Political Motivations*

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Abstract

Are politicians motivated by policy outcomes or by the perks of office? The answer to this question is central to understanding the behavior of office holders and the policies they produce. Despite the question's importance, however, the existing literature is not well suited to provide an answer. To shed light on the issue of political motivations I exploit a basic fact: to hold office, one must first win election. By characterizing the types of candidates that succeed in elections, I am able to predict the types that hold office and the policies that are produced. Toward this end, I develop a simple model of two candidate electoral competition in which candidates may be either *office* or *policy motivated*. In a second departure from standard formulations, the model incorporates both campaign and post-election behavior of candidates. In this environment I find that office motivated candidates are favored in electoral competition, but that their advantage is limited by the electoral mechanism itself, and policy motivated candidates win a significant fraction of elections. More importantly, I show that the competitive interaction among candidates of different motivations affects the incentives of *all* candidates – both office and policy motivated – and that this competition affects policy outcomes.

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1 Introduction

What are the motivations of those who hold public office? Are they inspired by policy outcomes, or do they merely seek the perquisites of office? These questions are of more than philosophical interest. In modern indirect democracies the holders of public office are awarded broad powers to determine both the direction and efficacy of government policy. It is important to know, therefore, whether elected leaders view public office as a means to an end or as an end in itself.

In this paper I attempt to shed light on the basic question of political motivations. The method of investigation is simple and builds upon a basic fact: to hold public office, one must first win election. By studying which types of candidates succeed in elections, we may begin to understand which types of candidates hold office and the policies that result. To formalize this approach, I develop a model of electoral competition with heterogeneously motivated candidates and allow them to compete against each other. I suppose that, in addition to ideological differences, candidates vary in how much they value policy outcomes over the perks of office; candidates are, therefore, in the language of the literature, either *policy* or *office motivated*. Each candidate's type is drawn from a known distribution and is private information.

In this setting I find that office motivated candidates are favored in elections (as intuition would suggest), but to a lesser extent than previously thought (see Calvert 1985) as their advantage is constrained by the electoral mechanism itself. Indeed, I find that policy motivated candidates win a significant fraction of elections. Moreover, and more importantly, I show that the competitive interaction among candidates of different motivations affect the incentives of *all* candidates, and that this competition affects policy outcomes.

The issue of candidate motivations is not new and has been prominent in the study of elections. Yet, despite this emphasis, the extant literature is not suited to answer the fundamental questions of interest. Previous research has allowed for different motivations, with one stream of literature following Hotelling (1929) and assuming office motivated candidates, while another stream assumes that candidates are policy motivated, as proposed by Wittman (1977, 1983) and Calvert (1985). It is the case in both literature streams, however, that within individual models candidates are assumed to be homogeneous in their motivations.[1] Thus, in these models the type of candidate that wins office is exogenously imposed rather than, as is the case here, endogenously determined through electoral competition.

This characteristic of the literature is critiqued disapprovingly by Persson and Tabellini (2000) – "... it is not satisfactory to leap back and forth between such different assumptions" (p. 484) – and they list its resolution as an outstanding challenge of political economics.[2] The model introduced here begins to address the challenge of Persson and

[1] A more detailed discussion of the related literature is delayed momentarily.

[2] Persson and Tabellini (2000) employ different terminology to that used here, referring to policy and office motivated candidates instead as *partisan* and *opportunistic* candidates, respectively.

Tabellini by constructing an integrated model of candidate motivations and showing which types are likely to hold office. Moreover, I show that in this model the sum is greater than the parts as behavior in the integrated model is not a convex combination of the extreme cases (of all office or all policy motivated candidates), but rather different altogether and instead a product of the competitive interactions among candidates of different motivations.

Driving the model is a novel conception of policy development. The model is inspired by two observations: that election campaigns matter but they are not all that matter and policy is only finalized after the election. To capture this richness, I model policy outcomes as determined by both the choice of a policy instrument *and* the quality of implementation, where candidates can commit to policy positions before the election but the quality of implementation depends on the efforts of election winners *after* they have been installed in office.

In this richer environment campaign promises play dual roles: as commitments to particular policy instruments *and* as signals about how a candidate will behave once in office. This duality induces a signaling game and driving this signaling game is a simple fact: policy motivated candidates care more about policy outcomes and, consequently, exert more effort if elected to office.[3] Thus, ceteris paribus, voters prefer to elect a policy motivated candidate rather than one that is office motivated. This *endogenous* voter preference creates an incentive for candidates to separate and imitate: policy motivated candidates wish to separate from office motivated candidates and signal their type to voters, and office motivated candidates seek to imitate policy motivated candidates and hide their type from voters. This game of cat-and-mouse is iterated continuously by strategic candidates such that equilibrium behavior differs significantly from that when motivations are homogeneous.

The expanded view of policy formation that is developed requires an expanded view of voter learning and behavior. It is no longer the case necessarily that voters support the candidate closest to them in the ideological space as they must weigh ideology against the quality of implementation. This balancing act is cognitively more demanding than in standard models, yet it is closer to real voting behavior where "character" (more formally, valence) issues are an important determinant of vote choice (Stokes 1963). In contrast to existing models (Ansolabehere and Snyder 2000; Groseclose 2001; Aragones and Palfrey 2002, 2005) the valence advantage appears endogenously here, demonstrating explicitly how valence can be generated by policy considerations.

This voting behavior is of interest in its own right and for what it implies for the interpretation of Black's (1958) median voter theorem. The theorem continues to hold in this environment as it is still very much the preferences of the median voter that drives outcomes. However, it is no longer the case that the most centrist candidate necessarily wins election, which implies in turn that policy convergence need not obtain.[4] In addition

[3] One may here interpret effort broadly as that exerted over a lifetime to build up competence. Corruption is another possible interpretation, with policy motivated candidates engaging in less.

[4] This possibility arises in existing models of valence competition although it requires asymmetry

to exposing a subtlety in applying the median voter theorem in incomplete information environments, this finding goes some way to providing an informational explanation as to why a "race toward the center" is not always observed in politics.

The focus of this paper is on electoral competition, and I take as given the demographics of the candidate pool. This choice leaves unanswered the complementary question of what motivates individuals to transform from citizens into candidates. Although the answer to this question is largely empirical (and dependant upon non-political outside options), the analysis provided here is an essential step in understanding political motivations. The equilibria of the game I study provide calculations that citizens must make in deciding whether to enter politics, and demonstrates the political outcomes that will result once these decisions have been made. In that sense, a contribution of the paper is to show that policy motivated candidates can win elections, and therefore have a reason to enter the political fray, dispelling the notion that "A good politician is quite as unthinkable as an honest burglar" (H.L. Mencken; 1880-1956).

1.1 Related Literature

Intriguingly, the central premise of the current model (to allow office and policy motivated candidates to compete against each other) is raised informally by Calvert (1985) who notes "there is no reason to expect policy motivation to be "selected out" among candidates." (p. 73). In an environment of complete policy commitment (and, significantly, candidate homogeneity), Calvert concludes however, that "... candidate motivations don't affect the conclusions of the spatial model." (p. 73) This conclusion contrasts with the one presented here, although the reason for such is easy to see. In assuming full commitment, Calvert allows no role for post-election behavior, precluding the signaling that drives the current model. My results show that Calvert's conjecture does not extend to the more realistic world in which candidate motivations are heterogeneous and private information.

A growing literature in political economy allows candidates to differ on characteristics other than ideology, although the focus of these models is not on candidate motivations and electoral competition. An exception is Roemer (1999) who models heterogeneity within political parties and explores how this affects the ability of parties to compete in a model with policy commitment. A second exception is Aragones and Palfrey (2005) who study a general model of candidate type, allowing for heterogeneity in valence, ideology and motivations (and *purify* the mixed equilibrium of Aragones and Palfrey (2002)). They assume, however, full commitment over policy at the electoral stage and the type of the winning candidate is not consequential (and signaling concerns do not arise).

The model is also related to the small literature on signaling models of two candidate

across candidates (Ansolabehere and Snyder 2000, Groseclose 2001, Aragones and Palfrey 2002). The subtlety exposed here is that in incomplete information environments the same property holds with even ex-ante symmetric candidates and without an exogenously imposed valence advantage.

elections that began with Banks (1990). These models, in various capacities, offer explanations of policy divergence, although the focus of each differs from the current paper. Banks (1990) develops a model of costly lying in elections, although he imposes these costs exogenously.[5] Schultz (1996) studies a model with a state of the world that is known by both candidates but unobserved by voters, and shows that if candidate preferences are sufficiently close to those of the median voter then this information can be transmitted through campaign platforms. Prat (2002a, 2002b) incorporates lobby groups into the model and studies the information transmission provided by campaign contributions.[6]

Models of single elections with policy commitment were introduced by Hotelling (1929) and have since then provided a popular modeling apparatus (Wittman 1983; Calvert 1985; Schultz 1996; Ansolabehere and Snyder 2000; Aragones and Palfrey 2002; etc.). The dual restrictions of a single election and commitment are interrelated and it is often suggested that reputational concerns in repeated play provide a foundation for policy commitment. However, to the extent that the credibility of campaign commitments depends on verifiability, it seems reasonable to assume that commitment is not possible on all dimensions of policy, and that effort levels are more difficult to verify than ideological promises. The model offered here captures this distinction in its most simple and extreme form, showing how all dimensions of policy can play a role in elections even if the ability to commit is only partial.[7]

An advantage of this approach is that it integrates into a single model both pre- and post-election behavior. This capability speaks to a second unresolved issue in political economy of how and when election campaigns matter. As is the case for candidate motivations, the literature on this question has proceeded along two parallel streams. The literature following Hotelling (1929) assumes not only that elections are important but that they are all-important as pre-election commitments fully determine policy outcomes. The opposing literature, originating with Barro (1973) and Ferejohn (1986), interprets literally the incompleteness of the electoral contract and treats all campaign statements as cheap talk, focusing instead on the behavior of agents in office. This state of affairs (perhaps not surprisingly) is also critiqued by Person and Tabellini (2000):

> "It is thus somewhat schizophrenic to study either extreme: where promises have no meaning or where they are all that matter. To bridge the two models is an important challenge." (page 483)

[5] Banks (1990) also shares the trait (and is one of the few papers to do so) that the link between campaign promises and policy outcomes is partially relaxed; see also Bernhardt and Ingberman (1985).

[6] In work done after this paper was circulated, Kartik and McAfee (2006) develop some related results. Candidates in their model are not concerned with policy, yet one type is assumed exogenously to possess a valence advantage (what they label 'character'). To induce a signaling game, they assume that the advantaged candidate is less flexible in policy offerings and, in fact, is entirely nonstrategic. In contrast, candidates in my model are fully strategic and differ only in their motivation. Moreover, the voter preference for one type of candidate emerges endogenously rather than being imposed exogenously.

[7] This formulation also captures the reality that politicians do not choose outcomes, but rather they choose policies which must be implemented.

The model introduced here offers one way to bridge this gap. By assuming partial commitment I allow for meaningful election campaigns while respecting the importance of post-election policy making. More importantly, this approach shows how promises can mean more than they appear on the surface, connecting issues of commitment to other policy dimensions. More generally, this connection only arises when motivations are heterogeneous, showing how the dual challenges of Persson and Tabellini are in fact closely connected.

2 The Model

There are n citizens, where n is odd, and two candidates, denoted by A and B. A single election is to be held and determined by majority rule. The timing of the election game is depicted in Table 1.

The policy space is the real line, $\mathbb{R}$. Prior to the election each candidate must commit to a policy position, where $x_j \in \mathbb{R}$ is the policy committed to by candidate j. The candidate who wins the election, denoted w, receives a benefit of W and also chooses a level of effort, $e_w \in [0,1]$, for $w = A, B$. Effort is costly, with cost given by $\gamma (e_w)^2$. The effort exerted by the office-holder may be interpreted as determining the quality of implementation of a policy choice, where the quality is assumed to equal $(1-e)$. The policy outcome, then, is composed of both a policy instrument and the quality of implementation, and the outcome space is $P = \mathbb{R}\times [0,1]$. A key feature of the model is that voters observe only $x = (x_A, x_B)$ prior to casting their votes.

Preferences are as follows. All actors – voters and candidates – derive utility from the policy outcome (x_w, e_w), the policy chosen and implemented by the winning candidate. Voters and candidates prefer more effort to less (effort is a public good), although they differ on ideological preferences. The ideal points for all actors, therefore, are on the x-axis. Denote voter ideal points by p_i for each voter i, with the median of citizens' p_i values at $p_m = 0$. The candidates are located symmetrically about the median voter with ideal points $-\alpha$ and α for candidates A and B, respectively, where $\alpha \geq 0$.

Voters and candidates also differ on the utility weighting assigned to policy. Each actor is endowed by nature with a type t, where $t \in \{h, l\}$, and the prior probability of being type l is $q \in [0,1]$. It is assumed that type is private information and that $\beta_h > \beta_l \geq 0$. Voter utility is as follows:

$$U_i (x_w, e_w | t) = -\beta_t \left[(p_i - x_w)^2 + (1-e_w)^2 \right],$$

where $i \in \{1, 2, ..., n\}$. Thus, voter preferences do not depend on the identity or type of the winning candidate, other than through the policy outcome. Also note that the separability of utility across dimensions aids in the exposition but is not necessary for the results.[8]

[8] In some instances conservatives may prefer incompetent liberal office holders (and vice-versa). Even if this is true (and it is not on issues such as defense and corruption), it cannot reverse the preferences

Stage 1:	Nature draws motivations for candidates and voters.
Stage 2:	Candidates commit to policy positions.
Stage 3:	Voters observe policy positions and cast votes.
Stage 4:	Winner decided; the incumbent implements policy commitment and exerts effort.
Stage 5:	Policy outcome is determined and payoffs received.

Table 1: Sequence of Play

Candidates have identical preferences to voters, although they may additionally be elected to office, receiving the perks of office and paying for effort to implement their chosen policy. The utility of candidate A is given by:

$$U_A(x_w, e_w|t) = -\beta_t\left[(-\alpha - x_w)^2 + (1-e_w)^2\right] + \Gamma_A(w)\left[W - \gamma(e_w)^2\right],$$

where

$$\Gamma_A(w) = \begin{cases} 1 & if \quad w = A \\ 0 & otherwise \end{cases}.$$

An actor's type affects the disutility felt from different policy outcomes. For voters this is inconsequential to behavior (although, if voting were costly, type may influence the turnout decision). For candidates type determines how much they value policy outcomes over the perks of office. For obvious reasons, therefore, I refer to candidates of type h as "policy motivated" and those of type l as "office motivated." Note that the difference between policy and office motivated candidates is only one of degree (as the traditional restriction for office motivated candidates of $\beta_l = 0$ is permitted but not imposed).[9]

A candidate's type determines the effort exerted should he be elected to office. Voters do not observe type and have only the information contained in a policy commitment (and the candidate's identity) to draw inferences about type. I make the standard assumption that all voters draw identical inferences (as they possess the same information);

of any voter. Instead the preferences of partisan voters would be strengthened, and electoral outcomes would still hinge on the median voter, whose preference is more likely to be symmetric across candidates.

[9] One may generalize this framework and suppose that voters and candidates assign different weights to the different components of policy outcomes, and that these values are imperfectly correlated (that is, a voter's concern for policy is only loosely correlated with that for effort). The assumption of equal weights is without loss of generality and adjustments to the normalization can produce any weighting desired. On the other hand, assuming that the weights are correlated is necessary for the results, although perfect correlation is not. It is sufficient to assume that the weights are positively correlated to some degree so that voters can draw inferences about expected effort from the policy commitments.

denote by $\pi_j(x_j)$ the posterior belief of voters that candidate j is of type l given policy commitment x_j, and set $\pi(x) = \{\pi_A, \pi_B\}$ for $x = \{x_A, x_B\}$. I assume voters do not use weakly dominated strategies, and therefore vote for the candidate that maximizes the expectation of utility (and voting is costless).[10]

A significant – and deliberate – feature of the model is that a candidate's motivation is the only information that is privately held (in particular, therefore, voters know candidate ideal points). This focuses attention on political motivations, ensuring that the strategic obfuscations of candidates are driven by their motivations and not their ideology, a topic that has been studied elsewhere (Banks 1990; Schultz 1996). In an appendix I relax this assumption and show that the model and the results extend easily in this direction.

The above restrictions imply that voter p_m (the voter with the median ideal point) is also pivotal in determining majority preference. A strict preference held by m for one candidate implies that a strict majority of voters hold the same preference. If, on the other hand, m is indifferent then all other voters are either split equally over the two candidates or are all indifferent also. To avoid unnecessary complication, I assume that an indifferent voter votes for candidate A if her ideal point is to the left of m's (i.e., $p_i < 0$) and for candidate B if to the right (i.e., $p_i > 0$). Focus can then be restricted to the preference of voter m. For the pair of policy commitments, x, denote by $r(x)$ the probability that the median voter votes for candidate A. If the median voter is indifferent, assume that $r(x) \in (0, 1)$ such that both candidates win with positive probability.

The election environment just described is formally a signaling game, although with several non-standard attributes. The election game has dual senders (the candidates) and multiple receivers (the voters), and one of the senders (the winner) takes an action after the receivers. Moreover, the receivers' action is collective and limited to a binary choice of one of the two senders. Although different to most signaling models, these features are necessary ingredients of a meaningful model of elections. Two more significant features that are different from other models (including Banks 1990) are that the voters intrinsically care about the signal that is sent by the candidates (the policy commitment) and that the candidates care about what happens should they lose (i.e., the policy to be implemented by their opponent). In this sense, candidates here can truly be said to be policy motivated. This dependence creates the possibility for free-riding by candidates who may prefer to lose the election and have the other candidate exert costly effort; to avoid this possibility I impose the constraint[11] $W \geq \gamma \left(\frac{\beta_h}{\beta_h+\gamma}\right)^2$.

An equilibrium satisfies the above conditions and involves a set of (possibly mixed) strategies for candidates and voters that optimize utility at every history based on their types and the beliefs $\pi(.)$, where beliefs are derived by Bayes' rule when possible (a

[10] To ensure meaningful voting it is required that $\beta_l > 0$.

[11] This constraint is sufficient but not necessary for the results to follow. It ensures that the direct benefit of winning office exceeds the cost of effort for candidates of all types and for all policy commitments.

Perfect Bayesian Equilibrium). For analytic simplicity I restrict attention to equilibria such that A locates to the left of B.[12] To avoid technicalities, I also consider only equilibria in which both candidates win election with positive probability.

The set of signaling equilibria is large and to provide sharp insight a refinement is required. For the following results to hold it is required only that, according to the standard notion, belief following a deviation be shifted toward the type that is "most likely" to deviate. Unfortunately, however, the simplest refinements that capture this notion have little technical bite in the policy environment (e.g., the intuitive criterion, divinity, D1; Cho and Kreps 1987, Banks and Sobel 1987). Elections differ from standard signaling games both in contextual details and what these details imply for signaling costs. In standard games the type most preferred by the receiver can send signals at lower cost. Here the opposite is true: all candidates prefer to commit to their ideal point and it is "cheaper" for office motivated candidates to move away from this ideal point. A further difficulty is that the cost of the signals themselves (the policy commitments) depend on the reaction of voters and so beliefs can always be found to render any deviation profitable.

One strategy here would be to adjust the definition of divinity or D1 to suit the electoral environment. As this would require excessive technical detail, I instead follow Banks (1990) and apply the stronger requirement of universal divinity, due to Banks and Sobel (1987). This requirement is far stronger than is necessary for the results presented here, and I point out the excess at the appropriate times (see, in particular, the discussion surrounding Lemma 5). A technical statement of universal divinity is provided in the appendix.

Before proceeding, some language on strategies is in order. A strategy for a candidate j is said to be *pooling* if j commits to the same policy position whether office or policy motivated (or mixes over the same distribution). Similarly, a strategy is said to be *separating* if voters precisely learn the candidate's type for all actions, and a strategy is *semi-separating* if it is neither pooling nor separating (alternatively this may be thought of as *semi-pooling*). Equilibria are referred to as pooling, separating, or semi-separating if both candidates A and B use those strategies. Although asymmetric strategies are permitted, all equilibria are symmetric and so the type of an equilibrium will follow immediately from the equilibrium strategy of any one candidate. Note that these definitions apply to individual candidates and how their behavior depends on their type; in particular, whether candidate A is pooling is independent of the choices of candidate B. If both candidates pool and locate at the same policy position (e.g., the median voter's ideal point) then strategies are said to be *convergent*, otherwise they are *divergent*.

[12] This applies the natural restriction that in equilibrium candidates do not locate on the far side of the median voter from their ideal point, formalizing the notion that partisans implement policies more favorable to themselves than does the opposition.

3 Results

3.1 A Simple Property of Equilibrium

The central problem for voters is to infer a candidate's type so as to predict his level of effort should he be installed in office. The first part of this process may be confounded by strategic behavior. The second part – the connection between type and effort level – is, however, clear and described in Lemma 1. The additive separability of preferences (and subgame perfection) implies that the equilibrium effort level for each type of candidate is independent of his policy commitment. This allows for the following simplification of equilibrium behavior.[13]

Lemma 1 *In equilibrium the effort level of the elected candidate is* $\frac{\beta_t}{\beta_t+\gamma}$ *for all* t*.*

The lemma establishes that the equilibrium effort level is increasing in the strength of policy preference. Simply because they intrinsically care more about policy outcomes, policy motivated candidates implement policies more effectively than do office motivated candidates. Critically, this induces in voters, ceteris paribus, an endogenous preference for policy motivated candidates.

Although simple, the property in Lemma 1 drives the electoral signaling game and is a central determinant of policy outcomes. This property is important as it provides the connection between post- and pre-election behavior of the candidates. Important to note is that this voter preference derives solely from candidate motivations and does not require the assumption of additional heterogeneity.

3.2 Benchmark Results

To show most clearly how the dual modeling innovations of the model interact, I consider here the two benchmark cases in which only one of the innovations is included. In both benchmark cases, full policy convergence is the unique outcome.

Homogeneous candidate motivations. Candidate homogeneity implies, by Lemma 1, that every candidate will behave identically if elected to office. As such, the voters' inference problem becomes inconsequential as although voters care about the implementation of policy, the quality is now independent of who wins the election (and thus the signaling game has no bite). The only dimension of electoral competition then is policy, and standard results for this environment guarantee that platforms must converge in equilibrium.[14]

[13] The statement of results within the body of the paper are in verbal form; the appendix contains formal statements of results as well as all proofs.

[14] Technically, multiple equilibria exist as convergence can be supported by multiple voter reaction functions r. Throughout the paper, claims of uniqueness are with respect to the policy outcomes that are possible.

Lemma 2 *If $q \in \{0, 1\}$ a unique equilibrium exists in which both candidates A and B locate at the median voter's ideal point.*

Convergence occurs in equilibrium regardless of whether candidates are office or policy motivated. Thus, despite different motivations (and disutility from converging on policy), electoral competition among homogeneous candidates induces policy choices that are independent of those motivations.

A constant quality of policy implementation. Extending the model to include heterogeneity in motivations does not weaken the incentive to converge if the quality of policy implementation is fixed. Lemma 3 shows that again complete convergence of policy must arise in equilibrium. Heterogeneity in motivations is, therefore, not sufficient in isolation to affect equilibrium behavior.

Lemma 3 *If $P = \mathbb{R}$ then, for all q, there exists a unique equilibrium in which both candidates A and B locate at the median voter's ideal point, regardless of type.*

With the implementation of policy at a fixed level, the winning candidate's type does not influence the policy outcome and competition again is only over policy instruments; convergence must then result. Clearly, this logic does not depend on fixing the effort level to 1 (such that $P = \mathbb{R}$), and holds for any constant effort level.[15]

3.3 Heterogeneous Motivations: Policy Divergence

The inclusion of heterogeneity in candidate motivations and the quality of implementation change the nature of electoral competition by inducing a signaling game at the election stage. The following lemma reflects basic properties of signaling games. These properties hold in any equilibrium and do not require the universal divinity refinement of beliefs.

Lemma 4 *In every equilibrium:*
(i) Office motivated candidates win with weakly higher probability.
(ii) Policy motivated candidates locate weakly closer to their ideal point.

The monotonicity results of Lemma 4 reflect the fact that movement towards the median voter is at greater cost to policy motivated candidates than to office motivated candidates. As office motivated candidates are less concerned about policy, they are more prepared to trade policy outcomes for an increased chance of winning office.

The simple intuition of Lemma 4, when combined with the requirements of universal divinity, leads to an important feature of voter beliefs. Because policy motivated candidates are less willing to trade policy for the chance of winning office, it follows that they

[15] Calvert (1985) and Wittman (1983) establish divergence results in the single dimension framework of Lemma 3 (with all policy motivated candidates; $q = 0$) by assuming candidates are uncertain about the location of the median voter's ideal point.

benefit more from moving towards their ideal point (ceteris paribus). Consequently, upon observing a deviation from a pooling strategy, voters believe the deviator to be policy motivated if the deviation is towards the ideal point. This leads to the following powerful result.

Lemma 5 *For $q \in (0, 1)$ the following holds:*
(i) a pooling equilibrium at the median voter's ideal point does not exist if $\alpha > 0$.
(ii) if a pooling equilibrium exists then candidate A locates at $-\alpha$ and candidate B locates at α.

Driving Lemma 5 is that a candidate's motivation provides a critical connection between policy commitments and effort levels, the two components of policy outcomes. This connection allows voters to infer valuable information about outcomes from policy commitments, in addition to the commitment itself.

To gain intuition for the lemma, suppose both candidates pool at the median voter and $\alpha > 0$. In this case the median voter receives her most preferred policy position irrespective of who wins, but the quality of implementation is uncertain as she receives no information about candidate type. If candidate B deviates towards his ideal point, inducing voters to believe he is policy motivated, the median voter faces a choice between different alternatives: her ideal policy with uncertain quality from candidate A, or a less attractive policy position from candidate B but with an expectation of high effort (a more effective implementation of the policy). As this logic applies for deviations of any size (as long as the deviation is towards the ideal point), the median voter prefers the divergent candidate if the deviation is sufficiently small. Consequently, the benchmark pooling equilibrium breaks down.

More generally, this logic (and lemma) shows that the standard intuition about the median voter theorem doesn't extend to incomplete information environments. Driving the lemma is the fact that the median voter need not necessarily support the closest candidate in the policy space. Consequently, although the theorem still holds as it is the preferences of the median voter driving outcomes, the power of the median voter does not necessarily induce convergence.

The lemma also shows clearly the role played by universal divinity. For the lemma to go through it is required that following a deviation beliefs shift in favor of policy motivated candidates enough to ensure the median voter prefers the deviator. This can hold for small changes in beliefs and is possible even if beliefs vary continuously (in the deviation). The strength of universal divinity exceeds these requirements as it shifts all belief on to the possibility that the candidate is policy motivated.

The intuition provided above does not depend on the candidates pooling at the median and generalizes to any pooling strategy that isn't at a candidate's ideal point (as a small deviation towards the ideal point must be available). When the candidates pool at their ideal points such a deviation is not possible, and an equilibrium may be supported (part ii of the lemma). By the symmetry of the model, therefore, pooling equilibria must be symmetric.

Of most interest here is that Lemma 5 immediately implies, for any degree of candidate heterogeneity, that the benchmark results for electoral competition no longer apply and policy divergence must occur. Moreover, equilibrium behavior in the general model is not a convex combination of the benchmark cases (which both predict policy convergence in this environment), but rather behavior is different altogether. If a candidate is pooling across types then there must be significant divergence and behavior unwinds all the way to the ideal point. The only other alternative is that candidates don't pool, instead separating in some capacity which leads to signaling behavior and voter learning (and divergence), effects that also don't arise in the benchmark model.

The breakdown of the benchmark results not only highlights the effect of candidate heterogeneity in a general model, but goes some way to explaining empirical phenomena as policy divergence is a commonly observed regularity in a variety of political systems (Budge, Robertsen, and Hearl 1987). In the following section I characterize precisely the nature of policy divergence and voter learning in equilibrium.

3.4 Equilibrium Behavior

The preceding discussion of pooling strategies considered only deviations by candidates toward their ideal points. For deviations away from ideal points the logic of Lemma 5 is reversed: it is more costly for policy motivated candidates to deviate and voters believe the deviator to be office motivated (expecting a low level of effort).

Suppose then that candidates are each pooling at their ideal point and one candidate, say candidate A, deviates towards the median voter. If the deviation is small then candidate A is worse off as voters will favor candidate B (who is still playing the equilibrium strategy). But what if the deviation is large? The loss from revealing his type is the same as for a small deviation, but the attractiveness to the median voter of the policy offered is increasing in the amount of convergence. For large enough deviations, therefore, the favor of the median voter can be secured and the election won. This logic requires that a sufficiently large deviation "towards" the median voter is possible, which in turn requires that the candidate ideal points (and the potential pooling equilibrium) are sufficiently extreme. The definition of α_1 provides the critical value.

Definition 1 α_1 *satisfies:*

$$\left(1 - \frac{\beta_l}{\beta_l + \gamma}\right)^2 = \frac{\alpha_1^2}{(1-q)} + \left(1 - \frac{\beta_h}{\beta_h + \gamma}\right)^2.$$

The value α_1 defines the policy position such that the median voter is indifferent over a policy of α_1 with beliefs equal to her priors, and a policy of 0 from an office motivated candidate; that is, one policy is at the median voter's ideal point with the expectation of low effort, and the second is a policy position at a candidate's ideal point with expectations equal to prior beliefs. Figure 1 shows this graphically via the median voter's indifference curve. The following result then obtains.

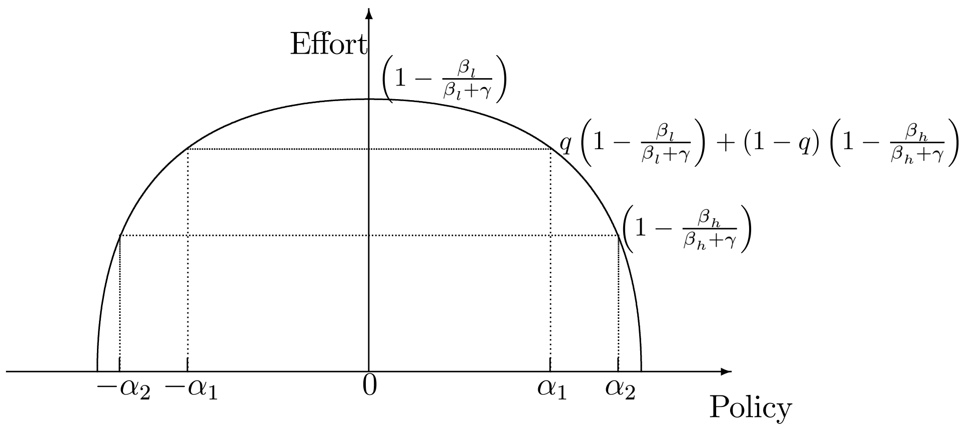


Figure 1: Median Voter's Indifference Curve

Theorem 1 *Suppose $q \in (0,1)$. For all $\alpha \in [0, \alpha_1]$ the unique equilibrium is pooling: candidate A locates at $-\alpha$ and candidate B locates at α, irrespective of their types. A pooling equilibrium does not exist if $\alpha > \alpha_1$.*

The breakdown of pooling equilibria for $\alpha > \alpha_1$ follows from the fact that office motivated types willingly separate from policy motivated types to win the support of voters. This behavior is unusual as a general property of signaling models is that, if types are revealed, then the type less preferred by the receiver (in this case an office motivated type) receives a less desirable reaction. This general property does not hold here as the voters intrinsically care about the signal that is sent, and this induces office motivated candidates, under certain circumstances, to willingly separate from their more preferred counterparts.

At the critical threshold of α_1 the nature of electoral competition changes. Rather than candidates pooling in their policy announcements to hide their types from voters, opportunistic candidates now willingly reveal their types and pander to the preferences of the median voter. As a consequence of these actions, voters learn valuable information about expected future performance from campaign platforms. The remaining two results of this section characterize equilibrium behavior in the domain where pooling equilibria don't exist, describing the amount of separation by candidates and the degree of information conveyed to voters. Toward this end, a second critical value of α is important.

Definition 2 α_2 *satisfies:*

$$\left(1-\frac{\beta_l}{\beta_l+\gamma}\right)^2 = \alpha_2^2 + \left(1-\frac{\beta_h}{\beta_h+\gamma}\right)^2.$$

The value α_2 defines the policy position such that the median voter is indifferent over a policy of α_2 from a policy motivated candidate, and a policy of 0 from an office motivated candidate; that is, a policy at the median voter's ideal point with the expectation of low effort, and a second policy at α_2 with the expectation of high effort. The value of α_2 depends on the difference $\beta_h - \beta_l$ (and γ), and is independent of q.

An obvious property of all equilibria is that candidates do not choose policy positions more extreme than their ideal point (as moving towards their ideal point induces voters to believe they are policy motivated and is more attractive to themselves and the median voter). An immediate implication of this property for $\alpha < \alpha_2$ is that neither candidate can play a separating strategy: if types separate completely, then the median voter must strictly prefer the policy motivated type, thereby violating Lemma 4. Thus, for candidate preferences in the domain (α_1, α_2) candidates must be semi-separating. Theorem 2 describes the equilibrium.

Theorem 2 *Suppose $q \in (0,1)$. For all $\alpha \in (\alpha_1, \alpha_2)$ the unique equilibrium is semi-separating: policy motivated candidates locate at their ideal point and office motivated candidates mix over their ideal point and the ideal point of the median voter. The median voter is indifferent over all equilibrium announcements.*

A semi-separating strategy requires one type of candidate to play a mixed strategy and for there to be some imitation. By the same logic for pooling equilibria (Lemma 5), if the semi-pooling is anywhere other than at the candidate's ideal point then a small deviation towards the ideal point is profitable. Thus, it must be the office motivated type that mixes and the semi-pool must be at the ideal point. When an office motivated type doesn't pool at the ideal point, his type is fully revealed to the voters. His reputation, therefore, cannot be damaged further and so he aggressively competes for voter favor on the remaining policy dimension. His incentive to converge is unencumbered and unabated (as in the benchmark results) and he mixes over his ideal point and zero. This logic applies to both candidates equally and the equilibrium is symmetric.

What is perhaps less obvious is that the office motivated candidates must mix in a precise ratio to leave the median voter indifferent over all possible announcements. This property is required in equilibrium to ensure in turn that office motivated candidates are indifferent over their possible actions and prepared to mix. To see why this is necessary, consider the incentives of candidate B if he is policy motivated and if voters strictly prefer a policy commitment of zero over a commitment to α. In this situation, candidate B loses whenever candidate A commits to zero and ties if A commits to $-\alpha$, in which case he wins a fraction of the time and the expected policy outcome is zero but with variance. By deviating to an announcement of zero himself, candidate B then strictly improves the policy outcome (as he is risk averse) and wins the election with higher probability, and so is better off. If, on the other hand, the median voter prefers an announcement at α then office-motivated candidates would not be prepared to mix. In equilibrium, therefore, the median voter must be indifferent.

The median voter is free to mix over all policy commitments offered in equilibrium (as she is indifferent). She does not mix equally if $\beta_l > 0$. If she did so then an office motivated candidate would strictly prefer to announce his ideal point rather than zero as it offers a more attractive policy outcome for the same probability of victory. It is only if $\beta_l = 0$, and a candidate is unconcerned with policy, that in equilibrium a non-centrist announcement wins with the same frequency as does a commitment to the median voter's ideal point. For $\beta_l > 0$, therefore, centrist policy commitments are rewarded with an increased chance of victory.

For candidate policy preferences more extreme than α_2 it is not possible for there to be any degree of imitation among candidates and simultaneously maintain the indifference of the median voter (as, recall, any imitation must be at a candidate's ideal point). For $\alpha \geq \alpha_2$ equilibrium strategies must be separating; they are described in Theorem 3.

Theorem 3 *Suppose $q \in (0, 1)$. For all $\alpha \geq \alpha_2$ the unique equilibrium is separating: policy motivated candidates A and B locate at $-\alpha_2$ and α_2, respectively, and all office motivated candidates locate at the ideal point of the median voter; the median voter is indifferent over all equilibrium announcements.*

As is the case in Theorem 2, once office motivated types separate from policy motivated candidates their type is fully revealed and they converge completely to the median voter's ideal point. The policy motivated types are similarly liberated and seek to converge, but they only are willing to do so while their reputation for high effort is kept intact. With office types all the way at 0, policy motivated types can move inward from their ideal point while retaining their reputation, but only until they reach the threshold $\pm\alpha_2$, the point at which the median voter is indifferent over the candidates. Further convergence would induce voters to believe the deviator to be office motivated. Thus, α_2 provides a bound on policy positions for all equilibria.

In contrast to the previous equilibria, voters in separating equilibria are able to precisely determine a candidate's type for all equilibrium announcements, and there remains no residual uncertainty about the quality of implementation to be expected. This result, in combination with the equilibria of Theorems 1 and 2, leads to the surprising conclusion that the more different are the preferences of the candidates and the median voter (the larger is α), the more information is conveyed in equilibrium. This finding contrasts with Schultz (1996) and results from other settings that assume heterogeneous preferences, such as legislative models of information transmission (Gilligan and Krehbiel 1987) and the cheap-talk literature generally (Crawford and Sobel 1982).

3.5 Properties of Equilibrium

The equilibria described in Theorems 1-3 allow insight into the nature of electoral competition when information is incomplete and the policy space rich, providing unique predictions about behavior and policy outcomes. In particular, and most germane, the equilibria provide answers to the foundational questions posed in the introduction.

(i) What are the motivations of candidates that win elections? In the equilibria with some separation (Theorems 2 & 3) it is true that more centrist policy commitments provide an electoral advantage, and that office motivated candidates benefit from this. However, this property not only doesn't hold in all equilibria (see Theorem 1), but even when it does hold, the advantage is not absolute and candidates with relatively extreme policy commitments are still able to win elections. Indeed, the electoral advantage exists

only if office motivated candidates are also motivated to some degree by policy outcomes (i.e., $\beta_l \neq 0$).

It follows, to answer question (i), that office motivated candidates do not always win elections and overwhelm policy motivated candidates, and in many situations perform no better in terms of winning elections. The greater willingness of office motivated candidates to trade policy for office is restrained by the electoral mechanism itself, and policy motivated candidates win a significant fraction of elections.

(ii) How does the competitive electoral process shape the policies that are produced? Equilibrium policy outcomes are very different when the motivations of candidates are heterogeneous. Not only do candidates diverge on policy, but they frequently diverge all the way to their ideal policy positions, thereby providing an informational explanation as to why candidates may truthfully campaign according to their own policy preferences even when policy commitments are possible.[16] In answer to the question, therefore, the interaction of candidates of different motivations has a significant impact on policy outcomes.

For any set of parameter values, the effect of equilibrium behavior on the distribution of candidate platforms and policy outcomes can be traced out. Figure 2 depicts the distribution of policy commitments for values of q when $\beta_l = 0$, $\beta_h = \gamma$, and $\alpha = \frac{1}{2}$. The first three panels, (a)-(c), depict the distribution of campaign promises by both candidates, with these commitments spread between the candidates' ideal points and the ideal point of the median voter. As the median voter mixes equally for $\beta_l = 0$, these figures also represent the distribution of policy outcomes. Panel (d) shows more specifically how the probability that a candidate locates at zero varies as q varies between zero and one.

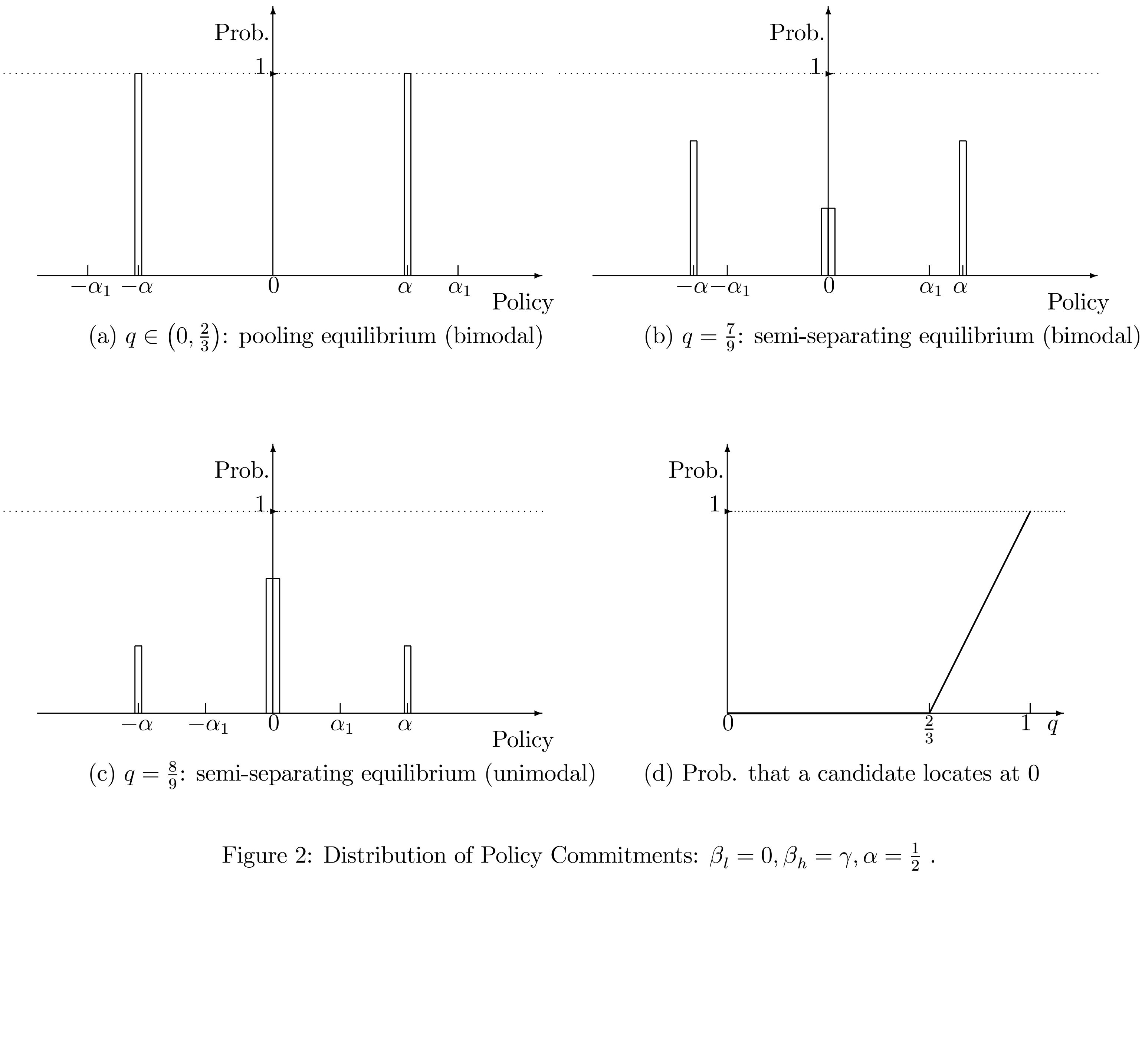
For the parameters of Figure 2 the critical values of α are $\alpha_1 = \frac{\sqrt{3}}{2}\sqrt{1-q}$ and $\alpha_2 = \frac{\sqrt{3}}{2}$, where α_2 is independent of q, and α_1 is decreasing in q. This implies that for α of sufficient size ($\alpha \geq \alpha_2$) the equilibria are separating for all q whereas, in contrast, for more moderate α ($\alpha < \alpha_2$) equilibria are pooling for some values of q and semi-separating for others, as depicted in Figure 2; notably, a fully separating equilibrium is not possible for $\alpha < \alpha_2$.

The distributions of policy arising in equilibrium can be compared to empirical observations. Poole and Rosenthal (1997) provide evidence consistent with Figure 2 and the finding of bimodal policy distributions. In particular, Panel (b) most closely reflects practice in that, in addition to groupings of candidates at non-centrist locations, there is a smattering of policy positions across more centrist locations.[17]

The results also relate to the empirical literature on the forces that drive political behavior (Levitt 1996). As the median voter theorem does not imply policy convergence

[16] This provides a contrast to the citizen-candidate literature (Osborne and Slivinski 1996; Besley and Coate 1997), in which such positions follow from an inability to commit.

[17] Although modeling elections from a different perspective, a similar clustering of policy positions is found in Reed (1994), Duggan (2000), Bernhardt, Dubey, and Hughson (2004), and Banks and Duggan (2006).



(a) $q \in \left(0, \frac{2}{3}\right)$: pooling equilibrium (bimodal)

(b) $q = \frac{7}{9}$: semi-separating equilibrium (bimodal)

(c) $q = \frac{8}{9}$: semi-separating equilibrium (unimodal)

(d) Prob. that a candidate locates at 0

Figure 2: Distribution of Policy Commitments: $\beta_l = 0, \beta_h = \gamma, \alpha = \frac{1}{2}$.

in incomplete information environments, it is no longer clear that politicians who deviate from the ideological preferences of voters are pursuing their own interests rather than pandering to voters (as such behavior is interpreted in Levitt 1996). Rather, the results presented here show that a "race to the center" may not be observed, despite the desire of candidates to offer voters the most attractive policy they possibly can.

Equilibrium behavior also gives rise to a nonmonotonic relationship between a candidate's policy commitment and his ideal point. If the ideal point is taken as a parameter, the position of policy motivated candidates is strictly increasing in their ideal point until they hit the bound of α_2, where it remains for more extreme candidates. In contrast, for office motivated candidates the policy choice is not monotonic as the switch from a pooling to semi-separating equilibrium induces the office motivated candidate to jump to the center. Supporting this relationship, Blomberg and Harrington (2000) provide evidence from the U.S. Congress that members at more extreme positions are viewed as less flexible and more ideological.

Voter Learning and Behavior

Voter learning is important both for the instances when it occurs, and because the *threat* of voter learning casts a shadow over candidate behavior. Voters do not learn any valuable information in the pooling equilibria, yet behavior is very different because of the *possibility* that information could be conveyed. Implied by this property is that political campaigns can matter, and they can matter in ways that are not directly measurable by what voters learn during the campaign.

As described above, voters learn more information about candidates type the more extreme are candidate ideal points. However, also increasing in ideal points is the divergence of policy commitments by policy motivated candidates. This creates a trade-off for voters and begs the question: Does the information about type revealed by electoral competition compensate for the inefficiency of policy divergence? As perhaps is clear by now, the answer is no. In fact, when $\alpha \geq \alpha_1$ the median voter obtains the same payoff as she would when $q = 1$ and all candidates are office motivated. In these situations the policy cost incurred by candidates attempting to signal their type exactly offsets the improvement in quality that flows from an increase in the fraction of policy motivated types to the pool of candidates.

For more moderate policy preferences, the inclusion of policy motivated candidates improves voter welfare (as divergence is limited by α) yet voters cannot extract the full surplus. Indeed, the election mechanism leads to the same outcome as would the process of selecting a candidate at random and allowing him complete freedom to determine all components of the policy outcome (both effort and the policy instrument). Thus, the ability for candidates to commit to policy does not provide any benefit to voters. An interesting implication of this discussion is that, because elections are costly, democracy itself may be inefficient, with voters preferring to select a candidate randomly from the available pool rather than engage in the electoral process.[18]

[18] This conclusion is dependent on policy motivation being bounded below by β_l. If the election

With respect to voter behavior, this discussion suggests that voters are better off focusing on the issues alone as if they do then candidate convergence obtains.[19] Consequently, myopic, or ill-informed, voting may be welfare improving and a rational response to an environment with incomplete information. That is, voters who ignore some dimensions of policy may make themselves better off if such ignorance can affect the policies offered by candidates. This incentive may go some way to explaining why voters may be attracted to a candidate who proclaims that the election should only be "about the issues."

The ability of voters to learn about candidate type is also important for the efficiency of policy outcomes. In pooling equilibria voters do not learn at all about candidate type and the electoral mechanism does not shape the quality of policy implementation (in the sense that selecting a candidate randomly would achieve the same result). In semi-separating and separating equilibria voters learn about type, but this is traded off against policy in such a way that the quality of implementation is lowered as a result of the election (as office motivated types win more frequently if $\beta_l > 0$).

This property suggest an equilibrium explanation for excessive government inefficiency. Moreover, a testable empirical prediction can be deduced. As office motivated candidates converge whereas policy motivated candidates do not, a relationship between policy and efficiency is produced: more centrist politicians (or governments) implement policies less efficiently than do those with non-centrist policy positions. This topic has not been investigated empirically (to the best of my knowledge), although it is key to understanding the trade-off between policy and efficiency in democracies.

3.6 Comparative Statics: Approaching Homogeneity

In this section I examine equilibrium behavior as the model approaches the benchmark environment of homogeneous candidate motivations. A complication is that there are three ways by which the benchmark can be approached: $q \to 1$, $q \to 0$, and $\beta_h - \beta_l \to 0$. Intriguingly, I find that behavior varies depending on how the limit is approached, and, consequently, convergence to the benchmark results does not always obtain.[20]

Corollary 1 analyzes the situations where one type of candidate is increasingly common in the candidate pool. The policy positions of candidates converge to the median voter's ideal point if policy motivated candidates disappear and only office motivated types remain, but significant divergence persists in the reverse case. Let $P_j(x)$ be the equilibrium probability that candidate j commits to policy x. Recall that α_1 is a function

mechanism were abolished then this bound may not persist.

[19] These conclusions rely on the assumption that the location of the median voter is known with certainty. If uncertainty exists then a degree of policy divergence may improve welfare. An interesting open question is then whether electoral dynamics can induce the "right" amount of divergence to optimize voter welfare.

[20] Calvert (1985) interprets his study of policy motivated candidates as a robustness check on the standard office motivated model. The current investigation can be interpreted in a similar way with respect to the standard homogeneous motivations model.

of q, whereas α_2 depends only on the difference $\beta_h - \beta_l$.

Corollary 1 *(i) Office motivated candidates remain: if* $q \to 1$ *then* $\alpha_1 \to 0$*, and* $P_A(0) = P_B(0) \to 1$*.*
(ii) Policy motivated candidates remain: if $q \to 0$ *then* $\alpha_1 \to \alpha_2$*, and* $P_A(-\hat{\alpha}) \to 1$ *and* $P_B(\hat{\alpha}) \to 1$*, where* $\hat{\alpha} = \min[\alpha, \alpha_2]$*.*

As the limit is approached a signaling game persists, and it is only at the limit that voter inference is moot. Candidate incentives to imitate and pool remain, therefore, and equilibrium behavior is driven by the relative costs and benefits of revealing one's type to the voters. If candidates are pooling then as policy motivated types disappear ($q \to 1$) voter expectations are for low effort. If a candidate separates and leads voters to believe he is office motivated, the change to voter utility is small and the deviation is profitable if the change in policy position is not too small. Thus, for pooling or semi-separating equilibria to be maintained the pool must increasingly approach the median voter's ideal point. In contrast, if it is office motivated candidates that disappear ($q \to 0$) then voter expectations are for high effort, and separating from a pool is not profitable unless the deviation is large. Consequently, non-negligible divergence can persist as the limit is approached, even if the chance a candidate is office motivated is vanishingly small.

The benchmark environment can also be reached by allowing differences in policy motivations to vanish. In this case, regardless of the convergent value of β, equilibrium behavior must converge. Convergence in this case is effective rather than absolute: a significant fraction of candidates locate away from zero at α_2, but as the difference in motivations disappears ($\beta_h - \beta_l \to 0$), the value of α_2 itself approaches zero.

Corollary 2 *If* $(\beta_h - \beta_l) \to 0$ *then* $\alpha_2 \to 0$*; for all* $q \in (0,1)$ *there exists an* $\varepsilon > 0$ *such that if* $(\beta_h - \beta_l) < \varepsilon$ *then* $P_A(-\alpha_2) = 1 - q$*,* $P_B(\alpha_2) = 1 - q$*, and* $P_A(0) = P_B(0) = q$*.*

The intuition here is similar to that for $q \to 1$ in Corollary 1. As motivational differences disappear, voter utility changes little for changes in belief about type, and deviations from pools (or semi-pools) are profitable unless those pools approach the median voter's ideal point.

In summary, the benchmark homogeneous motivations model is robust to some but not all perturbations. In particular, if there is even an arbitrarily small possibility that a candidate is of an undesirable type, aggregate behavior will be affected and significant policy divergence will result. An implication of these results is that the small threat of a "bad" candidate is more influential on behavior than the small threat of a "good" candidate.

4 Conclusion

The objective of this paper has been to address a basic question previously overlooked by the political economy literature: what are the motivations of those elected to public office? In contrast to the existing literature in which this question is resolved by fiat, I attempt here to address it directly. The method of investigation toward this end is simple and novel: I take heterogeneity in the candidate pool as a primitive, and allow candidates of different motivations to compete against each other. This approach produces a simple model of electoral competition that provides insight into the impact of candidate motivations on policy outcomes. In an appendix I generalize the model in two key respects – allowing candidate ideal points that are asymmetric and private information – and show that the key intuition is robust.

The main finding of the paper is that office motivated candidates do not dominate elections, despite their greater willingness to trade off policy for the perks of office. Thus, although a healthy dose of cynicism about the motivations of our elected leaders remains a wise position, all is not lost and a significant fraction of those who win government are interested in the policies they produce.

Balancing this positive result is the more concerning finding that policy outcomes themselves (independent of the quality of implementation) are distorted by the competitive forces within elections. This distortion arises as candidates seek to transmit information to voters even though such attempts are often ultimately futile. Consequently, equilibrium behavior in the model is not a convex combination of the alternative benchmark cases, and very different policies are chosen than would otherwise arise, even when no information is conveyed in the election. Supporting the conclusions presented here (however concerning) is that equilibrium behavior, both in terms of voter behavior and the divergence of policy positions, is broadly consistent with stylized facts from empirical research.

Much that is important to the practice of politics is omitted from the model and the model itself is but one specification of the policy process. The policy freedoms that real office holders enjoy extend well beyond effort levels, and the channels of competition in election campaigns are not restricted to a single policy dimension. These simplifications have been an intentional feature of the current enterprise, which is best seen as a small step to connect several hitherto distinct aspects of electoral competition into a single model, and show how their interdependencies affect policy outcomes. Much remains to be done to incorporate these insights into broader models of political economy, both theoretically and empirically.

5 Appendix A: Extensions

The model analyzed here is both simple and stylized, intended to expose most clearly the impact of candidate heterogeneity on policy outcomes. The most prominent restriction of the model is that the policy preferences of the candidates are symmetric and public information. In politics the policy preferences of candidates are often endogenous and possibly asymmetric, the result of either a primary election or strategic determination by the nominating party. Moreover, there is no compelling reason to think that a candidate's policy preferences are known definitively within the party, let alone among the public at large. In this appendix I relax individually the restrictions that ideal points are symmetric and public information and show that the main insights of the model extend to these more general environments.

Asymmetric Candidate Ideal Points

As the model is currently specified, asymmetric candidate ideal points pose a problem as the equilibria depend on voter indifference. For example, if ideal points are asymmetric and candidates play the pooling strategies of Theorem 1, one candidate wins and the other loses with certainty (possibly leading to equilibrium non-existence). This conclusion is, however, an artefact of the simple information structure and does not apply if some uncertainty about voter preferences is added to the model. This is confirmed by Theorem 4, which for brevity considers only pooling equilibria.[21]

Theorem 4 *Suppose the location of the median voter, p_m, is a random variable distributed uniformly on the interval $[-\delta, \delta]$, where p_m is unknown by candidates. Let candidate ideal points be α_A and α_B, respectively, such that $-\alpha_1 < \alpha_A \leq 0$, $0 \leq \alpha_B < \alpha_1$, and $\frac{\alpha_A+\alpha_B}{2} < \delta$. The unique equilibrium when $q \in (0,1)$ is for all candidate types to pool at their ideal point; both candidates win election with positive probability.*

It is rather natural to assume that candidates are uncertain about voter preferences, just as voters are uncertain about candidate preferences. The inclusion of this uncertainty "smooths out" candidate payoffs and, although not necessary for the main results, makes the model more broadly applicable.[22]

Ideal Points as Private Information

Suppose at Stage 1 of the election game (see Table 1) that, in addition to motivations, candidates also receive a policy preference that is private information. More specifically, suppose that candidates are either *centrists* (C) or *extremists* (E), where

[21] Similar issues surround the separating equilibria. Semi-separating equilibria are not so affected: by mixing in asymmetric ratios, the office motivated candidates can maintain voter indifference and support an equilibrium.

[22] Theorem 4 also suggests that an equilibrium may exist in multiple dimensional policy spaces, even when a core point does not exist.

candidates A and B's ideal points are 0 if centrists and $-\alpha$ and α, respectively, if extremists. Let candidates be centrist with probability p and extremist with probability $1-p$. A candidate's policy preference is assumed for simplicity to be independent of his motivation. Therefore, a candidate can now be one of four possible types with the following probabilities:

$$\begin{aligned}
\Pr\{C,l\} &= p.q \\
\Pr\{C,h\} &= p.(1-q) \\
\Pr\{E,l\} &= (1-p).q \\
\Pr\{E,h\} &= (1-p).(1-q).
\end{aligned}$$

The nature of equilibrium in this environment is (surprisingly) similar to the case considered previously (which corresponds to $p=0$). An immediate observation is that centrists always locate at their ideal point (as it corresponds to the ideal point of the median voter). Thus, when an extremist office motivated candidate deviates to 0, he no longer fully reveals his type, but rather he merges into the pool of centrist candidates, both office and policy motivated. This implies that in equilibrium extremists cannot pool at their ideal point, as they did in Theorem 1. If they did so then a deviation to zero would not adversely affect voter beliefs, and the more attractive policy commitment would win the election. Consequently, equilibria in this generalized environment require extremists to either semi-separate or separate entirely, although now there will be pooling across policy preferences (office motivated extremists will pool with centrists). These facts lead to a new critical value of α.

Definition 3 $\overline{\alpha}$ *satisfies:*

$$\left(1-\frac{\beta_l}{\beta_l+\gamma}\right)^2 = \left(1-p+\frac{p}{q}\right)\overline{\alpha}^2 + \left(1-\frac{\beta_h}{\beta_h+\gamma}\right)^2.$$

The value $\overline{\alpha}$ defines the policy position such that the median voter is indifferent over a policy of $\overline{\alpha}$ from a policy motivated candidate, and a policy of zero from either one of the three types, $\{0,l\}, \{0,h\}$, or $\{\alpha,l\}$, with beliefs determined by Bayes' rule. The statement of the definition follows from several steps of algebra. Further algebra shows several additional properties of $\overline{\alpha}$: $\overline{\alpha}<\alpha_2$, $\overline{\alpha}$ may be larger or smaller than α_1 depending on parameters, and that $\overline{\alpha}$ is decreasing in p.

Equilibria in this environment take one of two forms. Candidates with extreme preferences play a semi-separating strategy in equilibrium only if their policy preferences are not too extreme.

Theorem 5 *Suppose $p,q\in(0,1)$. For all $\alpha\in[0,\overline{\alpha})$ a unique equilibrium exists that is symmetric, and for extremists it is semi-separating. The strategy of candidate B is the following.*

$$\textit{Commit to policy: } \begin{cases} 0 \textit{ if of type } \{C,l\} \textit{ or } \{C,h\}; \\ \alpha \textit{ if of type } \{E,h\}; \\ \textit{mix over } \alpha \textit{ and } 0 \textit{ if of type } \{E,l\}. \end{cases}$$

The median voter is indifferent over all equilibrium announcements.

If instead the preferences of extremists are sufficiently divergent then they fully separate in equilibrium and policy commitments are bounded by $\overline{\alpha}$.

Theorem 6 *Suppose $p, q \in (0,1)$. For all $\alpha \geq \overline{\alpha}$ a unique equilibrium exists that is symmetric, and for extremists it is separating. The strategy of candidate B is the following.*

$$\text{Commit to policy: } \begin{cases} 0 \text{ if of type } \{C,l\},\ \{C,h\},\text{ or } \{E,l\}; \\ \overline{\alpha} \text{ if of type } \{E,h\}. \end{cases}$$

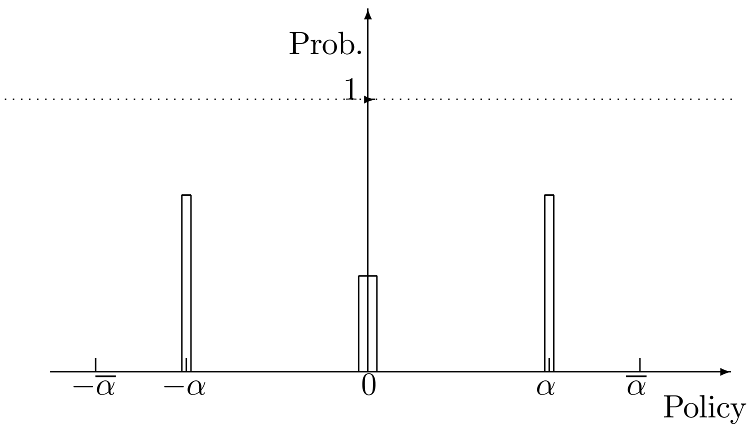
The median voter is indifferent over all equilibrium announcements.

The intuition for these equilibria are the same as for the previous results. In all equilibria the centrist candidates pool (therefore, they are centrist in both preference and action), and voters are always unable to sort between them. In contrast, extremist candidates separate to some degree in all equilibria and voters learn information about the expected quality of implementation. Figure 3 shows equilibrium configurations of policy commitments as p, the fraction of centrist candidates, varies; the parameters depicted are the same as in Figure 2 with the additional restriction that $q = \frac{1}{4}$ (corresponding to the pooling equilibrium of panel (a) in Figure 2). For these parameter values $\overline{\alpha} = \alpha = \frac{1}{2}$ at the critical value $p = \frac{2}{3}$; thus, the semi-separating equilibria of Theorem 5 apply for $p < \frac{2}{3}$, and the separating equilibria of Theorem 6 apply thereafter. (Note that $\overline{\alpha} \to \frac{\sqrt{3}}{2}$ as $p \to 1$, and equilibria are semi-separating for all p if $\alpha < \frac{\sqrt{3}}{2}$). In panel (c) the equilibrium is separating and all extremist office motivated candidates deviate to zero. To maintain voter indifference as p increases, the policy motivated extremists must converge, although this convergence is bounded away from zero by $\overline{\alpha}$.

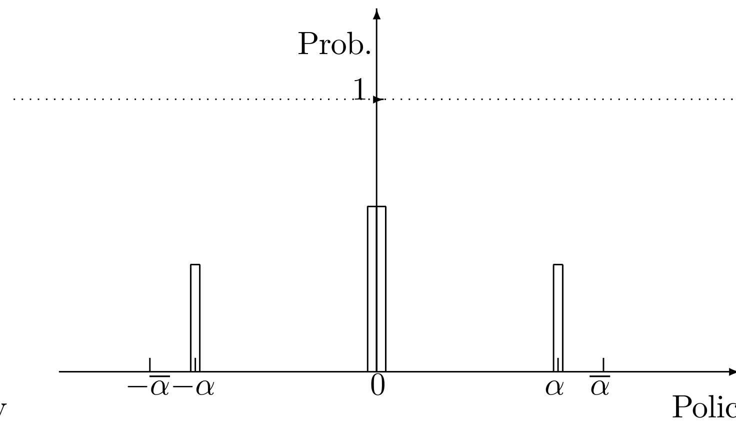
For simplicity it has been assumed that centrists have ideal points at zero. Equilibrium behavior is largely unchanged if instead the preferences of centrists also diverge, although with minor predictable adjustments. For example, in such a case centrists pool at their ideal points for low values of q, but, as in Theorem 1, the pooling equilibrium breaks down for sufficiently large q, and separation arises for both centrists and extremists.

6 Appendix B: Proofs

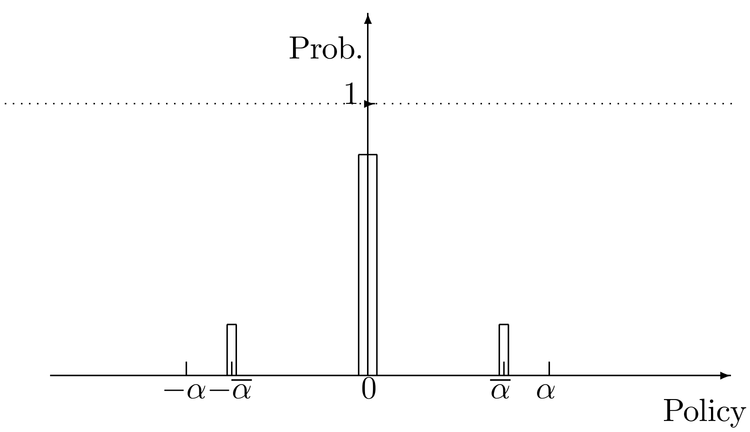
Define $e^t = \frac{\beta_t}{\beta_t + \gamma}$ for $t = h, l$. As this is independent of policy commitments, I simplify the strategies of candidates and write them only as the choice of a policy commitment. A mixed strategy σ_j maps candidate j's type into a probability distribution over policy positions, where $\sigma_j(x|t)$ represents the probability that candidate j commits to policy x if of type t. Denote equilibrium strategies by σ^*, r^*, and $\pi^* = \{\pi_A^*, \pi_B^*\}$. I abuse notation and use several definitions to also represent their expectation. I generalize



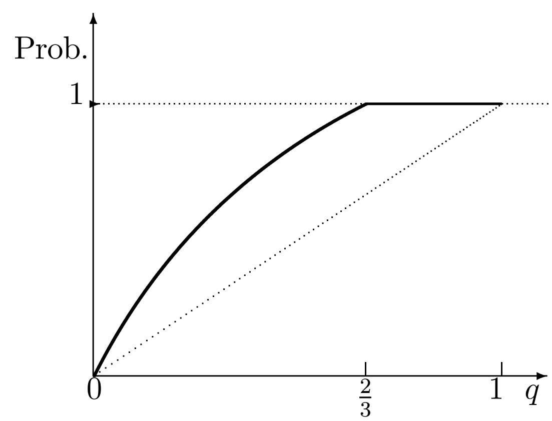
(a) $p = \frac{1}{4}$: semi-separating equilibrium (bimodal)



(b) $p = \frac{1}{2}$: semi-separating equilibrium (unimodal)



(c) $p = \frac{3}{4}$: separating equilibrium (unimodal)



(d) Prob. that type $\{E, l\}$ locates at 0

Figure 3: Distribution of Policy Commitments: $\beta_l = 0, \beta_h = \gamma, \alpha = \frac{1}{2}, q = \frac{1}{4}$.

the function $r(.)$ and allow it to depend on strategies σ. The expected utility for candidates is written as $U_j(\sigma_A, \sigma_B, r|t)$, and for voters the expected utility from policy commitment x_j is $U_i(x_j|\pi)$ for beliefs π. I allow the support of candidate strategies to be both countable and uncountable. In all equilibria, however, mixing is over at most two positions; consequently, to simplify language I refer throughout to probabilities rather than densities.

The proof of Lemma 1 is trivial and omitted. The proofs of Theorems 5 and 6 follow similar arguments to preceding results and are also omitted. I begin with a statement of universal divinity.

Universal divinity: For any out-of-equilibrium announcement x'_A, define $\rho(x'_A|t)$ as the set of median voter reaction functions (i.e., $r(x'_A, .)$) that make a type t candidate A indifferent between deviating and playing his equilibrium strategy. If $\rho(x'_A|l) \subset \rho(x'_A|h)$ then type h benefits from the deviation for a strictly greater set of reactions by the voters. Thus, he is more likely to deviate than a type l candidate, and universal divinity requires that voters believe with probability one that the deviator is of type h. Alternatively, if $\rho(x'_A|h) \subset \rho(x'_A|l)$ then a type l candidate is more likely to deviate, and voters believe with probability one the deviator is of type l.

Lemma 2: If $q \in \{0, 1\}$ then the unique equilibrium is $\sigma_j^*(0|t) = 1 \ \forall t, j$.

Proof of Lemma 2: For all x and j, $\pi_j(x) = q$, and the level of effort is independent of the winning candidate. Competition is only over policy commitments. The result then follows from well known arguments; see Calvert (1985).■

Lemma 3: If $P = \mathbb{R}$ then $\forall q$ the unique equilibrium is $\sigma_j^*(0|t) = 1 \ \forall t, j$.

Proof of Lemma 3: Analogous to Lemma 2.■

Lemma 4: Consider an equilibrium $\{\sigma^*, r^*, \pi^*\}$: If $\sigma_A^*(x|l) > 0$ and $\sigma_A^*(y|h) > 0$ then $r^*(x, \sigma_B^*) \geq r^*(y, \sigma_B^*)$ and $|-\alpha - x| \geq |-\alpha - y|$. The conditions for candidate B are analogous.

Proof of Lemma 4: Equilibrium requires for $\sigma_B^*(x|l) > 0$ and $\sigma_B^*(z|h) > 0$ that:

$$\begin{aligned} U_B(\sigma_A^*, x, r^*|l) &\geq U_B(\sigma_A^*, z, r^*|l), \text{ and} \\ U_B(\sigma_A^*, x, r^*|h) &\leq U_B(\sigma_A^*, z, r^*|h). \end{aligned} \tag{1}$$

Candidate B's expected utility from committing to x is (for any σ_A, r):

$$\begin{aligned} U_B(\sigma_A, x, r|t) &= -\beta_t q \left[\int \sigma(y|l) r(y,x) \left[(\alpha - y)^2 + \left(1 - e^l\right)^2 \right] \partial y \right] \\ &\quad -\beta_t (1-q) \left[\int \sigma(y|\beta_h) r(y,x) \left[(\alpha - y)^2 + \left(1 - e^h\right)^2 \right] \partial y \right] \\ &\quad -\beta_t \left[1 - r(\sigma_A, x)\right] \left[(\alpha - x)^2 + \left(1 - e^t\right)^2 + \frac{\gamma}{b}\left(e^t\right)^2 - \frac{W}{b} \right]. \end{aligned} \tag{2}$$

For $\beta_l = 0$ this reduces in equilibrium to $U_B(\sigma_A^*, x|t) = -\left[1 - r^*(\sigma_A^*, x)\right]\left[\gamma\left(\frac{b}{b+\gamma}\right)^2 - w\right]$, and part (i) of the lemma is immediate. So set $\beta_l > 0$. Substituting Equation 2 into the equilibrium conditions, dividing by β_t and rearranging, produces the conditions:

$$\chi \geq \left[r^*(\sigma_A^*, z) - r^*(\sigma_A^*, x)\right]\left[\left(1 - e^l\right)^2 + \frac{\gamma}{\beta_l}\left(e^l\right)^2 - \frac{w}{\beta_l}\right] \tag{3a}$$

$$\chi \leq \left[r^*(\sigma_A^*, z) - r^*(\sigma_A^*, x)\right]\left[\left(1 - e^h\right)^2 + \frac{\gamma}{\beta_h}\left(e^h\right)^2 - \frac{w}{\beta_h}\right] \tag{3b}$$

for some χ that is independent of t. Simple algebra and recalling $W \geq \gamma\left(e^h\right)^2$ establishes that $\left[\left(1 - e^l\right)^2 + \frac{\gamma}{\beta_l}\left(e^l\right)^2 - \frac{w}{\beta_l}\right] > \left[\left(1 - e^h\right)^2 + \frac{\gamma}{\beta_h}\left(e^h\right)^2 - \frac{w}{\beta_h}\right]$. Thus, the inequalities in Equations (3a) and (3b) then require:

$$r^*(\sigma_A^*, z) - r^*(\sigma_A^*, x) \geq 0 \Rightarrow r^*(\sigma_A^*, z) \geq r^*(\sigma_A^*, x),$$

proving part (i) of the lemma.

As $o_A \leq o_B$ in equilibrium, $U_B(\sigma_A^*, x, r^*|t)$ is decreasing in both $r(\sigma_A^*, x)$ and $|\alpha - x|$. Therefore, part (ii) of the lemma follows from part (i) if Equation 1 is to hold.■

Voter Beliefs: The following lemma describes how beliefs are formed for out-of-equilibrium policy commitments. Part (i) deals with deviations towards a candidate's ideal point, and parts (ii) and (iii) deviations away.

Lemma 6 *Suppose the strategy σ satisfies Lemma 4 and previous assumptions. If $\sigma_B(x|h) > 0$ and $\sigma_B(x'|h) = \sigma_B(x'|l) = 0$, universal divinity implies the following.*
(i) $\pi_B(x') = 0$ if $|\alpha - x'| < |\alpha - x|$.
(ii) Suppose $U_B(\sigma_A, \sigma_B, r|l) = U_B(\sigma_A, x, r|l)$. Then $\pi_B(x') = 1$ if $|\alpha - x'| > |\alpha - x|$.
(iii) Suppose $U_B(\sigma_A, \sigma_B, r|l) > U_B(\sigma_A, x, r|l)$. Then $\pi_B(x') = 0$ if $|x' - x| < \varepsilon$ for some $\varepsilon > 0$.

Proof of Lemma 6: Set $\sigma_B(x|h) > 0$ and $\sigma_B(x'|h) = \sigma_B(x'|h) = 0$. Let r' be a function derived from some voter belief function π' such that $U_B(\sigma_A, x, r|h) = U_B(\sigma_A, x', r'|h)$, and define

$$\psi_B(x, x', r'|l) = U_B(\sigma_A, x, r|l) - U_B(\sigma_A, x', r'|l).$$

Using the equality for policy motivated types, this reduces to:

$$\psi_B\left(x, x', r'|l\right) = \beta_l\left[r'\left(\sigma_A, x\right) - r\left(\sigma_A, x\right)\right]\left[\begin{array}{c}\left(\left(1-e^h\right)^2 + \frac{\gamma}{\beta_h}\left(e^h\right)^2 - \frac{W}{\beta_h}\right) - \\ \left(\left(1-e^l\right)^2 + \frac{\gamma}{\beta_l}\left(e^l\right)^2 - \frac{W}{\beta_l}\right)\end{array}\right].$$

The proof of Lemma 4 established that the term in square brackets is greater than zero, therefore:

$$\psi_B\left(x, x', r'|l\right) > 0 \text{ iff } r'\left(\sigma_A, x\right) - r\left(\sigma_A, x\right) > 0.$$

Suppose that $|\alpha - x'| < |\alpha - x|$. As U_B is strictly decreasing and continuous in r, the indifference requirement for a type h implies that $r'\left(\sigma_A, x\right) < r\left(\sigma_A, x\right)$ and $\psi_B\left(x, x', r'|l\right) < 0$. As utility is also continuous and monotonic in $|\alpha - x'|$, $\rho\left(x'|l\right) \subset \rho\left(x'|h\right)$, proving part (i). Analogously, $|\alpha - x'| > |\alpha - x| \Rightarrow \rho\left(x'|h\right) \subset \rho\left(x'|l\right)$, proving part (ii). Part (iii) follows by continuity.■

It follows immediately from the lemma that the support of both candidates' strategies are in $[-\alpha, \alpha]$. The monotonicity results of Lemma 4 then imply that there can be at most one policy position for any j such that $\sigma_j\left(x|t\right) > 0\ \forall t$. A final observation, which is stated as Lemma 7, is that the probability with which each type of candidate wins election is bounded above zero. This implies that each candidate's strategy support has a most extreme point, and that positive mass is placed on this point.

Lemma 7 *If $\sigma_A^*\left(x|t\right) > 0$ for some t, then $r^*\left(x, \sigma_B^*\right) > \varepsilon$ for some $\varepsilon > 0$. The equivalent holds for candidate B.*

Proof of Lemma 7: Suppose not for candidate B: therefore, $\exists$ a sequence x^n s.t. $\sigma_B^*\left(x^n|h\right) > 0$ and $r^*\left(\sigma_A, x^n\right) \to 1$ as $n \to \infty$. For this sequence, set $m = \{n|\min r^*\left(\sigma_A, x^n\right)\}$. Recall the assumptions that in equilibrium candidate A locates to the left of B and each candidate wins with positive probability; therefore, $r^*\left(\sigma_A, x^m\right) < 1$. This implies that $U_B\left(\sigma_A^*, x^m, r^*|h\right) > U_B\left(\sigma_A^*, x^n, r^*|h\right)$ for large enough n as U_B is strictly decreasing in r and $|\alpha - x|$, thereby violating equilibrium (as B prefers x^m to any policy of candidate A).■

Lemma 5: Set $q \in (0,1)$. If in equilibrium $\sigma_j\left(x|l\right) = \sigma_j\left(x|h\right)\ \forall x, j$, then $\sigma_A\left(-\alpha|t\right) = \sigma_B\left(\alpha|t\right) = 1\ \forall t$.

Proof of Lemma 5: If candidates are pooling, then by monotonicity they each pool at a single position: for some x and y, $\sigma_A\left(x|t\right) = \sigma_B\left(y|t\right) = 1$ and $\pi_A\left(x\right) = \pi_B\left(y\right) = q$. If $y < \alpha$ consider the deviation to $\tilde{y} = y + \varepsilon \in (y, \alpha]$. By Lemma 6, $\pi_B\left(\tilde{y}\right) = 0$, and as $\varepsilon \to 0$, $r\left(\sigma_A, x + \varepsilon\right) \leq r\left(\sigma_A, x\right) < 1$, and the deviation is profitable as U_B is decreasing in $|\alpha - x|$; the lemma follows.■

Theorem 1: Set $q \in (0,1)$. For all $\alpha \in [0, \alpha_1]$ the unique equilibrium is $\sigma_A^*\left(-\alpha|t\right) = 1$ and $\sigma_B^*\left(\alpha|t\right) = 1\ \forall t$. A pooling equilibrium does not exist if $\alpha > \alpha_1$.

Proof of Theorem 1: Set $\alpha \in [0, \alpha_1]$. If σ_B is not pooling then there exists $y < x$ s.t. $\sigma_B(x|h) > 0$, $\sigma_B(y|l) > 0$, $\pi_B(x) < q$, and $\pi_B(y) = 1$ (as, by the arguments of Lemma 5, if types pool at all then it must be at α). By the definition of α_1, this implies $r(\sigma_A, x) < r(\sigma_A, y)$, violating monotonicity.

The equilibrium must be pooling, and, by Lemma 5, $\sigma_B(\alpha|t) = \sigma_A(-\alpha|t) = 1\ \forall t$. Lemma 6 implies that $\pi_B(y) = 1$ for all $y \neq \alpha$ (likewise for A). For $\alpha < \alpha_1$ this implies by definition that $r(\sigma_A, y) = 1$, the policy outcome is $-\alpha$, and the deviation is not profitable. As utility is continuous, there exists for $\alpha = \alpha_1$ an $r(\sigma_A, 0)$ sufficiently small s.t. the deviation is not profitable. Thus, the pooling equilibrium exists.

If $\alpha > \alpha_1$ then a deviation by candidate B to 0 implies $r(\sigma_A, 0) = 0$. As B is risk averse and utility is decreasing in $r(.)$, the deviation is profitable and a pooling equilibrium does not exist.■

Theorem 2: Set $q \in (0, 1)$. For all $\alpha \in (\alpha_1, \alpha_2)$ the unique equilibrium is symmetric and given by: $\sigma_B^*(\alpha|h) = 1$ and $\sigma_B^*(0|l) + \sigma_B^*(\alpha|l) = 1$, s.t. $U_m(0|\pi^*) = U_m(\alpha|\pi^*)$.

Theorem 3: Set $q \in (0, 1)$. For $\alpha \geq \alpha_2$ the unique equilibrium is symmetric where $\sigma_B^*(\alpha_2|h) = 1$ and $\sigma_B^*(0|l) = 1$, s.t. $U_m(0|\pi^*) = U_m(\alpha_2|\pi^*)$.

Proof of Theorems 2 and 3: I begin by ruling out equilibria other than those in the theorems. Consider policy motivated candidates first and define $\overline{x} = \max\{x|\sigma_B(x|h) > 0\}$. If there is an $x' < \overline{x}$ s.t. $\sigma_B(x'|h) > 0$ then, by Lemma 6 and monotonicity, $\pi_B(\tilde{x}) = 0$ $\forall \tilde{x} \in (x', \overline{x})$. By Lemma 7, there must exist an action y, that is played with positive probability by candidate A and is such that $r(y, \overline{x}) \in (0, 1)$. Therefore, a deviation by B to $\tilde{x} \in (x', \overline{x})$ implies that $r(y, \tilde{x}) = 0$, and for $\tilde{x} \to \overline{x}$, candidate B is strictly better off. Therefore, there is a pair, $\overline{x}$ and $\overline{y}$, s.t. $\sigma_B(\overline{x}|h) = \sigma_A(\overline{y}|h) = 1$, and by Lemma 7, $U_m(x|\pi^*) = U_m(y|\pi^*)$.

The next step is to find the values of $\overline{x}$ and $\overline{y}$, and the equilibrium strategy of office motivated candidates. The strategies of candidates creates a distribution over the possible policy positions. As candidates are risk averse, at least one of them (and for symmetric strategies, both) prefer the certain outcome of 0; without loss of generality, let this be candidate B and suppose there is a z where $0 < z < \overline{x}$ and $\sigma_B(z|l) > 0$. Consider two possible cases for the strategy of A. If $\sigma_A(0|l) + \sigma_A(\overline{y}|l) = 1$ then $r(0, z) = 1$, which implies $r(0, \overline{x}) = 1$ by monotonicity. If B deviates to 0 then he increases his probability of winning and guarantees a policy outcome of 0 (as $r(0, \overline{x}) = 1 \Rightarrow r(\overline{y}, 0) = 0$); z can't be an equilibrium action. If $\sigma_A(0|l) + \sigma_A(\overline{y}|l) < 1$ then a deviation to 0 is similarly profitable. Therefore, in equilibrium $\sigma_B(0|l) + \sigma_B(\overline{x}|l) = 1$. An analogous condition holds for candidate A. If $\sigma_B(\overline{x}|l) > 0$ then by analogous arguments to Lemma 5, $\overline{x} = \alpha$; similarly, $\sigma_A(\overline{y}|l) > 0 \Rightarrow \overline{y} = -\alpha$.

Suppose again that candidate B prefers the certain outcome of 0 over the lottery if of type h. If $U_m(0|\pi^*) > U_m(\overline{x}|\pi^*)$ then $r(0, \overline{x}) = 1$, and a deviation to 0 is profitable:

it guarantees a policy of 0 and increases B's probability of winning. A similar condition holds for candidate A, and in equilibrium $U_m(0|\pi^*) = U_m(\overline{y}|\pi^*) = U_m(\overline{x}|\pi^*)$.

Theorem 2: $\alpha \in (\alpha_1, \alpha_2)$. If strategies are fully separating then $U_m(0|\pi^*) < U_m(\overline{x}|\pi^*)$, violating equilibrium. By Theorem 1, equilibrium can't be pooling as if pooling then $U_m(0|\pi^*) > U_m(\alpha|\pi^*)$. Thus, equilibrium requires a symmetric strategy where $\sigma_B(0|l) = k$, $\sigma_B(\alpha|l) = 1-k$, and $\sigma_B(\alpha|h) = 1$, for some $k \in (0,1)$. By the continuity of utility, a k' exists s.t. $U_m(0|\pi^*) = U_m(\alpha|\pi^*)$. Also by continuity, there exists an $r^*(.)$ s.t. candidates of type l are indifferent over committing to policies 0 and their ideal points. By Lemma 6, type h candidates strictly prefer committing to their ideal points. Finally, consider possible deviations. Lemma 6 implies that $\pi_B(z) = 1$ $\forall z \neq \alpha$, which guarantees $r(\sigma_A, z) = 1$; no profitable deviation exists for candidate B, and analogous arguments apply to candidate A.

Theorem 3: $\alpha \geq \alpha_2$. If strategies are partially separating then $\overline{x} = \alpha$ and $U_m(0|\pi^*) > U_m(\overline{x}|\pi^*)$, violating equilibrium. Thus, the equilibrium is fully separating, which requires $\sigma_A(0|l) = \sigma_A(-\alpha_2|h) = \sigma_B(0|l) = \sigma_B(\alpha_2|h) = 1$ to maintain voter indifference. By Lemma 6 there exists an $r(.)$ s.t. each type of candidate prefers his own strategy to imitating the other. Consider deviations by candidate B. For $z \in (0, \alpha_2)$, $\pi_B(z) = 1$, and $z \in (\alpha_2, \alpha)$, $\pi_B(z) = 0$; for all $z \notin \{0, \alpha\}$, $r(\sigma_A, z) = 1$ and the deviation isn't profitable. Analogous arguments apply to candidate A.■

Proof of Corollary 1: (i) As $q \to 1$, simple algebra shows $\alpha_1 \to 0$. The result follows from the equilibrium condition that $U_m(0|\pi^*) = U_m(\hat{\alpha}|\pi^*)$.
(ii) As $q \to 0$, simple algebra shows $\alpha_1 \to \alpha_2$, and the results follows from the equilibrium requirement that $\sigma_B^*(\hat{\alpha}|h) = 1$.■

Proof of Corollary 2: $(\beta_h - \beta_l) \to 0$ implies by algebra that $\alpha_2 \to 0$. As $\alpha > \alpha_2$ for $\beta_h - \beta_l$ sufficiently small, the result follows from the equilibrium conditions that $\sigma_B(\hat{\alpha}|h) = 1$ and $\sigma_B(0|l) = 1$.■

Theorem 4: For the conditions stated in the text, a unique equilibrium exists and is $\sigma_A(\alpha_A|t) = \sigma_B(\alpha_B|t) = 1$ $\forall t$.

Proof of Theorem 4: Analogous arguments to Lemma 6 and Theorem 1 imply that the only possible equilibrium is that in the theorem. As $\frac{\alpha_A + \alpha_B}{2} < \omega$ then $r(\alpha_A, \alpha_B) \in (0,1)$. If candidate B deviates to $\tilde{x} \neq \alpha_B$ then $\pi_B(\tilde{x}) = 1$ and, by the definition of α_1, $r(\alpha_A, \tilde{x}) = 1$, and the deviation isn't profitable. The same logic applies to deviations by A, and the result follows.■

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