Electoral Donations and Interest Group Influence

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Abstract

We analyze an environment with incomplete information in which an interest group *ideologically matches*: the interest group's resources are employed solely to aid the electoral prospects of politicians that are believed to share the group's policy preference. We identify conditions under which ideological matching can induce an incumbent to select policies that differ from those selected in the group's absence. Key to this result is the uncertainty of the interest group as to the incumbent's policy preference. In equilibrium, there is an inverse relationship between the magnitude of the interest group's donation to the incumbent and the probability the incumbent selects the group's preferred policy.

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> Too often, Members' first thought is not what is right or what they believe, but how it will affect fundraising. Who, after all, can seriously contend that a 100,000 dollar donation does not alter the way one thinks about – and quite possibly votes on – an issue? – Senator Alan K. Simpson (R. Wyoming)[1]

1 Introduction

Previous scholarship analyzing the effect of interest group resources on incumbent decision making (Besley and Coate 2000; Dal Bó, Dal Bó, and Di Tella 2003; Dal Bó and Di Tella 2002b; Felli and Merlo 2003; Grossman and Helpman 1994) has analyzed models where an interest group presents an incumbent with a *policy-contingent contract*. Such contracts map policy outcomes into an interest group action that affects the incumbent's welfare. As these contracts alter an incumbent's payoff from a given policy course, the incumbent can be induced to select policies that differ from those selected in the group's absence. In this line of scholarship, interest group resources are employed solely to affect incumbent decision making.

Many of the results in the cited literature rest on the assumption that policy-contingent contracts are enforceable: it is posited that the interest group fulfills its contractual obligations. However, since such contracts cannot be enforced by invoking the legal system, this assumption is problematic.[2] The present paper departs from prior work by analyzing interest group influence of incumbent behavior in an environment where no mechanisms exist to enforce policy-contingent contracts. In the modelled environment, the interest group's resources are employed solely to aid the electoral prospects of the politician most likely to share its policy preference: the interest group *ideologically matches*.[3]

In contrast to claims prevalent in the literature on interest group influence,[4] we find that ideological matching can affect incumbent behavior.[5] For this result to hold, the interest group

[1] "Declaration of Alan K. Simpson", in *McConnell v. Federal Electoral Commission: Expert Witness Reports and Fact Witness Declarations.*

[2] For example, Grossman and Helpman (1994) analyze an environment where the interest group's policy-contingent contract maps incumbent policies into incumbent donations; however, once the incumbent determines policy, the interest group has no incentive to make the payment called for by its contract.

[3] There exists a related literature that analyzes two-period models where politicians announce platforms in the first period and interest groups offer donations in the second period (Austen-Smith 1987; Baron 1994; Bennedson 1998). In an equilibrium to these models, an interest group donates only to the candidate whose platform is closest to the group's preferred policy. This work indicates that in determining her platform, a candidate will consider the platform's affect on the size of her campaign war chest. As this approach assumes that candidates faithfully implement their announced platforms, this line of scholarship, while providing many insights, effectively "black boxes" incumbent policy making – the issue of concern here.

[4] Claims that ideological matching cannot affect incumbent behavior are explicit in Bronars and Lott (1997) and Wright (1984); Wright (1984,45) asserts that a "necessary condition for PAC contributions to influence roll call votes" is that "PACs allocate money with the intent of influencing roll calls."

[5] Political actors have long noted the possibility of such effects. For example, Jeff Flake, a Club for Growth

must be uncertain of the incumbent's policy preference.[6] Moreover, in the environment studied, one should not expect a positive relationship between the size of the interest group's donation to the incumbent and the incumbent's probability of selecting the group's preferred policy. In fact, we demonstrate the possibility of a non-positive correlation between the two. Consequently, the numerous empirical studies finding little correlation between donations and roll-call votes need not indicate,[7] as typically interpreted, that interest group resources have a minimal effect on incumbent decision making.[8]

We now turn to outlining this paper's model and main propositions. A two-period model of lawmaking and elections is considered. During the first period, an existing incumbent determines policy. An election between the incumbent and her challenger is then held, where the election outcome is influenced by campaign spending. The election winner determines policy in the second period. The sole source of campaign funds is an interest group. The interest group offers its donations after the first-period policy is selected. Politicians care about both policy and holding office. We allow for the possibility that the interest group may have incomplete information regarding the incumbent's policy preference.

Since the game ends after the second period, the second-period policy is the preferred policy of the election winner.[9] As such, given the model's timing, the interest group's resources are employed solely to enhance the electoral prospects of the politician more likely to share the group's policy preference; hence, in an equilibrium, the interest group ideologically matches.

In characterizing the model's equilibria, we analyze the effect of ideological matching on incumbent behavior. We obtain four main results. First, when the incumbent's policy preference is common knowledge, there always exist equilibria in which ideological matching has no effect on incumbent behavior.[10] Second, when the incumbent's policy preference is not known by the interest group, there are environments such that ideological matching affects incumbent behavior

backed incumbent, attributes House Republican party discipline on Bush's 2001 tax cut to the Club's commitment to replacing moderate Republicans with supply-siders: "When you have 100 percent of Republicans voting for the Bush tax cut, you know that they're looking over their shoulder and not wanting to have (the Club for Growth) recruiting candidates in their district." The Club commonly delivers six-figures in bundled donations to candidates that share its ideological commitments.

[6]Hixon (2002) offers empirical evidence suggesting that uncertainty regarding incumbent policy preferences affects interest group lobbying activities.

[7]In a survey of nearly 40 papers that regress interest group donations on incumbent voting behavior, Ansolabehere *et al.* (2003, 114) report that in 3 out of 4 instances interest group donations "had no statically significant effects or had the wrong sign."

[8]For example, after regressing donations on votes and finding no relationship between the two, Wawro (2001, 563) concludes that "contributions do not have consistent effects that would indicate PACs are significantly biasing congressional decision making in their favor."

[9]This aspect of equilibrium behavior captures the idea that, all else equal, policies preferred by the interest group are more likely to result when the office holder shares its policy preference than when the office holder does not. Clearly, future work should extend the present approach to an infinite-horizon framework.

[10]As will be seen, equilibria may exist where this is not the case. However, such equilibria can be ruled out when we assume that there are diminishing marginal returns to campaign spending.

in all equilibria.[11] Third, in the presence of such uncertainty, an inverse relationship exists between the magnitude of the interest group's donation to the incumbent and the incumbent's probability of selecting the group's preferred policy. Fourth, incumbent behavior can be affected even in the absence of an interest group donation.

The intuition for the first two results is the following. As the modelled policy is taken to be of low salience to the electorate, in the absence of the interest group, the incumbent's probability of re-election is constant in her period-one policy choice; consequently, in the interest group's absence, the incumbent selects her preferred policy in the first period. Thus, to affect incumbent behavior, the interest group's presence must induce the incumbent to select her less preferred policy. To do so, its presence must result in the incumbent facing a tradeoff between maximizing her probability of re-election and implementing her preferred policy. In the context of the model analyzed, this means that the donations of the interest group must depend on the incumbent's first-period policy.

Since donations are employed to affect the election outcome, the interest group's return on a donation is a function of the group's perceived policy agreement with the incumbent relative to the challenger. Thus, if the incumbent's policy choice does not affect such perceptions, then the optimal donation behavior of the interest group is independent of the incumbent's policy choice. However, if the incumbent's policy choice does affect such perceptions (and the election outcome is sufficiently sensitive to campaign spending), then the incumbent's policy choice will affect the interest group's donations.

Begin by considering the case where the interest group knows the incumbent's policy preference. The interest group's perception of its policy agreement with the incumbent is then constant in the incumbent's policy choice. As such, one can always support an equilibrium where the interest group's donations are independent of the incumbent's first-period policy; in such an equilibrium, the incumbent behaves as she would in the absence of the interest group.

Now consider the case where the interest group does not know the incumbent's policy preference. The incumbent's first-period policy is then a noisy signal of her policy agreement with the interest group: the interest group's belief about the incumbent's policy preference will depend on the policy the incumbent selects. Consequently, interest group donations are conditioned on the period-one policy. Hence, some incumbents will face a tradeoff between implementing their preferred policy and maximizing their probability of re-election. Among such incumbents, those that place sufficient weight on re-election resolve this tradeoff by selecting their less preferred policy.

We now discuss the logic driving the non-positive relationship between interest group donations and interest group influence. When the interest group's presence has no effect on incumbent

[11] This result builds on insights drawn from models of repeated elections where the policy preference of each politician is hidden information (Banks and Duggan 2002; Cho 2001; Duggan 2000).

behavior, only those incumbents that share its policy preference select the group's preferred policy in period one. However, when the interest group is influential, this is no longer the case: incumbents that do not share the group's ideological commitments pool with those that do by selecting the group's preferred policy. Thus, the greater the interest group's influence, the smaller the weight it attaches to the incumbent sharing its ideological predispositions upon observing its preferred policy selected (in the first period). Hence, the magnitude of the interest group's donation to the incumbent when its preferred policy is selected is non-increasing in the group's influence over the incumbent's behavior.

That the interest group can influence the incumbent's policy choice in the absence of a donation to the incumbent's war chest results from the fact that the incumbent increases her probability of re-election by minimizing the size of her challenger's war chest. As such, so long as the incumbent forecasts that her first-period policy will affect the magnitude of the interest group's donation to her challenger, the incumbent's behavior can be influenced by the interest group's presence.

The paper proceeds as follows. Section two develops the theoretical framework within which the effect of ideological matching on incumbent behavior is analyzed. Section three analyzes incumbent behavior in the absence of an interest group. Section four analyzes the effect of ideological matching when the incumbent's policy preference is known by the interest group. Section five analyzes the effect of ideological matching when the interest group has incomplete information regarding the incumbent's policy preference. Section six identifies the equilibrium relationship between the magnitude of the interest group's donation to the incumbent and the incumbent's probability of selecting the group's preferred policy. Section seven places this paper's main results in the context of the theoretical literature on interest group influence of incumbent behavior. Section eight concludes. All proofs are relegated to an appendix.

2 The Model

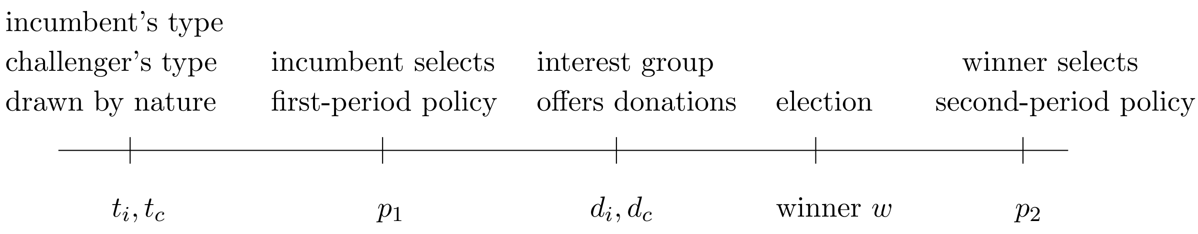
2.1 Timing and Information

In each of two periods, a policy from the set $P = \{x, y\}$ is selected. An existing incumbent i selects the first-period policy p_1. Upon selecting p_1, an election is held between the incumbent and a challenger c. The election winner w selects the second-period policy p_2. Campaign spending influences the election outcome. An interest group g finances the spending of each politician.[12]

Let d_i denote the interest group's donation to the incumbent; let d_c denote the interest group's

[12]The logic of the case with one interest group extends to the case of two interest groups with opposing policy preferences if the interest groups differ in either their respective resource endowments or the intensity of their respective policy commitments. Fox (2004) formalizes this claim.

Figure 1: Time Line of Interaction between Incumbent and Interest Group



donation to the challenger. The interest group's donation pair (d_i, d_c) is an element of the set $D = \mathbb{R}_+^2$. Donations are offered after the first-period policy is selected. The incumbent's probability of re-election is given by the twice-differentiable function $r : D \to (0, 1)$. As the incumbent's policy choice does not directly influence her probability of re-election, the modelled policy is of low salience to the electorate.[13] We assume that r is increasing in d_i and decreasing in d_c.

Each agent in the model is endowed with a type $t \in T = \mathbb{R}$. An agent's type characterizes its preference relation on P. While the interest group's type t_g is common knowledge, the incumbent's type t_i and the challenger's type t_c are private information. However, it is known that the incumbent's type t_i is a draw from the density function f_i, and the challenger's type t_c is a draw from the density function f_c. We assume that $t_g > 0$. The model's timing is summarized in Figure 1.

2.2 Payoffs

A history of the model is a list $(t_i, t_c, p_1, d_i, d_c, w, p_2)$ specifying the incumbent's type, the challenger's type, the first-period policy, the interest group's donation pair, the election winner, and the second-period policy; let H denote the model's set of histories. Generic agent j's payoff function is denoted $U_j : H \to \mathbb{R}$.

All actors in the model value policy. The utility agent j receives from x is t_j, and the utility agent j receives from y is zero:

$$u_j(p; t_j) = \begin{cases} t_j & \text{if } p = x \\ 0 & \text{if } p = y \end{cases} .$$

Consequently, an agent for whom $t > 0$ prefers x to y, an agent for whom $t = 0$ is indifferent between x and y, and an agent for whom $t < 0$ prefers y to x. The absolute value of t may be viewed as a measure of the intensity of an agent's preference for one policy over the other. Note,

[13] It can be verified that this model's logic continues to hold on issues of high salience to the public so long as campaign spending by the incumbent reduces the electoral cost of selecting the interest group's preferred policy.

the interest group prefers x to y, as we have assumed $t_g > 0$.

Each politician, in addition to policy, values holding office. A politician receives a rent $\rho > 0$ in each period that it determines policy. The magnitude of ρ may be viewed as a measure of the incumbent's desire to win re-election. Given the preceding motivation, the incumbent's payoff function U_i is specified as

$$U_i(t_i, t_c, p_1, d_i, d_c, w, p_2) = \begin{cases} (u_i(p_1; t_i) + \rho) + (u_i(p_2; t_i) + \rho) & \text{if } w = i \\ (u_i(p_1; t_i) + \rho) + u_i(p_2; t_i) & \text{if } w = c \end{cases}.$$

Analogously, the challenger's payoff function U_c is specified as

$$U_c(t_i, t_c, p_1, d_i, d_c, w, p_2) = \begin{cases} u_c(p_1; t_c) + u_c(p_2; t_c) & \text{if } w = i \\ u_c(p_1; t_c) + (u_c(p_2; t_c) + \rho) & \text{if } w = c \end{cases}.$$

The interest group, in addition to policy, cares about the size of its outlays. The cost to the interest group of offering donation pair (d_i, d_c) is given by the twice-differentiable function $m : D \to \mathbb{R}_+$. We assume that $m(0, 0) = 0$, m is increasing in both d_i and d_c, m is convex in d_i when $d_c = 0$, and m is convex in d_c when $d_i = 0$. Given the preceding motivation, the interest group's payoff function U_g is specified as

$$U_g(t_i, t_c, p_1, d_i, d_c, w, p_2) = u_g(p_1; t_g) + u_g(p_2; t_g) - m(d_i, d_c).$$

2.2.1 Expected Payoffs Given (t_i, p_1, d_i, d_c)

Each agent's preferences over lotteries on H are given by its expected payoff. Given a first-period policy p_1 and a donation pair (d_i, d_c), for each agent $j \in \{i, g\}$, it will be convenient to work with the expression defining its expected payoff when the incumbent's type t_i is known and uncertainty exists regarding the election outcome and the challenger's type. For a fixed (t_i, p_1, d_i, d_c), we denote this expression by $V_j(t_i, p, d_i, d_c)$.

To define $V_j(t_i, p, d_i, d_c)$, we must specify the incumbent's and the interest group's forecast of the second-period policy when the election winner's type is t. Given the incumbent's and the challenger's respective payoff functions, it is immediate that each, if elected, maximizes its payoff by selecting its preferred policy in the second period. As such, for the remainder of the paper, we assume that the election winner does so: when the election winner's type is t, the incumbent's and the interest group's forecast of the second-period policy is $\hat{p}_2(t)$, where

$$\hat{p}_2(t) = \begin{cases} x & \text{if } t \geq 0 \\ y & \text{otherwise} \end{cases}.$$

Thus,

$$V_j(t_i, p_1, d_i, d_c) = r(d_i, d_c)\left[U_j(t_i, t_c, p_1, d_i, d_c, i, \hat{p}_2(t_i))\right] + \\ (1 - r(d_i, d_c))\left[\int U_j(t_i, t_c, p_1, d_i, d_c, c, \hat{p}_2(t_c)) f_c(t_c) dt_c\right].$$

The first bracketed term is j's payoff conditional on the incumbent winning re-election; the second bracketed term is j's expected payoff conditional on the challenger winning the election. Note, uncertainty regarding the challenger's type enters the second bracketed term only. The weight attached to each bracketed term is determined by the incumbent's probability of re-election.

3 Incumbent Behavior in the Absence of the Interest Group

Since the incumbent selects her preferred policy when re-elected, any influence that the interest group has on incumbent behavior occurs in the first period. In this section, we analyze the incumbent's first-period behavior in the absence of the interest group. Consider a model based upon the preceding theoretical framework where positive donations are prohibited; we call this the *baseline model.* A strategy for the incumbent is a function $\sigma : T \to P$ that specifies a first-period policy for each incumbent-type. An *equilibrium to the baseline model* is an incumbent strategy σ^* where for each $t \in T$, $\sigma^*(t)$ is a solution to

$$\max_{p \in P} V_i(t, p, 0, 0).$$

In words, σ^* is an equilibrium if each incumbent-type's first-period policy maximizes her expected payoff. The following proposition is immediate.

Proposition 1 *σ^* is an equilibrium to the baseline model if and only if*

$$\sigma^*(t) \in \begin{cases} \{x\} & \text{if } t > 0 \\ \{x, y\} & \text{if } t = 0 \\ \{y\} & \text{if } t < 0 \end{cases}.$$

Proposition 1 states that in the interest group's absence, each incumbent-type selects her preferred policy in the first period. This follows because, in this environment, the incumbent's policy choice does not affect her probability of re-election. Consequently, facing no tension between her policy goal and her re-election goal, the incumbent's expected payoff is maximized by selecting her preferred policy in period one.

Given Proposition 1, we shall say that *the interest group influences an incumbent's behavior* if its presence induces the incumbent to select a first-period policy that differs from her preferred policy.

4 Incumbent Behavior when Her Policy Preference Is Known

Most empirical studies of interest group influence hypothesize that ideological matching has no effect on incumbent behavior. Bronars and Lott (1997), in a widely cited study, are explicit on this issue: they claim that if interest groups ideologically match, then the last-term voting behavior of retiring incumbents should not differ from their penultimate-term voting behavior.[14] This section identifies an environment where Bronars and Lott's assertion holds.

Consider a version of the theoretical framework developed in Section 2 where the incumbent's type is known by the interest group (i.e., f_i is concentrated at some $t \in T$). This assumption implies that the interest group knows the incumbent's policy preference. We refer to this model as the *complete information matching model*.[15]

In this environment, a strategy for the incumbent is simply a first-period policy $\sigma \in P$. A strategy for the interest group is a function $(\gamma_i, \gamma_c) : P \to D$. For each first-period policy $p \in P$, $\gamma_i(p)$ is the interest group's donation to the incumbent, and $\gamma_c(p)$ specifies its donation to the challenger. As the interest group has complete information regarding the incumbent's type, our solution concept is subgame perfect equilibrium.

The following two conditions must be met in a subgame perfect equilibrium.[16] First, the incumbent's first-period policy must maximize her expected payoff given the interest group's strategy and her forecast that the election winner will select its preferred policy. Second, for each first-period policy, the interest group's donation pair must maximize its expected payoff given its forecast that the election winner will select its preferred policy. An implication of the latter condition is that the resources of the interest group are employed solely to increase the probability that the election winner shares the group's policy preference: in a subgame perfect equilibrium, the interest group ideologically matches.

We now state this section's main result.

Proposition 2 *There exists a subgame perfect equilibrium* (σ^*, γ^*) *to the complete information matching model where* $\sigma^* = x$ *if* $t_i > 0, \sigma^* = y$ *if* $t_i < 0$*, and* $\gamma^*(x) = \gamma^*(y)$*.*

This result states that a subgame perfect equilibrium exists to the complete information matching model in which the incumbent selects her preferred policy in the first period. As such, when the incumbent's policy preference is known, a subgame perfect equilibrium exists where ideological matching has no influence on incumbent behavior. In the equilibrium identified, the interest group does not condition its donation pair on the first-period policy.

The intuition for this result is the following. Suppose that the interest group does not condition

[14] "...if campaign contributions are made to support those politicians who already value the same positions as their donors, there should be no change in voting patterns after campaign contributions stop during a politician's last term in office" (Bronars and Lott 1997, 319).

[15] Note, this setting allows for the possibility that the interest group has incomplete information about the challenger's policy preference.

[16] See Appendix A for the formal requirements a subgame perfect equilibrium must satisfy.

its donation pair on the incumbent's first-period policy: the donation pair offered when $p_1 = x$ is identical to the donation pair offered when $p_1 = y$. The incumbent's probability of re-election is then constant in her policy choice. Consequently, facing no tradeoff between implementing her preferred policy and maximizing her probability of re-election, the incumbent's best response is to select her preferred policy in period one.

That it is always optimal for the interest group to employ a strategy where its donation pair is not conditioned on the incumbent's first-period policy is a result of the fact that, in this environment, the interest group knows the incumbent's type. As such, the interest group can perfectly forecast the incumbent's second-period policy. Since this forecast is independent of the incumbent's first-period policy, the set of donation pairs that maximize the interest group's expected payoff is independent of the incumbent's first-period policy as well. Hence, an equilibrium exists where the donation pair offered in response to x is identical to the donation pair offered in response to y.

Although the set of donation pairs that maximize the interest group's expected payoff is independent of the incumbent's first-period policy, if this set is not a singleton, one could construct a subgame perfect equilibrium where the donation pair offered when $p_1 = x$ is distinct from the donation pair offered when $p_1 = y$. In such an equilibrium, the interest group's presence may affect the incumbent's tradeoff between implementing her preferred policy and maximizing her probability of re-election. To rule out the possibility that multiple donation pairs maximize the interest group's expected payoff, it is sufficient to assume that r is strictly concave in d_i and strictly convex in d_c.[17] Consequently, when there are diminishing marginal returns to campaign spending, the set of subgame perfect equilibria is a singleton.

Proposition 3 *If r is strictly concave in d_i and strictly convex in d_c, and $t_i \neq 0$, then the complete information matching model has a unique subgame perfect equilibrium.*

This proposition, taken together with Proposition 2, implies that the interest group cannot affect the incumbent's behavior when her policy preference is known and the marginal return to campaign spending is decreasing in both d_i and d_c.

5 Incumbent Behavior when Her Policy Preference Is Unknown

The analysis in the previous section demonstrated that when the incumbent's policy preference is known, an equilibrium exists where ideological matching has no effect on incumbent behavior. This section demonstrates that when the complete information assumption is relaxed, this no longer needs to be the case.

[17]This claim is formally established in Appendix B.

This difference is a consequence of the fact that in this section's model, the incumbent's first-period policy affects the interest group's forecast of her second-period policy. Hence, unlike the complete information case, the incumbent's policy choice affects the interest group's expected payoff from a given donation pair. As such, the interest group's optimal donation pair when $p_1 = x$ may not be optimal when $p_1 = y$; when this is the case, incumbent behavior may be influenced.

Consider a model based upon the theoretical framework in Section 2. Suppose that f_i, the density function from which the incumbent's type is drawn, is continuous and has support T. This assumption implies that the interest group does not know the incumbent's policy preference. We refer to this model as the *incomplete information matching model*.

Here, a strategy for the incumbent is a function $\sigma : T \to P$ that specifies a first-period policy for each incumbent-type. As in the previous sections, a strategy for the interest group is a function $(\gamma_i, \gamma_c) : P \to D$ that specifies a donation pair for each first-period policy. As this model constitutes an extensive-form game of incomplete information, our solution concept is perfect Bayesian equilibrium (PBE). A candidate for a PBE is a strategy for the incumbent, a strategy for the interest group, and a belief system. A belief system for this model is a function $\pi : P \to \Delta(T)$. ($\Delta(T)$ is the set of density functions with domain T.) For each first-period policy $p \in P$, $\pi(p)$ specifies the interest group's belief about which incumbent-types may have selected p; we interpret $\pi(t|p)$ to be the weight the interest group attaches to the incumbent's type being t when the first-period policy is p.

The following three conditions must be met in a PBE.[18] First, each incumbent-type must select a policy that maximizes her expected payoff given the interest group's strategy and her forecast that the election winner will select its preferred policy. Second, for each first-period policy, the donation pair offered maximizes the interest group's expected payoff given its belief about which incumbent-types could have chosen that policy and its forecast that the election winner will select its preferred policy. Third, the interest group's beliefs must be derived from the incumbent's strategy through Bayes' rule when possible. An implication of the latter two conditions is that, in a PBE, the interest group ideologically matches.

To state this section's main result, we say that σ *is a cutpoint strategy with cutpoint* $c \in \mathbb{R}$ if

$$\sigma(t) = \begin{cases} x & \text{if } t > c \\ y & \text{if } t < c \end{cases}.$$

Hence, if the incumbent employs a cutpoint strategy, the set of incumbent-types that select policy p is convex.

Proposition 4 *Suppose that $(\sigma^*, \gamma^*, \pi^*)$ is a PBE to the incomplete information matching model.*

[18] See Appendix A for the formal requirements a PBE must satisfy.

Then σ^* is a cutpoint strategy with cutpoint $c^* \leq 0$, $\gamma_i^*(x) \geq \gamma_i^*(y) = 0$, and $\gamma_c^*(y) \geq \gamma_c^*(x)$.

This proposition states the following. First, in any PBE, the incumbent employs a cutpoint strategy with a non-positive cutpoint: the interest group can only influence the first-period policy of those incumbent-types that prefer policy y. Second, in any PBE, the interest group's donation to the incumbent (challenger) when $p_1 = x$ is greater (less) than or equal to its donation to the incumbent (challenger) when $p_1 = y$.

We now discuss the logic behind Proposition 4. Suppose that by selecting x, an incumbent with type t optimally resolves any first-period tension between implementing her preferred policy and maximizing her probability of re-election. Since the magnitude of an incumbent's type equals the utility it receives when x is selected, any incumbent whose type is greater than t will find it optimal to choose x as well. Consequently, in an equilibrium, the incumbent will employ a cutpoint strategy.

We now argue that the interest group's equilibrium donation to the incumbent (challenger) is maximized when $p_1 = x$ ($p_1 = y$). Begin by noting that the interest group's marginal benefit from a donation to a politician depends on the difference in each politician's probability of pursuing x in period two. As the incumbent employs a cutpoint strategy, consistency of the interest group's belief system implies that the interest group places more weight on the event that the incumbent shares its policy preference when $p_1 = x$ than when $p_1 = y$. Consequently, the interest group's marginal benefit from a donation to the incumbent (challenger) is maximized when $p_1 = x$ ($p_1 = y$). Our claim regarding the interest group's equilibrium behavior thus follows.

All that remains to argue is that the cutpoint of the incumbent's equilibrium strategy is non-positive. Given the interest group's equilibrium strategy, when the incumbent selects x, she maximizes her own donations and minimizes her challenger's donations: selecting x maximizes the incumbent's probability of re-election. As such, incumbent-types that prefer x, facing no first-period tension between maximizing their probability of re-election and implementing their preferred policy, selects x in period one. Consequently, the cutpoint of the incumbent's equilibrium strategy is non-positive.

Proposition 4 does not rule out the case where the cutpoint of the incumbent's equilibrium strategy is zero; in this case, the interest group's presence has no effect on incumbent behavior. The next proposition identifies conditions that ensure that the cutpoint of the incumbent's equilibrium strategy is negative. When this is the case, ideological matching induces some incumbent-types that prefer policy y to choose policy x; in other words, under the identified conditions, the interest group's presence increases the proportion of incumbent-types that select its preferred policy.

Proposition 5 *Suppose that $(\sigma^*, \gamma^*, \pi^*)$ is a PBE to the incomplete information matching model.*

If either

$$\frac{\partial r(0,0)}{\partial d_c}\left[0-\int_0^\infty f_c(t)dt\right]t_g-\frac{\partial m(0,0)}{\partial d_c} \tag{1}$$

or

$$\frac{\partial r(0,0)}{\partial d_i}\left[1-\int_0^\infty f_c(t)dt\right]t_g-\frac{\partial m(0,0)}{\partial d_i} \tag{2}$$

is positive, then the cutpoint of σ^* is negative.

When (1) is positive and the incumbent prefers policy y, the interest group's marginal benefit from a donation to the challenger is greater than its marginal cost at donation pair (0,0). As such, the positivity of (1) guarantees the challenger a positive donation when the interest group believes that the incumbent does not share its policy preference. Analogously, if (2) positive, then the interest group's equilibrium donation to the incumbent is greater than zero when the interest group believes that the incumbent shares its policy preference.

That the positivity of either (1) or (2) rules out the case where the cutpoint of the incumbent's equilibrium strategy is zero results from the following logic. Without loss of generality, consider the case where (1) is positive, and the interest group's belief system is consistent with the incumbent strategy having a cutpoint of zero. Then, the interest group infers that the incumbent prefers x when $p_1 = x$; furthermore, the interest group infers that the incumbent prefers y when $p_1 = y$. In the former case, the interest group does not offer the challenger a positive donation; in the latter case, as (1) is positive, the challenger receives a positive donation from the interest group. As such, donations to the challenger are strictly minimized when $p_1 = x$. As $p_1 = x$ maximizes the magnitude of the interest group's donation to the incumbent, this implies that $p_1 = x$ strictly maximizes the incumbent's probability of re-election. Consequently, incumbent-types that prefer y face a tradeoff between implementing their preferred policy and maximizing their probability of re-election. As some of these incumbent-types optimally resolve this tradeoff by selecting x, a PBE where the incumbent's strategy has a cutpoint of zero cannot exist.

The next proposition establishes that the interest group can influence the incumbent's behavior without ever spending money on the incumbent's behalf.

Proposition 6 *Suppose that $(\sigma^*, \gamma^*, \pi^*)$ is a PBE to the incomplete information matching model. Further, suppose (1) is positive, (2) is non-positive, and r is concave in d_i. Then, the cutpoint of σ^* is negative, and for each $p \in P$, $\gamma_i^*(p) = 0$.*

When (2) non-positive and r is concave in d_i, for any belief of the interest group concerning the likelihood that the incumbent shares its policy preference, the interest group's marginal cost from a donation to the incumbent outweighs its marginal benefit; consequently, in equilibrium, regardless of the incumbent's policy choice, the interest group never aids her campaign. However, since (1) is positive, the cutpoint of the incumbent's equilibrium strategy is negative. These facts imply that, in this environment, those incumbent-types that prefer y but choose x are induced to do so not to maximize their own campaign resources, but to minimize their challenger's resources.[19]

We have thus far sidestepped the issues of equilibrium existence and uniqueness. The next result states that the strict concavity of r in d_i and the strict convexity of r in d_c are sufficient to ensure existence and a type of uniqueness. Suppose $(\sigma^*, \gamma^*, \pi^*)$ and $(\sigma^{**}, \gamma^{**}, \pi^{**})$ are PBE of the incomplete information matching model. These PBE *share the same cutpoint* if the cutpoint of σ^* is equal to the cutpoint of σ^{**}. These PBE *share the same interest group strategy* if for each $p \in P$, $\gamma^*(p) = \gamma^{**}(p)$.

Proposition 7 *Suppose that r is strictly concave in d_i and strictly convex in d_c. Then a PBE exists to the incomplete information matching model, and all PBE share the same cutpoint and interest group strategy.*

We conclude this section with an example that illustrates an environment where the interest group has no effect on incumbent behavior when the incumbent's policy preference is common knowledge, but does so when the incumbent's policy preference is private information.

Example 1 Suppose (1) is positive. Also, suppose that r is strictly concave in d_i and strictly convex in d_c.

Consider the case where f_i is concentrated at $t \neq 0$: the incumbent's policy preference is known by the interest group. Proposition 2 and Proposition 3 apply to this case; hence, ideological matching has no effect on this incumbent-type's behavior.

Now consider the case where the support of f_i is T: the interest group is uncertain of the incumbent's policy preference. Since (1) is positive, by Proposition 5, ideological matching affects the behavior of a fraction of the incumbent-types that prefer policy y. ■

6 Relationship between Donation Magnitude and Interest Group Influence

Many scholars have conjectured that the magnitude of an interest group's donation to an incumbent is positively correlated with the magnitude of the interest group's influence over the incumbent's

[19]This result can be viewed as a formalization of Mayhew's (1974, 41) claim that an "incumbent not only has to assure that his own election funds are adequate, he has to try to minimize the probability that actors will bankroll an expensive campaign against him."

behavior.[20] In this section, we formally analyze the relationship between these two variables in the context of the incomplete information matching model. We find, contrary to conventional wisdom, a non-positive correlation between donation magnitude and interest group influence; hence, a micro-foundation is provided for recent empirical scholarship estimating a non-positive correlation between donations and roll-call votes (Ansolabehere, de Figueiredo, and Snyder 2003; Grenzke 1989; Wawro 2001).

More formally, in this section, we examine how the equilibrium strategies of the incumbent and the interest group change as we vary the sole parameter of the incumbent's payoff function – the rent ρ it receives from holding office. We restrict our attention to an environment where all PBE share the same cutpoint and interest group strategy. Let $c^*(\rho)$ denote the cutpoint shared by all PBE at ρ. The smaller the value of $c^*(\rho)$, the greater the proportion of incumbent-types that select x in the first period. Hence, $c^*(\rho)$ can be viewed as an inverse measure of interest group influence at ρ. Let $\gamma^*(\rho)$ denote the interest group strategy shared by all PBE at ρ. Since the equilibrium donation to the incumbent when $p_1 = y$ is always zero,[21] $\gamma_i^*(x|\rho)$, the equilibrium donation to the incumbent when $p_1 = x$, serves as our measure of the magnitude of the group's donation to the incumbent at ρ.

Proposition 8 *Suppose that r is strictly concave in d_i and strictly convex in d_c. Further, suppose that (1) or (2) is positive. Then $c^*(\rho)$ is decreasing in ρ, and $\gamma_i^*(x|\rho)$ is non-increasing in ρ.*

This proposition states that both the cutpoint of the incumbent's equilibrium strategy and the interest group's equilibrium donation to the incumbent are non-increasing in the rent to holding office. In other words, varying the rent ρ results in a non-positive correlation between the incumbent's equilibrium probability of selecting the interest group's preferred policy (in the first-period) and the magnitude of the interest group's equilibrium donation to the incumbent.

To see the intuition for Proposition 8, observe that as the rent to holding office increases, the incumbent's incentive to gain re-election increases. As such, an increase in the rent ρ results in an increase in the proportion of incumbent-types that resolve any tension between their policy objective and their re-election objective in favor of the latter. Given that, in this environment, an incumbent strictly maximizes her probability of re-election by selecting x, as the rent ρ increases, the equilibrium cutpoint decreases.

[20]This conjecture is based on the suspicion that most donations are offered as part of quid pro quo exchanges between interest groups and incumbents.

[21]Recall that in any PBE of the incomplete information matching model, the incumbent's strategy has a non-positive cutpoint. Hence, when $p_1 = y$, the interest group infers the incumbent prefers y. Consequently, when $p_1 = y$, if the interest group offers a positive donation, the donation is employed to aid the electoral prospects of the challenger.

As the equilibrium cutpoint decreases, of those incumbent-types that select x, the proportion that prefer y increases. Therefore, since the equilibrium cutpoint is decreasing in ρ, the interest group's equilibrium belief that the incumbent shares its policy preference upon observing a first-period policy of x is decreasing in ρ. Hence, as the rent ρ increases, the interest group's marginal benefit from a donation to the incumbent when $p_1 = x$ decreases. Consequently, the magnitude of the interest group's equilibrium donation to the incumbent when $p_1 = x$ is non-increasing in ρ.

7 Discussion

As mentioned in the introduction, recent work exploring the effect of interest group resources on incumbent behavior has considered the case where prior to the incumbent's policy choice, an interest group confronts the incumbent with a policy-contingent contract. For each policy choice of the incumbent, the contract specifies an action by the interest group that affects the incumbent's welfare. For example, Grossman and Helpman (1994) analyze an environment where an interest group's policy-contingent contract maps each feasible incumbent policy choice into a non-negative monetary transfer. An alternative approach is that of Dal Bó and Di Tella (2002b). They analyze an environment where an interest group's policy-contingent contract maps each policy into an incumbent punishment level (e.g., the magnitude of a smear campaign).

A problematic assumption prevalent in this literature, noted earlier, is the assumption that interest groups fulfill their contractual obligations. As it is often the case that incumbents and interest groups interact repeatedly, some have appealed to theory of repeated games to explain why parties to a policy-contingent contract fulfill their commitments (Dal Bó, Dal Bó, and Di Tella 2002b).[22] Maintaining a reputation as a particular type of interest group ("honest" or "nasty") is an alternative explanation as to why interest groups deliver on their promised rewards and/or punishments (Kreps and Wilson 1982; Dal Bó, Dal Bó, and Di Tella 2002a).

The key theoretical contribution of the present paper is that it establishes that interest group influence of incumbent behavior is possible in an environment where policy-contingent contracts are unenforceable. In our setup, the interest group does not employ its resources to affect the incumbent's policy choice. Instead, in an equilibrium of this paper's model, donations are offered to enhance the electoral prospects of the politician most likely to share the group's policy preference.

Remark 1 *When the incumbent's policy preference is not known by the interest group, ideologically motivated donations can affect incumbent behavior.*

For the remainder of this discussion, we maintain that the incumbent's policy preference is

[22] Empirical work by McCarty and Rothenberg (1996) undermines such theoretical underpinnings.

not known by the interest group. As information regarding the incumbent's policy preference is incomplete, in our two-period model, the incumbent's first-period policy affects the interest group's belief regarding their policy agreement; consequently, given that the election outcome is sufficiently responsive to campaign spending,[23] the incumbent's first-period policy affects the magnitude of the interest group's respective donations to the incumbent and the challenger. Since the interest group's donations are conditioned on the incumbent's policy choice, it is as if the interest group presented the incumbent with a policy-contingent contract. However, in our model, the rewards (donations to the incumbent) and punishments (donations to the challenger) are credible, as they are determined endogenously via the interplay between incomplete information and the interest group's desire to elect a candidate that shares its policy preference. Consequently, we establish (Proposition 5) that interest groups can influence incumbent behavior even in a world where policy-contingent contracts cannot be enforced. In the parlance of the political debate surrounding campaign finance regulation, interest groups can taint the decision making of incumbents without resorting to quid pro quos. The type of incumbents affected by the interest group's presence are those that do not share the interest group's policy preference, yet place sufficient weight on re-election vis a vis policy.

Remark 2 *An interest group need not offer the incumbent a donation to affect the incumbent's policy choice.*

This remark is an insight first formalized by Dal Bó and Di Tella (2002b). In their model, the incumbent is induced to select the group's preferred policy, not to receive a reward, but to avoid a punishment, modelled as a utility loss, that the group would inflict otherwise; the interest group commits itself to a positive punishment level prior to the incumbent's policy choice in order to increase the probability the incumbent selects its preferred policy.

In the present model, the interest group hurts the incumbent's welfare when it offers a donation to her challenger. Since the incumbent wishes to be re-elected, the incumbent is, in part, motivated to minimize her challenger's donations. Unlike the interest group in Dal Bó and Di Tella's model, the interest group here does not harm the incumbent's welfare to affect her first-period policy. Instead, the interest group does so because the incumbent's first-period policy affects the interest group's forecast of the incumbent's second-period policy.

Remark 3 *The size of the interest group's donation to the incumbent when she selects the group's preferred policy is a poor indicator of the group's influence.*

In Grossman and Helpman's (1994) setup, for the case of a single interest group, in an equilibrium, a positive donation to the incumbent indicates that the incumbent's behavior was affected. In

[23] Anecdotal evidence abounds of particular interest group ad campaigns and/or canvasing activities that turn a candidate's fortunes around during the last few weeks of a campaign (Fenno 1996).

contrast, in an equilibrium of this paper's model, this is not necessarily the case; a donation to the incumbent merely indicates that the incumbent's behavior was affected with positive probability. Furthermore, in our model, an inverse relationship exists between the magnitude of the interest group's donation to the incumbent and the incumbent's probability of selecting the group's preferred policy (Proposition 8). Consequently, a large donation to the incumbent may be indicative of a case where the likelihood that the interest group's presence affected the incumbent's policy choice is small; a small donation to the incumbent may be indicative of the opposite.

8 Conclusion

Our main result is that when an incumbent's policy preference is not known, an interest group that employs its resources solely to influence election outcomes can induce certain types of incumbents to select policies that differ from those that would be selected in the group's absence. Consequently, interest group resources can affect policymaking even in the absence of quid pro quos between interest groups and incumbents.

Furthermore, in our model, to affect incumbent behavior, the interest group need not offer the incumbent a donation. As long as the intensity of the interest group's support for the incumbent's challenger is conditioned on the incumbent's policies, incumbent behavior can be affected. This result points to the possibility that political behavior may be motivated as much by the desire to dampen the intensity of the challenger's support as it is by the desire to cultivate support.

Finally, we identified a non-positive correlation between the incumbent's equilibrium probability of selecting the interest group's preferred policy and the magnitude of the interest group's equilibrium donation to the incumbent. This result suggests how interest group influence of incumbent behavior can be consistent with a non-positive cross-sectional correlation between donations and roll-call votes.

Fox (2004) establishes that the spirit of this paper's main result extends to the case of two interest groups with opposing policy preferences. Other extensions of this paper's theoretical framework include incorporating multiple incumbents in an infinite-horizon setup and offering a micro-founded model of voter responses to campaign advertising. The former would allow this framework to directly aid empirical scholarship estimating the effect of interest group resources on incumbent behavior. The latter would allow this framework to contribute to the literature analyzing the welfare effects of campaign finance regulation.

A Solution Concepts

Definition 1 *A subgame perfect equilibrium to the complete information matching model is a strategy profile* (σ^*, γ^*) *in which*

a. σ^* *is a solution to*

$$\max_{p \in P} V_i(t_i, p, \gamma_i^*(p), \gamma_c^*(p)); \tag{3}$$

b. for each $p \in P$, $(\gamma_i^*(p), \gamma_c^*(p))$ *is a solution to*

$$\max_{(d_i, d_c) \in D} V_g(t_i, p, d_i, d_c). \tag{4}$$

Definition 2 *A PBE to the incomplete information matching model is a strategy profile* (σ^*, γ^*) *and a belief system* π^* *in which*

a. for each $t \in T$, $\sigma^*(t)$ *is a solution to*

$$\max_{p \in P} V_i(t, p, \gamma_i^*(p), \gamma_c^*(p)); \tag{5}$$

b. for each $p \in P$, $(\gamma_i^*(p), \gamma_c^*(p))$ *is a solution to*

$$\max_{(d_i, d_c) \in D} \int V_g(t, p, d_i, d_c) \pi^*(t|p) dt; \tag{6}$$

c. for each $p \in P$, $\pi^*(p)$ *is derived from* σ^* *through Bayes' rule when possible.*

B The Interest Group's Donation Problem

Define a function $W : D \times P \times \Delta(T) \times \Delta(T) \to \mathbb{R}$, where

$$W(d_i, d_c; p, \pi) = \int V_g(t, p, d_i, d_c) \pi(t|p) dt.$$

Given a first-period policy p and a belief system π, the interest group's *donation problem* is

$$\max_{(d_i, d_c) \in D} W(d_i, d_c; p, \pi). \tag{7}$$

This appendix characterizes the solution to the interest group's donation problem. We establish that a solution to this problem exists; moreover, we show that it is unique when r is strictly concave in d_i and strictly convex in d_c. In addition, we prove that at such a solution, only the politician most likely to pursue x in the second period is ever offered a positive donation. Furthermore, we demonstrate that as the incumbent's probability of pursuing x in the second-period increases, the magnitude of the interest group's optimal donation to the incumbent (challenger) is non-decreasing (non-increasing).

Let

$$\lambda_c \equiv \int_0^\infty f_c(t)dt,$$

and let

$$\lambda_i(p,\pi) \equiv \int_0^\infty \pi(t|p)dt.$$

λ_c is the probability that the challenger's second-period policy is x. Given a belief system π, $\lambda_i(p,\pi)$ is the probability that the incumbent's second-period policy is x given that the first-period policy is p. With this notation, one can establish the useful equivalence

$$W(d_i, d_c; p, \pi) \equiv u_g(p; t_g) + r(d_i, d_c)[\lambda_i(p,\pi) - \lambda_c]t_g + \lambda_c t_g - m(d_i, d_c). \tag{8}$$

Thus, the marginal value to the interest group of a donation to a politician depends on the difference in each politician's probability of pursuing x in the second-period.

We begin to characterize the solution to the interest group's donation problem by formally stating the *Kuhn-Tucker first-order necessary conditions* that such a solution must satisfy.

Lemma 1 *Suppose that (d_i^*, d_c^*) is a solution to (7). Then there exists a vector (μ_i^*, μ_c^*):*

$$\frac{\partial r(d_i^*, d_c^*)}{\partial d_i}[\lambda_i(p,\pi) - \lambda_c]t_g - \frac{\partial m(d_i^*, d_c^*)}{\partial d_i} + \mu_i^* = 0 \tag{9}$$

$$\frac{\partial r(d_i^*, d_c^*)}{\partial d_c}[\lambda_i(p,\pi) - \lambda_c]t_g - \frac{\partial m(d_i^*, d_c^*)}{\partial d_c} + \mu_c^* = 0 \tag{10}$$

$$\mu_i^* \geq 0 \quad d_i^* \mu_i^* = 0 \tag{11}$$

$$\mu_c^* \geq 0 \quad d_c^* \mu_c^* = 0. \tag{12}$$

Proof: As the constraint qualification holds at any $(d_i, d_c) \in D$, by the Kuhn-Tucker Theorem, the result follows. ■

Lemma 2 *The subsequent results relating to the interest group's donation problem hold.*

a. A solution to (7) exists.

b. Let (d_i^*, d_c^*) denote a solution to (7). If $d_i^* > 0$, then $\lambda_i(p,\pi) > \lambda_c$. If $d_c^* > 0$, then $\lambda_i(p,\pi) < \lambda_c$.

c. Fix belief systems π' and π''. Suppose that (d_i^*, d_c^*) is a solution to

$$\max_{(d_i,d_c)\in D} W(d_i, d_c; p', \pi'),$$

and that (d_i^{**}, d_c^{**}) is a solution to

$$\max_{(d_i,d_c)\in D} W(d_i, d_c; p'', \pi'').$$

If $\lambda_i(p', \pi') > \lambda_i(p'', \pi'')$, then $d_i^* \geq d_i^{**}$ and $d_c^{**} \geq d_c^*$.

d. If r is strictly concave in d_i and strictly convex in d_c, then (7) has unique solution.

Proof: Part (a). We need to establish that a solution to the interest group's donation problem exists. Since $m(d_i, 0)$ is increasing and convex in d_i, the equation

$$m(d_i, 0) = 4t_g$$

has a unique solution in d_i, say $\bar{d}_i$. Since $m(0, d_c)$ is increasing and convex in d_c, the equation

$$m(0, d_c) = 4t_g$$

has a unique solution in d_c, say $\bar{d}_c$. Let

$$\overline{D} = \{(d_i, d_c) \in D : d_i \leq \bar{d}_i \text{ and } d_c \leq \bar{d}_c\}. \tag{13}$$

Take any $(d_i', d_c') \notin \overline{D}$. Now, note that

$$W(d_i', d_c'; p, \pi) - W(0, 0; p, \pi) = [\lambda_i(p, \pi) - \lambda_c][r(d_i', d_c') - r(0, 0)]t_g - m(d_i', d_c').$$

Because the λ's and r's are probabilities,

$$[\lambda_i(p, \pi) - \lambda_c][r(d_i', d_c') - r(0, 0]]t_g < t_g.$$

Because m is increasing in both of its arguments and $(d_i', d_c') \notin \overline{D}$,

$$m(d_i', d_c') > 4t_g.$$

From these inequalities, it follows that

$$W(d_i', d_c'; p, \pi) - W(0, 0; p, \pi) < t_g - 4t_g = -3t_g < 0.$$

As such, $(0, 0)$ yields the interest group a greater expected payoff than (d_i', d_c'). Hence, a solution to (7) must be an element of $\overline{D}$.

By the conclusion of the preceding paragraph, a solution to

$$\max_{(d_i,d_c)\in\overline{D}} W(d_i,d_c;p,\pi) \tag{14}$$

is a solution to (7). The Weierstrass Theorem yields a solution to (14) since $\overline{D}$ is compact and $W(d_i,d_c;p,\pi)$ is continuous in d_i and d_c.

Part (b). Suppose that (d_i^*,d_c^*) is a solution to (7), where $d_i^*>0$. We need to show that $\lambda_i(p,\pi)>\lambda_c$. To do so, we invoke the Kuhn-Tucker first-order necessary conditions for a maximum to the interest group's donation problem. When $d_i^*>0$, (9) and (11) imply that

$$\frac{\partial r(d_i^*,d_c^*)}{\partial d_i}[\lambda_i(p,\pi)-\lambda_c]t_g-\frac{\partial m(d_i^*,d_c^*)}{\partial d_i}=0. \tag{15}$$

By assumption, $\partial r(d_i^*,d_c^*)/\partial d_i>0$, $\partial m(d_i^*,d_c^*)/\partial d_i>0$, and $t_g>0$. Consequently, if (15) is to hold, $\lambda_i(p,\pi)>\lambda_c$. A similar argument applied to (14) and (16) shows that $d_c^*>0$ implies $\lambda_i(p,\pi)<\lambda_c$.

Part (c). Suppose that $(d_i^*,d_c^*)\in\arg\max W(d_i,d_c;p',\pi')$ and that $(d_i^{**},d_c^{**})\in\arg\max W(d_i,d_c;p'',\pi'')$. Also, suppose that $\lambda_i(p',\pi')>\lambda_i(p'',\pi'')$. We need to show that the magnitude of the interest group's optimal donation to the incumbent (challenger) is non-decreasing (non-increasing) in the incumbent's probability of selecting the interest group's preferred policy in the second period: $d_i^*\geq d_i^{**}$ ($d_c^{**}\geq d_c^*$). To do so, we consider three cases: (*i*) $\lambda_i(p',\pi')\geq\lambda_c\geq\lambda_i(p'',\pi'')$; (*ii*) $\lambda_i(p',\pi')>\lambda_i(p'',\pi'')>\lambda_c$; and (*iii*) $\lambda_c>\lambda_i(p',\pi')>\lambda_i(p'',\pi'')$. These cases are mutually exclusive and exhaustive.

We begin with case (*i*). Since $(d_i^*,d_c^*)\in\arg\max W(d_i,d_c;p',\pi')$, by part (*b*) of this lemma, $\lambda_i(p',\pi')\geq\lambda_c$ implies that $d_c^*=0$. Since $(d_i^{**},d_c^{**})\in\arg\max W(d_i,d_c;p'',\pi'')$, by part (*b*) of this lemma, $\lambda_c\geq\lambda_i(p'',\pi'')$ implies that $d_i^{**}=0$. Consequently, $d_i^*\geq d_i^{**}$ and $d_c^{**}\geq d_c^*$.

Consider case (*ii*). Since $(d_i^*,d_c^*)\in\arg\max W(d_i,d_c;p',\pi')$, by part (*b*) of this lemma, $\lambda_i(p',\pi')>\lambda_c$ implies that $d_c^*=0$. Since $(d_i^{**},d_c^{**})\in\arg\max W(d_i,d_c;p'',\pi'')$, by part (*b*) of this lemma, $\lambda_i(p'',\pi'')>\lambda_c$ implies that $d_c^{**}=0$. Hence, $(d_i^*,0)\in\arg\max W(d_i,d_c;p',\pi')$ and $(d_i^{**},0)\in\arg\max W(d_i,d_c;p'',\pi'')$.

As $(d_i^{**},0)\in\arg\max W(d_i,d_c;p'',\pi'')$,

$$W(d_i^{**},0;p'',\pi'')-W(d_i^*,0;p'',\pi'')=[r(d_i^{**},0)-r(d_i^*,0)][\lambda_i(p'',\pi'')-\lambda_c]t_g-m(d_i^{**},0)+m(d_i^*,0)$$

is non-negative. Suppose, by way of contradiction, that $d_i^{**}>d_i^*$. Since r is increasing in d_i, $r(d_i^{**},0)>r(d_i^*,0)$. As such, given that $W(d_i^{**},0;p'',\pi'')\geq W(d_i^*,0;p'',\pi'')$ and $\lambda_i(p',\pi')>\lambda_i(p'',\pi'')$,

$$W(d_i^{**},0;p',\pi')-W(d_i^*,0;p',\pi')=[r(d_i^{**},0)-r(d_i^*,0)][\lambda_i(p',\pi')-\lambda_c]t_g-m(d_i^{**},0)+m(d_i^*,0)$$

is positive. This implies that $(d_i^*, 0) \notin \arg\max W(d_i, d_c; p', \pi')$, a contradiction. Thus, $d_i^* \geq d_i^{**}$ and $d_c^{**} \geq d_c^*$. By a similar argument, an identical conclusion is reached in case (iii).

Part (d). Suppose r is strictly concave in d_i and strictly convex in d_c. We need to show that the solution to (7) is unique. There are three cases to consider: (i) $\lambda_i(p,\pi) = \lambda_c$, (ii) $\lambda_i(p,\pi) > \lambda_c$, and (iii) $\lambda_c > \lambda_i(p,\pi)$. These cases are mutually exclusive and exhaustive.

Consider case (i). Since $\lambda_i(p,\pi) = \lambda_c$, by part (b) of this lemma, if (d_i^*, d_c^*) is a solution to (7), then $d_i^* = 0$ and $d_c^* = 0$.

Consider case (ii). Since $\lambda_i(p,\pi) > \lambda_c$, by part (b) of this lemma, if (d_i^*, d_c^*) is a solution to (7), then $d_c^* = 0$. We now identify the interest group's optimal donation to the incumbent. Since $\lambda_i(p,\pi) > \lambda_c$, r is strictly concave in d_i, and m is convex in d_i when $d_c = 0$, the second derivative of W with respect to d_i at $(d_i, 0)$,

$$\frac{\partial^2 W(d_i, 0; p, \pi)}{\partial d_i^2} = \frac{\partial^2 r(d_i, 0)}{\partial d_i^2}[\lambda_i(p,\pi) - \lambda_c]t_g - \frac{\partial^2 m(d_i, 0)}{\partial d_i^2},$$

is negative: the interest group's expected payoff is strictly concave in its donation to the incumbent when its donation to the challenger equals zero.

Suppose that $\partial W(0, 0; p, \pi)/\partial d_i \leq 0$. Then, as W is strictly concave in d_i when $d_c = 0$, for all $d_i > 0$, $\partial W(d_i, 0; p, \pi)/\partial d_i < 0$. Consequently, if (d_i^*, d_c^*) is a solution to (7), as $d_c^* = 0$, first-order conditions (9) and (11) imply that $d_i^* = 0$. Now suppose that $\partial W(0, 0; p, \pi)/\partial d_i > 0$. Since W is strictly concave in d_i when $d_c = 0$, the solution to

$$\frac{\partial W(d_i, 0; p, \pi)}{\partial d_i} = 0$$

in d_i is unique. Label the solution d_i'. Consequently, if (d_i^*, d_c^*) is a solution to (7), as $d_c^* = 0$, first-order conditions (9) and (11) imply that $d_i^* = d_i'$. A similar argument establishes uniqueness for case (iii). ■

C The Incumbent's First-Period Policy Problem

Let $d^p = (d_i^p, d_c^p)$ denote the donation pair offered when the first-period policy is p. Given (d^x, d^y), the incumbent's *first-period policy problem* is

$$\max_{p \in P} V_i(t_i, p, d_i^p, d_c^p). \tag{16}$$

In this appendix, we establish that for any (d^x, d^y), the set of incumbent-types that find it optimal to choose policy p in the first period is convex.

We begin by writing out $V_i(t_i, p_1, d_i, d_c)$, the incumbent's expected payoff, in terms of the model's parameters:

$$V_i(t_i, p_1, d_i, d_c) = \begin{cases} t_i + \rho + r(d_i, d_c)[t_i + \rho] + [1 - r(d_i, d_c)]\lambda_c t_i & \text{if } p_1 = x \text{ and } t_i \geq 0 \\ \rho + r(d_i, d_c)[t_i + \rho] + [1 - r(d_i, d_c)]\lambda_c t_i & \text{if } p_1 = y \text{ and } t_i \geq 0 \\ t_i + \rho + r(d_i, d_c)\rho + [1 - r(d_i, d_c)]\lambda_c t_i & \text{if } p_1 = x \text{ and } t_i < 0 \\ \rho + r(d_i, d_c)\rho + [1 - r(d_i, d_c)]\lambda_c t_i & \text{if } p_1 = y \text{ and } t_i < 0 \end{cases} . \tag{17}$$

Define

$$T^x(d^x, d^y) \equiv \{t_i \in T : V_i(t_i, x, d_i^x, d_c^x) \geq V_i(t_i, y, d_i^y, d_c^y)\},$$

and define

$$T^y(d^x, d^y) \equiv \{t_i \in T : V_i(t_i, y, d_i^y, d_c^y) \geq V_i(t_i, x, d_i^x, d_c^x)\}.$$

Given (d^x, d^y), $T^p(d^x, d^y)$ is the set of incumbent-types for whom p is a solution to (16). The following lemma characterizes the set $T^p(d^x, d^y)$. The result is obtained through the algebraic manipulation of (17).

Lemma 3 *Let*

$$\tilde{c}(d^x, d^y) \equiv \begin{cases} \frac{\rho[r(d^y) - r(d^x)]}{1 + [r(d^y) - r(d^x)]\lambda_c} & \text{if } r(d^x) > r(d^y) \\ 0 & \text{if } r(d^x) = r(d^y) \\ \frac{\rho[r(d^y) - r(d^x)]}{1 + [r(d^x) - r(d^y)](1 - \lambda_c)} & \text{if } r(d^x) < r(d^y) \end{cases} . \tag{18}$$

$T^x(d^x, d^y) = [\tilde{c}(d^x, d^y), +\infty)$ *and* $T^y(d^x, d^y) = (-\infty, \tilde{c}(d^x, d^y)]$.

Inspection of this lemma reveals that an incumbent's less preferred policy is a solution to her first-period policy problem only if the probability of re-election that result from the less preferred policy is greater than the probability of re-election that results from her preferred policy.

D Equilibrium Cutpoints, Equilibrium Beliefs, and Equilibrium Donation Pairs

Lemma 4 *If* $(\sigma^*, \gamma^*, \pi^*)$ *is a PBE of the incomplete information matching model, then*

a. σ^* *is a cutpoint strategy with cutpoint* $\tilde{c}(\gamma^*(x), \gamma^*(y))$*;*

b.

$$\pi^*(t|x) = \begin{cases} \frac{f_i(t)}{\int_{\tilde{c}(\gamma^*(x), \gamma^*(y))}^{\infty} f_i(t)dt} & \text{if } t \geq \tilde{c}(\gamma^*(x), \gamma^*(y)) \\ 0 & \text{otherwise} \end{cases} , \tag{19}$$

and

$$\pi^*(t|y) = \begin{cases} 0 & \text{if } t \geq \tilde{c}(\gamma^*(x), \gamma^*(y)) \\ \frac{f_i(t)}{\int_{-\infty}^{\tilde{c}(\gamma^*(x), \gamma^*(y))} f_i(t)dt} & \text{otherwise} \end{cases} . \tag{20}$$

Proof: Suppose $(\sigma^*, \gamma^*, \pi^*)$ is a PBE. Part (a) is an immediate consequence of Lemma 3. Part (b) is an immediate consequence of part (a) of this lemma. ■

The next lemma identifies how the equilibrium donation pairs of the interest group change in response to an increase in the equilibrium cutpoint of the incumbent's strategy. It states that the magnitude of the interest group's equilibrium donation to the incumbent (challenger) when $p_1 = x$ is non-decreasing (non-increasing) in the cutpoint of the incumbent's equilibrium strategy; further, when $p_1 = y$, equilibrium donations are constant in the cutpoint of the incumbent's equilibrium strategy. Recall that the rent ρ the incumbent receives from holding office is a parameter of the model.

Lemma 5 *Assume r is strictly concave in d_i and strictly convex in d_c. Suppose $(\sigma^*, \gamma^*, \pi^*)$ is a PBE at ρ' and suppose $(\sigma^{**}, \gamma^{**}, \pi^{**})$ is a PBE at ρ''. If the cutpoint c^* of σ^* is less than or equal to the cutpoint c^{**} of σ^{**}, then $\gamma^*(y) = \gamma^{**}(y)$, $\gamma_i^{**}(x) \geq \gamma_i^*(x)$, and $\gamma_c^*(x) \geq \gamma_c^{**}(x)$, where the inequalities hold with equality if $c^* = c^{**}$.*

Proof: Assume r is strictly concave in d_i and strictly convex in d_c. Suppose $(\sigma^*, \gamma^*, \pi^*)$ is a PBE at ρ' and suppose $(\sigma^{**}, \gamma^{**}, \pi^{**})$ is a PBE at ρ''. Finally, posit that the cutpoint c^* of σ^* is less than or equal to the cutpoint c^{**} of σ^{**}.

By part (b) of Lemma 4, equilibrium beliefs are given by (19) and (20). As such, since $c^* \leq c^{**} \leq 0$, where the last inequality is a consequence of Proposition 4, we have that $\lambda_i(y, \pi^*) = \lambda_i(y, \pi^{**}) = 0$; furthermore, $\lambda_i(x, \pi^*) < \lambda_i(x, \pi^{**})$ when $c^* < c^{**}$, and $\lambda_i(x, \pi^*) = \lambda_i(x, \pi^{**})$ when $c^* = c^{**}$.

As r is strictly concave in d_i and strictly convex in d_c, by part (d) of Lemma 2, a unique solution exists to an interest group's donation problem. Thus, $\gamma^*(p)$ is the unique solution to

$$\max_{(d_i, d_c) \in D} W(d_i, d_c; p, \pi^*),$$

and $\gamma^{**}(p)$ is the unique solution to

$$\max_{(d_i, d_c) \in D} W(d_i, d_c; p, \pi^{**}).$$

Since $\lambda_i(y, \pi^*) = \lambda_i(y, \pi^{**})$, exploiting identity (8), we have that $W(d_i, d_c; y, \pi^*) = W(d_i, d_c; y, \pi^{**})$. Consequently, $\gamma^*(y) = \gamma^{**}(y)$. When $c^* = c^{**}$, $\lambda_i(x, \pi^*) = \lambda_i(x, \pi^{**})$; as a result, $W(d_i, d_c; x, \pi^*) = W(d_i, d_c; x, \pi^{**})$. Consequently, in this case, $\gamma^*(x) = \gamma^{**}(x)$. When $c^* < c^{**}$, $\lambda_i(x, \pi^*) < \lambda_i(x, \pi^{**})$; as such, we can apply part (c) of Lemma 2. Consequently, in this case, $\gamma_i^{**}(x) \geq \gamma_i^*(x)$ and $\gamma_c^*(x) \geq \gamma_c^{**}(x)$. ■

E Proof of Propositions 2 through 8

Proof of Proposition 2. Without loss of generality, suppose that the incumbent's type $t_i < 0$. We need to show the existence of a strategy profile (σ, γ), where $\sigma = y$ and $\gamma(x) = \gamma(y)$, that is subgame perfect. By part (a) of Lemma 2,[24] for each $p \in P$, a solution to (4) exists. Let (d_i^*, d_c^*) denote a solution to (4) when the first-period policy is x. We claim that the strategy profile (σ^*, γ^*), where $\sigma^* = y$ and $\gamma^*(p) = (d_i^*, d_c^*)$ for each $p \in P$, is a subgame perfect equilibrium to the complete information matching model.

We first check that (d_i^*, d_c^*) is a solution to (4) when $p_1 = y$. Since the interest group knows that $t_i < 0$, the interest group anticipates that regardless of the incumbent's first-period policy choice, the incumbent will select y if re-elected. Therefore,

$$V_g(t_i, p, d_i, d_c) \equiv u(p; t_g) + r(d_i, d_c)(0 - \lambda_c)t_g + \lambda_c t_g - m(d_i, d_c).$$

As (d_i^*, d_c^*) is a solution to (4) when $p_1 = x$,

$$\begin{aligned} V_g(t_i, x, d_i^*, d_c^*) = u(x; t_g) + r(d_i^*, d_c^*)(0 - \lambda_c)t_g + \lambda_c t_g - m(d_i^*, d_c^*) \geq \\ V_g(t_i, x, d_i, d_c) = u(x; t_g) + r(d_i, d_c)(0 - \lambda_c)t_g + \lambda_c t_g - m(d_i, d_c) \end{aligned}$$

for all $(d_i, d_c) \in D$. Therefore,

$$r(d_i^*, d_c^*)(0 - \lambda_c)t_g + \lambda_c t_g - m(d_i^*, d_c^*) \geq r(d_i, d_c)(0 - \lambda_c)t_g + \lambda_c t_g - m(d_i, d_c) \tag{21}$$

for all $(d_i, d_c) \in D$. The left-hand side of (21) equals $V_g(t_i, y, d_i^*, d_c^*)$, and the right-hand side of (21) equals $V_g(t_i, y, d_i, d_c)$; therefore, (d_i^*, d_c^*) is a solution to (4) when $p_1 = y$.

All that remains to check is that y is a solution to (3). Since $\gamma^*(x) = \gamma^*(y)$, by Lemma 3, the set of incumbent-types for whom y solves (3) is $(-\infty, 0]$. Consequently, since $t_i < 0$, y is a solution to (3). ■

Proof of Proposition 3. Suppose r is strictly concave in d_i and strictly convex in d_c. Without loss of generality, suppose that the incumbent's type $t_i < 0$. We need to show that the set of subgame perfect equilibria is a singleton. Given that r satisfies the stated convexity conditions, by part (d) of Lemma 2, for each $p \in P$, the solution to (4) is unique. Let (d_i^*, d_c^*) denote the unique solution to (4) when $p_1 = x$. We established in the proof of Proposition 2 that a solution to (4) when $p_1 = x$ is a solution to (4) when $p_1 = y$. Consequently, (d_i^*, d_c^*) is the unique solution to (4) when $p_1 = y$ as well.

[24] For each $p \in P$, suppose: $\pi(t_i|p) = 1$ and $\pi(t_i'|p) = 0$ for all $t_i' \neq t_i$. We then have that $V(t_i, p, d_i, d_c) = W(d_i, d_c; p, \pi)$. As such, we can apply Lemma 2 to make statements about the solution to (4).

Existence of a subgame perfect equilibrium was established in Proposition 2. Thus, to establish uniqueness, it is sufficient to show that if (σ, γ) is a subgame perfect equilibrium, then $\sigma = y$ and $\gamma(x) = \gamma(y) = (d_i^*, d_c^*)$. Suppose (σ^*, γ^*) is a subgame perfect equilibrium. As (σ^*, γ^*) is subgame perfect, for each $p \in P$, $\gamma^*(p)$ is a solution to (4). As such, we have that $\gamma^*(x) = \gamma^*(y) = (d_i^*, d_c^*)$. Since $\gamma^*(x) = \gamma^*(y)$, by Lemma 3, the set of incumbent-types for whom y is a the unique solution to (3) is $(-\infty, 0)$. As (σ^*, γ^*) is a subgame perfect, σ^* is a solution to (3). Consequently, since $t_i < 0$, $\sigma^* = y$. ■

Proof of Proposition 4. Suppose $(\sigma^*, \gamma^*, \pi^*)$ is a PBE of the incomplete information matching model. We need to establish that σ^* is a cutpoint strategy with cutpoint $c^* \leq 0$, $\gamma_i^*(x) \geq \gamma_i^*(y) = 0$, and $\gamma_c^*(y) \geq \gamma_c^*(x)$.

Part (a) of Lemma 4 established that σ^* is a cutpoint strategy with cutpoint $c^* = \tilde{c}(\gamma^*(x), \gamma^*(y))$. By part (b) of Lemma 4, $\pi^*(x)$ is given by (19) and $\pi^*(y)$ is given by (20). Thus, $\lambda_i(x, \pi^*) > \lambda_i(y, \pi^*)$. Consequently, by part (3) of Lemma 2, $\gamma_i^*(x) \geq \gamma_i^*(y)$ and $\gamma_c^*(y) \geq \gamma_c^*(x)$.

To see that $c^* \leq 0$, suppose, by way of contradiction, that $c^* > 0$. Then, by (18),

$$r(\gamma^*(y)) > r(\gamma^*(x)). \tag{22}$$

However, since $\gamma_i^*(x) \geq \gamma_i^*(y)$, $\gamma_c^*(y) \geq \gamma_c^*(x)$, and r is increasing in d_i and decreasing in d_c, $r(\gamma^*(x)) \geq r(\gamma^*(y))$, a contradiction with (22). Therefore, $c^* \leq 0$.

All that remains to show is that $\gamma_i^*(y) = 0$. Since $c^* \leq 0$, $\lambda_i(y, \pi^*) = 0$. As $\lambda_c \geq \lambda_i(y, \pi^*)$, by part (b) of Lemma 2, $\gamma_i^*(y) = 0$.

Proof of Proposition 5. Assume that either (1) or (2) is positive. Further, suppose $(\sigma^*, \gamma^*, \pi^*)$ is a PBE of the incomplete information matching model where c^* is the cutpoint of σ^*. We need to show that $c^* < 0$. By Proposition 4, $c^* \leq 0$. Hence, it is sufficient to show that $c^* \neq 0$.

Suppose, by way of contradiction, that $c^* = 0$. Applying arguments similar to those in the proof of Proposition 4, $c^* = 0$ implies that $\lambda_i(x, \pi^*) = 1$, $\lambda_i(y, \pi^*) = 0$, and

$$r(\gamma^*(y)) = r(\gamma^*(x)). \tag{23}$$

Since $\lambda_i(x, \pi^*) = 1 \geq \lambda_c$, by part (b) of Lemma 2, $\gamma_c^*(x) = 0$. Given that $\lambda_i(x, \pi^*) = 1$ and $\gamma_c^*(x) = 0$, when (2) is positive, first-order conditions (9) and (11) imply that $\gamma_i^*(x) > 0$. Since $\lambda_c \geq \lambda_i(y, \pi^*) = 0$, by part (b) of Lemma 2, $\gamma_i^*(y) = 0$. Given that $\lambda_i(y, \pi^*) = 0$ and $\gamma_i^*(y) = 0$, when (1) is positive, first-order conditions (10) and (12) imply that $\gamma_c^*(y) > 0$.

Combining the results of the preceding paragraph yields the following. When (1) is positive, $\gamma_i^*(x) \geq \gamma_i^*(y)$ and $\gamma_c^*(y) > \gamma_c^*(x)$. Analogously, when (2) is positive, $\gamma_i^*(x) > \gamma_i^*(y)$ and

$\gamma_c^*(y) \geq \gamma_c^*(x)$. In either case, as r is increasing in d_i and decreasing in d_c, $r(\gamma^*(x)) > r(\gamma^*(y))$, a contradiction with (23). Therefore, $c^* < 0$. ■

Proof of Proposition 6. Suppose that $(\sigma^*, \gamma^*, \pi^*)$ is a PBE to the incomplete information matching model. Further, suppose (1) is positive, (2) is non-positive, and r is concave in d_i.

As (1) is positive, by Proposition 5, the cutpoint of the incumbent's strategy is negative. All that remains to be shown is that for each $p \in P$, $\gamma_i^*(p) = 0$. Suppose that (d_i^p, d_c^p), where $d_i^p > 0$, is a solution to (6) when $p_1 = p$. By part (b) of Lemma 2, $d_i^p > 0$ implies that $\lambda_i(p, \pi^*) > \lambda_c$, which, by part ($b$) of Lemma 2, implies that $d_c^p = 0$. If $d_i^p > 0$ and $d_c^p = 0$, then first-order conditions (9) and (11) imply that

$$\frac{\partial r(d_i^p, 0)}{\partial d_i}[\lambda_i(p, \pi^*) - \lambda_c]t_g - \frac{\partial m(d_i^p, 0)}{\partial d_i} = 0.$$

However, since (2) is non-positive, $\lambda_i(p, \pi^*) < 1$ (since $c^* < 0$), r is concave in d_i, and m is convex in d_i when $d_c = 0$, this equality cannot hold for $d_i^p > 0$. Consequently, $d_i^p > 0$ cannot be part of a solution to (6) when $p_1 = p$; thus, $d_i^p = 0$. Hence, $\gamma_i^*(p) = 0$ for each $p \in P$. ■

Proof of Proposition 7. Suppose that r is strictly concave in d_i and strictly convex in d_c.

Existence. We establish that a PBE exists. To do so, we construct a map and establish that this map has a fixed point. Finally, we construct a PBE from a fixed point of the constructed map.

Define a function $(\tilde{\lambda}_i^x, \tilde{\lambda}_i^y) : \mathbb{R} \to \mathbb{R}^2$, where

$$\tilde{\lambda}_i^x(c) \equiv \begin{cases} 1 & \text{if } c \geq 0 \\ \frac{\int_0^\infty f_i(t)dt}{\int_c^\infty f_i(t)dt} & \text{otherwise} \end{cases},$$

and

$$\tilde{\lambda}_i^y(c) \equiv \begin{cases} \frac{\int_0^c f_i(t)dt}{\int_{-\infty}^c f_i(t)dt} & \text{if } c \geq 0 \\ 0 & \text{otherwise} \end{cases}.$$

Due to the continuity of f_i, both $\tilde{\lambda}_i^x$ and $\tilde{\lambda}_i^y$ are continuous in c.

Next, define a pair of functions $\widetilde{W}^p : D \times \mathbb{R} \to \mathbb{R}$ and $\tilde{d}^p : \mathbb{R} \to \mathrm{D}$, where

$$\widetilde{W}^p(d_i, d_c; c) = u_g(p; t_g) + r(d_i, d_c)[\tilde{\lambda}_i^p(c) - \lambda_c]t_g + \lambda_c t_g - m(d_i, d_c),$$

and

$$\tilde{d}^p(c) = \arg\max\{\widetilde{W}^p(d_i, d_c; c) : (d_i, d_c) \in \overline{D}\}.$$

$\overline{D}$ is the compact set defined in (13). As $\widetilde{W}$ is continuous in its arguments, and its domain is compact, the Weierstrass Theorem ensures that $\tilde{d}^p(c)$ is well defined. Now note that for any $c \in \mathbb{R}$ and $p \in P$, there exists a belief system π such that $\lambda_i(\pi, p) = \tilde{\lambda}_i^p(c)$. When $\lambda_i(\pi, p) = \tilde{\lambda}_i^p(c)$,

$\widetilde{W}^p(d_i, d_c; c) = W(d_i, d_c; p, \pi)$. Consequently, since r is strictly concave in d_i and strictly convex in d_c, by part (d) of Lemma 2, $\tilde{d}^p(c)$ is a singleton.

Finally, let the function

$$z : \left[\frac{-\rho}{1-\lambda_c}, \frac{\rho}{\lambda_c}\right] \times \overline{D} \times \overline{D} \to \left[\frac{-\rho}{1-\lambda_c}, \frac{\rho}{\lambda_c}\right] \times \overline{D} \times \overline{D}.$$

be defined by

$$z(c, d^x, d^y) = (\tilde{c}(d^x, d^y), \tilde{d}^x(c), \tilde{d}^y(c)).$$

(It is easily verified that for all $(d^x, d^y) \in D \times D$, $\tilde{c}(d^x, d^y) \in [-\rho/(1-\lambda_c), \rho/\lambda_c]$.) We claim that z has a fixed point. By the continuity of r, $\tilde{c}$ is continuous in (d^x, d^y). By the continuity of $\widetilde{W}^p$ in its arguments and the compactness of $\overline{D}$, applying the Theorem of Maximum, we have that $\tilde{d}^p$ is continuous in c. Since z inherits the continuity properties of its component functions, and its domain is compact and convex, Brouwer's theorem yields a fixed point, say (c^*, d^{x*}, d^{y*}).

It is easily verified that the triple $(\sigma^*, \gamma^*, \pi^*)$, where the cutpoint of σ^* is c^*, $(\gamma^*(x), \gamma^*(y)) = (d^{x*}, d^{y*})$, and π^* is derived from σ^* though Bayes' rule, is a PBE. This follows because $\tilde{c}$ defines the best-response condition for the incumbent, and $(\tilde{d}^x, \tilde{d}^y)$ defines the best-response condition for the interest group; in other words, a fixed point of z is a mutual best response.

Uniqueness. Let $(\sigma^*, \gamma^*, \pi^*)$ and $(\sigma^{**}, \gamma^{**}, \pi^{**})$ denote PBE of the model. We need to show that the cutpoint of σ^* equals the cutpoint of σ^{**} and that $\gamma^* = \gamma^{**}$. We begin by establishing the former. By part (a) of Lemma 4, the cutpoint of σ^* is $\tilde{c}(\gamma^*)$, and the cutpoint of σ^{**} is $\tilde{c}(\gamma^{**})$. By way of contradiction, suppose that $\tilde{c}(\gamma^*) \neq \tilde{c}(\gamma^{**})$. Without loss of generality, suppose $\tilde{c}(\gamma^*) < \tilde{c}(\gamma^{**})$. By (18), this implies that

$$r(\gamma^*(x)) - r(\gamma^*(y)) > r(\gamma^{**}(x)) - r(\gamma^{**}(y)). \tag{24}$$

Given that r is strictly concave in d_i and strictly convex in d_c, by Lemma 5, $\tilde{c}(\gamma^*) < \tilde{c}(\gamma^{**})$ implies that $\gamma^*(y) = \gamma^{**}(y)$, $\gamma_i^{**}(x) \geq \gamma_i^*(x)$, and $\gamma_c^*(x) \geq \gamma_c^{**}(x)$. As such, since r is increasing in d_i and decreasing in d_c,

$$r(\gamma^*(y)) = r(\gamma^{**}(y))$$

and

$$r(\gamma^*(x)) \leq r(\gamma^{**}(x)).$$

These two relations contradict (24). Consequently, $\tilde{c}(\gamma^*) = \tilde{c}(\gamma^{**})$. Thus, from Lemma (5), we conclude that $\gamma^* = \gamma^{**}$. ■

Proof of Proposition 8. Assume that r is strictly concave in d_i and strictly convex in d_c. Further, assume that (1) or (2) is positive. Suppose $(\sigma^*, \gamma^*, \pi^*)$ is a PBE at ρ' and $(\sigma^{**}, \gamma^{**}, \pi^{**})$ is a PBE at ρ'', where $\rho'' > \rho'$.

We first show that $c^*(\rho)$ is decreasing in ρ. By part (a) of Lemma 4, the cutpoint of σ^* is $\tilde{c}(\gamma^*)$, and the cutpoint of σ^{**} is $\tilde{c}(\gamma^{**})$. Since $\rho'' > \rho'$, we need to show that $\tilde{c}(\gamma^*) > \tilde{c}(\gamma^{**})$. Suppose, by way of contradiction, that $\tilde{c}(\gamma^*) \leq \tilde{c}(\gamma^{**})$. Since (1) or (2) is positive, by Proposition 5, both $\tilde{c}(\gamma^*)$ and $\tilde{c}(\gamma^{**})$ are negative. As such,

$$\tilde{c}(\gamma^*) = \frac{\rho^{'}[r(\gamma^*(y)) - r(\gamma^*(x))]}{1 + [r(\gamma^*(y)) - r(\gamma^*(x))]\lambda_c} \leq \frac{\rho^{''}[r(\gamma^{**}(y)) - r(\gamma^{**}(x))]}{1 + [r(\gamma^{**}(y)) - r(\gamma^{**}(x))]\lambda_c} = \tilde{c}(\gamma^{**}),$$

where $[r(\gamma^*(y)) - r(\gamma^*(x))] \in (-1, 0)$ and $[r(\gamma^{**}(y)) - r(\gamma^{**}(x))] \in (-1, 0)$. Re-arranging this inequality yields

$$\frac{\rho^{'}}{\rho^{''}} \geq \frac{[r(\gamma^{**}(y)) - r(\gamma^{**}(x))]}{[r(\gamma^*(y)) - r(\gamma^*(x))]} \frac{1 + [r(\gamma^*(y)) - r(\gamma^*(x))]\lambda_c}{1 + [r(\gamma^{**}(y)) - r(\gamma^{**}(x))]\lambda_c}.$$

Since $\rho^{''} > \rho^{'}$,

$$1 > \frac{[r(\gamma^{**}(y)) - r(\gamma^{**}(x))]}{[r(\gamma^*(y)) - r(\gamma^*(x))]} \frac{1 + [r(\gamma^*(y)) - r(\gamma^*(x))]\lambda_c}{1 + [r(\gamma^{**}(y)) - r(\gamma^{**}(x))]\lambda_c}.$$

Algebraic manipulation of the preceding expression yields

$$r(\gamma^*(y)) - r(\gamma^*(x)) < r(\gamma^{**}(y)) - r(\gamma^{**}(x)). \tag{25}$$

Since r is strictly concave in d_i and strictly convex in d_c, by Lemma 5, $\tilde{c}(\gamma^*) \leq \tilde{c}(\gamma^{**})$ implies that $\gamma^*(y) = \gamma^{**}(y)$, $\gamma_i^{**}(x) \geq \gamma_i^*(x)$, and $\gamma_c^*(x) \geq \gamma_c^{**}(x)$. As r is increasing in d_i and decreasing in d_c,

$$r(\gamma^*(y)) = r(\gamma^{**}(y))$$

and

$$r(\gamma^*(x)) \leq r(\gamma^{**}(x)).$$

These two relations contradict (25). Consequently, $\tilde{c}(\gamma^*) > \tilde{c}(\gamma^{**})$.

We now establish that $\gamma_i^*(x|\rho)$ is non-increasing in ρ. Since $\rho'' > \rho'$, we need to show that $\gamma_i^*(x) \geq \gamma_i^{**}(x)$. As r is strictly concave in d_i and strictly convex in d_c, and $\tilde{c}(\gamma^*) > \tilde{c}(\gamma^{**})$, by Lemma 5, $\gamma_i^*(x) \geq \gamma_i^{**}(x)$. ■

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