Lies, damned lies, and political campaigns

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Abstract

Despite a pervasive presence in politics, lying has not traditionally played a role in formal models of elections. In this paper we develop a model that allows candidates in the campaign stage to misrepresent their policy intentions if elected to office, and in which the willingness to lie varies across candidates. We find that candidates more willing to lie are favored, but that this advantage is limited by the electoral mechanism and to such an extent that more honest candidates win a significant fraction of elections. Most notably, the possibility that some candidates lie more than others affects the behavior of all candidates, changing the nature of political campaigns in an empirically consistent manner. This effect also implies that misleading conclusions will be drawn if homogeneous candidate honesty is assumed.

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1. Introduction

“People never lie so much as after a hunt, during a war or before an election.”

Attracting the support of voters is central to the success of political candidates. An ability to lie allows candidates to hide undesirable characteristics from voters, thereby increasing their appeal.
It might be concluded, therefore, that the more willing a candidate is to lie, the more effective they will perform politically; indeed, as a candidate willing to lie can promise everything that an honest candidate can promise plus more, a basic conclusion may be that more capable liars will dominate those less so and consequently almost always win elections.

We explore this logic formally and find it to be partly true but mostly false. We develop a model of electoral competition with the standard one dimensional policy space, but allow political candidates to be heterogeneous both in their policy intention (should they be elected) and also in the cost they incur from misrepresenting this intention. This generates a two dimensional signaling game and although much of our intuition requires only weak conditions, we follow Banks (1990) and employ universal divinity to provide a sharp description of behavior.

In this setting we show that electoral competition imposes a natural constraint on the advantage of lying that binds even in the absence of a direct voter preference for honesty. The electoral environment does favor candidates who are more willing to lie but to a lesser degree than intuition—or popular observation—would suggest, and to such a reduced extent that more honest candidates are victorious in a significant proportion of elections. Furthermore, we show that the possibility that some candidates lie more than others dramatically affects the behavior of all candidates: that is, candidates of all levels of honesty choose different policy platforms than they otherwise would. Immediately, this finding implies that, although candidates with a high willingness to lie are favored, an ex ante assumption that candidates are all equally willing to lie produces a misrepresentation of the competitive forces facing candidates and yields misleading conclusions.

The intuition for these results turns on a simple fact: for lying to be effective it must be believed. Consider, for example, the problem of a median voter facing the choice between two candidates, one with a platform at her preferred policy and one slightly divergent, and in which candidates differ in their willingness to lie about their policy intentions. The voter’s optimal action in this circumstance depends of the relative honesty of the candidates. If she believes that the candidate with a divergent platform will produce a more centrist final policy (as the candidate is constrained in his campaign announcement by his reluctance to lie) then she should support this candidate over the more centrist alternative.

This simple possibility feeds back into candidate behavior and has a substantial impact on the policies they offer. Precisely because willing liars are prepared to “say whatever it takes to get elected,” voters are wary of overly-attractive campaign promises, and develop endogenously a preference for more honest candidates. Consequently, willing liars refrain from pandering entirely to the median voter’s ideal point if doing so reveals their mendacity, and instead they find it optimal to imitate their more honest colleagues. By so doing, however, they limit themselves to performing no better than those they are imitating, and as a result more honest candidates often win elections and are not driven from the political domain.

This imitation and obfuscation by candidates also bears import for the level of information revelation in elections. We establish the impossibility of voters learning fully the policy intentions of candidates they elect to office. In fact, the set of equilibria presents voters with a basic trade-off: separate honest from less honest candidates or centrists from extremists, but not by both characteristics at once. In either case, therefore, the policy intentions of candidates are left unclear. Ironically, despite these difficulties, we show that the presence of cheap-talking candidates actually increases the honesty of campaign promises, in fact increasing it to the point that many candidates truthfully reveal their policy intention during the campaign.

Despite a pervasive presence in politics, lying has not traditionally played a role in formal models of elections. We build upon a model of Banks (1990) that remains one of the few models
that relaxes the link between campaign promises and policy outcomes (see also Bernhardt and Ingberman, 1985 and Harrington, 1993a). Banks allows candidates to make campaign promises that differ from their policy intentions, where the difference between “what they say” and “what they do” imposes a cost on the victorious candidate. A limitation of Banks’ model is his assumption that the cost of lying is the same for all candidates, and therefore that all candidates are equally willing to lie about their intentions. In his setting, then, the voter inference problem is straightforward: more centrist campaign promises must be associated with more centrist policy intentions. As such, the median voter in Banks’ model always supports the most centrist policy announcement (and the example described above does not arise).

We extend the model of Banks and allow for heterogeneity in the willingness of candidates to lie, more specifically we assume that candidates can be one of two types: costly liars or cost-free liars. This heterogeneity substantially complicates the voter inference problem as voters must now distinguish liars from cheap talkers as well as centrists from extremists to ascertain a candidate’s true intentions. An implication of the voter inference problem is that a monotonic relationship between campaign promises and policy intentions no longer exists (as is the case in the above example). This possibility suggests a subtlety of the median voter theorem in incomplete information environments: although outcomes are still driven by the preference of the median voter and the theorem holds, it no longer implies that the most centrist candidate necessarily wins election.

The source of a candidate’s ability to lie can be many and varied. We caution against interpreting the willingness of a candidate to lie as purely a moral issue. In essence lying is an ability, and variations of this ability, as well as the willingness to utilize it, can arise for a variety of moral, personal, or societal reasons. For example, party affiliations as well as political histories often impose constraints on what can be credibly claimed by different politicians. Regardless of the source, however, it would seem more reasonable to assume than to not that variation exists in both the ability and willingness of candidates to misrepresent their true intentions. Such an assumption is the starting point for the analysis presented herein.

In addition to empirical content, our model has independent theoretical interest. Formally our model nests both the costly signaling model of Banks (1990) and cheap talk models of elections as special cases. The analysis provides an initial exploration of the interaction of costly and cost-less signalers in a single environment and the implications for the transmission of information. Furthermore, the model is one of the few cases of a signaling game with multidimensional types for which an analytic characterization of equilibria is available.\(^1\)

The unification of costless and costly signalers is also relevant to the political economy literature on elections. An unresolved issue in political economy is whether campaigns matter to policy development. The literature has proceeded in two related, but largely distinct streams. The original stream following Hotelling (1929) supposes that election promises are binding (that is, lying involves an infinite cost), and therefore policy is determined at the campaign stage. The opposing literature, whose roots can be found in Barro (1973), supposes instead that campaign promises are meaningless (that is, lying is costless), and that policy is determined only once a candidate is installed in office. Persson and Tabellini (2000) critique this state of the literature as follows:

\(^1\) See also Stamland (1999), although our equilibria are unlike his. Stamland’s “sufficient cost” assumption ensures the separation of high and low types whereas, in contrast, pooling plays a central role in our results (a further difference is that Stamland works with a finite type space).
“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” (p. 483).

The model presented here is a step toward addressing this challenge. It is significant that our model nests both traditional models as special cases. Our approach is to integrate into a single model candidates for whom elections are cheap talk and those who are at least partially bound by their promises. Our results show that the mere prospect that a campaign promise is binding, even if vanishingly small, is sufficient to pin down the behavior of all candidates and give structure to political campaigns, even for those candidates that are cheap talkers.

In work done after this paper was circulated, Kartik and McAfee (2006) develop a model that corresponds approximately to the special case of our model in which costly liars suffer an infinite disutility from lying. However, as they assume candidates can commit to policy positions, the lying interpretation offered here does not apply to their setting. Instead, they must assume exogenously that voters prefer the inflexible type (who in this extreme case is non-strategic). In contrast, in our model the voter preference for honesty emerges endogenously.

The remainder of the paper is organized as follows. The following section presents the model and in Section 3 general equilibrium properties are derived. In Section 4 we impose the universal divinity refinement to obtain more precise predictions. The model and results are related to empirical observations in Section 5 and conclusions are drawn in Section 6. All proofs are gathered in Appendix A.

2. The model

We build upon a model of electoral competition with incomplete information due to Banks (1990). There are two candidates, each of whom possesses a policy intention that they will implement if elected to office; thus each candidate is assumed to have already solved for their optimal behavior once in office and the post-election stage is modeled in reduced form. The candidates simultaneously announce campaign platforms from which the voters attempt to infer the true intentions of each candidate (which is private information). Voters then select a candidate to support and by majority rule a winner is determined. Once in office the winning candidate implements his policy intention and payoffs are realized.

The policy space is $P \subseteq \mathbb{R}$, a closed convex interval with $|P| = 2D$. Without loss of generality, assume that the midpoint of $P$ is zero; therefore, $P = [-D, D]$. There are two candidates, $A$ and $B$, whose types are two dimensional. Candidates possess policy intentions, $\alpha$ and $\beta$, that are assumed to be independent symmetric random variables: $\alpha$ is drawn from the cdf $F(.)$ and density $f(.)$, where $f(x) > 0$ for all $x \in [0, D]$, and $\beta$ has density $f(-x)$ for all $x \in [-D, 0]$. These are the policies the candidates will implement if elected to office. Candidates also possess a willingness, or propensity, to lie, which we formalize as a cost variable $k$. With probability $q$
a candidate is *zero-cost* and with probability \((1 - q)\) a candidate is *high-cost*. The model of Banks (1990) studies only the special case of \(q = 0\). The variable \(k\) parameterizes the cost of lying should a candidate implement a policy different from their campaign promise. For high-cost candidates set \(k = K\). Zero-cost types do not incur any such cost (i.e., \(k = 0\)), and therefore are *cheap talkers*.

The distributions \(F\) and \(q\) are common knowledge and independent, so a candidate’s policy intention and cost are ex ante uncorrelated. Therefore, a key—and intentional—feature of our model is that the sets of high- and zero-cost types differ only in their willingness to lie.

Candidates derive utility from winning office but incur a cost of lying. For tractability we assume the net payoff to a candidate from winning the election is given by the function \(\psi(\alpha, k, p_A)\):

\[
\psi(\alpha, k, p_A) = y - k.(\alpha - p_A)^2,
\]

where \(\alpha\) is the candidate’s policy intention and \(p_A\) is the announced policy platform. Losing candidates do not bear any cost of lying as it is only the winning candidate’s true position (and veracity) that is ultimately revealed; if a candidate loses he receives a utility of zero.\(^4\) It is assumed that \(y > 0\) and a candidate can always receive a higher payoff from some announcement, if elected, than from not being elected (that is, the benefits of office are strictly positive). A literal interpretation of the model is that candidates are office motivated and some of them do not like to lie. Moreover, once in office candidates will appeal to a particular constituency (their base) with their policy choice, and voters are imperfectly informed about this intention.

Candidate \(A\) is free to make any policy announcement in the interval \([0, D]\), regardless of type, and candidate \(B\) any announcement in the interval \([-D, 0]\).\(^5\) A mixed strategy \(\sigma_J(\alpha, k)\) maps candidate \(J\)’s policy intention and cost of lying into a probability distribution over possible policy platforms; denote by \(\sigma_J(p | \alpha, k)\) the density of this distribution at announcement \(p \in P\), and the support by \(s_J(\alpha, k) \subseteq P\) (if \(s_J(\alpha, k)\) is a singleton candidate \(J\) plays a pure strategy).

For tractability, we restrict attention to strategies that are symmetric with respect to candidates and the origin. That is, \(\sigma_A(p | \alpha, k) = \sigma_B(-p | -\alpha, k)\) for all \(\alpha \in [0, D]\).\(^6\) Further, as zero-cost candidates receive the same payoff for any announcement, regardless of their policy intention (conditional on winning or losing), we suppose that all low-cost candidates play the same (possibly mixed) strategy; denote the support for zero-cost types by \(s^0_J\) where \(s^0_J = s_J(\alpha, 0)\) for all \(\alpha\).

There exists a finite set \(N = \{1, 2, \ldots, n\}\) of voters, where \(n\) is odd. All voters have quadratic utility over the policy space,

\[
u_i(\alpha) = -(\alpha - p_i)^2,
\]

where \(p_i\) is voter \(i\)’s ideal point and \(\alpha\) is an implemented policy. The median voter, \(v \in N\), is assumed to have an ideal point equal to the midpoint of the policy space; thus, \(p_v = 0\). Voter \(i\)’s

\(^4\) This cost function also underlies the model of elections and legislative politics in Austen-Smith and Banks (1988). See also Bernhardt and Ingberman (1985).

\(^5\) The environment described here differs slightly from that of Banks (1990), although the equilibria induced are identical. Banks permits candidate strategies to span all of \(P\) but assumes voters can distinguish candidates only by their policy announcements (and so identification by party labels or individual characteristics is not possible). We find the present formulation to be the most natural and the easiest to present.

\(^6\) Banks (1990) considers asymmetric strategies in only one instance and shows that some pooling equilibria exist that are not symmetric with respect to the origin. These equilibria also exist here, although they will not be considered. See footnote 10.
expected utility from candidate A winning the election after observing policy announcement $p$, given beliefs $\mu_A(\cdot|p)$ concerning candidate A’s true policy position, is

$$Eu_i(p | \mu_A) = -(\bar{\alpha} - p_i)^2 - \text{var}(\alpha),$$

where $\bar{\alpha}$ is the mean and $\text{var}(\alpha)$ is the variance associated with the density $\mu_A(\cdot|p)$. We suppose that beliefs are common across voters, both in and out of equilibrium. It should be noted that voter utility does not depend directly on a candidate’s willingness to lie or announced platform. Rather, voters are only concerned with the policy that is ultimately implemented.

Votes are cast after observation of campaign policy platforms. Thus, a strategy for voter $i$ is a function $r_i$ where $r_i(p_A, p_B)$ is the probability that $i$ votes for candidate A, given that $i$ observes announced positions $p_A$ and $p_B$. The probability that $i$ votes for B is $1 - r_i(p_A, p_B)$ and abstention is not allowed. We suppose that voters use weakly undominated strategies. Thus, if a voter has a strict preference for one candidate they vote for that candidate, and if indifferent they randomize equally.\footnote{This assumption is not necessary, although in its absence equilibria may be asymmetric.}

Given voter behavior, denote by $\lambda(p_A, p_B)$ the probability candidate A wins election given platforms $p_A$ and $p_B$; for mixed strategies the probability is $\lambda(\sigma_A, \sigma_B)$. Thus, given announcement $p_A$ and B’s strategy $\sigma_B$, the expected utility of candidate A is equal to: $\lambda(p, \sigma_B)\psi(\alpha, k, p)$. The assumption of quadratic utilities and the equilibrium condition that all voters possess the same beliefs imply that the complexity of calculating electoral equilibria can be reduced. For any set of policy announcements, voter expectations for candidate A reduce to some lottery over the policy space $[0, D]$, and similarly for candidate B to some lottery over $[-D, 0]$. Consequently, if the median voter prefers the lottery associated with candidate A to that of candidate B, then so too do all voters with ideal points to her right (that is, ideal points greater than zero). If the median voter is indifferent between the candidates then voters with $p_i > 0$ strictly prefer candidate A and voters with $p_i < 0$ strictly prefer candidate B. This implies that $\lambda(p_A, p_B) = r_v(p_A, p_B)$. The important implication of this property is that, despite the richness of the model, the median voter remains ascendant and her preferences drive the election outcome.

Following Banks (1990), we define an electoral equilibrium as beliefs and strategies (for both candidates and voters) that satisfy the conditions described above and the requirements of Perfect Bayesian Equilibrium (PBE). Denote the set of electoral equilibrium strategies by $\Gamma_e$. An equilibrium requires that Bayes’ rule be used to update beliefs wherever possible and that candidates optimize with respect to each other and the strategies of voters. The equilibrium condition for candidate A can then be written as follows (the condition for candidate B is analogous). For all $p \in s_A(\alpha, k)$ and $p' \in P$:

$$\lambda(p, \sigma_B)\psi(\alpha, k, p) \geq \lambda(p', \sigma_B)\psi(\alpha, k, p'). \tag{1}$$

Although much can be said about behavior in electoral equilibrium (see Section 3), the freedom to specify beliefs precludes the possibility for a sharp characterization. Toward this end, we follow Banks (1990) and apply the refinement of universal divinity due to Banks and Sobel (1987). Universal divinity requires that, for every out-of-equilibrium announcement, voters decide which type of candidate is most likely to “defect” from the equilibrium and make such an announcement, and then place probability one on that type of candidate making the announcement.

Universal divinity is stronger than is required for our results. In particular, as evidenced by the proofs below, what is required is strict monotonicity of beliefs: that is, if type $t'$ benefits from
a deviation only when some set of types strictly benefits, then the posterior should not increase the weight on type \( t' \). However universal divinity is employed because it is both simpler to work with and widely recognized (see footnote 11). Also note that in the game we study universal divinity is essentially equivalent to the \( D2 \) refinement of Cho and Kreps (1987).

For any electoral equilibrium \( \tau \in \Gamma_e \), let \( \theta(\alpha, k, p) \) be the probability of election that makes a candidate of type \( \{\alpha, k\} \) indifferent between following his equilibrium strategy and deviating by announcing the out-of-equilibrium position \( p \). For zero-cost types, \( \theta(\alpha, 0, p) = \lambda(p', \sigma_B) \) for \( p \neq p' \) and \( p' \in s^0_A \). For high-cost types:

\[
\theta(\alpha, K, p) = \lambda(s_A(\alpha, K), \sigma_B) \cdot \psi(\alpha, k, s_A(\alpha, K)) / \psi(\alpha, k, p).
\]

We say that \( \{\alpha', k'\} \) is “more likely” to defect to \( p \) than \( \{\alpha, k\} \) if \( \theta(\alpha, k, p) > \theta(\alpha', k', p) \); that is, the set of voter strategies for which \( \{\alpha', k'\} \) would want to defect is larger (by inclusion) than for \( \{\alpha, k\} \). The criterion of universal divinity requires that after out-of-equilibrium announcements voters assign positive probability only to those candidate types that are most likely to defect.

Formally, an electoral equilibrium is universally divine if the following condition holds. Denote the set of universally-divine equilibria by \( \Gamma_u \).

**Condition 1.** If \( \sigma_A(p \mid \alpha, k) = 0 \) for all \( \alpha, k \), then \( \mu(\alpha' \mid p) > 0 \) only if, for some \( k' \), \( \{\alpha', k'\} = \arg \min_{\{\alpha, k\}} \theta(\alpha, k, p) \).

Before proceeding to our results we wish to point out that while the chosen form has the desirable property that it nests previous models, e.g., Banks (1990) and Barro (1973), as special cases, it is not without limitations. In particular, that the low-cost types’ marginal cost of misrepresentation is zero is key to pinning down the structure of the equilibrium developed below. In general, multidimensional signaling games are difficult to solve and this assumption gives us a lot of traction. Even more importantly, the assumption of zero cost implies that the two classes of candidates we consider correspond to models where elections matter and when they do not. Thus, that low-cost types are cheap talkers not only provides technical convenience, but rather it allows us to generalize and synthesize two widely-used classes of models.

### 3. Electoral equilibrium

The framework developed above creates a multidimensional two-sender signaling problem. The model substantially complicates that considered by Banks (1990) as the presence of senders with different signaling costs confounds the inference problem faced by voters. For expository simplicity we focus hereafter on the strategy of candidate \( A \); by the assumption of symmetry, the behavior of candidate \( B \) is defined implicitly. We first present some simple propositions that characterize the nature of electoral equilibria (without the divinity refinement). Much of the intuition of our model emerges under only these relatively weak conditions.

#### 3.1. High-cost candidates

The following two results for high-cost candidates reflect basic properties of signaling games and are implied almost directly by Eq. (1) (they hold also in the model of Banks (1990) where candidates are only high-cost).
Proposition 1. In every electoral equilibrium, \[ \max[s_A(\alpha, K)] \leq \min[s_A(\alpha', K)] \] if \( \alpha < \alpha' \).

This proposition establishes that, in all symmetric electoral equilibria, high-cost candidates who are more extreme in their policy intentions make announcements that are (weakly) farther from the median than more moderate candidates. From here it is straightforward but tedious to show that the set of high-cost types playing mixed strategies in equilibrium is of zero measure. To avoid unnecessary generality, we hereafter assume that high-cost types play pure strategies (as does Banks, 1990). The ordering of Proposition 1 implies that high-cost extreme candidates are elected (weakly) less often in equilibrium.

Proposition 2. In every electoral equilibrium, \[ \lambda(s_A(\alpha, K), \sigma_B) \geq \lambda(s_A(\alpha', K), \sigma_B) \] if \( \alpha < \alpha' \).

Banks (1990) concedes that with only high-cost candidates \( q = 0 \) the set \( \Gamma_e \) of electoral equilibria is quite large and little of substantive value can be added to the above propositions without restricting out-of-equilibrium beliefs. In contrast, we show here that if \( q \in (0, 1) \) and the pool of candidates includes both high- and zero-cost types, several strong statements about imitation and the nature of equilibrium can be made with only the requirements of electoral equilibrium. These statements are now developed, beginning with the behavior of zero-cost candidates.

3.2. Zero-cost candidates

Zero-cost candidates are not burdened with signaling costs and so do not face a trade-off between policy location and the probability of victory. Instead, the utility of zero-cost types is maximized when the probability of victory is maximized. Therefore, in equilibrium all zero-cost types have equal probability of victory, regardless of their policy intentions, and this probability must be at least equal of that for all high-cost candidates.

Proposition 3. In every electoral equilibrium, \[ s_A^0 \subseteq \arg \max_{p_A \in P} \lambda(p_A, \sigma_B). \]

3.3. Imitate and obscure: high- and zero-cost candidates

The above simple results are enough to characterize a key property of equilibrium with costly and costless liars: by their campaign announcements voters may be able to sort between types or within types, but not both. That is, in equilibrium voters face a trade-off. If they can distinguish zero-cost types from high-cost types it must be that they cannot distinguish centrists from extremists. Alternatively, if they can separate extremists from centrists they cannot perfectly distinguish zero from high-cost liars. Consequently, voter learning in equilibrium is necessarily incomplete.

Below we develop results describing this trade-off. The following terminology is helpful in distinguishing the possible behaviors of candidates. A candidate is said to be separating if voters can precisely identify his true policy preference; that is, \( \{\alpha, k\} \) is separating if \( \mu(\alpha|s_A(\alpha, k)) = 1 \). By assumption, it is possible only for high-cost types to separate. A candidate is pooling if he chooses the identical policy platform as other candidates of similar cost; that is, \( \{\alpha, k\} \) is pooling if there exists a \( \alpha' \neq \alpha \) such that \( s_A(\alpha, k) = s_A(\alpha', k) \). Also by assumption, it must be that all zero-cost candidates are pooling. High-cost types are said to play a pooling strategy if all candidates play the same strategy. A high-cost candidate is imitated if a zero-cost candidate announces the same policy platform; that is, \( s_A(\alpha, K) \in s_A^0 \). If a candidate is neither pooling nor separating (and thus he is imitated), then he is obscured. An obscured high-cost candidate is
distinguishable by his action from other high-cost candidates, but not from imitating zero-cost candidates.

To see the trade-off voters face in equilibrium, suppose that high- and zero-cost types separate completely from each other (that is, no high-cost types are imitated). Proposition 4 shows in this case that the cost of separating zero from high-cost types is that voters cannot distinguish policy intentions within types.

**Proposition 4.** If no candidate is imitated in an electoral equilibrium, then all high-cost types must play the same pooling strategy.

Key to this result is that voters learn valuable information if high-cost types separate: that a more centrist announcement promises a more attractive policy outcome. By Proposition 1, therefore, centrist announcements are preferred by the median voter to a random draw over the policy space, but this is exactly what is offered by zero-cost candidates. Thus, to maintain equilibrium, the separation of high- and zero-cost types implies that high-cost types must pool among themselves.8

Consider now the alternative in which high-cost types do not play a pooling strategy. As just argued, centrist high-cost types will be favored by voters if they can separate themselves from other candidates. Unfortunately for them, however, zero-cost types have an incentive to imitate them (as otherwise zero-cost types are defeated by them). Proposition 5 describes the nature of imitation in equilibrium.

**Proposition 5.** If in equilibrium some but not all high-cost types are imitated, the set of imitated types is either \([0, \alpha')\) or \([0, \alpha']\), for some \(\alpha' > 0\).

Proposition 5 establishes two facts: (i) that zero-cost candidates cannot imitate only the high-cost candidate at the median, and (ii) if zero-cost candidates imitate a high-cost candidate they must also imitate all high-cost candidates that are more centrist in their policy intentions. Immediately, this finding implies that voters are (weakly) more able to identify the true policy intentions of extreme candidates than centrist ones. These arguments also lead to the following corollary.

**Corollary 1.** If in equilibrium some but not all high-cost types are imitated, zero-cost types always imitate high-cost types (that is, for all \(p \in s^0_A\), there is some \(\alpha\) such that \(\sigma(p | \alpha, K) > 0\)).

Corollary 1 shows that in any electoral equilibrium that conveys policy information to the voters (i.e., not a pooling strategy), zero-cost candidates always imitate a high-cost type (it is the zero-cost types that are imitating high-cost types—rather than the other way around—as it is the zero-cost types that would suffer from separation). Thus, the strategy of high-cost types, if not requiring pooling at a unique location, completely determines the policy platforms of zero-cost types.

These results are important to the nature of political campaigns (and require only rather weak conditions). Although campaign promises for zero-cost candidates are entirely cheap talk, the

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8 In the appendix we prove two implications of this result: (i) for types to separate as in the proposition zero-cost types must locate at an extreme announcement, and (ii) such separation cannot occur in equilibrium if \(K > \hat{K}\), where \(\psi(D, \hat{K}, D/2) = 0\).
prospect that promises may matter—even if this prospect is vanishingly small—serves to pin down the behavior of all candidates, including zero-cost candidates. More informally, one may say that even though zero-cost candidates will say anything to get elected, they must look like they care about their promises in order to convince voters that they can be trusted with the levers of government.

4. Universally-divine electoral equilibrium

4.1. Benchmark results

To obtain sharp insight, we now apply the refinement of universal divinity to pin down the more salient properties of the equilibrium. We begin our analysis with some benchmark results. If \( q = 0 \) the model collapses to that of Banks (1990) in which all candidates are high-cost. Banks proved the following two results. Define \( K^* \) by the identity \( \psi(D, K^*, 0) = 0 \). Thus, if \( K = K^* \) the candidate with the most extreme policy intention (\( \alpha = D \)) is indifferent between announcing the median position and losing the election.

**Banks I** (1990; Proposition 3). Set \( q = 0 \) and \( K < K^* \). The unique universally-divine equilibrium is \( s_A(\alpha, K) = 0 \forall \alpha \).

If the costs of lying are sufficiently low the only universally-divine equilibrium is for all candidates to pool at the same announcement. In this case the candidates are indistinguishable to voters who respond by picking a winner randomly. Were a candidate to deviate and announce platform \( p > 0 \), voters form the belief that the deviator is of type \( \{D, K\} \) with extreme policy intentions. These beliefs imply the deviator always loses, and therefore no type deviates. The extreme beliefs follow from the quadratic cost of lying function, as those lying the most experience the greatest marginal benefit from lying less. If candidates pool at a point other than zero then a deviation to zero induces voters to believe that the deviator is of type \( \{0, K\} \), which guarantees victory for the deviator and therefore is profitable.

Banks’ second (and main) result is to show that if costs exceed the threshold \( K^* \) there is some separation of policy platforms, what we refer to as a separating equilibrium.

**Banks II** (1990; Proposition 4). Set \( q = 0 \) and \( K > K^* \). The unique universally-divine equilibrium takes the following form:

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9 Banks (1990) states this result with instead the weak inequality \( K \leq K^* \). However, additional equilibria exist at \( K = K^* \), although they are substantively the same and differ at only one point. The variation is that it is now possible for \( s_A(D, K) > 0 \); this strategy supports an equilibrium as the extreme type is indifferent between losing with certainty and winning at zero.

10 Banks (1990) does not make the restriction that strategies be symmetric about zero in his Proposition 3 and shows that there exists a continuum of equilibria in which all candidates pool at a single point in some interval around the median voter; and as \( K \) increases the interval collapses. We restrict attention to symmetric strategies as it simplifies the statement of the current result as well as being imposed in all other results.

11 As should be clear, the beliefs implied by universal divinity are excessively strong. The same argument holds for any set of beliefs which (from the perspective of the median voter) is first order stochastically dominated by the prior beliefs (i.e., if any measurable weight is moved from one type to a more extreme type; indeed, with risk averse voters second order stochastic dominance is sufficient). In this case the deviator again surely loses and the deviation remains unprofitable.
(i) $\forall \alpha \in [0, \alpha(K)], s_A(\alpha, K) = 0$;
(ii) $\forall \alpha \in (\alpha(K), D], s_A(\alpha, K)$ is strictly increasing (i.e. separating), where $\alpha(K) \in (0, D)$.

Figures 1 and 2 depict the two types of possible equilibria. If in the separating equilibrium the median voter observes a policy platform at zero (her ideal point), she cannot be sure of the policy that will be implemented, but she does know that it must be in the interval $[0, \alpha(K)]$. Despite the uncertainty, the median voter strictly prefers this lottery to the certain outcome of the first separating type $\alpha(K)$. The types $(\alpha(K), D]$ cannot pool at a non-centrist platform as a deviation towards the center is then possible, inducing beliefs that the deviator is type $\alpha(K)$, which for small deviations increases utility (as the probability of winning jumps discontinuously in the announcement whereas the cost of lying is continuous).

Before considering the complete model, we move to the opposite extreme and suppose that all candidates are zero-cost. This produces the following obvious result.

**Proposition 6.** Set $q = 1$. Any $\sigma_A(\alpha, 0)$ is supportable as a universally-divine electoral equilibrium.

With only zero-cost candidates the election campaign is one of cheap talk (and is, therefore, meaningless). Consequently, the set of equilibrium actions cannot be pinned down at all. The
candidates need not worry about revealing to voters their willingness to lie, and as a consequence their behavior is not restricted.\footnote{If a prediction is desired in this setting then one may consider it as the limit of the model with only high-cost candidates and with the cost of lying approaching zero; i.e., $q = 0$ and $K \to 0$. A unique equilibrium exists along the sequence which can be used as an equilibrium selection at the limit.}

### 4.2. Equilibrium existence and characterization

To understand the incentives when high- and zero-cost candidates coexist it is instructive to begin with the equilibrium of Banks II as a baseline (Fig. 2). The intuition of this equilibrium is not upset if a small fraction of zero-cost candidates is added to the type space. By Proposition 3 the zero-cost candidates must join the pool at the median. In this case the median voter, if observing a campaign announcement of zero, believes final policy to be in the interval $[0, \alpha(K)]$ with probability $\frac{(1-q)F(\alpha(K))}{(1-q)F(\alpha(K)) + q}$ and over the entire space $[0, D]$ with probability $\frac{q}{(1-q)F(\alpha(K)) + q}$. The presence of zero-cost candidates reduces the utility of the median voter from an announcement at zero, although for small enough $q$ she still strictly prefers this lottery compared to the certain policy $\alpha(K)$ offered by the first separating type, and thus the equilibrium of Banks still exists.\footnote{The critical value of $\alpha(K)$ varies with $q$, although it varies continuously and for small values of $q$ this argument still holds.}

Fig. 2. Separating equilibrium.
For larger \( q \), however, the logic of Banks’ equilibrium result may break down and the centrist equilibrium no longer exists. This is reported as Lemma 1. Define \( K^{ce} \) implicitly by 
\[
\psi(\alpha^{ce}, K^{ce}, 0) = 0,
\]
where \( \alpha^{ce} \) is the certainty-equivalent outcome to a random draw of a candidate (i.e., \( \alpha^{ce} \) leaves the median voter indifferent between outcome \( \alpha^{ce} \) and a zero-cost type).

**Lemma 1.** A pool of high-cost candidates at zero cannot support a universally-divine equilibrium if \( K > K^{ce} \) and \( q > q^K \), where \( \partial q^K / \partial K < 0 \).

To the median voter, the addition of more zero-cost types implies that an announcement in the pool increasingly resembles a lottery over the entire space. Conditional on coming from a high-cost candidate, a centrist announcement remains attractive to the median voter but it is increasingly weighed down by the probability that the candidate is low-cost. Ultimately, the pool is sufficiently unattractive that the median voter prefers the first separating type. The median voter can infer with certainty the outcome to be expected from the first separating type, who is denoted by \( \alpha(K, q) \). Although this outcome is not the median voter’s most preferred, it is better than the lottery offered by the pool and the prospect of an extreme outcome. The reversal in voter preference just described violates Proposition 3 and the equilibrium of Banks breaks down.

The breakdown of Banks’ equilibrium leads to the question that is the focus of our paper. If candidates cannot pool at the median voter, how then do they behave? The signaling literature provides little guidance on this question. The standard intuition from the literature—as reflected in the equilibria of Banks—is that equilibria satisfy some basic patterns under the refinement of universal divinity: pooling for some preferred types then separating, but not vice versa, and there cannot be multiple pools or multiple separating segments.\(^{14}\) Our results so far, however, have shown that an equilibrium cannot begin with a pool for types around zero, and it is clear that the pool cannot simply be moved elsewhere (as type \( \{0, K\} \) would deviate to 0 and win), nor can these most centrist types separate immediately from all other types.

Our remaining results show that equilibria still exist in this environment and that the equilibrium behavior of candidates takes a very special and unusual form. Significantly, despite the subtle construction of equilibrium, the resultant behavior more closely approximates the observed behavior of real candidates. The logic of equilibrium requires a delicate balancing of the strategies of high- and zero-cost types and is as follows.

Banks’ separating equilibrium breaks down as the pool at zero is too unattractive to entice more extreme high-cost types to join (in that it is too far from their policy intentions). To construct an equilibrium the set of announcements made by zero-cost types must be made more attractive to induce high-cost types to join (to the extent that the pool is preferred by voters over any remaining separating types). Such an attraction can only be achieved by moving the pool away from zero and towards the policy preferences of the separating high-cost candidates. But as the arguments following Banks’ first result show, a pool for all centrist types \( [0, \alpha'] \) away from zero is unstable (as deviations towards zero are profitable). The solution then, is for the pool away from zero to consist of an intermediate interval of high-cost types rather than those with the most centrist (or most extreme) policy intentions.

\(^{14}\) The standard equilibrium in signaling models is for there to be at most one break in the strategy, and for this to be a break from a pool to separating. See Banks and Sobel (1987) or Cho and Kreps (1987) for examples and derivations of these equilibria.
But if they do not pool, how do the centrist candidates behave? And why don’t those in the pool imitate the centrists? The first question is answered in Proposition 7 that shows that the high-cost candidates must act in accordance with a particular family of cut-point strategies.

**Proposition 7.** Set \( q \in [0, 1) \). In every universally-divine equilibrium there exists \( \alpha' \) and \( \alpha'' \) such that

(i) \( \forall \alpha \in [0, \alpha'), s_A(\alpha, K) = \alpha, \)

(ii) \( \forall \alpha \in [\alpha', \alpha''], s_A(\alpha, K) = \alpha', \)

(iii) \( \forall \alpha \in (\alpha'', D], \frac{\partial s_A(\alpha, K)}{\partial \alpha} > 0. \)

Note that equilibria in the benchmark case of \( q = 0 \) require high-cost candidates to use a cut-point strategy (\( \alpha' = 0 \) and \( \alpha'' = D \) for the pooling equilibrium of Fig. 1; and \( \alpha' = 0, \alpha'' < D \) for the separating equilibrium of Fig. 2). If \( \alpha' > 0 \), however, equilibrium behavior is unlike in those of Banks and the pool of high-cost types is located away from zero. Figure 3 depicts the pattern of equilibrium announcements in this case. If \( \alpha' = 0 \) we say the equilibrium is **centrist**, and if \( \alpha' > 0 \) the equilibrium is said to be **non-centrist**.

The surprising feature of the non-centrist equilibrium in Fig. 3 is that centrist candidates truthfully announce their policy intentions. Paradoxically, the addition of cheap talkers into the candidate pool, and the consequent threat of imitation, actually reduces the pressure on high-cost types to converge, instead increasing the amount of truthfulness in elections.

![Figure 3. Non-centrist separating equilibrium: \( \alpha' > 0, \alpha'' < D \).](image-url)
To complete the equilibrium we must answer the dual questions of how zero-cost types play, and why the pooling candidates don’t imitate the centrist candidates? These questions, not surprisingly, are intertwined. Lemma 2 characterizes the behavior that is required of zero-cost candidates to support equilibrium.

**Lemma 2.** Set $q \in (0, 1)$ and $K > K^*$. In every universally-divine equilibrium $[0, \alpha') \subseteq \mathcal{S}_A \subseteq [0, \alpha']$, where $\alpha'$ is the first cut-point of the high-cost types’ strategy.

In equilibrium zero-cost candidates have to mix over all policy announcements up to and possibly including the pool (if the pool is at zero then zero-cost candidates must locate there). This implies that if $\alpha' > 0$ the centrist high-cost candidates are obscured by zero-cost candidates. This result also shows why high-cost types must tell the truth (Lemma 7). For zero-cost types to mix over this interval they must be indifferent over all locations, but this implies that high-cost types must have strict preferences over the interval (as the different locations reflect different degrees of lying), preferring strictly to locate closer to their policy intention. For deviations to not be profitable, therefore, it must be that high-cost types are not lying and are located at their policy intention.

For this strategy to support an equilibrium, it must be that the median voter is indifferent over all such announcements (otherwise Proposition 3 is violated) and for zero-cost types to mix according to a particular ratio. When the median voter receives an announcement $\tilde{\alpha}$ in $[0, \alpha')$, she faces a lottery over a high-cost candidate with a definite policy intention $\tilde{\alpha}$, and a zero-cost candidate with an intended policy anywhere in the policy space. To maintain indifference as $\tilde{\alpha}$ increases, therefore, the median voter must place decreasing beliefs on a type being zero-cost.15

The equilibrium behavior of zero-cost types explains why pooling high-cost types do not have the incentive to imitate more centrist candidates. By doing so they would incur a greater signaling cost (as their lie increases) but receive no additional benefit. Voters would believe, conditional on the candidate being high-cost, that his policy intention is more attractive, but this benefit to the candidate is exactly offset by a decreased belief that the deviator is in fact high-cost. For the same reason, those high-cost candidates who are imitated by zero-cost types also do not have the incentive to deviate inward (or outward).

The following proposition completes the characterization of equilibrium by confirming the existence of a universally-divine equilibrium. The proof establishes the existence of cut-points $\alpha'$ and $\alpha''$ and a corresponding mixing strategy for zero-cost candidates such that the median voter is indifferent over all announcements in $[0, \alpha']$, as required.16

**Proposition 8.** A universally-divine equilibrium exists for all $q \in [0, 1]$.

It follows immediately that in all equilibria the zero-cost candidates imitate if $K > K^*$. It also follows that $\alpha'' > \alpha'$ and some high-cost candidates pool at the announcement $\alpha'$. Without a pool at $\alpha'$ a discontinuity in $\lambda$ at $\alpha'$ appears, and high-cost types $\alpha' + \varepsilon$ have the incentive to deviate and announce $\alpha'$.

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15 For example, if $D = 1$ and $f$ is distributed uniformly, the equilibrium strategy for zero-cost types is: $\sigma_A(p|\alpha, 0) = \delta(1 - 3p^2) - 1$, $\forall p \in [0, \alpha')$, for some constant $\delta > 1$ such that $\sigma_A(\alpha, 0)$ is a probability distribution. Thus, the weight a zero-cost type puts on a centrist announcement is decreasing quadratically in the announcement.

16 It is possible to characterize the equilibrium requirements quite precisely. However, they do not add significantly to the intuition of the previous results and we do not explore them in any detail here.
4.3. Comparative statics

Although the family of universally-divine equilibrium strategies is unique, a continuum of equilibria typically exists within this family for any parameter values. The equilibria vary in the critical values $\alpha'$ and $\alpha''$, requiring the zero-cost types to mix in different proportions. It is important to note that non-centrist equilibria exist for all $q > 0$, even when centrist equilibria exist (i.e., $\alpha' = 0$), although as $q \to 0$ the amount of divergence that can arise in equilibrium decreases. For larger $q$ the centrist equilibrium breaks down (as in Lemma 1) and all equilibria must be non-centrist, as depicted in Fig. 3.

A final result of interest is the limiting behavior of candidates as the costs of lying become large for high-cost candidates. In Banks’ benchmark case of $q = 0$, $\alpha'' \to 0$ as $K \to \infty$, and consequently almost all types separate (as $\alpha' = 0$ for $q = 0$) and the electoral campaign fully reveals to voters the true policy intentions of candidates. This is no longer true for $q \in (0, 1)$. If $\alpha''$ becomes small, voters prefer the first separating type to a selection out of the pool of imitated types and equilibrium breaks down. Consequently, the electorate cannot approach full informativeness even as signaling costs for costly liars become large.

**Corollary 2.** Set $q > 0$ and let $K \to \infty$. Then $\alpha'' \to \alpha'$ and $\alpha' \to \hat{\alpha} > 0$ in all universally-divine electoral equilibria.

5. Discussion: equilibrium characteristics

Many features of the cut-point equilibria approximately correspond to empirical regularities. We address briefly some of the most interesting equilibrium characteristics. We break the discussion down into three broad (and overlapping) categories: candidate platforms, voter learning, and the broader question of the importance and utility of political campaigns. We also discuss some models with related equilibrium properties.

5.1. Candidate platforms

**Policy divergence**

In the model the policy intentions of candidates are imposed exogenously, and attention is focused on how, given these intentions, candidates behave during political campaigns. It is striking, therefore, that for arbitrary distributions of policy outcomes, the patterns of campaign announcements made in equilibrium closely resemble the patterns of observed policy positions from real elections. If $\alpha' > 0$ in equilibrium then measure zero candidates converge on the median voter (see Fig. 3) and a measurable fraction of candidates cluster at two distinct non-centrist points. Divergence and clustering of policy platforms are both commonly observed in real plurality rule elections. Alesina and Rosenthal (1995) document this for the case of the US.17

The equilibrium divergence and clustering of campaign promises is of interest for several additional reasons. Firstly, divergence occurs in the absence of uncertainty about the location of the

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17 In our model the clustering of campaign platforms does not—by design—translate to analogous clustering of policy outcomes. In multiple period models, in which the incentive to signal, imitate and pool also applies to actual policy choices, such effects may be observed.
median voter, unlike in Wittman (1983) and Calvert (1985). Secondly, and more importantly, divergent equilibria arise even when almost all candidates are cheap talkers (i.e., as \( q \to 1 \)), and have complete freedom to move about the policy space. Thus, even in the situation where voters are almost sure that campaign promises are meaningless, a vanishingly small probability that promises are partially binding ties down the behavior of all candidates, and in a way that resembles empirical observation (in that equilibria are of the sort depicted in Fig. 3 with zero-cost candidates mixing across the middle policy announcements and two clumps at non-centrist locations).

Related to the observation of policy divergence is the issue of electoral pandering. Our model and equilibria suggest an explanation for why candidates diverge and do not pander entirely to the median voter, and why a “race to the center” is not always observed in real elections. In equilibrium zero-cost candidates would willingly converge towards the median voter if doing so increased their chance of winning. However, the constraints of the signaling mechanism, and their own flexibility, imply that this is not the case. Voters cannot be sure after observing a centrist position that it represents the candidate’s true policy intention or whether the candidate is a zero-cost opportunist.

The inability of candidates to effectively pander to the median voter derives from the disconnection of policy outcomes from campaign promises. In standard models of election campaigns in which elected candidates are obligated to implement campaign promises, the median voter’s reaction to pandering is unambiguously positive. In contrast, once the link is even partially severed, campaign promises may be empty rhetoric and limits exist on the effectiveness of pandering. Not surprisingly, drawing a distinction between words and actions in politics leads to a vastly different conception of electoral competition.

\textit{Are winners always liars?}

A second key feature of equilibrium is that elections are not necessarily dominated by those candidates most willing to lie. In fact, precisely because zero-cost candidates will say anything to be elected, voters are led to disbelieve campaign statements that “promise too much.” Thus, zero-cost types must constrain their talk in equilibrium, even though it is free, and this allows high-cost types to win a significant fraction of elections.

More precisely, the structure of equilibrium is such that high-cost types win with exactly the same probability as zero-cost types if \( \alpha < \alpha'' \) (that is, they are not overly extreme). More extreme high-cost types \( (\alpha > \alpha'') \) cannot defeat zero-cost types, and win only when facing a high-cost type who is more extreme than themselves. The probability that a (relatively) honest candidate wins any particular election, therefore, depends on \( q \) and the equilibrium parameters, \( \alpha' \) and \( \alpha'' \). As \( q \) increases the honesty of the candidate pool declines. However, to support equilibrium the bounds on \( \alpha' \) and \( \alpha'' \) must increase. This implies that the electoral mechanism mitigates the adverse impact of declining quality of the candidate pool, as changes in equilibrium provide more honest candidates a chance of winning.

The need for zero-cost candidates to disguise their type from voters not only allows high-cost types to win, but more surprisingly, it actually increases the level of honesty in elections. In non-centrist equilibria high-cost centrist candidates are able to campaign according to their actual type.
policy intentions, thereby avoiding the cost of lying altogether. Thus, the inclusion of cheap talkers in the candidate pool can both lead to more truthful political campaigns and improve the welfare of some high-cost candidates.

5.2. Voter behavior

Driving the strategic behavior of candidates is voter learning and behavior. The cognitive demands placed on voters in the model are greater than in standard environments (in which the voter simply supports the nearest candidate), although the resultant behavior resonates with observed patterns of behavior in real elections. We discuss briefly here several such properties.

Asymmetric learning

The amount of information conveyed to voters in equilibrium depends on a candidate’s type. For extreme policy announcements voters are more certain of the actual policy that will be implemented, and candidates that announce more extreme policy platforms are more likely to be high-cost and policy-inflexible. These equilibrium characteristics are related and both appear in the empirical literature (Blomberg and Harrington, 2000). In equilibrium voters are unsure about a candidate’s true policy intentions and this may be interpreted as political ambiguity. Unlike standard conceptions of ambiguity (as flowing from deliberate obfuscation), the ambiguity here arises due to limitations of the electoral mechanism in conveying information to the electorate.

Valence

In equilibrium it is in the interests of voters to draw inferences about a candidate’s type. These inferences lead endogenously to a preference for high-cost candidates, and this preference proves crucial to the equilibrium behavior of candidates. The benefit that high-cost types then receive from voters can be thought of as a valence advantage (Stokes, 1963). The equilibrium derived here shows how valence factors may arise endogenously—in that candidates seek to convince voters they are of the preferred type—and the corresponding equilibrium behavior explores the incentives of candidates to strategically manipulate any valence advantage they hold.

Median voter theorem

The endogenous voter preference for high-cost types is also important to the interpretation of the median voter theorem in this environment (Black, 1958). The difficulty for candidates to pander to the median voter is driven by the fact that the most centrist candidate does not necessarily win the election. Although such outcomes may lead one to believe that the logic of the median voter theorem breaks down (Levitt, 1996), it still very much is the preferences of the median voter that drive the election outcomes. Rather, this possibility exposes the subtlety that in incomplete information environments the median voter theorem no longer necessarily implies the most centrist candidate wins election, a subtlety that has not been previously allowed for.

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19 The former property arises in the equilibria of Banks (1990), but the latter does not as he assumes candidates are homogeneous in flexibility.
5.3. The quality of elections

A puzzling aspect of modern elections is that, despite suspicions that campaigns are dominated by meaningless blather, candidates go to the trouble of staking out detailed policy positions. The equilibria of the model as \( q \to 1 \) are consistent with both of these observations. Despite the overwhelming presence of cheap talkers in the candidate pool, the mere possibility that a candidate may be of the preferable high-cost type, pins down the behavior of cheap talkers out of the fear of revealing their type (as vanishingly small utility differences still drive behavior). Therefore, the set of equilibrium behavior at the limit (of \( q = 1 \)) is radically different to that close to the limit as although little information is conveyed through campaign announcements, the possibility for valuable information to be conveyed constrains behavior.

These properties suggest that observations of heated campaigning should not be interpreted as per se evidence of meaningful campaigns. Rather, one may interpret campaigning as an elaborate but necessary process that candidates go through, simply because there is a possibility (even if miniscule) that a candidate may make meaningful promises and the campaign may matter.

5.4. Related literature

The model shares several common features with the models of hierarchies developed in a series of papers by Harrington (1998, 1999a, 1999b, 2000) and may be best seen as their complement. In models of repeated interaction among pairs of agents that are either “flexible” or “rigid,” Harrington develops two fundamental results: that agent flexibility may work against an agent in the long run, and that successful agents (those that rise to the top of hierarchies) may appear to have motivations that differ from their true motivations. These results resonate with those reported here although the informational environments are different and the signaling game that is the focus here does not appear in the models of Harrington.

Our results also have a direct application to the apparently unrelated field of social and group behavior. Bernheim (1994) develops a model of individual choice that shares many structural features with the model of Banks (1990), interpreting pooling equilibria as an explanation for social conformity and the evolution of social norms. Under this interpretation, the extension incorporated here corresponds loosely to the inclusion of “social sheep,” individuals solely concerned with conforming and possessing status within a group. The results then suggest that, ironically, the inclusion of social sheep make conforming less frequent, leading to consumption decisions more in line with agents’ true consumption preferences and less tailored to achieving social status.

Finally, despite the models approaching electoral competition from different perspectives, the structure of our equilibria are similar in spirit to those of Reed (1994), Duggan (2000), Bernhardt et al. (2004), and Banks and Duggan (2006). Working in dynamic repeated election settings, these models identify equilibria that employ cut-point strategies and exhibit clustering of candidate positions, two features prominent in our analysis. A key difference, however, is that in these models candidates strategically choose policies to implement once elected to office and clustering is in policy outcomes. In contrast, candidates in our model choose only their campaign pronouncements and the clustering in our model is only evident (by construction) during campaigns.
6. Conclusion

Political candidates possess different capabilities in competing for and performing in office, a crucial example of which is their ability and willingness to lie. In this paper we develop a model of electoral competition to explore the impact of heterogeneity in the willingness of candidates to lie on political behavior and outcomes. We find that candidates more willing to lie are favored in elections, however the advantage held is not overwhelming and more honest candidates are not always defeated. Most significantly, the presence of each candidate type has a significant impact on the behavior of all other candidates.

Within the boundaries of an electoral campaign we have identified an incentive for imitation among political actors in order to influence an audience. It would seem reasonable to conclude that this incentive is not confined to election campaigns and permeates throughout other aspects of the political environment. Exploring these possibilities in settings such as the legislature and judiciary is potentially a profitable direction for future work.

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Appendix A

Several proofs are omitted for brevity: Proposition 1 is identical to Proposition 1 in Banks (1990) with only adjustments in notation; Propositions 3 and 6 are obvious and stated without proof; Lemma 1 is an immediate corollary of the subsequent results that are proven independently.

As explained in the text, the election outcome turns on the utility of the median voter. Omitting the subscript \( v \) for simplicity, we write \( E_u(\tau, \rho) \) to represent the median voter’s expected utility from a lottery over outcomes in the set \( \tau \) with the probability distribution of \( \tau \) given by \( \rho \). Define \( \alpha^{ce} \in [0, D] \) as the certainty equivalent that satisfies \( E_u(\alpha^{ce}, 1) = E_u([0, D], f(.)) \) (see Lemma 1). If the distribution \( \rho \) is simply \( f \) conditional on the set \( \tau \) we omit the distribution argument (and write \( E_u(\tau, .) \)). It is useful at times to express utility directly over campaign promises: let \( E_u(p) \) be the median voter’s expected utility for campaign announcement \( p \). Finally, define \( T(p) = \{ \alpha \mid s_A(\alpha, K) = p \} \) as the set of high-cost types that announce \( p \), and \( \Delta(\sigma_A) = \{ \alpha \mid s_A(\alpha, K) \in s^0_A \} \) as the set of high-cost types imitated by zero-cost types (we omit the argument \( \sigma_A \) hereafter for simplicity).

Proof of Proposition 2. Suppose not and that \( \lambda(p, \sigma_B) < \lambda(p', \sigma_B) \) for \( p = s_A(\alpha, K) \) and \( p' = s_A(\alpha', K) \). By Proposition 3, \( p \notin s^0_A \) and \( E_u(p) = E_u(T(p), .) \). If \( p' \notin s^0_A \) also then \( \lambda(p, \sigma_B) \geq \lambda(p', \sigma_B) \) by Proposition 1, establishing a contradiction.

Suppose instead that \( p' \in s^0_A \) which implies \( E_u(p') \) is some convex combination of \( E_u(T(p'), .) \) and \( E_u(\alpha^{ce}, 1) \), and consider two cases. (i) If \( E_u(T(p), .) > E_u(\alpha^{ce}, 1) \), then \( E_u(p') > E_u(p') \) as by Proposition 1, \( E_u(T(p'), .) > E_u(T(p'), .) \); this implies \( \lambda(p, \sigma_B) \geq \lambda(p', \sigma_B) \), a contradiction.

(ii) If \( E_u(T(p), .) < E_u(\alpha^{ce}, 1) \) then by Proposition 1, \( E_u(T(p'), .) < E_u(\alpha^{ce}, 1) \) also, and \( E_u(p') < E_u(\alpha^{ce}, 1) \). Proposition 1 also implies there is a \( p'' \in s_A(\alpha'', K) \) for some \( \alpha'' < \alpha \)
such that \( Eu(p'') > Eu(\alpha^{ce}, 1) > Eu(p') \) regardless of \( s_A^0 \), implying the contradiction that \( p' \notin s_A^0 \). \( \square \)

**Formal statement of proposition 4.** If in any electoral equilibrium \( \bigcup_{s} s_A (\alpha, K) \bigcap s_A^0 = \emptyset \), then \( s_A (\alpha, K) = s_A (\alpha', K) \) for all \( \alpha, \alpha' \in [0, D] \). Further, \( \min s_A^0 \geq \max_{\alpha} \{ s_A (\alpha, K), 2D - s_A (\alpha, K) \} \).

If \( K > \hat{K} \), where \( \psi (D, \hat{K}, D/2) = 0 \), then such an equilibrium does not exist and \( s_A (\alpha, K) \cap s_A^0 \neq \emptyset \) for some \( \alpha \).

**Proof of Proposition 4.** As there is no imitation, \( Eu(p) = Eu(\alpha^{ce}, 1) \forall p \in s_A^0 \). If \( s_A (\alpha, K) \) is not constant in \( \alpha \), then by Proposition 1, \( Eu(T(p),.) > Eu(\alpha^{ce}, 1) \) for some \( p \), which violates Proposition 3.

So set \( s_A (\alpha, K) = \hat{s} \) for all \( \alpha \). If \( \min s_A^0 < \hat{s} \) then \( \psi (0, K, \min s_A^0) > \psi (0, K, \hat{s}) \), and as \( \lambda (\min s_A^0, \sigma_B) \geq \lambda (\hat{s}, \sigma_B) \) by Proposition 3, \( \{0, K\} \) can profitably deviate to \( \min s_A^0 \). Similarly, if \( \min s_A^0 < 2D - \hat{s} \), then type \( \{D, K\} \) can profitably deviate to \( \min s_A^0 \).

If \( K > \hat{K} \) then \( \psi (\alpha, K, \hat{s}) < 0 \) for some \( \alpha \) and that type would prefer to lose the election. \( \square \)

**Proof of Proposition 5.** The proof is via three contradictions; note that by assumption \( \Delta \notin \{0, D\} \).

Case (i). \( 0 \notin \Delta \). By Proposition 1, \( Eu(s_A (0, K)) > \max \{ Eu(\alpha^{ce}, 1), Eu(T(p),.) \} \) for any \( p \neq s_A (0, K) \). As for all \( p \in s_A^0 \), \( Eu(p) \) is a convex combination of \( Eu(\alpha^{ce}, 1) \) and \( Eu(T(p),.) \), then \( \lambda (s_A (0, K), \sigma_B) > \lambda (p, \sigma_B) \), violating Proposition 3.

Case (ii). \( \Delta \) is not convex. By Case (i), \( \exists 0 < \alpha_2 < \alpha_3 \) such that \( 0, \alpha_2 \in \Delta \) but \( \alpha_2 \notin \Delta \). As \( Eu(T(s_A (0, K)),.) > Eu(\alpha^{ce}, 1) \), equilibrium requires \( Eu(T(s_A (\alpha_3, K))) > Eu(\alpha^{ce}, 1) \), but then \( Eu(s_A (\alpha_3, K)) < Eu(T(s_A (\alpha_3, K))) < Eu(s_A (\alpha_2, K)) \), contradicting Proposition 3.

Case (iii). \( \Delta = 0 \). Thus, \( Eu(s_A (0, K)) = Eu(\alpha^{ce}, 1) \). If \( \forall \alpha \in (0, D) \), \( s_A (\alpha, K) \) is not constant there exists an \( \alpha_1 \) such that \( Eu(s_A (\alpha_1, K)) > Eu(\alpha^{ce}, 1) \), violating Proposition 3. Suppose then that \( \forall \alpha \in (0, D) \), \( s_A (\alpha, K) = \hat{s} > s_A (0, K) \). For \( \alpha' < \frac{\hat{s}}{2} \), \( \psi (\alpha', K, s_A (0, K)) > \psi (\alpha', K, \hat{s}) \), and by Proposition 3, \( \lambda (s_A (0, K), \sigma_B) > \lambda (s_A (0, K), \sigma_B) \); thus, a profitable deviation by type \( \{\alpha', K\} \) is available. The case \( \hat{s} < s_A (0, K) \) is ruled out by Proposition 1. \( \square \)

**Proof of Corollary 1.** For any \( p \in s_A^0 \) such that \( s_A (\alpha, K) \neq p \forall \alpha \), \( Eu(p) = Eu(\alpha^{ce}, 1) \).

By conditions of the corollary and Proposition 1, \( Eu(s_A (0, K)) > Eu(\alpha^{ce}, 1) \), implying \( \lambda (s_A (0, K), \sigma_B) > \lambda (p, \sigma_B) \), violating Proposition 3. \( \square \)

**Proof of Proposition 7: Part 1.** We begin with a lemma for obscured candidates: if \( \forall \alpha \in (\alpha_1, \alpha_2) \) high-cost types are obscured, then \( s_A (\alpha, K) = \alpha \). To see this, first note that as \( \lambda \) is constant for obscured types, \( s(.) \) must be continuous. Now suppose the lemma is not true and for some \( \alpha \in (\alpha_1, \alpha_2) \), \( s_A (\alpha, K) < \alpha \). The deviation \( \hat{s} = s_A (\alpha, K) + \varepsilon \), for \( \varepsilon > 0 \) small, implies \( \lambda (\hat{s}, \sigma_B) = \lambda (s_A (\alpha, K), \sigma_B) \) and \( \psi (\alpha, K, \hat{s}) = \psi (\alpha, K, s_A (\alpha, K)) \) as \( \hat{s} = s_A (\alpha', K) \) for some \( \alpha' \in (\alpha_1, \alpha_2) \); thus, the deviation is profitable. The case for \( s_A (\alpha, K) > \alpha \) is analogous, and the lemma is true. We also note here that, via similar arguments, it can be shown that \( s_A (\alpha, K) \leq 0 \) for separating segments.

**Part 2.** The three categories of pooling, separating, and obscured, fully describe the possible strategies for high-cost types. The proof of the proposition proceeds by considering all possible combinations of these categories and eliminating those that do not satisfy the cut-point strategy. This process employs out-of-equilibrium announcements, for which we must characterize \( \theta \). To
simplify the expressions, we abuse notation and write \( \lambda(\alpha, k) = \lambda(s(\alpha, k), \sigma_B) \) to denote the equilibrium probability of victory for type \((\alpha, k)\).

In equilibrium \( \lambda(\cdot, \cdot) \) is continuous in \( \alpha \), implying \( \theta(\cdot) \) is continuous also and is differentiable everywhere except at the jump discontinuities of \( s_A(\cdot) \). For zero-cost types, \( \theta(\alpha, 0, p) = \lambda(\alpha, 0) \) and \( \frac{\partial \theta}{\partial \alpha} = 0 \). For high-cost types,

\[
\frac{d\theta(\alpha, K, p)}{d\alpha} = \begin{cases} 
\psi(\alpha, K, p) \left[ \lambda(\alpha, K) \left( \frac{\partial \psi(\alpha, K, s_A(\alpha, K))}{\partial \alpha} + \frac{\partial \psi(\alpha, K, s_A(\alpha, K))}{\partial s_A} \right) \right] 
- \frac{d\psi(\alpha, K, p)}{d\alpha} \cdot \lambda(\alpha, K) \cdot \psi(\alpha, K, s_A(\alpha, K)) \right] 
+ \frac{d\psi(\alpha, K, p)}{d\alpha} \cdot \lambda(\alpha, K) \cdot \psi(\alpha, K, s_A(\alpha, K)) \right] 
\end{cases} 
\]

which gives,

\[
- f(\alpha) \cdot \psi(\alpha, K, s_A(\alpha, K)) + \frac{\partial \psi(\alpha, K, s_A(\alpha, K))}{\partial s_A} \cdot \frac{\partial s_A(\alpha, K)}{\partial \alpha} \left( 1 - F(\alpha) \right) = 0.
\]

Combining these relationships, Eq. (A.1) simplifies to:

\[
\frac{d\theta(\alpha, K, p)}{d\alpha} = \lambda(\alpha, K) \left( \frac{\psi(\alpha, K, p) \cdot \frac{\partial \psi(\alpha, K, s_A(\alpha, K))}{\partial \alpha}}{[\psi(\alpha, K, p)]^2} \right).
\]

To simplify this expression, consider the possible strategies. (i) Separating. We have \( \lambda(\alpha, K) = (1 - q)(1 - F(\alpha)) \) and \( \frac{\partial \lambda}{\partial \alpha} = -(1 - q) f(\alpha) \). The equilibrium condition requires that \( s_A(\alpha, K) \) maximizes utility for type \((\alpha, K)\), implying the necessary first order condition:

\[
\frac{d\psi(\alpha, K, s_A(\alpha, K))}{d\alpha} \left. \right|_{\alpha' = \alpha} = 0,
\]

(ii) Pooling. As \( \frac{\partial \lambda(\alpha, K)}{\partial \alpha} = 0 \) and \( \frac{\partial s_A(\alpha, K)}{\partial \alpha} = 0 \), Eq. (A.2) holds.

(iii) Obscured. As \( \psi(\alpha, K, \alpha) = \gamma \) and \( \frac{\partial \gamma}{\partial \alpha} = 0 \),

\[
\frac{d\theta(\alpha, K, p)}{d\alpha} = -\gamma \frac{d\psi(\alpha, K, p)}{d\alpha} \cdot \lambda(\alpha, K) \left[ \frac{\psi(\alpha, K, p)}{[\psi(\alpha, K, p)]^2} \right],
\]

the sign of which is determined by \( -\frac{d\psi(\alpha, K, p)}{d\alpha} \).

**Part 3.** We now use Eqs. (A.2) and (A.3) to establish beliefs for out-of-equilibrium announcements. We show that for any strategy (pooling, obscured, separating) used on the interval \([\alpha_1, \alpha_2]\), deviations toward the center can only be attributed to type \( \alpha_1 \), and deviations toward the extreme can only be attributed to type \( \alpha_2 \). This follows if on the interval \( d\theta(\alpha, K, p)/d\alpha > 0 \) and \( d\theta(\alpha, K, p)/d\alpha < 0 \), respectively. Note that \( \psi(\alpha, K, p) \leq 0 \) implies type \((\alpha, K)\) cannot profit from a deviation to \( p \), and voters assign zero belief to this type; therefore, \( \theta \) is only defined when \( \psi(\alpha, K, p) > 0 \).

**Case 1—Pooling.** Suppose types \([\alpha_1, \alpha_2]\) pool at announcement \( \hat{s} \), where \( \hat{s} \leq \alpha_1 \), and that \( p \) is an out-of-equilibrium announcement (the case \( \hat{s} > \alpha_1 \) is analogous). Consider four subcases.

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20 Note that the \( q \) terms cancel out and produce the same derivation as in Banks (1990), although there are several typos in his statements.
(ia) \( p < \hat{s} \). Then \( \forall \alpha \in [\alpha_1, \alpha_2], \psi(\alpha, K, p) < \psi(\alpha, K, \hat{s}) \) and, by quadratic utility, \( \partial \psi(\alpha, K, p)/\partial \alpha < \partial \psi(\alpha, K, \hat{s})/\partial \alpha \). Hence, \( d(\theta(\alpha, K, p))/d\alpha > 0 \);

(1b) \( \hat{s} < p \leq \alpha_1 \). Then \( \forall \alpha \in [\alpha_1, \alpha_2], \psi(\alpha, K, p) > \psi(\alpha, K, \hat{s}) \) and \( \partial \psi(\alpha, K, \hat{s})/\partial \alpha < \partial \psi(\alpha, K, p)/\partial \alpha \). Hence, \( d(\theta(\alpha, K, p))/d\alpha < 0 \);

(ic) \( p \in (\alpha_1, \alpha_2). \) Case (ib) holds for \( p \in [\alpha_1, \alpha_2) \) and note that \( d\theta(\alpha, K, p)/dp < 0 \) in this domain. For \( \alpha \in (\alpha_1, p) \), \( \theta(\alpha, K, p) = \theta(\alpha, K, 2\alpha - p) \), and \( d(\theta(\alpha, K, p))/d\alpha < 0 \), implying that \( d\theta(\alpha, K, p)/d\alpha > 0 \). The case for \( p > s_A(\alpha_2, K) \) is again similar to Case I, giving \( d\theta(\alpha, K, p)/d\alpha < 0 \).

Case II—Separating. Suppose all types on the domain \([\alpha_1, \alpha_2] \) separate (recalling \( s_A(\alpha, K) \leq \alpha \) and continuous for separating types) and that \( p < s_A(\alpha_1, K) \) is an out-of-equilibrium announcement. For all \( \alpha \in [\alpha_1, \alpha_2] \), as for pooling types, \( \psi(\alpha, K, p) < \psi(\alpha, K, s_A(\alpha, K)) \) and \( \partial \psi(\alpha, K, p)/\partial \alpha < \partial \psi(\alpha, K, s_A(\alpha, K))/\partial \alpha \), implying that \( d(\theta(\alpha, K, p))/d\alpha > 0 \). The case for \( p > s_A(\alpha_2, K) \) is again similar to Case I, giving \( d\theta(\alpha, K, p)/d\alpha < 0 \).

Case III—Obscured. Suppose candidates on the domain \([\alpha_1, \alpha_2] \) are obscured and recall that this requires \( s_A(\alpha, K) = \alpha \). For \( p < \alpha_1 \), \( d\psi(\alpha, K, p)/d\alpha < 0 \), giving \( d\theta(\alpha, K, p)/d\alpha < 0 \). Alternatively, for \( p > \alpha_2 \), \( d\psi(\alpha, K, p)/d\alpha > 0 \) and \( d\theta(\alpha, K, p)/d\alpha < 0 \).

By the continuity of utility, these properties imply that for any out-of-equilibrium announcement \( p \), belief can only be assigned to either zero-cost types or to at most two high-cost types, \( \hat{\alpha} \) and \( \bar{\alpha} \), where \( \hat{\alpha} = \max_{s_1(\alpha, K) < p} \alpha \) and \( \bar{\alpha} = \min_{s_1(\alpha, K) > p} \alpha \).

Part 4. Return now to the possible combinations of separating, pooling, and obscured, and consider the intervals \([\alpha_1, \alpha') \) and \([\alpha', \alpha_2] \). The cut-point strategy permits the following possible strategies, where \( \gamma : \tau \) implies strategy \( \gamma \) is used on interval \([\alpha_1, \alpha') \) and \( \tau \) is used on interval \([\alpha', \alpha_2] \): (a) with a discontinuity at \( \alpha' \), only pooling: separating is allowed, (b) without a discontinuity at \( \alpha' \), obscured: pooling any common strategy across the intervals is allowed. In the following we eliminate all other possibilities, proving the proposition.

Case 1—Separating: Separating. With a discontinuity at \( \alpha' \), \( \lambda(s_A(\alpha, K), \sigma_B) \) is continuous and \( \psi(.) \) discontinuous in \( \alpha \), violating the continuous utility requirement of equilibrium.

Case 2—Separating: Obscured. Ruled out by Proposition 5.

Case 3—Separating: Pooling. Without a discontinuity at \( \alpha' \), \( \psi(.) \) is continuous and \( \lambda(s_A(\alpha, K), \sigma_B) \) discontinuous in \( \alpha \), violating the continuous utility requirement of equilibrium. So suppose \( s_A(\alpha, K) \) is discontinuous at \( \alpha' \), noting that equilibrium requires type \( \{\alpha', K\} \) to be indifferent between announcements \( s_A(\alpha', K) \) and \( \hat{s} \), where \( \hat{s} \) is the pooling announcement. This implies, by Proposition 2, that \( s_A(\alpha', K) < \alpha \). If \( \hat{s} \leq \alpha' \) then \( \mu(\alpha'|p) = 1 \) for all \( p \in (s_A(\alpha', K), \hat{s}) \). For \( p \to \hat{s} \), \( \psi(\alpha', K, p) \to \psi(\alpha', K, \hat{s}) \) but \( \lambda(p, \sigma_B) \to \lambda(\hat{s}, \sigma_B) + \delta \), for some \( \delta > 0 \), and for \( |\hat{s} - p| \) sufficiently small a deviation to \( p \) is profitable (for \( \hat{s} > \alpha \) the same conclusion emerges by considering the deviation to \( \alpha \)).

Case 4—Pooling: Pooling. Similarly to Case 3 for a discontinuity at \( \alpha' \): if the pools are at \( \hat{s} < \hat{s}' \leq \alpha' \), then \( \mu(\alpha'|p) = 1 \) for all \( p \in (\hat{s}, \hat{s}') \) and a deviation is profitable for \( |\hat{s}' - p| \) sufficiently small. The cases \( \hat{s} < \alpha' < \hat{s}' \) and \( \alpha' \leq \hat{s} < \hat{s}' \) are similar.

Case 5—Obscured: Separating. A discontinuity at \( \alpha' \) is ruled out by the requirements for obscured and separating segments, respectively, that \( s_A(\alpha, K) = \alpha \) and \( s_A(\alpha, K) \leq \alpha \). Without a discontinuity in \( s_A(\alpha, K) \), \( \lambda(.) \) is discontinuous at \( \alpha' \), but \( \psi \) is continuous, violating continuous utility.

Case 6—Pooling: Obscured. By Proposition 5 the pooling types are imitated, implying \( \lambda(\alpha, K) \) is constant across \( (\alpha_1, \alpha_2) \). As \( s_A(\alpha, K) = \alpha \) for obscured types, a discontinuity at \( \alpha' \) requires \( \hat{s} < \alpha' \), where \( \hat{s} \) is the location of the pool. This implies type \( \alpha' \) strictly prefers to be obscured than imitated, violating equilibrium. Thus, we can only have \( \hat{s} = \alpha' \), which implies the
announcement \( p = \alpha' - \varepsilon \) is out-of equilibrium for \( \varepsilon \) small (to the left of a pool can only be an obscured interval, but as \( s(\alpha, K) = \alpha \) in this interval there is a discontinuity between these segments). If the pooling types are \((\alpha_1, \alpha')\) then for this deviation we have \( \mu(\alpha_1 \mid p) = 1 \), and it is profitable. (An identical argument shows that in general if types \([\alpha_1, \alpha_2]\) pool at some announcement \( \bar{\alpha} \), then \( \bar{\alpha} \leq \alpha_1 \).

**Case 7—Obscured: Obscured.** The requirement that \( s(\alpha, K) = \alpha \) for obscured types precludes a discontinuity at \( \alpha' \).

**Case 8—Pooling: Separating.** Without a discontinuity at \( \alpha' \), \( \psi(.) \) is continuous and \( \lambda(s_A(\alpha, K), \sigma_B) \) discontinuous in \( \alpha \), violating the continuous utility requirement of equilibrium.

**Case 9—Obscured: Pooling.** The requirements that \( s(\alpha, K) = \alpha \) for obscured and \( s(\alpha, K) \leq \alpha \) for pooling (see Case 6) precludes a discontinuity at \( \alpha' \). \( \Box \)

**Proof of Lemma 2.** By the definition of obscured, \([0, \alpha') \subseteq s^0_A \). If \( s_A(\alpha, K) \in s^0_A \) for some \( \alpha > \alpha'' \) then type \([\alpha, K]\) is obscured. But by the proof of Proposition 7, there cannot be a jump from pooling to obscured; a contradiction. \( \Box \)

**Proof of Proposition 8.** Banks I and II and Proposition 6 establish the result for \( q = 0, 1 \). If \( K \leq K^* \) and \( q \in (0, 1) \) then \( s_A(\alpha, K) = 0 \forall \alpha \) which, by Proposition 4 and the arguments in Banks I, is universally-divine. For the remaining case \( q \in (0, 1) \) and \( K > K^* \) we construct a cut-point equilibrium with the properties \( \alpha' > 0 \) and \( \alpha' \notin s^0_A \). The values \( K, q \), and \( \alpha' \) define uniquely the separating segment of \( s_A(.) \) and the cut-point \( \alpha'' \) (see Banks, 1990) such that type \( \alpha'' \) is indifferent between pooling and separating. For each \( q \), there is a \( \bar{\alpha}(q) < \alpha'' \) such that iff \( \bar{\alpha} \leq \bar{\alpha}(q) \), a distribution \( g(. \mid \bar{\alpha}, q) \) can be found which satisfies \( \text{Eu}(p) = \text{Eu}(p') \forall p, p' \in [0, \bar{\alpha}] \), where \( g \) is the distribution of zero-cost types (on the support \([0, \bar{\alpha})\)). As \( \bar{\alpha} \to 0 \), \( \text{Eu}(p) \to \alpha'' \), and as \( \bar{\alpha} \to \bar{\alpha}(q) \), \( \text{Eu}(p) \to \bar{\alpha} \), for each \( p \in [0, \bar{\alpha}) \). By continuity, therefore, a \( \bar{\alpha} \), and a corresponding \( g(. \mid \bar{\alpha}, q) \), exist such that \( \text{Eu}(p) = \text{Eu}(p') \forall p, p' \in [0, \alpha''] \) (that is, including the pool at \( \alpha'' \)). We propose that \( \bar{\alpha} = \alpha' \) and the corresponding distribution \( g' \) (and implicit \( \alpha''(K, q, \alpha') \)) compose a universally-divine equilibrium.

To confirm this strategy as an equilibrium, we consider possible deviations. Out-of-equilibrium announcements of two sorts are possible: in the interval \((\alpha'', s_A(\alpha'', K))\) and more extreme than \( s_A(D, K) \). The proof of Proposition 7 implies that \( \mu(\alpha'' \mid p) = 1 \) for the former deviation and \( \mu(D \mid p) = 1 \) for the latter. As type \( \alpha'' \) is indifferent between announcements \( \alpha' \) and \( s_A(\alpha', K) \), deviations to \( p \in (\alpha'', s_A(\alpha'', K)) \) are unprofitable as \( \lambda(p, \sigma_B) = \lambda(s_A(\alpha'', K), \sigma_B) \) and \( \psi(\alpha'', K, p) < \psi(\alpha'', K, s_A(\alpha'', K)) \). By quadratic utility, the deviation is also unprofitable for other high-cost types. It is unprofitable for zero-cost types as \( \lambda(s_A(\alpha'', K), \sigma_B) < \lambda(p, \sigma_B) \forall p \in s^0_A \). For deviations to \( p > s_A(D, K) \), \( \mu(D \mid p) = 1 \) implies \( \lambda(p, \sigma_B) = 0 \), and the deviation is not profitable for all candidates.

Players can also deviate by imitating each other. By construction, zero-cost types cannot profitably deviate as they, along with imitated and pooling high-cost types, win with the highest probability. Imitated high-cost candidates tell the truth and can do no better. If a pooling high-cost type deviates to \( p < \alpha' \) they incur a greater cost of lying without an increase in \( \lambda \), and this is not profitable. Type \( \alpha' \) is indifferent between the pool at \( \alpha' \) and the announcement \( s_A(\alpha'', K) \), so by quadratic utility pooling types strictly prefer the pool to any separating announcement. The same argument shows that separating types do not wish to imitate their more centrist colleagues. \( \Box \)
Proof of Corollary 2. As $K \to \infty$, $s_A(\alpha, K) \to \alpha \forall \alpha$, implying $\alpha'' \to \alpha'$. Suppose the claim is not true and $\alpha' \to 0$ for $q > 0$. Then $Eu(p) \to \alpha^{ce} \forall p \leq \alpha'$, and $\lambda(p, \sigma_B) < \lambda(s_A(\alpha'', K) + \epsilon, \sigma_B)$ for $\epsilon$ small as $\alpha'' + \epsilon < \alpha^{ce}$, violating Proposition 2; hence, the claim is true. □

References


