benefits of entry—a function of a citizen's ideal point that is computed by the *LHS* of (7)—are evaluated at the equilibrium cutpoints, i.e., setting $(\check{x}_l, \check{x}_r) = (\check{x}_l^*, \check{x}_r^*)$, for the given cost and varying x_i in the interval $[-1, 1]$. These equilibrium net-benefits curves for the two costs are represented by the two solid U-shaped curves in the figure. The higher curve is the (equilibrium) expected net-benefits curve when $c = 0.34$, and the lower curve corresponds to the (equilibrium) expected net benefits of entry when $c = 0.15$. The equilibrium cutpoints are then given by the intersection of the net-benefits curve for $c = 0.15$ (0.34) with the corresponding cost lines. Each citizen with an ideal point in between the two intersection points does not enter as a candidate (the net benefits of entry fall short of the cost for such a citizen), and each citizen with an ideal point equal to or more extreme than either cutpoint enters. Thus, in this example, the equilibrium entry cutpoints when $c = 0.15$ are $(-0.35, 0.71)$, while the equilibrium entry cutpoints when $c = 0.34$ are $(-0.81, 1)$.

The dotted U-shaped curve with a kink at the bottom traces the locus of equilibrium cutpoints as the entry cost varies, with points to the left of the kink corresponding to values of $\check{x}_l^*$ for various costs, and points to the right of the kink corresponding to values of $\check{x}_r^*$. Hence, the two equilibrium pairs of cutpoints for $c = 0.15$ and 0.34 necessarily lie on this curve. Notice that for $c \geq 0.34$, there is no entry from the right, as the equilibrium cutpoint is at $\check{x}_r^* = 1$, so this corresponds to case (iii) in Proposition 1. For costs less than or equal to 0.05, all citizens enter, which corresponds to case (i) in Proposition 1 (this is shown in Figure 1 by the intersection of the cost line $c = 0.05$

Figure 1 Expected Net Benefits, Entry Costs, *c*, and Symmetric Entry Equilibrium in Pairs of Cutpoint Policies for $c = 0.15$ and 0.34, $n = 5$, and $b = 0$



and dotted curve at $\check{x}_l^* = \check{x}_r^* = \check{x}_{\min}^* = 0.24$). Equilibria in the intermediate range of costs $0.05 < c < 0.34$, including $c = 0.15$, correspond to case (iv) of Proposition 1, where there is some entry on both sides. Case (ii), with no entry, occurs at costs greater than or equal to 0.47, at which point the dotted line hits the left boundary of the set of ideal points (-1), in the far upper left of the graph.

With respect to comparative statics (Proposition 2), the dotted line shows that an increase in the entry costs, c, yields more extreme equilibrium cutpoints and hence less entry, on average.[18] Moreover, though not shown in the figure, an increase in the benefits from holding office, b, would shift up the expected net-benefits curves, and as a consequence, the equilibrium cutpoints would become less extreme, and entry would increase. Finally, also not shown in the figure, for any entry cost, c, as n gets very large the expected net-benefits curve approaches the horizontal axis, and the cutpoints converge to -1 and 1 (Proposition 3).

[18]Expected entry is given by $E[m(\check{x}_l, \check{x}_r)] = np = n[1 - F(\check{x}_r) + F(\check{x}_l)]$ and expected policy outcomes in both directions by $E[\gamma_l(\check{x}_l, \check{x}_r)] = \frac{\int_{-1}^{\check{x}_l} f(x)x\,dx}{\int_{-1}^{\check{x}_l} f(x)dx}$ and $E[\gamma_r(\check{x}_l, \check{x}_r)] = \frac{\int_{\check{x}_r}^{1} f(x)x\,dx}{\int_{\check{x}_r}^{1} f(x)dx}$.

Extensions

In this section, we analyze in turn the robustness of our political polarization result with respect to variations in the default policy and to partially private information, that is, directional information about the candidates' political leanings.

Variations in the Default Policy

In the following, we discuss variations in the default policy that takes effect if no citizen runs for office. In the model of Osborne and Slivinski (1996), where the types of all citizens and candidates are complete information, the default policy is an infinite loss, $-\infty$. Applying this drastic measure to our model with incomplete (private) information would result in a unique equilibrium of universal entry, regardless of the specific citizen types and their distribution. To see this, note that in any equilibrium without universal entry, we have $p < 1$, and thus, the expected utility from not entering is $-\infty$, and the expected utility from entering is bounded below by $-c - U(-1, 1)$ (recall that U has finite values). In other words, there is no feasible policy that gives any citizen a utility of a magnitude that can match an infinite loss. Therefore, an equilibrium would only exist if the conditions of universal entry are satisfied (see Proposition 1 (i)), which seems to be a very restrictive political scenario.

An obvious alternative to modeling the no-entry outcome would be to have a fixed default policy, $\overline{d} \in \mathbb{R}$, such as the status quo policy (e.g., Besley and Coate 1997). Applying $\overline{d} \in [-1, 1]$ to our model yields only slightly different conditions compared to our stochastic default policy, d, where one citizen is randomly selected as the new leader if nobody enters. To see this, let us first introduce $\overline{d}$ to our best response entry condition (7), which is a function of the cutpoints $(\check{x}_l, \check{x}_r)$:

$$(1-p)^{n-1}\left(\frac{n-1}{n}\right)\left[b + U(x_i, \overline{d})\right] + \sum_{m=2}^{n}\binom{n-1}{m-1}p^{m-1}(1-p)^{n-m} \times \frac{1}{m}\left[b + E[\,U(x_i,\gamma) \mid \gamma \notin (\check{x}_l, \check{x}_r)]\right] \geq c. \quad (14)$$

This looks very similar to condition (7), and it is straightforward to establish the U-shaped property of the left-hand side (cf. Lemma 1 and footnote 2 in the online supporting information), which is key to characterizing a unique equilibrium in cutpoints. When comparing the expected loss from our stochastic default policy and the fixed default policy (shown in the first terms of conditions (7) and (14)), some citizens with $E[\,U(x_i, d) | \, d \in (\check{x}_l, \check{x}_r)] > (<) \; U(x_i, \overline{d})$ would enter (abstain) with d but not with $\overline{d}$. The effect of moving the fixed default policy along the real line of the policy space is that expected entry decreases in the direction where $\overline{d}$ moves and increases in the opposite direction. In other words, both equilibrium cutpoints $\check{x}_l^*$ and $\check{x}_r^*$ move in the same direction as $\overline{d}$. As such, it has a qualitatively similar effect as shifting the distribution of ideal points to the left or right.

A slightly more general formulation of the fixed default policy would be to allow randomization over exogenous status quo points. Again, this is different from what we do in the article, but the characterization of a unique cutpoint equilibrium still goes through because a similar result to Lemma 1 (U-shaped net-benefits curve) can be shown for arbitrary exogenous stochastic defaults. Also, note that for very large n for cases (iii) and (iv) of Proposition 1, using an exogenous stochastic status quo given by F will be approximately the same as our endogenous model of randomly selecting a leader from the population, because for large n the equilibrium cutpoints converge to -1 and 1. In contrast to the alternative default policies discussed above, in our stochastic default policy, the distribution of potential leaders from the citizenry results endogenously from the rational calculus of the players, and indeed is part of the equilibrium.[19]

A third possibility is an alternative way to endogenize the no-entry outcome by allowing for multiple rounds in the entry stage: if nobody runs for office in round 1, another round follows and this continues until eventually there is at least one candidate. Importantly, after each unsuccessful entry round, the citizens Bayesian update that no citizen's type is more extreme than the equilibrium cutpoints in that round. Then, the entry decision in round 2 will be derived just like the one in round 1, except that the earlier probability distribution of ideal points will be truncated, and so forth. As a consequence, the equilibrium cutpoints get more moderate with every additional entry round. A caveat of the process of multiple entry rounds is that it may continue without end (e.g., if the costs of entry are larger than the payoffs from holding office and the difference in utility between the largest and smallest actual types). To avoid this problem, one could, for example, assume a maximum number of possible entry rounds after which our stochastic default policy is invoked, or assume benefits from holding office that are sufficiently large relative to the costs of entry such that some voter would always prefer to enter if she is certain that no other voter will enter.

The equilibrium conditions for the cutpoints would be more complicated with multiple entry rounds, compared to our stochastic default policy. Specifically, one cannot solve the model "forward" in a straightforward recursive fashion by using initial cutpoints derived from the equilibrium conditions of Proposition 1. This is because the cutpoints in round 1 depend on beliefs about the cutpoints in round 2, and so forth. However, one can characterize equilibrium conditions in a recursive fashion by using the monotonicity established in Lemma 1 (i.e., the U-shaped best response condition), which will continue to hold. Specifically, a citizen whose type corresponds to an equilibrium cutpoint in round 1 is indifferent between entering in round 1 and postponing her entry decision to round 2, if nobody runs for office. However, the expected payoffs in round 2 are determined by the equilibrium cutpoints in round 2, which in turn are a function of the cutpoints in round 3, and so forth. In

[19] Note that in our stochastic default policy, the selected leader receives benefits from holding office but does not bear any entry costs. This simplifies the equilibrium analysis, and none of our propositions would change if such costs were introduced. To see this, consider costs $\widehat{c}$, smaller or larger than c, for the randomly selected leader. Compared to the best response entry condition (7), a term $-(1-p)^{n-1}\widehat{c}/n$ would be added to the left-hand side, with no essential consequence for our propositions.

other words, the multiple entry rounds create a nested system of expected continuation payoffs in entry round t, $E[CV_t(x_i, (\check{x}_l, \check{x}_r)_{\forall t'>t}, n, c, b)]$, which depends on citizen i's type, all future cutpoints $(\check{x}_l, \check{x}_r)_{\forall t'>t}$, and all exogenous parameters. Großer and Palfrey (2011) show that the equilibrium cutpoints in round 1 of multiple entry rounds are (weakly) more extreme than with our stochastic default policy. Of course, there are other ways of modeling multiple entry rounds. The aim here is just to explain that the model can accommodate a variety of other ways to endogenize the default policy, without changing the qualitative properties of the entry equilibrium.

Directional Information about Candidates' Political Leanings

It is often the case that voters have directional information about each entrant's political leaning, and our model can be extended to accommodate such information about the candidates' ideal points. In particular, suppose that after entry decisions, voters learn whether a candidate's ideal point lies to the "left" ($x_i \leq \check{x}_l$) or "right" ($\check{x}_r \leq x_i$), but they are not informed about any candidate's exact ideal point. An obvious way in which directional information might be revealed to the general public is via party labels. Therefore, we assume here that candidates entering from the left ($x_i \leq \check{x}_l$) are affiliated with party L, and candidates entering from the right ($\check{x}_r \leq x_i$) are affiliated with party R. To avoid coordination problems, parties have some kind of nomination state where they choose one of their party's entrants as the party nominee. Here, we assume that this procedure is completely random,[20] so each of them has an equal winning probability of $1/m_l$ and $1/m_r$, where m_l and m_r denote the number of left and right contenders and $m \equiv m_l + m_r$.[21] We call this the *Nomination* stage. In the *Voting* stage, after the selection of nominees by each party, each citizen either votes for party L's or party R's nominee or abstains. The rest of the model is the same as in the previous section.

The analysis of the directional information model is more complex than for private information, but similar results obtain. The reason for the added complexity is that an entrant's probability of winning will now be different for entrants from the left and entrants from the right. A further complication is that an equilibrium in the directional information model has three endogenous variables that must be solved for simultaneously: a pair of entry cutpoints, $(\check{x}_l, \check{x}_r)$, and a voting cutpoint, $\check{x}_\phi$, that divides the voters between those who will vote for party L's nominee and those who will vote for party R's nominee.[22] In spite of the more complex entry equilibria with directional information, we obtain similar results as before:

Proposition 4 (Directional information about candidates' ideal points). *When directional information about the candidates' ideal points "left" ($x_i \leq \check{x}_l$) or "right" ($\check{x}_r \leq x_i$) is revealed to the general public in nominating conventions of party L and party R where nominees are randomly selected, and when each citizen votes for either party nominee or abstains, existence of equilibrium in a pair of entry cutpoints is maintained. In particular, the equilibrium characterization and comparative statics results use the same logic as for private information of ideal points (cf. Propositions 1 to 3).*

Proof. See the online supporting information. ■

The formal proof is rather lengthy, but the intuition is straightforward.[23] First, the case where there is entry on only one side or neither side is trivial from the voter's perspective, so that does not change the earlier analysis. Therefore, suppose there is at least one entrant from each party, so the election is between the L party nominee and the R party nominee. In the *Voting* stage, $F(\check{x}_\phi)$ and $1 - F(\check{x}_\phi)$ are party L's and party R's expected total vote shares, respectively, or alternatively, the probability that a randomly selected voter votes for the respective parties. The voting cutpoint is introduced since citizens are typically not indifferent between candidates across party lines. Specifically, each citizen i knows that the expected ideal point of the left and right (other) nominee is $\overline{x}_l \equiv \frac{\int_{-1}^{\check{x}_l} f(x)x dx}{\int_{-1}^{\check{x}_l} f(x) dx}$ and $\overline{x}_r \equiv \frac{\int_{\check{x}_r}^{1} f(x)x dx}{\int_{\check{x}_r}^{1} f(x) dx}$, respectively, and thus $\check{x}_\phi \equiv \frac{\overline{x}_l + \overline{x}_r}{2}$. Then, each party nominee votes for herself, and each other citizen i votes for the party L (party R) nominee if $|x_i - \overline{x}_l| < (>) |x_i - \overline{x}_r|$, which weakly dominates abstaining and voting for the nominee of R (L) (an indifferent nonnominee $\check{x}_\phi$-type is assumed to vote randomly for either party with equal probability for each

[20] We assume this for simplicity, but it would be interesting to extend this further and model the nomination procedure explicitly.

[21] If there is no entrant from one direction, this corresponds to the case where the election is uncontested by one of the parties.

[22] If F is symmetric, this complexity does not arise, as the voting cutpoint is 0 and thus there always exists an equilibrium that yields the exact same predictions as the entry equilibrium with private information. This is because when a pair of cutpoints is symmetric about zero, each entrant's probability of winning is the same. See the working-paper version of this article for details (Großer and Palfrey 2011).

[23] Proposition 4 does not address the question of uniqueness of the cutpoint equilibria.

or abstain). As a consequence, a change in $(\check{x}_l, \check{x}_r)$ generally changes $\check{x}_\phi$ and in this way affects the probability that any of the left (right) entrants will lead the community, ρ_l ($\rho_r = 1 - \rho_l$). Because like-minded entrants are equally likely to become nominees, changes in the entry cutpoints affect the probability of *each* left and right entrant becoming the new community leader, $E[\rho_l/m_l]$ and $E[(1-\rho_l)/m_r]$, in proportion to the changes in the ρ-terms. Specifically, a unilateral change of an entry cutpoint has two ceteris paribus effects that work in opposite directions. First, a direct effect of a more extreme-entry cutpoint is to decrease the expected number of entrants in the direction of this cutpoint, which works to increase the probability of each contender becoming the nominee (and vice versa for a more moderate entry cutpoint). Second, an indirect effect of a more extreme-entry cutpoint works to decrease the expected relative vote share $F(\check{x}_\phi)/[1 - F(\check{x}_\phi)]$ for entrants in this direction, because $\check{x}_\phi$ shifts this way and thus decreases the probability of each contender becoming the community leader (and vice versa for a more moderate entry cutpoint). The overall effect of a unilateral change in an entry cutpoint on the probability that the eventual winner will be from the political left or right is ambiguous. However, despite this ambiguity, an equilibrium in cutpoints $[(\check{x}_l, \check{x}_r), \check{x}_\phi]$ can be shown to exist, and the characterization and comparative statics results use the same logic as for our model with private information. This straightforward transfer of results is essentially due to continuity of the best response condition and the U-shaped property of the expected net benefits for entry—in particular, that the probability of becoming the party nominee and community leader is constant in this response—that continues to hold with directional information.

Proposition 4 provides additional support for our political polarization result from the previous section by showing that the model can be extended to allow for additional information about candidates in the form of directional information. Moreover, the results from introducing directional information via party labels suggest that our citizen-candidate model could provide a promising platform from which one can explore the party-formation process. Such extensions could be related to the incentives of candidates to conglomerate in parties in order to increase their winning chances[24] or to the role of parties as informative "brands" (Snyder and Ting 2002). Other extensions could vary the party nomination procedure. For example, instead of randomly selecting one contender as the nominee, one could select the one closest to the party median (defined as the median of the distribution of potential party contenders, i.e., the distribution truncated by the respective cutpoint), or the most moderate or most extreme contender. We leave to future research the analysis of these and other extensions.

Discussion and Conclusions

We analyze a citizen-candidate model with plurality voting and incomplete information about all citizen and candidate ideal points. This is the polar opposite assumption to the seminal models of Besley and Coate (1997) and Osborne and Slivinski (1996), which assume complete information about the ideal points of all citizens before entry decisions are made, and our main conclusions are almost the polar opposite as well. Our analysis of equilibrium in the citizen-candidate model with private information completely reverses the two key properties of equilibria that generally hold in the models with complete information: indeterminacy of equilibrium and centrality of candidates. We fully characterize the unique equilibria of the Bayesian entry game. These equilibria are in cutpoint strategies, characterized by a unique pair of ideal points, where only citizens more extreme than (or at) these cutpoints run for office. In the limiting case, as the community becomes very large, only those citizens with ideal points at the extreme boundaries of the distribution of ideal points become candidates. We show that this holds for any well-behaved probability distribution of ideal points—symmetric or asymmetric—and it implies substantial political polarization in large populations, independent of the distribution of citizen ideal points! It only depends on the support of the distribution of ideal points. For example, consider the class of ideal point distributions defined by the set of all normal distributions truncated (and renormalized) at -1 and 1. Then for all these distributions, the only entrants in a large electorate will have ideal points at -1 and 1. Even if the density

[24]Information about candidates' political leanings creates strong incentives for like-minded politicians to join forces in parties or coalitions. This is because coordination can potentially raise the probability that the community leader will come from their own ranks as well as each member's probability of this being her. To see the intuition, consider the following example: Suppose there are two left entrants and one right entrant, and exactly half of the voters are leftists and half are rightists. Without a party L, a left leader will only arise if all leftist votes are (randomly) cast for one left entrant. By contrast, the two left entrants can gain on average by forming a party L for which each is equally likely to become the nominee. Then, party L will win with probability 1/2, and each member will lead the community with probability 1/4.

of ideal points is concentrated almost entirely at 0, so there is essentially no polarization of preferences in the general electorate, all candidates (and hence all policies) will be extreme. These properties of our equilibrium cutpoints, uniqueness and the emergence of only extreme candidates, differ from the multiple equilibria derived in previous citizen-candidate models, a subset of which typically includes candidates with an ideal points at or close to the median ideal point.

The comparative statics results for our model are empirically plausible. On average, higher entry costs yield fewer and more extreme candidates, whereas higher benefits from holding office yield more and less extreme candidates. The logic is that there are two kinds of potential benefits to running for office: office-holding benefits and policy benefits. Entry costs and office-holding benefits affect all potential candidates the same, but policy benefits affect potential candidates differently, depending on their ideology. Greater policy benefits provide stronger incentives for more extreme candidates to run for office. Finally, an increase in the number of citizens has ambiguous effects on the number of candidates if n is small, but for large n the effect is to produce more extreme candidates; we characterize the limiting equilibrium distribution and expected number of entrants.

Modeling citizen and candidate ideal points on issues as being either fully private information (as we do here) or fully public information (as past researchers have done) provides useful benchmarks to consider, benchmarks that offer important insights about how information affects entry equilibria. Indeed, this article shows that the information effects are huge, essentially reversing the two key conclusions from citizen-candidate models with complete information. However, for many issues, citizens possess information somewhere in between these two limit cases. A particular relevant piece of information is about a candidate's political leaning, that is, whether she is a "leftist" or "rightist," which is revealed to the general public via party nominating conventions where the left or right party, respectively, selects one nominee for the election. We show that this directional information supports the exact same equilibrium cutpoints as for private information and symmetrically distributed ideal points. However, it generally affects the cutpoints because the parties' voter support, and hence their individual chances of becoming the new community leader, depends on these cutpoints. However, the main results for our cutpoint equilibrium still go through! Our model with directional information can, for example, be utilized to study endogenous party formation, since this information can serve as a coordination device for candidates with the same political leaning. In this respect, combining our model with Snyder and Ting's (2002) model of political parties as informative "brands" to voters would be an interesting next step. Another interesting extension would be to utilize other kinds of information about the candidates' ideal points, such as in the way introduced to the spatial model of competition by Banks (1990) or allowing for polls, media, or other sources of information about candidate preferences. If candidates take their own private polls, then they may have different information than voters. Finally, one could analyze within the framework of our citizen-candidate model the effects of information about candidate valence that increases an entrant's probability of being elected on the polarization of political candidates (e.g., Groseclose 2001). For example, if acquiring valence is costly (as in Serra 2010), we conjecture our results still go through because citizens with more extreme ideal points have higher incentives to enter than those with moderate ideal points and therefore are willing to pay more for their candidacy. The analysis of such models and other elaborations of our basic model provide a number of promising directions for future research.

We also elaborate on the choice of our default policy, which randomly selects one citizen as the new leader if nobody runs for office. A consequence of this default policy is that it implements a policy decision as part of the equilibrium. We compared it to the commonly used fixed default policy, such as a status quo policy (e.g., Besley and Coate 1997; Eguia 2007). If this exogenous policy is a feasible ideal point, the main results for our equilibrium cutpoints are maintained, though they are biased in an intuitive way (i.e., depending on their location). Finally, we discuss an alternative stochastic default policy with multiple entry rounds. That is, if nobody runs for office, another entry round follows, and this continues until eventually at least one candidate emerges. This default policy demands additional assumptions to ensure that the process ends with certainty. Comparing the equilibrium cutpoints for the first entry round to those for our citizen-candidate model with random default policy suggests that the first-round cutpoints will be more extreme when multiple entry rounds are possible (Großer and Palfrey 2011).

On a grander scale, this article may contribute to our understanding of why we often observe extreme policy decisions and political polarization in democracies (e.g., McCarty, Poole, and Rosenthal 2006), in contrast to the classical Downsian predictions of median outcomes. Previous citizen-candidate models do not make sharp predictions about this important empirical regularity and typically have equilibria that produce median or centrist outcomes. In our model, this phenomenon is predicted to arise even in communities where preferences are not polarized at all. Rather, extreme and polarized policies are the outcome of a process where only (the most) extreme citizens find it worthwhile to enter the electoral competition as candidates. This reduces social welfare, since concave preferences imply that centrist outcomes will be more efficient than extreme outcomes. The informational problem that candidates' true policy intentions when elected are privately known challenges the fundamental democratic idea that policy decisions should reflect the will of the majority. It remains to be shown empirically whether and, if so, to what extent this kind of informational asymmetry combined with endogenous entry of candidates contributes to political polarization.

References

Ansolabehere, Stephen, Jonathan Rodden, and James M. Snyder Jr. 2008. "The Strength of Issues: Using Multiple Measures to Gauge Preference Stability, Ideological Constraint, and Issue Voting." *American Political Science Review* 102(2): 215–32.

Bafumi, Joseph, and Michael C. Herron. 2010. "Leapfrog Representation and Extremism: A Study of American Voters and Their Members in Congress." *American Political Science Review* 104(3): 519–42.

Banks, Jeffrey. 1990. "A Model of Electoral Competition with Incomplete Information." *Journal of Economic Theory* 50(2): 309–25.

Besley, Timothy, and Stephen Coate. 1997. "An Economic Model of Representative Democracy." *Quarterly Journal of Economics* 112(1): 85–114.

Brams, Steven J., and Philip D. Straffin Jr. 1982. "The Entry Problem in a Political Race." In *Political Equilibrium*, ed. P. C. Ordeshook and K. A. Shepsle. Dordrecht, Netherlands: Kluwer, 181–211.

Brusco, Sandro, and Jaideep Roy. 2011. "Aggregate Uncertainty in the Citizen Candidate Model Yields Extremist Parties." *Social Choice and Welfare* 36(1): 83–104.

Campbell, Angus, Philip E. Converse, Warren E. Miller, and Donald E. Stokes. 1960. *The American Voter*. New York: Wiley.

Casamatta, Georges, and Wilfried Sand-Zantman. 2005. "Citizen Candidacy with Asymmetric Information." *The B.E. Journal of Theoretical Economics* 5(1), Article 3.

Dhillon, Amrita, and Ben Lockwood. 2002. "Multiple Equilibria in the Citizen-Candidate Model of Representative Democracy." *Journal of Public Economic Theory* 4(2): 171–84.

DiMaggio, Paul, John Evans, and Bethany Bryson. 1996. "Have Americans' Social Attitudes Become More Polarized?" *American Journal of Sociology* 102(3): 690–755.

Downs, Anthony. 1957. *An Economic Theory of Democracy*. New York: Harper and Row.

Eguia, Jon X. 2007. "Citizen Candidates under Uncertainty." *Social Choice and Welfare* 29(2): 317–31.

Feddersen, Timothy J. 1992. "A Voting Model Implying Duverger's Law and Positive Turnout." *American Journal of Political Science* 36(4): 938–62.

Feddersen, Timothy J., and Wolfgang Pesendorfer. 1998. "Convicting the Innocent: The Inferiority of Unanimous Jury Verdicts under Strategic Voting." *American Political Science Review* 92(1): 23–35.

Feddersen, Timothy J., Itai Sened, and Stephen G. Wright. 1990. "Rational Voting and Candidate Entry under Plurality Rule." *American Journal of Political Science* 34(4): 1005–1016.

Fey, Mark. 1997. "Stability and Coordination in Duverger's Law: A Formal Model of Pre-election Polls and Strategic Voting." *American Political Science Review* 91(1): 135–47.

Fey, Mark. 2007. "Duverger's Law without Strategic Voting." Working paper, University of Rochester.

Fiorina, Morris P., and Samuel J. Abrams. 2008. "Political Polarization in the American Public." *Annual Review of Political Science* 11: 563–88.

Fiorina, Morris P., Samuel J. Abrams, and Jeremy C. Pope. 2006. *Culture War? The Myth of a Polarized America*. 2nd ed. New York: Pearson Longman.

Groseclose, Tim. 2001. "A Model of Candidate Location When One Candidate Has a Valence Advantage." *American Journal of Political Science* 45(4): 862–86.

Großer, Jens, and Thomas R. Palfrey. 2009. "A Citizen Candidate Model with Private Information." In *The Political Economy of Democracy*, ed. E. Aragonés, C. Beviá, H. Llavador, and N. Schofield. Bilbao, Spain: Fundación BBVA, 15–29.

Großer, Jens, and Thomas R. Palfrey. 2011. "Candidate Entry and Political Polarization: An Anti-Median Voter Theorem." *Social Science Working Paper 1343*, California Institute of Technology.

Hamlin, Alan, and Michael Hjortlund. 2000. "Proportional Representation with Citizen Candidates." *Public Choice* 1033(3–4): 205–30.

Hotelling, Harold. 1929. "Stability in Competition." *Economic Journal* 39(153): 41–57.

McCarty, Nolan, Keith T. Poole, and Howard Rosenthal. 2006. *Polarized America: The Dance of Ideology and Unequal Riches*. Cambridge, MA: MIT Press.

Osborne, Martin J. 1993. "Candidate Positioning and Entry in a Political Competition." *Games and Economics Behavior* 5(1): 133–51.

Osborne, Martin J., Jeffrey Rosenthal, and Matthew Turner. 2000. "Meetings with Costly Participation." *American Economic Review* 90(4): 927–43.

Osborne, Martin J., and Al Slivinski. 1996. "A Model of Political Competition with Citizen Candidates." *Quarterly Journal of Economics* 111(1): 65–96.

Palfrey, Thomas R. 1984. "Spatial Equilibrium with Entry." *Review of Economic Studies* 51(1): 139–56.

Palfrey, Thomas R. 1989."A Mathematical Proof of Duverger's Law." In *Models of Strategic Choice in Politics*, ed. Peter C. Ordeshook. Ann Arbor: University of Michigan Press, 69–91.

Palfrey, Thomas R., and Keith T. Poole. 1987. "The Relationship between Information, Ideology, and Voting Behavior." *American Journal of Political Science* 31(3): 511–30.

Poole, Keith T., and Howard Rosenthal. 1984. "The Polarization of American Politics." *Journal of Politics* 46(4): 1061–79.

Roemer, John. 2003. "Indeterminacy of Citizen-Candidate Equilibrium." *Cowles Foundation Discussion Paper 1410*, Yale University.

Serra, Gilles. 2010. "Polarization of What? A Model of Elections with Endogenous Valence." *Journal of Politics* 72(2): 426–37.

Snyder, James M., Jr., and Michael M. Ting. 2002. "An Informational Rationale for Political Parties." *American Journal of Political Science* 46(1): 90–110.

Wittman, Donald. 1983. "Candidate Motivation: A Synthesis of Alternative Theories." *American Political Science Review* 77(1): 142–57.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

- Proof of Lemma 1
- Proof of Proposition 1 (Symmetric entry equilibria)
- Proof of Proposition 2 (Comparative statics)
- Proof of Proposition 3 (Large communities)
- Proof of Proposition 4 (Directional information about candidates' ideal points)