

Communicating and Investing in Policy Expertise: A Case for Primaries

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Abstract

Effective policy-making depends on the availability of information and policy expertise. A crucial role of elections is to provide incentives for candidates to learn about good policies and communicate these to voters. We investigate how alternative forms of intra-party competition strengthen these incentives. We distinguish *closed nomination processes*, in which the nomination process is conducted away from the scrutiny of voters, and *open nomination processes*, according to which a primary contest is held under the full view of the electorate. We show that open nomination processes provide better incentives for candidates to offer the policies that they believe are most likely to succeed, despite the threat of open division between candidates. We also show that when candidates must invest in policy expertise, open nomination procedures alone can provide incentives for them to do so. We illustrate the scope of the model for the design of institutions that promote issue-based election campaigns.

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1. Introduction

The proper functioning of representative democracy depends upon the ability and willingness of elected officials to construct and communicate to voters effective solutions to substantive policy problems. The quality of these solutions, in turn, depends upon the information and expertise that are employed in their design. Weber, for example, argues:

...the sciences, both normative and empirical, are capable of rendering inestimable service to persons engaged in political activity by telling them that (1) these and these “ultimate” positions are conceivable with reference to this practical problem; (2) such and such are the facts which you must take into account in making your choice between these positions.

(Weber, 1949, 10)

More informed policymakers are better equipped to discern the consequences of initiatives and gauge the probable success of alternative implementation strategies. But acquiring information, seeking out relevant expertise, and communicating this expertise to voters are costly and uncertain endeavors. They are costly, in terms of effort and expense, and subject to uncertainty both from a *technical* perspective, since even well-conceived policies may fail, as well as from a *political* perspective, since politicians must first be elected in order to have an opportunity to implement the solutions that they have taken time to develop.

Electoral campaigns represent the most promising incentives for candidates to undertake this effort. They can serve as *battlegrounds of ideas* by exposing voters to a wide range of views and allowing them to choose the candidate who offers the most effective policy agenda.

And by providing an explicit arena for competition between policy ideas, elections should also provide office-motivated candidates with potent incentives to invest in the quality of these ideas. In other economic settings, competition between agents has been conceived principally, and in some cases solely, as a means to extract information (e.g. Holmstrom (1982)).

On the other hand, if elections fail to provide candidates with these incentives, it is difficult to conceive of any other institution that can make good on this deficit. And there is always chance that they will fail: instead of investing in policy expertise, candidates may find it strategically valuable to focus their efforts on vacuous or negative image campaigns, or set up vote-buying machines that eschew the appeal of good ideas in favor of the lure of money and patronage (Easterly and Levine (1997), Keefer and Vlaicu (2008), Mauro (1995)).

Many possible forms of electoral institutions may foment beneficial incentives. Different electoral rules, such as majoritarian or proportional, may lead candidates to seek broad rather than narrow appeal (Myerson (1993)), or to form platforms based on public good provision rather than targeted vote-buying (Lizzeri and Persico (2001)). Fora for public deliberation, such as town-hall meetings, may improve the quality of policy debate during the general election, and force candidates to construct well-crafted, specific policy agendas that can be communicated credibly to the electorate (Fujiwara and Wantchekon (2012)). We, however focus our enquiry on the structure of intra-party competition and in particular, the significance of primary contests. Primaries are already understood by scholars to constitute very different political environments to general elections. They may empower ideological

voters and induce candidates to adopt more polarized platforms (Serra (2011)), or offer budgetary concessions to faction leaders in order to attain the nomination of their party (Hirano et al. (2009)). By contrast, we study the role that primary contests can play in providing incentives for candidates to communicate to voters - and invest in - information and expertise. We consider a classic information structure - there are two states of the world, two policies, and a biased common prior distribution over states. There are two candidates in a party, who compete for nomination from the party leadership by announcing a platform. Before making their announcement, each candidate receives a private signal which provides information about the realized state. The leadership observes the candidates' announcements, and chooses a single candidate to compete in the general election. Voters observe the outcome of the nomination process and form beliefs about the efficacy of the nominee's chosen policy which determines the nominee's probability of winning the election.

We distinguish between nomination processes by considering two alternative institutional forms. The first, we call *closed nomination processes*. These are parties in which the selection of the party's nominee is conducted behind closed doors, or smoke-filled rooms. A consequence of such processes is that voters do not observe the potential agreement or dissent of candidates who were not chosen to be the party's nominee. We contrast this with a second environment that we call *open nomination procedures*. Under such procedures, candidates compete with one another to be selected as party nominee in full view of the wider electorate.

While scholars have argued that open party nomination procedures may have many virtues for effective *preference aggregation*, we focus on their positive effects for *information*

aggregation, and in turn, information acquisition. Specifically, we show that open parties provide candidates with better incentives to truthfully reveal their private information - and subsequently, we show that they provide better incentives for candidates to acquire this information. The key mechanism in our analysis is that open parties allow winning nominees to benefit from the announcement of the loser: in the event that each candidate's position supports the other, voters are better able to infer that their investments have paid off. On the other hand, open parties also expose candidates to the risk of a *divisive primary* - those in which disagreement between candidates is laid before the electorate. When such disagreement occurs, it is indeed harmful to the winner of the primary. But, it is precisely the fear of this effect that provides incentives for candidates to reveal their private beliefs. We show that this effect on investment incentives overcomes the increased risk of division, and renders open parties superior to closed parties. In contrast with many existing models of primary competition which take as given the presence of a candidate with some innate 'valence' characteristic (for example, Ansolabehere and Snyder Jr (2000), Groseclose (2001)), we show how valence qualities can emerge as an equilibrium outcome of the intra-party contest.

Our approach builds directly on the seminal contribution of Caillaud and Tirole (2002), who initially proposed the benefits of primary competition for information acquisition and revelation. In their model, candidates pay a fixed cost to increase the probability with which they successfully design an effective programmatic policy. They assume that there is a continuum of possible policies, and that candidates cannot lie about the policy they designed. This implies that candidates would announce the same policy if and only if they

are both informed. This information structure carries a number of implications that we feel more closely resemble the trade-offs candidates face, in real elections.

First, in the event that candidates do not propose the same policy, voters in Caillaud and Tirole (2002) have no prior beliefs that might lead them to favor one policy over another. In our model, a biased prevailing nostrum is crucial to the trade-offs faced by candidates in choosing whether to represent their beliefs, truthfully. Second, their model does not allow candidates to misrepresent their belief about which policy would be in the voters' interest. We do not feel that politicians are, in practice, bound to announce only policies that they believe are in the voter's best interest (Prat (2005)) when trying to get themselves elected. Finally, where Caillaud and Tirole (2002) assume that a candidate's probability of winning in the general election - i.e. her continuation payoff - is linear in the voter's posterior belief that her policy is right, we impose the requirement only that this continuation payoff is strictly increasing. Indeed, linearity constitutes a knife-edge case for much of our analysis: many interesting insights emerge from considering the case in which the probability of winning is either concave or convex in the posterior, and we argue that this may better describe a range of relevant electoral environments.

Many papers study the trade-off between alternative forms of *inter-party* contests, for example majoritarian versus proportional electoral rules; prominent examples are given in Persson and Tabellini (2002), Lizzeri and Persico (2001) and Myerson (1993). This contrasts with our focus on *intra-party* competition. We hope to catalyze new lines of empirical enquiry into the consequences of primaries, relating the support that voters express for parties in the general election to the observable money and effort expended by candidates on think tanks,

experts and other sources of information and expertise. We provide empirical illustrations of the main ideas in our theory, and also describe subsequent empirical work that we will carry out to test directly our main conclusions.

Model

There are two *candidates*, a and b and a *leadership*. There is a *state*, $\omega \in \{X, Y\}$, with a common prior belief that is biased in favor of X : $\Pr(\omega = X) = \theta \in (\frac{1}{2}, 1)$. Initially, all players in the model are uninformed beyond the common prior about which of the two states has been realized. At the start of the model, however, each candidate $i \in \{a, b\}$ receives a private signal $s_i \in \{s_i^X, s_i^Y\}$; each signal is drawn independently, conditional on the realized state. Specifically: $\Pr(s_i = s_i^X | \omega = X) = \Pr(s_i = s_i^Y | \omega = Y) = 1 - \epsilon$, where ϵ will be taken to be arbitrarily small in a manner to be described, below.

After each candidate $i \in \{a, b\}$ observes her private signal, each simultaneously announces a policy x_i or y_i to the party leadership. We let σ_i^j denote the probability with which candidate $i \in \{a, b\}$ selects the message x after signal $s_i^j \in \{s_i^X, s_i^Y\}$. Thus:

$$\sigma = (\sigma_a^X, \sigma_a^Y, \sigma_b^X, \sigma_b^Y) \tag{1}$$

is the strategy profile for the candidates. The leadership observes an element from the set of message profiles:

$$M = \{x_a x_b, x_a y_b, y_a x_b, y_a y_b\} \tag{2}$$

where, for example, $x_a y_b$ means that candidate a announces x and candidate b announces y . After observing these announcements, the leadership nominates a single candidate to

stand as its nominee in the general election. The strategy $\tau(m_a m_b) : M \rightarrow [0, 1]$ assigns to each element of M a probability with which candidate a is nominated after the leadership observes each candidate's announcement.

We distinguish the alternative forms of intra-party selection according to their informational consequences. Under *open nomination processes*, we assume that the voter's observes an element of the set:

$$\{x_a x_b, x_a y_b, y_a x_b, y_a y_b\} \times \{a, b\} \quad (3)$$

That is, she can directly observe the proposals of both candidates, and the identity of the candidate who was nominated. Under *closed nomination processes*, by contrast, the voter's observes only an element of $\{x_a, x_b, y_a, y_b\}$: she can directly observe only the identity of the candidate who was nominated, and the platform that she offered. The voter then uses her information to form a posterior probability that that the platform offered by the nominee matches the state, μ .

Rather than explicitly model the inter-party contest, we assume that candidates and the leadership believe that the probability with which the pivotal voter selects the nominee is $P(\mu) = \mu^k$. The functional form μ^k allows us to distinguish cases in which the continuation payoff is convex, linear or concave in the voter's posterior estimate of the nominee's platform. These cases turn out to be important for our analysis.

Solution Concept

We study sequential equilibria, on which we impose some additional restrictions. First, we restrict the leadership to use nomination strategies which depend only on the announce-

ments of the candidates:

$$\tau(x_a y_b) = 1 - \tau(y_a x_b), \quad \tau(x_a x_b) = \frac{1}{2} \quad (4)$$

This criterion removes the possibility of what Kartik et al. (2013) refer to as ‘non-competitive equilibria’, or equilibria in which a single candidate wins with probability 1 regardless of the message that she or the other candidate sends. Such equilibria exist, and in these it is possible to have the winning candidate convey her private information: however, they do not seem particularly plausible or theoretically germane in the present context. Moreover, they cannot support any information acquisition when there is a positive cost of acquiring a signal, as we show later. Note that our approach is similar to Heidhues and Lagerlöf (2003).

For the sake of tractability, we focus on equilibria in the setting where private signals are of arbitrarily high quality. Specifically, we consider equilibria which exist at $\epsilon = 0$ (i.e., zero signal error) and in which the associated strategies and beliefs of players constitute the limit of a sequence of equilibria for a sequence of strictly positive error rates converging to zero. We refer to these as ‘continuous equilibria’. Naturally, there remain multiple equilibria - such as those in which each candidate plays a babbling strategy. We will focus on the equilibrium which maximizes the probability of the event in which a candidate is nominated who offers the correct policy.

Benchmark: Optimal Nomination Procedures Under Truth-Telling Strategies

We start by examining a benchmark case in which candidates play *truthful* strategies: $\sigma = (1, 0, 1, 0)$, and the leadership nominates the candidate which it believes is most likely

to be correct.

This implies the following selection rule for the leadership under both *open* and *closed* parties: (i) if at least one candidate offers the policy x , randomize uniformly over the set of candidates who offer x , and (ii) if neither candidate offers the policy x , randomise uniformly over the set of candidates of who offer y . The reason for this is that for any noise in the candidates' private signals ($\epsilon > 0$), the posterior of the leadership after observing $x_a y_b$ or $y_a x_b$ reverts to the prior, which is biased in favour of state X . When $\epsilon = 0$, such an event occurs with probability zero, but our continuity criterion requires that we impose this belief on the out-of-equilibrium event in which candidates publicly disagree, given their use of truth-telling strategies.

A consequence of the leadership's strategy is that agreement or disagreement does not have an effect on the nomination decision. However, it affects the continuation payoff of the leadership and the nominated candidate by determining the voter's subsequence confidence in the nominee's platform. In particular, for any positive error rate, we have the following ordering over the voter's beliefs under open parties:

$$\underbrace{\Pr(\omega = X|m = x_a x_b)}_{\text{posterior from agreement on } x} > \underbrace{\Pr(\omega = Y|m = y_a y_b)}_{\text{posterior from agreement on } y} > \underbrace{\Pr(\omega = X|m \in \{x_a y_b, y_a x_b\})}_{\text{posterior from disagreement } (= \theta)} \quad (5)$$

and under closed parties, for sufficiently small error rate³:

$$\underbrace{\Pr(\omega = Y|m \in \{y_a, y_b\})}_{\text{posterior from nominee's policy } y} > \underbrace{\Pr(\omega = X|m \in \{x_a, x_b\})}_{\text{posterior from nominee's policy } x} \quad (6)$$

The reason is as follows: under closed nomination procedures, the voter's problem is to

³Specifically, $0 < \epsilon < \frac{-4\theta^2 + \sqrt{16\theta^4 - 32\theta^3 + 20\theta^2 - 4\theta + 1} + 6\theta - 3}{4\theta - 2}$

infer the underlying distribution of candidates' signals from her observation of a single announcement. When she observes a single announcement of y , she learns that each candidate must have received the signal s^Y ; when she observes a single announcement of X , she learns only that *at least* one candidate received the signal s^X . In particular, observing the policy y is “better news” about the degree of consensus within the party. Finally, we observe:

$$\underbrace{\Pr(\omega = X | m \in \{x_a x_b\})}_{\text{posterior from open agreement on } x} > \underbrace{\Pr(\omega = X | m \in \{x_a, x_b\})}_{\text{posterior from } x \text{ under closed}} > \underbrace{\Pr(\omega = X | m \in \{x_a y_b, y_a x_b\})}_{\text{posterior from open disagreement } (= \theta)}$$

In words: open agreement is better for the party's image than obfuscation, but obfuscation is better than open disagreement. It is straightforward to show that openness is preferred by the leadership when the following condition is satisfied:

$$\frac{P[\Pr(\omega = X | m \in \{x_a, x_b\})] - P(\theta)}{P[\Pr(\omega = X | m \in \{x_a x_b\})] - P[\Pr(\omega = X | m \in \{x_a, x_b\})]} \leq \frac{\Pr(s_a = s_b = s^X)}{\Pr(s_a \neq s_b)}$$

where the left-hand side of this expression is the relative benefit of concealing dissensus, rather than revealing consensus on the state X . The right-hand side is the inverse likelihood ratio of the corresponding events. We now state and prove our benchmark result.

Proposition 1. If candidates play truthful strategies, and the leadership nominates the candidate which it believes is mostly likely to have the correct policy:

1. if $k < 1$, the leadership prefers *closed nomination procedures*;
2. if $k = 1$, the leadership is indifferent between either procedure; and,
3. if $k \geq 1$, the leadership prefers *open nomination procedures*.

We prove a more general form of this result in the text. Suppose $P(\cdot)$ is convex. Write the short hand $\mu(m)$ for the voter's posterior assessment that the state is X conditional on the observation m . Then, we have $\mu(x_i y_j) < \mu(x_i) < \mu(x_a x_b)$, and convexity implies:

$$\frac{P(\mu(x_i)) - P(\mu(x_i y_j))}{\mu(x_i) - \mu(x_i y_j)} < \frac{P(\mu(x_i x_j)) - P(\mu(x_i y_j))}{\mu(x_i x_j) - \mu(x_i y_j)} < \frac{P(\mu(x_i x_j)) - P(\mu(x_i))}{\mu(x_i x_j) - \mu(x_i)}$$

and combining the first and third inequalities, we obtain:

$$\frac{P(\mu(x_i)) - P(\mu(x_i y_j))}{P(\mu(x_i x_j)) - P(\mu(x_i))} < \frac{\mu(x_i) - \mu(x_i y_j)}{\mu(x_i x_j) - \mu(x_i)} = \frac{\Pr(s_a = s_b = s^X)}{\Pr(s_a \neq s_b)}$$

Thus, when $P(\cdot)$ is strictly convex (or, in our formulation, $k > 1$), the probability of winning function rises more steeply for higher values of the voter's posterior belief. When $P(\cdot)$ is strictly concave ($k < 1$), the probability of winning is more responsive to disagreement than to agreement; as such, the closed process brings greater benefit to the party since it obscures disagreement.

The benchmark analysis is conducted under the supposition that candidate play truth-telling strategies, and that parties nominate whichever candidate they believe is most likely to have chosen the good policy. We now consider each environment, in turn, to determine whether or not these strategies are incentive compatible and what can be achieved in equilibrium if they are not.

Equilibrium under Open Nomination Processes

We now turn to the analysis of the candidates' and leadership's strategies under the supposition that the nomination process allows voters to scrutinize not only the announcement of the winning nominee, but also the announcement of the candidate who was not selected.

We start by asking under what conditions a truth-telling equilibrium might exist, i.e. an equilibrium in which $\sigma = (1, 0, 1, 0)$. Under the supposition of truth-telling by candidates, in any sequential equilibrium, the strict best response of the leadership is the same as in the benchmark case: pick a candidate i who offers y if and only if both candidates announce this platform. This is because the leadership's choice of candidate conveys no additional information the voter beyond her observation of each candidate's announcement.

We turn to the analysis of candidates' strategies. Suppose a candidate $i \in \{a, b\}$ receives a signal indicating that the unlikely state (Y) has been realized. Then, her payoff from announcing Y is:

$$\frac{1}{2} \Pr(s_j^Y | s_i^Y) P [\Pr(\omega = Y | y_a y_b, \sigma)] \quad (7)$$

since she is nominated with positive probability only if the other candidate also announces the same policy, and then she is nominated with probability one half and receives the continuation payoff associated with both candidates agreeing on the policy y .⁴ By announcing x_i , instead, she obtains the payoff:

$$\Pr(s_j^Y | s_i^Y) P [\Pr(\omega = X | x_i y_j, \sigma)] + \frac{1}{2} \Pr(s_j^X | s_i^Y) P [\Pr(\omega = X | x_a x_b, \sigma)]. \quad (8)$$

If the other candidate announces y_j , the voter's posterior belief reverts to the prior, and thus the leadership strictly prefers the nomination of the candidate who announces x_i . This specious policy differentiation therefore guarantees the candidate's nomination, but leaves

⁴Note that the restriction to $\tau(x_i x_j) = \tau(y_i y_j) = \frac{1}{2}$ is not material to the argument, since this creates the best possible case for each candidate's incentives. Choosing an asymmetric randomisation simply tightens the truth-telling constraint for the member who is nominated with lower probability.

her with a lower continuation payoff through the effect of the voter observing open disagreement. On the other hand, if the remaining candidate announces x_j , each is equally likely to be nominated and receives the highest continuation payoff. Comparing these expressions, we obtain the following:

Proposition 2. If and only if:

$$k > \frac{\log\left(\frac{1}{2}\right)}{\log(\theta)}$$

then there exists a continuous equilibrium in which each candidate announces her signal.

Proof. The incentive constraint for candidate i can be written:

$$\frac{\Pr(s_j^Y | s_i^Y)}{1 - \Pr(s_j^Y | s_i^Y)} \left(\frac{P[\Pr(\omega = Y | y_a y_b, \sigma)]}{P[\Pr(\omega = X | x_a x_b, \sigma)]} - 2P(\theta) \right) \geq 1 \quad (9)$$

Note that $P(\theta)$ is independent of ϵ , $\frac{\Pr(\omega=Y|y_a y_b, \sigma)}{\Pr(\omega=X|x_a x_b, \sigma)}$ is strictly decreasing in ϵ , $\lim_{\epsilon \rightarrow 0} \frac{\Pr(\omega=Y|y_a y_b, \sigma)}{\Pr(\omega=Y|x_a x_b, \sigma)} = 1$ and $\lim_{\epsilon \rightarrow 0} \frac{\Pr(s_j^Y | s_i^Y)}{1 - \Pr(s_j^Y | s_i^Y)} = \infty$. So, it is sufficient for the existence a continuous equilibrium that there exist $\epsilon(k) > 0$ such that $\frac{\Pr(\omega=Y|y_a y_b, \sigma)}{\Pr(\omega=Y|x_a x_b, \sigma)} - 2P(\theta) > 0$ for $0 < \epsilon < \epsilon(k)$, which is true if and only if $2\theta^k < 1$; re-arranging yields the conclusion. \square

The key impediments to truth-telling under open nomination procedures are two-fold: first, announcing the policy y_i guarantees that the probability of being nominated is weakly less than one half, regardless of the other candidate's announcement and indeed defeat is assured if the other candidate announces x_j . On the other hand, conditional on receiving a signal indicating that the state is y , candidate i expects candidate j to receive the same signal, and the eventual nominee receives a much stronger post-primary boost from the consensus that is generated by their agreement than would emerge from disagreement. Since

$\theta > \frac{1}{2}$, we must have $k > 1$, so a linear or concave continuation payoff over beliefs will not suffice.

What if these conditions fail to hold? Then, to some degree of truth-telling can only be supported through an equilibrium in which candidates play a mixed strategy after the receipt of at least one signal. Consider the following strategy profile: each candidate announces x with probability 1 after receiving the signal s_i^X , and announces x with probability $\hat{\sigma}(\epsilon, \theta)$ after signal s_i^Y . Thus, the strategy profile is $\sigma = (1, \hat{\sigma}(\epsilon, \theta), 1, \hat{\sigma}(\epsilon, \theta))$.

The particular form of this mixture depends on the shape of $P(\cdot)$. Clearly, each candidate must be indifferent between announcement after receiving the private signal s_i^Y . To support indifference, suppose that the leadership - after observing two differing policy announcements - selects the candidate who offered x with probability $\hat{\tau}(\epsilon, \theta)$. In that case, indifference for the leadership requires $\Pr(\omega = X | m \in \{x_a y_b, y_a x_b\}, \sigma) = \frac{1}{2}$, or:

$$\hat{\sigma}(\epsilon, \theta) = \frac{\epsilon(1 - \epsilon)(2\theta - 1)}{(1 - 2\epsilon(1 - \theta) - \theta - \epsilon^2(2\theta - 1))} \quad (10)$$

Note that $\lim_{\epsilon \rightarrow 0} \hat{\sigma}(\epsilon, \theta) = 0$. Recall that, under truthful strategies, the leadership's (and the voter's) posterior beliefs upon disagreement revert to the prior ($\theta > \frac{1}{2}$). Incentive compatibility fails if $P(\theta)$ is too large relative to the benefit of truth-telling. Under the proposed candidate mixed strategies, however, posterior beliefs revert to $\frac{1}{2}$, which endogenously worsens the continuation payoff to lying about one's signal, after receiving signal s_i^Y . This exerts discipline on the candidates, which can then be fine-tuned by the leader's choice $\hat{\tau}$. Such a choice exists so long as $\frac{1}{2}P(\Pr(\omega = Y | y_i y_j, \sigma)) - P(\frac{1}{2})$ is not too large, which in particular requires $k < 1$.

If, instead, this difference is ‘large’ - i.e. $k \in \left[1, \frac{\log \frac{1}{2}}{\log \theta}\right]$ - then there is no mixture by the leadership which can create indifference for the candidates between announcing x or y after signal s_i^Y . In essence, continuation payoffs penalise dissensus insufficiently to support an equilibrium in which $\Pr(\omega = X|m \in \{x_a y_b, y_a x_b\}) = \theta$, but penalise it too much to support an equilibrium in which $\Pr(\omega = X|m \in \{x_a y_b, y_a x_b\}) = \frac{1}{2}$. In that case, the mixture $\hat{\sigma}(\theta, \epsilon)$ is chosen to target a posterior belief $\Pr(\omega = X|m \in \{x_a y_b, y_a x_b\}, \sigma) = \beta(k) \in (\frac{1}{2}, \theta)$, which adjusts with k and induces indifference between the candidates despite the voter’s strict preference for policy x after observing disagreement. This mixture converges to zero as ϵ converges to zero and - as in the case where the voter is rendered indifferent after disagreement - the strategies and beliefs are continuous at $\epsilon = 0$, since the beliefs can be assigned to the off-path event in which candidates disagree. We summarise these findings:

Proposition 3.

If $k < \frac{\log \frac{1}{2}}{\log \theta}$, there exists a continuous equilibrium in which $\sigma = (1, \hat{\sigma}(\epsilon, \theta), 1, \hat{\sigma}(\epsilon, \theta))$, where:

$$\hat{\sigma}(\epsilon, \theta) = \frac{(1 - \epsilon)\epsilon(\theta - \beta)}{(1 - \theta)\beta - \epsilon^2(\theta - \beta) - 2(1 - \theta)\beta\epsilon} \quad (11)$$

and

$$\beta = \begin{cases} \frac{1}{2} & \text{if } k \leq 1 \\ \beta(k) \in (\frac{1}{2}, \theta) & \text{if } k > 1 \end{cases} \quad (12)$$

and where $\beta(k)$ solves:

$$P(\beta(k)) = \frac{1}{2}P(\Pr(\omega = Y|y_a y_b, \sigma)) - \frac{1}{2} \frac{\Pr(x_j | s_i^Y)}{\Pr(y_j | s_i^Y)} P(\Pr(\omega = X|x_a x_b, \sigma)) \quad (13)$$

The nomination strategy of the leadership is $\tau(x_a x_b) = \tau(y_a y_b) = \frac{1}{2}$, and $\tau(x_a y_b) = 1 - \tau(y_a x_b) = \hat{\tau}$, where:

$$\hat{\tau} = \begin{cases} \hat{\tau} & \text{if } k \leq 1 \\ 1 & \text{if } k > 1 \end{cases} \quad (14)$$

where $\hat{\tau}$ solves:

$$\hat{\tau} = \Pr(x_j | s_i^Y) + 2^{k-1} (\Pr(y_j | s_i^Y) P(\Pr(\omega = Y | y_a y_b, \sigma)) - \Pr(x_j | s_i^Y) P(\Pr(\omega = Y | x_a x_b, \sigma))) \quad (15)$$

Proof. Consider, first $k \leq 1$. The indifference condition for candidates is given by (15). Call the RHS $G(\epsilon, \theta, k)$. We have $G_1(0, \theta, k) = 2^{k-1}$, so we need $1 \geq 2^{k-1}$ or $k \leq 1$ is necessary, and $\frac{\partial G_1(\epsilon, \theta, k)}{\partial \epsilon} \Big|_{\epsilon=0} = \frac{(2^k - 1)(2\theta - 1)}{\theta - 1} < 0$, so there exists $\epsilon(k) > 0$ such that $\epsilon < \epsilon(k)$ implies $1 > G_1(\epsilon, \theta, k)$. Thus, $k \leq 1$ is sufficient for the existence of a mixture $\hat{\tau}$ which induces the equality (15), and which is continuous in $\epsilon \geq 0$. Moreover, since we may assign $\Pr(\omega = Y | m \in \{x_a y_b, y_a x_b\})$ off the equilibrium path at $\epsilon = 0$, beliefs and strategies are continuous at $\epsilon = 0$. Now consider $k \in \left(1, \frac{\log \frac{1}{2}}{\log \theta}\right]$. The relevant indifference condition is (13). Call the RHS $G_2(\epsilon, \theta, k)$. The root of $P(\beta) - G_2(0, \theta, k)$ is $\beta = 2^{-k-1}$, and this difference is continuous at each $\epsilon > 0$ and continuous on the right at $\epsilon = 0$. We have $\frac{1}{2} < 2^{-k-1} < \theta$ so long as $1 < k < \frac{\log \frac{1}{2}}{\log \theta}$; moreover: $\frac{\partial G_2(\epsilon, \theta, k)}{\partial \epsilon} \Big|_{\epsilon=0} = \frac{\beta - \theta}{2\beta(1 - \theta)} < 0$, so the equilibrium is continuous at $\epsilon \geq 0$. Since $\beta(k) > \frac{1}{2}$, the strategy of the leadership is trivially incentive compatible. \square

To summarise: under open parties, an equilibrium always exists in which at least some information is transmitted from candidates to voters. If the electoral environment rewards

consensus, sufficiently, then candidates have a strict incentive to reveal their private information. Note that this is solely a consequence of the benefits of consensus, since there is no exogenous revelation of the state. Even when such an equilibrium cannot be supported, it is possible to construct equilibria in which candidates are ‘partially’ truthful. The critical trade-off is that specious platform differentiation at the intra-party contest *helps*, but the openness of disagreement *hurts* at the inter-party contest. We next turn to the analysis of closed party in order to see how these conclusions are modified when voters do not observe the intra-party stage of the contest.

Equilibrium under Closed Nomination Processes

We now consider the case of *Closed Nomination Procedures*. Our premise is that the voter observes only the announcement of the candidate who is selected by the party to run as its nominee in the general election.

This induces a non-trivial inferential problem on the part of voter, upon observing a nominee and her platform. In her effort to learn the quality of the candidate’s platform, she cannot observe the other candidate’s proposal, which under some strategy profiles would be valuable information. However, she can use the leadership’s nomination decision and the observed candidate’s platform to form an inference about the unobserved platform. Unfortunately, the leadership recognises that this inference is being made, and has strong incentives to manipulate it. We show that in equilibrium, this capacity to manipulate is undone, but at a significant cost to the voter’s own ability to learn about platform quality.

To see how problems arise, consider a strategy profile in which: each candidate an-

nounces the policy which coincides with her private signal, and the leadership nominates the candidate who it believes is most likely to have chosen the correct policy. This implies:

$$\Pr(\omega = Y | m \in \{y_a, y_b\}, \sigma, \tau) > \max_{m \in \{x_a, x_b\}} \Pr(\omega = X | m, \sigma, \tau) \quad (16)$$

That is, when the voter observes a single candidate announce the policy y , she infers that *both* candidates believe that the state is Y . When she observes x , however, the inference is necessarily weaker because the voter can infer only that at least one candidate believes that the state is X . This implies, however, that the leadership would strictly prefer to nominate a candidate who announced y , even if there were internal disagreement, in order to give the veneer of a ‘radical consensus’. But then, a candidate would prefer to announce y after signal s_i^X in order to guarantee herself nomination and the highest possible chance of election. In essence, the *herding* problem induced by open party contests is replaced with an *anti-herding* problem under closed party contests.

We construct an equilibrium under closed parties having the properties (i) each candidate is indifferent between proposals after each signal (ii) the leadership is indifferent over each candidate at every pair of announcements and (iii) the voter is indifferent over any candidate-policy. We then show that properties (i)-(iii) are necessary features of a continuous equilibrium under closed parties. Moreover, the equilibrium that we construct gives closed parties the best possible chance, in the sense that it maximises the probability of the event in which a candidate is nominated who offers the policy which matches the state.

To support the equilibrium, we specify that each candidate announces x_i with probability 1 after signal s_i^X , and announces x_i with probability $\check{\sigma}(\theta, \epsilon)$ after signal s_i^Y . This ensures

that (iii) holds, which is sufficient for (ii). In turn, uniform randomisation of candidates after every message pair to the leadership yields (i). The mixture used by the candidates after signal s_i^Y is:

$$\check{\sigma}(\theta, \epsilon) = \frac{\epsilon(1 - \epsilon)(2\theta - 1)}{(1 - \theta)^2 - (2\theta - 1)\epsilon^2 - 2(1 - \theta)^2\epsilon} \quad (17)$$

which implies that the voter's belief after any announcement that the nominee's policy is high quality is:

$$\Pr(\omega = X | m \in \{x_a, x_b\}, \sigma, \tau) = \Pr(\omega = Y | m \in \{y_a, y_b\}, \sigma, \tau) = \frac{(1 - \epsilon)(1 - \theta)}{1 + \epsilon(2\theta - 1) - \theta} \quad (18)$$

We first establish equilibrium strategies, then order the distortion in candidates' strategies relative to the case of open parties. Finally, we show that there is no other continuous equilibrium which improves on this, in the sense of maximising the probability with which a candidate offering the correct policy is nominated, for arbitrarily high signal strengths (ϵ sufficiently close to 0).

Proposition 4. Under closed parties, there is a continuous equilibrium in which $\sigma = (1, \check{\sigma}(\theta, \epsilon), 1, \check{\sigma}(\theta, \epsilon))$, and $\tau(x_ax_b) = \tau(x_ay_b) = \tau(y_ax_b) = \tau(y_ay_b) = \frac{1}{2}$. Moreover:

$$0 < \hat{\sigma}(\theta, \epsilon) < \check{\sigma}(\theta, \epsilon) < 1 \quad (19)$$

That is, the distortion in candidate strategies is higher under closed than the equilibria under open parties in the previous Propositions. Finally, there is no other continuous equilibrium in which the event that a candidate is nominated and offers the correct policy occurs with strictly higher probability.

The distortion in candidates' strategies after receiving signal s_i^Y is always greater under closed parties, than open parties. This is immediate in the case of truthful strategies under the latter, so we turn to the case in which candidates instead play partially revealing strategies under open parties (i.e. $k < \frac{\log \frac{1}{2}}{\log \theta}$). In that case, the candidates' mixtures induce in the voter a weak preference for the policy x , *conditional on observing disagreement* between the candidates. Because an announcement of policy y_i indicates that the candidate received the signal s_i^Y for sure, the announcement of y_i is good news in favour of state Y . On the other hand, the other candidate's announcement of x_j is good news in favour of state X , but it is partially muted by the contrary announcement. This is because the mixed strategy of the candidates leads the voter to put some probability on a candidate who announced x receiving the signal indicating that the state is Y . In order to compensate the voter's inference to induce a weak preference for x , the mass placed on announcing x_i after signal s_i^Y - $\hat{\sigma}$ - must therefore be 'small'.

Consider, instead, the case of closed parties. In that event, the mixture - $\check{\sigma}$ is chosen to make the voter hold a weak preference for x *conditional on observing a single announcement*. If the voter weakly prefers x at $\sigma \leq \hat{\sigma}$ in spite of observed disagreement, she must strictly prefer x at $\sigma \leq \hat{\sigma}$ in the absence of observed disagreement. Thus, we must have $\check{\sigma} > \hat{\sigma}$, i.e. more distortion under closed parties.

Notice that, in equilibrium, parties convey no information to voters about the degree of consensus within, through their choice of nominee. If the voter's belief were sensitive to the party's choice of candidate, the party would attempt to manipulate it. In equilibrium, the possibility of manipulation is ruled out, but at significant cost to the ability of candidates

to truthfully reveal their private information.

2. Comparing *Open* and *Closed* Parties

We have characterised equilibria under each form of intra-party competition: now we wish to compare their desirability from the leadership's perspective. The preferred regime will be the one which maximises the expected probability of winning.

Recall that in the benchmark case - under the supposition of truthful strategies by candidates and the leadership - the latter prefers closed parties whenever $k \leq 1$, i.e. whenever the probability of winning is convex in the voter's posterior assessment of the nominee's policy. However, truth-telling cannot be supported as an equilibrium under closed parties, nor under open parties whenever k is too small. Under open parties, the party's probability of winning varies across equilibria, whose existence is demarcated by the value of k ; under closed parties, by contrast, in the best semi-separating equilibrium the probability of winning does not depend on the voter's observation.

The next proposition clarifies the leadership's preferred system, as a function of the ex-ante bias - θ - and the sensitivity of the probability of winning to the voter's belief - k .

Proposition 5. There exists $\hat{\theta} < 1$ and $k^*(\theta) \leq 1$ such that, for ϵ sufficiently close to zero:

1. if and only if $k \geq k^*(\theta)$, the leadership prefers *open* versus *closed* parties
2. if and only if $\theta \geq \hat{\theta}$, $k^*(\theta) = 0$.

Moreover, $k^*(\theta)$ is strictly decreasing in θ .

Proof. Suppose $\theta > \frac{\log \frac{1}{2}}{\log \theta}$. Let $H_1(\theta, \epsilon, k, \sigma^Y)$ denote the leadership's payoff under open parties in an equilibrium in which the strategy profile $\sigma = (1, \sigma^Y, 1, \sigma^Y)$ and $H_2(\theta, \epsilon, k)$ denote the corresponding payoff under closed parties. Start with $k > \frac{\log \frac{1}{2}}{\log \theta}$. We have

$$\left. \frac{dH_1(\theta, \epsilon, k, 0)}{d\epsilon} \right|_{\epsilon=0, k > \frac{\log \frac{1}{2}}{\log \theta}} = 2(\theta^k - 1) \quad (20)$$

and

$$\left. \frac{dH_2(\theta, \epsilon, k)}{d\epsilon} \right|_{\epsilon=0} = -k \frac{\theta}{1 - \theta} \quad (21)$$

Thus, in both cases, the payoff is strictly decreasing in ϵ . We wish to compare the relative magnitudes of this decrease in a neighbourhood of 0. Direct comparison yields

$$\left| \left. \frac{dH_1(\theta, \epsilon, k, 0)}{d\epsilon} \right|_{\epsilon=0, k > \frac{\log \frac{1}{2}}{\log \theta}} \right| < \left| \left. \frac{dH_2(\theta, \epsilon, k)}{d\epsilon} \right|_{\epsilon=0} \right| \quad (22)$$

from which the claim follows. Suppose, instead, $k \in [0, 1)$. Then, $\left. \frac{dH_1(\theta, \epsilon, k, \hat{\sigma})}{d\epsilon} \right|_{\epsilon=0} = 4(2^{-k} - 1)\theta$. Proceeding through the same steps as the previous case, we find $k^*(\theta) \leq 1$ such that $\left| \left. \frac{dH_2(\theta, \epsilon, k)}{d\epsilon} \right|_{\epsilon=0, k \in [k^*(\theta), 1]} \right| \geq \left| \left. \frac{dH_1(\theta, \epsilon, k, \hat{\sigma})}{d\epsilon} \right|_{\epsilon=0, k \in [k^*(\theta), 1]} \right|$, and moreover $\left| \left. \frac{dH_2(\theta, \epsilon, k)}{d\epsilon} \right|_{\epsilon=0, k \in [0, k^*(\theta)]} \right| < \left| \left. \frac{dH_1(\theta, \epsilon, k, \hat{\sigma})}{d\epsilon} \right|_{\epsilon=0, k \in [0, k^*(\theta)]} \right|$. Moreover, there exists $\hat{\theta} \approx 0.639$ such that $\theta \geq \hat{\theta}$ implies $k^*(\theta) \leq 0$, otherwise $k^*(\theta) \in (0, 1]$. The argument for $k \in \left[1, \frac{\log \frac{1}{2}}{\log \theta}\right]$ is similar. \square

As the error in the candidates' signals converges to 0, the voter's posterior after observing agreement under open parties, or any announcement under closed parties, converges to unity. On the other hand, her belief after observing disagreement under open parties is bounded away from 1, although the probability of this event is also converging to zero. As the voter's posterior becomes increasingly insensitive to high quality beliefs ($k \rightarrow 0$), the benefit of switching from closed to open parties falls, and if there is a sufficient degree of ex-ante

uncertainty (θ low), the risk of open disagreement is sufficiently unpalatable that the party prefers to remain closed.

Thus, the two impediments to the willingness of the leadership to switch to open parties are:

- (i) a high degree of ex-ante uncertainty about the appropriate policy action, and
- (ii) an electoral environment which is relatively insensitive to beliefs about policy quality.

The latter might be a consequence of an electoral environment which is dominated by clientelistic transfers or vote-buying.

Note, however, that the voter's *expected posterior belief* about the quality of the nominee's policy is *always* higher under open than closed parties. Of course, *ex-post*, the realisation of a divisive primary would lead her posterior belief about platform quality to be worse under open parties than closed. Thus, our results are consistent the idea that the reforming leaders believe that primaries will stimulate voter enthusiasm for the winning candidate, but ex-post may find that a divisive primary actually hurts the nominee's chances.

3. Investing in Policy Expertise

We have, so far, assumed that candidates exogenously receive their private information, without having to undertake any effort to do so. In practice, information does not come for free. Experts and consultants must be compensated, and even in the absence of a pecuniary cost, there is an opportunity cost of taking time to learn about challenging policy issues.

To capture this idea, we suppose that candidates must pay a positive cost $c > 0$ in order to acquire their signal. If the signal is not acquired, the candidate receives no private signal. The decision to acquire the signal is each candidates' private information.

Candidates will only be prepared to invest in policy expertise if they believe that such investments will be rewarded at the polls. Thus, the form of intra-party contest may be crucial to fomenting proper electoral incentives for candidates. Indeed, we show that this is the case.

Proposition 6. An equilibrium in which each candidate invests in policy expertise exists only under *open nomination processes*, and in that case if and only if $k > \frac{\log \frac{1}{2}}{\log \theta}$.

Why is that investment can only be obtained under these restrictive conditions? In order for candidates to be willing to undertake costly *information acquisition*, they must benefit sufficiently from this investment in the *information aggregation* stage. In particular, this rules out information acquisition in an equilibrium of the continuation game in which any candidate is indifferent between announcements after at least one signal. For in that case, the candidate weakly prefers to make the same announcement after both signals, and thus cannot strictly improve on a non-responsive strategy. But in that case, why should she acquire information?

When a truthful equilibrium exists, by contrast, it is valuable for a candidate to purchase a signal precisely because it assists her in implicitly coordinate with the remaining candidate to obtain the highest possible continuation payoff. There is no exogenous revelation of the state: all information obtained by the voter, and thus all incentives to acquire information,

stem from the mutual incremental benefit of consensus versus dissensus within the party.

4. Conclusion

Elections represent the most promising incentives for political candidates to communicate their policy expertise to voters, to contribute to an informed public debate, and to invest in their knowledge of relevant policy problems. We have proposed a theory of intra-party competition which focuses on the role played by different degrees of transparency in the process by which candidates are selected. Allowing voters to ‘look inside’ the nomination process party increases the risk that they will observe disagreement between the candidates, which in turn hurts the image of the nominee. On the other hand, if the candidates are able to converge to the same view, and do so in the public view, this confers an advantage on the nominee. Under closed parties, by contrast, none of these possibilities arise. Instead, voters observe a single nominee with a single policy prescription, and must form an inference about the degree of dissent or unity that fomented the party’s choice of candidate. In equilibrium, the attempt of the leadership to manipulate this image, and to project the most favourable image possible is undone, but at significant cost to it’s image.

Our theory uncovers an avenue by which parties benefit from reverting to a transparent selection process. This avenue is distinct from traditional explanations focusing on the democratic legitimacy attained by a candidate who is selected by a wider cross-section of the party. Instead, leaders benefit from transparency through the more potent incentives it provides candidates to communicate their policy expertise to voters. Transparency, therefore, is a mechanism by which leaders create ‘valence’ for their candidate. This is in spite

of the damage done to the party's chances by open disagreement, or a 'divisive primary'.

We also point to features of the political environment which may hinder a move to transparency. A high degree of uncertainty about the appropriate course of action, or an election environment in which the policy debate lacks salience will diminish the attractiveness of transparency to the leadership. The latter, in particular, may arise from a lack of voter information, or electoral politics which focus on other instruments such as clientelism, or vote-buying. Subsidising fora for public deliberation, such as town-hall meetings (Fujiwara and Wantchekon (2012)), or media coverage of campaigns, can be interpreted as ways to increase the salience of the policy debate in a campaign. Of course, issue salience is endogenous: if voters do not believe that candidates will make a serious effort, there is little reason to pay attention in the first place. When voter attention is scarce and costly, there may be a complementarity between voters' propensity to pay attention to parties, and the transparency of the debate that takes place within the latter. These, and other important questions, are left to future research.

5. Appendix

Proof of Proposition 4

Existence and the comparison of $\hat{\sigma}$ and $\check{\sigma}$ are straightforward, so we focus on the final claim.

Fix an equilibrium strategy pair (σ, τ) , let $P(x_i) \equiv P(\Pr(\omega = X|x_i, \sigma, \tau))$ for $i \in \{a, b\}$, and likewise for $P(y_i)$. I first claim that in an equilibrium, there exists no $q_i \in \{x_a, x_b, y_a, y_b\}$ satisfying $P(q_i) < \min_{q'_j \neq q_i} P(q'_j)$. Suppose this claim is false. In that case, the candidate i must be nominated with probability 0 after announcement q_i . If candidate $j \neq i$ announces the same policy with probability 0, for $\epsilon > 0$, i may deviate to the strategy of candidate j and win with positive probability, since $\tau(x_a x_b) = \tau(y_a y_b) = \frac{1}{2}$ and the continuation payoff is strictly positive. If, instead, j announces the same policy with positive probability, $\tau(x_a x_b) = \tau(y_a y_b) = \frac{1}{2}$ again yields a contradiction.

This implies $|\{\arg \min_{q \in \{x_a, x_b, y_a, y_b\}} P(q)\}| \in \{2, 4\}$. The latter is a property of the equilibrium established in the Proposition, so I focus on ruling out the former in any equilibrium. Suppose, then, $|\{\arg \min_{q \in \{x_a, x_b, y_a, y_b\}} P(q)\}| = 2$. If $\{x_a, y_a\} = \{\arg \min_{q \in \{x_a, x_b, y_a, y_b\}} P(q)\}$, $P(x_b) > P(x_a)$, so $\tau(x_a, x_b) = 1$, a contradiction. The same argument applies if $\{x_b, y_b\} = \{\arg \min_{q_i \in \{x_a, x_b, y_a, y_b\}} P(q)\}$. Suppose $\{x_a, y_b\} = \{\arg \min_{q_i \in \{x_a, x_b, y_a, y_b\}} P(q)\}$. Then, $\tau(y_a y_b) = 1$, a contradiction. Suppose, finally, $\{y_a, x_b\} = \{\arg \min_{q_i \in \{x_a, x_b, y_a, y_b\}} P(q)\}$. Then, $P(y_b) > P(y_a)$, and so $\tau(y_a y_b) = 0$, a contradiction. Thus, a requirement of equilibrium is $P(x_a) = P(x_b) = P(y_a) = P(y_b)$.

In the equilibrium identified in the Proposition, at $\epsilon = 0$, the event in which a candidate

is nominated and her policy matches the state occurs with probability 1. Thus, we need only consider other possible continuous equilibria which also satisfy this property at $\epsilon = 0$. This implies $\sigma_i^X = 1$ and $\sigma_i^Y = 1$ is weakly optimal for each $i \in \{a, b\}$. The condition $P(x_a) = P(x_b) = P(y_a) = P(y_b)$ and $\tau(x_ax_b) = \tau(y_ay_b) = \frac{1}{2}$, therefore implies $\tau(x_ay_b) = \tau(x_by_a) = \frac{1}{2}$. It is then straightforward to show that $\sigma_a^X(\epsilon, \theta) = \sigma_b^X(\epsilon, \theta) \equiv \sigma^X(\epsilon, \theta)$ and $\sigma_a^Y(\epsilon, \theta) = \sigma_b^Y(\epsilon, \theta) \equiv \sigma^Y(\epsilon, \theta)$ for any $\epsilon \geq 0$. Solving $P(x_a) = P(y_a)$ to obtain $\hat{\sigma}^X(\sigma^Y, \epsilon, \theta)$ yields

$$\hat{\sigma}^X(\sigma^Y, 0, \theta) = \frac{\theta^2 + \sqrt{\theta^4 + 4\sigma^Y(1 - \sigma^Y)\theta^2(1 - \theta)^2}}{2\theta^2} \quad (23)$$

which implies that in a continuous equilibrium in which $\sigma^X(\sigma^Y(\epsilon, \theta), 0, \theta) = 1$, we have $\sigma^Y(0, \theta) \in \{0, 1\}$. If $\sigma^Y(0, \theta) = 1$, then $\Pr(x_a) = \Pr(x_b) = \theta$ at $\epsilon = 0$, which is strictly lower than in the equilibrium we characterised in the proposition. So, we need only show there is no continuous equilibrium satisfying $\sigma^Y(0, \theta) = 0$ and $\sigma^X(0, \theta) = 1$ having the property that there exists $\bar{\epsilon} > 0$ such that for $\epsilon < \bar{\epsilon}$, the probability that a candidate is nominated with the correct policy is higher than in the equilibrium stated in the Proposition.

To establish this claim, we pick $\sigma^X(\epsilon, \theta)$ to satisfy a target posterior $\Pr(\omega = X | m \in \{x_a, x_b\}, \sigma, \tau) = \lambda \in [0, 1]$ and obtain:

$$\begin{aligned} \sigma^X(\epsilon, \theta) &= \frac{\sigma^Y(\lambda(1 - \theta) + \lambda + \epsilon(\theta(2\lambda - 1) - \lambda))}{\theta(1 - \lambda + (2\lambda - 1)\epsilon) - \lambda\epsilon} \\ &\equiv \sigma^X(\lambda, \theta, \epsilon) \end{aligned} \quad (24)$$

We then solve $\sigma^X(\lambda, \theta, \epsilon) = \hat{\sigma}^X(\sigma^Y, \epsilon, \theta)$ to obtain:

$$(\sigma^Y)^*(\lambda, \epsilon, \theta) = \frac{(\theta + \lambda - 1)(-\theta\lambda + \theta + 2\theta\lambda\epsilon + \theta(-\epsilon) - \lambda\epsilon)}{(\theta - 1)\theta(2\lambda - 1)(2\epsilon - 1)} \quad (25)$$

$$(\sigma^X)^*(\lambda, \epsilon, \theta) = \frac{(\theta + \lambda - 1)(-\theta\lambda + \lambda + \epsilon(\theta(2\lambda - 1) - \lambda))}{(\theta - 1)\theta(2\lambda - 1)(2\epsilon - 1)} \quad (26)$$

For ϵ sufficiently small, $(\sigma^Y)^*(\lambda, \epsilon, \theta)$ is strictly decreasing in λ and $(\sigma^X)^*(\lambda, \epsilon, \theta)$ is strictly convex in λ . Our problem therefore reduces to maximizing λ subject to $(\sigma^Y)^*(\lambda, \epsilon, \theta) \in [0, 1]$ and $(\sigma^X)^*(\lambda, \epsilon, \theta) \in [0, 1]$. Convexity of $(\sigma^X)^*(\lambda, \epsilon, \theta) \in [0, 1]$ implies that the solution maximises $(\sigma^X)^*(\lambda, \epsilon, \theta)$ subject to $(\sigma^X)^*(\lambda, \epsilon, \theta) \leq 1$ and $(\sigma^Y)^*(\lambda, \epsilon, \theta) \geq 0$. It is straightforward to check:

$$(\sigma^X)^*(\lambda, \epsilon, \theta) = 1 \Rightarrow \lambda = \frac{(1 - \epsilon)(1 - \theta)}{1 - \epsilon - \theta(1 - 2\epsilon)} \quad (27)$$

which yields

$$(\sigma^Y)^* \left(\frac{(1 - \epsilon)(1 - \theta)}{1 - \epsilon - \theta(1 - 2\epsilon)}, \epsilon, \theta \right) = \frac{\epsilon(1 - \epsilon)(2\theta - 1)}{(1 - \theta)^2 - (2\theta - 1)\epsilon^2 - 2(1 - \theta)^2\epsilon} \quad (28)$$

which is exactly the strategy that we characterise in the Proposition.

Proof of Proposition 6

First, we show that if the equilibrium of the continuation game in which players make announcements is $\sigma = (1, 0, 1, 0)$, there exists $\bar{c} > 0$ such that $c \geq 0$ implies that an equilibrium exists in which player acquires a signal.

Suppose that a single player deviates to not acquiring a signal. In the continuation game, she prefers to announce x_i with probability 1 if:

$$\Pr(s_j^X) \frac{1}{2} P(\Pr(\omega = X | x_i x_j)) + \Pr(s_j^Y) P(\theta) \geq \Pr(s_j^Y) \frac{1}{2} P(\Pr(\omega = Y | y_i y_j)) \quad (29)$$

which, for ϵ sufficiently close to 0, is true. It follows that the payoff difference to acquiring information is positive if:

$$\Pr(s_i^Y, s_j^Y) \frac{1}{2} P(\Pr(\omega = Y|y_i y_j)) + \Pr(s_i^X, s_j^X) \frac{1}{2} P(\Pr(\omega = Y|x_i x_j)) \quad (30)$$

$$\geq \Pr(s_j^X) \frac{1}{2} P(\Pr(\omega = X|x_i x_j)) + (\Pr(s_j^Y) - \Pr(s_j^X, s_j^Y)) P(\theta) \quad (31)$$

and the incentive constraint which governs truth-telling is:

$$\frac{1}{2} [\Pr(s_j^Y | s_i^Y) P(\Pr(\omega = Y|y_i y_j)) - \Pr(s_j^X | s_i^Y) P(\Pr(\omega = X|x_i x_j))] - \Pr(s_j^Y | s_i^Y) P(\theta) \geq 0 \quad (32)$$

which is satisfied by the supposition that the truth-telling equilibrium exists. Simple algebra established that these two constraints are equivalent. Thus, there exists $\bar{c} \geq 0$ such that $c \leq \bar{c}$ implies that an equilibrium exists in which each candidate acquires the signal and plays a truthful strategy in the continuation game.

Next, we claim that if, the continuation game in which players make announcements, a player is indifferent between announcements after at least one signal, there is no equilibrium in which she incurs a positive cost to acquire information. Suppose that, in the continuation game, candidate i is indifferent between messages after receiving signal $s \in \{s_i^X, s_i^Y\}$, and weakly prefers action $\hat{p} \in \{x_i, y_i\}$ after signal $\hat{s} \in \{s_i^X, s_i^Y\}$, $\hat{s} \neq s$. Then, her equilibrium payoff in the continuation game is equal to her payoff from playing a strategy in which she announces \hat{p} with probability 1 after either signal. Then, under any strategy in which she pays $c > 0$ to acquire a signal, she strictly prefers not to acquire information and announce \hat{p} with probability 1 in the continuation game, since she receives the same expected utility in the continuation game but does not incur $c > 0$.

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